JNP GROUP

CONSULTING ENGINEERS

Phase II Geo-environmental Report

Project: The Bungalow,
New Years Green Lane,
Harefield.

Client: London Borough of Hillingdon Council

Reference: M44477-JNP-XX-XX-RP-G-1002 P03

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FOR AND ON BEHALF OF JNP GROUP

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EXECUTIVE SUMMARY

Site location	The Bungalow Site, New Years Green Lane, Harefield, UB9 6LX	
Development scheme	The existing buildings are to be refurbished or demolished, and the site redeveloped with a one storey staff facility building, with access roads and areas of hardstanding for parking; areas of soft landscaping to be retained and improved.	
NGR	506235, 188178	
Current use	On-site: Derelict residential property, stables and barn with small areas of hardstanding. The majority of the site is covered in soft-standing.	Off-site: The surrounding area is primarily open fields with recycling centres to the south-east and west.
Geology (from GI)	Made ground – variable thickness found in all exploratory holes with a maximum thickness of 4.60 m. Lambeth Group – granular and cohesive deposits recorded.	
Groundwater	No groundwater encountered during the ground investigation. To date groundwater levels during the monitoring period range between **3.88 m bgl and dry**.	
Foundation design	**Piled foundations are recommended due to the variable nature and low bearing capacity ground conditions at the site.** Design sulphate class **DS-2** and ACEC class **AC-2** is required for buried concrete with the soils encountered on this site.	
Road construction	A **CBR of 3%** is applicable for the site, based upon DCP testing results with CBR values ranging between 8.3% to 9.6%.	
Contamination	**A Risk** to human health as exceedances in heavy metals, hydrocarbons and asbestos was recorded within the made ground at the site.	
Ground gas	A **Characteristic Situation 2** for boreholes WS02 and WS03 has been identified. Gas protection measures will be required for all proposed buildings due to the likelihood of gas migration from the designated contaminated land area surrounding the site.	

1 INTRODUCTION

1.1 General

1.1.1 JNP Group was instructed by London Borough of Hillingdon Council to undertake a ground investigation of:

The Bungalow Site,
New Years Green Lane,
Harefield,
UB9 6LX

hereinafter referred to as 'the site'. This report is subject to the limitations presented in Appendix A.

1.1.2 It is understood that the existing buildings are to be demolished or refurbished, and the site redeveloped with a one storey staff facility building, with access roads and areas of hardstanding for parking, and areas of soft landscaping to be retained and improved. New Years Green Lane is to be widened and an access road into the site constructed. The development is for the relocation of the current staff facilities for Harefield Re-use and Recycling Centre and creation of further car parking. The proposed redevelopment layout is shown on external Drawing Reference 2022/D/334/P/03 Rev C (Jan 2023) produced by London Borough of Hillingdon (Appendix B).

1.1.3 All comments given are based on the understanding that the proposed redevelopment will be as detailed above.

1.2 Objectives

1.2.1 The purpose of the investigation was to determine the geotechnical and geo-environmental ground conditions at the site and assess the implications of such relative to the proposed redevelopment. The scope of work comprised an intrusive investigation, laboratory testing, and gas and groundwater level monitoring. This report contains details of the site, the work and laboratory testing undertaken, strata encountered, geotechnical and chemical laboratory test results, monitoring results, and provides an interpretative assessment of the ground conditions with regard to geotechnical and contaminated land issues.

1.2.2 This report has been produced to satisfy the objections made by the Environment Agency (Ref. NE/2022/135123/02) to the planning application for 'demolition of existing bungalow, all stable structures and outbuildings and the erection of staff facilities, recycling stalls and recladding of existing barn; widening of road, link access to Civic Amenity site, installation of new boundary fence and gates including all associated external works' (Ref. 29665/APP/2022/2534). This correspondence is included in Appendix C.

1.3 Methodology

1.3.1 This report has been compiled in accordance with the on-line Land contamination: risk management (LCRM) guidance produced by the Environment Agency (June 2019). This can be found on the UK government website: https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks.

1.3.2 With regard to geotechnical aspects, reference is also made to the requirements of BS EN 1997, Eurocode 7, Geotechnical Design, and associated standards.

1.3.3 This report should be read in conjunction with the following JNP Group Reports:

- M44477-JNP-XX-XX-RP-G-1001 P03. Phase I Geo-environmental Report, Dated November 2023.

2 SITE DESCRIPTION

2.1.1 The site is located off New Years Green Lane, in Harefield, Uxbridge approximately 25 km north-west of London city centre (see Figure 1 Key Plan). The centre of the site is located at National Grid Reference TQ 062 881. The site covers an area of approximately 0.57 hectares.

2.1.2 An Engineer from JNP Group visited the site on 30th October 2023, the weather was partially cloudy with sun but dry. Photographs of the site are included within Appendix D.

2.1.3 The site was generally level, with a large bund placed to the south of the bungalow. The bund was re-sited to allow vehicles into the site.

2.1.4 Buildings on-site included stables (wooden construction) in the north, a barn (wood and cement sheeting (possible asbestos containing) in the east and a bungalow (brick construction) in the south-west. These buildings were all derelict and abandoned with evidence of vandalism.

2.1.5 The remaining ground coverage was primarily soft-standing with a variety of vegetation such as scrub, grasses and newly planted and mature trees. Concrete hardstanding was present in the northernmost part of the site where the stables are located.

2.1.6 Fly tipping and litter were present at the site entrance. The rest of the site was largely clear of any litter.

2.1.7 No invasive species were noted during the site work. However, JNP Group recommend that a specialist is consulted to confirm this assessment.

2.1.8 The boundaries of the site were open fields to the north and east with New Years Green Lane to the south. The west was bounded by open fields and then the recycling centre.

2.1.9 Adjacent land uses were fields to the north and east of the site. There is a waste recycling centre c. 250m to the south-east with fields between the site and this facility. Commercial buildings (used by the Dogs Trust) and grassland are to the south, beyond New Years Green Lane. The Harefield Re-use and Recycling Centre is located to the west of the site beyond more fields.

2.1.10 The surrounding land uses are summarised in Table 2.1 below.

Table 2.1 Surrounding Land Use

Direction	Land Use
North	Open fields
East	Open fields
South	New Years Green Lane
West	Open fields, recycling centre

3 UK CONTAMINATED LAND LEGISLATIVE FRAMEWORK

3.1 General

3.1.1 Given that the site is being assessed with the potential for future development, the most applicable appraisal relates to the requirements of the Planning Regime as described in the National Planning Policy Framework.

3.1.2 In order to proceed with an assessment of contamination issues it is essential that there is compliance with UK guidance as detailed in the on-line Land contamination: risk management (LCRM) guidance produced by the Environment Agency (June 2019). This can be found on the UK government website: https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks.

3.1.3 Part IIA of the Environmental Protection Act, 1990, which was enacted by Section 57 of the Environment Act 1995, and the associated Contaminated Land (England) Regulations 2000 (SI 2000/227), was introduced on 1 April 2000. It created a new statutory regime for the identification and remediation of land where contamination poses an unacceptable risk to human health and the environment. The guidance was subject to a review by DEFRA in 2012, and a revision was published.

3.1.4 Part IIA provides a statutory definition of contaminated land:

3.1.5 *"any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is a significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused".*

3.1.6 Controlled waters are considered to be all groundwaters, inland surface waters, and estuarine and coastal waters.

3.1.7 To determine whether land falls under the Part IIA definition of contaminated land, the site should be evaluated in the context of a risk-based framework. The assessment of contaminated land is typically a two-phase process, which is initially based on a qualitative assessment of the likelihood of complete pollution linkages, with a quantitative element that seeks to determine the degree and the significance of the harm. Land is only defined as 'Contaminated Land' if a "significant pollutant linkage" is present.

3.1.8 A pollutant linkage must comprise the following:

Source *- a contaminant at a concentration capable of causing adverse health or environmental effects.*

Receptor *- there must be a receptor (e.g. human, controlled waters, ecological, or property) present, which may be at risk of harm or impact from the source.*

Pathway *- there must be an exposure pathway through which the receptor comes into contact with the contamination source.*

3.1.9 Each of these elements can exist independently, but they create risk only when they are linked together, so that a particular contaminant affects a particular receptor, through a particular pathway.

3.1.10 The responsible authority then needs to consider whether the identified pollution linkage:

- is resulting in significant harm being caused to the receptor in the pollutant linkage;
- presents a significant possibility of significant harm being caused to that receptor;
- is resulting in the pollution of controlled waters, which constitute the receptor; or is likely to result in such pollution.

3.1.11 If a pollutant linkage is demonstrated, then the Part IIA legislation provides powers for remedial action to be enforced by the Local Authority in whose area the contaminated land is situated.

3.1.12 In addition, JNP Group has undertaken a preliminary risk assessment based on the probability of receptor exposure to the identified source and the consequences of such exposure.

3.1.13 Risk management, which can include site surfacing, formal management systems, legal requirements; is then considered to provide an overall residual risk. The categories of environmental risk used by JNP Group are given in the table that follows.

Table 3.1 Risk Matrix

Environmental Risks		
HIGH		Issues within this category likely to provide a significant cost or liability. Further detailed investigation may be required to clarify the risk.
MEDIUM		It is possible that issues within this category may provide a cost or liability. Further investigation may be required to clarify the risk.
LOW		It is unlikely that issues within this category will provide a significant cost or liability. Basic investigation may be required to clarify the risk.
NONE		No source – pathway – receptor linkage present.

4 SITE WORK AND MONITORING

4.1 Introduction

The intrusive site work was undertaken by JNP Group on 12th March 2024 and comprised five dynamic sampling boreholes, three of which were installed with gas and groundwater monitoring installations and four hand excavated pits. Six return gas and groundwater level monitoring visits were undertaken during a period from 21st March to 6th June 2024.

4.1.1 All site work was completed under the instruction and supervision of JNP Group with the ground investigation procedures and sample descriptions given in the following publications:

- BS 5930 (2015). Code of Practice for Site Investigations;
- BS 10175 (2001+A1:2013+A2:2017). Investigation of potentially contaminated sites - code of practice;
- BS EN ISO 14688-1. "Soil - Identification and Description;
- BS EN ISO 14688-2. Soil - Classification principles and quantification of descriptive characteristics;
- BS 18400-104:2018. Soil Quality – Sampling. Part 104: Strategies;
- BS 18400-202:2018. Soil Quality – Sampling. Part 202: Preliminary Investigations;
- BS 18400-203: 2018. Soil Quality – Sampling. Part 203: Investigation of potentially contaminated sites;
- BS 18400-205: 2018. Soil Quality – Sampling. Part 205: Guidance on the procedure for investigation of natural, near natural and cultivated sites;

4.1.2 For sites affected by asbestos impacted soils, the guidance given in the following publications has been followed:

- Industry Guidance on Interpretation for Managing & Working with Asbestos in Soil and Construction and Demolition Materials (CL:AIRE 2016);
- Asbestos in Soil and made ground: a guide to understanding and managing risks (CIRIA C733 2014).

4.1.3 The design and installation of groundwater quality monitoring points has been undertaken following the guidance given in the Environment Agency science report:

- SC020093. Guidance on the design and installation of groundwater quality monitoring points. 2006.

4.1.4 The locations of the exploratory holes are shown on JNP Group Drawing M44477-JNP-XX-XX-DR-G-2003. The exploratory hole records including strata and groundwater encountered, in-situ testing and samples taken are presented in Appendix E. The full details of the site work undertaken are summarised in the following sections.

4.1.5 The site investigation strategy comprised a systemic distribution across the site to suit the proposed redevelopment and address relevant spatial locations considered most likely to be sensitive. Table 4.1 shows the rationale for the location of each exploratory hole.

Table 4.1 Exploratory Hole Location Rationale

Exploratory Hole Reference	Rationale
WS01-WS03	General site coverage. Assess groundwater and gas conditions.
WS04-WS05	General site coverage.
HP01-HP02	General site coverage.
HP03-HP04	General coverage, target the 'no dig' proposed gravel pathway.

4.1.6 The general sampling strategy was to take representative soil samples from the ground to characterise the strata encountered and to provide suitable horizontal distribution, however, where visible contamination was present or suspected, targeted spot samples were taken.

4.2 Dynamic Sampling Boreholes

4.2.1 Five dynamic sampling boreholes, designated WS01-WS05 (inclusive) were formed on 12th March 2024, to depths of 5.00 m below ground level (bgl) at various locations across the site.

4.2.2 The dynamic sampling technique uses a lightweight tracked rig to advance a borehole by 1 m intervals using 1 m long steel sampler tubes, at diameters of 100 mm, reducing to 70 mm. The soils are then recovered from each sample tube as continuous core samples, which are logged and sub-sampled on site. Environmental soil samples were generally taken from each made ground material, together with any materials suspected of containing elevated concentrations of contaminants, based on visual and olfactory evidence. The environmental samples comprised a small volatiles jar, and an amber glass jar. Bulk and small plastic tub samples were also taken from selected materials, for laboratory geotechnical testing. In situ Standard Penetration Tests (SPTs) were undertaken in accordance with BS 5930 (2015) at 1.0 m depth intervals in the boreholes in order to obtain in situ strength or relative density parameters for geotechnical design.

4.2.3 All exploratory boreholes commenced with hand excavated trial pits to depths of 1.20 m bgl to mitigate risks of encountering existing underground utilities.

4.2.4 Three boreholes (WS01-WS03) were completed with 50 mm gas monitoring standpipe installations, with protruding standpipes. The remaining boreholes were backfilled with arisings and the ground surface left in a safe and tidy manner.

4.2.5 Response zones within the installations were installed between depths of 1.00 m bgl to 5.00 m bgl in order to target the underlying Made ground.

4.3 Hand Excavated Pits

4.3.1 Four trial pits were excavated using hand-tools in order to obtain samples in areas where access was restricted on site. The pits were formed to depths of between 0.30 m and 0.40 m bgl.

4.3.2 Additional hand pits were excavated to obtain samples along the western arm and for leachate testing at WS01 respectively.

4.4 Dynamic Cone Penetrometer Tests

4.4.1 Three dynamic cone penetrometer (DCP) tests were undertaken to a depth of 1.00 m bgl in order to determine California Bearing Ratio (CBR) values for pavement design. The tests,

DCP1 to DCP3 (inclusive) were undertaken within the current access road located nearby to areas of proposed new roads.

4.4.2 Limited visibility and the high-traffic nature limited the locations of the DCPs. DCP testing was not possible in areas of the proposed widening of New Years Green Lane.

4.4.3 The DCP probe comprises a cone of a known surface area on a steel shaft, that is driven into the ground by a set mass falling a set distance. Readings or 'blow counts' are recorded for successive depth increments, and these are mathematically converted into CBR values. The results of the DCP tests are included in Appendix E.

4.5 Monitoring

4.5.1 Monitoring of the installed standpipes has been undertaken on six occasions at fortnightly intervals (21st March to 6th June 2024) after the completion of the site work.

4.5.2 Monitoring involved the measurement of the ground gas composition at each of the installations for methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) concentrations, together with atmospheric pressure, downhole pressure and flow rates, using a Gas Data GFM430 gas meter. After the measurement of gas concentrations, the depth to any groundwater within the standpipe was recorded. At least two of the monitoring visits were undertaken during periods of low and falling atmospheric pressure.

4.5.3 The frequency and duration of gas monitoring was selected based on the guidance given in the following publications:

- CIRIA C665. Assessing risks posed by hazardous gases to buildings. 2007;
- BS 8485. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. 2015;
- CL:AIRE RB 17. A Pragmatic Approach to Ground Gas Risk Assessment. 2012.

4.5.4 Volatile organic compound (VOC) monitoring was undertaken during each site visit, after the initial site work, using a photoionization detector (PID). Recorded concentrations of VOCs are presented in the monitoring records.

4.5.5 Groundwater monitoring has been undertaken on six occasions at fortnightly intervals (21st March to 6th June 2024) after the completion of the site work.

4.5.6 Table 4.2 justifies the response zones selected for each monitoring borehole.

Table 4.2 Response Zone Rationale

Exploratory Hole Reference	Response Zone (m bgl)	Rationale
WS01	1.00 – 5.00	To monitor groundwater concentrations and levels within the Lambeth Group.
WS02	1.00 – 5.00	To monitor groundwater concentrations and levels within the Made ground
WS03	1.00 – 5.00	To monitor groundwater concentrations and levels within the Lambeth Group.

4.5.7 It should be noted that long-term groundwater levels may vary from those reported due to seasonal fluctuation or weather events, such as droughts, significant rainfall, or recent flooding.

4.5.8 The monitoring results are presented in Appendix F.

4.5.9 If should be noted that once the groundwater monitoring boreholes are no longer required they need to be decommissioned following the guidance given in the EA science report SC020093 (EA 2008).

5 LABORATORY TESTING

5.1 Geotechnical

5.1.1 A programme of laboratory testing was scheduled by JNP Group to determine geotechnical properties of selected soil samples obtained from the investigation. The details of the geotechnical testing are summarised below:

Table 5.1 Scheduled Geotechnical Laboratory Tests

Test Description	Number of Tests
Atterberg limits including moisture content	4
Ground Aggressivity Suite (in accordance with BRE SD1)	5

5.1.2 Tests were undertaken in accordance with BS1377 (1990) “Methods of test for Soils for Civil Engineering purposes”. The results of the geotechnical testing are presented in Appendix G.

5.2 Environmental

5.2.1 A programme of chemical laboratory testing was scheduled by JNP Group on selected soil samples taken from various depths in the made ground and natural ground recovered from the exploratory holes. Samples of any soils displaying visual or olfactory evidence of contamination were also collected and submitted for laboratory analyses. The samples were placed into suitable containers for the required chemical analyses.

5.2.2 All samples were transported, on the day of collection, to i2 Analytical Testing Services in Watford which is accredited under UKAS and MCerts. The following table summarises the contaminants scheduled:

Table 5.2 Scheduled Soil Chemical Analyses

Determinant	No
Metals and semi-metals (arsenic, beryllium, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, vanadium and zinc)	11
Polycyclic Aromatic Hydrocarbons (PAH) 16 USEPA Speciated	7
Total Petroleum Hydrocarbons (TPH) Carbon banded	6
TPH Criteria Working Group (TPH CWG)	2
Soil Organic Matter (SOM) and pH	7
Asbestos screening	8
Pesticides	1

5.2.3 The results of the laboratory chemical testing are interpreted in Section 8 and are presented in full in Appendix H.

6 GROUND AND GROUNDWATER CONDITIONS

6.1 Strata Encountered

6.1.1 The ground conditions encountered during the intrusive investigation were generally consistent with the published geological map. A variable thickness of made ground was found to be underlain by both granular and cohesive deposits of the Lambeth Group; this graded from very soft to soft clays and loose sands with increasing depth.

6.1.2 A summary of the stratigraphy encountered during the investigation is presented in Table 6.1 and described in the following sections, but for full details and descriptions, reference should be made to the exploratory hole records presented in Appendix E.

Table 6.1 Stratigraphy Encountered

Stratum	Depth to Top (m bgl)	Depth to Base (m bgl)	Thickness (m)
Made ground All exploratory holes	Ground level	0.20 – 4.60	0.20 – 4.60
Lambeth Group All exploratory holes except HP01-HP04	0.20 – 4.60	Not proven	Not proven

6.2 Made Ground

6.2.1 Made ground was encountered in all exploratory holes to depths of 0.20 m – 4.60 m bgl.

6.2.2 The made ground consisted of brown-grey, brown, orange-brown clay, sand and gravel. The proportion of clay, sand and gravel varied between exploratory holes. The gravel fraction comprised flint, charcoal, brick, concrete. Occasional fragments of wood, plastic and pottery were also encountered.

6.3 Lambeth Group

6.3.1 Soils inferred to be of the Lambeth Group were encountered in WS01-WS05. The top of the lithological unit was encountered at depths of between 0.20 m and 4.60 m bgl, extending to depths of between 4.00 m and 5.00 m bgl, with a maximum thickness of 4.30 m encountered in WS03.

6.3.2 The Lambeth Group consisted of very soft to soft orange-brown sandy, gravelly clay and loose brown, orange-brown clayey, gravelly sands. The gravel fraction comprised flint.

Table6.2 Lambeth Group – Geotechnical Laboratory Test Results Summary

Property	Number of Tests	Range	Mean	Assessment
Natural Moisture Content	4	12.4 – 21.4	16.7	Intermediate Plasticity Low Volume Change Potential
% passing 425 sieve	4	51 – 88	70	
Liquid Limit %	4	40 – 45	43	
Plastic Limit %	4	15 – 21	18	
Plasticity Index %	4	22 – 29	21	

Property	Number of Tests	Range	Mean	Assessment
Modified Plasticity Index %	4	15 - 19	18	
SPT 'N' Values (granular)	5	2 - 8	4	Very loose to loose
c_u = 4.5 x SPT 'N' Value (kN/m^2)	14	18 - 27	20	Very soft to soft

6.3.3 The SPT N value / depth profile is presented as Figure 2, the undrained shear strength / depth profile as Figure 3, and a plasticity chart as Figure 4.

6.4 Groundwater

6.4.1 Details of groundwater entries recorded during the site work period, and levels recorded subsequently during the monitoring visits, are summarised in the table which follows.

Table6.3 Summary of groundwater observations

Exploratory Location	Groundwater during site work		Groundwater during monitoring
	Strikes (m bgl)	Comments	Range
WS01	-	-	3.88 – dry
WS02	-	-	4.38 - dry
WS03	-	-	4.90 - dry
WS04-WS05	-	-	-
HP01-HP04	-	-	-

6.5 Ground Contamination and Deleterious Material

6.5.1 Deleterious material consisting of charcoal, brick, concrete and occasional fragments of wood, plastic and pottery were encountered in the made ground across the site.

6.5.2 WS02, HP03 and HP04 are located in an area designated as contaminated land. The made ground of WS02 was grey-black in colour.

6.6 Ground Gas Conditions

6.6.1 During the six monitoring visits, methane concentrations remained below detection limits, and a maximum concentration of carbon dioxide of 14.4% was recorded, with negligible flow rates. Full details of the gas concentrations and flow rates recorded during the monitoring period are presented in Appendix F.

6.7 Trees and Tree Roots

6.7.1 A number of mature trees and vegetation is present across the site, primarily along the site boundaries.

6.8 Obstructions

6.8.1 No obstructions were encountered during the investigation; borehole locations were chosen with consideration for areas of hardstanding.

6.9 Data Gaps and Uncertainties

6.9.1 Access to the south-eastern and western areas of the site were limited due to ground conditions. Hand pits were excavated in these areas to obtain samples for chemical testing.

7 HUMAN HEALTH DETAILED QUANTITATIVE RISK ASSESSMENT

7.1 Introduction

7.1.1 Qualitative assessment of risks may be sufficient in many cases to eliminate the possibility of significant pollutant linkages. However, quantitative risk assessment is formally required to determine whether there is a 'significant possibility of significant harm being caused'. Part IIA of the Environmental Protection Act 1990 recommends that 'authoritative and scientifically based guideline values for concentrations of the potential pollutants in or under the land' be used to quantify the risk posed by contamination.

7.1.2 Under the Planning Regime, a quantitative risk assessment can be used to decide whether the site is suitable for the proposed use. In addition, the National Planning Policy Framework (March 2012) also indicates that after remediation, as a minimum land should not be capable of being determined as contaminated land under Part IIA.

7.2 Current UK Screening Values

7.2.1 The UK technical guidance for assessing risks to human health is issued from various UK bodies, including the Environment Agency (EA), DEFRA, Contaminated Land: Applications in Real Environment (CL:AIRE), Chartered Institute of Environmental Health (CIEH), and Land Quality Management (LQM) Ltd (part of the University of Nottingham).

7.2.2 New and updated screening values in the form of provisional Category 4 Screening Levels (C4SL) (published in 2014), and Suitable for Use Levels (S4UL), (published 2015), have been produced by DEFRA and CIEH / LQM respectively using modified versions of the EA's Contaminated Land Exposure Assessment (CLEA) software.

C4SL

7.2.3 Provisional C4SL have been derived by CL:AIRE (project team for DEFRA's SP1010 project) following revised statutory guidance, and as a tool to assist in applying the Part IIA Category 1- 4 classifications to a site. The purpose of the C4SL is to provide a simple test for deciding that land is suitable for use, and definitely not contaminated land under Part IIA. They describe a level of risk that is above minimal, but is still low.

7.2.4 In calculating provisional C4SL some of the exposure modelling scenarios and exposure parameters used in the CLEA software have been modified. These modifications are not discussed further, but reference should be made to the original CL:AIRE / DEFRA publications should further information or clarification be required. A list of the new publications is included in the references section at the end of this report.

7.2.5 To date, six contaminants have been assigned provisional C4SL: arsenic; benzene; benzo[a]pyrene; cadmium; chromium VI, and lead, for the standard land uses (residential with, and without plant uptake, allotments, commercial, and public open space (parks and residential).

7.2.6 The C4SL are also considered suitable to be used under the planning regime, and DEFRA have confirmed this to all local authorities.

S4UL

7.2.7 The LQM / CIEH S4UL represent generic assessment criteria based on minimal or tolerable risk that are intended to be protective of human health. They have been derived in

accordance with current UK legislation using a modified version of the CLEA software, and are still based on many conservative assumptions. They represent values above which further assessment of the risks or remedial actions may be needed.

7.2.8 S4UL have been derived for a comprehensive list of metals, non–metals, petroleum hydrocarbons, polycyclic aromatic hydrocarbons, chlorinated hydrocarbons, phenolic compounds, explosives, and pesticides, for the standard land uses (residential with, and without plant uptake, allotments, commercial, and public open space (residential and park)).

7.2.9 For details of the exposure parameters and scenarios used to derive the S4UL the reader is reference to the original LQM / CIEH document "The LQM/CIEH S4UL for Human Health Risk Assessment" (2015).

7.2.10 Both sets of screening values can be used to undertake a generic risk assessment by comparing the data directly to the screening value which is considered a conservative approach or statistically to the screening value. Alternatively and if a sufficient dataset is available, a statistical assessment can be undertaken following the guidance given in the joint Chartered Institute of Environmental Health (CIEH) and the Contaminated Land: Applications in Real Environment (CL:AIRE) organisation publication "Guidance On Comparing Soil Contamination Data with a Critical Concentration" (CIEH / CL:AIRE May 2008).

7.3 Petroleum Hydrocarbons

7.3.1 JNP Group have followed the guidance given in the Environment Agency publication 'The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils' (Environment Agency, 2005). LQM S4UL values have been published based on carbon banded hydrocarbons with aliphatic and aromatic split, corresponding to the TPH CWG bands.

7.3.2 JNP Group have compared the results of carbon-banded hydrocarbon analysis with the most sensitive LQM S4UL value within the band under scrutiny. Generally, the most sensitive band comprises the lightest aromatic fraction within the carbon band under scrutiny.

7.3.3 The Society of Brownfield Risk Assessment (SoBRA) have produced some Generic Assessment Criteria for assessing chronic risks from the inhalation of vapours arising from groundwater (GAC_{gwvap}) for a short list of 66 organic contaminants (SoBRA February 2017). These are designed to a defensible screening criteria to assist in evaluating this exposure pathway. They represent concentrations below which the chronic risks from vapour migration and inhalation can be considered low / tolerable. GAC_{gwvap} have been developed in line with current UK risk assessment guidance, and CLEA v1.07 software was used for residential and commercial land use scenarios.

7.3.4 Further details of the input parameters selected for use to generate the GAC_{gwvap} can be found in the SoBRA report, and have not been reproduced here. However, it should be noted that they have been derived using some conservative assumptions:

- Impacted ground / perched water is beneath the buildings;
- An infinite source term is present;
- There is no biodegradation;
- Groundwater depth is 0.65m below ground;
- Use of a sand soil type (in line with SR3)

8 SOIL AND GROUNDWATER ASSESSMENT RESULTS

8.1 Soil Results

8.1.1 The results of chemical testing of twelve samples of made ground been compared with the C4SL and the LQM S4UL values. The northern rectangular area of the site, where the proposed buildings are located have been be compared to commercial guideline values (WS01, WS03-WS05, HP02) and the areas of open space, including the proposed 'no dig' pathway areas (WS04, HP1-HP4) will be compared to residential public open space guideline values.

8.1.2 The following determinants were recorded at concentrations less than their respective limits of laboratory detection, and hence have not been included in this assessment: selenium, petroleum hydrocarbons C_6-C_{10}, petroleum hydrocarbons aliphatic C_5-C_{21}, petroleum hydrocarbons aromatic C_5-C_{35}, pesticides, and VOC.

8.1.3 A SOM of 1% is applicable to the soils within the area of the proposed office buildings for conservatism and an SOM of 2.5% is applicable in the areas of open space.

Table 8.1 Comparison of Soil Chemical Test Results with Commercial Guideline Values

Determinant	Maximum Measured Concentration (mg/kg)	Background Concentration (mg/kg)	LQM/CIEH Commercial (mg/kg)	No. of tests	No. of exceedances
Arsenic	19	<15	640	6	0
Beryllium	0.99	-	12	6	0
Boron	2.4	-	290	6	0
Cadmium	9	0.4 – 1.8	190	6	0
Chromium (total or trivalent)*	170	70 – 90	8600	6	0
Copper	230	20	68000	6	0
Mercury (inorganic)	1.2	-	1100	6	0
Lead	660	75 – 100	2330**	6	0
Nickel	42	17	980	6	0
Vanadium	63	70	9000	6	0
Zinc	2200	70	40000	6	0
			1%		
Naphthalene	0.53	-	190	4	0
Acenaphthylene	0.13	-	83000	4	0
Acenaphthene	0.09	-	84000	4	0
Fluorene	0.13	-	63000	4	0
Phenanthrene	1.4	-	22000	4	0
Anthracene	0.42	-	520000	4	0
Fluoranthene	5.4	-	23000	4	0
Pyrene	4.9	-	54000	4	0
Benzo(a)anthracene	3	-	170	4	0
Chrysene	2.8	-	350	4	0
Benzo(b)fluoranthene	4.3	-	44	4	0
Benzo(k)fluoranthene	1.8	-	1200	4	0
Benzo(a)pyrene	3.4	-	35	4	0
Indeno(1,2,3-c,d)pyrene	2.1	-	500	4	0
Dibenzo(a,h)anthracene	0.26	-	3.5	4	0
Benzo(g,h,i)perylene	2.8	-	3900	4	0
TPH C10-C25	38	-	9700	3	0

Determinant	Maximum Measured Concentration (mg/kg)	Background Concentration (mg/kg)	LQM/CIEH Commercial (mg/kg)	No. of tests	No. of exceedances
(TPH aliphatic C10-C12***)					
TPH C25-C40 (TPH aromatic C21-C35***)	100	-	28000	3	0
Asbestos	**Detected**	-	Presence	5	WS04 0.25m (amosite) (<0.001%)

* assumed all chromium on site is in trivalent form
*** Most sensitive fraction within wider TPH band (specified)

Table 8.2 Comparison of Soil Chemical Test Results with Residential Public Open Space Guideline Values

Determinant	Maximum Measured Concentration (mg/kg)	Background Concentration (mg/kg)	LQM/CIEH S4UL Residential Public Open Space (mg/kg)	Number of tests	Number of exceedances
Arsenic	**94**	<15	79	4	WS02 0.15m
Beryllium	**8**	-	2.2	4	HP4 0.20m WS02 0.15m
Boron	1.4	-	21000	4	0
Cadmium	3.9	0.4 – 1.8	120	4	0
Chromium (total or trivalent) *	84	70 – 90	1500	4	0
Copper	310	20	12000	4	0
Lead	390	75 – 100	630	4	0
Nickel	150	17	230	4	0
Vanadium	130	70	2000	4	0
Zinc	1200	70	81000	4	0
			2.5%		
Naphthalene	0.9	-	4900	3	0
Acenaphthylene	1.4	-	15000	3	0
Acenaphthene	4.7	-	15000	3	0
Fluorene	4.5	-	9900	3	0
Phenanthrene	75	-	3100	3	0
Anthracene	20	-	74000	3	0
Fluoranthene	110	-	3100	3	0
Pyrene	91	-	7400	3	0
Benzo(a)anthracene	**42**	-	29	3	HP4 0.20m
Chrysene	38	-	57	3	0
Benzo(b)fluoranthene	**41**	-	7.2	3	HP1 0.15m HP4 0.20m
Benzo(k)fluoranthene	16	-	190	3	0
Benzo(a)pyrene	**34**	-	5.7	3	HP1 0.15m HP4 0.20m
Indeno(1,2,3-c,d)pyrene	21	-	82	3	0
Dibenzo(a,h)anthracene	**5.6**	-	0.57	3	HP1 0.15m HP4 0.20m
Benzo(g,h,i)perylene	23	-	640	3	0

Determinant	Maximum Measured Concentration (mg/kg)	Background Concentration (mg/kg)	LQM/CIEH S4UL Residential Public Open Space (mg/kg)	Number of tests	Number of exceedances
TPH Aliphatic C_{21} – C_{35}	24	-	500^	1	0
TPH C_{10}-C_{25} (TPH aliphatic C_{10}-C_{12}***)	**570**	-	500^	2	HP3 0.30m
TPH C_{25}-C_{40} (TPH aromatic C_{21}-C_{35}***)	**1000**	-	500^	2	HP3 0.30m

^Professional judgement

8.2 Interpretation

8.2.1 The analyses recorded marginally elevated concentrations of arsenic, asbestos, PAH and petroleum hydrocarbons with respect to the selected screening values. These occurrences are discussed in the following sections.

Heavy Metals

8.2.2 When compared with residential public open space screening values, elevated concentrations of arsenic were found in WS02 at 0.15 m. This borehole is located within the designated contaminated land area. The exploratory hole logs recorded black-brown made ground with deleterious material including charcoal, glass, brick, plastic and pottery.

Elevated PAH

8.2.3 When compared with residential public open space screening values, elevated concentrations of PAHs were identified in HP1 at 0.15 m and HP4 at 0.20m bgl.

8.2.4 HP1 is located to the south-east of the site within an area of open space occupied by newly planted trees and beehives. The exploratory hole records encounter made ground with rare brick and charcoal fragments at this depth.

8.2.5 HP4 is located along the western 'arm' of the site in the proposed location of the 'no dig' footpath. The exploratory hole logs encountered made ground but did not record any visual or olfactory evidence of contamination. However, the hand pit is located within the area designated contaminated land.

Petroleum Hydrocarbons

8.2.6 There are exceedances in the TPH C_{10}-C_{25} of 570 mg/kg and TPH C_{25}-C_{40} of 1,000 mg/kg recorded in HP3 at 0.30 m. HP3 is located in the 'no dig' footpath of the proposed development in the western arm in the area designated as contaminated land. The exploratory hole logs record brown made ground with brick fragments.

Asbestos

8.2.7 Asbestos was identified in WS04 at 0.25 m bgl. WS04 is located to the south of the derelict barns, situated to the north of the site. The asbestos was identified as amosite asbestos as loose fibres with a quantification of <0.001 %.

8.3 Risk to Controlled Waters

Soil Concentrations

8.3.1 No mobile hydrocarbon contamination has been recorded.

8.3.2 When compared to background concentrations arsenic, lead and zinc are elevated within the soil

Leachate Results and Assessment

8.3.3 One sample of made ground was submitted for leachate analysis in order to determine metal mobility.

8.3.4 The following determinants were recorded at concentrations less than the limit of laboratory detection and hence have not been included in this assessment: arsenic, beryllium, boron, cadmium, chromium, lead, mercury, selenium and vanadium.

Table 8.3 Comparison of Leachate Chemical Test Results with Guideline Values

Determinant	Maximum Measured Concentration (µg/l)	Drinking Water Standard (µg/l)	Freshwater Environmental Quality Standard (µg/l)	No. of tests undertaken	No. of exceedances
Barium	5.4	100	n/a	1	0
Copper	0.16	2000	1**	1	0
Nickel	0.20	20	4*	1	0
Zinc	0.55	3000	10.9**	1	0

* Dependent on hardness, salmonid receptor
** bioavailable EQS UK TAG

8.3.5 No exceedances of the EQS or DWS or Level 1 RTV were recorded.

Groundwater Results and Assessment

8.3.6 JNP Group submitted one sample of groundwater from WS01 during the monitoring period.

8.3.7 The following determinants were recorded at concentrations less than the limit of laboratory detection and hence have not been included in this assessment: hydrocarbons, BTEX, MTBE, beryllium, cadmium and mercury.

Table 8.4 Comparison of Groundwater Chemical Test Results with Guideline Values

Determinant	Maximum Measured Concentration (µg/l)	Drinking Water Standard (µg/l)	Freshwater Environmental Quality Standard (µg/l)	No. of tests undertaken	No. of exceedances
Arsenic	6.49	10	50	1	0
Barium	78	100	n/a	1	0
Chromium (total)	1	50	5-50*	1	0
Copper	0.22	2000	1**	1	0
Lead	0.04	25	1.2**	1	0
Nickel	1.60	20	4**	1	0

Determinant	Maximum Measured Concentration (µg/l)	Drinking Water Standard (µg/l)	Freshwater Environmental Quality Standard (µg/l)	No. of tests undertaken	No. of exceedances
Selenium	2	10	n/a	1	0
Vanadium	4.4	n/a	20 – 60*	1	0
Zinc	0.70	3000	10.9**	1	0

* dependent on hardness, salmonid receptor
** bioavailable EQS UK TAG

8.3.8 No exceedances of the DWS or EQS were recorded.

8.3.9 When compared to background concentrations, arsenic, lead and zinc concentrations are elevated within the soil. However, from the leachate testing they are not mobile. In addition, from the results of the chemical testing, the groundwater underlying the site does not appear to have been impacted.

8.4 Soil and Groundwater Results Summary

8.4.1 On the basis of the chemical testing undertaken, JNP Group considers that a viable risk to human health exists from elevated concentrations of arsenic, asbestos and hydrocarbons in near-surface soils.

8.4.2 On the basis of the soil leachate and groundwater assessment undertaken JNP Group do not considered that a significant risk to controlled waters is present at the site..

9 GROUND GAS ASSESSMENT

9.1 Methodology

9.1.1 JNP Group has used the guidance given in the following document to assess the risks from ground gases or landfill gases:

- CIRIA C665. Assessing risks posed by hazardous gases to buildings. 2007;
- BS 8485. Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. 2015 +A1 2019;
- CL:AIRE RB 17. A Pragmatic Approach to Ground Gas Risk Assessment. 2012;
- NHBC. Hazardous Ground Gas – An Essential Guide for Housebuilders. NF94. April 2023.

9.1.2 JNP Group has used multiple lines of evidence when assessing the risks from ground gases and / or landfill gases:

- Nature, type and thickness of made ground;
- Organic content of stratum;
- Age of the landfill / waste / backfill material;
- Review of data set (size, anomalous results (changes in atmospheric pressure, groundwater level));
- Location so buildings in relation to gas monitoring installations
- Zoning of site (to suit source, layout and spatial distribution of data);
- Initial review of maximum gas and flow concentrations against reference values prescribed within BS 8485 (2015);
- Calculation of appropriate gas screening value (GSV) to suit dataset to determine the site characteristic for the site. The GSV is calculated using the following equation, with the resulting number compared to those given in Table 2 of BS: 8584 (2015 +A1 2019)
    - gas concentration (%) x borehole flow rate (l/h)

9.2 Results

9.2.1 The maximum carbon dioxide and methane concentrations, the maximum flow rate, and the screening values for each borehole during the monitoring period, are summarised in the following table.

9.2.2 VOCs levels measured using the PID were low with values between 0.0 and 0.2 across the monitoring period.

9.2.3 Methane concentrations above 1% were not recorded.

9.2.4 Carbon dioxide concentrations above 5% were recorded in WS02 and WS03 of 14.4% and 8.9% respectively. WS02 is located within the area of designated contaminated land with made ground encountered to 2.75 m bgl, where ground gas generation has likely occurred. WS03 is located in the central-east of the site; while no source of is apparent in the shallow made ground, it is likely a pathway is present through the more-permeable sand strata located at the base of the borehole (4.25-5.00 m bgl). Gas generation in the made ground

within the area of designated contaminated land, was evident from WS02, has likely migrated through permeable strata at depth, recorded as elevated carbon dioxide concentrations in WS03.

9.2.5 The elevated carbon dioxide concentrations were not coincident with either rising groundwater levels or low / falling atmospheric pressure.

9.2.6 The raw and collated results of the ground gas monitoring undertaken are presented in Appendix F. This includes a graph showing the atmospheric pressure trend throughout the monitoring period.

Table 9.1 Calculated Gas Screening Values

Location	Maximum CH_4 Concentration (% v/v)	Maximum CO_2 Concentration (% v/v)	Maximum Flow Rate (l/hr)	Maximum Gas Screening Value (l/hr)
WS01	0.0	2.5	0.0	0.0
WS02	0.0	14.4	0.0	0.0
WS03	0.0	8.9	0.0	0.0

9.3 Interpretation

9.3.1 Elevated concentrations of carbon dioxide are present in WS02 and WS03, therefore, these boreholes are classified as CS2. The area surrounding the site is designated contaminated land; due to the high concentrations of carbon dioxide in WS02, the likelihood of migration into WS03 and slightly elevated concentrations in WS01, it is prudent that gas protection measures are used for all buildings within the proposed development.

9.3.2 For conservatism the development buildings have been classed as Type B and therefore following the guidance in BS 8485, require 3.5 points of protection which can be made up by any combination of structural, ventilation and / or gas membrane installation. Tables 5, 6 and 7 detail the different types of gas protection and allocated points. The final decision for protection type selection will be with the structural engineer.

10 REVISED CONCEPTUAL SITE MODEL AND OVERALL ENVIRONMENTAL RISK

10.1 Summary

10.1.1 Following the ground investigation and subsequent assessment undertaken, the conceptual site model and overall environmental risk assessment have been updated as detailed in the following table.

Table 10.1 Updated Conceptual Model and Risk Assessment

Issue	Risk		Justification
HUMAN HEALTH	MEDIUM		Unacceptable concentration of heavy metals, hydrocarbons and asbestos are present within the made ground across the site. Elevated concentrations of carbon dioxide have been recorded across the site at WS02 and WS03. Gas protection measures are required in these areas.
GROUNDWATER	LOW		No mobile species of heavy metals or hydrocarbons are present. Groundwater and leachate testing recorded no exceedances.
SURFACE WATER	LOW		. No mobile species of heavy metals or hydrocarbons are present. Groundwater and leachate testing recorded no exceedances.
PROPERTY & INFRASTRUCTURE	MEDIUM		Elevated concentrations of carbon dioxide have been recorded across the site at WS02 and WS03. Gas protection measures to CS2 are required in these areas.
ECOLOGY	LOW		Based on the assumption that there may be sensitive/ protected species on site (subject to any ecological survey undertaken)

11 GEOTECHNICAL ENGINEERING ASSESSMENT

11.1 Proposed Development / Redevelopment

11.1.1 It is understood that the existing buildings are to be demolished or refurbished, and the site redeveloped with a one storey staff facility building, with access roads and areas of hardstanding for parking, and areas of soft landscaping to be retained and improved. New Years Green Lane is to be widened and an access road into the site constructed. The development is for the relocation of the current staff facilities for Harefield Re-use and Recycling Centre and creation of further car parking.

11.2 Summary of Ground and Groundwater Conditions

11.2.1 The ground conditions encountered during the intrusive investigations were generally consistent with the published geological records. In general, a variable thickness of made ground was found to be underlain by both granular and cohesive deposits of the Lambeth Group; this graded from very soft to soft clays and loose sands with increasing depth.

11.3 Shallow Foundations

11.3.1 The made ground deposits are considered unsuitable to support foundation loads due to their poor engineering characteristics, and inherent variability. However, ground improvement techniques may be an option for treating the made ground to render it suitable for use of shallow reinforced strip, pad or raft foundations.

11.4 Ground Improvement

11.4.1 Ground improvement techniques may render the made ground deposits suitable for traditional foundations. However, due to the size of the site and the costs involved, ground improvement techniques are unlikely to be feasible.

11.5 Piled Foundations

11.5.1 Given the ground conditions encountered and low bearing capacity, piles would be a suitable foundation solution on site.

11.5.2 Due to the size of the site, micro-piles are the most feasible pile type. Consultation with a micro-piling contractor will be required to confirm the suitability of the ground conditions on site.

11.5.3 In order to be able to design a robust and economical piled foundation design, additional geotechnical data will be required to a depth of at least two pile diameters below proposed pile toe levels, or five meters, whichever is greater. Preliminary pile designs could be undertaken in advance of any supplementary assessment, if structural loads and a preferred pile layout were provided. This in turn would allow an estimate to be made of the depth required of any additional borehole that was deemed necessary for pile design purposes.

11.5.4 The additional ground investigation will likely involve dynamic probing in the Lambeth Group.

11.5.5 The suitability of the various pile types, lengths, diameters, and load capacities should be confirmed by consultation with a reputable specialist piling contractor, ideally with local experience.

11.6 Ground Floor Slabs

11.6.1 The underlying soils are considered to have low volume change potential, and consequently may heave. In addition, made ground was recorded to depths > 600 mm. Therefore, suspended ground floor slabs should be used incorporating suitable underfloor voids, based on the recommendations in NHBC Chapter 4.2, with reference to soils of low volume change potential.

11.6.2 Once the gas monitoring period is complete, this section will be reviewed to determine whether suspended ground floor slabs are required.

11.7 Groundwater and Excavations

11.7.1 Groundwater was not encountered during the site work. During the monitoring period groundwater levels ranged between 3.88 m bgl and dry. However, the groundwater levels may fluctuate due to seasonal or other effects, such as extreme, prolonged meteorological events or periods. Groundwater control / dewatering measures, such as sump pumping / well pointing should be considered for all excavations.

11.7.2 Boreholes carried out as part of this investigations may represent soft spots and conduits/sumps for groundwater or surface water. In excavations, such materials may also be loose and unstable. Unless specifically stated, exploratory hole locations should be regarded as approximate. Consideration should be given to accurate location of such features where it is considered they may impact on the proposed development.

11.7.3 Conventional mechanical backhoe excavators should prove suitable for excavation through the ground conditions encountered at the site. However, should occasional large obstructions be encountered in excavations, larger capacity excavators and pneumatic/hydraulic breakout equipment may be necessary.

11.7.4 The made ground deposits are in a loose state of compaction and will be subject to spalling and partial collapse within excavations. Deeper excavations are likely to be prone to rapid, unpredictable, large-scale collapse, particularly in the presence of groundwater inflows. Consequently, temporary support should be considered for all excavations where collapse is to be avoided. Heavier duty closed shoring should be provided for any excavation where human entry is necessary, in compliance with statutory requirements to ensure safe working conditions. Elevated concentrations of carbon dioxide have been recorded from the made ground, hence care should be taken when personnel enter excavations or other confined spaces, to ensure full ventilation is available and appropriate safety precautions taken.

11.8 Pavement Design

California Bearing Ratio

11.8.1 The near surface soils comprise variable made ground deposits, which indicates an equilibrium subgrade CBR value of <2.5 % (based upon Table 3.1 in Interim Advice Note 73/06 Rev 1 2009). This subgrade is considered unsuitable support for a pavement foundation and requires improvement. Options for improvement include; replacement of the weak soils with more suitable material, lime treatment, or the inclusion of geosynthetics.

11.8.2 It is recommended that the subgrade CBR value is verified immediately before placement of the pavement capping/subbase to confirm the minimum design CBR value. The design CBR value should not be increased on the basis of these tests. Should testing indicate a subgrade

CBR less than the design value, then measures should be taken to improve the subgrade before proceeding with pavement construction.

11.8.3 The results of three hand-held Dynamic Cone Penetrometer (DCP) tests recorded CBR values of between 8.3 % and 9.6 % at depths ranging between 0.15 – 0.60 m bgl. The DCP tests are assumed to have been undertaken in made ground, therefore it is the responsibility of the designer to determine the CBR value for road construction.

Frost Susceptibility

Cohesive Soils

11.8.4 Soils with a Plasticity Index of greater than 15% would not generally be frost-susceptible (i.e. susceptible to ice lenses formation in frosty conditions) (Croney and Jacobs, 1967). Cohesive soils encountered across the site at varying depths, with an average Plasticity Index of 26%. This indicates that the soils are not frost susceptible.

11.9 Ground Aggressivity to Buried Concrete

11.9.1 Chemical analyses of five samples have been undertaken in accordance with BRE SD1 2005 "Concrete in aggressive ground" to determine their concrete classification.

Table 11.1 Concrete Classification Assessment

Strata	Details	Range	Concrete Class
Made ground	Number of Tests	4	DS2 – AC2
	Water Soluble Sulphates (mg/l)	16 - 295	
	pH	7.4 – 8.9	
	Total Potential Sulphate %	0.01 – 0.26	
Lambeth Group	Number of Tests	1	DS1 – AC1
	Water Soluble Sulphates (mg/l)	400	
	pH	8	
	Total Potential Sulphate %	1.20 – 2.75	

11.9.2 On the basis of the above assessment, and in accordance with BRE SD1 (2005) "Concrete in aggressive ground", a Design Sulphate Class of DS2, with an ACEC of AC-2, would apply for all buried concrete.

12 CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

12.1.1 JNP Group has determined through desk-based research, intrusive investigation, laboratory testing, monitoring, and assessment that:

- Ground conditions at the site comprise a variable thickness of made ground was found to be underlain by both granular and cohesive deposits of the Lambeth Group;
- A risk to future end users is present from metal and hydrocarbon contaminants in made ground deposits;
- No risk to controlled waters is identified from leachate and groundwater testing;
- Gas protection measures to CS2 are recommended;.
- Traditional shallow strip or pad foundations are not considered feasible due to the variable nature and low bearing capacity of the made ground on site. Therefore, piles would be a suitable foundation solution on site.

12.2 Recommendations

12.2.1 In line with the guidelines given LCRM and consequent to the ground investigation conclusions; JNP Group recommends that:

- A remediation strategy report be produced for the site. This would include undertaking an options appraisal of potential remediation options and assess the feasibility of short-listed remedial options, undertaking a hazardous waste assessment, designing a sustainable remediation strategy for the site, and an outline validation plan.
- A tree survey be undertaken at the site, in order to be able to assess their impact upon foundations types and depths.
- A copy of this report is submitted to the Regulatory Authorities for their approval before any further work is undertaken at the site.

12.2.2 In addition, should materials management be required as part of the redevelopment works, JNP Group recommends that the proposed development works are undertaken in accordance with the definition of Waste Code of Practice (DoWCoP); in following this guidance and to ensure materials are managed correctly, a Materials Management Plan will need to be prepared and declared in advance by a Qualified Person, then implemented and documented in a Verification Report. If this process is not undertaken, then following recent changes in Landfill Tax Regulations by HMRC. There is a risk of penalties equating to twice the Landfill Tax being applied to the re-use of material o site. If the proposed works are to be undertaken outside the DoWCoP, there would need to be some of Environmental Permitting or suitable equivalent. The requirements of such are likely to be more onerous and may take longer to be granted.

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FIGURES / DRAWINGS

Project Name	The Bungalow, New Years Green Lane	**Record of Results for TRL DCP (Dynamic Cone Penetrometer)**	JNP GROUP CONSULTING ENGINEERS
Project No.	M44477		
Engineer	Ben Thrift		
Client	London Borough of Hillingdon Council		

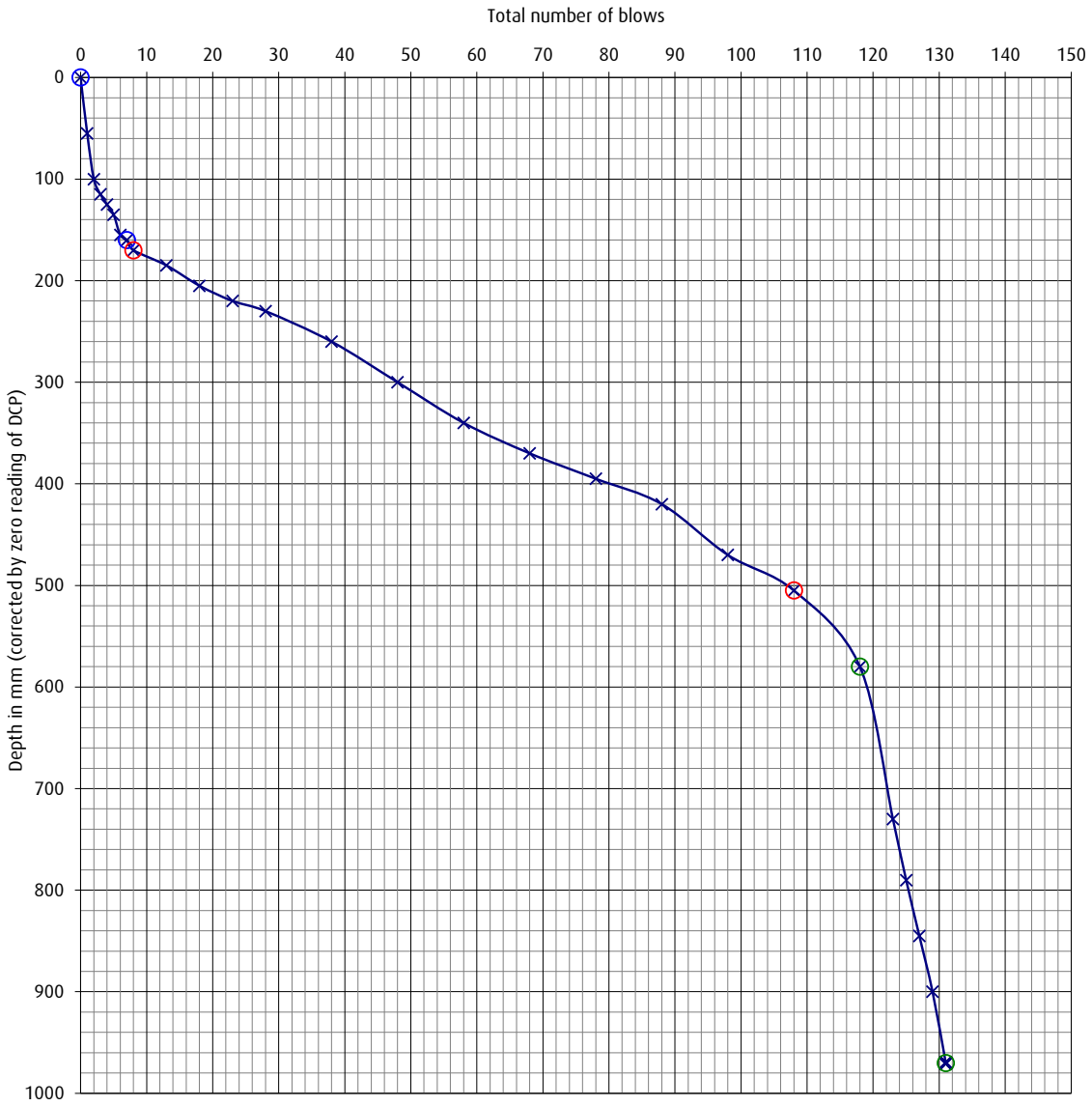
Test no	DCP1
Initial Depth	0 m

Number of blows	Total blows	Reading mm	Difference mm		Number of blows	Total blows	Reading mm	Difference mm
0	*0*	30	*0*					
1	*1*	85	*55*					
1	*2*	130	*45*					
1	*3*	145	*15*					
1	*4*	155	*10*					
1	*5*	165	*10*					
1	*6*	185	*20*					
1	*7*	190	*5*					
1	*8*	200	*10*					
5	*13*	215	*15*					
5	*18*	235	*20*					
5	*23*	250	*15*					
5	*28*	260	*10*					
10	*38*	290	*30*					
10	*48*	330	*40*					
10	*58*	370	*40*					
10	*68*	400	*30*					
10	*78*	425	*25*					
10	*88*	450	*25*					
10	*98*	500	*50*					
10	*108*	535	*35*					
10	*118*	610	*75*					
5	*123*	760	*150*					
2	*125*	820	*60*					
2	*127*	875	*55*					
2	*129*	930	*55*					
2	*131*	1000	*70*					

Remarks Undertaken from ground level

Recorded by:	Ben Thrift
Date:	08/05/2024

Project Name	The Bungalow, New Years Green Lane	**Record of Results for TRL DCP (Dynamic Cone Penetrometer)**	JNP GROUP CONSULTING ENGINEERS
Project No.	M44477		
Engineer	Ben Thrift		
Client	London Borough of Hillingdon Council		
Test no	DCP1	Initial Depth 0 m	



Remarks Undertaken from ground level

Recorded by:	Ben Thrift
Date:	08/05/2024

Project Name	The Bungalow, New Years Green Lane	**Record of Results for TRL DCP (Dynamic Cone Penetrometer)**	JNP GROUP CONSULTING ENGINEERS
Project No.	M44477		
Engineer	Ben Thrift		
Client	London Borough of Hillingdon Council		

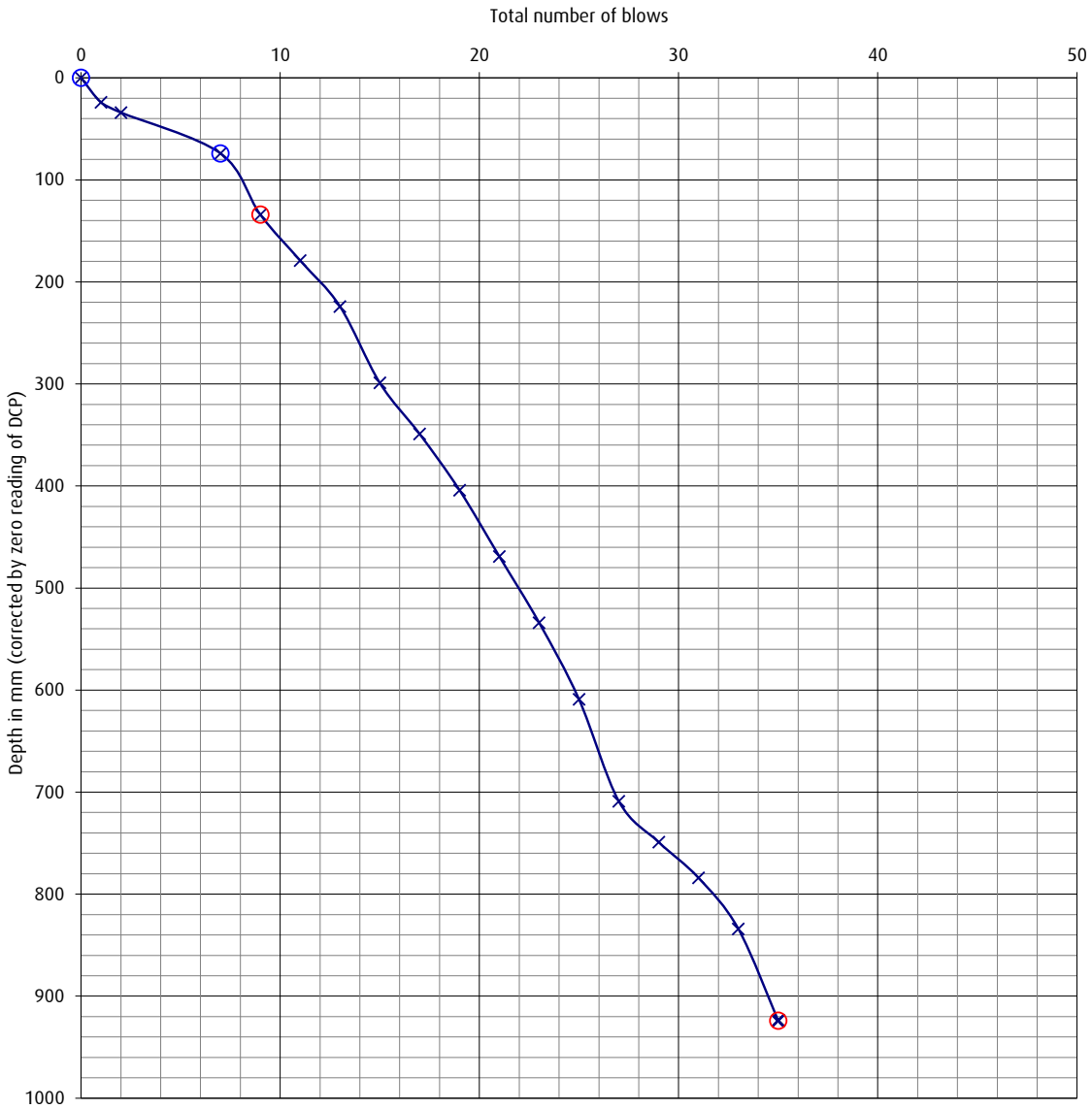
Test no	DCP2	Initial Depth	0 m

Number of blows	Total blows	Reading mm	Difference mm		Number of blows	Total blows	Reading mm	Difference mm
0	*0*	76	*0*					
1	*1*	100	*24*					
1	*2*	110	*10*					
5	*7*	150	*40*					
2	*9*	210	*60*					
2	*11*	255	*45*					
2	*13*	300	*45*					
2	*15*	375	*75*					
2	*17*	425	*50*					
2	*19*	480	*55*					
2	*21*	545	*65*					
2	*23*	610	*65*					
2	*25*	685	*75*					
2	*27*	785	*100*					
2	*29*	825	*40*					
2	*31*	860	*35*					
2	*33*	910	*50*					
2	*35*	1000	*90*					

Remarks Undertaken from ground level

Recorded by:	Ben Thrift
Date:	08/05/2024

Project Name	The Bungalow, New Years Green Lane	**Record of Results for TRL DCP (Dynamic Cone Penetrometer)**	JNP GROUP CONSULTING ENGINEERS
Project No.	M44477		
Engineer	Ben Thrift		
Client	London Borough of Hillingdon Council		
Test no	DCP2	Initial Depth 0 m	



Remarks Undertaken from ground level

Recorded by:	Ben Thrift
Date:	08/05/2024

Project Name	The Bungalow, New Years Green Lane	**Record of Results for TRL DCP (Dynamic Cone Penetrometer)**	JNP GROUP CONSULTING ENGINEERS
Project No.	M44477		
Engineer	Ben Thrift		
Client	London Borough of Hillingdon Council		

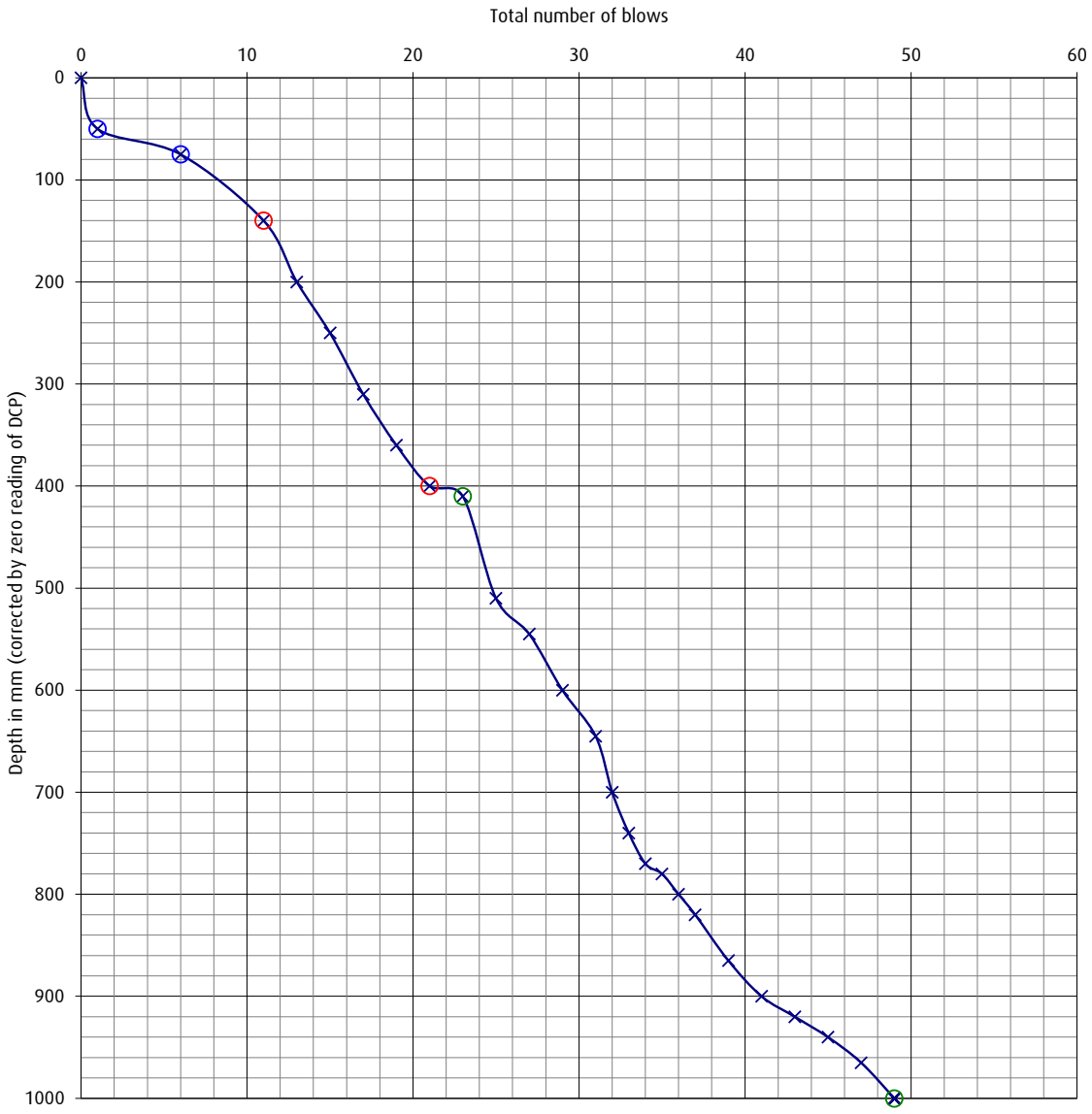
Test no	DCP-BH01	Initial Depth	0 m

Number of blows	Total blows	Reading mm	Difference mm		Number of blows	Total blows	Reading mm	Difference mm
0	*0*	0	*0*					
1	*1*	50	*50*					
5	*6*	75	*25*					
5	*11*	140	*65*					
2	*13*	200	*60*					
2	*15*	250	*50*					
2	*17*	310	*60*					
2	*19*	360	*50*					
2	*21*	400	*40*					
2	*23*	410	*10*					
2	*25*	510	*100*					
2	*27*	545	*35*					
2	*29*	600	*55*					
2	*31*	645	*45*					
1	*32*	700	*55*					
1	*33*	740	*40*					
1	*34*	770	*30*					
1	*35*	780	*10*					
1	*36*	800	*20*					
1	*37*	820	*20*					
2	*39*	865	*45*					
2	*41*	900	*35*					
2	*43*	920	*20*					
2	*45*	940	*20*					
2	*47*	965	*25*					
2	*49*	1000	*35*					

Remarks Undertaken from ground level

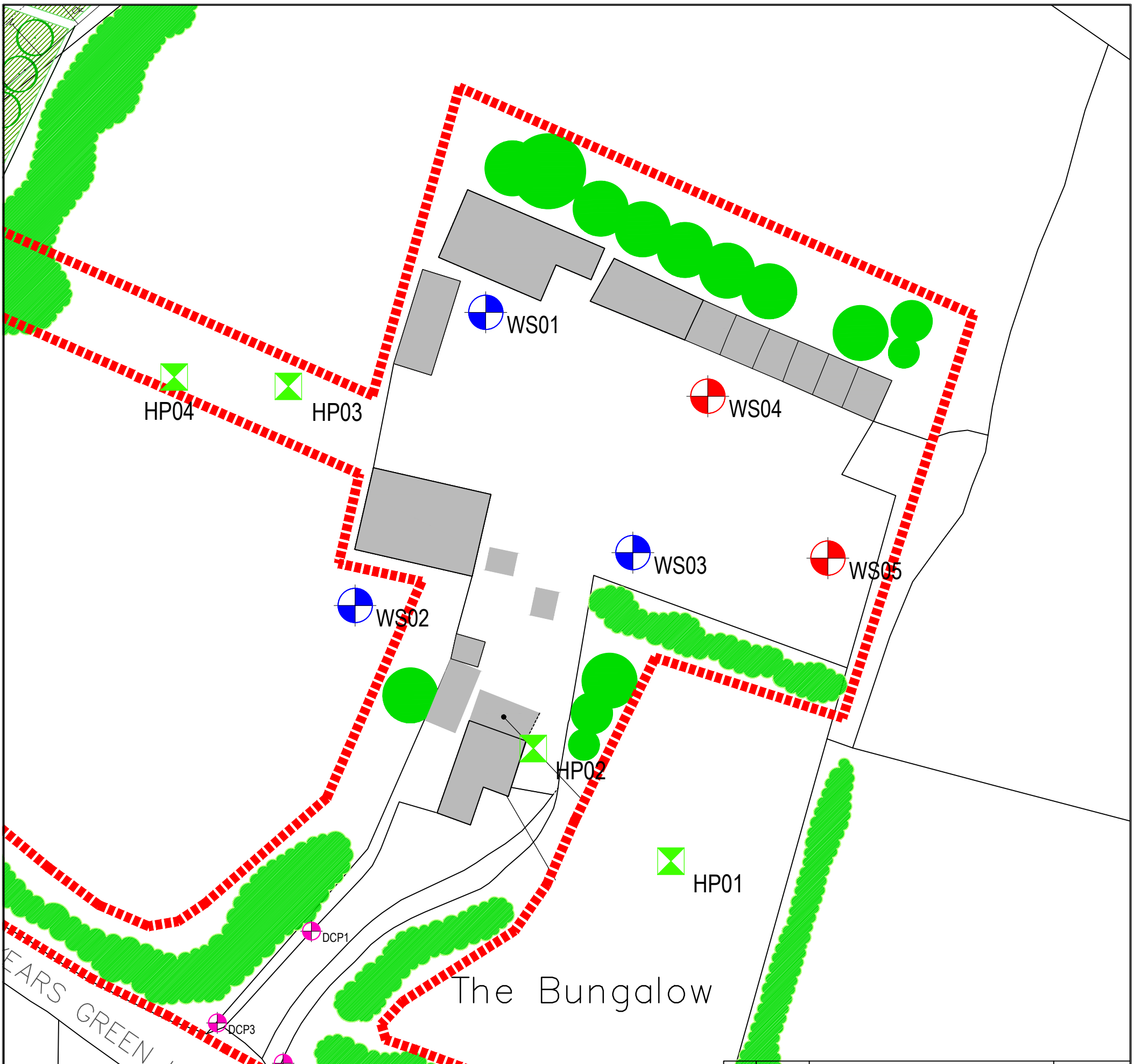
Recorded by:	Ben Thrift
Date:	08/05/2024

Project Name	The Bungalow, New Years Green Lane	**Record of Results for TRL DCP (Dynamic Cone Penetrometer)**	JNP GROUP CONSULTING ENGINEERS
Project No.	M44477		
Engineer	Ben Thrift		
Client	London Borough of Hillingdon Council		
Test no	DCP-BH01	Initial Depth 0 m	



Remarks Undertaken from ground level

Recorded by:	Ben Thrift
Date:	08/05/2024



Rev.	Date	Description	Drn / Chk'd / App'd
P01	10/05/2024	First Issue	CG/HI/HI

Suitability:

S2 - Suitable for Information

Client:

London Borough of Hillingdon Council

Job:

The Bungalow, New Years Green Lane

Title:

Exploratory Hole Location Plan

Classification:

FI_60_20

Scale @ A3:

As Shown

JNP GROUP
CONSULTING ENGINEERS
● Amersham ● Brighouse ● Bristol ● Glasgow
● Hartlepool ● Sheffield ● Warwick
www.jnpgroup.co.uk

Project - Originator - Volume/System - Level/Location - Type - Discipline - Number

M44477 - JNP - XX - XX - DR - G - 2003

Document/Drawing Number

Revision:

P01

JNP Group Internal Project Number: M44477

Figure 1

Site Location Plan

Project:

The Bungalow, New Years Green Lane

Project No:

M44477

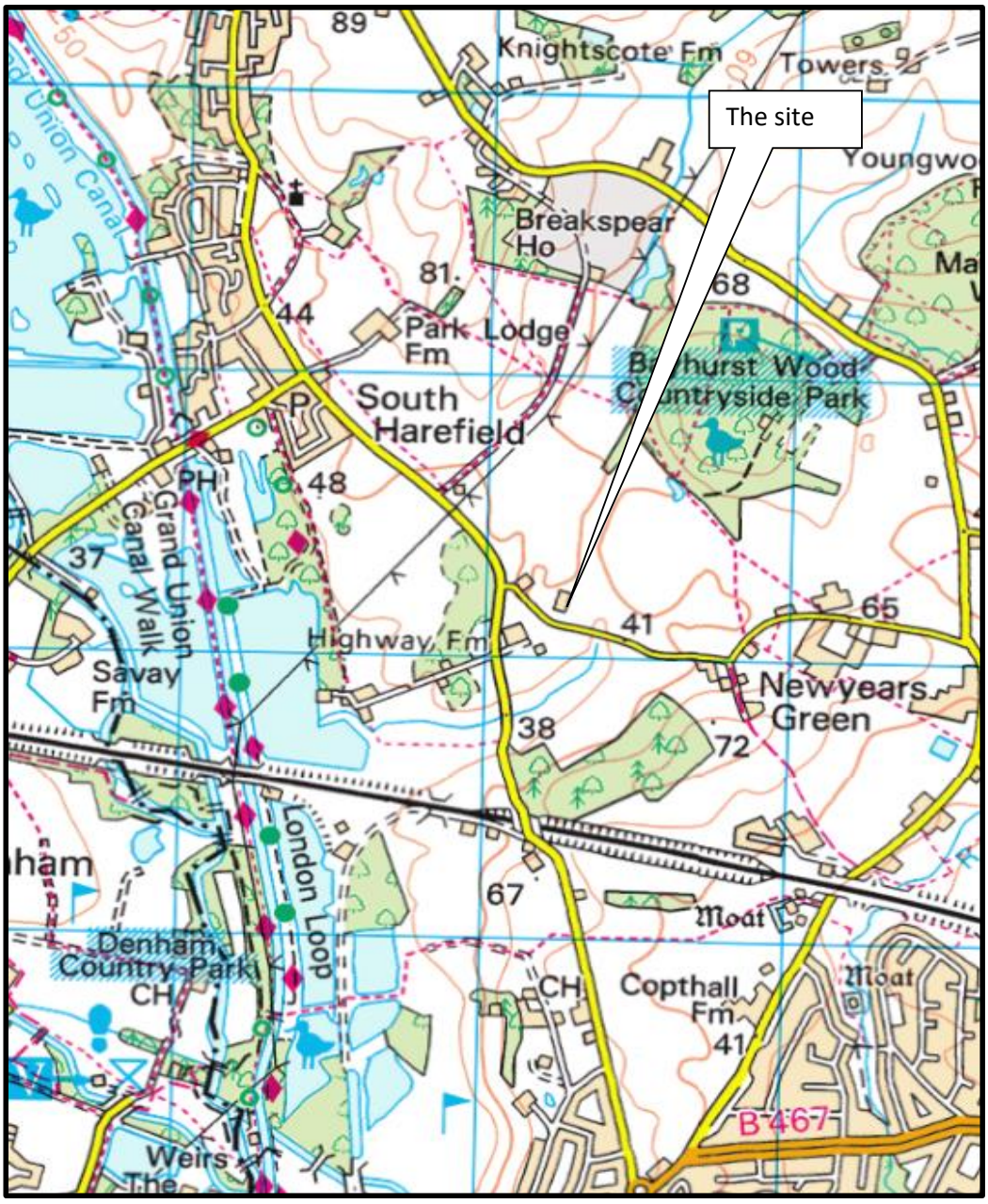


Figure 2

SPT / Depth Relationship

Project:

The Bungalow, New Years Green Lane

Project No:

M44477

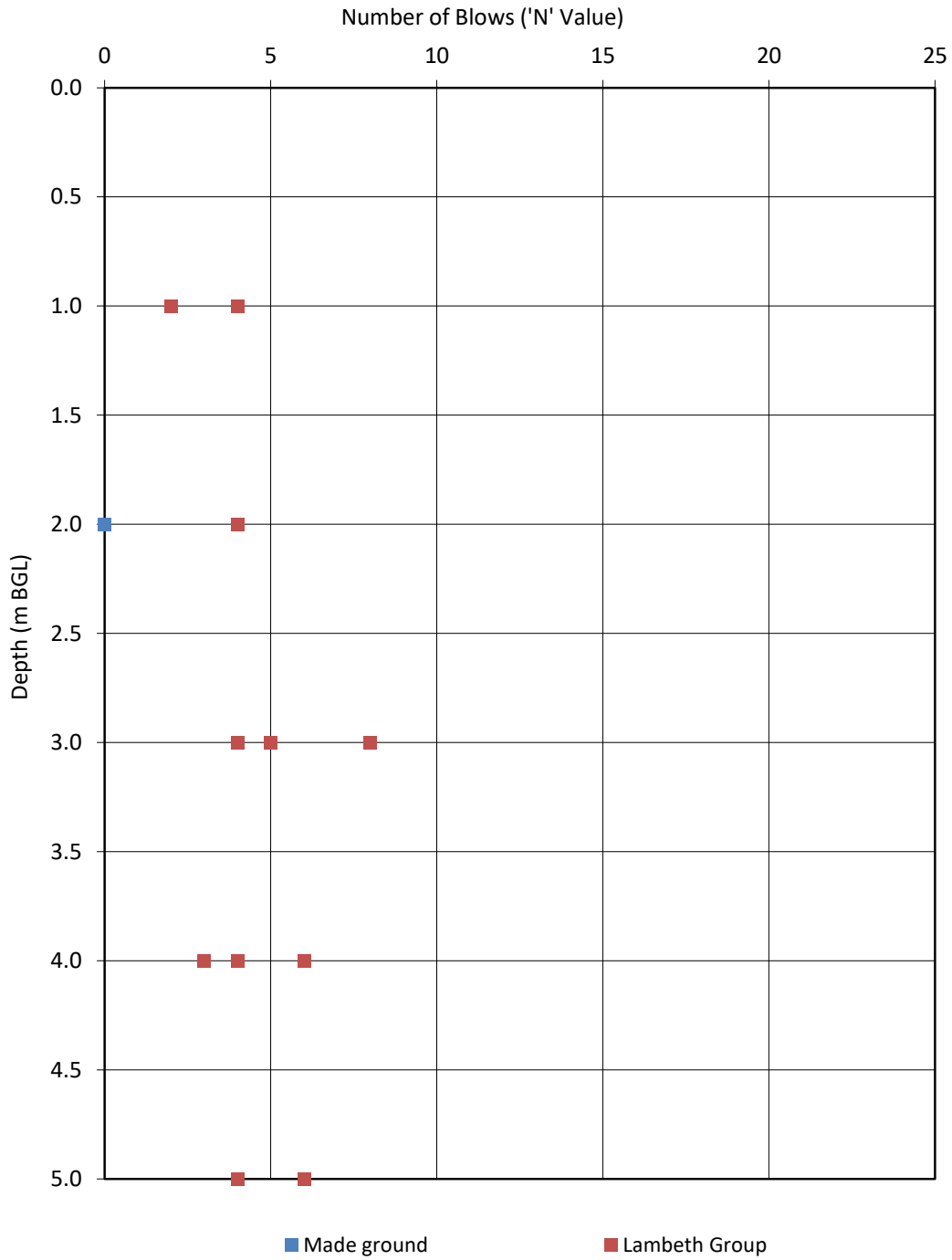


Figure 3

Undrained Shear Strength / Depth Relationship

Project:

The Bungalow, New Years Green Lane

Project No:

M44477

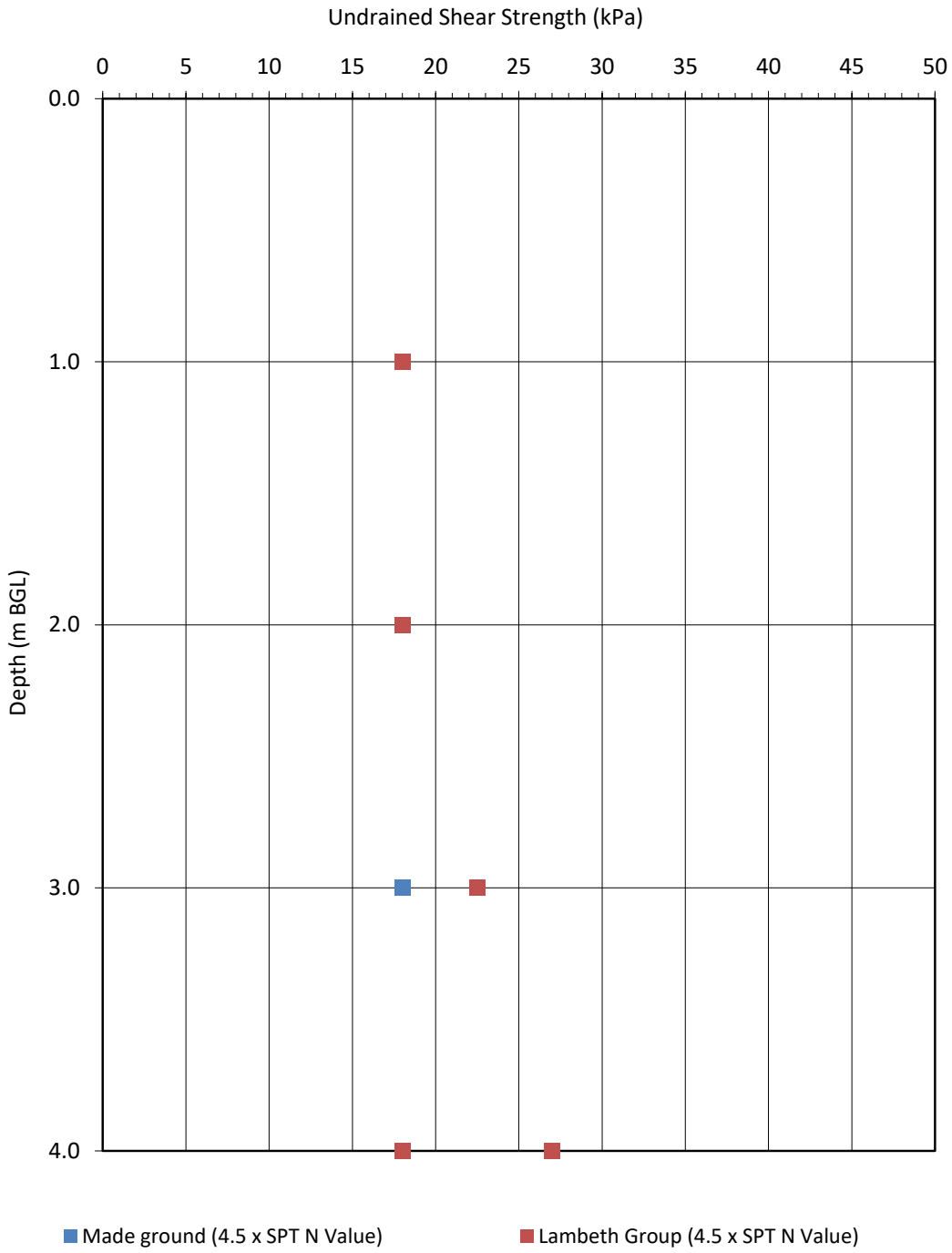


Figure 4

Plasticity Index Chart

Project:

The Bungalow, New Years Green Lane

Project No:

M44477

Key:
C Clay M Silt

L Low plasticity
I Intermediate plasticity
H High plasticity
V Very high plasticity
E Extremely high plasticity

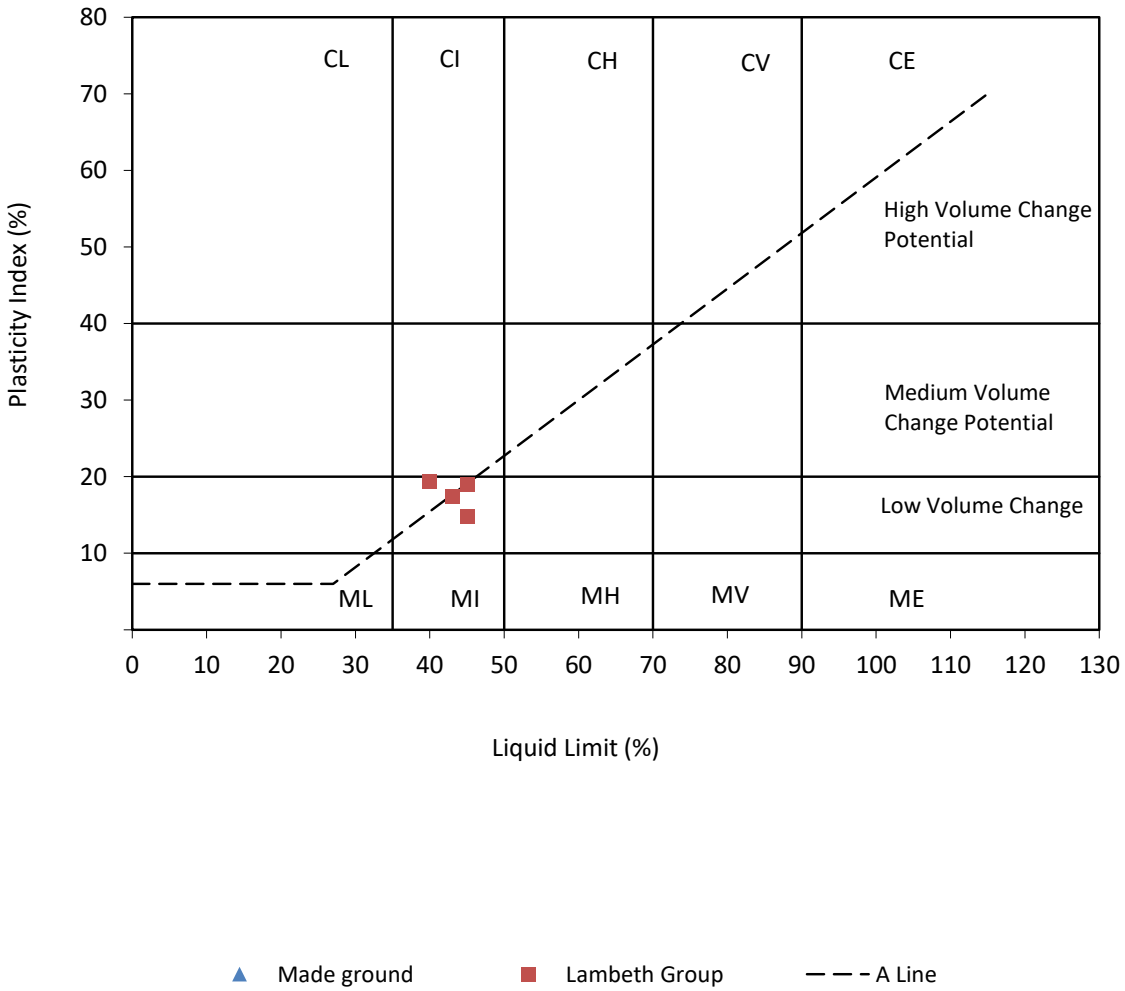


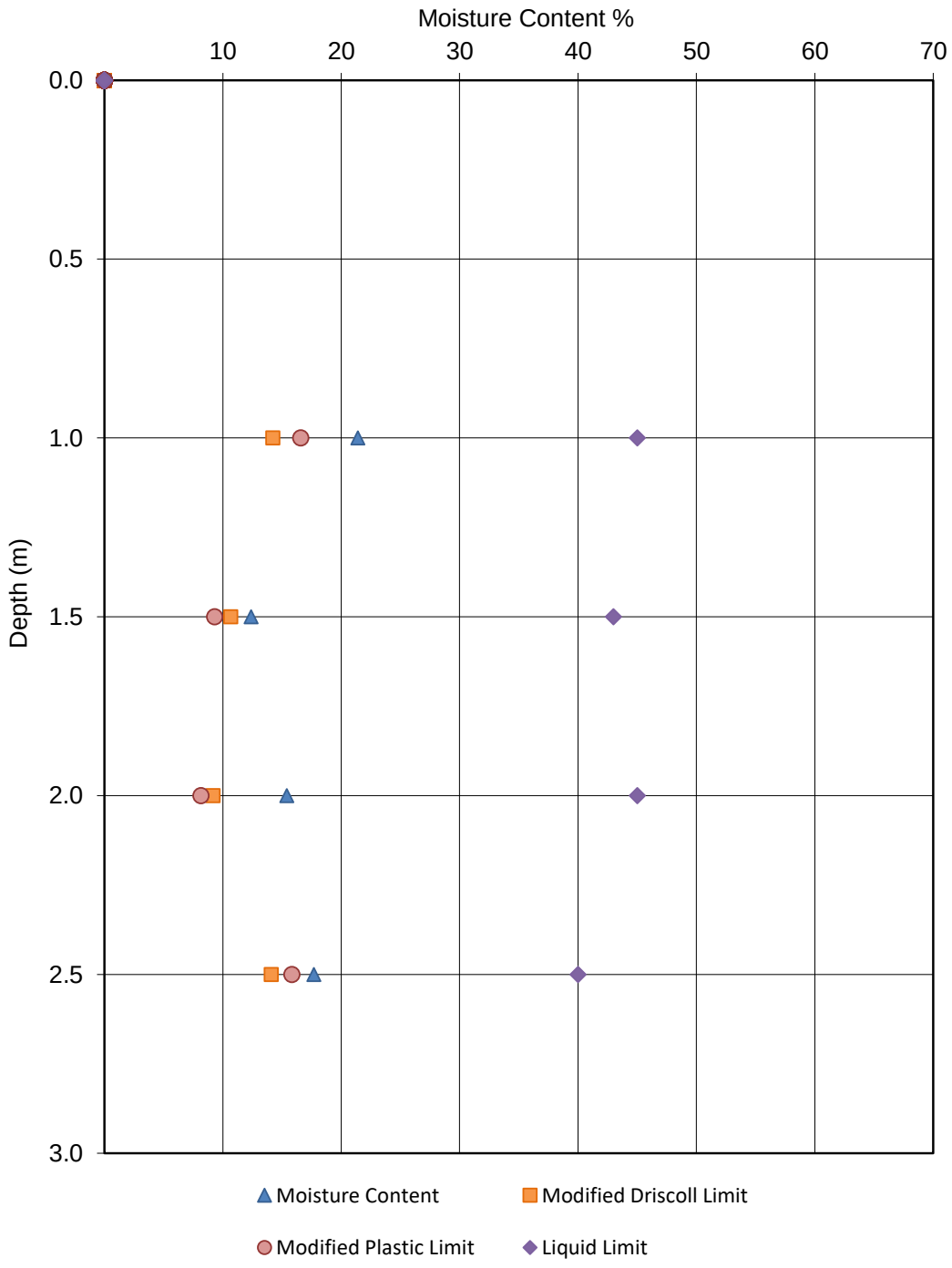
Figure 5 **Moisture Content / Depth Relationship**

Project:

The Bungalow, New Years Green Lane

Project No:

M44477



APPENDIX A: LIMITATIONS

INTRODUCTION

This report is confidential and has been prepared solely for the benefit of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from JNP Group; a charge may be levied against such approval. JNP Group accepts no responsibility or liability for the consequences of this document being used for any purpose or project other than for which it was commissioned, and: this document to any third party with whom and agreement has not been executed.

Any comments given within this report are based on the understanding that the proposed works to be undertaken will be as described in the introduction and the information referred to and provided by others and will be assumed to be correct and will not have been checked by JNP Group and JNP Group will not accept any liability or responsibility for any inaccuracy in such information.

Any deviation from the recommendations or conclusions contained in this report should be referred to JNP Group in writing for comment and JNP Group reserve the right to reconsider their recommendations and conclusions contained within. JNP Group will not accept any liability or responsibility for any changes or deviations from the recommendations noted in this report without prior consultation and our full approval.

The details contained within this report reflect the site conditions prevailing at the time of investigation. JNP Group warrants the accuracy of this report up to and including that date. Additional information, improved practice or changes in legislation may necessitate this report having to be reviewed in whole or in part after that date. If necessary, this report should be referred back to JNP Group for re-assessment and, if necessary, re-appraisal.

This report is only valid when used in its entirety. Any information or advice included in the report should not be relied upon until considered in the context of the whole report. Whilst this report and the opinion made herein are correct to the best of JNP Group' belief, JNP Group cannot guarantee the accuracy or completeness of any information provided by third parties.

The report represents the finding and opinions of experience geotechnical and geo-environmental engineers. JNP Group does not provide legal advice and the advice of lawyers may also be required.

It should be noted that the following were not included as part of the agreed scope of works with the client: detailed ecological surveys.

JNP Group has provided advice and made recommendations based on the findings of the work undertaken, however this is subject to the approval / acceptance by the relevant Regulatory Authorities.

Objectives

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, JNP Group reserves the right to review such information and, if warranted, to modify the opinions accordingly. It should be noted

that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Intrusive Investigations

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made.

Where intrusive investigations have been undertaken, they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature sampling, no investigation technique is capable of identifying all conditions present in all areas. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised “hotspots” of contamination where concentrations may be significantly higher than those actually encountered. The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

The objectives of the investigation have been linked to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and ground water. The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to areas unoccupied by the building(s) on the site and by buried services.

Gas and groundwater levels may vary from those reported due to seasonal, or other effects.

Although preliminary comment has been provided by JNP Group regarding UXO and Invasive Species, JNP Group not experts in these and as such specialist advice should be sought regarding the presence of UXO and invasive species at the site.

A Phase I UXO report was obtained for the site and reviewed by JNP Group. The recommendations included site supervision for intrusive works and a Phase II UXO report. The former was carried out during the site investigation. The latter has been commissioned and is due for completion prior to the construction phase of the proposed development.

Gas Membranes

Where JNP Group are commissioned to undertake the inspection and validation of a gas membrane, we, at the time of inspection, will ensure that the membrane is laid in accordance with the relevant arrangements and sections. At that time we will ensure that the venting media is laid correctly in preparation of the membrane and we will ensure that any tears in the membrane or bad workmanship is reported and instructions given to be rectified. Thereafter it is the duty of the Principal Contractor to ensure that tears and defects are rectified.

Remediation and Verification Reports Limitations

The risk assessment and opinions provided, inter alia, take into consideration currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Where intrusive investigations have been undertaken, they have been designed to provide a reasonable level of assurance on the conditions. Given the discrete nature sampling, no investigation technique is capable of identifying all conditions present in all areas. The number of sampling points

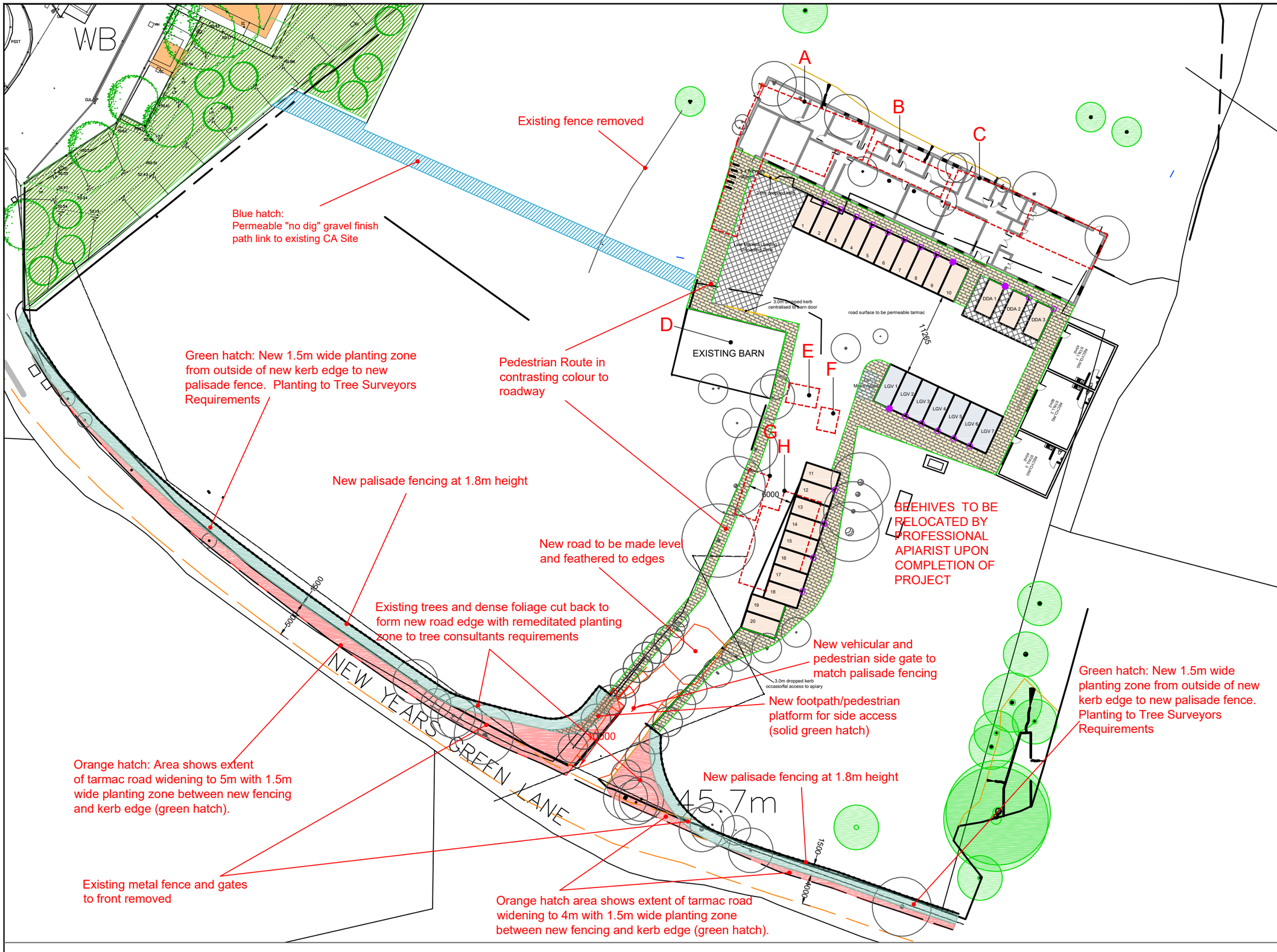
and the methods of sampling and testing do not preclude the existence of localised “hotspots” of contamination where concentrations may be significantly higher than those actually encountered.

If costs have been included in relation to the site remediation these must be confirmed by a qualified quantity surveyor. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed from Third Party should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, JNP Group reserves the right to review such information and, if warranted, to modify the opinions accordingly.

Whilst this report and the opinion made herein are correct to the best of JNP Group’s belief, JNP Group cannot guarantee the accuracy or completeness of any information provided by third parties.

Gas and groundwater levels may vary from those reported due to seasonal, or other effects.

APPENDIX B: THIRD PARTY DRAWINGS



NOTES

BUILDING STRUCTURES WITHIN, SITE APPROX AREA = 564.4m² (ESTIMATED VOLUME IN m³ IN BRACKETS)

A - 168.5m²	(354.8m³)
B - 36.6m²	(97.0m³)
C - 112.9m²	(229.6m³)
D - 127.5m²	(570.0m³)
E - 11m²	(21.6m²)
F - 7.9m²	(16.0m³)
G - 18.7m²	(41.2m³)
H - 81.3m²	(271.0m³)

Total Area = 564.4m²

Total Volume = 1601.2m³

Total Volume Retained = 570m³

PARKING:
Parking coordinates with planning application-

20	Standard Car Parking Spaces
3	Mobility Spaces
7	Light Goods Vans
4	Motorcycle Spaces
5	Bicycle Spaces

EV Chargers: 3 Active
: 19 Passive
EV charger requirement
5% of 30 Active = 2
5% of 30 Passive = 2

Rev	Revision notes	Initials	Date
C	Boundary fence height reduced. 19 passive chargers total added as per planners recommendations. "no dig" note added to path link	db	15.05.23
B	Car Parking layout revised match brief and planning application. Notes amended and added. "Demolitions Shown" in title block amended.	db	15.05.23
A	Layout re-drawn using topographical map. Hatches added to show cut backs, routes, and planting zones. Notes added	db	23.01.23

HILLINGDON
LONDON
PLACE DIRECTORATE
CAPITAL PROGRAMME WORKS SERVICE
2E/10, CIVIC CENTRE, UXBRIDGE, UB8 1UW
Tel: 01895 250 111 www.hillingdon.gov.uk

PROJECT
THE BUNGALOW SITE
NEWYEARS GREEN LANE,
HAREFIELD, UB9 6LX

DESCRIPTION
THE BUNGALOW SITE
PROPOSED SITE LAYOUT WITH CAR PARKING & DEMOLITIONS SHOWN

SCALE	DRAWN BY	CHECKED BY	DATE
1:500 @ A3	DB	SV	JAN 2023

DRAWING No. 2022/D/334/P/03 REV. C

NOTES:

- TO BE READ IN CONJUNCTION WITH LANDSCAPE PLAN DRAWING 2022/D/334/P/07 OR LATEST REVISION
- TO BE READ IN CONJUNCTION WITH ARBORICULTURAL LANDSCAPE ARCHITECTS "DESIGN RATIONALE & PLANTING SPECIFICATION" REF TH3858 LSCP OR LATEST REVISION - 16/03/23
- TO BE READ IN CONJUNCTION ARBORICULTURAL LANDSCAPE ARCHITECTS DRAWING REF TH3858 OR LATEST REVISION - 16/03/23
- ALL PLANTING OUTSIDE SITE BOUNDARY IS INDICATIVE AND DOES NOT FORM PART OF THE APPLICATION

0 10 20 30 40 50m

Scale 1:500

APPENDIX C: REGULATORY CORRESPONDENCE

creating a better place

Environment Agency

Nesha Burnham
London Borough of Hillingdon
Development Control
Civic Centre High Street
Uxbridge
Middlesex
UB8 1UW

Our ref: NE/2022/135123/02
Your ref: 29665/APP/2022/2534

Date: 04 October 2023

Dear Nesha,

The Bungalow, New Years Green Lane, Harefield, UB9 6LX.

Demolition of existing bungalow, all stable structures, and outbuildings. Erection of staff facilities, recycling stalls and recladding of existing Barn. Widening of road, link access to Civic Amenity site, installation of new boundary fence and gates including all associated external works.

Thank you for re-consulting us on the above planning application on 14 September 2023. As part of the consultation, we have reviewed the following information:

- Hydraulic Modelling Report prepared by Ambiental Environmental Assessment, dated 4 September 2023 (ref: 6933-RHD-ZZ-XX-RP-Z-0001, project number: 6933)

Environment Agency Position
Following the submission of new documents, we are now in a position to remove part one of our previous objection (NE/2023/135123/01) on flood risk. The modeling submitted has considered the relevant onsite conditions, including a 100% culvert blockage upstream of the site. This sufficiently and proportionately demonstrates that this development is not at risk of fluvial flooding from the 1in20, 1in30 and 1in100 + climate change flood events. Despite this, we will be **maintaining our other objection** in relation to insufficient information determining the risks to groundwater.

Objection – Insufficient information determining the risks to groundwater
We object to the planning application, as submitted, because the risks to groundwater from the development are unacceptable. The applicant has not supplied adequate information to demonstrate that the risks posed to groundwater can be satisfactorily managed. We recommend that planning permission should be refused on this basis in line with paragraph 174, 183 and 184 of the National Planning Policy Framework and Policy DMEI 12 of Hillingdon's Local Plan Part 2 - Development Management Policies.

Reasons
We object to this proposal as this planning application does not demonstrate that the risks of pollution to controlled waters are understood, acceptable, or can be appropriately managed.

Cont/d..

Part of the proposed development (the link road) is located within the New Years Green Lane Landfill. The New Years Green Landfill was designated as Contaminated Land and a Special Site under Part 2A of the Environmental Protection Act 1990 by the London Borough of Hillingdon May 2011. A Special Site is a site that has been determined as Contaminated Land, where a source-pathway-receptor contaminant linkage with respect to controlled water has been identified, and regulation has been transferred to the Environment Agency. We have included a redline boundary plan indicating the extent of the Contaminated Land at New Years Green Landfill (Attachment 1). In addition, as the planning application is not supported by an appropriate risk assessment, it does not meet the requirements set out in paragraphs 183 and 188 of the National Planning Policy Framework.

Overcoming our objection
The applicant should submit a preliminary risk assessment which includes a desk study, conceptual model, and initial risk assessment. This information must demonstrate to the Environment Agency and the Local Planning Authority that the risk to controlled waters has been fully understood, that the proposed development will not exasperate the current known risk to groundwater at the site or the development will incorporate measures that will prevent the known conditions at the site from deteriorating further.

Advice to the Local Planning Authority

Connection to mains foul drainage not feasible (no foul drainage assessment submitted)
Government guidance contained within the national Planning Practice Guidance (Water supply, wastewater and water quality – considerations for planning applications, paragraph 020) sets out a hierarchy of drainage options that must be considered and discounted in the following order:

1. Connection to the public sewer

2. Package sewage treatment plant (adopted in due course by the sewerage company or owned and operated under a new appointment or variation)

3. Septic Tank

Foul drainage should be connected to the main sewer. Where this is not possible, under the Environmental Permitting Regulations 2016 any discharge of sewage or trade effluent made to either surface water or groundwater will need to be registered as an exempt discharge activity or hold a permit issued by the Environment Agency, additional to planning permission. This applies to any discharge to inland freshwaters, coastal waters or relevant territorial waters.

Please note that the granting of planning permission does not guarantee the granting of an Environmental Permit. Upon receipt of a correctly filled in application form we will carry out an assessment. It can take up to 4 months before we are in a position to decide whether to grant a permit or not.

Domestic effluent discharged from a treatment plant/septic tank at 2 cubic metres or less to ground or 5 cubic metres or less to surface water in any 24 hour period must comply with General Binding Rules provided that no public foul sewer is available to serve the development and that the site is not within an inner Groundwater Source Protection Zone.

Cont/d..

A soakaway used to serve a non-mains drainage system must be sited no less than 10 metres from the nearest watercourse, not less than 10 metres from any other foul soakaway and not less than 50 metres from the nearest potable water supply.

Where the proposed development involves the connection of foul drainage to an existing non-mains drainage system, the applicant should ensure that it is in a good state of repair, regularly de-sludged and of sufficient capacity to deal with any potential increase in flow and loading which may occur as a result of the development.

Where the existing non-mains drainage system is covered by a permit to discharge then an application to vary the permit will need to be made to reflect the increase in volume being discharged. It can take up to 13 weeks before we decide whether to vary a permit.

Further advice is available at: Septic tanks and treatment plants: permits and general binding rules.

Advice to the applicant

Water Resources
Increased water efficiency for all new developments potentially enables more growth with the same water resources. Developers can highlight positive corporate social responsibility messages and the use of technology to help sell their homes. For the homeowner lower water usage also reduces water and energy bills.

We endorse the use of water efficiency measures especially in new developments. Use of technology that ensures efficient use of natural resources could support the environmental benefits of future proposals and could help attract investment to the area. Therefore, water efficient technology, fixtures and fittings should be considered as part of new developments.

Commercial/Industrial developments
We recommend that all new non-residential development of 1000sqm gross floor area or more should meet the BREEAM ‘excellent’ standards for water consumption.

We also recommend you contact your local planning authority for more information.

Pre-Application Advice
We strongly encourage applicants to seek our pre-application advice to ensure environmental opportunities are maximised and to avoid any formal objections from us. If the applicant had come to us, we could have worked with them to resolve these issues prior to submitting their planning application. The applicant is welcome to seek our advice now to help them overcome our objection via HNLSustainablePlaces@environment-agency.gov.uk.

Further information on our charged planning advice service is available at; https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions.

Final comments
Thank you for contacting us regarding the above application. Our comments are based on our available records and the information submitted to us. Please quote our reference number in any future correspondence. Please provide us with a copy of the decision notice for our records. This would be greatly appreciated.

Cont/d..

If you are minded to approve the application contrary to our objection, please contact us to explain why material considerations outweigh our objection. This will allow us to make further representations.

Should you have any queries regarding this response, please contact me.

Yours sincerely,

Elizabeth Clements
Sustainable Places Planning Advisor

E-mail: HNLSustainablePlaces@environment-agency.gov.uk | Tel: 02077644285

End

HILLINGDON
LONDON

Environmental Protection Act 1990 Section 78B

Record of the Determination that the Land known as 'New Years Green Lane Landfill Site' is Contaminated Land

In accordance with Part 2A of the Environmental Protection Act 1990 the London Borough of Hillingdon has determined that the land at: The former **'New Years Green Lane Landfill Site'**

National Grid Reference: 506286 E and 188274 N:

Is Contaminated Land as defined by Section 78A (2) of the Environmental Protection Act 1990, because:

The London Borough of Hillingdon has identified the presence of a contamination source, a pathway and receptor with respect to the current use of the land. The London Borough of Hillingdon is satisfied that the pollution of controlled waters is being caused. The London Borough of Hillingdon is also satisfied there is a significant possibility of significant harm being caused from landfill gas with no suitable and sufficient risk management arrangements in place to prevent such harm (as defined in Table B2 of the Statutory Guidance to Part 2A).

A summary of the basis on which this determination has been made is set out in the following schedule to this record

Signed

P. Law

Dated

26th May 2011

Peggy Law
Consumer Protection Manager
Planning, Environment, Education and Community Services

INVESTOR IN PEOPLE

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Planning, Environment, Education and Community Services
T.01895 250155 F.01895 277443
London Borough of Hillingdon,
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Schedule of Determination

London Borough of Hillingdon
Environmental Protection Act 1990, Part 2A – Section 78B
Record of Determination of the Land at the Former Landfill Site at New Years Green Lane, Harefield, Middlesex

1. Introduction and Site Location

Paragraph B.52 of the Statutory Guidance (DEFRA Circular 01/2006) requires local authorities to prepare a written record of determination that particular land is contaminated land for the purposes of Part 2A of the Environmental Protection Act 1990. This document outlines why the London Borough of Hillingdon, 'the Council' has determined that the land at the New Years Green Lane Former Landfill site is 'Contaminated Land'.
The Council owned site now known as New Years Green Landfill is located at Grid Ref 506286 E and 188274 N approximately 2 km south east of Harefield as shown edged red on the attached plan, Figure 1. The site extends for an area of over 70 Ha and is currently used for rough grazing. Formerly the site was used as a sand and gravel quarry which was in-filled with domestic waste during the 1960s and 1970s. Following tipping by the Greater London Council the site was capped to make it suitable for its current use. There are three residential buildings and a Civic Amenity Centre situated at the site boundary and three farms surround it. The waste appears to extend under the Civic Amenity Centre land. Highway Farm is also partially tipped. The site geology identified through the various investigation boreholes comprises of a clay topsoil cover over the waste. Under the waste lie the sands, gravels and clays of the Reading Formation and below this is the Upper Chalk. Although no details of the construction and previous operation of the site are available, it is understood that the chalk was not to be exposed during the mineral extraction and a 6ft thickness of overburden was to be placed prior to tipping. The Reading formation contains clay but is not generally regarded as a competent geological barrier. It is described as a Secondary Aquifer by the Environment Agency, 'EA'. It may retard but is unlikely to completely prevent the passage of contaminated liquids into the chalk aquifer beneath. There is evidence of perched waters within the fill material above the Reading formation and a known principal aquifer is in the underlying chalk. The majority of the site overlies the outer source protection zone for the Ickenham Public Water Supply with a small part of the site overlying the inner source protection zone. It is assumed that there is a potential for contamination to overly the inner source protection zone because there is little information regarding the nature and location of tipped material. The New Years Green Bourne runs through the site in a culvert from an ephemeral pond to the north of the site entering the Colne/Grand Union system to the West at Dews Farm. The River Pinn and River Colne are over 700m from the site and there is no indication of a connection between contamination on site and of these two rivers.

2. Description of the Significant Pollutant Linkages

Table 1 Significant Pollutant Linkages

Linkage ID[1]	Contaminant	Migration and Exposure pathways	Receptor	Comment
1	Ammonia (NH_3 as N)	Leaching from contaminated fill	Groundwater (SPZ 1)	Regulation 3(a) linkage
2	Ammonium (as NH_4)	Leaching from contaminated fill	Groundwater (SPZ 1)	Regulation 3(a) linkage
3	Benzene	Leaching from contaminated fill	Groundwater (SPZ 1)	Regulation 3(c) linkage
4	Calcium	Leaching from contaminated fill	Groundwater (SPZ 1)	
5	Chlorobenzene	Leaching from contaminated fill	Groundwater (SPZ 1)	Regulation 3(c) linkage
6	1,1-Dichloroethane (1,1-DCE)	Leaching from contaminated fill	Groundwater (SPZ 1)	Regulation 3(c) linkage
7	Iron	Leaching from contaminated fill	Groundwater (SPZ 1)	Regulation 3(a) linkage
8	Magnesium	Leaching from contaminated fill	Groundwater (SPZ 1)	
9	Mecoprop	Leaching from contaminated fill	Groundwater (SPZ 1)	Regulation 3(c) linkage
10	Potassium	Leaching from contaminated fill	Groundwater (SPZ 1)	
11	Sulphate	Leaching from contaminated fill	Groundwater (SPZ 1)	
12	TPH >C6-C40	Leaching from contaminated fill	Groundwater (SPZ 1)	Regulation 3(c) linkage
13	Ammonia (NH_3 as N)	Migration of leachate into Culvert	Surface Waters	
14	Ammonium (as NH_4)	Migration of leachate into Culvert	Surface Waters	
15	Chloride	Migration of leachate into Culvert	Surface Waters	
16	Sodium	Migration of leachate into Culvert	Surface Waters	
17	Sulphate	Migration of leachate into Culvert	Surface Waters	
18	TPH C6 – C40	Migration of leachate into Culvert	Surface Waters	
19	Methane	Migration to buildings (inhalation)	Humans (asphyxiant)	
20	Carbon Dioxide	Migration to buildings (inhalation)	Humans (asphyxiant)	
21	Methane	Migration to buildings and ignition of gas	Buildings (explosion hazard)	

[1] There are different numbers referenced in the original Conceptual Model in the Atkins Report (2006)

Table 1 – Twenty one significant pollutant linkages (SPLs) have been identified by the Council. The SPLs which form the basis of this determination have been grouped according to the exposure pathway as shown in the Table 1 as required by paragraph B52(a) of the statutory Guidance to Part 2A. The linkages specific to Regulations 3(a) and 3(c) are indicated because they are required for designation as a Special Site. The other linkages part of the evidence to determine the site as Contaminated Land.

3. Physical Extent of the Land

The extent of the 'Contaminated Land' has been decided upon by the Council as the area marked as Red on Figure 1 as appended to this record of determination (following Page 17).

Guidance on the considerations that are relevant to determining the extent of contaminated land can be found in paragraphs B32 – B36 of DEFRA Circular 01/2006. Highway Farm and the Civic Amenity Site have not been included in the area of determination. The greater part of any contamination source is thought to be located at New Years Green Landfill Site as shown on Figure 1. Highway Farm was a lesser part of the old landfill area and was remediated to a suitable for use standard under the planning regime in 2006. Investigations by consultants to the owners of Highway Farm in 2003 and subsequent groundwater monitoring from 2006 to 2010 confirmed that the ammonia concentrations were higher in the monitoring boreholes outside of Highway Farm next to New Years Green Landfill. This indicated that the predominant source of groundwater contamination was most likely New Years Green Landfill to the immediate north of Highway Farm. The Civic Amenity Site is currently subject to a planning permission for redevelopment. The three residential properties surrounding the landfill are not included as they do not appear to be located on landfill although the landfill extends to the edge of their gardens.

The area of determination is defined as recommended by the Environment Agency in their Detailed Advice of 2008. The land determined is the area of land where it is established that there is the presence of significant pollutants in the landfill leachate and high levels of landfill gas (B32(a)).

4. Summary of the evidence on which the determination is based (B.52 (b))

The landfill was considered as a potential source of ammonia pollution at the public water supply borehole as far back as 1985. Pollution by ammonia in the New Years Bourne was first brought to the Council's attention by the National Rivers Authority on 15 June 1995. The Council was informed by the Environment Agency, 'EA' of the closure of the Ickenham Public Water Supply Borehole by the Three Valleys Water Company, 'TVWC' due to pollution levels on 21 May 1997. The ammonia had been treated at the public supply but

the treatment system failed due to iron concentrations within the groundwater. The EA also again indicated that the landfill was known to cause pollution in the watercourse which runs in a culvert below the site. The Council also found high ammonia levels in the watercourse, part of the New Years Green Bourne Stream. The landfill was seen by the EA as the main potential source of water contamination. The site was forthwith investigated by the EA and the Council, and an assessment was made under Part IIA.

Since 1997 the EA and the Council have carried out contamination investigations and monitoring work on the landfill site, and within the groundwater regime in the area. There is only a little recent information on water quality at the public supply, 'PWS' when the boreholes were pumped for a short period. A number of site investigation reports are available for the landfill site assessing both gas and water issues. The determination is based on a number of reports that are listed below (references 1 to 10).

The EA agreed with the Council to carry out a detailed inspection of the site following the Council's request under B28-B29 of the Statutory Guidance. There are two Part IIA reviews of the site dated May 2004 (Enviros Consulting Limited) and December 2006 (Atkins). These reports were followed by formal detailed advice from the EA received on 6 August 2008. The views of the Agency provided in the detailed advice were confirmed in a letter to the council dated 15 December 2010.

As a separate matter landfill gas has been monitored at the site from 2005 by SLR Consultants for health and safety reasons rather than as a Part IIA investigation. The site investigations and reviews are listed below with brief summaries.

Site Investigation Reports by Consultants for the Council and Environment Agency (EA)

- Symonds Travers Morgan for the National Rivers Authority (now the EA) – Investigation of Ammonia pollution at Ickenham Public Water Supply Source, Hillingdon – November, 1997 (ref1).

- Aspinwall & Co for the EA – Investigation of Water Pollution from New Years Green Lane Landfill Site, Ickenham – March 1999 (ref 2).

- Enviros for LBH - Environmental Monitoring at New Years Green Lane Landfill Site, Ickenham March, 2001 (ref 3).

- Enviros for LBH - Environmental Monitoring at New Years Green Lane Landfill Site, Ickenham, June, 2002 (ref 4).

- Site Investigation (November 2003) and Groundwater Monitoring (2003 to 2010) carried out by Waterman Environmental for the Dogs Trust at Highway Farm (ref 5).

- Enviros for LBH - New Years Green Lane Landfill Site – Gas Risk Assessment – July, 2002 / SLR Consultants for LBH - Yearly Landfill Gas Monitoring Reports for New Years Green Landfill (2005 to 2009) (ref 6).

Part 2A Assessment Reports for the Environment Agency

- Enviros for the EA – Critical Review of New Years Green Landfill - May 2004 (ref 7).

- Atkins for the EA – Final Interpretative Report, New Years Green Landfill, Hillingdon - B20 (a) and B20 (b) Part IIA Detailed Inspection 2006 (ref 8).

Site Specific Advice of the Environment Agency

- Detailed Advice to the London Borough of Hillingdon with a covering letter dated 6 August 2008 (Groundwater & Contaminated Land Team, Environment Agency) (ref 9).

Remediation Options Report for the Council

- Atkins for LBH - New Years Green Landfill - Outline Remediation Options Appraisal February 2011 (ref 10)

Summary of the Site Investigation Reports

Initial Investigation (ref 1)
Investigation of Ammonia Pollution at Ickenham Public Supply Source 1995

The NRA commissioned the report due to concerns about ammonia levels at Ickenham. Correspondence from 1977 to 1988 with the Three Valleys Water Company on the ammonia pollution at Ickenham was summarised in the report. The report collated background information on the Ickenham PWS including borehole logs, adits, pumping rates and water quality. Data was presented on a regional hydro-geological setting. This report was the first report on the groundwater contamination in the area and involved the drilling of 2 deep groundwater boreholes south of the site. Water samples were taken from these boreholes and at the 3 pumped PWS boreholes, and 7 surface water sites including the landfill culvert and a nearby ditch. The hydrogeology and hydrochemistry were assessed in detail. The hydro-chemical interpretation of the surface waters and groundwater was concluded to consistently suggest the landfill to be the main source of pollution to the Ickenham Public Water Supply. Concerns were that rising groundwater

levels might increase the ammonia levels by mixing with the landfill leachate. The report suggested the landfill as the most significant source of groundwater pollution but also mentioned other potential sources. It was indicated that there may be other landfill sites up-gradient of the supply and a ditch that may be contributing to the problem. The report made recommendations regarding appropriate actions to protect groundwater resources, including the investigation of the design and extent of the waste in the New Years Green Landfill Site, and the extent of the groundwater contaminated plume. The report outlined remediation options and gave recommendations for further investigations including more intrusive work as there were only 2 monitoring boreholes.

The Main Intrusive Site Investigation (ref 2)
Investigation of Water Pollution from New Years Green Lane Landfill Site, Ickenham 1999

The investigation involved the completion of the drilling and sampling of 12 leachate monitoring boreholes in the waste and five groundwater monitoring boreholes in the chalk. The report provided an interpretation of the waste thickness, and levels and quality of leachate, groundwater, surface water and landfill gas. No solid soil samples were tested for contamination, the contamination and water quality tests were specifically of leachate and groundwater samples.

The testing of the leachate samples showed high levels of ammoniacal nitrogen up to 509 mg/l. The results of the groundwater testing confirmed that ammoniacal nitrogen concentrations in the groundwater were at concentrations up to 37 mg/l (as N). A tritium analysis of the leachate and groundwater was carried out and confirmed that landfill leachate was affecting the groundwater as obtained from boreholes adjacent and to the south of the site.

The role of the culvert and surface water contamination in the Bourne Stream were considered in more detail in this report. It appeared that low flow conditions produced high levels of ammonia in the stream with a peak of 170 mg/l in 1995. When the flow is high there appeared to be no impact. Landfill gas levels were found to be high at most of the monitoring boreholes. Methane and Carbon Dioxide levels were found up to 61% and 30% respectively.

A ‘Groundwater Impact Assessment’ was provided which gave a refinement of the existing Gerrard’s Cross GPZ model in the area of the source, and a risk assessment for the Ickenham PWS. The risk assessment gave predictions for future groundwater quality.
The public water supply was only pumped for a short period and no conclusions were drawn on the groundwater monitoring at the supply boreholes.

Eleven remedial options were provided including actions at the landfill site, and treatment at the water supply boreholes. A period of two years further monitoring was recommended for the site to identify the most beneficial of the above remedial options for the landfill site

including the culvert and New Years Bourne. There was now an established monitoring network for landfill leachate, surface water, groundwater and landfill gas.

Monitoring Work 1 (ref 3 and 4)
Environmental Monitoring at New Years Green Lane Landfill Site (Years 2000-2001 and 2001-2002)

The monitoring over a two year period used the existing network. The results obtained over a two year period indicated that there had been little overall change since the 1998 investigations as reported in 1999. The landfill continued to have an effect on groundwater and surface water quality. Data from a CCTV survey of the culvert was provided and some data from test pumping at the Ickenham PWS was also carried out. The culvert survey indicated that there were no blockages or impediments to flow and no leachate ingress was confirmed. It was noted that the weather conditions were dry with little flow in or out of the culvert. The pumping at the PWS boreholes was only 3 weeks and the volume pumped was low compared to the operation in 1995. Therefore although no contamination was found the conclusions were viewed with caution. The report also concluded that the groundwater flow regime had been modified with groundwater flowing in a south westerly rather than southerly direction now.
Landfill gas was still found to be at high levels and the risk to local properties was as a consequence deemed high with no off site monitoring wells and control measures in place.

Monitoring Work 2 (refs 7 and 8)
Part 2A Assessment Reports for the Environment Agency dated 2004 (Enviros and 2006 (Atkins) / Additional monitoring at groundwater boreholes on Highway Farm
The reports by Enviros and Atkins both contain monitoring information that is used in the assessment below of the evidence upon which the determination is based. The monitoring work is limited but includes groundwater, surface water, leachate and gas monitoring. It was undertaken with regard to the B29 request for the Agency to inspect the site. The reports are essentially a B20 (a) and B20 (b) Part 2A detailed inspection. The leachate and groundwater were analysed for a range of compounds including some List 1 and List 2 compounds.
The monitoring at 8 wells by Enviros in 2004 confirmed that the leachate was still significantly contaminated and ammonia levels remained high. The leachate was found to contain some list 1 compounds including organhalogen compounds (including 1.1 dichloroethane, chlorobenzene and Mecoprop), cadmium and hydrocarbons. Seven groundwater boreholes were monitored. The groundwater in the chalk was found to contain organhalogen compounds (including 1.1 dichloroethane, chlorobenzene and Mecoprop) and some TPH compounds. Three surface water samples and landfill gas levels were monitored during the site work.
Groundwater monitoring has been carried out by the Waterman Environmental for the Dogs Trusts at Highway Farm, as the Trust own the land and are required by agreement

with the Council to monitor groundwater boreholes within their land. Data is available from 2006 to 2010 and the results were assessed against the Water Supply (Water Quality) Regulations 2000, 'WSR'. The WSR are exceeded for a number of compounds. Of particular relevance to the determination is the presence of ammonia (as NH4) in the groundwater during most monitoring rounds. The levels are significant varying considerably with a maximum of 31.9 mg/l. Levels in 2010 were from 2.15 mg/l up to 16.7 mg/l. All of the boreholes are south of the New Years Green Landfill Site. This data again supports the formal determination of the site as 'Contaminated Land'. Prior to this monitoring work a site investigation was undertaken by the Waterman Environmental at Highway Farm. This established the monitoring boreholes and provided a ground investigation. It was concluded that the landfill in the area did not pose a risk to the underlying aquifer or other receptors. However some gasworks waste was indicated to be an exception to this and remediation work involving the removal of these hydrocarbon hotspots was undertaken during the redevelopment works. The ammonia levels found in the groundwater were thought to be from the larger part of New Years Green Lane Landfill to the north. After considering the information on Highway Farm (ref 5) including details of the remediation works to make the land suitable for use it was decided not to include this land in the area of determination as shown on Figure 1.

Landfill Gas - Intrusive Investigations and Risk Assessment

Gas Risk Assessment (Enviros 2002) / Yearly Landfill Gas Monitoring (SLR Consultants 2005 to 2011) (ref 6)

The work for the 2002 report involved two phases of intrusive investigation. Phase 1 involved soil probing and the installation of 8 gas monitoring standpipes to 3 metres depth near sensitive properties. Landfill gas levels were significant when monitored. A second phase of investigation involved soil probing, trial pitting and the installation of a further 8 standpipes. The trial pitting confirmed that waste extended to the edge of three residential properties and the 'Civic Amenity Site'. The standpipes were monitored for landfill gas and the results used to inform the risk assessment for the site. Subject to on-going monitoring the category of risk was reduced at some of the receptors after the Phase 2 work. Consultants advised the Council to monitor the site to enable any worsening trends to be identified. An action plan was advised in the event of rising gas concentrations. With continued monitoring the risks remained moderate at two properties and high at the Civic Amenity Centre. The work has established a network of 16 monitoring standpipes near to properties deemed to be at risk from landfill gas migration. In 2011 there are currently 14 of these standpipes left on the site

From 2005 to 2011 the site has been monitored quarterly for landfill gas by the Council. There are a series of yearly reports for this work. There are now a total of 36 monitoring standpipes on the site as two further phases of installing standpipes were undertaken in 2006 and 2009. The network is mainly surrounding or within the grounds of the Civic Amenity Site and the two nearest Bungalows. High landfill gas readings are found on a regular basis at the Civic Amenity Site. Limited site investigations at the Civic Amenity Site confirm that there is landfill beneath the site. The risk assessment as of 2011 has not

deteriorated from the initial 2002 risk assessment by Enviros prior to the monitoring by SLR Consultants (ref 6). However the risk does remain significant and monitoring continues at the site in 2011 for health and safety reasons.

Additional Information - Summary of the Outline Remediation Options Report for the Council dated 2011 (ref 10)

The options report provided an assessment of the remediation options for the site currently available and updated the remediation options assessment by Aspinwall & Co in 1999. The report provided an initial screen of the options and then followed the guidance in CLR11 for scoring remediation options to give total scores for the preferred options. The preferred remediation options are listed and scored. It is indicated that no one solution will provide sufficient management of all the high risk PPLs to controlled waters. Further monitoring and risk assessment is recommended. Following the determination of the site this is proposed to be carried out prior to the implementation of the necessary remediation measures.

The report also provided a screening of the contaminants present in controlled waters using the revised Water Framework Directive Environmental Quality Standards (Directive 2008/105/EC) as incorporated into the Environment Agency guidelines in 2010.

5. Summary of assessment of the evidence on which the determination is based (B.52 (c))

Part 2A Assessment Reports for the Environment Agency dated 2004 (Enviros) and 2006 (Atkins) and Detailed Advice of the Environment Agency to the Council dated 2008 (ref 7, 8 and 9)

Detailed Advice of the EA - Following the site investigations from 1995 to 2002 it was decided by the Council to inspect the site under Part IIA. As a consequence of the site being a potential 'Special Site' the Council wrote to the Environment Agency, 'EA' on 30 October 2002 requesting the EA to inspect the site on the Council's behalf. The EA duly agreed to inspect the site on 11 November 2002.

Enviros carried out the first assessment for the EA and provided a 'B20 Detailed Inspection' report in May 2004. The EA confirmed by a letter of 21 July 2004 that it considered the site a 'Special Site' should it be determined as 'Contaminated Land'. It was recommended by the EA that the site should be designated under Regulations 3(a) and 3(c) of the Contaminated Land (England) Regulations 2006 (SI 2006 No 1380), 'the Regulations'). It was indicated that the site may also fall under Regulation 3(b).

The EA considered that some further characterisation of the site was required to establish all of the potential pollutant linkages and confirm the significant linkages. As a consequence the Atkins carried out a second detailed inspection of the site for the EA. A report was provided in December 2006. An initial potential pollutant linkage table was

drawn up on the basis of the previous investigations and sufficient additional work to confirm these within the context of the contaminated land legislation was undertaken. A description of the work undertaken may be found in the final interpretive report (Atkins, 2006).

The EA confirmed 21 pollutant linkages at the site to the Council by a letter dated 6 August 2008 and summary document, 'Detailed advice to the London Borough of Hillingdon New Years Green Landfill'. The detailed advice recommended that the site should be determined 'Contaminated Land' under Paragraph 78A (2) (b) (Pollution of Controlled Waters) of Part IIA, and designated a 'Special Site' under Regulations 3(a) and 3(c) of the Regulations. It was also advised that determination under Paragraph 78A (2) (a) due to risks from landfill gas may be appropriate although monitoring did not indicate that critical concentrations had been reached. This Council continues to monitor the site and may need to specify remediation actions in the form of monitoring or otherwise in the future.

The Council has now considered the detailed advice of the Environment Agency dated August 2008 and reconfirmed in December 2010 in addition to the two detailed inspection reports by the Agency's consultants from 2004 and 2006.

6. Contaminated Land Determination

(i) Pollution of Controlled Waters

The evidence for the pollution of controlled waters is within the site investigations and monitoring reports listed above. The data has undergone a Level 1 analysis using generic guidelines advised by the EA. These include drinking Water Standards, Environmental Quality Standards and substances limited by Groundwater Directive 80/68/EEC and Groundwater Regulations 1998.

Source (Landill Leachate)

The source of contamination has been confirmed in the landfill leachate. Although the solid waste was not assessed in the reports there is sufficient monitoring data for the landfill leachate to confirm that there is a source of contamination in the leachate head within the solid waste of the landfill. There is a high probability that these contaminants are still present in the landfill leachate. Contamination in the leachate includes:

The investigations confirm the presence, in the leachate, of the following substances defined in List 1 of the List of substances determined for the purpose of the EC Groundwater Directive (80/68/EEC).

- Organohalogens; dichloroethane, dichlorobenzene, chlorobenzene and Mecoprop,
- Mercury,

- Cadmium,
- Mineral oils and hydrocarbons; TPH in the C6 to C40 range, Benzene, xylene, acenapthrene, naphthalene, phenanthrene, dibenzofuran, flourene, isopropylbenzene, methylnaphthalene and trimethylbenzene,

The following substances are defined in List 2 of the Groundwater Directive

- Nitrosodiphenylamine,
- Dimethylphenol,
- Ammoniacal nitrogen

The Groundwater Directive 80/68/EEC and Groundwater Regulations 1998 state that we must prevent discharges of List 1 substances into groundwater and limit the discharge of List 2 substances to avoid pollution.

Concentrations of the following substances are limited by the Drinking Water and Environmental Quality Standards and deterioration of baseline groundwater quality to those standards is unacceptable.

- Metals; iron, calcium, magnesium, sodium
- Sulphate,
- Chloride,

Pathways

The main controlled water receptor under consideration is the principal chalk aquifer which is used by the public water supply borehole at Ickenham. Also considered are the secondary A aquifer and the Bourne Stream.

The exposure pathways to the secondary and principal aquifers include migration of landfill leachate vertically down to the major chalk aquifer through the sandy, gravely and clayey horizons of the Reading Beds (Secondary Aquifer) after leaching from the waste. Although an overburden was due to be placed over the chalk prior to tipping this cannot be confirmed. There also may be preferential pathways created by the drains and culverts. Due to the presence of contamination in the major aquifer including ammonia which is consistently found it appears that this is a pathway is present.

Receptors (Groundwater)

In the groundwater of the Principal Aquifer contaminants have been found. The presence in the groundwater of the following substances below exceeding the groundwater requirements and standards is confirmed:

- Ammoniacal nitrogen
- Dichloroethene
- Chlorobenzene
- Mecoprop
- TPH (C10-C40)
- Benzene
- Iron, magnesium, sodium, calcium,
- Sulphate
- Chloride

Conclusion - The work done by Atkins and earlier consultants (as referenced below) has provided sufficient evidence to demonstrate that contamination within the landfill site is adversely affecting controlled waters.

A source pathway receptor pollutant linkage has been established for controlled waters specifically the groundwater in the chalk aquifer below the site. This comprises pollutant linkages 1 to 12 in Table 1 above.

As regards surface waters ammonia has been identified intermittently at high levels within the Bourne Stream. The linkages 13 to 18 in Table 1 above have been included as part of the determination as they should be included in the remediation work. This may include works to the culvert which could be affecting the stream and shallow aquifer.

Note: If there are changes to assessment standards such as the Environmental Quality Standards then the chemical data for the site will be screened against the new standards. Of note are the recently published revised Water Framework Directive Environmental Quality Standards (Directive 2008/105/EC).

(ii) Significant Possibility of Significant Harm

Source

Carbon dioxide and methane in the body of the landfill have both been identified in gas monitoring results from all of the site investigation and monitoring reports.

Pathway

Migration from the landfill mass via; the made ground, sand and gravels or chalk below the base of the landfill; man made pathways such as the culvert buried services, drains, sewers.

Receptors

On the boundary of the landfill there are three residential properties and a Civic Amenity Site. The Civic Amenity site is upon land that appears to been built on made ground or even the landfill, and a pathway is likely from the bulk of the landfill. The residential properties are not on landfill. There are two farm properties adjacent to the site, one being Highway Farm is on landfill.

The main danger from methane and carbon dioxide is once they have collected in any of the buildings around the site. There they pose a threat either via asphyxiation of residents or via the ignition of methane. The gas risk assessment from 2002 confirmed moderate to high risks to surrounding properties. The site has been monitored and risk assessed for landfill gas from 2005 to 2011. This is the way the landfill gas risk has been managed to identify trends in gas production in order to take early remedial actions as necessary.

Conclusion - Due to the evidence of consistently high levels of gas still present in the landfill it is considered that the site represents a significant possibility of significant harm from landfill gas as defined in Table B (2) of Annex 3 to the Statutory Guidance. This comprises 3 significant pollutant linkages numbered 19, 20 and 21 in Table 1 above. Monitoring is continuing to manage the risk and the Council may continue to specify remediation action in the form of the ongoing 'monitoring actions' to keep the situation under review.

7. Proposed Special Site Designation following Contaminated land Determination

The Council has considered the evidence of the pollution of controlled waters with respect to Regulation 3 Contaminated Land (England) Regulations 2006 taking into account the detailed advice of the Environment Agency dated August 2008. It is considered by the Council that New Years Green Landfill Site is a Special Site under Regulations 3(a) and 3(c) as advised by the Agency. This is explained below.

1. Regulation 3 (a) – Under regulation 3(a), controlled waters which are, or are intended to be, used for the supply of drinking water for human consumption are being affected by the land to the extent that changes in the treatment process are required. New Years Green lies up-gradient of several such abstractions and overlies part of the inner and outer source protection zones for Ickenham, a borehole that has long had problems with contamination and is at present out of use due to a change in the nature of the contamination in the local aquifer. After changing the treatment process to cope with increasing levels of ammonia, the increased concentration of iron in the groundwater will require additional treatment to make it suitable for supply. It is this subsequent change in the treatment process that causes the failure under Regulation 3(a). The contamination emanating from New Years Green Landfill site is considered to be substantially responsible for this failure. The Ickenham abstraction is still licensed and intended to be used for supply.

2. Regulation 3(c) of the Regulations requires a particular type of contamination in a specified aquifer (underground strata comprised of specified formations of rocks). The chalk aquifer below the site is listed in paragraph 2 of schedule 1 of the regulations. Of the contaminants identified, only a few contaminants found in both the landfill leachate and the chalk groundwater samples are listed in paragraph 1 of schedule 1. These are Hydrocarbons (TPH C6 to C40) and Benzene, and Organohalogens (Chlorobenzene, Dichloroethene DCE and Mecoprop).

Contaminant	Family or group as defined for paragraph 1 of schedule 1 of Regulation 3(c).
TPH C6 to C40	Hydrocarbon
Benzene	Hydrocarbon
DCE (Dichloroethene)	Organohalogen
Mecoprop	Organohalogen
Chlorobenzene	Organohalogen

8. Summary of how the relevant requirements of Chapters A and B of the Statutory Guidance have been met (B52 (d))

Risk Assessment
Paragraph A.11 Contaminants, pathways and receptors have been identified for the site.

Paragraphs A.17 and A.19 Twenty one significant pollutant linkages have been identified at the site resulting in the pollution of controlled waters and the significant possibility of significant harm from landfill gas to nearby residential properties.

Pollution of controlled waters
Paragraphs A.36, A.37 and A.39. Monitoring data shows that contaminants are present in the landfill leachate at high concentrations and continue to enter the aquifer below the site. This is the source that continues to enter controlled waters. Contaminants have been found to be dissolved in the groundwater of the chalk aquifer.

Significant possibility of significant harm
Paragraphs A.27 to A30. A gas risk assessment was undertaken in 2002 and identified high risks to residential and commercial sites. High levels of gas within the adjacent landfill indicate a significant source and potential degree of harm to the receptors. The receptors are susceptible as they are not protected by any gas mitigation measures. It is not

considered that the current use of the land will cease and residential properties will remain at the boundary.

Determining whether the land appears to be contaminated land
Paragraph B.31. The London Borough of Hillingdon has determined the land to be contaminated land. This decision relies on the detailed advice regarding controlled waters by the Environment Agency as based on their Critical Review and subsequent 'B20(a) and B20(b) Part IIA Detailed Inspection'.

Physical extent of the Land
Paragraph B.32 to B36. The land has been determined in extent as the area advised by the Environment Agency and justified above in the text to this record of determination.

Making the Determination
Paragraph B.38. The site is determined on the grounds that

1. The pollution of controlled waters is being caused, and;
2. There is a significant possibility of significant harm from landfill gas

Paragraph B.39. The London Borough of Hillingdon have taken all relevant and available information into account from the initial investigations in November 1995 to the final detailed advice from the Agency in 2008 and latest landfill gas and groundwater monitoring in 2010.

Paragraph B40. The significant pollutant linkages are detailed above in Table 1.

Paragraph B41. Additive/synergistic effects are not thought relevant in this case.

Para B.43. The Environment Agency has been involved with the investigations at the site since 1995. The London Borough of Hillingdon has consulted with the Agency at the site since 1997. A formal request was made to the Agency to inspect the site on the Council's behalf under Part IIA as a potential Special Site and agreed in November 2002. The Agency provided their final detailed advice in August 2008 and the Council has had regard to their advice in the final determination.

Paragraph B.45. The site has been assessed for landfill gas levels from 1999 to 2011. A scientific and technical assessment of the risks arising from this pollutant linkage has been carried out by the Council. The assessment work in 2002 and in subsequent yearly monitoring reports indicates a risk from landfill gas. No risk management measures are in place such as gas protection on buildings, barriers or venting trenches. Perimeter monitoring is used to manage the risk by identifying trends and necessary actions however it is considered on the balance of probabilities that there remains a significant possibility of significant harm due to the high levels of gas within the landfill site.

Paragraph B.50. A scientific and technical assessment of all of the relevant and available evidence from 1995 to 2011 has been carried out by the Council having regard to the detailed advice of the Environment Agency. The Council is satisfied that, on the balance of probabilities potential pollutants are present in the landfill site (contaminated fill and leachate) and these potential pollutants are entering controlled waters (groundwater) by the pathways identified in the pollutant linkages.

References

The Site Investigation Reports and Site Assessment Reports from 1995 to 2011 are listed in Paragraph 4 above.

Detailed Advice to the London Borough of Hillingdon with a covering letter dated 6 August 2008 (Groundwater & Contaminated Land Team, Environment Agency) (ref 9).

Part 2A of the Environmental Protection Act 1990

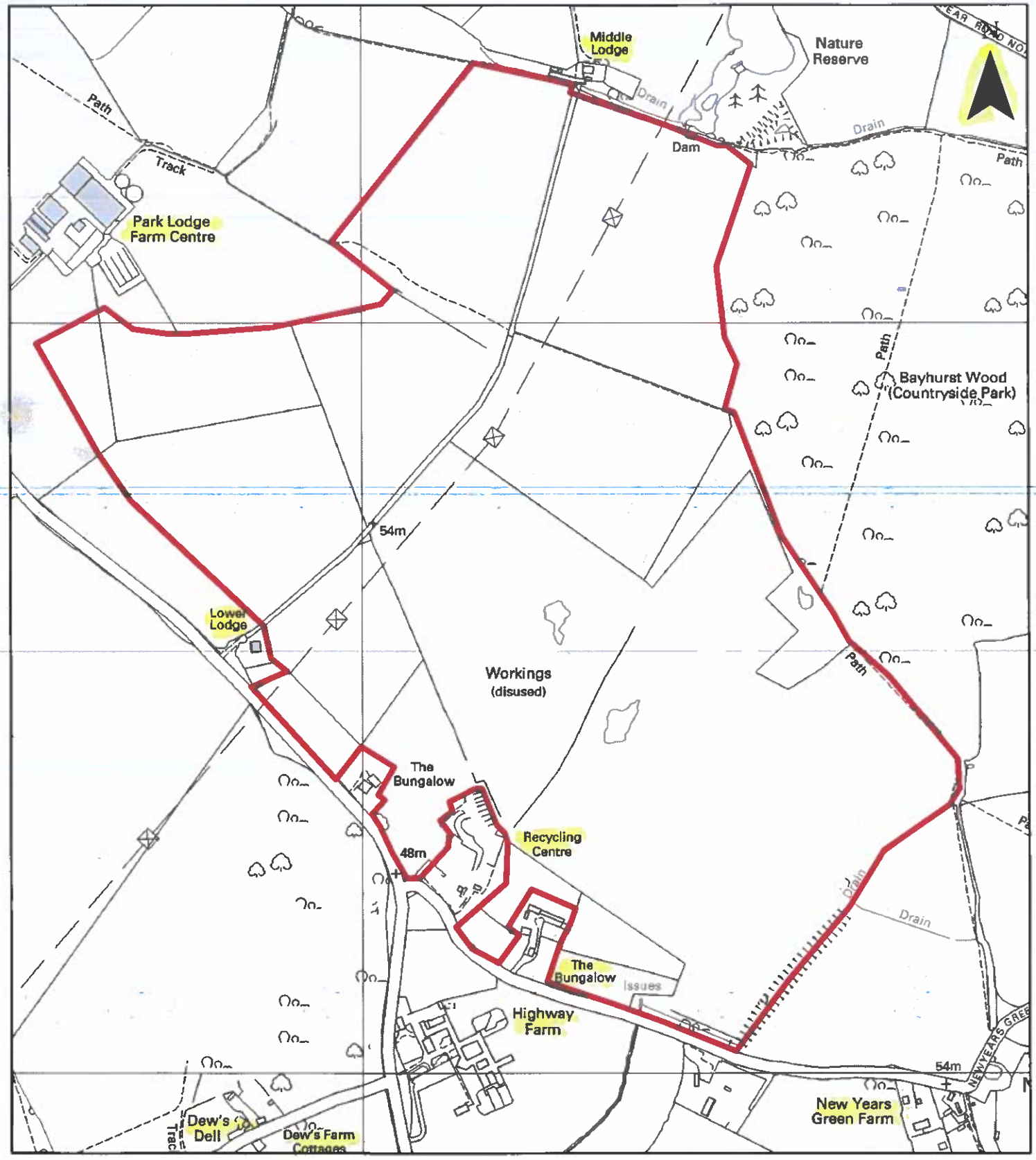
The Contaminated Land (England) Regulations 2006

Statutory Guidance (DEFRA) - Circular 01/2006 Environmental Protection Act 1990: Part 2A Contaminated Land September 2006

Contaminated Land Inspection Strategy for the London Borough of Hillingdon (July 2001) and Contaminated Land Inspection Strategy Review (November 2007)

CIEH – Local authority Guide to the Application of Part 2A of the Environmental Protection act 1990 (July 2001)

The following appended map known as Figure 1 shows the area of the land at New Years Green Lane Landfill Site that has been determined by the London Borough of Hillingdon to be Contaminated Land.



Scale: 7,000, Date 20/05/2011

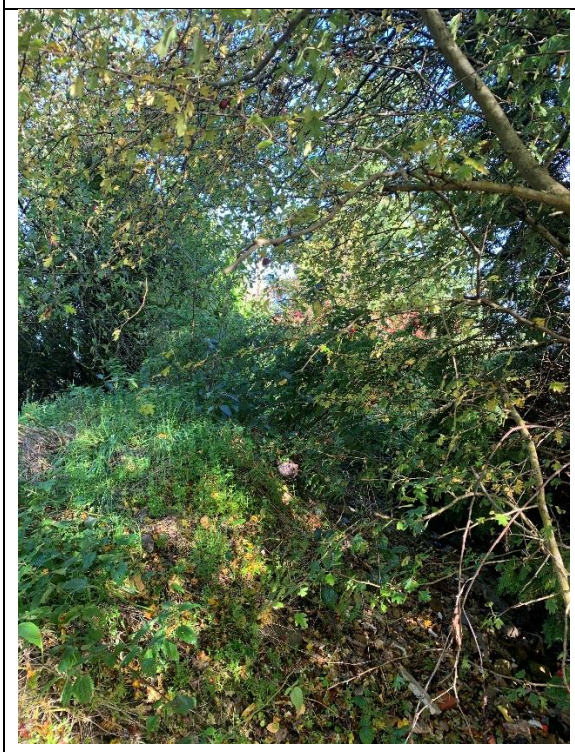
Record of Determination
Figure 1: New Years Green Lane Landfill Site NGR 506286E 188274N
The red boundary indicates the site determined as Contaminated Land

HILLINGDON
LONDON

APPENDIX D: PHOTO DOCUMENT

Site entrance

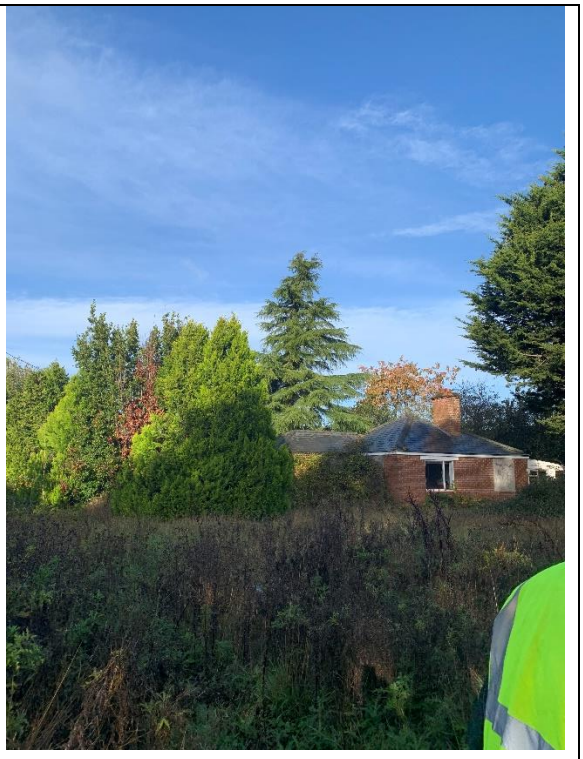
Fly tipping and litter next to site entrance.



Large bund restricting access to site

Pylon visible on site nearby to the bund.

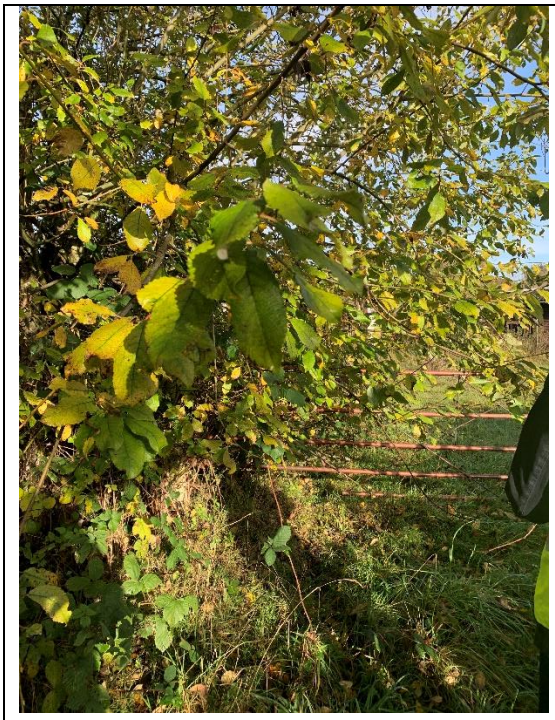
Beehives located in the south/south-east of the site



View of bungalow in the south-west of the site

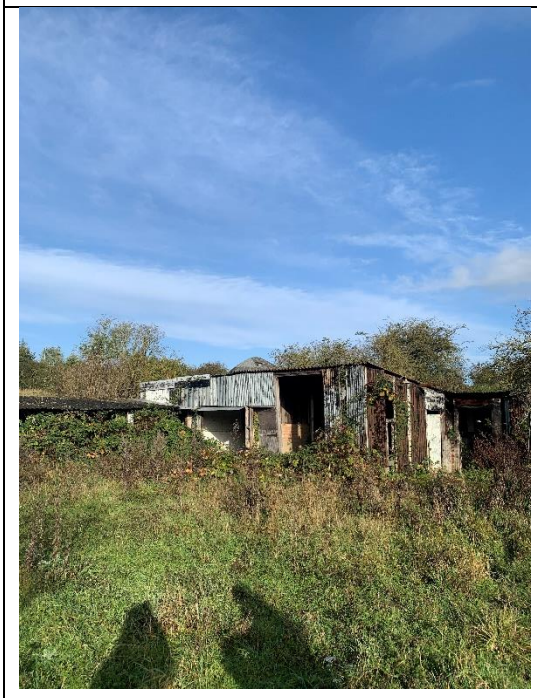
Newly planted trees in the south-east area of the site

Vandalism and condition of the bungalow



View of gated entrance further north of the site into the area of stables/barn.

View of the abandoned and derelict stables in the north of the site.



View of the abandoned and derelict stables in the north of the site.

View of the abandoned and derelict stables in the north of the site.

	
View of the abandoned and derelict stables in the north of the site.	View of barn on site in the north-west of the site.

Site Investigation Photographs

WS01 hand pit arisings (GL-1.00m bgl)

WS01 arisings (1.00-5.00m bgl)

WS02 arisings (GL-5.00m bgl)

WS03 hand pit arisings (GL-1.00m bgl)

WS03 arisings (1.00-5.00m bgl)

WS04 hand pit arisings (GL-1.00m bgl)

WS04 arisings (1.00-5.00m bgl)

WS05 arisings (GL-4.00m bgl)

APPENDIX E: EXPLORATORY HOLE RECORDS & DCP RESULTS

Trial Pit Log

JNP GROUP
CONSULTING ENGINEERS

Trialpit No
HP01
Sheet 1 of 1

Project Name: The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 506235.00 - 188148.00 Level:	Date 12/03/2024
Location: London Borough of Hillingdon		Dimensions (m): Depth 0.40	Scale 1:25
Client: London Borough of Hillingdon Council			Logged CG

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.15	ES		0.20			Soft brown sandy, gravelly CLAY. Gravel is fine to medium subrounded to subangular quartzite with rare brick and charcoal. MADE GROUND
				0.40			Orange-brown slightly clayey, gravelly SAND. Gravel is fine to medium, subrounded quartzite. MADE GROUND
							End of pit at 0.40 m

1
2
3
4
5

Remarks: Hand excavated sampling pit for chemcial testing.

Stability:

JNP GROUP
CONSULTING ENGINEERS

Trial Pit Log

JNP GROUP
CONSULTING ENGINEERS

Trialpit No
HP04
Sheet 1 of 1

Project Name: The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 506177.00 - 188198.00 Level:	Date 21/03/2024
Location: London Borough of Hillingdon		Dimensions (m): Depth 0.40	Scale 1:25
Client: London Borough of Hillingdon Council			Logged RS

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.20	ES					Firm brown mottled orange-brown CLAY with rootlets. MADE GROUND
	0.40	ES		0.40			End of pit at 0.40 m

1
2
3
4
5

Remarks: Hand excavated sampling pit for chemcial testing.

Stability:

JNP GROUP
CONSULTING ENGINEERS

Trial Pit Log

JNP GROUP
CONSULTING ENGINEERS

Trialpit No
HP03
Sheet 1 of 1

Project Name: The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 506201.00 - 188210.00 Level:	Date 21/03/2024
Location: London Borough of Hillingdon		Dimensions (m): Depth 0.30	Scale 1:25
Client: London Borough of Hillingdon Council			Logged RS

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.10	ES		0.07			Brown silty, slightly gravelly CLAY with rootlets. Gravel is fine subangular brick. MADE GROUND
				0.15			Light brown clayey SAND. MADE GROUND
	0.30	ES		0.30			Brown clayey GRAVEL. MADE GROUND
							End of pit at 0.30 m

1
2
3
4
5

Remarks: Hand excavated sampling pit for chemcial testing.

Stability:

JNP GROUP
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Trial Pit Log

JNP GROUP
CONSULTING ENGINEERS

Trialpit No
HP02
Sheet 1 of 1

Project Name: The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 506232.00 - 188166.00 Level:	Date 12/03/2024
Location: London Borough of Hillingdon		Dimensions (m): Depth 0.40	Scale 1:25
Client: London Borough of Hillingdon Council			Logged CG

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.30	ES		0.20			Dark brown-black gravelly SAND. Gravel is fine to medium subangular quartzite, flint and concrete. MADE GROUND
				0.40			Orange-brown clayey, gravelly SAND. Gravel is fine to medium, subrounded quartzite. MADE GROUND End of pit at 0.40 m

Remarks: Hand excavated sampling pit for chemcial testing.

Stability:

JNP GROUP
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Borehole Log

JNP GROUP
CONSULTING ENGINEERS

Borehole No.
WS01
Sheet 1 of 1

Project Name:	The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 506224.00 - 188214.00	Hole Type WS
Location:	London Borough of Hillingdon		Level:	Scale 1:50
Client:	London Borough of Hillingdon Council		Dates: 12/03/2024 - 12/03/2024	Logged By CG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 0.40	ES ES		0.30			Grass over soft brown mottled orange-brown, sandy, gravelly CLAY. Gravel is fine to medium, subrounded to subangular flint and charcoal. MADE GROUND
		1.00 1.00	D	N=4 (1,1/1,1,1,1)	1.20			Loose orange-brown gravelly, clayey SAND with rare grey clay pockets. Gravel is medium subrounded and subangular charcoal,and flint. MADE GROUND
		2.00 2.00	D	N=4 (1,1/1,1,1,1)	2.00			Soft orange-brown gravelly, very sandy CLAY. Gravel is medium subrounded and subangular charcoal and flint. MADE GROUND
		3.00 3.00	D	N=4 (1,1/1,1,1,1)				Soft orange-brown sandy, gravelly CLAY. Gravel is fine to medium, subrounded to subangular flint with rare charcoal fragments. MADE GROUND
		4.00 4.00	D	N=4 (1,1/1,1,1,1)				
					4.60			Soft grey-brown mottled grey CLAY. LAMBETH GROUP
		5.00 5.00	D	N=4 (1,1/1,1,1,1)	5.00			End of borehole at 5.00 m

Remarks
Borehole terminated at target depth. No groundwater encountered. Borehole installed with 50mm standpipe with response zone between 1.00 - 5.00 m.

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Borehole Log

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Borehole No.
WS02
Sheet 1 of 1

Project Name:	The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 506208.00 - 188179.00	Hole Type WS
Location:	London Borough of Hillingdon		Level:	Scale 1:50
Client:	London Borough of Hillingdon Council		Dates: 12/03/2024 - 12/03/2024	Logged By CG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.15	ES		0.20			Soft light brown sandy, gravelly CLAY. Gravel is fine to medium subrounded quartzite. MADE GROUND
		0.50	ES					Very loose brown mottled grey-black gravelly SAND. Gravel is fine to medium, subangular to angular, charcoal, glass, wood, plastic, pottery and brick. MADE GROUND
		1.00		N=2 (1,0/1,0,1,0)				
		1.50	D					
		2.00		N=0 (1,0/0,0,0,0)				
					2.75			Orange-brown clayey, gravelly SAND. Gravel is fine to medium, subrounded flint. LAMBETH GROUP
		3.00	D		3.00			Soft orange-brown sandy, gravelly CLAY. Gravel is fine to medium, subrounded to subangular flint. LAMBETH GROUP
		3.00		N=4 (1,1/1,1,1,1)				
		4.00		N=4 (1,1/1,1,1,1)				
		5.00		N=4 (1,0/1,1,1,1)	5.00			End of borehole at 5.00 m

Remarks
Borehole terminated at target depth. No groundwater encountered. Borehole installed with 50mm standpipe with response zone between 1.00 - 5.00 m.

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Borehole Log

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Borehole No.
WS03
Sheet 1 of 1

Project Name:	The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 206243.00 - 188186.00	Hole Type WS
Location:	London Borough of Hillingdon		Level:	Scale 1:50
Client:	London Borough of Hillingdon Council		Dates: 12/03/2024 - 12/03/2024	Logged By CG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	ES		0.20			Light yellow-brown mottled black gravelly SAND. Gravel is fine to medium, subangular to angular charcoal, brick and concrete. MADE GROUND
		0.50	D					
		0.60	ES		0.70			Dark grey gravelly SAND. Gravel is fine to coarse, subangular to angular brick, charcoal, glass, flint and quartzite. MADE GROUND
		1.00		N=2 (1,0/1,0,1,0)				Very soft to soft orange-brown gravelly CLAY. Gravel is fine to medium, subrounded to subangular flint. LAMBETH GROUP
		1.50	D					
		2.00		N=4 (1,1/1,1,1,1)				
		3.00	D					
		3.00		N=5 (1,1/1,1,1,2)				
		4.00		N=4 (1,1/1,1,1,1)				
					4.25			Loose orange-brown SAND. LAMBETH GROUP
		5.00	D		5.00			End of borehole at 5.00 m
		5.00		N=4 (1,1/1,1,1,1)				

Remarks
Borehole terminated at target depth. No groundwater encountered. Borehole installed with 50mm standpipe with response zone between 1.00 - 5.00 m.

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Borehole Log

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Borehole No.
WS04
Sheet 1 of 1

Project Name:	The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 506244.00 - 188206.00	Hole Type WS
Location:	London Borough of Hillingdon		Level:	Scale 1:50
Client:	London Borough of Hillingdon Council		Dates: 12/03/2024 - 12/03/2024	Logged By CG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.25	ES					Dark grey-brown gravelly SAND. Gravel is fine to medium, subangular brick, pottery, charcoal and concrete.
		0.50	ES		0.50			MADE GROUND
		1.00	D		1.00			Soft brown mottled grey-brown sandy, gravelly CLAY. Gravel is fine to medium subrounded to subangular quartzite, charcoal and glass.
		1.00		N=2 (1,0/1,0,0,1)				MADE GROUND
		2.00	D					Very soft to soft orange-brown sandy, gravelly CLAY. Gravel is fine to medium, subrounded to subangular flint.
		2.00		N=4 (0,0/1,1,1,1)				LAMBETH GROUP
		3.00	D					
		3.00		N=5 (1,1/1,1,2,1)				
					3.50			Loose orange-brown clayey SAND.
		4.00	D					LAMBETH GROUP
		4.00		N=3 (1,0/1,0,1,1)				
					4.50			Soft brown mottled grey-brown slightly sandy CLAY.
		5.00	D		5.00			LAMBETH GROUP
		5.00		N=4 (1,1/1,1,1,1)				End of borehole at 5.00 m

Remarks
No groundwater encountered. Borehole backfilled with arisings.

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Borehole Log

Borehole No. **WS05**

Sheet 1 of 1

Project Name:	The Bungalow, New Years Green Lane	Project No. M44477	Co-ords: 506263.00 - 188188.00	Hole Type WS
Location:	London Borough of Hillingdon		Level:	Scale 1:50
Client:	London Borough of Hillingdon Council		Dates: 12/03/2024 - 12/03/2024	Logged By CG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	ES		0.20			Brown-grey sandy GRAVEL. Gravel is fine subangular to angular quartzite and flint. MADE GROUND
		0.50	D					Soft brown sandy, gravelly CLAY. Gravel is fine to medium subrounded to subangular flint. LAMBETH GROUP
		1.00		N=4 (1,1/1,1,1,1)				
		2.00		N=4 (1,0/1,1,1,1)	2.00			Soft brown sandy CLAY. LAMBETH GROUP
		2.50	D					
		3.00		N=8 (1,1/2,2,2,2)	3.00			Loose brown clayey, gravelly SAND. Gravel is fine, subrounded to subangular flint. LAMBETH GROUP
		3.50	D		3.25			Soft sandy, gravelly CLAY. Gravel is fine, subrounded to subangular flint. LAMBETH GROUP
		4.00		N=6 (2,2/2,2,1,1)	4.00			End of borehole at 4.00 m
		5.00		N=6 (1,1/2,1,2,1)				

Remarks

No groundwater encountered. Borehole backfilled with arisings.

APPENDIX F: MONITORING RESULTS

GAS MONITORING DATA

Site:	**The Bungalow, New Years Green Lane**	**Operator:**	**RS**
Project:	**M44477** **Date:** 21/03/2024	**Weather:**	Cloudy

JNP GROUP
CONSULTING ENGINEERS

Monitoring Location	Standpipe diameter (mm)	Standpipe Depth (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (^oC)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
WS01	55	1.00-5.00	3.93	1025	0.0	0.0	14	15	0.0	0.8	18.3	0.2	
								30	0.0	0.9	17.7		
								60	0.0	0.9	17.6		
								90	0.0	0.9	17.6		
								120	0.0	0.9	17.6		
								180	0.0	0.9	17.6		
								240	0.0	0.9	17.6		
								300	0.0	0.9	17.6		
WS02	55	1.00-5.00	4.38	1025	0.0	0.0	14	15	0.0	9.5	10.4	0.2	
								30	0.0	10.1	9.5		
								60	0.0	10.6	9.4		
								30	0.0	10.1	9.2		
								120	0.0	10.2	9.2		
								180	0.0	10.2	9.2		
								240	0.0	10.3	9.2		
								300	0.0	10.3	9.2		
WS03	55	1.00-5.00	Dry	1025	0.0	0.0	14	15	0.0	1.9	19.0	0.1	
								30	0.0	1.9	19.0		
								60	0.0	2.0	19.2		
								90	0.0	1.9	19.2		
								120	0.0	2.0	19.1		
								180	0.0	1.9	19.2		
								240	0.0	1.9	19.2		
								300	0.0	1.9	19.2		
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					

GAS MONITORING DATA

Site:	**The Bungalow, New Years Green Lane**	**Operator:**	**CG**
Project:	**M44477**	**Date:** 09/04/2024	**Weather:** Cloudy with light rain

Monitoring Location	Standpipe diameter (mm)	Standpipe Depth (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (°C)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
WS01	55	1.00-5.00	3.88	1010	0.0	0.0		15	0.0	0.0	20.5		Gas monitor fault - concentrations recorded likely inaccurate
								30	0.0	0.0	20.1		
								60	0.0	0.0	20.3		
								90	0.0	0.0	20.3		
								120	0.0	0.0	20.3		
								180	0.0	0.0	20.3		
								240	0.0	0.0	20.3		
								300	0.0	0.0	20.3		
WS02	55	1.00-5.00	4.45	1010	0.0	0.0		15	0.0	0.0	20.7		Gas monitor fault - concentrations recorded likely inaccurate
								30	0.0	0.0	20.5		
								60	0.0	0.1	20.3		
								30	0.0	0.0	20.3		
								120	0.0	0.0	20.2		
								180	0.0	0.0	20.2		
								240	0.0	0.0	20.2		
								300	0.0	0.0	20.2		
WS03	55	1.00-5.00	4.97	1010	0.0	0.0		15	0.0	0.0	20.7		Gas monitor fault - concentrations recorded likely inaccurate
								30	0.0	0.1	20.5		
								60	0.0	0.0	20.4		
								90	0.0	0.0	20.4		
								120	0.0	0.0	20.4		
								180	0.0	0.0	20.4		
								240	0.0	0.0	20.4		
								300	0.0	0.0	20.4		
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					

GAS MONITORING DATA

Site:	**The Bungalow, New Years Green Lane**	**Operator:**	**RS**
Project:	**M44477** **Date:** 25/04/2024	**Weather:**	Cloudy, Dry

Monitoring Location	Standpipe diameter (mm)	Standpipe Depth (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (°C)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
WS01	55	1.00-5.00	Dry	1004	0.0	0.0	12	15	0.0	2.5	16.7	0.0	
								30	0.0	2.4	17.1		
								60	0.0	2.4	17.3		
								90	0.0	2.4	17.3		
								120	0.0	2.4	17.4		
								180	0.0	2.4	17.3		
								240	0.0	2.3	17.4		
								300	0.0	2.3	17.4		
WS02	55	1.00-5.00	Dry	1004	0.0	0.0	12	15	0.0	9.5	12.3	0.1	
								30	0.0	9.8	11.5		
								60	0.0	9.8	11.4		
								30	0.0	9.9	11.5		
								120	0.0	9.7	11.4		
								180	0.0	9.9	11.4		
								240	0.0	9.9	11.3		
								300	0.0	9.9	11.3		
WS03	55	1.00-5.00	Dry	1004	0.0	0.0	12	15	0.0	6.9	11.8	0.2	
								30	0.0	8.2	10.9		
								60	0.0	8.3	10.7		
								90	0.0	8.4	10.6		
								120	0.0	8.4	10.6		
								180	0.0	8.5	10.5		
								240	0.0	8.7	10.2		
								300	0.0	8.9	10.1		
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					

GAS MONITORING DATA

Site:	**The Bungalow, New Years Green Lane**	**Operator:**	**RS**
Project:	**M44477**	**Date:**	16/05/2024
		Weather:	Cloudy, Light rain

Monitoring Location	Standpipe diameter (mm)	Standpipe Depth (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (°C)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
WS01	55	1.00-5.00	4.13	1005	0.0	0.0	16	15	0.0	3.5	15.2	0.0	
								30	0.0	3.3	15.3		
								60	0.0	3.4	15.3		
								90	0.0	3.4	15.3		
								120	0.0	3.4	15.3		
								180	0.0	3.4	15.3		
								240	0.0	3.4	15.3		
								300	0.0	3.4	15.3		
WS02	55	1.00-5.00	4.60	1005	0.0	0.0	16	15	0.0	13.7	4.5	0.0	
								30	0.0	14.1	3.9		
								60	0.0	14.2	3.7		
								30	0.0	14.2	3.7		
								120	0.0	14.3	3.6		
								180	0.0	14.3	3.6		
								240	0.0	14.4	3.6		
								300	0.0	14.4	3.6		
WS03	55	1.00-5.00	4.90	1005	0.0	0.0	16	15	0.0	5.4	14.2	0.0	
								30	0.0	7.1	13.3		
								60	0.0	7.2	13.1		
								90	0.0	7.2	13.1		
								120	0.0	7.2	13.1		
								180	0.0	7.2	13.1		
								240	0.0	7.2	13.1		
								300	0.0	7.2	13.1		
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					

GAS MONITORING DATA

Site:	**The Bungalow, New Years Green Lane**			**Operator:**	**RS**
Project:	**M44477**	**Date:**	23/05/2024	**Weather:**	Dry, Cloudy

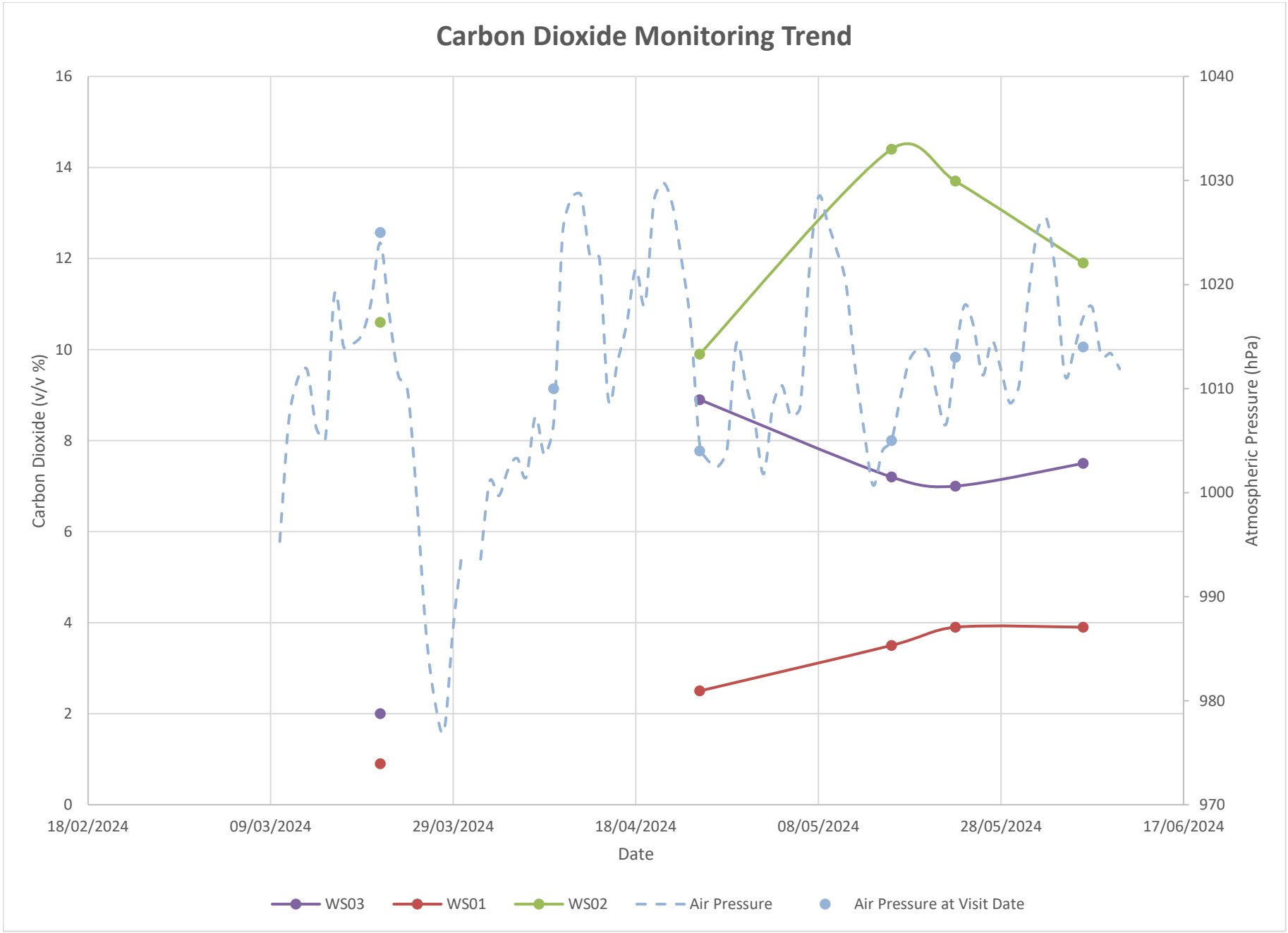
JNP GROUP
CONSULTING ENGINEERS

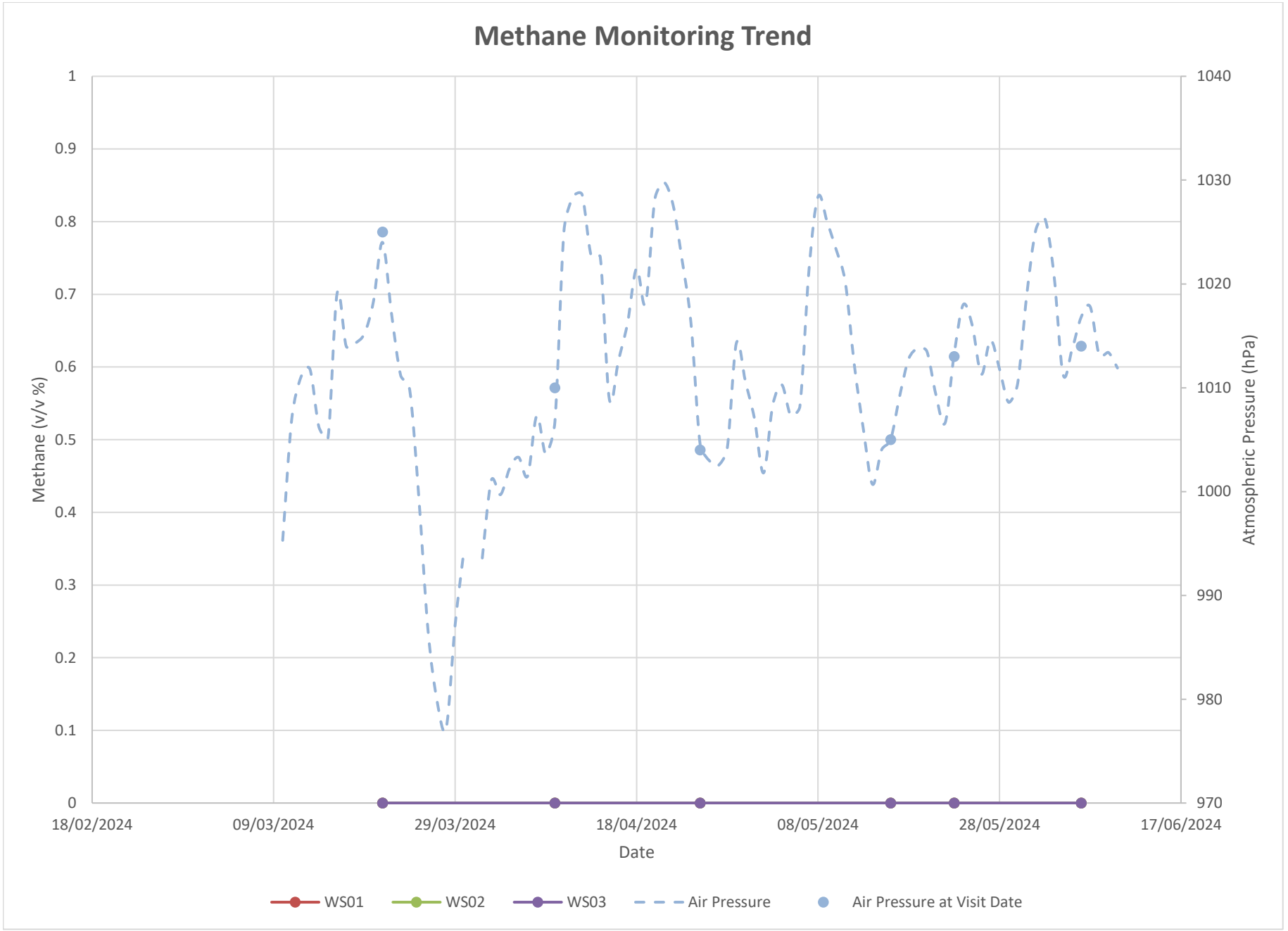
Monitoring Location	Standpipe diameter (mm)	Standpipe Depth (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (^oC)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
WS01	55	1.00-5.00	4.06	1013	0.0	0.0	17	15	0.0	3.9	15.0	0.0	
								30	0.0	3.8	15.1		
								60	0.0	3.7	15.1		
								90	0.0	3.7	15.0		
								120	0.0	3.7	15.0		
								180	0.0	3.7	15.1		
								240	0.0	3.7	15.0		
								300	0.0	3.7	15.0		
WS02	55	1.00-5.00	4.60	1013	0.0	0.0	17	15	0.0	13.3	7.0	0.0	
								30	0.0	13.6	6.7		
								60	0.0	13.6	6.8		
								30	0.0	13.6	6.7		
								120	0.0	13.7	6.7		
								180	0.0	13.6	6.6		
								240	0.0	13.6	6.7		
								300	0.0	13.6	6.7		
WS03	55	1.00-5.00	4.92	1013	0.0	0.0	17	15	0.0	5.9	13.9	0.0	
								30	0.0	6.9	13.3		
								60	0.0	7.0	13.3		
								90	0.0	7.0	13.3		
								120	0.0	7.0	13.2		
								180	0.0	7.0	13.2		
								240	0.0	7.0	13.2		
								300	0.0	7.0	13.2		
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					

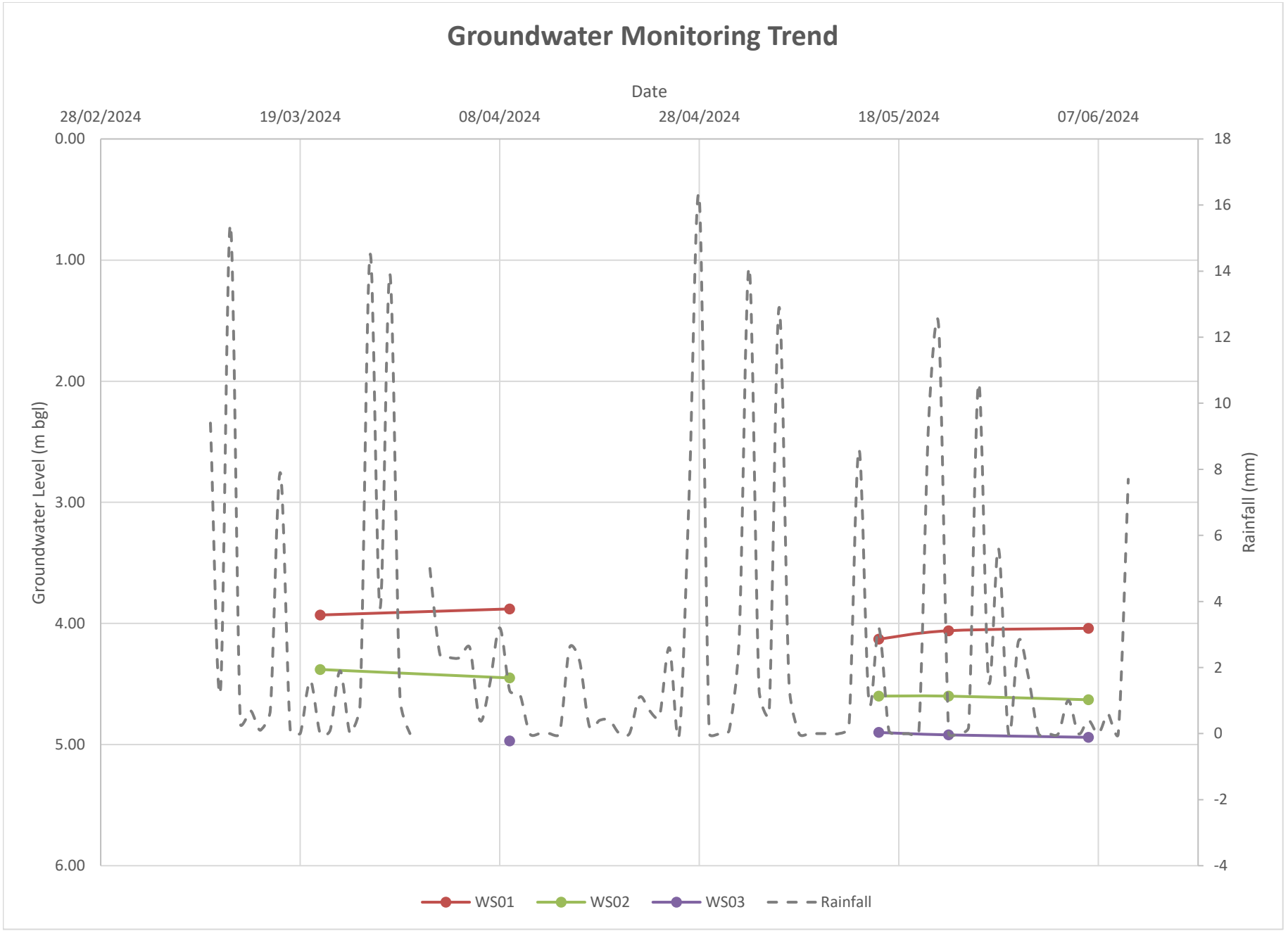
GAS MONITORING DATA

Site:	The Bungalow, New Years Green Lane	Operator:	CG
Project:	M44477	Date: 06/06/2024	Weather: Warm and cloudy

Monitoring Location	Standpipe diameter (mm)	Standpipe Depth (m bgl)	Water Level (m bgl)	Atmos. Pressure (mb)	Initial Flow Rate (litres/hr)	Average Flow Rate (litres/hr)	Temp (°C)	Reading Duration (s)	CH_4 (% v/v)	CO_2 (% v/v)	O_2 (% v/v)	PID	Notes
WS01	55	1.00-5.00	4.04	1014	0.0	0.0		15	0.0	3.9	15.9	0.0	
								30	0.0	3.9	15.0		
								60	0.0	3.9	14.8		
								90	0.0	3.9	14.7		
								120	0.0	3.9	14.7		
								180	0.0	3.9	14.7		
								240	0.0	3.9	14.7		
								300	0.0	3.9	14.7		
WS02	55	1.00-5.00	4.63	1014	0.0	0.0		15	0.0	11.4	11.0	0.0	
								30	0.0	11.6	10.3		
								60	0.0	11.7	10.2		
								30	0.0	11.8	10.1		
								120	0.0	11.9	10.1		
								180	0.0	11.9	10.1		
								240	0.0	11.9	10.1		
								300	0.0	11.9	10.1		
WS03	55	1.00-5.00	4.94	1014	0.0	0.0		15	0.0	7.5	13.4	0.0	
								30	0.0	7.4	13.7		
								60	0.0	7.3	13.7		
								90	0.0	7.3	13.7		
								120	0.0	7.3	13.7		
								180	0.0	7.3	13.7		
								240	0.0	7.3	13.7		
								300	0.0	7.3	13.7		
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					
0	55	0.00						15					
								30					
								60					
								90					
								120					
								180					
								240					
								300					


Carbon Dioxide Monitoring Trend
Carbon Dioxide (v/v %)
Atmospheric Pressure (hPa)
16
14
12
10
8
6
4
2
0
1040
1030
1020
1010
1000
990
980
970
18/02/2024
09/03/2024
29/03/2024
18/04/2024
08/05/2024
28/05/2024
17/06/2024
Date
WS03
WS01
WS02
Air Pressure
Air Pressure at Visit Date


Methane Monitoring Trend
Methane (v/v %)
Atmospheric Pressure (hPa)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1040
1030
1020
1010
1000
990
980
970
18/02/2024
09/03/2024
29/03/2024
18/04/2024
08/05/2024
28/05/2024
17/06/2024
Date
WS01
WS02
WS03
Air Pressure
Air Pressure at Visit Date


Groundwater Monitoring Trend
Date
28/02/2024
19/03/2024
08/04/2024
28/04/2024
18/05/2024
07/06/2024
Groundwater Level (m bgl)
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Rainfall (mm)
18
16
14
12
10
8
6
4
2
0
-2
-4
WS01
WS02
WS03
Rainfall

APPENDIX G: GEOTECHNICAL RESULTS

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS EN ISO 17892-12:2018+A2:2022, cl 5.3.14, 5.5, Fall Cone Method, 1 Pt Test, BS 1377-2:2022, cl 5.3, 6

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

4041

Client:	JNP Midlands LLP	Client Reference:	M44477
Client Address:	3rd Floor, Marlborough House, 48 Holly Walk, Leamington Spa, CV32 4XP	Job Number:	24-008903-1
		Date Sampled:	12/03/2024
		Date Received:	13/03/2024
Contact:	Charlotte Grisby	Date Tested:	19/03/2024
Site Address:	NYGL	Sampled By:	Not Given

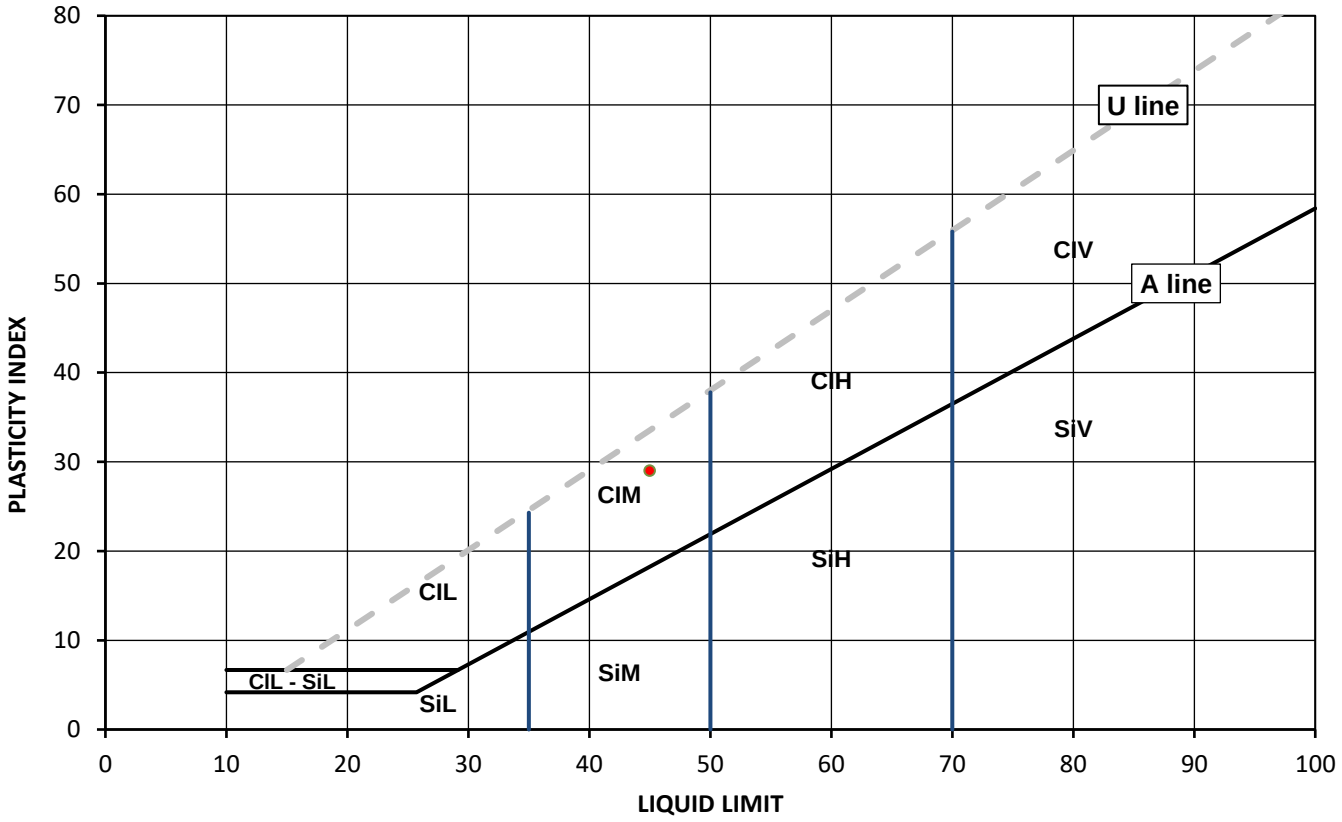
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	144671	Depth Top [m]:	2.00
Hole No.:	WS01	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown gravelly slightly sandy CLAY		

Sample Preparation: Tested after washing to remove >0.425 mm;
Cone Type: 80g/30deg

As Received Water Content [W] %	Corrected Liquid Limit [WL] %	Correlation Factor	Plastic Limit [Wp] %	Plasticity Index [Ip] %	Liquidity index [IL] % #	Consistency index [IC] % #	% Passing 425µm BS Test Sieve
15.4	45	1.000	16	29	-0.03	1.03	51



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; Correlation Factor by Clayton C.R.I and Jukes A.W (1978); # Non accredited

Remarks: Not enough the material to carry out 4 Point Atterberg test/A 1-point test was performed

Signed: Katarzyna Koziel
Katarzyna Koziel
Senior Reporting Specialist

for and on behalf of i2 Analytical Ltd

Date Reported: 05/04/2024

GF 360.12

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:	JNP Midlands LLP	Client Reference:	M44477
Client Address:	3rd Floor, Marlborough House, 48 Holly Walk, Leamington Spa, CV32 4XP	Job Number:	24-008903-1
		Date Sampled:	12/03/2024
		Date Received:	13/03/2024
Contact:	Charlotte Grisby	Date Tested:	19/03/2024
Site Address:	NYGL	Sampled By:	Not Given

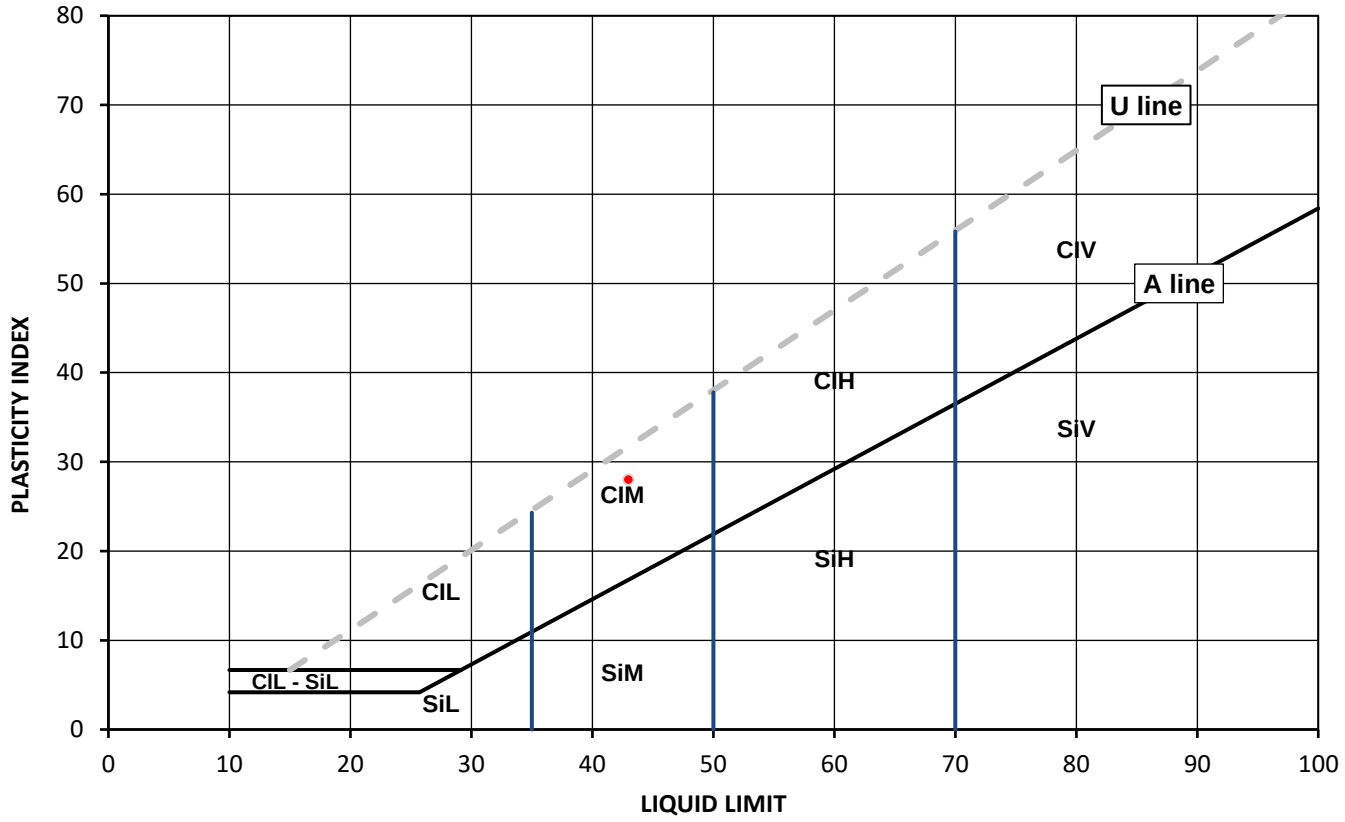
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	144672	Depth Top [m]:	1.50
Hole No.:	WS03	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown gravelly 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
12.4	43	15	28	-0.11	1.11	62



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

Katarzyna Koziel
Senior Reporting Specialist

for and on behalf of i2 Analytical Ltd

Date Reported: 05/04/2024

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:	JNP Midlands LLP	Client Reference:	M44477
Client Address:	3rd Floor, Marlborough House, 48 Holly Walk, Leamington Spa, CV32 4XP	Job Number:	24-008903-1
		Date Sampled:	12/03/2024
		Date Received:	13/03/2024
Contact:	Charlotte Grisby	Date Tested:	19/03/2024
Site Address:	NYGL	Sampled By:	Not Given

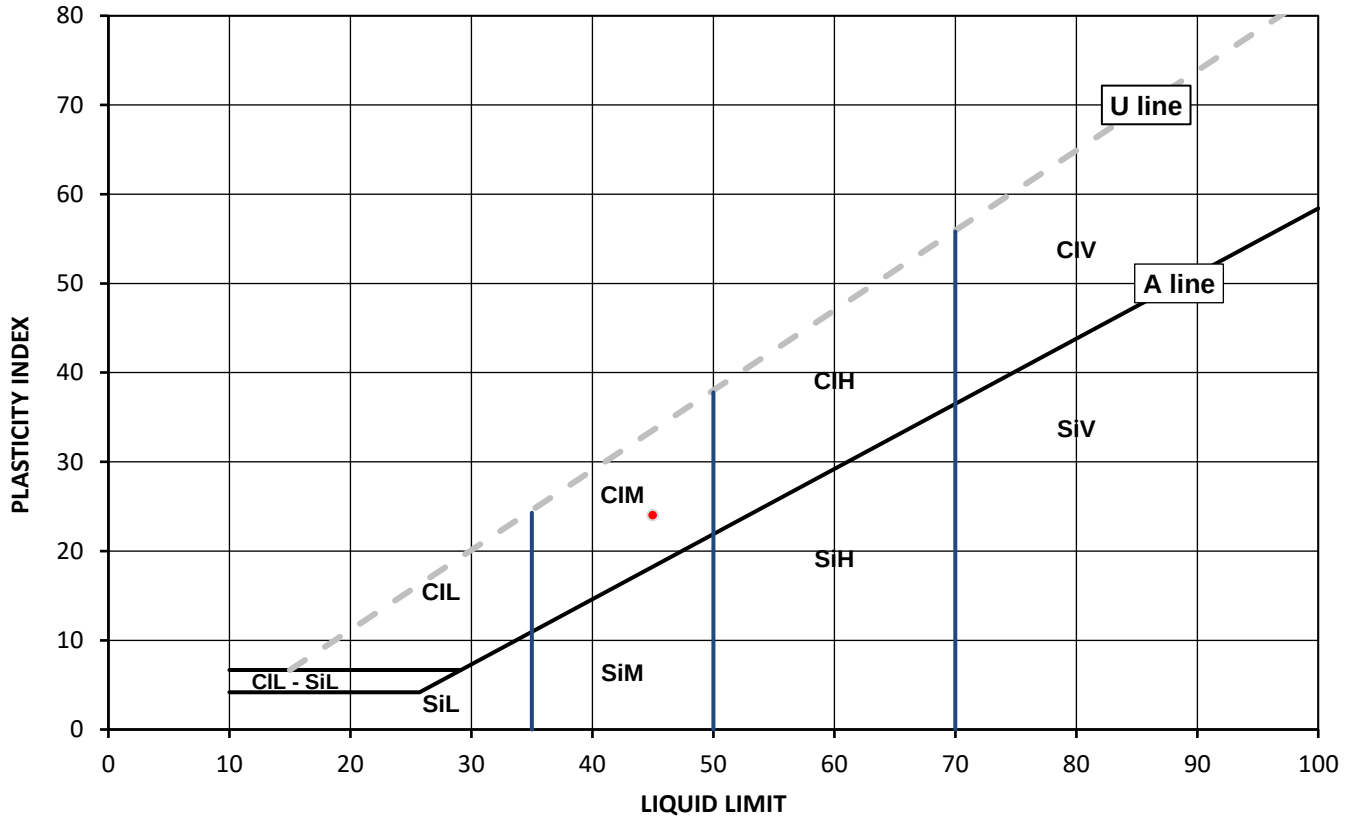
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	144673	Depth Top [m]:	1.00
Hole No.:	WS04	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
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
21.4	45	21	24	0.00	1.00	79



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

Katarzyna Koziel
Senior Reporting Specialist

for and on behalf of i2 Analytical Ltd

Date Reported: 05/04/2024

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:	JNP Midlands LLP	Client Reference:	M44477
Client Address:	3rd Floor, Marlborough House, 48 Holly Walk, Leamington Spa, CV32 4XP	Job Number:	24-008903-1
		Date Sampled:	12/03/2024
		Date Received:	13/03/2024
Contact:	Charlotte Grisby	Date Tested:	19/03/2024
Site Address:	NYGL	Sampled By:	Not Given

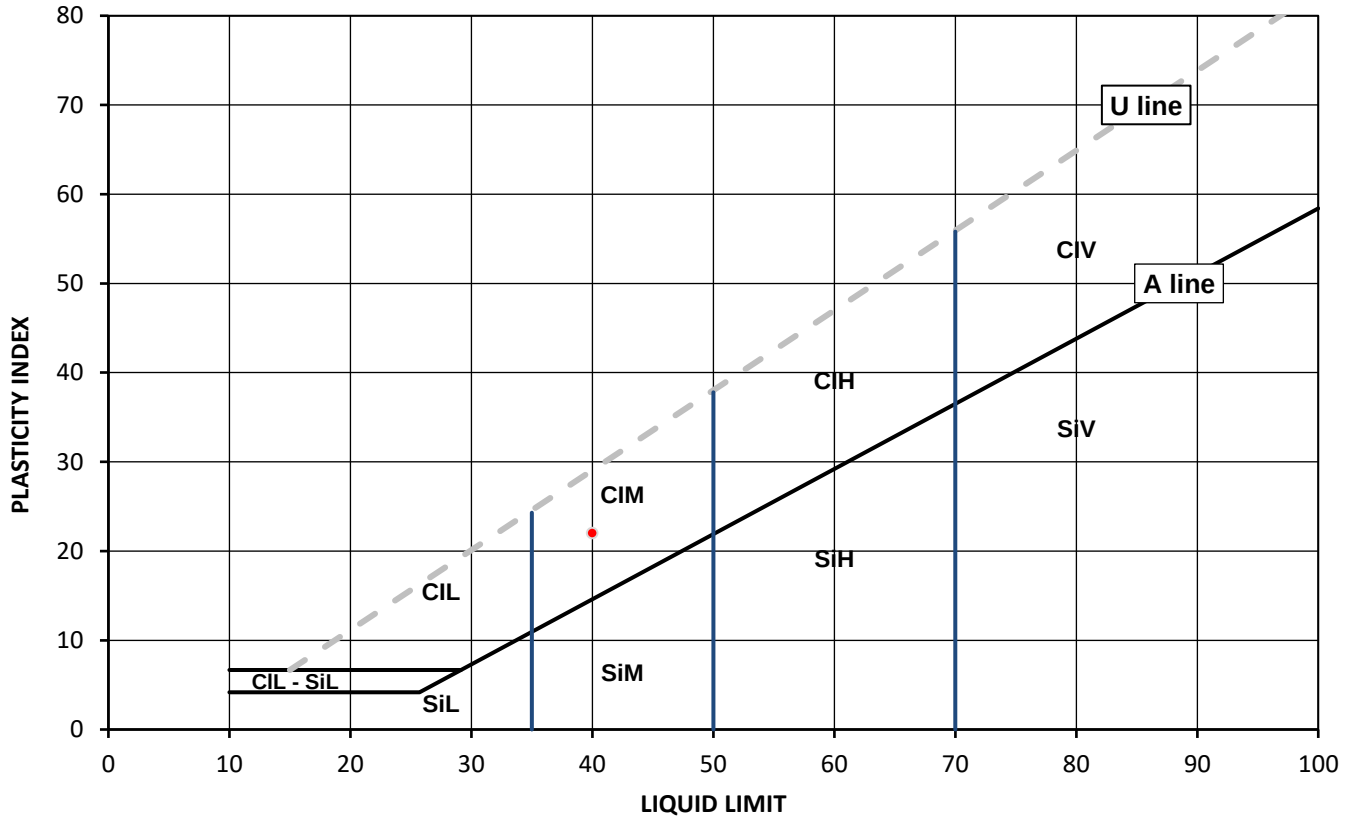
Testing carried out at i2 Analytical Limited, ul. Pionierow, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	144674	Depth Top [m]:	2.50
Hole No.:	WS05	Depth Base [m]:	Not Given
Sample Reference:	Not Given	Sample Type:	D
Sample Description:	Brown slightly gravelly sandy CLAY		

Sample Preparation: Tested after >0.425mm removed by hand; 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
17.7	40	18	22	0.00	1.00	88



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

Katarzyna Koziel
Senior Reporting Specialist

for and on behalf of i2 Analytical Ltd

Date Reported: 05/04/2024

GF 337.13

4041

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

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

Environmental Science

Client: JNP Midlands LLP

Client Address: 3rd Floor, Marlborough House, 48 Holly Walk, Leamington Spa, CV32 4XP

Contact: Charlotte Grisby

Site Address: NYGL

W by BS EN 17892-1: 2014; Correlation Factor by Clayton C.R.I and Jukes A.W (1978)

Client Reference: M44477
Job Number: 24-008903-1
Date Sampled: 12/03/2024
Date Received: 13/03/2024
Date Tested: 19/03/2024
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
144671	WS01	Not Given	2.00	Not Given	D	Brown gravelly slightly sandy CLAY	Atterberg 1 Point	15.4	51	45	1.000	16	29	80g/30 deg	W			
144672	WS03	Not Given	1.50	Not Given	D	Brown gravelly sandy CLAY	Atterberg 4 Point	12.4	62	43	-	15	28	80g/30 deg	W / I			
144673	WS04	Not Given	1.00	Not Given	D	Yellowish brown slightly gravelly slightly sandy CLAY	Atterberg 4 Point	21.4	79	45	-	21	24	80g/30 deg	W / I			
144674	WS05	Not Given	2.50	Not Given	D	Brown slightly gravelly sandy CLAY	Atterberg 4 Point	17.7	88	40	-	18	22	80g/30 deg	R / 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

Katarzyna Koziel
Senior Reporting Specialist

for and on behalf of i2 Analytical Ltd

Date Reported: 05/04/2024 **GF 362.13**

JNP Midlands LLP
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Analytical Report Number : 24-008904

Project / Site name:	NYGL	**Samples received on:**	13/03/2024
Your job number:	M44477	**Samples instructed on/ Analysis started on:**	13/03/2024
Your order number:	GO3077	**Analysis completed by:**	21/03/2024
Report Issue Number:	1	**Report issued on:**	26/03/2024
Samples Analysed:	5 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
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: 24-008904
Project / Site name: NYGL
Your Order No: GO3077

Lab Sample Number				144675	144676	144677	144678	146849
Sample Reference				WS01	WS03	WS04	WS05	WS02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.00	0.50	1.00	2.50	1.50
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
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	9.3	14	15	16	19
Total mass of sample received	kg	0.1	NONE	0.6	0.6	0.5	0.4	0.7
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8	8.9	7.7	7.4	7.4
Total Sulphate as SO_4	%	0.005	MCERTS	0.01	0.122	0.014	0.02	0.263
Water Soluble Sulphate as SO_4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	33	310	39	75	590
Water Soluble SO_4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	16.4	157	19.7	37.3	295
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	< 0.5	4.9	0.9	0.8	3.3
Total Sulphur	mg/kg	50	MCERTS	53	500	100	81	1600
Total Sulphur	%	0.005	MCERTS	0.005	0.05	0.01	0.008	0.159
Water Soluble Nitrate (2:1) as N	mg/kg	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	5.7
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	3.4
Heavy Metals / Metalloids								
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	< 2.5	2.7	2.9	15

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

Analytical Report Number : 24-008904
Project / Site name: NYGL

* 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 *
144675	WS01	None Supplied	1	Brown sandy clay
144676	WS03	None Supplied	0.5	Brown sand
144677	WS04	None Supplied	1	Brown clay and sand
144678	WS05	None Supplied	2.5	Brown clay with vegetation
146849	WS02	None Supplied	1.5	Brown loam and sand with gravel and vegetation

Analytical Report Number : 24-008904
Project / Site name: NYGL

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
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
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
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
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

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.

APPENDIX H: CHEMICAL TEST RESULTS

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Analytical Report Number : 24-008873

Project / Site name:	NYGL	**Samples received on:**	13/03/2024
Your job number:	M44477	**Samples instructed on/ Analysis started on:**	13/03/2024
Your order number:	G03077	**Analysis completed by:**	21/03/2024
Report Issue Number:	1	**Report issued on:**	25/03/2024
Samples Analysed:	10 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Reporting Specialist
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.

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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: 24-008873
Project / Site name: NYGL
Your Order No: G03077

Lab Sample Number				144533	144534	144535	144536	144537
Sample Reference				WS01	WS01	WS02	WS02	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.40	0.15	0.50	0.10
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
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	10	9.7	27	22	16
Total mass of sample received	kg	0.1	NONE	0.4	0.5	0.4	0.6	0.4
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	DSA	-	-	DSA	-
Actinolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Amosite detected	Type	N/A	ISO 17025	-	-	-	-	-
Anthophyllite detected	Type	N/A	ISO 17025	-	-	-	-	-
Chrysotile detected	Type	N/A	ISO 17025	-	-	-	-	-
Crocidolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Tremolite detected	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	-	-	-	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	8.2	-	-	6.7	8.6
Organic Matter (automated)	%	0.1	MCERTS	1.3	-	-	3.6	2.4
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	0.13	-	-
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	0.79	-	0.35	-	-
Anthracene	mg/kg	0.05	MCERTS	0.16	-	0.11	-	-
Fluoranthene	mg/kg	0.05	MCERTS	0.93	-	1.1	-	-
Pyrene	mg/kg	0.05	MCERTS	0.77	-	1.1	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.41	-	0.64	-	-
Chrysene	mg/kg	0.05	MCERTS	0.41	-	0.78	-	-
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.54	-	0.84	-	-
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.09	-	0.37	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.36	-	0.58	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.22	-	0.32	-	-
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.28	-	0.4	-	-
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	4.96	-	6.71	-	-

Analytical Report Number: 24-008873
Project / Site name: NYGL
Your Order No: G03077

Lab Sample Number				144533	144534	144535	144536	144537
Sample Reference				WS01	WS01	WS02	WS02	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.40	0.15	0.50	0.10
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
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	17	13	94	15	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	70	43	860	98	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.94	0.73	8	1.3	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.3	1.4	1.2	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	3.9	< 0.2	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	150	54	84	43	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	15	310	27	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	44	21	390	81	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	22	17	150	22	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	50	40	130	58	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	86	40	1200	100	-
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	-	< 0.020	-	-
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	< 0.020	-	< 0.020	-	-
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	< 0.050	-	< 0.050	-	-
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	-	< 1.0	-	-
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	-	< 2.0	-	-
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	-	< 8.0	-	-
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	-	24	-	-
TPHCWG - Aliphatic >C5 - C35 EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	-	24	-	-
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 >EC5 - EC35 EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10	-	< 10	-	-
Petroleum Range Organics (C6 - C10) HS_1D_TOTAL	mg/kg	1	NONE	-	-	-	-	-
TPH (C10 - C25) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	-	-	-	-	-
TPH (C25 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	-	-	-	-	-
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	-	-

Analytical Report Number: 24-008873
Project / Site name: NYGL
Your Order No: G03077

Lab Sample Number				144533	144534	144535	144536	144537
Sample Reference				WS01	WS01	WS02	WS02	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.40	0.15	0.50	0.10
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Pesticides								
Alpha-BHC (Benzene Hexachloride)	µg/kg	10	NONE	-	-	-	-	< 10
Alachlor	µg/kg	10	NONE	-	-	-	-	< 10
Bifenthrin	µg/kg	10	NONE	-	-	-	-	< 10
Cyhalothrin (Lambda)	µg/kg	10	NONE	-	-	-	-	< 10
Gamma-BHC (Lindane, gamma HCH)	µg/kg	10	NONE	-	-	-	-	< 10
Omethoate	µg/kg	10	NONE	-	-	-	-	< 10
1,2,3-Trichlorobenzene	µg/kg	10	NONE	-	-	-	-	< 10
1,3,5-Trichlorobenzene	µg/kg	10	NONE	-	-	-	-	< 10
2,6-Dichlorobenzonitrile	µg/kg	10	NONE	-	-	-	-	< 10
Dimethylvinphos	µg/kg	10	NONE	-	-	-	-	< 10
Demeton-O	µg/kg	10	NONE	-	-	-	-	< 10
Demeton-S	µg/kg	10	NONE	-	-	-	-	< 10
Endrin Aldehyde	µg/kg	10	NONE	-	-	-	-	< 10
Endrin Ketone	µg/kg	10	NONE	-	-	-	-	< 10
Hexachlorobutadiene	µg/kg	10	NONE	-	-	-	-	< 10
Phosphamidon (Sum)	µg/kg	10	NONE	-	-	-	-	< 10
1,2,4,5-Tetrachlorobenzene	µg/kg	10	NONE	-	-	-	-	< 10
Cis-Permethrin	µg/kg	10	NONE	-	-	-	-	< 10
Endosulfan sulfate	µg/kg	10	NONE	-	-	-	-	< 10
Etrimfos	µg/kg	10	NONE	-	-	-	-	< 10
Fenvalerate (Sum)	µg/kg	10	NONE	-	-	-	-	< 10
Hexachlorobenzene	µg/kg	10	NONE	-	-	-	-	< 10
Mevinphos, E+Z	µg/kg	10	NONE	-	-	-	-	< 10
Pentachlorobenzene	µg/kg	10	NONE	-	-	-	-	< 10
Pirimiphos-ethyl	µg/kg	10	NONE	-	-	-	-	< 10
Propetamphos	µg/kg	10	NONE	-	-	-	-	< 10
Tecnazene	µg/kg	10	NONE	-	-	-	-	< 10
Trans-Permethrin	µg/kg	10	NONE	-	-	-	-	< 10
Aldrin	µg/kg	10	NONE	-	-	-	-	< 10
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-	< 10
Beta-BHC	µg/kg	10	NONE	-	-	-	-	< 10
Cis-Chlordane	µg/kg	10	NONE	-	-	-	-	< 10
Chlorfenvinphos	µg/kg	10	NONE	-	-	-	-	< 10
Chlorpyrifos	µg/kg	10	NONE	-	-	-	-	< 10
Chlorothalonil	µg/kg	10	NONE	-	-	-	-	< 10
Carbophenothion	µg/kg	10	NONE	-	-	-	-	< 10
Cyfluthrin (Sum)	µg/kg	10	NONE	-	-	-	-	< 10
Delta-BHC	µg/kg	10	NONE	-	-	-	-	< 10
Dieldrin	µg/kg	10	NONE	-	-	-	-	< 10
Deltamethrin	µg/kg	10	NONE	-	-	-	-	< 10
Heptachlor Exo-epoxide	µg/kg	10	NONE	-	-	-	-	< 10
Endrin	µg/kg	10	NONE	-	-	-	-	< 10
Endosulfan I (alpha isomer)	µg/kg	10	NONE	-	-	-	-	< 10
Endosulfan II (beta isomer)	µg/kg	10	NONE	-	-	-	-	< 10
Fenthion	µg/kg	10	NONE	-	-	-	-	< 10
Isodrin	µg/kg	10	NONE	-	-	-	-	< 10
Methacrifos	µg/kg	10	NONE	-	-	-	-	< 10
O,p'-DDD	µg/kg	10	NONE	-	-	-	-	< 10
O,p'-DDE	µg/kg	10	NONE	-	-	-	-	< 10
O,p'-DDT	µg/kg	10	NONE	-	-	-	-	< 10
Parathion	µg/kg	10	NONE	-	-	-	-	< 10

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Lab Sample Number				144533	144534	144535	144536	144537
Sample Reference				WS01	WS01	WS02	WS02	WS03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.40	0.15	0.50	0.10
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Parathion-methyl	µg/kg	10	NONE	-	-	-	-	< 10
Pendimethalin	µg/kg	10	NONE	-	-	-	-	< 10
Phorate	µg/kg	10	NONE	-	-	-	-	< 10
Phosalone	µg/kg	10	NONE	-	-	-	-	< 10
P,p'-DDD	µg/kg	10	NONE	-	-	-	-	< 10
P,p'-DDE	µg/kg	10	NONE	-	-	-	-	< 10
P,p'-DDT	µg/kg	10	NONE	-	-	-	-	< 10
P,p'-Methoxychlor	µg/kg	10	NONE	-	-	-	-	< 10
Propyzamide	µg/kg	10	NONE	-	-	-	-	< 10
Trans-Chlordane	µg/kg	10	NONE	-	-	-	-	< 10
Cypermethrin (Sum)	µg/kg	10	NONE	-	-	-	-	< 10
Dichlorvos	µg/kg	10	NONE	-	-	-	-	< 10
Dimethoate	µg/kg	10	NONE	-	-	-	-	< 10
Diazinon	µg/kg	10	NONE	-	-	-	-	< 10
Ethion	µg/kg	10	NONE	-	-	-	-	< 10
Fenitrothion	µg/kg	10	NONE	-	-	-	-	< 10
Malathion	µg/kg	10	NONE	-	-	-	-	< 10
Pirimiphos-methyl	µg/kg	10	NONE	-	-	-	-	< 10
Trifluralin	µg/kg	10	NONE	-	-	-	-	< 10
Azinphos-ethyl	µg/kg	10	NONE	-	-	-	-	< 10

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

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Lab Sample Number				144538	144539	144540	144541	144542
Sample Reference				WS03	WS04	WS04	WS05	HP1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	0.25	0.50	0.10	0.15
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
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	58.2	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	13	11	18	14
Total mass of sample received	kg	0.1	NONE	0.4	0.5	0.6	0.5	0.5
Asbestos								
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	DSA	DSA	DSA	DSA	DSA
Actinolite detected	Type	N/A	ISO 17025	-	Not-detected	-	-	-
Amosite detected	Type	N/A	ISO 17025	-	Detected	-	-	-
Anthophyllite detected	Type	N/A	ISO 17025	-	Not-detected	-	-	-
Chrysotile detected	Type	N/A	ISO 17025	-	Not-detected	-	-	-
Crocidolite detected	Type	N/A	ISO 17025	-	Not-detected	-	-	-
Tremolite detected	Type	N/A	ISO 17025	-	Not-detected	-	-	-
Asbestos % by hand picking/weighing	%	0.001	ISO 17025	-	< 0.001	-	-	-
Asbestos Containing Material Types Detected (ACM)	Type	N/A	ISO 17025	-	Loose Fibres	-	-	-
General Inorganics								
pH (L099)	pH Units	N/A	MCERTS	-	8.4	-	10.8	7.5
Organic Matter (automated)	%	0.1	MCERTS	-	4.2	-	0.7	2.1
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	0.53	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.13	0.11	-	< 0.05	0.15
Acenaphthene	mg/kg	0.05	MCERTS	0.06	0.09	-	< 0.05	0.42
Fluorene	mg/kg	0.05	MCERTS	0.13	0.08	-	< 0.05	0.3
Phenanthrene	mg/kg	0.05	MCERTS	0.72	1.4	-	0.86	6
Anthracene	mg/kg	0.05	MCERTS	0.26	0.42	-	0.21	1.8
Fluoranthene	mg/kg	0.05	MCERTS	2.1	5.4	-	1.5	13
Pyrene	mg/kg	0.05	MCERTS	2	4.9	-	1.5	12
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.2	3	-	0.95	7.2
Chrysene	mg/kg	0.05	MCERTS	1.2	2.8	-	1.1	6.8
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	1.6	4.3	-	0.8	11
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.62	1.8	-	0.39	4.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.3	3.4	-	0.66	9.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.75	2.1	-	0.28	4.6
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.26	0.6	-	0.06	1.3
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.93	2.8	-	0.31	5.3
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	13.6	33.2	-	8.59	82.8

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Lab Sample Number				144538	144539	144540	144541	144542
Sample Reference				WS03	WS04	WS04	WS05	HP1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	0.25	0.50	0.10	0.15
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
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	13	19	15	14	-
Barium (aqua regia extractable)	mg/kg	1	MCERTS	270	470	270	60	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.89	0.99	0.74	0.76	-
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	1.3	0.6	2.4	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.2	2.7	9	< 0.2	-
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	71	150	65	170	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	62	230	180	12	-
Lead (aqua regia extractable)	mg/kg	1	MCERTS	240	400	660	8.7	-
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	0.6	1.2	< 0.3	-
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	30	42	19	-
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	-
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	44	44	35	63	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	530	590	2200	44	-
Petroleum Hydrocarbons								
TPHCWG - Aliphatic >C5 - C6 HS_1D_AL	mg/kg	0.02	NONE	-	-	-	-	-
TPHCWG - Aliphatic >C6 - C8 HS_1D_AL	mg/kg	0.02	NONE	-	-	-	-	-
TPHCWG - Aliphatic >C8 - C10 HS_1D_AL	mg/kg	0.05	NONE	-	-	-	-	-
TPHCWG - Aliphatic >C10 - C12 EH_CU_1D_AL	mg/kg	1	MCERTS	-	-	-	-	-
TPHCWG - Aliphatic >C12 - C16 EH_CU_1D_AL	mg/kg	2	MCERTS	-	-	-	-	-
TPHCWG - Aliphatic >C16 - C21 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	-	-
TPHCWG - Aliphatic >C21 - C35 EH_CU_1D_AL	mg/kg	8	MCERTS	-	-	-	-	-
TPHCWG - Aliphatic >C5 - C35 EH_CU+HS_1D_AL	mg/kg	10	NONE	-	-	-	-	-
TPHCWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.01	NONE	-	-	-	-	-
TPHCWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.01	NONE	-	-	-	-	-
TPHCWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.05	NONE	-	-	-	-	-
TPHCWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	-	-	-	-	-
TPHCWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	-	-	-	-	-
TPHCWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	-	-
TPHCWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	-	-	-	-	-
TPHCWG - Aromatic >EC5 - EC35 EH_CU+HS_1D_AR	mg/kg	10	NONE	-	-	-	-	-
Petroleum Range Organics (C6 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0	< 1.0
TPH (C10 - C25) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	38	-	22	68
TPH (C25 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	100	-	< 10	69
VOCs								
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	-	-	-	-	-
Benzene	µg/kg	5	MCERTS	-	-	-	-	-
Toluene	µg/kg	5	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	5	MCERTS	-	-	-	-	-
p & m-Xylene	µg/kg	5	MCERTS	-	-	-	-	-
o-Xylene	µg/kg	5	MCERTS	-	-	-	-	-

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Lab Sample Number				144538	144539	144540	144541	144542
Sample Reference				WS03	WS04	WS04	WS05	HP1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	0.25	0.50	0.10	0.15
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Pesticides								
Alpha-BHC (Benzene Hexachloride)	µg/kg	10	NONE	-	-	-	-	-
Alachlor	µg/kg	10	NONE	-	-	-	-	-
Bifenthrin	µg/kg	10	NONE	-	-	-	-	-
Cyhalothrin (Lambda)	µg/kg	10	NONE	-	-	-	-	-
Gamma-BHC (Lindane, gamma HCH)	µg/kg	10	NONE	-	-	-	-	-
Omethoate	µg/kg	10	NONE	-	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	10	NONE	-	-	-	-	-
1,3,5-Trichlorobenzene	µg/kg	10	NONE	-	-	-	-	-
2,6-Dichlorobenzonitrile	µg/kg	10	NONE	-	-	-	-	-
Dimethylvinphos	µg/kg	10	NONE	-	-	-	-	-
Demeton-O	µg/kg	10	NONE	-	-	-	-	-
Demeton-S	µg/kg	10	NONE	-	-	-	-	-
Endrin Aldehyde	µg/kg	10	NONE	-	-	-	-	-
Endrin Ketone	µg/kg	10	NONE	-	-	-	-	-
Hexachlorobutadiene	µg/kg	10	NONE	-	-	-	-	-
Phosphamidon (Sum)	µg/kg	10	NONE	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	µg/kg	10	NONE	-	-	-	-	-
Cis-Permethrin	µg/kg	10	NONE	-	-	-	-	-
Endosulfan sulfate	µg/kg	10	NONE	-	-	-	-	-
Etrimfos	µg/kg	10	NONE	-	-	-	-	-
Fenvalerate (Sum)	µg/kg	10	NONE	-	-	-	-	-
Hexachlorobenzene	µg/kg	10	NONE	-	-	-	-	-
Mevinphos, E+Z	µg/kg	10	NONE	-	-	-	-	-
Pentachlorobenzene	µg/kg	10	NONE	-	-	-	-	-
Pirimiphos-ethyl	µg/kg	10	NONE	-	-	-	-	-
Propetamphos	µg/kg	10	NONE	-	-	-	-	-
Tecnazene	µg/kg	10	NONE	-	-	-	-	-
Trans-Permethrin	µg/kg	10	NONE	-	-	-	-	-
Aldrin	µg/kg	10	NONE	-	-	-	-	-
Azinphos-methyl	µg/kg	10	NONE	-	-	-	-	-
Beta-BHC	µg/kg	10	NONE	-	-	-	-	-
Cis-Chlordane	µg/kg	10	NONE	-	-	-	-	-
Chlorfenvinphos	µg/kg	10	NONE	-	-	-	-	-
Chlorpyrifos	µg/kg	10	NONE	-	-	-	-	-
Chlorothalonil	µg/kg	10	NONE	-	-	-	-	-
Carbophenothion	µg/kg	10	NONE	-	-	-	-	-
Cyfluthrin (Sum)	µg/kg	10	NONE	-	-	-	-	-
Delta-BHC	µg/kg	10	NONE	-	-	-	-	-
Dieldrin	µg/kg	10	NONE	-	-	-	-	-
Deltamethrin	µg/kg	10	NONE	-	-	-	-	-
Heptachlor Exo-epoxide	µg/kg	10	NONE	-	-	-	-	-
Endrin	µg/kg	10	NONE	-	-	-	-	-
Endosulfan I (alpha isomer)	µg/kg	10	NONE	-	-	-	-	-
Endosulfan II (beta isomer)	µg/kg	10	NONE	-	-	-	-	-
Fenthion	µg/kg	10	NONE	-	-	-	-	-
Isodrin	µg/kg	10	NONE	-	-	-	-	-
Methacrifos	µg/kg	10	NONE	-	-	-	-	-
O,p'-DDD	µg/kg	10	NONE	-	-	-	-	-
O,p'-DDE	µg/kg	10	NONE	-	-	-	-	-
O,p'-DDT	µg/kg	10	NONE	-	-	-	-	-
Parathion	µg/kg	10	NONE	-	-	-	-	-

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Lab Sample Number				144538	144539	144540	144541	144542
Sample Reference				WS03	WS04	WS04	WS05	HP1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.60	0.25	0.50	0.10	0.15
Date Sampled				12/03/2024	12/03/2024	12/03/2024	12/03/2024	12/03/2024
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Parathion-methyl	µg/kg	10	NONE	-	-	-	-	-
Pendimethalin	µg/kg	10	NONE	-	-	-	-	-
Phorate	µg/kg	10	NONE	-	-	-	-	-
Phosalone	µg/kg	10	NONE	-	-	-	-	-
P,p'-DDD	µg/kg	10	NONE	-	-	-	-	-
P,p'-DDE	µg/kg	10	NONE	-	-	-	-	-
P,p'-DDT	µg/kg	10	NONE	-	-	-	-	-
P,p'-Methoxychlor	µg/kg	10	NONE	-	-	-	-	-
Propyzamide	µg/kg	10	NONE	-	-	-	-	-
Trans-Chlordane	µg/kg	10	NONE	-	-	-	-	-
Cypermethrin (Sum)	µg/kg	10	NONE	-	-	-	-	-
Dichlorvos	µg/kg	10	NONE	-	-	-	-	-
Dimethoate	µg/kg	10	NONE	-	-	-	-	-
Diazinon	µg/kg	10	NONE	-	-	-	-	-
Ethion	µg/kg	10	NONE	-	-	-	-	-
Fenitrothion	µg/kg	10	NONE	-	-	-	-	-
Malathion	µg/kg	10	NONE	-	-	-	-	-
Pirimiphos-methyl	µg/kg	10	NONE	-	-	-	-	-
Trifluralin	µg/kg	10	NONE	-	-	-	-	-
Azinphos-ethyl	µg/kg	10	NONE	-	-	-	-	-

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

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Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
144539	WS04	0.25	165	Loose Fibres	**Amosite**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

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* 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 *
144533	WS01	None Supplied	0.2	Brown clay and sand with gravel and vegetation
144534	WS01	None Supplied	0.4	Brown clay and sand with gravel and vegetation
144535	WS02	None Supplied	0.15	Brown loam and sand with gravel and vegetation
144536	WS02	None Supplied	0.5	Brown clay and loam with gravel and vegetation
144537	WS03	None Supplied	0.1	Brown sand with gravel and vegetation
144538	WS03	None Supplied	0.6	Brown clay and sand with gravel and vegetation
144539	WS04	None Supplied	0.25	Brown sand with brick and vegetation
144540	WS04	None Supplied	0.5	Brown clay and sand with vegetation and stones
144541	WS05	None Supplied	0.1	Brown sand with gravel and vegetation
144542	HP1	None Supplied	0.15	Brown sandy clay with gravel and vegetation

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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
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references	HSE Report No: 83/1996, HSG 248 (2021), HSG 264 (2012) & SCA Blue Book (draft)	A006B	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
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
Pesticides by GC-MS/MS	Detemination of Pesticides in soil by GC MS/MS	In-house method	L055B	W	NONE
Speciated EPA-16 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
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	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

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.

Analytical Report Number : 24-008873
Project / Site name: NYGL

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

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 - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

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Analytical Report Number : 24-010532

Project / Site name:	NYGL	**Samples received on:**	21/03/2024
Your job number:	M44477	**Samples instructed on/ Analysis started on:**	22/03/2024
Your order number:	G03077	**Analysis completed by:**	03/04/2024
Report Issue Number:	1	**Report issued on:**	04/04/2024
Samples Analysed:	2 soil samples		

Signed:

Anna Goc
PL Head of Reporting Team
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: 24-010532
Project / Site name: NYGL
Your Order No: G03077

Lab Sample Number				152341	152342
Sample Reference				HP3	HP4
Sample Number				ES2	ES1
Depth (m)				0.30	0.20
Date Sampled				21/03/2024	21/03/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	18
Total mass of sample received	kg	0.1	NONE	0.3	0.4
Asbestos					
Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	-	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	-	DSA
General Inorganics					
pH (L099)	pH Units	N/A	MCERTS	-	9.6
Organic Matter (automated)	%	0.1	MCERTS	-	3.6
Speciated PAHs					
Naphthalene	mg/kg	0.05	MCERTS	-	0.9
Acenaphthylene	mg/kg	0.05	MCERTS	-	1.4
Acenaphthene	mg/kg	0.05	MCERTS	-	4.7
Fluorene	mg/kg	0.05	MCERTS	-	4.5
Phenanthrene	mg/kg	0.05	MCERTS	-	75
Anthracene	mg/kg	0.05	MCERTS	-	20
Fluoranthene	mg/kg	0.05	MCERTS	-	110
Pyrene	mg/kg	0.05	MCERTS	-	91
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	42
Chrysene	mg/kg	0.05	MCERTS	-	38
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	-	41
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	-	16
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	34
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	21
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	5.6
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	23
Total PAH					
Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	-	528
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	16	16
Barium (aqua regia extractable)	mg/kg	1	MCERTS	160	170
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.2	2.9
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	1.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.6	0.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	39
Copper (aqua regia extractable)	mg/kg	1	MCERTS	18	38
Lead (aqua regia extractable)	mg/kg	1	MCERTS	47	94
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	27
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	59	67
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	110	120

Analytical Report Number: 24-010532
Project / Site name: NYGL
Your Order No: G03077

Lab Sample Number				152341	152342
Sample Reference				HP3	HP4
Sample Number				ES2	ES1
Depth (m)				0.30	0.20
Date Sampled				21/03/2024	21/03/2024
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Petroleum Hydrocarbons					
Petroleum Range Organics (C6 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	-
TPH (C10 - C25) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	570	-
TPH (C25 - C40) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	1000	-

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

Analytical Report Number : 24-010532
Project / Site name: NYGL

* 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 *
152341	HP3	ES2	0.3	Brown loam and sand with gravel and vegetation
152342	HP4	ES1	0.2	Brown clay and loam with gravel and vegetation

Analytical Report Number : 24-010532
Project / Site name: NYGL

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
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
Speciated EPA-16 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
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	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

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.

Analytical Report Number : 24-010532
Project / Site name: NYGL

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

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 - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

UKAS TESTING
4041

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Analytical Report Number : 24-018603

Project / Site name:	New Years Green Lane	**Samples received on:**	08/05/2024
Your job number:	M44477	**Samples instructed on/ Analysis started on:**	08/05/2024
Your order number:	GO3140	**Analysis completed by:**	16/05/2024
Report Issue Number:	1	**Report issued on:**	17/05/2024
Samples Analysed:	1 water sample - 1 leachate sample		

Signed:

Anna Goc
PL Head of Reporting Team
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: 24-018603
Project / Site name: New Years Green Lane

Your Order No: GO3140

Lab Sample Number	193721
Sample Reference	WS01
Sample Number	None Supplied
Depth (m)	4.00
Date Sampled	08/05/2024
Time Taken	None Supplied

Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH (L099)	pH Units	N/A	NONE	U/S *
Dissolved Organic Carbon (DOC)	mg/l	0.1	ISO 17025	18.8
Hardness - Total	mgCaCO3/l	1	ISO 17025	378
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16
Heavy Metals / Metalloids				
Arsenic (dissolved)	µg/l	0.15	ISO 17025	6.49
Barium (dissolved)	µg/l	0.06	ISO 17025	78
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	1
Copper (dissolved)	µg/l	0.5	ISO 17025	2.5
Lead (dissolved)	µg/l	0.2	ISO 17025	0.8
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	11
Selenium (dissolved)	µg/l	0.6	ISO 17025	2
Vanadium (dissolved)	µg/l	0.2	ISO 17025	4.4
Zinc (dissolved)	µg/l	0.5	ISO 17025	5.3
Boron (dissolved)	µg/l	10	ISO 17025	130
Calcium (dissolved)	mg/l	0.012	ISO 17025	120

Analytical Report Number: 24-018603
Project / Site name: New Years Green Lane

Your Order No: GO3140

Lab Sample Number				193721
Sample Reference				WS01
Sample Number				None Supplied
Depth (m)				4.00
Date Sampled				08/05/2024
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Petroleum Hydrocarbons				
TPH - Aliphatic >C5 - C6 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH - Aliphatic >C6 - C8 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH - Aliphatic >C8 - C10 $_{HS\_1D\_AL}$	µg/l	1	ISO 17025	< 1.0
TPH - Aliphatic >C10 - C12 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10
TPH - Aliphatic >C12 - C16 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10
TPH - Aliphatic >C16 - C21 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10
TPH - Aliphatic >C21 - C35 $_{EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10
TPH - Aliphatic >C5 - C35 $_{HS+EH\_1D\_AL\_MS}$	µg/l	10	NONE	< 10
TPH - Aromatic >EC5 - EC7 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH - Aromatic >EC7 - EC8 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH - Aromatic >EC8 - EC10 $_{HS\_1D\_AR}$	µg/l	1	ISO 17025	< 1.0
TPH - Aromatic >EC10 - EC12 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10
TPH - Aromatic >EC12 - EC16 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10
TPH - Aromatic >EC16 - EC21 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10
TPH - Aromatic >EC21 - EC35 $_{EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10
TPH - Aromatic >EC5 - EC35 $_{HS+EH\_1D\_AR\_MS}$	µg/l	10	NONE	< 10
VOCs				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	3	ISO 17025	< 3.0
Benzene	µg/l	3	ISO 17025	< 3.0
Toluene	µg/l	3	ISO 17025	< 3.0
Ethylbenzene	µg/l	3	ISO 17025	< 3.0
p & m-xylene	µg/l	3	ISO 17025	< 3.0
o-xylene	µg/l	3	ISO 17025	< 3.0

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

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Analytical Report Number: 24-018603
Project / Site name: New Years Green Lane

Your Order No: GO3140

Lab Sample Number				193720
Sample Reference				WS01
Sample Number				None Supplied
Depth (m)				0.50
Date Sampled				08/05/2024
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH (automated)	pH Units	N/A	ISO 17025	8
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	9.5
Hardness - Total	mgCaCO3/l	1	ISO 17025	27.6
Heavy Metals / Metalloids				
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0
Barium (dissolved)	µg/l	0.05	ISO 17025	5.4
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	< 10
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	4.5
Lead (dissolved)	µg/l	1	ISO 17025	< 1.0
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	0.8
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	2.3

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

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Analytical Report Number : 24-018603
Project / Site name: New Years Green Lane

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
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW	In-house method based on USEPA Method 6020 & 200.8 for the determination of trace elements in water by ICP-MS	L012B	W	ISO 17025
Dissolved Organic Carbon in leachate	Determination of dissolved organic carbon in leachate by the measurement on a non-dispersive infrared analyser of carbon dioxide released by acidification	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	NONE
Dissolved Organic Carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR Analyser	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037B	W	ISO 17025
Metals by ICP-OES in leachate	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
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices: SW, GW, PW, PrW (Al, Cu, Fe,Zn)	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil	L039B	W	ISO 17025
Total Hardness of leachates	Determination of hardness in leachates by calculation from calcium and magnesium	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045B	W	ISO 17025
Total petroleum hydrocarbons with carbon banding by GC-MS in water	Determination of total petroleum hydrocarbons in water by GC-MS/GC-MS HS with carbon banding aliphatic and aromatic	In-house method	L070B	W	NONE
BTEX and/or Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA 8260	L073B	W	ISO 17025
Total petroleum hydrocarbons by GC-MS HS in water	Determination of total petroleum hydrocarbons in water by GC-MS HS	In-house method	L088	W	ISO 17025
pH at 20°C in leachate (automated)	Determination of pH in leachate by electrometric measurement	In-house method	L099	W	ISO 17025
pH at 20°C in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method	L099	W	NONE
Speciated EPA-16 PAHs and/or Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds (including PAH) in leachate by extraction in dichloromethane followed by GC-MS	In-house method based on USEPA 8270	L102B	W	ISO 17025

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Analytical Report Number : 24-018603
Project / Site name: New Years Green Lane

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
WAC Leachate 10:1		In-house method	L043B	W	NONE

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 - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

*U/S - Unsuitable for analysis due to sample matrix.

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