

**Manor Nursery
Angmering
West Sussex**

**Combined Geotechnical and
Ground Contamination Risk Assessment**



Report No. LW26073

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Report prepared for the benefit of:

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Limitations

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The risk assessment presented in this report follows 'source-pathway-receptor' techniques for the determination of whether a site is contaminated. This is standard practice in the UK, being intrinsic to Part 2A of the Environmental Protection Act 1990 as amended.

The report considers the proposed end users as the most sensitive human health receptors. If significant risks to construction workers are identified by the preliminary assessment attention is drawn to this, although it is noted that no assessment of risk from acute exposure has been undertaken in this connection.

This report is not intended to be either an ecological, archaeological or flood risk assessment. An appropriate specialist should be consulted about any concerns that may arise in this regard.

EXECUTIVE SUMMARY

It is proposed to redevelop the site at the existing Manor Nursery, Angmering, West Sussex. At present outline permission has been granted for the construction of 32 new houses with private gardens and new access roads. It is understood that the final development layout may be subject to change, but that a residential development of some form is proposed and it is on this basis that the risk assessment for the site has been undertaken. The following presents a summary of the main findings of the ground investigation and contamination risk assessment. It is emphasised that no reliance should be placed on any individual point until the whole of the report has been read as other sections of the report may put into context the information contained herein.

The site was undeveloped up until circa 1977 when nursery buildings were first shown. The construction and subsequent demolition of some ancillary structures has taken place since the nursery was first developed.

Reference to geological datasets indicates that the site is expected to be underlain by the River Terrace Deposits overlying the White Chalk Subgroup. The ground investigation partially confirmed these predictions, with the underlying soils comprising a variable thickness of made ground, overlying generally firm and stiff gravelly clays and loose to medium dense gravels of the River Terrace Deposits. Softer soils were recorded locally. None of the boreholes, which generally extended to a depth of 3 metres encountered the White Chalk Subgroup deposits.

The River Terrace Deposits are classed as a Secondary A Aquifer. The White Chalk Subgroup is classed as a Principal Aquifer. The site does not lie within an Environment Agency Source Protection Zone with regard to the protection of the quality of groundwater that is abstracted for potable supply. Groundwater was not encountered during the intrusive works.

The preliminary contamination risk assessment identified two potentially significant pollutant linkages to localised sources with regard to proposed end users, one of which may also pose a risk to controlled waters beneath the site.

The cohesive soils of the River Terrace deposits were classified as clays of intermediate plasticity, likely to exhibit a medium shrinkage/heave potential. As such all new foundation systems should take into account current guidance such as that given by the Building Research Establishment (BRE) or the National House Builders Council (NHBC).

A net allowable bearing capacity of 135kN/m² may be assumed for the design of pad or strip foundations up to 1m in breadth that are constructed to bear upon the minimum firm-to-stiff soils or medium dense soils of the River Terrace Deposits. The quoted bearing capacity is expected to limit settlement to less than 25mm. In general a minimum depth to formation of 0.9m should be adopted, although foundations should be deepened where made ground is found to extend below this depth or where there is a requirement to protect foundations against seasonal soil volume changes induced by trees. Further investigation should be considered should houses be constructed in those areas associated with softer soils.

Groundwater was not encountered during the intrusive works, but it is possible that perched water of heavy precipitation during construction could enter excavations. In such circumstances it would be expected that the water would be adequately managed by pumping from sumps or possibly natural seepage, or a combination of the two.

It could be expected that unsupported excavations within the fine grained River Terrace Deposits would remain stable for a short period of time. Where excavations are required to

remain stable in the medium or long term within the fine grained soils or in any case where stable excavations are required within the made ground or coarse grained soils, excavations should either be suitably supported or side slopes should be battered back to a safe angle of repose. All excavations requiring human entry must be shored or battered as necessary to conform to current best practice, as accepted by the Health and Safety Executive (HSE); relevant guidance is given on the HSE website (www.hse.gov.uk).

A DS-1 Design Sulfate Class and an AC-1 ACEC classification may be assumed as a minimum for the design of concrete in contact with the ground.

In view of the variable thickness of made ground and the presence of soils of medium volume change potential underlying the site, it is recommended that ground floors for all sensitive structures should be suspended.

A design equilibrium CBR value of no greater than 3% should be assumed for the preliminary design of pavement bearing on the undisturbed River Terrace Deposits. The subgrade is likely to be susceptible to frost heave.

The in situ test results indicate that the granular soils of the River Terrace Deposits should be capable of accepting surface water run-off via soakaways,

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1. INTRODUCTION

It is proposed to redevelop the site of the existing Manor Nursery, Angmering, West Sussex. At the time of writing, outline permission has been granted for the construction of 32 new houses with private gardens and associated access roads. It is understood that the final development layout may change, but that a residential development of some form is proposed and it is on this basis that the site assessment has been undertaken.

Ashdown Site Investigation Limited was commissioned to carry out a combined geotechnical and ground contamination risk assessment of the site by Mr J Godfrey of Hanbury Properties Ltd, 17 Northgate, Chichester, West Sussex, PO19 1BJ.

The scope of the commission and the terms and conditions under which the work was undertaken are set out within the offer letter Q14-914/rev2 dated 11th February 2015. The instruction to proceed was received from the client in an email dated 25th February 2015.

The objectives of the works were to:

- a) Establish the expected geology, hydrogeology and hydrology at the site.
- b) Ascertain the development history and current site use.
- c) Develop a preliminary conceptual model of the site identifying potentially significant pollutant linkages relating to end users of the development, to controlled waters or off-site sensitive receptors.
- d) Investigate the shallow ground and groundwater conditions prevailing at the site.
- e) Provide advice to assist others in undertaking design of foundations, ground floors, road pavement and soakaways.
- f) Test for the presence of potentially significant contamination in the ground.
- g) Develop a quantitative conceptual model of the site identifying potentially significant pollutant linkages relating to end users of the development, to controlled waters or off-site sensitive receptors.

The preliminary conceptual model has been based on the findings of a walkover survey and reference to historical Ordnance Survey maps and published geological and environmental information obtained from various sources; the latter having been obtained from interrogation of database information compiled by GroundSure Limited.

Copies of the historical maps and geo-environmental data referred to in this report are included in a separate volume, entitled Geo-Environmental Data and Historical Maps (Ashdown Site Investigation Limited, Report Number LW26073/map, dated March 2015).

2. PRELIMINARY CONTAMINATION ASSESSMENT

2.1 Walkover Survey

The site comprises an irregular shaped plot of land located off High Street, Angmering, West Sussex, and is centred on the approximate Ordnance Survey national grid reference TQ 0764 0424. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively. Photographs taken during the walkover survey are included in Appendix A.

An access road led onto the site in its north western corner. This led to a roadstone surfaced car park which occupied much of the western half of the site. Some pallets of compost and other products were stored in various places in the car park. A small wooden toilet block was located on the southern boundary of the site.

The north eastern part of the site was occupied by an outdoor plant display area which was surfaced with a mixture of concrete and geotextile matting.

To the south of this was the main nursery building which comprised a single storey steel frame and glass building that covered the majority of the south eastern part of the site. A small brick built plant room with a suspected asbestos roof was located adjacent to the north eastern corner of the nursery.

The plant room contained a boiler that was formerly oil fired. The oil tank had been removed from the room and had been placed on the eastern boundary of the site along with a pile of other demolition spoil and waste materials.

In the south eastern corner of the site was an open area of ground where the remains of a large bonfire, including various pieces of scrap metal, was noted.

The site was bounded to the south by an area of land which was in the process of being developed for housing. The A280 ran along the eastern edge of the site and a small access road, beyond which was a car park, lay to the north of the site. An area of open land lay to the west.

2.1.1 Potential Contamination Sources Identified by Walkover Survey

The walkover survey identified the following potential sources of contamination:

On Site

- Existing Nursery. Potential for heavy metal, PAH compound, pesticide and herbicide contamination.
- Plant Room, above ground tank and waste materials. Potential for heavy metal, PAH compound and petroleum hydrocarbon contamination.
- Bonfire Remains. Potential for heavy metal and PAH compound contamination.

Off Site

- No significant off-site sources of contamination were identified by the Walkover Survey.

2.2 Geological Data Review

2.2.1 Expected Geology

The data presented in the GeoInsight section of the accompanying Geo-Environmental Data has been reviewed. Reference has also been made to the British Geological Survey lexicon of named rock units and British Geological Survey mapping data.

The stratigraphic succession that may be expected to underlie the site is presented in the following table.

Table 1. Expected Geological Strata

Type	Stratum
Superficial Deposits	River Terrace Deposits
Bedrock Deposits	White Chalk Subgroup

2.2.1.1 River Terrace Deposits

The River Terrace Deposits generally comprise well graded sandy fine to coarse gravel of flint. Locally sand or gravel strata may predominate.

2.2.1.2 White Chalk Subgroup

The White Chalk Subgroup comprises a weak, white chalk locally with flint bands together with scattered nodular flints. It may be expected to have a deeply convoluted upper surface as a result of solution weathering. The presence of cavities in the chalk is very rare and solution features, if present, can be expected to be infilled with Quaternary deposits such as the River Terrace Deposits or the Head.

The infill material may be significantly weaker than the surrounding chalk. Solution features can comprise pipes extending to several metres deep into the chalk or conical depressions and basin shaped structures.

2.2.2 Radon Gas

The site is reported to be within an area where between 5% and 10% of properties are above the action level requiring radon gas protection measures to be installed in new buildings or extensions to existing ones. Basic radon protection measures are reported to be needed within new buildings and extensions to existing ones. It is recommended that discussions with building control are undertaken to confirm their exact requirements in this connection.

2.2.3 Ground Workings

The only area of ground workings identified refers to an "unspecified pit" located some 210m to the north east. Inspection of the historical maps indicates that this appears to be an extant feature and as such is not considered to represent a significant risk.

2.2.4 Mining, Extractions and Natural Cavities

No significant risks from mining, natural cavities or extractions are reported on or in the vicinity of the site.

2.2.5 Natural Ground Subsidence

The maximum hazard rating of natural subsidence within the site boundary (including a 50m buffer zone) is low. This hazard rating is based on the interrogation of the six British Geological Survey (BGS) natural ground stability datasets (GeoSure). These are reviewed individually in the table below.

Table 2. Natural Ground Subsidence Hazards

Section	Risk Assessment (GroundSure)
Soil Volume Change Potential (Shrink-Swell)	Low
Landslides	Very Low
Ground Dissolution of Soluble Rocks	Low
Compressible Deposits	Negligible
Collapsible Deposits	Low
Running Sands	Low

It should be noted that the assessment provided within the GroundSure report represents a generic assessment only. Detailed assessment of the geotechnical characteristics of the soils encountered at the site is presented in Section 5 of this report.

2.2.6 Background Mean Soil Concentrations of Metals

The GroundSure GeoInsight report provides information on background chemistry of the soils in the area of the site. The following estimated mean concentrations of metals are reported. It should be noted that the data set may not reflect higher concentrations of contaminants that may be present within made ground soils or natural soils that may have been affected by current or historical uses of the site.

Table 3. Background Mean Soil Concentrations of Metals

Metal	Mean Soil Concentration (mg/kg)	Remarks & ASI Ltd Assessment
Arsenic	15-25	The mean soil concentrations indicated are not considered to be significantly elevated for the proposed use.
Cadmium	<1.8	
Chromium	60-90	
Nickel	15-30	
Lead	<100	

2.2.7 Potential Contamination Sources identified by Geological Data Review

The following potential sources of contamination have been identified from the geological data review:

On Site

- Radon Gas.

Off Site

- No significant off-site sources of contamination were identified from the geological data review.

2.3 Hydrogeology

2.3.1 Aquifer Classification

The Environment Agency designates aquifers in accordance with the Water Framework Directive. These designations reflect not only the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey.

The River Terrace Deposits and White Chalk Subgroup expected beneath the site are classified as a Secondary A Aquifer and a Principal Aquifer respectively. Secondary A Aquifers are characterised by permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. Principal Aquifers comprise deposits that have high intergranular and/or fracture permeability, usually providing a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

2.3.2 Groundwater Source Protection Zones and Abstraction Licences

The closest groundwater abstraction licence is recorded to lie 571m to the south west of the site. The abstraction is listed as being for horticultural watering.

There are no potable groundwater abstractions within 2km of the site.

The site does not lie within an Environment Agency Source Protection Zone with regard to the protection of the quality of groundwater that is abstracted for potable supply.

2.4 Hydrology

2.4.1 Surface Water Features

The closest surface water feature identified appears to be a drainage ditch associated with the A280 some 80m to the south east of the site.

There is no Environment Agency information on river quality within 250m of the site.

2.4.2 *Surface Water Abstraction Licences*

The closest surface water abstraction licence is recorded to lie 1959m to the west of the site. The abstraction is listed as being for direct spray irrigation.

2.4.3 *Flooding*

The site does not lie within an Environment Agency Flood Zone.

There are no flood defences, areas benefiting from flood defences or areas used for flood storage within 250m of the site.

The site lies within 50m of an area where a limited potential of Clearwater Flooding (flooding associated with an unconfined aquifer) is recorded.

The BGS consider the confidence rating of their data in this area to be high.

2.5 Site History

Historical Ordnance Survey maps covering the area of the site have been reviewed and are summarised in the following table.

It is noted that each map presents information applicable at the time of the survey (or revision date) and is subject to surveying and cartographic errors and/or advances. Revisions to maps are made at irregular intervals and it is possible that significant developments may have taken place on or within the vicinity of the site that are not shown on the maps.

'In the Vicinity of the Site' generally refers to features of relevance within approximately 250m of the site boundary, but may also include more distant features if considered to be pertinent to the assessment of the development history.

Table 4. Summary of Significant Features Identified on Historical Maps

Map Details	On-Site	In the Vicinity of the Site	Potential Contamination Sources
1876 1:10,560	The site comprises part of an open field.	Unlabelled roads run along the northern and the southern part of the eastern site boundary A pond is shown approximately 150m east of the site.	
1970 1:2,500	No significant changes.	The pond is no longer shown and appears to have been backfilled.	Given its size and distance from the site, backfill to the pond is not considered to represent a significant risk to the site from ground gas migration.
1977 1:2,500	The site is now labelled as a Nursery. Two buildings are shown partially occupying the footprint of the existing structure. Two other long rectangular structures are shown within the existing car park buildings.	No significant changes.	Site use as a Nursery

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Map Details	On-Site	In the Vicinity of the Site	Potential Contamination Sources
1994 1:2,500	The two long structures are no longer shown in the western part of the site. The whole footprint of the existing nursery building is now shown as being occupied by structures. An additional rectangular structure is shown to the east of the main nursery and extends off site to the north east.		Made ground from demolition works
2010 1:10,000	The building in the eastern part of the site is no longer shown due to the change in route of the A280.	The route of the new A280 now runs along the eastern boundary.	Made ground from demolition works

2.5.1 Potential Contamination Sources identified by Historical Map Review

The following potential sources of contamination were identified from the historical map review:

On Site

- Site use as a Nursery. Potential for heavy metal, PAH compound, petroleum hydrocarbon, herbicide and pesticide contamination.
- Made Ground from demolition works. Potential for heavy metal, PAH compound and asbestos contamination.

Off Site

- No significant off-site sources of contamination were identified by the historical map review.

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2.6 Environmental Data Review

Records of potentially contaminative activities, authorisations, pollution incidents and land uses recorded by the regulatory authorities and compiled by GroundSure in their EnviroInsight Report have been reviewed. Data are supplied by the British Geological Survey (BGS), Environment Agency, Health Protection Agency, The Coal Authority and Local Authorities.

Ashdown Site Investigation Ltd. (ASI Ltd.) has commented, where appropriate, on the potential risks identified both to and from the site.

Table 5. Environmental Permits, Incidents and Registers

Section	Remarks	Potential Source Identified
Records of Licensed Discharge Consents	The data identifies four records within 250m with the closest being located 177m north east. All four entries refer to non-water company sewage discharges, most likely to be septic tanks.	In view of the distance and nature of the entries, none are considered to pose a significant risk to the site.
Environment Agency Recorded Pollution Incidents – National Incidents Recording System, List 2	The data identifies two records which both refer to an incident on site on 24 th January 2002. No details of what the pollutants were are provided but they are recorded as a category 3 (minor) land impact.	Pollution Incident

No landfills or other waste sites considered to pose a significant risk have been identified on or in the vicinity of the site.

Table 6. Current Land Uses

Section	Remarks	Potential Source Identified
Current Industrial Data	The data identifies one record within 250m located 230m south west for an electricity substation.	In view of the distance it is not considered to pose a significant risk to the site.

No fuel sites or underground oil or gas pipelines considered to pose a significant risk have been identified on or in the vicinity of the site.

2.6.1 Potential Contamination Sources Identified by Environmental Data Review

The following potential sources of significant contamination were identified by the Environmental Data Review.

On Site

- Pollution Incident. No details of the incident are provided, given the low land impact recorded this could represent contamination be heavy metals, PAH compounds or petroleum hydrocarbons.

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Off Site

- No significant sources of off-site contamination have been identified by the environmental data review.

2.7 Preliminary Contamination Risk Assessment

2.7.1 Basis of Risk Assessment

The preliminary risk assessment for the site considers the potential sources of contamination identified, the potential receptors that may be present in view of the development proposals and the contaminant pathways by which these may be linked.

A complete pollutant linkage is only deemed to exist where all three are present and a site is considered suitable for use where no complete pollutant linkages are identified.

Where a complete pollutant linkage is considered to be present, an assessment of the level of risk associated with the pollutant linkage has been carried out in line with guidance published within "Contaminated Land Risk Assessment: A guide to good practice" published by CIRIA (C552, 2001).

The level of risk is determined using the risk matrix presented in the following table. Classifications of probability, consequence and risk are presented in Appendix E.

Table 7. Risk Assessment Matrix

		Probability			
		Very Low	Low	Moderate	High
Consequence	Very Minor	Negligible	Very Low	Low	Low/Moderate
	Minor	Very Low	Low	Low/Moderate	Moderate
	Moderate	Low	Low/Moderate	Moderate	High
	Severe	Low/Moderate	Moderate	High	Very High

The assessment of risk has been undertaken on the basis that the proposed development for the site will include the provision of new residential buildings along with areas of private garden where direct soil contact and the growing of fruit and vegetables may occur.

It is noted that an asbestos survey of existing structures and infrastructure (as defined under Section 5(a) of the Control of Asbestos Regulations 2012) was beyond the brief of this report. The risk assessment has been undertaken on the basis that should asbestos be identified within buildings or infrastructure (with particular attention to the possible suspected asbestos cement roof panels in the plant room), these materials will be removed appropriately by licensed contractors and asbestos materials disposed of in accordance with legal requirements prior to demolition or other works in order to avoid contaminating soils at the site.

The findings of the preliminary contamination assessment have been used to inform the ground investigation works which are discussed in the following section of the report.

2.7.2 Preliminary Conceptual Model

The preliminary conceptual model for the proposed development is presented in the following table. A diagrammatic preliminary conceptual model is presented as Figure 4.

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Table 8. Preliminary Conceptual Model

Potential Sources Identified	Potential Contaminants	Receptor	Potential Pathways	Potential Pathway Present?	Probability	Consequence	Overall Assessment of Risk
1) Site use as a Nursery.	Heavy metals, PAH compounds, petroleum hydrocarbons, herbicides and pesticides	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	Yes	Moderate	Moderate	Moderate
			b) Ingestion of soil and indoor dust.	Yes	Moderate	Moderate	Moderate
			c) Consumption of homegrown produce and attached soil.	Yes	Moderate	Moderate	Moderate
			d) Inhalation of soil dust (indoor and outdoor).	Yes	Moderate	Moderate	Moderate
			e) Contamination of incoming services.	Yes	Moderate	Moderate	Moderate
			f) Inhalation of soil vapours.	Yes	Moderate	Moderate	Moderate
			g) Inhalation of soil gases.	No	Not Applicable		
		Groundwater	h) Migration to groundwater.	Yes	Low	Moderate	Low/Moderate
2) Made Ground from demolition works.	Heavy metals, PAH compounds and asbestos	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	Yes	Low	Minor	Low
			b) Ingestion of soil and indoor dust.	Yes	Low	Minor	Low
			c) Consumption of homegrown produce and attached soil.	Yes	Low	Minor	Low
			d) Inhalation of soil dust (indoor and outdoor).	Yes	Low	Minor	Low
			e) Contamination of incoming services.	No	Not Applicable		
			f) Inhalation of soil vapours.	No			
			g) Inhalation of soil gases.	No			
	Heavy metals and PAH compounds	Groundwater	h) Migration to groundwater.	Yes	Very Low	Very Minor	Negligible

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Potential Sources Identified	Potential Contaminants	Receptor	Potential Pathways	Potential Pathway Present?	Probability	Consequence	Overall Assessment of Risk
3) Pollution Incident.	Heavy metals, PAH compounds and petroleum hydrocarbons	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	Yes	Low	Moderate	Low/Moderate
			b) Ingestion of soil and indoor dust.	Yes	Low	Moderate	Low/Moderate
			c) Consumption of homegrown produce and attached soil.	Yes	Low	Moderate	Low/Moderate
			d) Inhalation of soil dust (indoor and outdoor).	Yes	Low	Moderate	Low/Moderate
			e) Contamination of incoming services.	Yes	Low	Minor	Low
			f) Inhalation of soil vapours.	Yes	Low	Minor	Low
			g) Inhalation of soil gases.	No	Not Applicable		
		Groundwater	h) Migration to groundwater.	Yes	Very Low	Very Minor	Negligible
4) Plant Room, above ground tank and waste materials.	Heavy metals, PAH compounds, petroleum hydrocarbons and asbestos	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	Yes	Moderate	Severe	High
			b) Ingestion of soil and indoor dust.	Yes	Moderate	Severe	High
			c) Consumption of homegrown produce and attached soil.	Yes	Moderate	Severe	High
			d) Inhalation of soil dust (indoor and outdoor).	Yes	Moderate	Severe	High
			e) Contamination of incoming services.	Yes	Moderate	Severe	High
			f) Inhalation of soil vapours.	Yes	Moderate	Severe	High
			g) Inhalation of soil gases.	No	Not Applicable		
	Heavy metals, PAH compounds and petroleum hydrocarbons	Groundwater	h) Migration to groundwater.	Yes	Moderate	Severe	High

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Potential Sources Identified	Potential Contaminants	Receptor	Potential Pathways	Potential Pathway Present?	Probability	Consequence	Overall Assessment of Risk
5) Bonfire Remains.	Heavy metals and PAH compounds	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	Yes	Low	Minor	Low
			b) Ingestion of soil and indoor dust.	Yes	Low	Minor	Low
			c) Consumption of homegrown produce and attached soil.	Yes	Low	Minor	Low
			d) Inhalation of soil dust (indoor and outdoor).	Yes	Low	Minor	Low
			e) Contamination of incoming services.	No	Not Applicable		
			f) Inhalation of soil vapours.	No			
			g) Inhalation of soil gases.	No			
		Groundwater	h) Migration to groundwater.	Yes	Very Low	Very Minor	Negligible
5) Radon Gas	Radon Gas	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	No	Not Applicable		
			b) Ingestion of soil and indoor dust.	No			
			c) Consumption of homegrown produce and attached soil.	No			
			d) Inhalation of soil dust (indoor and outdoor).	No			
			e) Contamination of incoming services.	No			
			f) Inhalation of soil vapours.	No			
			g) Inhalation of soil gases.	Yes	Moderate	Moderate	Moderate
	None	Groundwater	h) Migration to groundwater.	Not Applicable			

3. GROUND INVESTIGATION

3.1 Introduction

The ground investigation comprised the excavation of a series of dynamic sampler boreholes with accompanying (super heavy) dynamic probing, hand auger boreholes and TRL dynamic cone penetrometer testing. The fieldwork was carried on the 6th and 11th March 2015. The exploratory hole locations are shown on Figure 2.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole records given in Appendix B, together with notes to assist in their interpretation.

3.2 Exploratory Holes

3.2.1 Dynamic Sampler Boreholes

Eleven boreholes (designated WS1 to WS11) were drilled to depths of 3m below ground level.

The boreholes were formed by a series of 1.0m long, open ended, hollow steel tubes of between 35mm and 100mm diameter, each containing a removable plastic liner. The tubes, progressively reducing in diameter, were driven into the ground by means of a track-mounted drop weight. Each tube was extracted from the ground using a hydraulically operated jack and the enclosed sample was recovered in its plastic liner.

The system enables sub-samples to be taken for detailed examination and laboratory testing.

3.2.2 Hand Auger Boreholes

Two boreholes (designated HA1 and HA2) were bored to depths of 1m below ground level. The hand auger enables disturbed soil samples to be taken using a cutting tool twisted into the soil by hand.

3.3 Sampling

Disturbed samples of soil were taken at the depths shown in the exploratory hole records and were collected in plastic liners, plastic bags, plastic tubs or amber jars fitted with gas tight lids.

On collection the amber jars were stored in cool boxes with cooling blocks to maintain temperatures below 4°C until transferred to refrigerators upon return to the office and subsequently forwarded to the external accredited chemical testing laboratory.

3.4 In Situ Testing

The depths of in situ testing, together with the test results, are either given on the exploratory hole records or are summarised separately in Appendix B. Notes providing additional information on the tests performed are included in the appendix.

3.4.1 DPSH Dynamic Probe (Super Heavy) Testing

Continuous dynamic probe tests were undertaken adjacent to boreholes WS1 to WS11 to depths of 5m below ground level. Probing was undertaken in accordance with BS EN ISO 22476-2:2005 using a super heavy DPSH-B probing geometry.

The DPSH-B configuration is similar to that of the standard penetration test (SPT); the main differences being that the tip comprises a 90° cone, the driving rods are lighter than those used for SPT testing and the blow counts are recorded over 100mm increments rather than 300mm, as is the case for the SPT.

The blow counts recorded and the calculated dynamic point resistances, which account for inertia of the anvil and driving rods, are presented on the probe records and separately in Appendix B.

3.4.2 Undrained Shear Strength

Undrained shear strength determinations were made in situ within the fine grained soils using a Geonor hand shear vane.

Additionally undrained shear strength determinations were made within samples of the fine grained soils held in the dynamic sampler liners using a hand penetrometer.

3.4.3 California Bearing Ratio Tests

Testing to determine the in situ California Bearing Ratio (CBR) of soils was conducted at shallow depths adjacent to boreholes WS1, WS5-WS11, HA1 and HA2 using a Transport Road Laboratory (TRL) cone penetrometer. The tests were carried out to a maximum depth of 0.95m below existing ground level.

3.4.4 Soakage Testing

Falling head soakage tests were undertaken in boreholes WS1, WS6, WS9 and WS10 with the holes at depths of 3m below ground level within the River Terrace Deposits. The tests were carried out in general accordance with The Soakaway Design Guide published by Kent County Council (2000).

3.5 Laboratory Testing

Laboratory testing was scheduled by Ashdown Site Investigation Ltd. Results from the laboratory tests are provided in Appendix C.

3.5.1 Geotechnical Testing

Geotechnical testing was undertaken by Ashdown Site Investigation Ltd in accordance with the methods given in BS1377:1990 Parts 1 to 8 'Methods of test for soils for civil engineering purposes'. Chemical testing to enable classification of the chemical environment of soils in

accordance with BRE SD1 was undertaken by an external UKAS accredited laboratory. Notes to assist with the interpretation of the tests are contained within Appendix C.

3.5.2 *Chemical Testing*

Chemical testing of selected samples was undertaken by a laboratory with recognised (UKAS and MCERTS) accreditation for quality control.

4. GROUND CONDITIONS

4.1 Stratigraphy

4.1.1 *Surface Covering*

Boreholes WS5, WS6, WS7 and WS11 were progressed through a surface covering of topsoil some 50mm to 250mm in thickness.

Boreholes WS1 to WS4, located within the car park, were excavated through a covering of broken asphalt and crushed hardcore some 200mm or 300mm thick.

Specific surface coverings were not recorded at the remaining borehole positions.

4.1.2 *Made Ground/ Reworked Ground*

With the exception of boreholes WS5 and WS7, made ground or reworked ground, generally comprising sandy gravelly clay or silt was recorded to depths of between 0.20m and 1.10m below ground level. The gravel fraction contained variable quantities of flint, brick, plastic, nails, ironstone and geo-membrane.

4.1.3 *River Terrace Deposits*

Underlying the made ground/surfacing, the investigation progressed into undisturbed generally firm-to-stiff, stiff and very stiff sandy gravelly clays and loose to medium dense and medium dense clayey gravel deposits to the full depth of the investigation. Locally (boreholes WS1 and WS9) softer soils were recorded within 1m of the ground surface and, in the case of WS1, between the depths of 2.1 and 2.8m below ground level.

The results of the dynamic probe tests indicate that these soils, which are considered to represent the River Terrace Deposits indicated on the published geological map, extended to at least 5.0m below ground level.

4.1.4 *White Chalk Subgroup*

The investigation did not penetrate into the underlying chalk of the White Chalk Subgroup indicated to be present below the River Terrace Deposits on the published geology map.

4.2 Stability

Instability was recorded locally within the coarse grained soils.

4.3 Groundwater Conditions

Groundwater was not encountered during the intrusive works.

5. GEOTECHNICAL ASSESSMENT

The site has outline permission granted for the construction of 32 houses with private gardens, parking and associated infrastructures. It is understood that the final development layout may be subject to change.

At the time of writing, no details were available concerning the specific loads likely to be applied to the foundations.

5.1 Foundations

5.1.1 *Soil Shrinkage/Heave Potential*

The fine grained soils of the River Terrace Deposits have been classified as clays of intermediate plasticity and with modified plasticity indices in the range of 20% to 24% the soils may be expected to exhibit a medium volume change potential. As such all new foundation systems should take into account current guidance such as that given by the Building Research Establishment (BRE) or the National House Builders Council (NHBC).

Whilst this report has been prepared to provide advice to assist designers in undertaking detailed design, the report itself does not represent a detailed design statement. Detailed foundation design, including assessment of minimum founding depths for spread foundations, and requirements for placement of void formers etc., should take into account the volume change potential of the soil and the presence of trees (previous, present and proposed).

5.1.2 *Spread Foundations*

Unless evidence exists to the contrary, all made ground and any soils disturbed by the construction or removal of any previously existing foundations or services should be regarded as being variable in nature and state of compaction and, as such, unsuitable as a founding medium for shallow footings. New footings should be constructed so as to bear below such soils and onto undisturbed, competent, natural deposits.

For design purposes, a net allowable bearing capacity of 135kN/m² may be assumed for spread (pad or strip) foundations up to 1m across bearing within the minimum firm-to-stiff, fine or coarse grained soils of the River Terrace Deposits. The quoted bearing capacity is expected to limit settlement to less than 25mm. In general a minimum depth to formation of 0.9m should be adopted, although foundations should be deepened where made ground is found to extend below this depth or where there is a requirement to protect foundations against seasonal soil volume changes induced by trees.

Attention is drawn to the weaker soils recorded below a depth of 2.1m in borehole WS1. In the event that foundation depths greater than 1 metre are proposed in this area it would be prudent to undertake additional investigations in order to confirm the bearing capacity of the soils below the proposed formation level.

Attention is also drawn to the presence of interbedded fine grained and coarse grained soils across the site. As there is the potential for mixed soil conditions to be present beneath footings, designers should consider the need for foundations to be reinforced due to the potential for differential cracking to develop as a result of coarse grained and fine grained soils settling at different rates under loading.

5.2 Groundwater

Groundwater was not encountered during the intrusive works, however the potential for perched groundwater to be present at various levels within the made ground should not be overlooked.

It is also possible that heavy precipitation during construction could lead to the ingress of perched groundwater or surface water run-off into excavations. In such circumstances it would be expected that water entering into excavations would be adequately managed by pumping from sumps or possibly natural seepage, or a combination of the two.

5.3 Stability of Excavations

It could be expected that unsupported excavations within the fine grained River Terrace Deposits would remain stable for a short period of time. Where excavations are required to remain stable in the medium or long term within the fine grained soils or in any case where stable excavations are required within the made ground or coarse grained soils, excavations should either be suitably supported or side slopes should be battered back to a safe angle of repose.

All excavations requiring human entry must be shored or battered as necessary to conform to current best practice, as accepted by the Health and Safety Executive (HSE); relevant guidance is given on the HSE website (www.hse.gov.uk). Current legislation requires that where personnel access is required into any excavation a competent person must inspect excavation supports or battering of slopes at the start of the working shift and at other specified times. No work should take place until the excavation is safe. Excavations should also be inspected after any event that may have affected their stability, such as a significant weather event, changes in surcharge loadings imposed by temporary storage of materials or changes in site traffic plans or alteration of support systems. Inspections should be formally recorded and any faults that are found should be corrected immediately.

5.4 Aggressivity to Concrete

In consideration of the soils encountered beneath the site and its historical usage it is considered that 'natural ground conditions' may be assumed for the purpose of assessing the aggressivity of the chemical environment for concrete classification (ACEC class). Given the expected high permeability of the natural soils, 'mobile groundwater' conditions have also been assumed.

Assessment of the Chemical analysis of the soil indicates a sulphate content falling into Design Sulfate Class DS-1 Table C1 of the Building Research Establishment Special Digest No 1 "Concrete in aggressive ground", 2005. The results of the pH tests indicate that the underlying soils are slightly acidic to alkaline in reaction.

In accordance with the digest, a DS-1 Design Sulfate Class and an AC-1 ACEC classification may be assumed as a minimum for the design of concrete in contact with the ground.

5.5 Ground Floors

In view of the variable thickness of made ground and the presence of soils of medium volume change potential underlying the site, it is recommended that ground floors for all sensitive structures should be suspended.

Current guidance suggests that ground bearing floor slabs may, however, be considered where made ground soils are not present or are to be removed from beneath building footprints and the depth of foundations required to protect against seasonal soil volume changes close to trees is less than 1.5m. In such circumstances further works should be undertaken to demonstrate, that close to the time of construction, no significant soil desiccation is present. If ground bearing floors are adopted it is recommended that the potential for differential movement, both between the floor slab and walls and across the floor slab itself, should be anticipated. Such floors should be fully debonded from walls. Formations should be adequately proof rolled and any excessively soft materials excavated and replaced with a suitable, well graded granular fill. The depth of any fill should be limited to a maximum of 600mm unless placed to an engineering specification designed to limit internal settlement of the fill materials to a tolerance to be advised by the designer.

The detailing of services through, or under, ground-bearing floors should incorporate flexible connections and, where appropriate, enhanced falls.

5.6 Pavement Design

Cone penetrometer tests undertaken to establish the California bearing ratio (CBR) of the in situ soils indicated CBR values ranging between 1% and 39% but typically in the range 1% to 10% in the underlying made ground and River Terrace Deposits at the time of the investigation. It is noted that CBR values are, in part, dependent on the moisture content of the tested soils and are consequently subject to seasonal variation.

The former Department of the Environment, Transport and the Regions Design Manual for Roads and Bridges, Volume 7 (Pavement Design & Maintenance), Section 2, Part 2 1994 provides a useful correlation between plasticity indices and equilibrium (long term) CBR values. This guidance suggests a design equilibrium CBR value of 3% would be applicable to the natural soils for the construction of thin (300mm) pavement under poor to average construction conditions and assuming a low groundwater table.

Based upon review of the in situ test results and the quoted guidance it is recommended that, for the River Terrace Deposits, a CBR value of no greater than 3% should be adopted for preliminary pavement design.

All formations should be proof rolled and any excessively large, soft, degradable or otherwise unsuitable materials thus identified should be removed and be replaced with well compacted coarse grained fill. Prepared subgrades should be protected from severe adverse weather by ensuring they are graded to falls to prevent ponding, and they should be reasonably protected from trafficking during construction.

The subgrade should be assumed to be susceptible to frost heave.

Where new roads are to be adopted the local highway authority should be consulted with reference to the acceptability of the proposed CBR figures prior to designs being finalised and construction undertaken.

5.7 Drainage

In situ soakage testing was undertaken in accordance with 'The Soakaway Design Guide' published by Kent County Council (July 2000). From the results of the tests, calculations were made in accordance with the guide to estimate the infiltration rate that could be expected for soakaways constructed to discharge into the underlying soils within the test zone.

The infiltration rates derived from the tests are summarised in the following table.

Table 9. Calculated Infiltration Rates

Exploratory Hole	Test Response Zone Depth (m)		Stratum	Infiltration Rate (f) (m/sec)	Driving Head of Water (m)
	Top	Bottom			
WS1 - Borehole	1.00	3.00	River Terrace Deposits	6×10^{-4}	1.0 or 2.0
WS6 - Borehole	1.00	3.00	River Terrace Deposits	6×10^{-4}	1.0 or 2.0
WS9 - Borehole	1.00	3.00	River Terrace Deposits	6×10^{-4}	1.0 or 2.0
WS10 - Borehole	1.00	3.00	River Terrace Deposits	2×10^{-4}	1.0

The value 'f' is equivalent to the soil infiltration coefficient 'q' quoted in the Construction Industry Research and Information Association (CIRIA) Report 156.

The test results indicate that the granular soils of the River Terrace Deposits should be capable of accepting surface water run-off via soakaways, although the design of soakaway geometries should be carefully considered to ensure they are capable of half emptying within a 24hour period, as is recommended by the BRE 365 Guide.

In view of the potential for chalk deposits to underlie the site at relatively shallow depth, to minimise the risk of subsidence, soakaways should be constructed a minimum of 5.0m away from proposed or existing buildings.

In the event that discharge to ground via soakaways is proposed, it is recommended that designers refer to Pollution Prevention Guidance Notes (PPGs) published by the Environment Agency for advice on legal requirements and good practice to reduce risks to groundwater. In particular reference should be made to PPGs 1 and 3, providing general advice on the prevention of pollution and the use and design of oil separators in surface water drainage systems, respectively. The Local Authority and/or relevant water company should be consulted in relation to consent for discharge of water from rooftops, areas of hardstanding and roadways to drains.

6. QUANTITATIVE CONTAMINATION ASSESSMENT

6.1 Introduction

This risk assessment takes into account the findings of the intrusive works and laboratory testing along with on-site observations in order to quantify risk associated with the potential pollutant linkages identified by the preliminary ground contamination risk assessment.

6.2 Assessment Strategy

Table 10. Investigation Works Carried Out

Contaminant Source	Exploratory Position
Site use as a nursery	As the use of the site may have led to contamination occurring in any location, all boreholes are considered to be relevant to this source.
Made Ground from Demolition Works	Boreholes WS1, WS2, WS3, WS10, WS11, HA1 and HA2.
Pollution Incident	Due to the absence of any information as to the specific location of this incident, all boreholes have been considered to be relevant to this source.
Plant Room, above ground tank and waste materials	Boreholes HA1 and HA2 and sample DS.
Bonfire Remains	Borehole WS10
Radon Gas	Not Applicable

6.3 Analysis of Contamination Test Results

For the assessment of risk to human health a quantitative assessment of the laboratory test results obtained from the investigation has been undertaken by comparing soil contaminant concentrations against appropriate soil screening values (SSVs). These screening values comprised the 'Suitable For Use Levels' (S4ULs) calculated as a joint project between LQM and CIEH and published in 'The LQM/CIEH Suitable 4 Use Levels, 2015'. In lieu of an S4UL screening value for lead, the Category 4 Screening Level (C4SL) was used, as published within SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Final Project Report, published by DEFRA, 2014.

In view of the proposed development the assessment has been made against SSVs calculated using the generic "Residential" land use as defined within Science Report SC050021/SR3, January 2009, with the amendments discussed in the LQM/CIEH report. The critical receptor for this land use is considered to be a young female child resident on site from birth to age 6. Exposure routes that are considered include the potential for direct ingestion of the soil, the

outdoor and indoor ingestion of dust, the potential inhalation of dust and vapours, ingestion of site grown vegetables and ingestion of soil attached to vegetables.

For the assessment of risk to controlled waters a qualitative assessment has been undertaken based upon the concentrations of contaminants recorded within the soil samples and the information obtained from the desk study concerning the sensitivity of the underlying strata or nearby surface water receptors.

6.3.1 Statistical Analysis

Statistical analysis of the concentrations of heavy metals and polycyclic aromatic hydrocarbon (PAH) compounds determined by laboratory testing of soil samples has been undertaken in line with guidance set out in 'Comparing Soil Contamination Data with a Critical Concentration' report, published by the CIEH/ CL:AIRE (May 2008).

The CIEH/CL:AIRE guidance provides a framework for assessing measured contaminant concentrations on a site against user defined critical concentrations – or indicators of risk.

Under a planning scenario, the null hypothesis tested is that the true population mean is greater than a "critical concentration". The critical concentration used within this assessment is the relevant screening value for the proposed end use.

The null hypothesis can be rejected if it can be shown (with a sufficient degree of confidence) that the true population mean lies below the critical concentration. The confidence level recommended within the guidance is 95% i.e. the statistical evidence must show that there is at least a 95% likelihood that the true population mean lies below the critical concentration. In this instance the site is considered suitable for the proposed use.

Where there is insufficient evidence to reject the null hypothesis, further risk assessment and/or remediation may be necessary.

Guidance on comparing soil contamination data with a critical concentration is provided in Appendix D, along with the summary sheets from the statistical analysis.

A total of ten samples of the shallow made ground and topsoil from across the site were tested for heavy metals and PAH compounds. In general these materials were described as being relatively similar with the exception of the sample taken from ground level in borehole WS10, which was dominated by bonfire ash, and the sample DS, taken from within the demolition spoil noted on the eastern side of the site. The two latter samples were excluded from the dataset and the results have been assessed individually.

6.4 Heavy Metals

The following table summarises the calculated soil screening values along with sample means and 95th percentile upper confidence limits.

Table 11. Soil Screening Values and Upper Confidence Limits for Heavy Metals

Contaminant	SSV (mg/kg)	Sample Mean (mg/kg)	95% Upper Confidence Limit (mg/kg)	Can H ₀ be rejected
Arsenic	37	7.84	9.96	Yes
Cadmium	11	0.29	0.48	Yes
Chromium	910	17.95	23.22	Yes
Copper	2400	16.54	22.27	Yes
Lead	200	31.76	41.69	Yes
Mercury	40	0.25	0.25	Yes
Nickel	180	14.55	19.85	Yes
Selenium	250	0.58	0.90	Yes
Zinc	3700	76.20	180.39	Yes
Hexavalent Chromium*	6	0.40	0.40	Yes
Water Soluble Boron	290	0.48	0.94	Yes

The statistical analysis indicates that the shallow made ground and topsoil generally present across the site does not contain any significantly elevated concentrations of heavy metals in relation to the SSV for a residential land use.

The sample of demolition spoil also did not record any elevated concentrations of heavy metals in relation to the SSV.

The sample of bonfire ash taken from ground level at borehole WS10 recorded an elevated concentration of arsenic. This material should be considered to represent a significant risk to end users of the site where it remains within any proposed garden or soft landscaped areas.

6.5 Asbestos

No suspected asbestos materials were noted within any of the exploratory holes undertaken at the site but three samples of the made ground, including the sample of demolition spoil, were screened for the presence of this contaminant. None of the samples recorded the presence of any asbestos fibres.

An asbestos survey of existing structures and infrastructure (as defined under Section 5(a) of the Control of Asbestos Regulations 2012) was beyond the scope of this investigation. The potential for asbestos containing materials to be present within the fabric of buildings or infrastructure located on the site cannot be dismissed by reference to the soil test results contained within this report. It is recommended that relevant asbestos registers be inspected prior to commencing any demolition works at the site. Should asbestos be identified within buildings or infrastructure, these materials should be appropriately removed by licensed contractors and be disposed of in accordance with legal requirements prior to demolition to avoid contaminating soils at the site.

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6.6 Organic Contaminants

6.6.1 Polycyclic Aromatic Hydrocarbon (PAH) Compounds

The following table summarises the calculated soil screening values along with sample means and 95th percentile upper confidence limits.

Table 12. Soil Screening Values and Upper Confidence Limits for PAH Compounds

Contaminant	SSV (mg/kg)	Sample Mean (mg/kg)	95% Upper Confidence Limit (mg/kg)	Can H ₀ be rejected
Naphthalene	2.3	0.01	0.02	Yes
Acenaphthylene	170	0.01	0.03	Yes
Acenaphthene	210	0.01	0.02	Yes
Fluorene	170	0.01	0.01	Yes
Phenanthrene	95	0.06	0.09	Yes
Anthracene	2400	0.02	0.05	Yes
Fluoranthene	280	0.22	0.34	Yes
Pyrene	620	0.20	0.31	Yes
Benz(a)anthracene	7.2	0.12	0.20	Yes
Chrysene	15	0.13	0.34	Yes
Benzo(b)fluoranthene	2.6	0.15	0.37	Yes
Benzo(k)fluoranthene	77	0.14	0.38	Yes
Benzo(a)pyrene	2.2	0.17	0.45	Yes
Indeno(123-cd)pyrene	27	0.10	0.26	Yes
Dibenz(ah)anthracene	0.24	0.03	0.08	Yes
Benzo(ghi)perylene	320	0.18	0.29	Yes

The statistical analysis indicates that the shallow made ground and topsoil generally present across the site does not contain any significantly elevated concentrations of PAH compounds in relation to the SSV for a residential land use.

Neither the sample of demolition spoil nor the sample of bonfire ash recorded any elevated concentrations of PAH compounds in relation to the SSV.

6.6.2 Petroleum Hydrocarbons

A total of six samples were tested for concentrations of petroleum hydrocarbons. Four of these were taken from boreholes HA1 and HA2 which were specifically targeted at the location of the plant room and the pile of waste materials, which included the now empty above ground oil tank formerly housed within the plant room.

None of the samples from HA1 or HA2 recorded any detectable concentrations of petroleum hydrocarbons.

The remaining two samples, from WS1 and WS8, were non-targeted and recorded a maximum concentration of just 18.8mg/kg, the majority of which was recorded within the heavy C₂₁-C₃₅ fraction. These concentrations are well below the screening values published by LQM/CIEH.

The results of the investigation indicate that there is no evidence of significant widespread petroleum hydrocarbon contamination across the site and that the existing plant room does not appear to have resulted in significant contamination of the surrounding area. However, there remains the potential for some localised contamination to be present directly beneath the plant room. It is recommended that this area is inspected following demolition and clearance of the site and that if any evidence of contamination is identified that further testing and assessment of this area be carried out.

6.6.3 *Herbicides and Pesticides*

Two samples were screened for a variety of pesticides and herbicides. Neither sample recorded any detectable concentrations of the compounds tested for. No visual or olfactory evidence of any significant pesticide or herbicide contamination was noted within any of the boreholes.

There is not considered to be a significant risk to end users of the site from widespread pesticide or herbicide contamination.

6.6.4 *Radon Gas*

As noted within the preliminary contamination risk assessment, the site lies within an area where basic radon protection measures are required to be incorporated within all new buildings.

6.7 Quantitative Contamination Risk Assessment

6.7.1 *Quantitative Conceptual Model*

The quantitative conceptual model for the proposed development is presented in the following table. A diagrammatic preliminary conceptual model is presented as Figure 4.

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Table 13. Quantitative Conceptual Model

Source Identified	Contaminant	Receptor	Potential Pathways	Pathway Present?	Probability	Consequence	Overall Assessment of Risk
1) Bonfire Ash in the south eastern corner of the site.	Arsenic	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	Yes	Low	Minor	Low
			b) Ingestion of soil and indoor dust.	Yes	Low	Minor	Low
			c) Consumption of homegrown produce and attached soil.	Yes	Low	Minor	Low
			d) Inhalation of soil dust (indoor and outdoor).	Yes	Low	Minor	Low
			e) Contamination of incoming services.	No	Not Applicable		
			f) Inhalation of soil vapours.	No			
			g) Inhalation of soil gases.	No			
	Arsenic	Groundwater	h) Migration to groundwater.	Yes	Very Low	Very Minor	Negligible
2) Soils directly beneath the existing plant room.	Petroleum Hydrocarbons	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	Yes	Low	Moderate	Low/Moderate
			b) Ingestion of soil and indoor dust.	Yes	Low	Moderate	Low/Moderate
			c) Consumption of homegrown produce and attached soil.	Yes	Low	Moderate	Low/Moderate
			d) Inhalation of soil dust (indoor and outdoor).	Yes	Low	Moderate	Low/Moderate
			e) Contamination of incoming services.	Yes	Very Low	Minor	Very Low
			f) Inhalation of soil vapours.	Yes	Very Low	Minor	Very Low
			g) Inhalation of soil gases.	No	Not Applicable		
	Petroleum Hydrocarbons	Groundwater	h) Migration to groundwater.	Yes	Very Low	Minor	Very Low

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Source Identified	Contaminant	Receptor	Potential Pathways	Pathway Present?	Probability	Consequence	Overall Assessment of Risk
3) Radon Gas	Radon Gas	Human Health (End Users)	a) Dermal contact with soil and dust (indoor & outdoor).	Yes	Not Applicable		
			b) Ingestion of soil and indoor dust.	Yes			
			c) Consumption of homegrown produce and attached soil.	Yes			
			d) Inhalation of soil dust (indoor and outdoor).	Yes			
			e) Contamination of incoming services.	No			
			f) Inhalation of soil vapours.	No			
			g) Inhalation of soil gases.	Yes	Moderate	Moderate	Moderate
	None	Groundwater	h) Migration to groundwater.	No	Not Applicable		

6.8 Risks to Other Potential Receptors

The following general guidance is given with regard to other potential on site receptors, which may not necessarily be statutory drivers for remedial works.

As a minimum and in accordance with industry best practice all ground-workers should be issued with the appropriate PPE and should be instructed in safe working methods.

As a precautionary measure instructions should be given in the recognition of potentially hazardous materials, including oily and odorous soil and water and discoloured or fibrous substances. Any oil-like substances contacting the skin must be washed off immediately using an appropriate cleanser. Operatives should be warned to avoid contact between hands and mouth before washing. The consumption of food and smoking must be confined to designated clean areas. Suitable welfare (washing) facilities should be provided. These precautions should be taken in addition to anything highlighted by a site specific risk assessment which should be undertaken by any contractor prior to commencing work.

All site personnel should be appropriately briefed on what actions to take in the event that evidence of significant contamination is identified or suspected.

6.9 Recommendations

As significant risks to end users have been identified by the risk assessment some remedial works will be required.

It is recommended that the complete removal of the bonfire material from the south eastern part of the site will sever the pollutant linkage by the removal of the source and that this will remove the risk to end users of the development.

As discussed in section 6.6.2 it is recommended that following the removal of the plant room that the underlying soils are inspected to determine if there is any visual or olfactory evidence of petroleum hydrocarbon contamination. In the event that suspected contamination is identified then further testing and assessment should be carried out.

A comparison of the test results with the screening criteria set out within Table 3.1 of the "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites" published by UK Water Industry Research in 2010 indicates that the protection of water supply services is unlikely to be required. However it is noted that the testing undertaken to date does not encompass all of the contaminants that may be required by water supply companies for assessment purposes. Notwithstanding the above it is strongly recommended that designers should consult with the proposed water supply company to ascertain whether they require further laboratory testing and assessment specific to proposed routes of services.

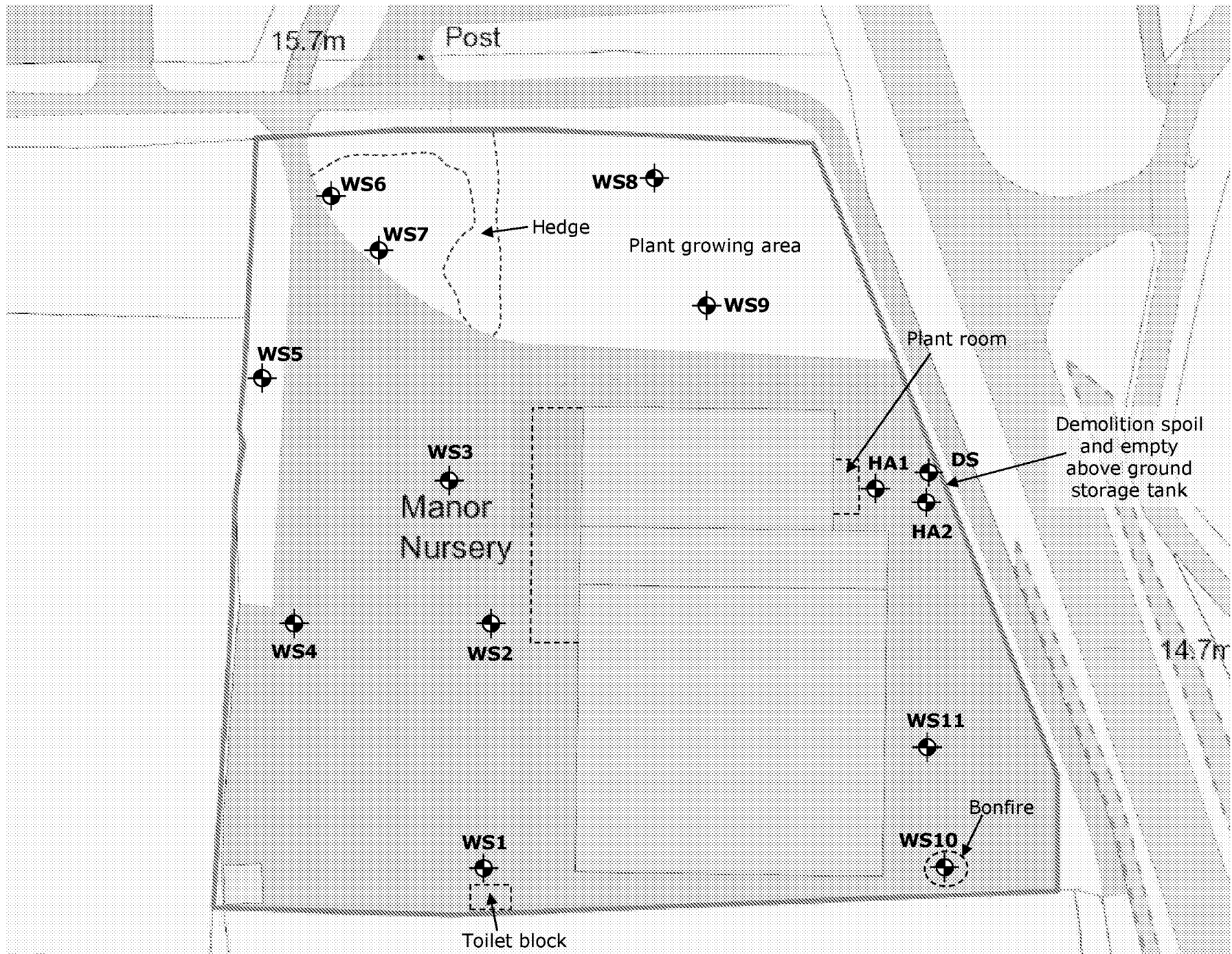
In addition to the above, should materials not previously identified by the investigation and that are suspected of being 'contaminants' be encountered during the course of the works, advice should be sought immediately on their identification and how they should be treated.

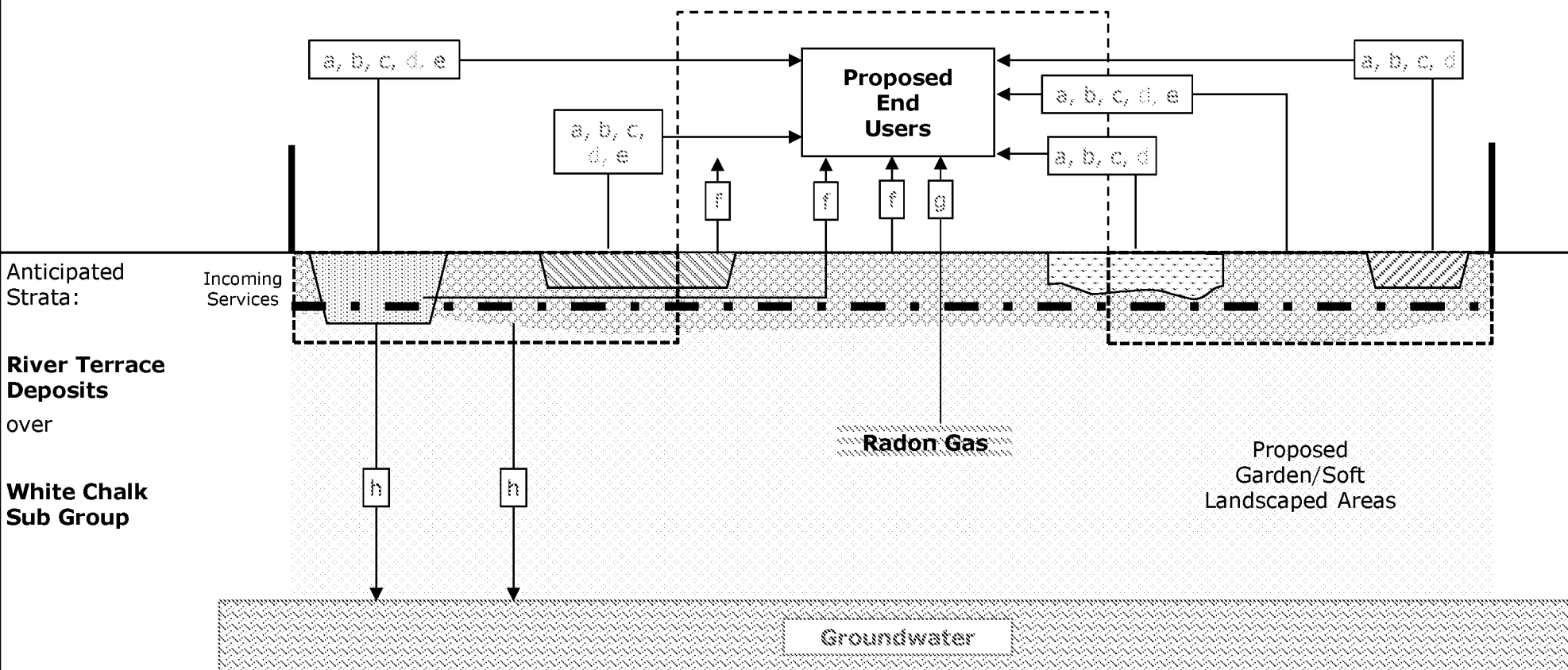
If necessary the newly identified contaminants will be subject to a revised risk assessment and remediation strategy.

**Ashdown Site Investigation Ltd.
April 2015**

FIGURES

- Figure 1 Site Location Plan
- Figure 2 Site Plan
- Figure 3 Preliminary Conceptual Model
- Figure 4 Quantitative Conceptual Model





APPENDIX A

Site Walkover Photographs



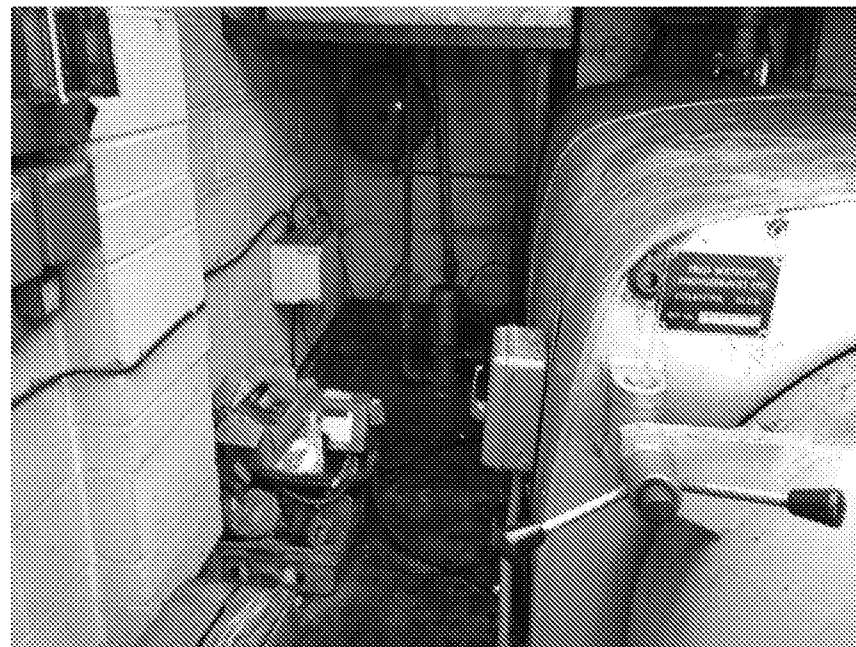
Looking south across the car park on the western part of the site



Plant sales area in the north east of the site



Plant room on the east of the site.



Inside the plant room showing the staining on the floor slab.



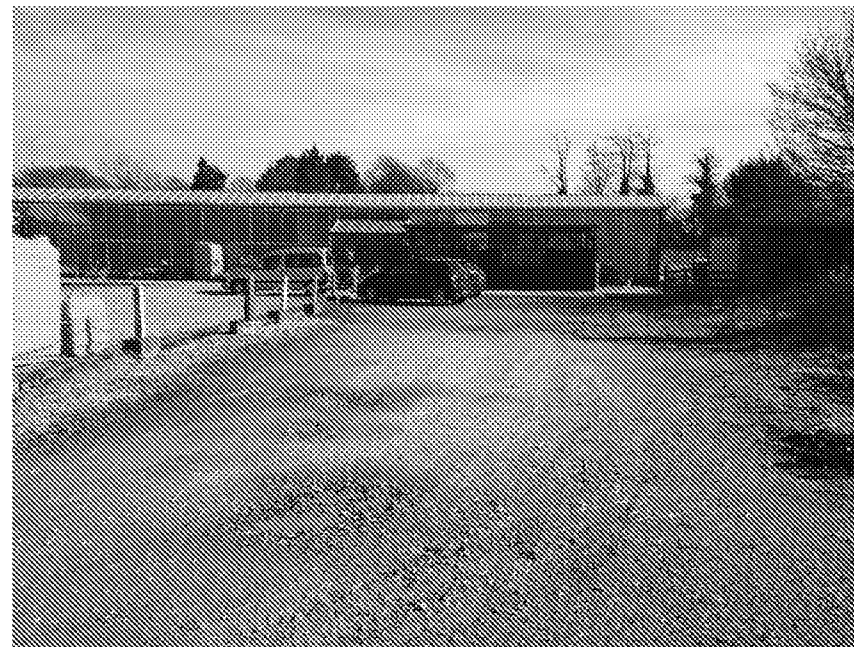
Demolition spoil and above ground oil tank formerly located in the plant room.



View to the south along the western part of the site towards the bonfire mound



Bonfire Mound in the south eastern corner of the site.



View to the east along the southern edge of the site. The small toilet block can be seen on the right hand side.

APPENDIX B

Exploratory Hole Notes

In Situ Testing Notes

Exploratory Hole Records

DPSH-B Dynamic Probe Records

Summary of In Situ TRL Cone Penetrometer (CBR) Test Results

Summary of Borehole Falling Head Soakage Test Results

NOTES FOR THE INTERPRETATION OF EXPLORATORY HOLE RECORDS

1 Symbols and abbreviations

Samples

U	'Undisturbed' Sample: - also known as 'U100' or 'U4' - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
Uo	Sample not obtained.
U*	Full penetration of sample not obtained.
U**	Full penetration obtained but limited sample recovered.
Pi	Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D	Disturbed Sample.
R	Root Sample.
B	Bulk Disturbed Sample.
W	Water Sample.
J	Jar Sample (sample taken in amber glass jar fitted with gas tight lid)
T	Tub Sample
Vi	Vial Sample
E	Environmental Suite (including a jar sample, tub sample and vial sample)

In situ Testing

S	Standard penetration test (SPT): In the borehole record the depth of the test is that at the start of the normal 450mm penetration, the number of blows to achieve the standard penetration of 300mm (the 'N' value) is shown after the test index letter, but the seating blows through the initial 150mm penetration are not reported unless the full penetration of 450mm cannot be achieved. In the latter case, the symbols below are added to the test index letter:-
S(R)	Refusal of standard penetration test. Blow count reported includes seating blows. Total penetration of refused SPT reported in mm in brackets on borehole record.
So	'Split spoon' SPT sampler sank under its own weight. The test is usually completed when the number of blows reaches 50 (25 blows for seating count). The depths of both the top and bottom of the test drive are shown in the sample column on the Borehole Record. If a sample is not recovered in the sampler, a disturbed sample is taken over the depth of the test as boring continues.
C	Standard Penetration Test (SPT) conducted usually in coarse grained soils or weak rocks using the same procedure as for the SPT but with a 50mm diameter, 60° apex solid cone fitted in place of the sampler. Variations in test results are indicated by the same symbols as for the SPT (above).
V	Shear Vane Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.
H	Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.
P	Perth Penetrometer Test: See "In Situ Testing Notes" for full description. Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column. In sand the number of blows is approximately equivalent to the SPT "N" value.

2 **Soil Description**

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002) and Part 2 Principles of classification (BS EN 14688-2:2004) as well as the BS5930:1990 + A2:2010 code of Practice for Site Investigations.

Fine Grained Soils

The consistency of fine grained soils given in the report is based on visual inspection of the samples and the strength is based on results of in situ and/or laboratory undrained shear strength tests when carried out.

The consistency is determined on the following basis:

Consistency	Manual Test
Very Soft	Soil exudes between fingers when squeezed in hand
Soft	Soils can be moulded by light finger pressure
Firm	Cannot be moulded by finger but rolled to 3mm threads without breaking/crumbling
Stiff	Crumbles/breaks when rolled to 3mm thick threads but can be moulded into a lump again
Very Stiff	Cannot be moulded and crumbles under pressure, can be indented by thumbnail

Based on BS EN ISO 14688-1:2002

The terms used for the designation of the undrained shear strength are as follows:

Undrained Shear Strength	
Extremely to Very Low	<20 kPa
Low	20-40 kPa
Medium	40-75 kPa
High	75-150 kPa
Very High	150-300 kPa
Extremely high	300-600 kPa

Based on BS EN ISO 14688-2:2004

Note: The undrained shear strength of the soils is measured either by laboratory testing or in the field using hand penetrometer or shear vane.

It is recognised that any coarse grained soil that has in excess of approximately 35% fine grained soil (clay and silt) can often be expected to behave as a fine grained soil despite the dominance of coarse grained material within the soil mass. To reflect this, it is the soil type that dominates the behaviour of the soil mass that appears on the exploratory hole records.

Coarse Grained Soils

The relative densities of coarse grained soils (sand and gravel) given in the report are based on field estimations and the results of the Standard Penetration Test (SPT) and equivalent correlation from other testing. The classification in terms of "N" Values is as follows:

SPT 'N' Value	Relative Density
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Greater than 50	Very Dense

3 **Rock Description**

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1:2003) as well as the BS5930:1990 + A2:2010 code of Practice for Site Investigations.

The description of rock mass includes the type of rock, structure, discontinuities and weathering.

The unconfined compressive strength of rock material is determined on the following basis:

Term	Field Identification	Unconfined Compressive Strength (MPa)
Extremely Weak	Indented by thumbnail	Less than 1
Very Weak	Crumbles under firm blows with point of geological hammer, peeled by pocket knife	1 to 5
Weak	Peeled by pocket knife with difficulty, shallow indentations made by firm blow with geological hammer	5 to 25
Medium Strong	Cannot be peeled or scraped with knife, can be fractured with single firm blow of geological hammer	25 to 50
Strong	Requires more than one blow of geological hammer to fracture	50 to 100
Very Strong	Requires many blows of geological hammer to fracture it	100 to 250
Extremely Strong	Can only be chipped with geological hammer	Greater than 250

The terms describing discontinuity and bedding spacing are as follows:

Bedding Thickness

Very Thick	>2000mm
Thick	2000-600mm
Medium	600-200mm
Thin	200-60mm
Very Thin	60-20mm
Thickly Laminated	20-6mm
Thinly Laminated	<6mm

Discontinuity Spacing

Very Wide	>2000mm
Wide	2000-600mm
Medium	600-200mm
Close	200-60mm
Very Close	60-20mm
Extremely Close	<20mm

Chalk

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk. See additional chalk classification notes.

IN SITU TESTING NOTES

1 Standard Penetration Testing

Standard penetration testing (SPT) is carried out within a cased cable percussion borehole. The test is performed using either a split spoon (barrel) sampler in finer grained deposits, or, in coarser grained soils or weak rocks, using a 50mm diameter, 60° apex solid cone fitted in place of the sampler.

The sampler is driven into the deposits at the base of the borehole by means of a 63.5kg hammer falling freely through 760mm.

In the borehole record the depth of the test is that at the start of the normal 450mm penetration, the number of blows to achieve the standard penetration of 300mm (the "N" value) is shown after the test index letter, but the seating blows through the initial 150mm penetration are not reported unless the full penetration of 450mm cannot be achieved.

(BS EN ISO 22476-3:2005, Geotechnical investigation and testing – Field Testing, Part 3)

2 Dynamic Probe Testing

The DPH (heavy) dynamic probing rig drives a 32mm diameter rod with a 15cm² area, 90° end cone into the ground by means of a 50kg hammer which falls freely through a distance of 0.5m. The number of blows per 100mm penetration (N_{100}) is recorded.

The DPSH (super heavy) dynamic probing rig drives a 35mm diameter rod with a 20cm² area, 90° end cone into the ground by means of a 63.5kg hammer that falls freely through a distance of 0.75m. The number of blows per 100mm penetration (N_{100}) is recorded. The results can provide a useful indication of the relative strength of the material. The dynamic probing is carried out in accordance with BS EN ISO 22476-2:2005.

3 Perth Penetrometer Test

In this test a hardened stainless steel rod is driven into the deposit by a 9.5kg sliding hammer falling freely through 600mm. After an initial penetration of 150mm the number of blows required to drive the rod a further 300mm is recorded. In sand the Perth blow count gives a close correlation to the "N-value" that could be expected from a standard penetration test (SPT) made in similar materials. The results are less reliable in coarser grained materials but can give an indication of their engineering properties. The perth penetrometer test is carried out in accordance with the Australian Standard AS 1289:6.3.3-1997, Method of Testing Soils for Engineering Purposes, there is no European equivalent code.

4 Undrained Shear Strength

Undrained shear strength determinations are made in situ within the fine grained soils using a Geonor hand shear vane or (usually in the case of window sampler boreholes) a hand penetrometer. The test records the undrained shear strength (cohesion) in kN/m². The shear vane records a maximum shear strength of 130kN/m² and the hand penetrometer records a maximum shear strength of 250kN/m².

3 California Bearing Ratio Test

In this test a hand held Farnell cone penetrometer apparatus is pushed into the deposits for the estimation of the California bearing ratio of the subgrade (for use in pavement design). The test equipment is design for the estimation of the bearing ratio of fine grained soils (clay and silt) only and is unsuitable for use in coarse grained soils and rock.



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Borehole No.: WS1

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 11/03/2015

End Date: 11/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	J T	0.10					0.20	MADE GROUND: Slightly sandy gravel. Gravel is subangular to rounded fine to coarse flint.
	H	0.40		35				Soft brown slightly gravelly silty CLAY with some fine rootlets. Gravel is subangular to rounded fine flint. (River Terrace Deposits) becoming stiff below 0.60m depth.
	J T	0.50						
	D	0.60						
	H	0.60		140				
	J T H	0.90		120				
	V	1.00		80				
	H	1.10		140				
	J T	1.20						
	D H	1.40		180			1.50	Loose to medium dense brown silty clayey GRAVEL. Gravel is angular to rounded fine to medium flint. (River Terrace Deposits) becoming medium dense below 1.70m depth.
	D	1.80						
							2.10	
	D	2.20						Soft light brown slightly gravelly silty CLAY. Gravel is angular to rounded fine flint. (River Terrace Deposits)
	H	2.30						
	J T	2.50						
	H	2.60					2.80	
	D	2.80						Loose to medium dense brown silty clayey GRAVEL. Gravel is angular to rounded fine to medium flint. (River Terrace Deposits)
							3.00	
								End of Borehole

Remarks:

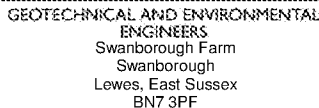
Borehole dry and stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: DE



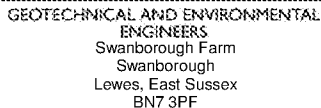
Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 06/03/2015

End Date: 06/03/2015

Remarks: Borehole dry and stable on completion. Dynamic probe carried out adjacent to borehole.	Excavation Method: Dynamic Sampler
	Borehole Diameter: Various
	Made By: PM



Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 06/03/2015

End Date: 06/03/2015

Remarks: Borehole dry and stable on completion. Dynamic probe carried out adjacent to borehole.	Excavation Method: Dynamic Sampler
	Borehole Diameter: Various
	Made By: PM



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Borehole No.: WS4

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 06/03/2015

End Date: 06/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	J T D	0.10 0.20					0.20	MADE GROUND: Brown grey gravel. Gravel is angular to subangular fine to coarse flint.
	J T D H	0.40 0.50		115				Stiff brown orange slightly sandy slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	D J T H V	0.80 0.90 1.00		115 95			1.10	
	D	1.20						Stiff to very stiff brown orange slightly sandy silty very gravelly CLAY. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	J T	1.50					2.00	
								Medium dense brown slightly sandy silty clayey GRAVEL. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	J T D	2.50 2.60					3.00	
								End of Borehole

Remarks:

Borehole dry and stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: PM



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Borehole No.: WS5

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 06/03/2015

End Date: 06/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	D	0.10						
	J T	0.20					0.25	Topsoil with roots.
	H	0.30		140				
	D	0.40						
	J T H	0.50		90				Stiff brown orange slightly sandy slightly gravelly silty CLAY. Gravel is angular to subangular fine to medium flint. (River Terrace Deposits)
	H	0.80		140				
	V	1.00		110				
	J T	1.20						
	D	1.50					1.70	
								Loose to medium dense brownn slightly sandy silty clayey GRAVEL. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	J T	2.20						
	D H	2.50		140				with a pocket of stiff slightly gravelly slightly sandy silty CLAY at 2.50m depth.
							3.00	
								End of Borehole

Remarks:

Borehole dry and stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: PM



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Borehole No.: WS6

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 06/03/2015

End Date: 06/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	J T	0.10					0.15	Topsoil.
	J T	0.30						Firm brown orange slightly sandy silty CLAY with occasional gravel of angular to subrounded fine to medium flint. (River Terrace Deposits) becoming firm to stiff below 0.80m depth. becoming stiff below 1.40m depth.
	D	0.40						
	D H	0.80		60				
	J T	0.90						
	V	1.00		85				
	H	1.40		140				
	J T	1.50						
	D H	1.80		140				
	V	2.00		90			2.20	
	D	2.40						
	J T	2.50						Medium dense brown slightly sandy silty clayey GRAVEL. Gravel is angular to subrounded fine to coarse flint. (River Terrace Deposits)
							3.00	
								End of Borehole

Remarks:

Borehole dry and stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: PM



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Borehole No.: WS7

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 06/03/2015

End Date: 06/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	J T	0.10					0.20	Topsoil with occasional gravel of angular to subangular fine to medium flint and occasional brick.
	D	0.30						Firm brown orange slightly silty CLAY with occasional gravel of angular to subangular fine to medium flint. (River Terrace Deposits) becoming stiff below 0.80m depth.
	J T H	0.50		90				
	H	0.80		115				
	V	1.00		110				
	D	1.20						
	J T H	1.50		90			1.90	Loose to medium dense brown slightly sandy silty clayey GRAVEL. Gravel is angular to subangular fine to coarse flint. (River Terrace Deposits)
	D	2.40						
	J T	2.50					3.00	
								End of Borehole

Remarks:

Borehole dry and stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: PM



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Borehole No.: WS8

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 11/03/2015

End Date: 11/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	J T	0.10					0.15	MADE GROUND: Dark brown gravelly clayey silt. Gravel is subangular to rounded fine to medium flint (50mm) over, MADE GROUND: Yellow brown slightly clayey very gravelly sand. Gravel is subangular to rounded fine to medium flint.
	D	0.50		70			0.60	Reworked: Brown mottled red slightly gravelly silty clay. Gravel is subangular to rounded fine to medium ironstone.
	H	0.65						
	J T	0.70		90				Firm to stiff brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to medium flint. (River Terrace Deposits)
	H	0.80						
	V	1.00		80				
	J T H	1.20						
	D	1.30						
	H	1.50		95			1.60	
	D	1.70						Medium dense brown silty clayey GRAVEL. Gravel is angular to rounded fine to medium flint. (River Terrace Deposits)
	J T	1.90						
	D	2.20						
	J T	2.50						becoming loose below 2.50m depth.
	D	2.80					3.00	
								End of Borehole

Remarks:

Borehole is dry and stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: DE



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Borehole No.: WS9

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 11/03/2015

End Date: 11/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
							0.20	MADE GROUND: Dark brown very gravelly silt. Gravel is subangular to rounded fine to medium flint.
	J T H	0.30		35				Soft grey mottled brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to medium flint. (River Terrace Deposits) becoming brown at 0.50m depth.
	D	0.40						
	H	0.50		35				becoming stiff and very gravelly below 1.10m depth.
	J T	0.80						
	D H	0.90		115				Medium dense brown silty clayey GRAVEL. Gravel is angular to rounded fine to medium flint. (River Terrace Deposits)
	D H	1.20		115			1.40	
	J T	1.50						
	D	1.70						
	D	2.10						
	J T	2.50						
	D	2.80					3.00	
								End of Borehole

Remarks:

Borehole dry on completion.

Borehole collapsed to 2.50m depth on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: DE



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Borehole No.: WS10

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 11/03/2015

End Date: 11/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	J T	0.00					0.10	MADE GROUND: Dark grey mottled brown clayey gravelly silt. Gravel is subangular to rounded fine to medium flint, nails and ash.
	H	0.20		195				
	D	0.40						MADE GROUND: Brown slightly gravelly silty clay. Gravel is subangular to rounded fine to medium flint and brick.
	J T H	0.50		80				
	D H	0.80		90				Medium dense brown silty clayey GRAVEL. Gravel is angular to rounded fine to medium flint. (River Terrace Deposits)
	J T	0.90					1.10	
	V	1.00		80				
	J T	1.50						
	D	1.80						
	J T	2.50						
	D	2.60						
	D	2.90					3.00	
								End of Borehole

Remarks:

Borehole dry and stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: DE



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Lewes, East Sussex
BN7 3PF

Borehole No.: WS11

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 11/03/2015

End Date: 11/03/2015

Standpipe Installation	Samples and Testing					Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	DPSH Profile Blows/100mm 5 15 25	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)					
							0.00	Ground Level
	J T	0.10					0.30	Topsoil (50mm) over, MADE GROUND: Dark brown clayey very gravelly silt. Gravel is subangular to rounded fine to medium flint, brick and plastic.
	D H	0.50		150				Very stiff dark brown slightly gravelly silty CLAY. Gravel is angular to rounded fine to medium flint. (River Terrace Deposits)
	J T	0.60						
	D H	0.90		70				becoming firm to stiff very gravelly at 0.80m depth.
	H	1.20		200			1.40	
	D	1.30						
	J T	1.50						Loose to medium dense brown silty clayey GRAVEL. Gravel is angular to rounded fine to medium flint. (River Terrace Deposits)
	D	1.80						
	D	2.20						becoming medium dense to dense and slightly silty below 2.10m depth.
	J T	2.50						
	D	2.70					3.00	
								End of Borehole

Remarks:

Borehole dry and stable on completion.

Dynamic probe carried out adjacent to borehole.

Excavation Method: Dynamic Sampler

Borehole Diameter: Various

Made By: DE



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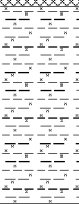
Borehole No.: HA1

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 11/03/2015

End Date: 11/03/2015

Standpipe Installation	Samples and Testing				Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)				
						0.00	Ground Level
	J T	0.10				0.20	Topsoil (50mm) over, MADE GROUND: Brown mottled red silty clay with pockets of red sand.
	J T	0.80				1.00	Brown slightly gravelly silty CLAY. Gravel is angular to rounded fine flint. (River Terrace Deposits)
							End of Borehole

Remarks:

Borhole dry and stable on completion.

Excavation Method: Hand Auger

Borehole Diameter: Various

Made By: DE



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Borehole No.: HA2

Site Name: Manor Nursery, Angmering, West Sussex

Job No.: LW26073

Start Date: 11/03/2015

End Date: 11/03/2015

Standpipe Installation	Samples and Testing				Strata		
	Sample Type	Depths		Vane/ Pen Test N Value	Legend	Depth / Reduced Level	Strata Descriptions
		From (m)	To (m)				
						0.00	Ground Level
	J T	0.30				0.40	Topsoil (50mm) over, MADE GROUND: Dark brown slightly sandy slightly gravelly silty clay. Gravel is angular to rounded fine flint.
	J T	0.90				1.00	Brown slightly gravelly silty CLAY. Gravel is subangular to rounded fine to medium flint. (River Terrace Deposits)
							End of Borehole

Remarks:

Borehole dry and stable on completion.

Excavation Method: Hand Auger

Borehole Diameter: Various

Made By: DE

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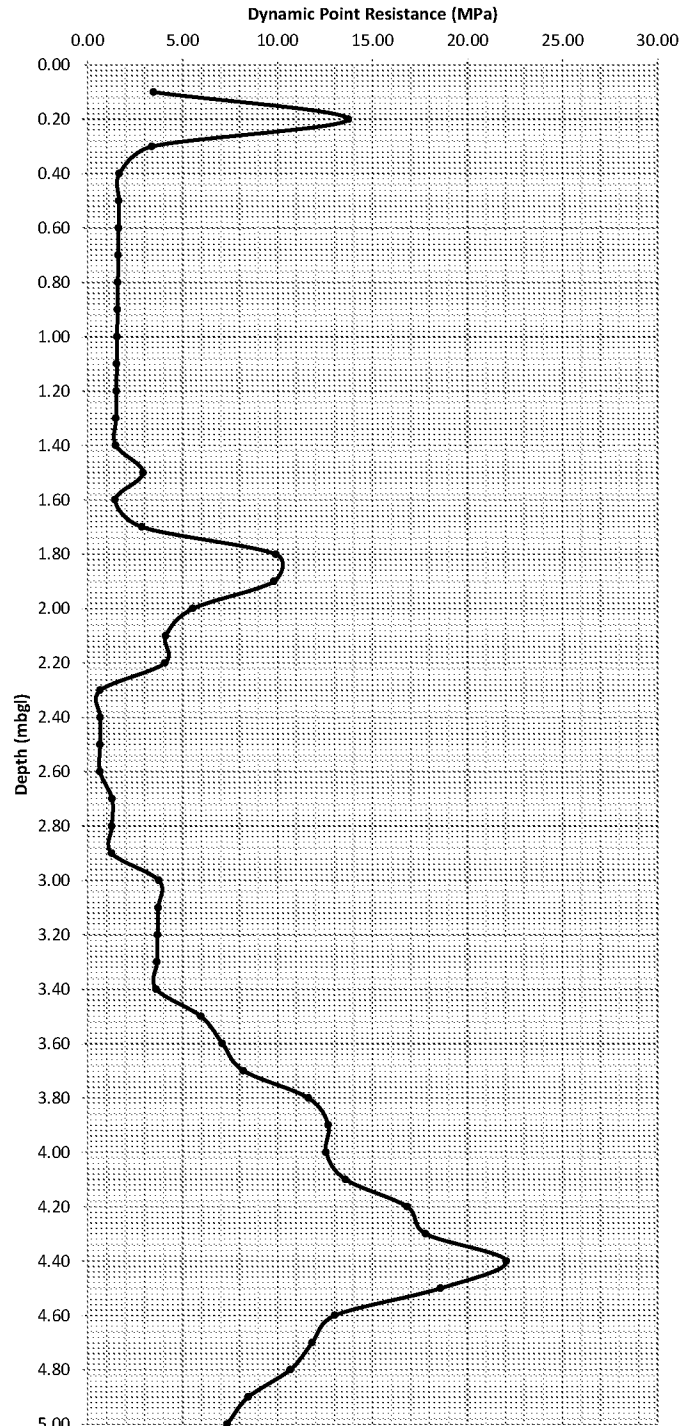
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS1	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10	2	0.05	3.58	3.48
0.20	8	0.01	14.33	13.74
0.30	2	0.05	3.58	3.39
0.40	1	0.10	1.79	1.67
0.50	1	0.10	1.79	1.65
0.60	1	0.10	1.79	1.63
0.70	1	0.10	1.79	1.61
0.80	1	0.10	1.79	1.59
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	1	0.10	1.79	1.48
1.50	2	0.05	3.58	2.93
1.60	1	0.10	1.79	1.45
1.70	2	0.05	3.58	2.86
1.80	7	0.01	12.54	9.92
1.90	7	0.01	12.54	9.81
2.00	4	0.03	7.17	5.54
2.10	3	0.03	5.37	4.11
2.20	3	0.03	5.37	4.07
2.30	0.5	0.20	0.90	0.67
2.40	0.5	0.20	0.90	0.66
2.50	0.5	0.20	0.90	0.66
2.60	0.5	0.20	0.90	0.65
2.70	1	0.10	1.79	1.29
2.80	1	0.10	1.79	1.28
2.90	1	0.10	1.79	1.26
3.00	3	0.03	5.37	3.76
3.10	3	0.03	5.37	3.72
3.20	3	0.03	5.37	3.69
3.30	3	0.03	5.37	3.65
3.40	3	0.03	5.37	3.62
3.50	5	0.02	8.96	5.97
3.60	6	0.02	10.75	7.10
3.70	7	0.01	12.54	8.21
3.80	10	0.01	17.92	11.62
3.90	11	0.01	19.71	12.67
4.00	11	0.01	19.71	12.56
4.10	12	0.01	21.50	13.58
4.20	15	0.01	26.87	16.83
4.30	16	0.01	28.66	17.80
4.40	20	0.01	35.83	22.06
4.50	17	0.01	30.46	18.59
4.60	12	0.01	21.50	13.01
4.70	11	0.01	19.71	11.83
4.80	10	0.01	17.92	10.67
4.90	8	0.01	14.33	8.46
5.00	7	0.01	12.54	7.34



Notes:

Hammer Mass 63.5 kg
 Fall Height 0.76 m
 Cone Area 0.0019 m²
 E_{theor} 473 J
 Energy Ratio 0.719
 Anvil Mass 1 kg
 Rod Mass 8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

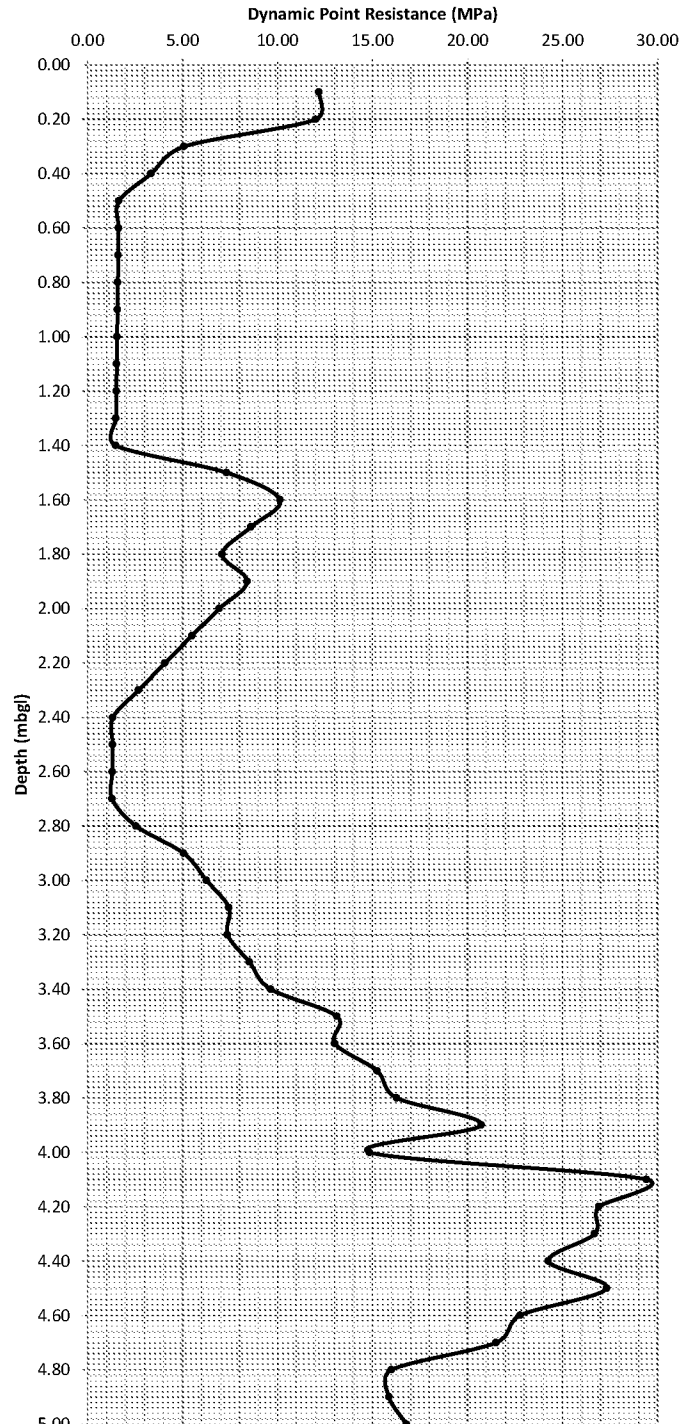
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS2	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10	7	0.01	12.54	12.18
0.20	7	0.01	12.54	12.02
0.30	3	0.03	5.37	5.08
0.40	2	0.05	3.58	3.35
0.50	1	0.10	1.79	1.65
0.60	1	0.10	1.79	1.63
0.70	1	0.10	1.79	1.61
0.80	1	0.10	1.79	1.59
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	1	0.10	1.79	1.48
1.50	5	0.02	8.96	7.32
1.60	7	0.01	12.54	10.14
1.70	6	0.02	10.75	8.59
1.80	5	0.02	8.96	7.08
1.90	6	0.02	10.75	8.41
2.00	5	0.02	8.96	6.93
2.10	4	0.03	7.17	5.49
2.20	3	0.03	5.37	4.07
2.30	2	0.05	3.58	2.69
2.40	1	0.10	1.79	1.33
2.50	1	0.10	1.79	1.32
2.60	1	0.10	1.79	1.30
2.70	1	0.10	1.79	1.29
2.80	2	0.05	3.58	2.55
2.90	4	0.03	7.17	5.06
3.00	5	0.02	8.96	6.26
3.10	6	0.02	10.75	7.44
3.20	6	0.02	10.75	7.37
3.30	7	0.01	12.54	8.52
3.40	8	0.01	14.33	9.64
3.50	11	0.01	19.71	13.14
3.60	11	0.01	19.71	13.02
3.70	13	0.01	23.29	15.25
3.80	14	0.01	25.08	16.27
3.90	18	0.01	32.25	20.73
4.00	13	0.01	23.29	14.84
4.10	26	0.00	46.58	29.43
4.20	24	0.00	43.00	26.93
4.30	24	0.00	43.00	26.70
4.40	22	0.00	39.41	24.26
4.50	25	0.00	44.79	27.34
4.60	21	0.00	37.62	22.77
4.70	20	0.01	35.83	21.51
4.80	15	0.01	26.87	16.00
4.90	15	0.01	26.87	15.87
5.00	16	0.01	28.66	16.79



Notes:

Hammer Mass 63.5 kg
 Fall Height 0.76 m
 Cone Area 0.0019 m²
 E_{theor} 473 J
 Energy Ratio 0.719
 Anvil Mass 1 kg
 Rod Mass 8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

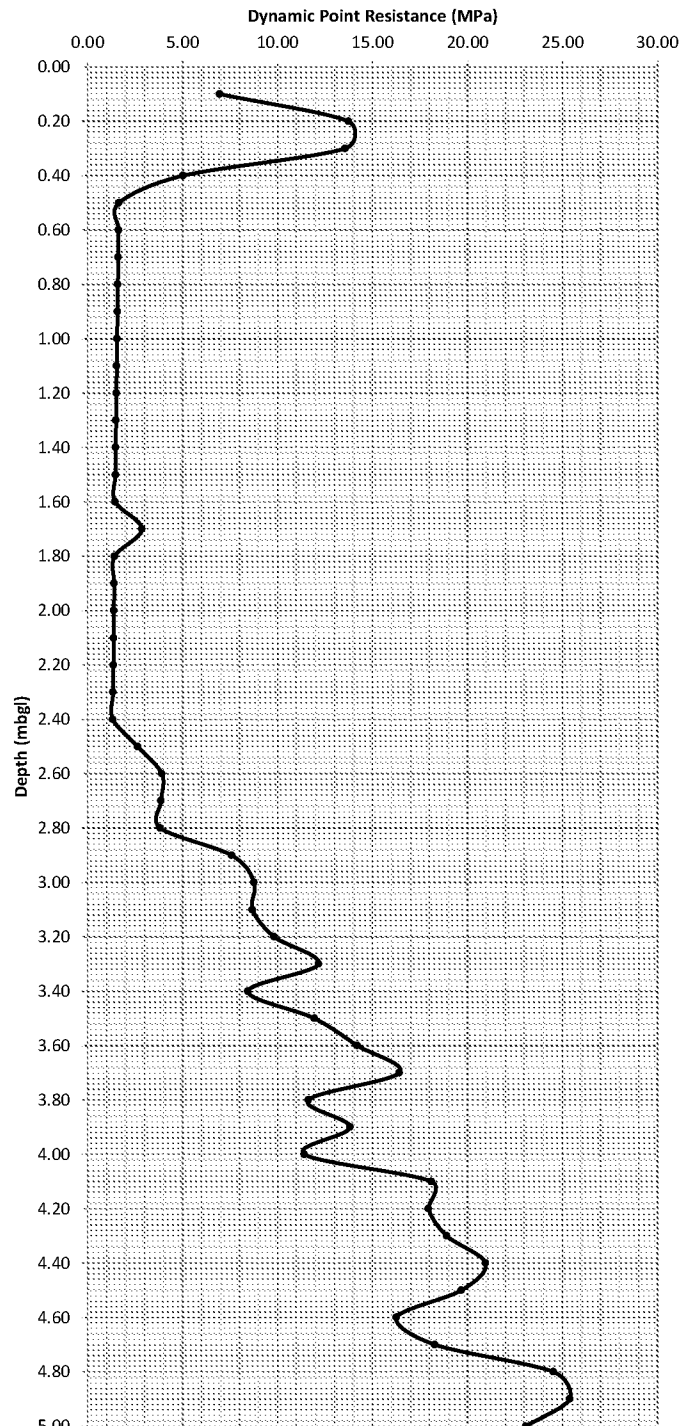
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS3	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10	4	0.03	7.17	6.96
0.20	8	0.01	14.33	13.74
0.30	8	0.01	14.33	13.56
0.40	3	0.03	5.37	5.02
0.50	1	0.10	1.79	1.65
0.60	1	0.10	1.79	1.63
0.70	1	0.10	1.79	1.61
0.80	1	0.10	1.79	1.59
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	1	0.10	1.79	1.48
1.50	1	0.10	1.79	1.46
1.60	1	0.10	1.79	1.45
1.70	2	0.05	3.58	2.86
1.80	1	0.10	1.79	1.42
1.90	1	0.10	1.79	1.40
2.00	1	0.10	1.79	1.39
2.10	1	0.10	1.79	1.37
2.20	1	0.10	1.79	1.36
2.30	1	0.10	1.79	1.34
2.40	1	0.10	1.79	1.33
2.50	2	0.05	3.58	2.63
2.60	3	0.03	5.37	3.91
2.70	3	0.03	5.37	3.87
2.80	3	0.03	5.37	3.83
2.90	6	0.02	10.75	7.59
3.00	7	0.01	12.54	8.77
3.10	7	0.01	12.54	8.68
3.20	8	0.01	14.33	9.83
3.30	10	0.01	17.92	12.17
3.40	7	0.01	12.54	8.44
3.50	10	0.01	17.92	11.94
3.60	12	0.01	21.50	14.20
3.70	14	0.01	25.08	16.42
3.80	10	0.01	17.92	11.62
3.90	12	0.01	21.50	13.82
4.00	10	0.01	17.92	11.42
4.10	16	0.01	28.66	18.11
4.20	16	0.01	28.66	17.95
4.30	17	0.01	30.46	18.91
4.40	19	0.01	34.04	20.95
4.50	18	0.01	32.25	19.68
4.60	15	0.01	26.87	16.27
4.70	17	0.01	30.46	18.28
4.80	23	0.00	41.21	24.53
4.90	24	0.00	43.00	25.39
5.00	22	0.00	39.41	23.08



Notes:

Hammer Mass 63.5 kg
 Fall Height 0.76 m
 Cone Area 0.0019 m²
 E_{theor} 473 J
 Energy Ratio 0.719
 Anvil Mass 1 kg
 Rod Mass 8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

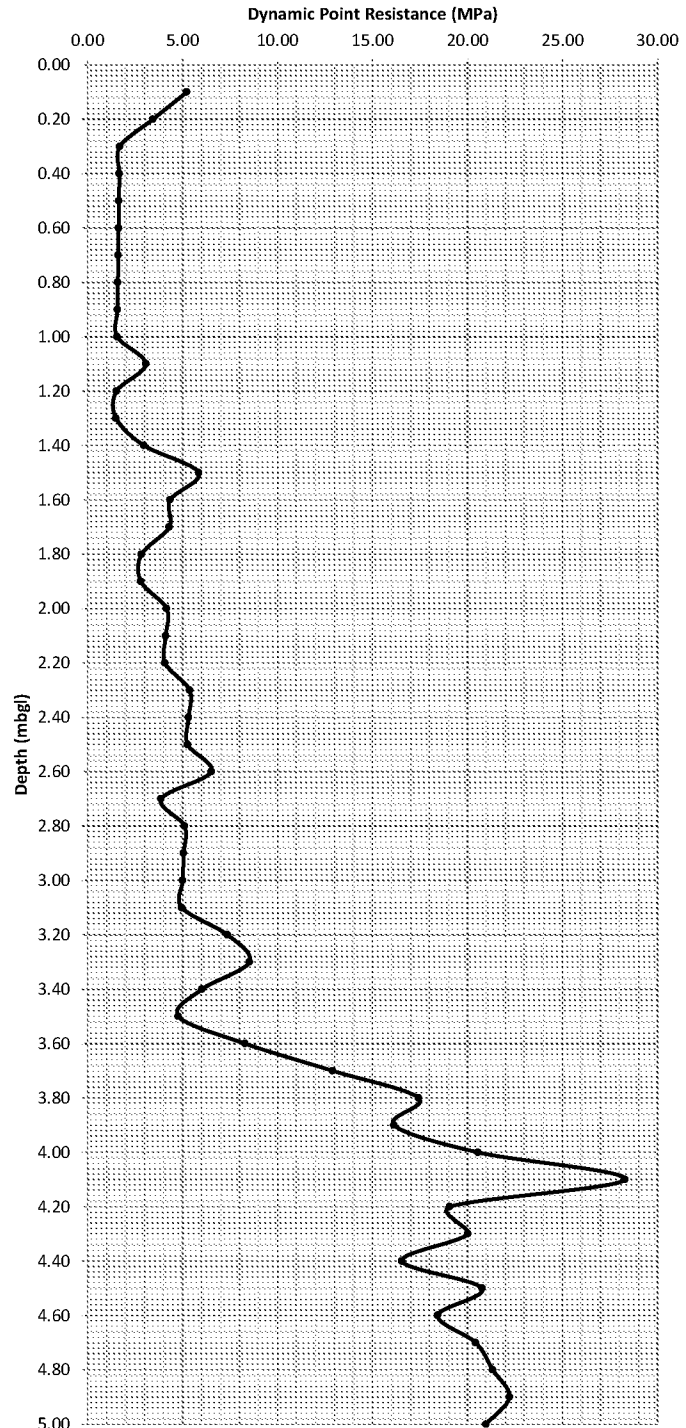
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS4	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10	3	0.03	5.37	5.22
0.20	2	0.05	3.58	3.43
0.30	1	0.10	1.79	1.69
0.40	1	0.10	1.79	1.67
0.50	1	0.10	1.79	1.65
0.60	1	0.10	1.79	1.63
0.70	1	0.10	1.79	1.61
0.80	1	0.10	1.79	1.59
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	2	0.05	3.58	3.07
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	2	0.05	3.58	2.96
1.50	4	0.03	7.17	5.86
1.60	3	0.03	5.37	4.34
1.70	3	0.03	5.37	4.30
1.80	2	0.05	3.58	2.83
1.90	2	0.05	3.58	2.80
2.00	3	0.03	5.37	4.16
2.10	3	0.03	5.37	4.11
2.20	3	0.03	5.37	4.07
2.30	4	0.03	7.17	5.37
2.40	4	0.03	7.17	5.32
2.50	4	0.03	7.17	5.26
2.60	5	0.02	8.96	6.51
2.70	3	0.03	5.37	3.87
2.80	4	0.03	7.17	5.11
2.90	4	0.03	7.17	5.06
3.00	4	0.03	7.17	5.01
3.10	4	0.03	7.17	4.96
3.20	6	0.02	10.75	7.37
3.30	7	0.01	12.54	8.52
3.40	5	0.02	8.96	6.03
3.50	4	0.03	7.17	4.78
3.60	7	0.01	12.54	8.28
3.70	11	0.01	19.71	12.90
3.80	15	0.01	26.87	17.43
3.90	14	0.01	25.08	16.13
4.00	18	0.01	32.25	20.55
4.10	25	0.00	44.79	28.29
4.20	17	0.01	30.46	19.07
4.30	18	0.01	32.25	20.02
4.40	15	0.01	26.87	16.54
4.50	19	0.01	34.04	20.78
4.60	17	0.01	30.46	18.43
4.70	19	0.01	34.04	20.43
4.80	20	0.01	35.83	21.33
4.90	21	0.00	37.62	22.21
5.00	20	0.01	35.83	20.98



Notes:

Hammer Mass 63.5 kg
 Fall Height 0.76 m
 Cone Area 0.0019 m²
 E_{theor} 473 J
 Energy Ratio 0.719
 Anvil Mass 1 kg
 Rod Mass 8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

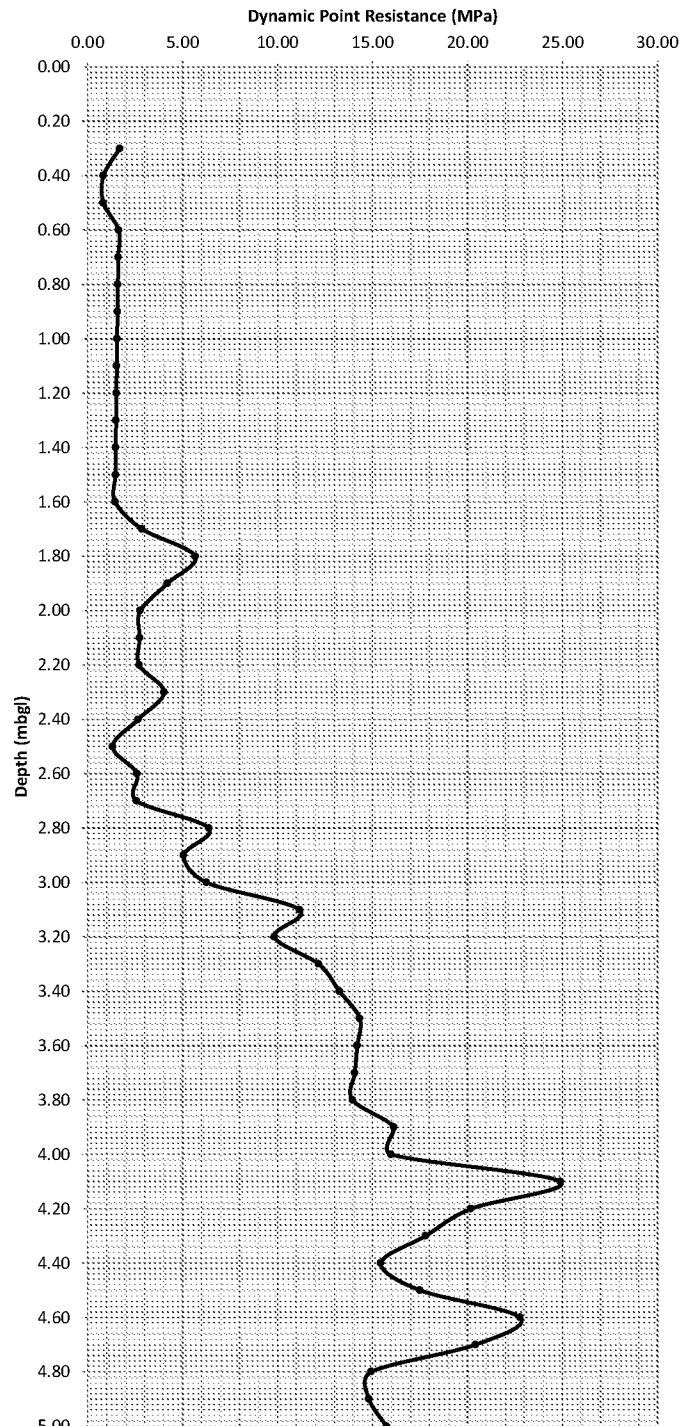
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS5	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	1	0.10	1.79	1.69
0.40	0.5	0.20	0.90	0.84
0.50	0.5	0.20	0.90	0.83
0.60	1	0.10	1.79	1.63
0.70	1	0.10	1.79	1.61
0.80	1	0.10	1.79	1.59
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	1	0.10	1.79	1.48
1.50	1	0.10	1.79	1.46
1.60	1	0.10	1.79	1.45
1.70	2	0.05	3.58	2.86
1.80	4	0.03	7.17	5.67
1.90	3	0.03	5.37	4.20
2.00	2	0.05	3.58	2.77
2.10	2	0.05	3.58	2.74
2.20	2	0.05	3.58	2.71
2.30	3	0.03	5.37	4.03
2.40	2	0.05	3.58	2.66
2.50	1	0.10	1.79	1.32
2.60	2	0.05	3.58	2.61
2.70	2	0.05	3.58	2.58
2.80	5	0.02	8.96	6.38
2.90	4	0.03	7.17	5.06
3.00	5	0.02	8.96	6.26
3.10	9	0.01	16.12	11.16
3.20	8	0.01	14.33	9.83
3.30	10	0.01	17.92	12.17
3.40	11	0.01	19.71	13.26
3.50	12	0.01	21.50	14.33
3.60	12	0.01	21.50	14.20
3.70	12	0.01	21.50	14.07
3.80	12	0.01	21.50	13.95
3.90	14	0.01	25.08	16.13
4.00	14	0.01	25.08	15.98
4.10	22	0.00	39.41	24.90
4.20	18	0.01	32.25	20.20
4.30	16	0.01	28.66	17.80
4.40	14	0.01	25.08	15.44
4.50	16	0.01	28.66	17.50
4.60	21	0.00	37.62	22.77
4.70	19	0.01	34.04	20.43
4.80	14	0.01	25.08	14.93
4.90	14	0.01	25.08	14.81
5.00	15	0.01	26.87	15.74



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.719
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

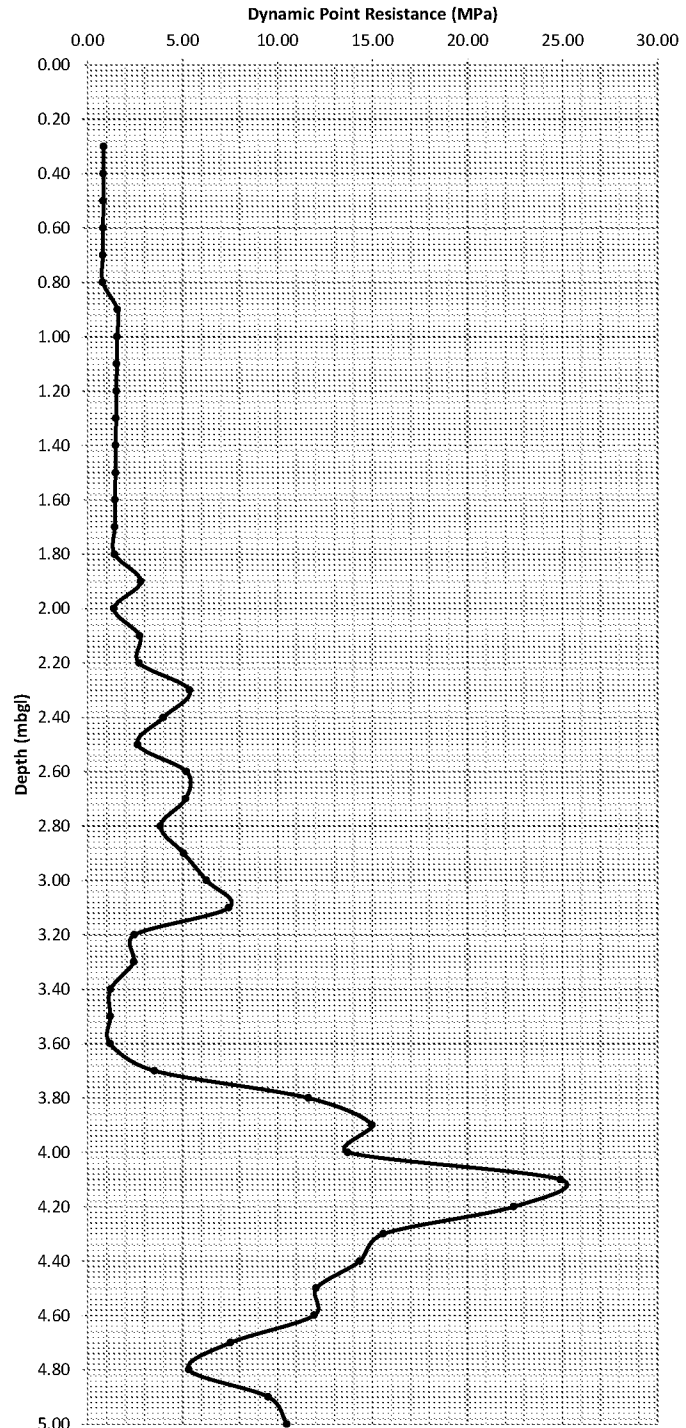
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS6	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	0.5	0.20	0.90	0.85
0.40	0.5	0.20	0.90	0.84
0.50	0.5	0.20	0.90	0.83
0.60	0.5	0.20	0.90	0.82
0.70	0.5	0.20	0.90	0.81
0.80	0.5	0.20	0.90	0.80
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	1	0.10	1.79	1.48
1.50	1	0.10	1.79	1.46
1.60	1	0.10	1.79	1.45
1.70	1	0.10	1.79	1.43
1.80	1	0.10	1.79	1.42
1.90	2	0.05	3.58	2.80
2.00	1	0.10	1.79	1.39
2.10	2	0.05	3.58	2.74
2.20	2	0.05	3.58	2.71
2.30	4	0.03	7.17	5.37
2.40	3	0.03	5.37	3.99
2.50	2	0.05	3.58	2.63
2.60	4	0.03	7.17	5.21
2.70	4	0.03	7.17	5.16
2.80	3	0.03	5.37	3.83
2.90	4	0.03	7.17	5.06
3.00	5	0.02	8.96	6.26
3.10	6	0.02	10.75	7.44
3.20	2	0.05	3.58	2.46
3.30	2	0.05	3.58	2.43
3.40	1	0.10	1.79	1.21
3.50	1	0.10	1.79	1.19
3.60	1	0.10	1.79	1.18
3.70	3	0.03	5.37	3.52
3.80	10	0.01	17.92	11.62
3.90	13	0.01	23.29	14.97
4.00	12	0.01	21.50	13.70
4.10	22	0.00	39.41	24.90
4.20	20	0.01	35.83	22.44
4.30	14	0.01	25.08	15.57
4.40	13	0.01	23.29	14.34
4.50	11	0.01	19.71	12.03
4.60	11	0.01	19.71	11.93
4.70	7	0.01	12.54	7.53
4.80	5	0.02	8.96	5.33
4.90	9	0.01	16.12	9.52
5.00	10	0.01	17.92	10.49



Notes:

Hammer Mass 63.5 kg
 Fall Height 0.76 m
 Cone Area 0.0019 m²
 E_{theor} 473 J
 Energy Ratio 0.719
 Anvil Mass 1 kg
 Rod Mass 8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

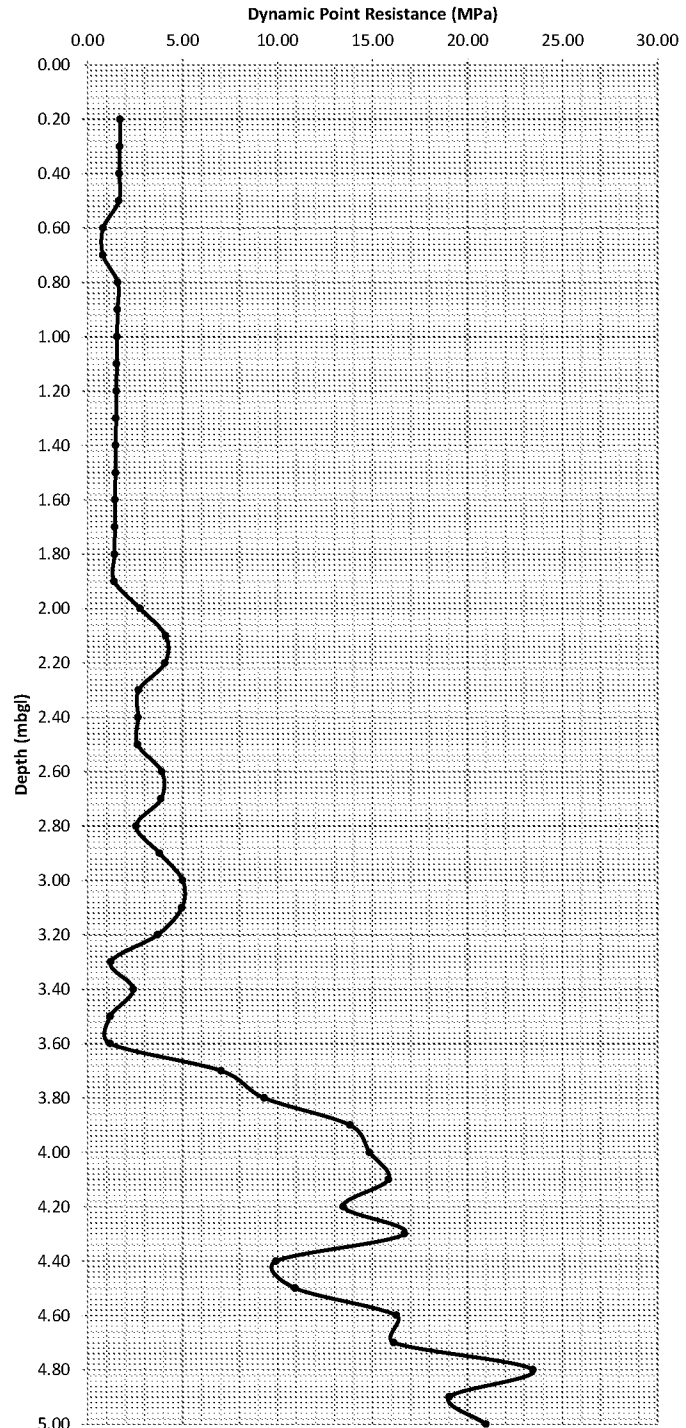
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS7	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20	1	0.10	1.79	1.72
0.30	1	0.10	1.79	1.69
0.40	1	0.10	1.79	1.67
0.50	1	0.10	1.79	1.65
0.60	0.5	0.20	0.90	0.82
0.70	0.5	0.20	0.90	0.81
0.80	1	0.10	1.79	1.59
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	1	0.10	1.79	1.48
1.50	1	0.10	1.79	1.46
1.60	1	0.10	1.79	1.45
1.70	1	0.10	1.79	1.43
1.80	1	0.10	1.79	1.42
1.90	1	0.10	1.79	1.40
2.00	2	0.05	3.58	2.77
2.10	3	0.03	5.37	4.11
2.20	3	0.03	5.37	4.07
2.30	2	0.05	3.58	2.69
2.40	2	0.05	3.58	2.66
2.50	2	0.05	3.58	2.63
2.60	3	0.03	5.37	3.91
2.70	3	0.03	5.37	3.87
2.80	2	0.05	3.58	2.55
2.90	3	0.03	5.37	3.79
3.00	4	0.03	7.17	5.01
3.10	4	0.03	7.17	4.96
3.20	3	0.03	5.37	3.69
3.30	1	0.10	1.79	1.22
3.40	2	0.05	3.58	2.41
3.50	1	0.10	1.79	1.19
3.60	1	0.10	1.79	1.18
3.70	6	0.02	10.75	7.04
3.80	8	0.01	14.33	9.30
3.90	12	0.01	21.50	13.82
4.00	13	0.01	23.29	14.84
4.10	14	0.01	25.08	15.84
4.20	12	0.01	21.50	13.46
4.30	15	0.01	26.87	16.68
4.40	9	0.01	16.12	9.93
4.50	10	0.01	17.92	10.94
4.60	15	0.01	26.87	16.27
4.70	15	0.01	26.87	16.13
4.80	22	0.00	39.41	23.46
4.90	18	0.01	32.25	19.04
5.00	20	0.01	35.83	20.98



Notes:

Hammer Mass 63.5 kg
 Fall Height 0.76 m
 Cone Area 0.0019 m²
 E_{theor} 473 J
 Energy Ratio 0.719
 Anvil Mass 1 kg
 Rod Mass 8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

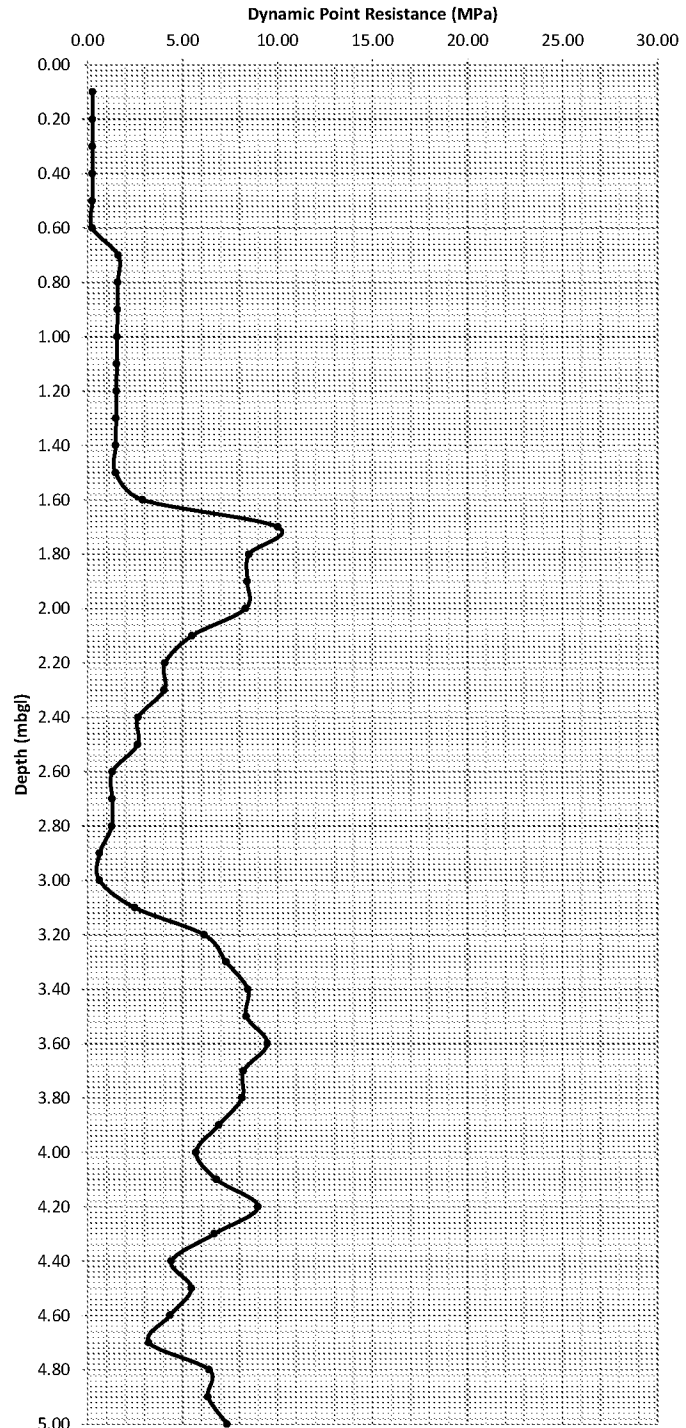
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS8	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10	0.15	0.67	0.27	0.26
0.20	0.15	0.67	0.27	0.26
0.30	0.15	0.67	0.27	0.25
0.40	0.15	0.67	0.27	0.25
0.50	0.15	0.67	0.27	0.25
0.60	0.15	0.67	0.27	0.24
0.70	1	0.10	1.79	1.61
0.80	1	0.10	1.79	1.59
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	1	0.10	1.79	1.48
1.50	1	0.10	1.79	1.46
1.60	2	0.05	3.58	2.90
1.70	7	0.01	12.54	10.03
1.80	6	0.02	10.75	8.50
1.90	6	0.02	10.75	8.41
2.00	6	0.02	10.75	8.32
2.10	4	0.03	7.17	5.49
2.20	3	0.03	5.37	4.07
2.30	3	0.03	5.37	4.03
2.40	2	0.05	3.58	2.66
2.50	2	0.05	3.58	2.63
2.60	1	0.10	1.79	1.30
2.70	1	0.10	1.79	1.29
2.80	1	0.10	1.79	1.28
2.90	0.5	0.20	0.90	0.63
3.00	0.5	0.20	0.90	0.63
3.10	2	0.05	3.58	2.48
3.20	5	0.02	8.96	6.14
3.30	6	0.02	10.75	7.30
3.40	7	0.01	12.54	8.44
3.50	7	0.01	12.54	8.36
3.60	8	0.01	14.33	9.47
3.70	7	0.01	12.54	8.21
3.80	7	0.01	12.54	8.14
3.90	6	0.02	10.75	6.91
4.00	5	0.02	8.96	5.71
4.10	6	0.02	10.75	6.79
4.20	8	0.01	14.33	8.98
4.30	6	0.02	10.75	6.67
4.40	4	0.03	7.17	4.41
4.50	5	0.02	8.96	5.47
4.60	4	0.03	7.17	4.34
4.70	3	0.03	5.37	3.23
4.80	6	0.02	10.75	6.40
4.90	6	0.02	10.75	6.35
5.00	7	0.01	12.54	7.34



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.719
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

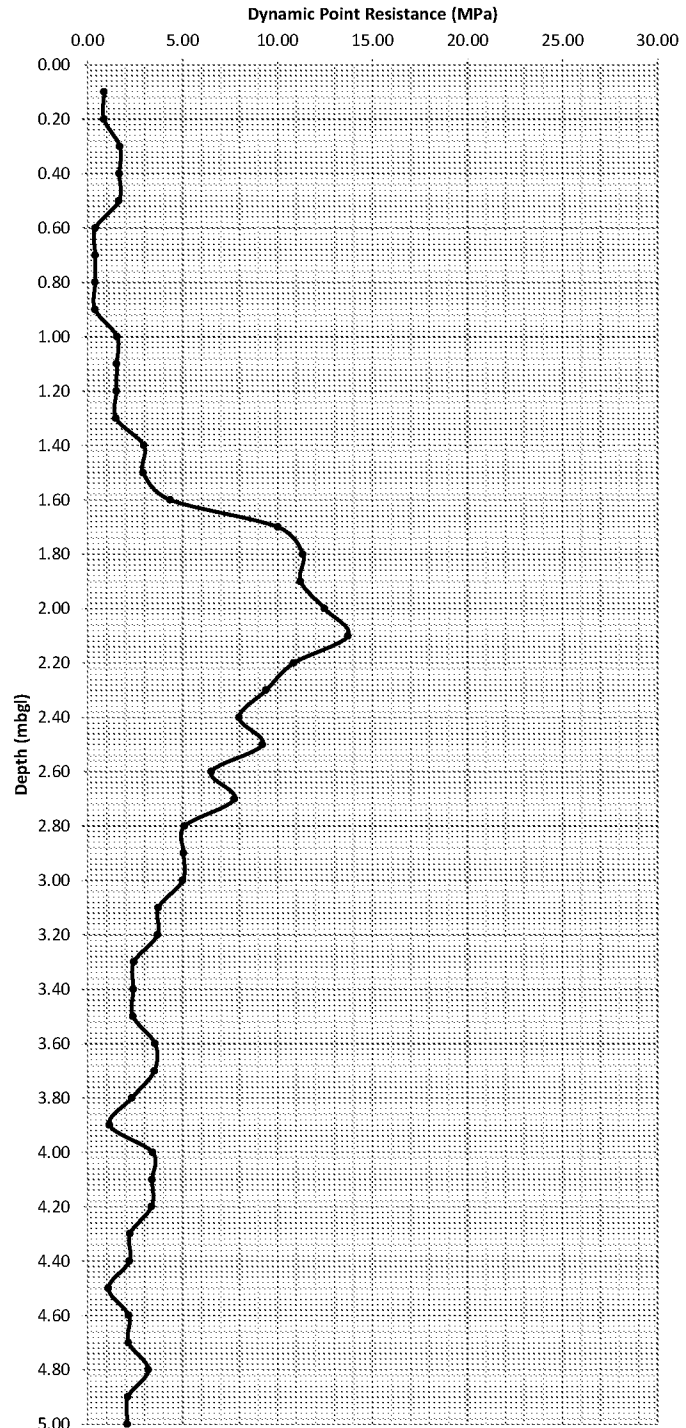
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS9	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10	0.5	0.20	0.90	0.87
0.20	0.5	0.20	0.90	0.86
0.30	1	0.10	1.79	1.69
0.40	1	0.10	1.79	1.67
0.50	1	0.10	1.79	1.65
0.60	0.25	0.40	0.45	0.41
0.70	0.25	0.40	0.45	0.40
0.80	0.25	0.40	0.45	0.40
0.90	0.25	0.40	0.45	0.39
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	1	0.10	1.79	1.50
1.40	2	0.05	3.58	2.96
1.50	2	0.05	3.58	2.93
1.60	3	0.03	5.37	4.34
1.70	7	0.01	12.54	10.03
1.80	8	0.01	14.33	11.33
1.90	8	0.01	14.33	11.21
2.00	9	0.01	16.12	12.48
2.10	10	0.01	17.92	13.72
2.20	8	0.01	14.33	10.86
2.30	7	0.01	12.54	9.40
2.40	6	0.02	10.75	7.98
2.50	7	0.01	12.54	9.21
2.60	5	0.02	8.96	6.51
2.70	6	0.02	10.75	7.74
2.80	4	0.03	7.17	5.11
2.90	4	0.03	7.17	5.06
3.00	4	0.03	7.17	5.01
3.10	3	0.03	5.37	3.72
3.20	3	0.03	5.37	3.69
3.30	2	0.05	3.58	2.43
3.40	2	0.05	3.58	2.41
3.50	2	0.05	3.58	2.39
3.60	3	0.03	5.37	3.55
3.70	3	0.03	5.37	3.52
3.80	2	0.05	3.58	2.32
3.90	1	0.10	1.79	1.15
4.00	3	0.03	5.37	3.43
4.10	3	0.03	5.37	3.40
4.20	3	0.03	5.37	3.37
4.30	2	0.05	3.58	2.22
4.40	2	0.05	3.58	2.21
4.50	1	0.10	1.79	1.09
4.60	2	0.05	3.58	2.17
4.70	2	0.05	3.58	2.15
4.80	3	0.03	5.37	3.20
4.90	2	0.05	3.58	2.12
5.00	2	0.05	3.58	2.10



Notes:

Hammer Mass 63.5 kg
 Fall Height 0.76 m
 Cone Area 0.0019 m²
 E_{theor} 473 J
 Energy Ratio 0.719
 Anvil Mass 1 kg
 Rod Mass 8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

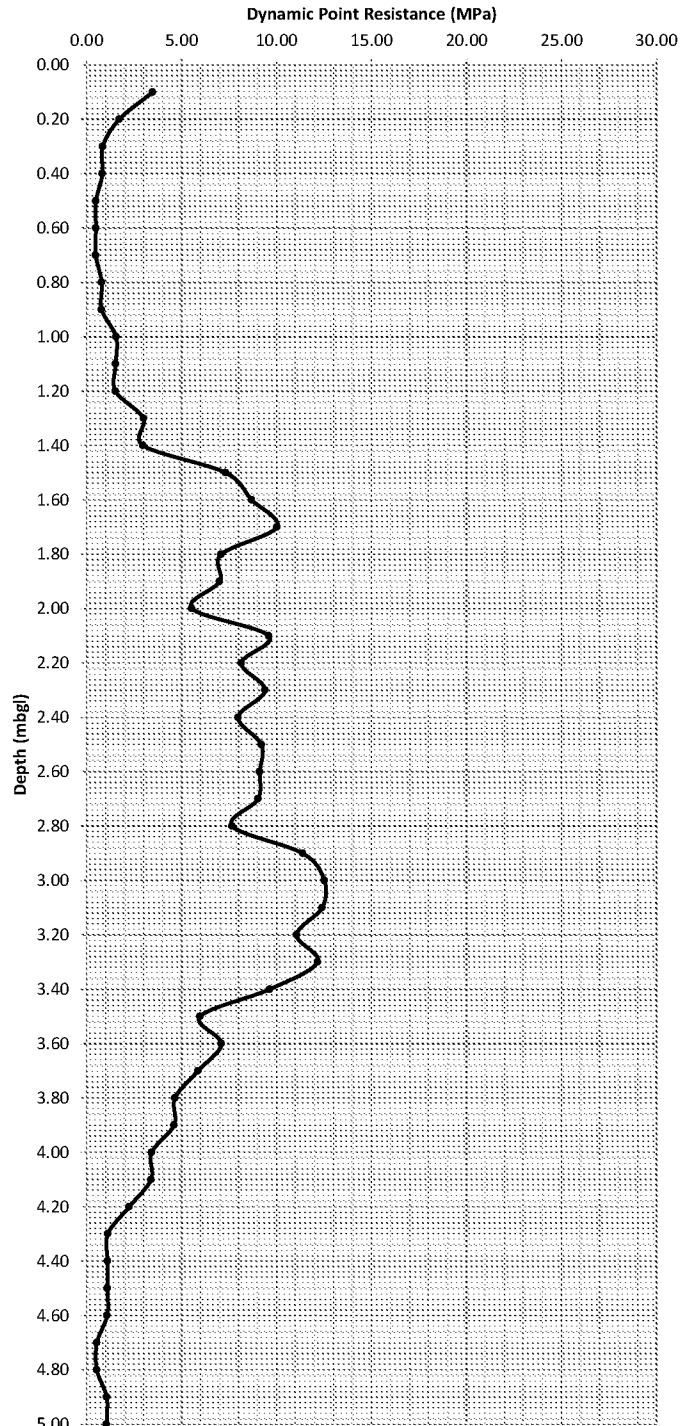
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS10	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10	2	0.05	3.58	3.48
0.20	1	0.10	1.79	1.72
0.30	0.5	0.20	0.90	0.85
0.40	0.5	0.20	0.90	0.84
0.50	0.3	0.33	0.54	0.50
0.60	0.3	0.33	0.54	0.49
0.70	0.3	0.33	0.54	0.48
0.80	0.5	0.20	0.90	0.80
0.90	0.5	0.20	0.90	0.79
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	1	0.10	1.79	1.52
1.30	2	0.05	3.58	3.00
1.40	2	0.05	3.58	2.96
1.50	5	0.02	8.96	7.32
1.60	6	0.02	10.75	8.69
1.70	7	0.01	12.54	10.03
1.80	5	0.02	8.96	7.08
1.90	5	0.02	8.96	7.01
2.00	4	0.03	7.17	5.54
2.10	7	0.01	12.54	9.60
2.20	6	0.02	10.75	8.14
2.30	7	0.01	12.54	9.40
2.40	6	0.02	10.75	7.98
2.50	7	0.01	12.54	9.21
2.60	7	0.01	12.54	9.12
2.70	7	0.01	12.54	9.03
2.80	6	0.02	10.75	7.66
2.90	9	0.01	16.12	11.38
3.00	10	0.01	17.92	12.52
3.10	10	0.01	17.92	12.40
3.20	9	0.01	16.12	11.06
3.30	10	0.01	17.92	12.17
3.40	8	0.01	14.33	9.64
3.50	5	0.02	8.96	5.97
3.60	6	0.02	10.75	7.10
3.70	5	0.02	8.96	5.86
3.80	4	0.03	7.17	4.65
3.90	4	0.03	7.17	4.61
4.00	3	0.03	5.37	3.43
4.10	3	0.03	5.37	3.40
4.20	2	0.05	3.58	2.24
4.30	1	0.10	1.79	1.11
4.40	1	0.10	1.79	1.10
4.50	1	0.10	1.79	1.09
4.60	1	0.10	1.79	1.08
4.70	0.5	0.20	0.90	0.54
4.80	0.5	0.20	0.90	0.53
4.90	1	0.10	1.79	1.06
5.00	1	0.10	1.79	1.05



Notes:

Hammer Mass	63.5 kg
Fall Height	0.76 m
Cone Area	0.0019 m ²
E _{theor}	473 J
Energy Ratio	0.719
Anvil Mass	1 kg
Rod Mass	8.79 kg/m

ASHDOWN SITE INVESTIGATION LTD

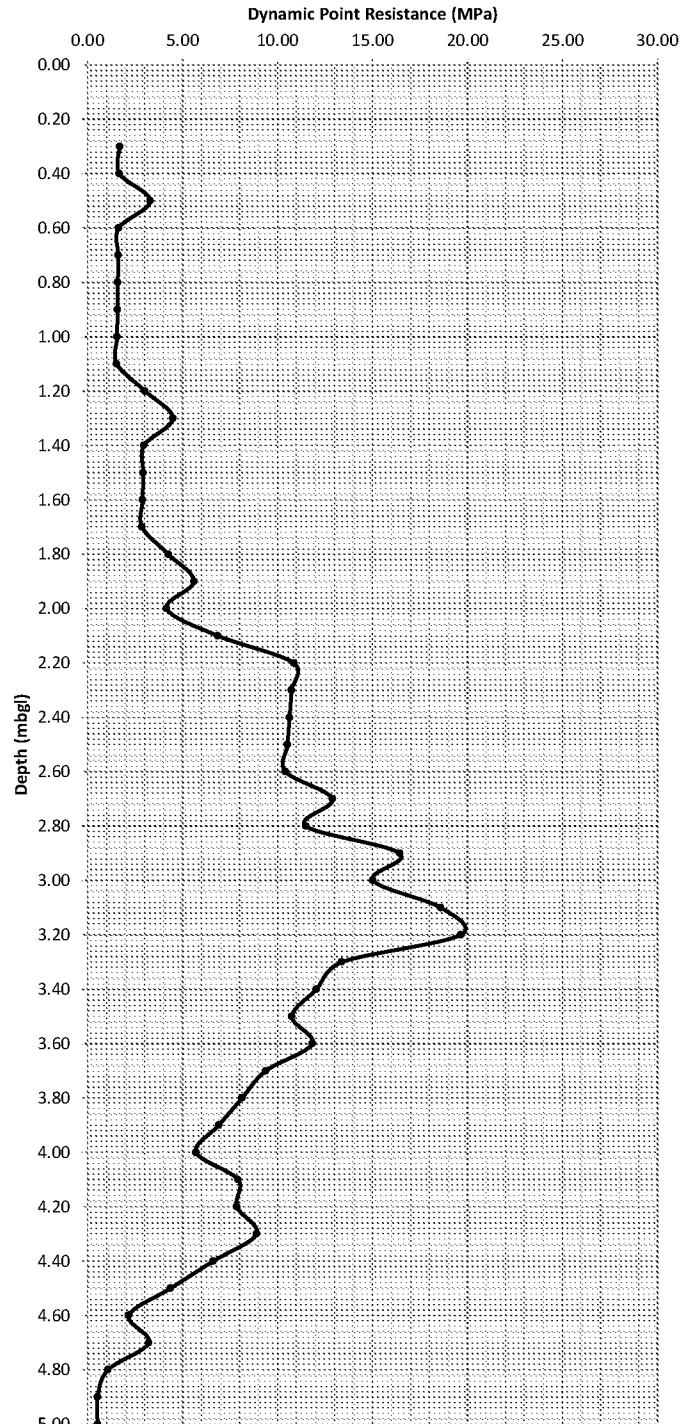
Dynamic Probe Record

SITE Manor Nursery, Angmering, West Sussex

Report Ref.

LW26073

Test Location Reference			WS11	
Depth (mbgl)	Blows (per 100mm)	Average Penetration per Blow (m)	Unit Point Resistance (MPa)	Dynamic Point Resistance (MPa)
0.10				
0.20				
0.30	1	0.10	1.79	1.69
0.40	1	0.10	1.79	1.67
0.50	2	0.05	3.58	3.30
0.60	1	0.10	1.79	1.63
0.70	1	0.10	1.79	1.61
0.80	1	0.10	1.79	1.59
0.90	1	0.10	1.79	1.57
1.00	1	0.10	1.79	1.55
1.10	1	0.10	1.79	1.53
1.20	2	0.05	3.58	3.03
1.30	3	0.03	5.37	4.50
1.40	2	0.05	3.58	2.96
1.50	2	0.05	3.58	2.93
1.60	2	0.05	3.58	2.90
1.70	2	0.05	3.58	2.86
1.80	3	0.03	5.37	4.25
1.90	4	0.03	7.17	5.60
2.00	3	0.03	5.37	4.16
2.10	5	0.02	8.96	6.86
2.20	8	0.01	14.33	10.86
2.30	8	0.01	14.33	10.74
2.40	8	0.01	14.33	10.63
2.50	8	0.01	14.33	10.53
2.60	8	0.01	14.33	10.42
2.70	10	0.01	17.92	12.90
2.80	9	0.01	16.12	11.49
2.90	13	0.01	23.29	16.44
3.00	12	0.01	21.50	15.03
3.10	15	0.01	26.87	18.60
3.20	16	0.01	28.66	19.65
3.30	11	0.01	19.71	13.39
3.40	10	0.01	17.92	12.06
3.50	9	0.01	16.12	10.75
3.60	10	0.01	17.92	11.83
3.70	8	0.01	14.33	9.38
3.80	7	0.01	12.54	8.14
3.90	6	0.02	10.75	6.91
4.00	5	0.02	8.96	5.71
4.10	7	0.01	12.54	7.92
4.20	7	0.01	12.54	7.85
4.30	8	0.01	14.33	8.90
4.40	6	0.02	10.75	6.62
4.50	4	0.03	7.17	4.37
4.60	2	0.05	3.58	2.17
4.70	3	0.03	5.37	3.23
4.80	1	0.10	1.79	1.07
4.90	0.5	0.20	0.90	0.53
5.00	0.5	0.20	0.90	0.52



Notes:

Hammer Mass 63.5 kg
 Fall Height 0.76 m
 Cone Area 0.0019 m²
 E_{theor} 473 J
 Energy Ratio 0.719
 Anvil Mass 1 kg
 Rod Mass 8.79 kg/m

TRL Dynamic Cone Penetrometer Record

LW26073

Depth (mbgl)	CBR (%)
0.00	15
0.01	10
0.02	15
0.03	10
0.04	15
0.05	10
0.06	15
0.07	10
0.08	15
0.09	10
0.10	15
0.11	10
0.12	15
0.13	10
0.14	15
0.15	110
0.16	10
0.17	15
0.18	10
0.19	15
0.20	10
0.21	15
0.22	10
0.23	15
0.24	10
0.25	15
0.26	10
0.27	15
0.28	10
0.29	15
0.30	10
0.31	15
0.32	10
0.33	15
0.34	10
0.35	15
0.36	10
0.37	15
0.38	10
0.39	15
0.40	10
0.41	15
0.42	10
0.43	15
0.44	10
0.45	15
0.46	10
0.47	15
0.48	10
0.49	15
0.50	10
0.51	15
0.52	10
0.53	15
0.54	10
0.55	15
0.56	10
0.57	15
0.58	10
0.59	15
0.60	10
0.61	15
0.62	10
0.63	15
0.64	10
0.65	15
0.66	10
0.67	15
0.68	10
0.69	15
0.70	10
0.71	15
0.72	10
0.73	15
0.74	10
0.75	15
0.76	10
0.77	15
0.78	10
0.79	15
0.80	10
0.81	15
0.82	10
0.83	15
0.84	10
0.85	15
0.86	10
0.87	15
0.88	10
0.89	15
0.90	10
0.91	15
0.92	10
0.93	15
0.94	10
0.95	15
0.96	10
0.97	15
0.98	10
0.99	15
1.00	10
1.01	15
1.02	10
1.03	15
1.04	10
1.05	15
1.06	10
1.07	15
1.08	10
1.09	15
1.10	10
1.11	15
1.12	10
1.13	15
1.14	10
1.15	15
1.16	10
1.17	15
1.18	10
1.19	15
1.20	10
1.21	15
1.22	10
1.23	15
1.24	10
1.25	15
1.26	10
1.27	15
1.28	10
1.29	15
1.30	10
1.31	15
1.32	10
1.33	15
1.34	10
1.35	15
1.36	10
1.37	15
1.38	10
1.39	15
1.40	10
1.41	15
1.42	10
1.43	15
1.44	10
1.45	15
1.46	10
1.47	15
1.48	10
1.49	15
1.50	10
1.51	15
1.52	10
1.53	15
1.54	10
1.55	15
1.56	10
1.57	15
1.58	10
1.59	15
1.60	10
1.61	15
1.62	10
1.63	15
1.64	10
1.65	15
1.66	10
1.67	15
1.68	10
1.69	15
1.70	10
1.71	15
1.72	10
1.73	15
1.74	10
1.75	15
1.76	10
1.77	15
1.78	10
1.79	15
1.80	10
1.81	15
1.82	10
1.83	15
1.84	10
1.85	15
1.8	

ARUN DISTRICT COUNCIL A/86/20/DOC

TRL Dynamic Cone Penetrometer Record

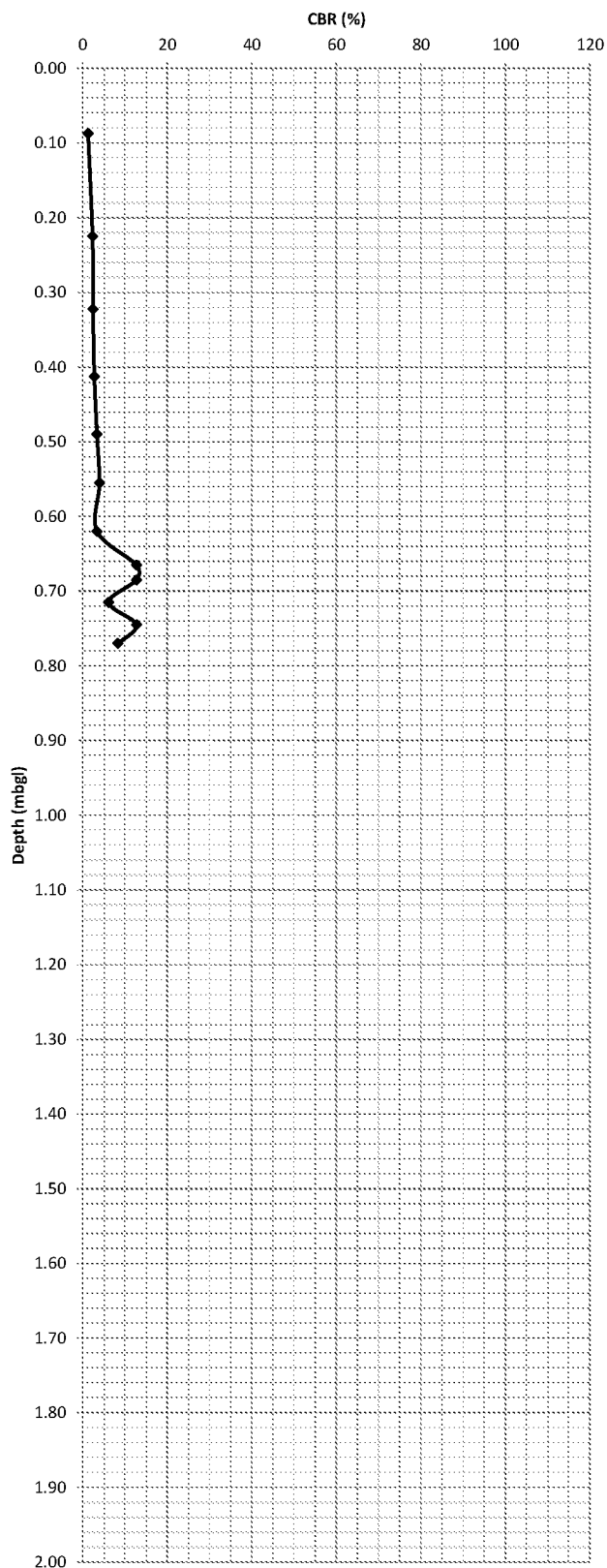
LW26073

Depth (mbgl)	CBR (%)
0.00	5
0.05	10
0.10	15
0.15	10
0.20	5
0.25	10
0.30	5
0.35	10
0.40	5
0.45	10
0.50	5
0.55	10
0.60	25
0.65	10
0.70	5
0.75	10
0.80	5
0.85	10
0.90	5
0.95	10
1.00	5
1.05	10
1.10	5
1.15	10
1.20	5
1.25	10
1.30	5
1.35	10
1.40	5
1.45	10
1.50	5
1.55	10
1.60	5
1.65	10
1.70	5
1.75	10
1.80	5
1.85	10
1.90	5
1.95	10
2.00	5

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

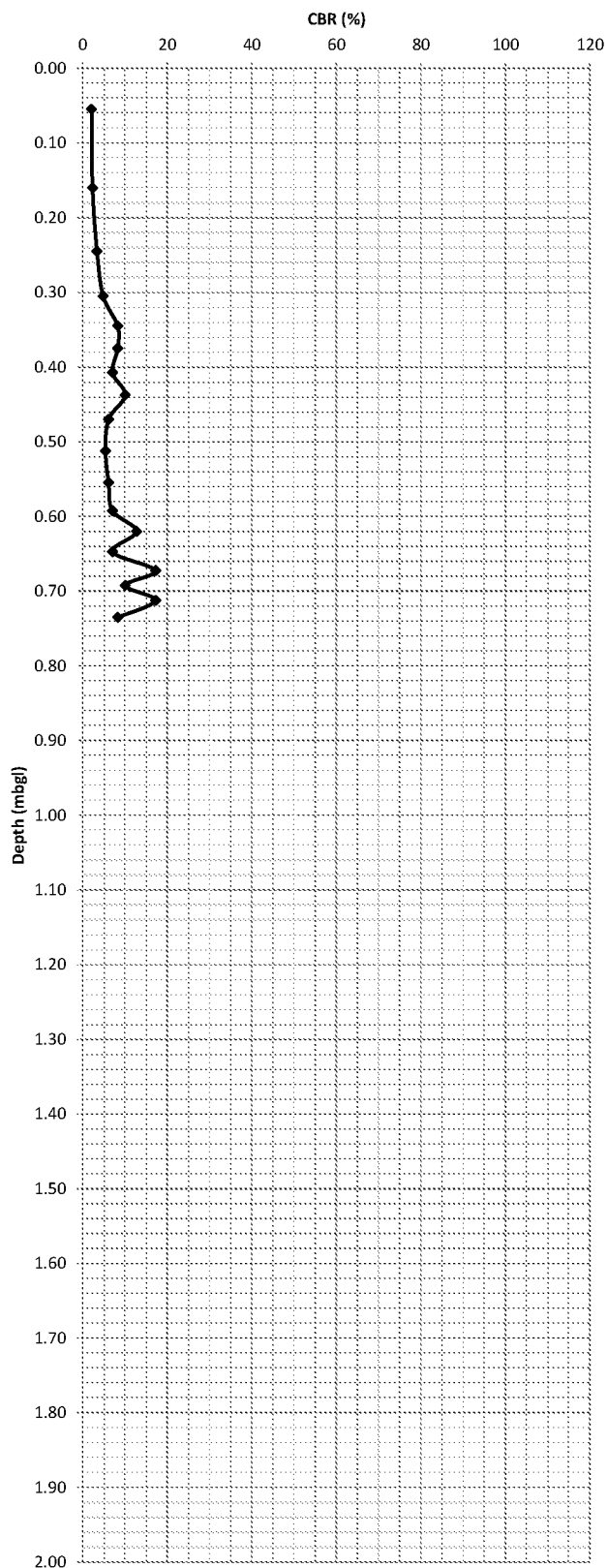
LW26073



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

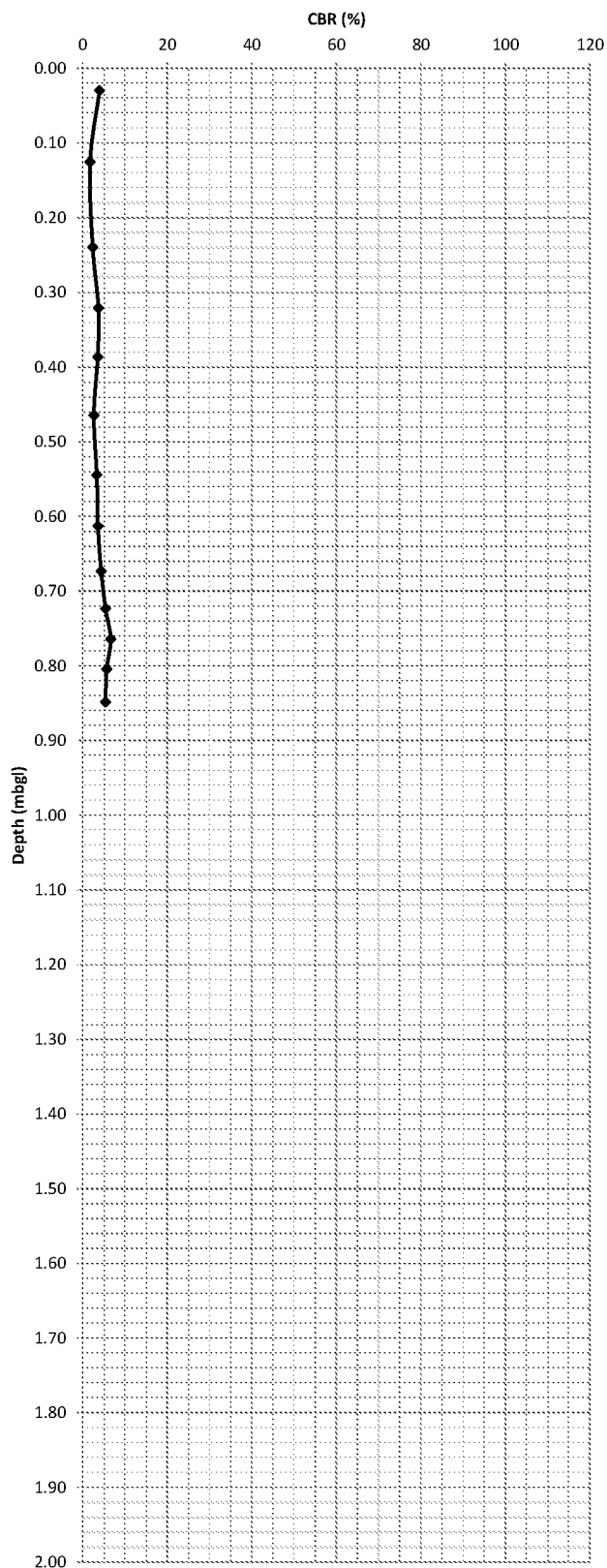
LW26073



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

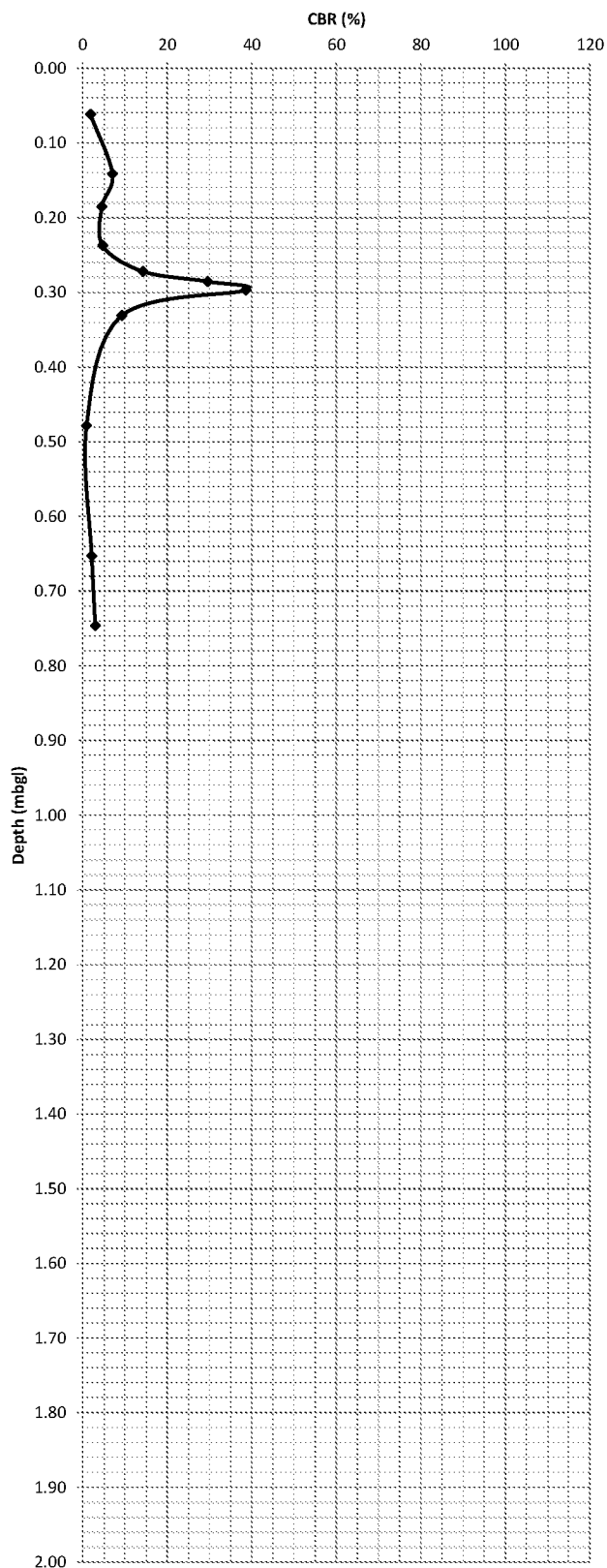
LW26073



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

LW26073



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

LW26073

Depth (mbgl)	CBR (%)
0.00	10
0.02	15
0.04	15
0.06	10
0.08	10
0.10	10
0.12	10
0.14	10
0.16	10
0.18	10
0.20	10
0.22	10
0.24	10
0.26	10
0.28	10
0.30	10
0.32	10
0.34	10
0.36	10
0.38	10
0.40	10
0.42	10
0.44	10
0.46	10
0.48	10
0.50	10
0.52	10
0.54	10
0.56	10
0.58	10
0.60	10
0.62	10
0.64	10
0.66	10
0.68	10
0.70	10
0.72	10
0.74	10
0.76	10
0.78	10
0.80	10
0.82	10
0.84	10
0.86	10
0.88	10
0.90	10
0.92	10
0.94	10
0.96	10
0.98	10
1.00	10
1.02	10
1.04	10
1.06	10
1.08	10
1.10	10
1.12	10
1.14	10
1.16	10
1.18	10
1.20	10
1.22	10
1.24	10
1.26	10
1.28	10
1.30	10
1.32	10
1.34	10
1.36	10
1.38	10
1.40	10
1.42	10
1.44	10
1.46	10
1.48	10
1.50	10
1.52	10
1.54	10
1.56	10
1.58	10
1.60	10
1.62	10
1.64	10
1.66	10
1.68	10
1.70	10
1.72	10
1.74	10
1.76	10
1.78	10
1.80	10
1.82	10
1.84	10
1.86	10
1.88	10
1.90	10
1.92	10
1.94	10
1.96	10
1.98	10
2.00	10

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

LW26073

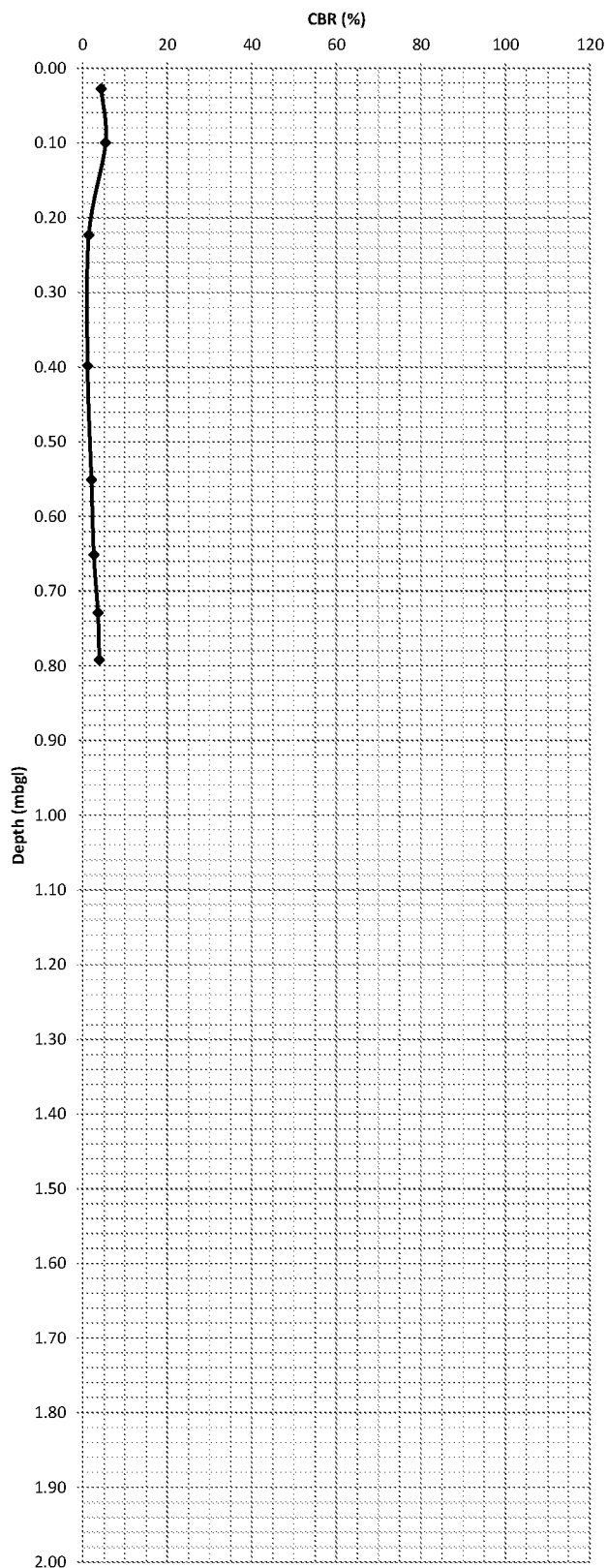
Figure 1 is a line graph showing the CBR (%) of the subgrade soil at various depths (0.00 to 2.00 mbgl). The CBR values are generally low, ranging from approximately 0% to 20% across the depth profile.

Depth (mbgl)	CBR (%)
0.00	0
0.05	0
0.10	0
0.15	0
0.20	0
0.25	0
0.30	0
0.35	0
0.40	0
0.45	0
0.50	0
0.55	0
0.60	0
0.65	0
0.70	0
0.75	0
0.80	0
0.85	0
0.90	0
0.95	0
1.00	0
1.05	0
1.10	0
1.15	0
1.20	0
1.25	0
1.30	0
1.35	0
1.40	0
1.45	0
1.50	0
1.55	0
1.60	0
1.65	0
1.70	0
1.75	0
1.80	0
1.85	0
1.90	0
1.95	0
2.00	0

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

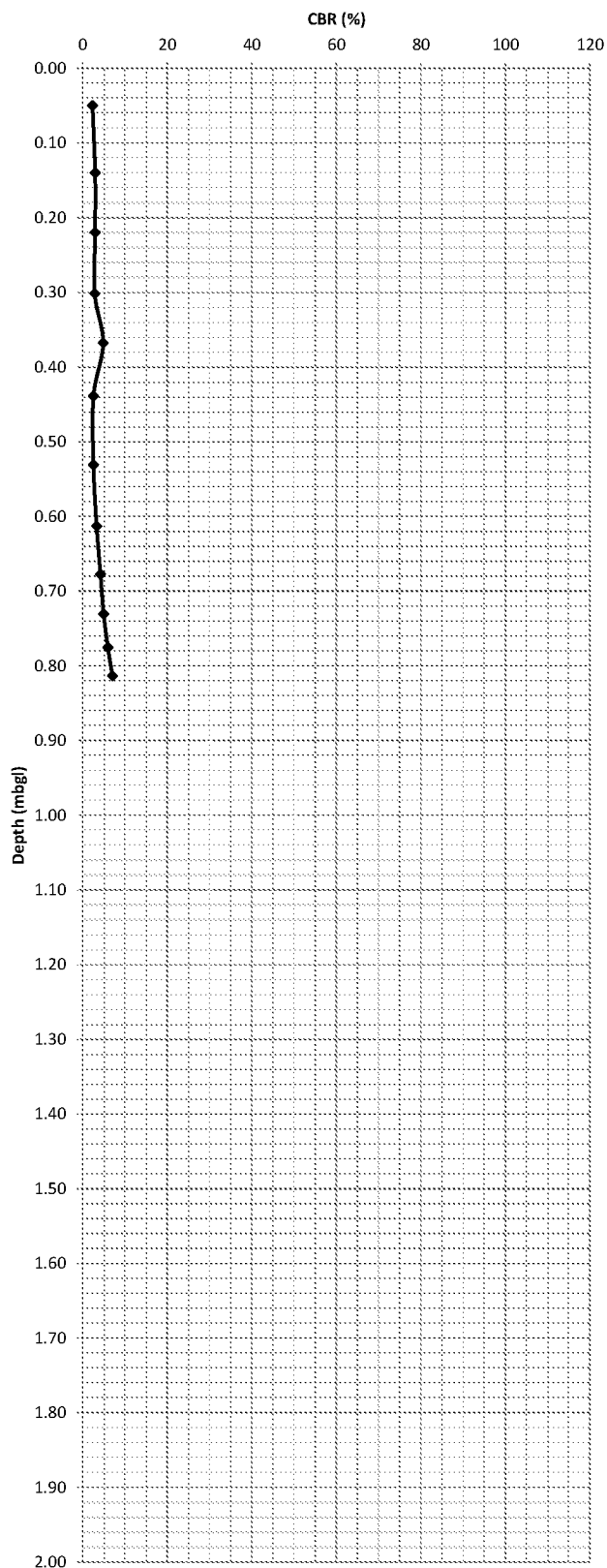
LW26073

[illegible]

Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

TRL Dynamic Cone Penetrometer Record

LW26073



Notes: CBR Value calculated in accordance with the TRRL equation given in TRL Road Note 8.

ASHDOWN SITE INVESTIGATION LIMITED

Site: Manor Nursery, Angmering, West Sussex

Report No.: LW26073

Sheet No.: 1 of 2

SUMMARY OF BOREHOLE FALLING HEAD SOAKAGE TEST RESULTS

Borehole WS1	
Time (mins)	Depth to water (m bgl)
0	GL
1	Dry
Borehole Depth (m bgl)	3.00
Casing Depth (m bgl)	1.00
Borehole Diameter (mm)	75.00
Casing Diameter (mm)	105.00

Borehole WS6	
Time (mins)	Depth to water (m bgl)
0	GL
1	Dry
Borehole Depth (m bgl)	3.00
Casing Depth (m bgl)	1.00
Borehole Diameter (mm)	80.00
Casing Diameter (mm)	105.00

Notes: bgl – below ground level.

ASHDOWN SITE INVESTIGATION LIMITED

Site: Manor Nursery, Angmering, West Sussex

Report No.: LW26073

Sheet No.: 2 of 2

SUMMARY OF BOREHOLE FALLING HEAD SOAKAGE TEST RESULTS

Borehole WS9		Borehole WS10	
Time (mins)	Depth to water (m bgl)	Time (mins)	Depth to water (m bgl)
0	GL	0	0.80
1	Dry	1	1.80
		2	1.90
		4	1.95
		8	2.00
		16	2.05
		32	2.10
		60	2.20
Borehole Depth (m bgl)	3.00	Borehole Depth (m bgl)	3.00
Casing Depth (m bgl)	1.00	Casing Depth (m bgl)	1.00
Borehole Diameter (mm)	75.00	Borehole Diameter (mm)	75.00
Casing Diameter (mm)	105.00	Casing Diameter (mm)	105.00

Notes: bgl – below ground level.

APPENDIX C

Geotechnical Laboratory Testing Notes
Geotechnical Test Results
Contamination Test Results

GEOTECHNICAL LABORATORY TESTING NOTES

1 Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1:2002) and Part 2 Principles of classification (BS EN 14688-2:2004) as well as the BS5930:1990 + A2:2010 code of Practice for Site Investigations.

2 Index Tests

Index (Atterberg Limit) tests are undertaken on samples of fine grained soils provide the primary information for the classification of fine grained soils.

Fine grained soil is tested to determine its liquid and plastic limits, which are moisture contents that define boundaries between material consistency states. These tests are used to evaluate indices used for soil identification and to help determine the shrinkage and swelling characteristics of the soil under conditions of changing moisture content. The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

The consistency index is derived from the Index Tests and is summarized in the following table. These divisions may be approximate, particularly for low plasticity soils. The consistency recorded on the soil classification summary is derived from the consistency index.

Consistency	Consistency Index
Very Soft	<0.25
Soft	0.25 to 0.50
Firm	0.50 to 0.75
Stiff	0.75 to 1.00
Very Stiff	>1.00

Based on BN EN ISO 14688-2:2004

3 Particle Size Distribution Tests

Sieve analyses are carried out soil samples to establish their particle size distribution that can assist in the assessment of the permeability and classification of granular soils.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

4 Natural Moisture/ Saturated Moisture Content Determination of Chalk

The results of natural moisture or saturated moisture content tests of disturbed samples of chalk are used to assist in the classification of the chalk to determine key geotechnical parameters of strength, density and crushing properties.

The tests are carried out in accordance with BS1377: Part 2: 1990 + A1:1996 Classification tests.

5 Soil Suction Testing

Soil suction tests are undertaken for the determination of the state of desiccation in clay soils.

The testing is carried out in accordance with the Building Research Establishment Information Paper IP4/93, dated February 1993.

6 Triaxial Compression Tests

Undrained triaxial compression tests are carried out on undisturbed samples of cohesive soil in order to assist in the determination of the undrained shear strength of the soil. The results of moisture content and density determinations are also included.

The tests are carried out in accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

7 Shear Vane and Hand Penetrometer Testing

Undisturbed samples are tested in the laboratory using a Geonor Hand Shear Vane for the determination of their undrained shear strength.

The vane tests are carried out in general accordance with BS1377: Part 7: 1990 + A1:1994 Shear strength tests (total stress).

8 One Dimensional Consolidation Tests

One-dimensional consolidation tests are performed on undisturbed soil samples to ascertain their settlement characteristics.

The tests are carried out in accordance with BS1377: Part 5: 1990 + A1:1994 Compressibility, Permeability and Durability tests.

9 Dry Density / Moisture Content Relationship (Compaction) Testing

Compaction testing for the determination of the dry density / moisture content relationship is carried out on using either a 2.5kg, 4.5kg hammer or a vibrating hammer.

The tests are carried out in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction-related tests.

10 California Bearing Ratio

The soil is usually compacted at the as dug "natural" moisture content and often at moisture contents around the natural moisture content.

The California bearing ratio is determined in accordance with the British Standard BS1377: Part 4: 1990 + A1 & A2:2002 Compaction related tests.

11 Chemical Testing

Soil samples are tested for their concentration of water soluble sulphate and pH for use in concrete mix design.

Water samples are tested for total sulphate concentration and pH value.

Where a water soluble sulphate content in soils or a total sulphate content in groundwater exceeds 3000mg/l SO₄ the magnesium sulphate content of the samples is required to be determined (BRE Special Digest 1:2005).

Swanborough Farm Swanborough Lewes, East Sussex BN73PF	ASHDOWN SITE INVESTIGATION LTD Geotechnical and Geoenvironmental Engineers	ASHDOWN SITE INVESTIGATION L I M I T E D
---	--	--

Site:	Manor Nursery, Angmering, West Sussex.	Job No:	LW26073
		Sheet No:	1

SOIL CLASSIFICATION SUMMARY

BH/TP No.	Depth (m)	Nat. Moist. Cont. (w %)	Equiv. Moist. Cont. (w _a %)	Atterberg Limits			Class'n	Cons. Index (I _c)	% passing 425 µm sieve	Visual Description of Sample
				W _L %	W _p %	I _p %				
WS1	0.60	23		43	19	24	CI	0.83*	100	Stiff brown slightly sandy CLAY.
WS3	0.90	23		43	21	22	CI	0.91*	100	Stiff brown CLAY.
WS6	1.80	20		40	18	22	CI	0.91*	95	Stiff brown slightly gravelly slightly sandy CLAY. Gravel is fine to medium flint.
WS9	0.90	24		43	19	24	CI	0.79*	99	Stiff brown slightly sandy CLAY with rare fine to medium flint gravel.

Test Method: Classification Tests BS1377: Part 2: 1990: Method 4.4, 5.3 and 5.4

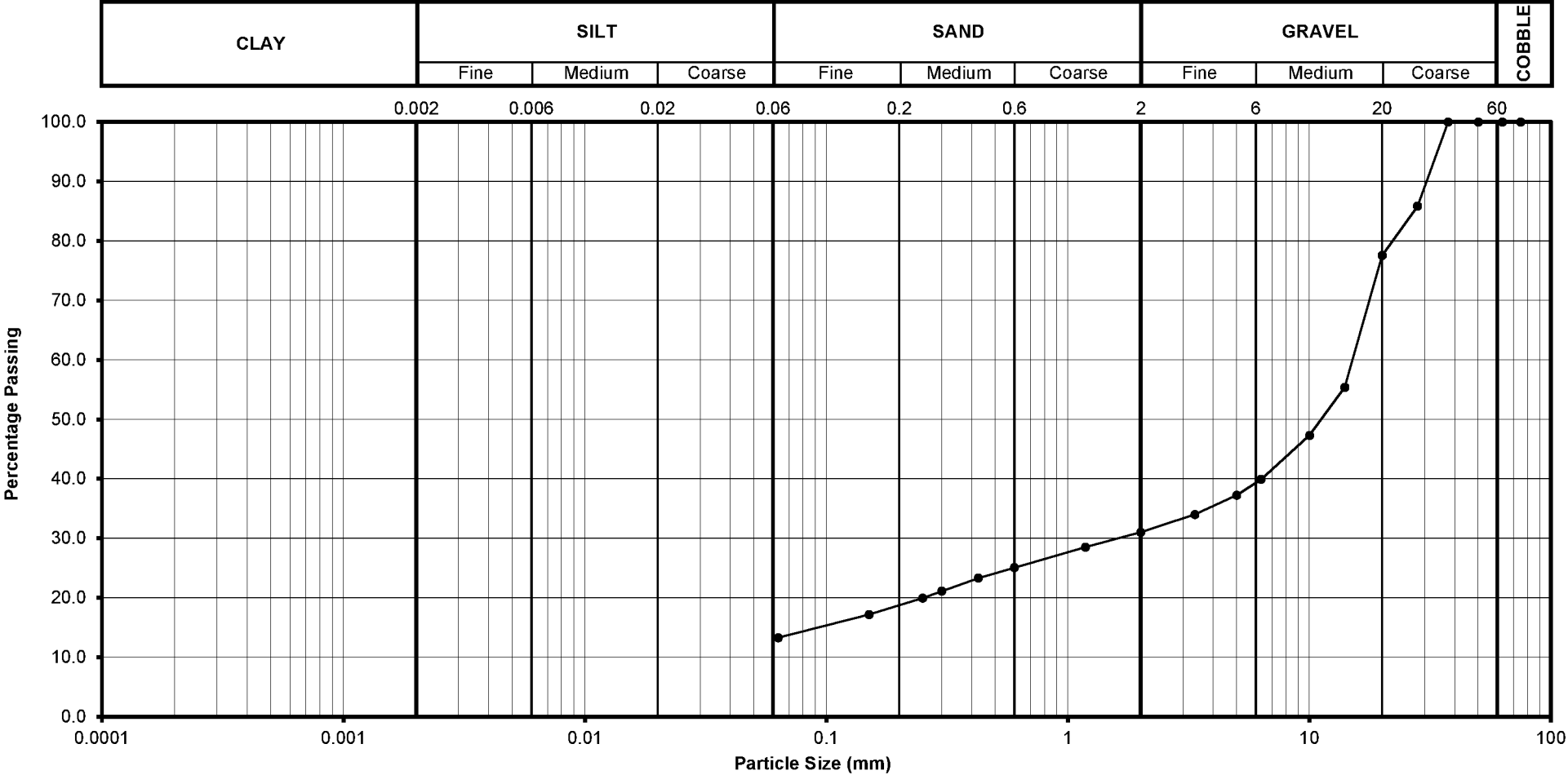
* Consistency index based on natural moisture content and not the equivalent moisture content.

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Swanborough
Lewes, East Sussex
BN73PF

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Geotechnical and Geoenvironmental Engineers



Particle Size Distribution by Wet Sieve; BS1377: Part 2 1990



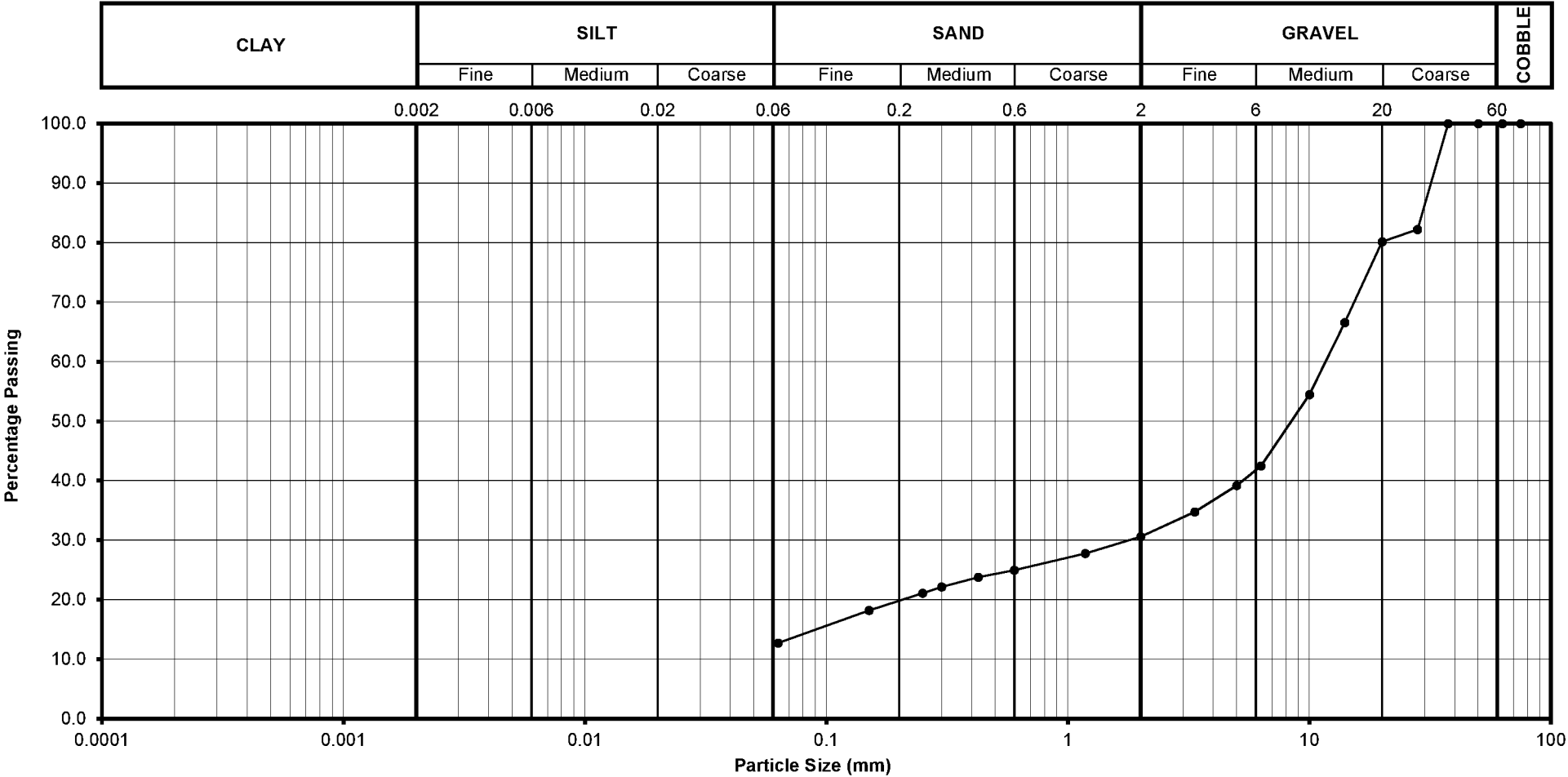
Job Name	Manor Nursery, Angmering, West Sussex.	BH/ TP No.	WS4	Sample Description	Clayey sandy GRAVEL.
Job No.	LW26073	Sample Depth (m)	2.60		

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Lewes, East Sussex
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ASHDOWN SITE INVESTIGATION LTD
Geotechnical and Geoenvironmental Engineers



Particle Size Distribution by Wet Sieve; BS1377: Part 2 1990



Job Name	Manor Nursery, Angmering, West Sussex.	BH/ TP No.	WS11	Sample Description	Clayey sandy GRAVEL.
Job No.	LW26073	Sample Depth (m)	2.20		



Unit A2
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Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY



THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 15-01099

Issue: 1

Date of Issue: 24/03/2015

Contact: David Harris

Customer Details: Ashdown Site Investigation Limited
The Old Dairy
Swanborough Farm
Lewes
East Sussex

Quotation No: Q14-00001

Order No: 150206

Customer Reference: LW26073

Date Received: 17/03/2015

Date Approved: 24/03/2015

Details: Manor Nursery, Angmering, West Sussex

Approved by:

Naomi Williams, Customer services officer

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 15-01099

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
19886	WS1 1.40	11/03/2015	18/03/2015	Silty clayey loam	
19887	WS3 0.15	11/03/2015	18/03/2015	Sandy silty loam	
19888	WS9 0.90	11/03/2015	18/03/2015	Silty clayey loam	
19889	WS8 0.50	11/03/2015	18/03/2015	Silty loam	
19890	WS7 1.20	11/03/2015	18/03/2015	Silty loam	
19891	WS10 2.60	11/03/2015	18/03/2015	Silty clayey loam	



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Results Summary

Report No.: 15-01099

Report Ref: 15 01000

ELAB Reference	19886	19887	19888	19889	19890	19891			
Customer Reference									
Sample ID									
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Location	WS1	WS3	WS9	WS8	WS7	WS10			
Sample Depth (m)	1.40	0.15	0.90	0.50	1.20	2.60			
Sampling Date	11/03/2015	11/03/2015	11/03/2015	11/03/2015	11/03/2015	11/03/2015			
Determinand	Codes	Units	LOD						
Metals									
Water soluble magnesium	N	g/l	0.01	n/t	< 0.01	< 0.01	< 0.01	n/t	n/t
Anions									
Water Soluble Chloride	M	mg/kg	40	n/t	< 40	< 40	< 40	n/t	n/t
Water Soluble Nitrate	M	mg/kg	40	n/t	< 40	< 40	< 40	n/t	n/t
Water Soluble Sulphate	M	g/l	0.02	< 0.02	0.02	< 0.02	< 0.02	< 0.02	< 0.02
Miscellaneous									
pH	M	units	0.1	6.3	8.3	7.5	7.0	7.4	7.1



Method Summary

Report No.: 15-01099

Parameter	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil				
pH	Air dried sample	24/03/2015	113	Electromeric
W. Sol Metals	Air dried sample	23/03/2015	118	ICPMS
Water soluble anions	Air dried sample	20/03/2015	172	Ion Chromatography



Report Information

Report No.: 15-01099

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage



2683



Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY



THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 15-00921

Issue: 2

Date of Issue: 19/03/2015

Contact: David Harris

Customer Details: Ashdown Site Investigation Limited
The Old Dairy
Swanborough Farm
Lewes
East Sussex

Quotation No: Q14-00001

Order No: 150192

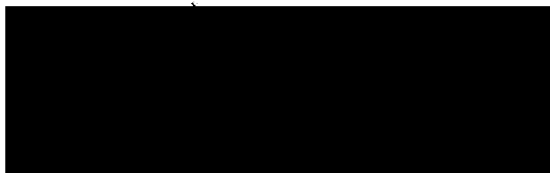
Customer Reference: LW26073

Date Received: 09/03/2015

Date Approved: 19/03/2015

Details: Manor Nursery, Angmering, West Sussex

Approved by:



John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 15-00921

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
13881	WS2 0.40	06/03/2015	10/03/2015	Silty loam	



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Results Summary

Report No.: 15-00921

ELAB Reference	18881
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	WS2
Sample Depth (m)	0.40
Sampling Date	06/03/2015

Determinand	Codes	Units	LOD	
OrganoChlorine Pesticides				
alpha-HCH	M	ug/kg	10	< 10
beta_HCH	M	ug/kg	10	< 10
gamma-HCH	M	ug/kg	10	< 10
delta-HCH	N	ug/kg	10	< 10
Heptachlor	N	ug/kg	10	< 10
Aldrin	M	ug/kg	10	< 10
Heptachlor expoxide	N	ug/kg	10	< 10
trans-Chlordane	N	ug/kg	10	< 10
alpha cis-Chlordane	N	ug/kg	10	< 10
p,p-DDE	M	ug/kg	10	< 10
Dieldrin	M	ug/kg	10	< 10
Endrin	N	ug/kg	10	< 10
p,p-DDD	M	ug/kg	10	< 10
Endosulfan II	N	ug/kg	10	< 10
Endrin aldehyde	N	ug/kg	10	< 10
p,p-DDT	M	ug/kg	10	< 10
Endosulphan sulphate	M	ug/kg	10	< 10
Methoxychlor	N	ug/kg	10	< 10
Endrin ketone	N	ug/kg	10	< 10



Results Summary

Report No.: 15-00921

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ELAB Reference	18881
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	WS2
Sample Depth (m)	0.40
Sampling Date	06/03/2015

Determinand	Codes	Units	LOD	
OrganoPhosphorus Pesticides				
Acephate	N	ug/kg	100	< 100
Azinphos-methyl	N	ug/kg	100	< 100
Chlorpyrifos	N	ug/kg	100	< 100
Demeton-s-methyl	N	ug/kg	100	< 100
Dichlorvos	N	ug/kg	100	< 100
Dimethoate	N	ug/kg	100	< 100
Ethion	N	ug/kg	100	< 100
Malathion	N	ug/kg	100	< 100
Mathidathion	N	ug/kg	100	< 100
Methamidophos	N	ug/kg	100	< 100
Omethoate	N	ug/kg	100	< 100
Pirimifos-methyl	N	ug/kg	100	< 100
Profenofos	N	ug/kg	100	< 100
Pyrazophos	N	ug/kg	100	< 100
Tokuthion	N	ug/kg	100	< 100
Tolclofos-methyl	N	ug/kg	100	< 100



Results Summary

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Report No.: 15-00921

ELAB Reference	18881
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	WS2
Sample Depth (m)	0.40
Sampling Date	06/03/2015

Determinand	Codes	Units	LOD	
SVOC				
Acid herbicides	N	mg/kg	0.01	< 0.01



Method Summary

Report No.: 15-00921

Parameter	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil				
SVOC in solids	As submitted sample	11/03/2015	167	GC-MS
Organochlorine Pesticides in solids	As submitted sample	18/03/2015	173	GC-MS
Organophosphorus Pesticides in solids	As submitted sample	18/03/2015	173	GC-MS



Report Information

Report No.: 15-00921

Key

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M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
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Soil sample results are expressed on an air dried basis

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PCB congener results may include any coeluting PCBs

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-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

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Charges may apply to extended sample storage



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Unit A2
Windmill Road
Ponswood Industrial Estate
St Leonards on Sea
East Sussex
TN38 9BY



THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 15-01073

Issue: 1

Date of Issue: 20/03/2015

Contact: David Harris

Customer Details: Ashdown Site Investigation Limited
The Old Dairy
Swanborough Farm
Lewes
East Sussex

Quotation No: Q14-00001

Order No: 150207

Customer Reference: LW26073

Date Received: 13/03/2015

Date Approved: 20/03/2015

Details: Manor Nursery, Angmering, West Sussex

Approved by:



John Wilson, Operations Manager

Any comments, opinions or interpretations expressed herein are outside the scope of UKAS accreditation (Accreditation Number 2683)



Sample Summary

Report No.: 15-01073

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
19699	WS1 0.10	11/03/2015	16/03/2015	Sandy loam	
19700	WS2 0.20	06/03/2015	16/03/2015	Loamy sand	
19701	WS3 0.20	06/03/2015	16/03/2015	Sandy silty loam	
19702	WS5 0.20	06/03/2015	16/03/2015	Silty loam	
19703	WS7 0.10	06/03/2015	16/03/2015	Sandy silty loam	
19704	WS8 0.10	11/03/2015	16/03/2015	Silty loam	
19705	WS10 GL	11/03/2015	16/03/2015	Sandy silty loam	
19706	WS10 0.50	11/03/2015	16/03/2015	Silty loam	
19707	DS GL	11/03/2015	16/03/2015	Sandy silty loam	
19708	HA1 0.10	11/03/2015	16/03/2015	Sandy silty loam	
19709	HA1 0.80	11/03/2015	16/03/2015	Silty loam	
19710	HA2 0.30	11/03/2015	16/03/2015	Silty loam	
19711	HA2 0.90	11/03/2015	16/03/2015	Silty loam	



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Results Summary

Report No.: 15-01073

ELAB Reference	19699	19700	19701	19702	19703	19704
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS2	WS3	WS5	WS7	WS8
Sample Depth (m)	0.10	0.20	0.20	0.20	0.10	0.10
Sampling Date	11/03/2015	06/03/2015	06/03/2015	06/03/2015	06/03/2015	11/03/2015

Determinand	Codes	Units	LOD						
Metals									
Arsenic	M	mg/kg	1	5.5	4.0	4.0	7.2	8.6	12.2
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5
Chromium	M	mg/kg	5	9.9	6.5	10.9	17.8	23.3	27.2
Copper	M	mg/kg	5	5.4	< 5.0	17.6	17.9	18.9	26.4
Lead	M	mg/kg	5	13.1	14.6	21.9	33.8	37.2	53.3
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	5.2	< 5.0	28.1	13.6	15.8	17.7
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	45	< 45.0	54.2	< 45.0	61.9	63.0	234
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	< 0.5	< 0.5	< 0.5	1.1	0.5	< 0.5
Miscellaneous									
pH	M	units	0.1	9.2	9.1	8.4	7.7	7.7	7.4
Soil Organic Matter	U	%	0.1	1.3	0.9	1.6	6.1	3.0	2.2



2683

Results Summary

Report No.: 15-01073

ELAB Reference	19699	19700	19701	19702	19703	19704
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS2	WS3	WS5	WS7	WS8
Sample Depth (m)	0.10	0.20	0.20	0.20	0.10	0.10
Sampling Date	11/03/2015	06/03/2015	06/03/2015	06/03/2015	06/03/2015	11/03/2015

Determinand	Codes	Units	LOD						
Organics									
>C8-C10 BCB	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t	< 1.0
>C10-C12 BCB	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t	< 1.0
>C12-C16 BCB	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t	< 1.0
>C16-C21 BCB	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t	1.6
>C21-C35 BCB	N	mg/kg	1	4.8	n/t	n/t	n/t	n/t	14.0
>C35-C40 BCB	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t	3.2
Total (>C8-C40) BCB	N	mg/kg	1	4.8	n/t	n/t	n/t	n/t	18.8
Polyaromatic hydrocarbons									
Naphthalene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.02	< 0.01	0.01	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01	0.02	< 0.01	0.04	0.01	0.01	< 0.01
Acenaphthene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01
Fluorene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01	0.17	0.04	0.09	0.04	0.07	0.04
Anthracene GCMS	N	mg/kg	0.01	0.05	0.01	0.05	0.02	0.02	< 0.01
Fluoranthene GCMS	N	mg/kg	0.01	0.42	0.12	0.53	0.18	0.27	0.14
Pyrene GCMS	N	mg/kg	0.01	0.38	0.10	0.52	0.17	0.23	0.12
Benzo (a) anthracene GCMS	N	mg/kg	0.01	0.18	0.06	0.40	0.10	0.13	0.05
Chrysene GCMS	N	mg/kg	0.01	0.21	0.09	0.43	0.12	0.09	0.07
Benzo (b) fluoranthene GCMS	N	mg/kg	0.01	0.16	0.07	0.47	0.11	0.14	0.17
Benzo (k) fluoranthene GCMS	N	mg/kg	0.01	0.20	0.08	0.49	0.13	0.15	0.06
Benzo (a) pyrene GCMS	N	mg/kg	0.01	0.23	0.10	0.58	0.14	0.17	0.07
Indeno (1,2,3-cd) pyrene GCMS	N	mg/kg	0.01	0.11	0.06	0.34	0.08	0.10	0.04
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	0.03	0.02	0.11	0.03	0.03	0.01
Benzo(ghi)perylene GCMS	N	mg/kg	0.01	0.16	0.09	0.41	0.11	0.15	0.04
Total PAH(16) GCMS	N	mg/kg	0.04	2.35	0.87	4.50	1.27	1.58	0.85



Results Summary

Report No.: 15-01073

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ELAB Reference	19699	19700	19701	19702	19703	19704
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS1	WS2	WS3	WS5	WS7	WS8
Sample Depth (m)	0.10	0.20	0.20	0.20	0.10	0.10
Sampling Date	11/03/2015	06/03/2015	06/03/2015	06/03/2015	06/03/2015	11/03/2015

Determinand	Codes	Units	LOD						
OrganoChlorine Pesticides									
alpha-HCH	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
beta_HCH	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
gamma-HCH	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
delta-HCH	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Heptachlor	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Aldrin	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Heptachlor expoxide	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
trans-Chlordane	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
alpha cis-Chlordane	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
p,p-DDE	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Dieldrin	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Endrin	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
p,p-DDD	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Endosulfan II	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Endrin aldehyde	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
p,p-DDT	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Endosulphan sulphate	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Methoxychlor	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
Endrin ketone	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	< 10
OrganoPhosphorus Pesticides									
Acephate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Aziniphos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Chlorpyrifos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Demeton-s-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Dichlorvos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Dimethoate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Ethion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Malathion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Mathidathion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Methamidophos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Omethoate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Pirimifos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Profenofos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Pyrazophos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Tokuthion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100
Tolclofos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	< 100



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Results Summary

Report No.: 15-01073

Report Ref: 15-01676

ELAB Reference	19705	19706	19707	19708	19709	19710			
Customer Reference									
Sample ID									
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL			
Sample Location	WS10	WS10	DS	HA1	HA1	HA2			
Sample Depth (m)	GL	0.50	GL	0.10	0.80	0.30			
Sampling Date	11/03/2015	11/03/2015	11/03/2015	11/03/2015	11/03/2015	11/03/2015			
Determinand	Codes	Units	LOD						
Metals									
Arsenic	M	mg/kg	1	48.4	10.4	3.8	10.8	n/t	n/t
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	n/t	n/t
Chromium	M	mg/kg	5	38.7	24.4	5.1	23.6	n/t	n/t
Copper	M	mg/kg	5	91.3	25.7	5.7	17.9	n/t	n/t
Lead	M	mg/kg	5	25.9	31.1	6.9	49.1	n/t	n/t
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	n/t	n/t
Nickel	M	mg/kg	5	12.5	17.1	< 5.0	16.4	n/t	n/t
Selenium	M	mg/kg	1	1.1	1.1	< 1.0	< 1.0	n/t	n/t
Zinc	M	mg/kg	45	211	60.5	< 45.0	91.0	n/t	n/t
Inorganics									
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	n/t	n/t
Water Soluble Boron	N	mg/kg	0.5	2.1	0.6	< 0.5	0.6	n/t	n/t
Miscellaneous									
pH	M	units	0.1	8.0	7.3	8.2	6.8	n/t	n/t
Soil Organic Matter	U	%	0.1	6.2	2.2	3.8	2.1	n/t	n/t



Results Summary

Report No.: 15-01073

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ELAB Reference	19705	19706	19707	19708	19709	19710
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS10	WS10	DS	HA1	HA1	HA2
Sample Depth (m)	GL	0.50	GL	0.10	0.80	0.30
Sampling Date	11/03/2015	11/03/2015	11/03/2015	11/03/2015	11/03/2015	11/03/2015
Determinand	Codes	Units	LOD			
Organics						
>C8-C10 BCB	N	mg/kg	1	n/t	n/t	n/t
>C10-C12 BCB	N	mg/kg	1	n/t	n/t	n/t
>C12-C16 BCB	N	mg/kg	1	n/t	n/t	n/t
>C16-C21 BCB	N	mg/kg	1	n/t	n/t	n/t
>C21-C35 BCB	N	mg/kg	1	n/t	n/t	n/t
>C35-C40 BCB	N	mg/kg	1	n/t	n/t	n/t
Total (>C8-C40) BCB	N	mg/kg	1	n/t	n/t	n/t
Polyaromatic hydrocarbons						
Naphthalene GCMS	N	mg/kg	0.01	0.16	< 0.01	< 0.01
Acenaphthylene GCMS	N	mg/kg	0.01	0.01	< 0.01	< 0.01
Acenaphthene GCMS	N	mg/kg	0.01	0.01	< 0.01	< 0.01
Fluorene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Phenanthrene GCMS	N	mg/kg	0.01	0.04	0.02	0.01
Anthracene GCMS	N	mg/kg	0.01	0.02	< 0.01	< 0.01
Fluoranthene GCMS	N	mg/kg	0.01	0.10	0.04	0.02
Pyrene GCMS	N	mg/kg	0.01	0.09	0.03	0.02
Benzo (a) anthracene GCMS	N	mg/kg	0.01	0.02	0.01	< 0.01
Chrysene GCMS	N	mg/kg	0.01	0.03	0.02	< 0.01
Benzo (b) fluoranthene GCMS	N	mg/kg	0.01	0.03	0.05	< 0.01
Benzo (k) fluoranthene GCMS	N	mg/kg	0.01	0.02	0.03	< 0.01
Benzo (a) pyrene GCMS	N	mg/kg	0.01	0.01	0.02	< 0.01
Indeno (1,2,3-cd) pyrene GCMS	N	mg/kg	0.01	< 0.01	0.01	< 0.01
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene GCMS	N	mg/kg	0.01	< 0.01	0.01	0.02
Total PAH(16) GCMS	N	mg/kg	0.04	0.56	0.25	0.12



Results Summary

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Report No.: 15-01073

ELAB Reference	19705	19706	19707	19708	19709	19710
Customer Reference						
Sample ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS10	WS10	DS	HA1	HA1	HA2
Sample Depth (m)	GL	0.50	GL	0.10	0.80	0.30
Sampling Date	11/03/2015	11/03/2015	11/03/2015	11/03/2015	11/03/2015	11/03/2015

Determinand	Codes	Units	LOD						
OrganoChlorine Pesticides									
alpha-HCH	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
beta_HCH	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
gamma-HCH	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
delta-HCH	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Heptachlor	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Aldrin	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Heptachlor expoxide	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
trans-Chlordane	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
alpha cis-Chlordane	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
p,p-DDE	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Dieldrin	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Endrin	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
p,p-DDD	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Endosulfan II	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Endrin aldehyde	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
p,p-DDT	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Endosulphan sulphate	M	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Methoxychlor	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
Endrin ketone	N	ug/kg	10	n/t	n/t	n/t	n/t	n/t	n/t
OrganoPhosphorus Pesticides									
Acephate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Azinphos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Chlorpyrifos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Demeton-s-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Dichlorvos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Dimethoate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Ethion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Malathion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Mathidathion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Methamidophos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Omethoate	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Pirimifos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Profenofos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Pyrazophos	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Tokuthion	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t
Tolclofos-methyl	N	ug/kg	100	n/t	n/t	n/t	n/t	n/t	n/t



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Results Summary

Report No.: 15-01073

ELAB Reference	19711
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	HA2
Sample Depth (m)	0.90
Sampling Date	11/03/2015

Determinand	Codes	Units	LOD	
Metals				
Arsenic	M	mg/kg	1	n/t
Cadmium	M	mg/kg	0.5	n/t
Chromium	M	mg/kg	5	n/t
Copper	M	mg/kg	5	n/t
Lead	M	mg/kg	5	n/t
Mercury	M	mg/kg	0.5	n/t
Nickel	M	mg/kg	5	n/t
Selenium	M	mg/kg	1	n/t
Zinc	M	mg/kg	45	n/t
Inorganics				
Hexavalent Chromium	N	mg/kg	0.8	n/t
Water Soluble Boron	N	mg/kg	0.5	n/t
Miscellaneous				
pH	M	units	0.1	n/t
Soil Organic Matter	U	%	0.1	n/t



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Results Summary

Report No.: 15-01073

ELAB Reference	19711
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	HA2
Sample Depth (m)	0.90
Sampling Date	11/03/2015

Determinand	Codes	Units	LOD	
Organics				
>C8-C10 BCB	N	mg/kg	1	< 1.0
>C10-C12 BCB	N	mg/kg	1	< 1.0
>C12-C16 BCB	N	mg/kg	1	< 1.0
>C16-C21 BCB	N	mg/kg	1	< 1.0
>C21-C35 BCB	N	mg/kg	1	< 1.0
>C35-C40 BCB	N	mg/kg	1	< 1.0
Total (>C8-C40) BCB	N	mg/kg	1	< 1.0
Polyaromatic hydrocarbons				
Naphthalene GCMS	N	mg/kg	0.01	n/t
Acenaphthylene GCMS	N	mg/kg	0.01	n/t
Acenaphthene GCMS	N	mg/kg	0.01	n/t
Fluorene GCMS	N	mg/kg	0.01	n/t
Phenanthrene GCMS	N	mg/kg	0.01	n/t
Anthracene GCMS	N	mg/kg	0.01	n/t
Fluoranthene GCMS	N	mg/kg	0.01	n/t
Pyrene GCMS	N	mg/kg	0.01	n/t
Benzo (a) anthracene GCMS	N	mg/kg	0.01	n/t
Chrysene GCMS	N	mg/kg	0.01	n/t
Benzo (b) fluoranthene GCMS	N	mg/kg	0.01	n/t
Benzo (k) fluoranthene GCMS	N	mg/kg	0.01	n/t
Benzo (a) pyrene GCMS	N	mg/kg	0.01	n/t
Indeno (1,2,3-cd) pyrene GCMS	N	mg/kg	0.01	n/t
Dibenzo(a,h)anthracene GCMS	N	mg/kg	0.01	n/t
Benzo(ghi)perylene GCMS	N	mg/kg	0.01	n/t
Total PAH(16) GCMS	N	mg/kg	0.04	n/t



Results Summary

Report No.: 15-01073

2683

ELAB Reference	19711
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	HA2
Sample Depth (m)	0.90
Sampling Date	11/03/2015

Determinand	Codes	Units	LOD	
OrganoChlorine Pesticides				
alpha-HCH	M	ug/kg	10	n/t
beta_HCH	M	ug/kg	10	n/t
gamma-HCH	M	ug/kg	10	n/t
delta-HCH	N	ug/kg	10	n/t
Heptachlor	N	ug/kg	10	n/t
Aldrin	M	ug/kg	10	n/t
Heptachlor expoxide	N	ug/kg	10	n/t
trans-Chlordane	N	ug/kg	10	n/t
alpha cis-Chlordane	N	ug/kg	10	n/t
p,p-DDE	M	ug/kg	10	n/t
Dieldrin	M	ug/kg	10	n/t
Endrin	N	ug/kg	10	n/t
p,p-DDD	M	ug/kg	10	n/t
Endosulfan II	N	ug/kg	10	n/t
Endrin aldehyde	N	ug/kg	10	n/t
p,p-DDT	M	ug/kg	10	n/t
Endosulphan sulphate	M	ug/kg	10	n/t
Methoxychlor	N	ug/kg	10	n/t
Endrin ketone	N	ug/kg	10	n/t
OrganoPhosphorus Pesticides				
Acephate	N	ug/kg	100	n/t
Azinphos-methyl	N	ug/kg	100	n/t
Chlorpyrifos	N	ug/kg	100	n/t
Demeton-s-methyl	N	ug/kg	100	n/t
Dichlorvos	N	ug/kg	100	n/t
Dimethoate	N	ug/kg	100	n/t
Ethion	N	ug/kg	100	n/t
Malathion	N	ug/kg	100	n/t
Mathidathion	N	ug/kg	100	n/t
Methamidophos	N	ug/kg	100	n/t
Omethoate	N	ug/kg	100	n/t
Pirimifos-methyl	N	ug/kg	100	n/t
Profenofos	N	ug/kg	100	n/t
Pyrazophos	N	ug/kg	100	n/t
Tokuthion	N	ug/kg	100	n/t
Tolclofos-methyl	N	ug/kg	100	n/t



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Results Summary

Report No.: 15-01073

ELAB Reference	19704
Customer Reference	
Sample ID	
Sample Type	SOIL
Sample Location	WS8
Sample Depth (m)	0.10
Sampling Date	11/03/2015

Determinand	Codes	Units	LOD	
SVOC				
Acid herbicides	N	mg/kg	0.01	< 0.01



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Results Summary

Report No.: 15-01073

Asbestos Qualitative Results

Analytical result only applies to the sample as submitted by the client. Any comments, opinions or interpretations (marked #) L in this report are outside UKAS accreditation (Accreditation No2683). They are subjective comments only which must be verified by the client.

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Result
19699	0.10	WS1	Sandy loam	No asbestos detected
19704	0.10	WS8	Silty loam	No asbestos detected
19707	GL	DS	Sandy silty loam	No asbestos detected

Method Summary

Report No.: 15-01073

Parameter	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil				
Polyaromatic hydrocarbons (GC-MS)	As submitted sample	18/03/2015		GC-MS
Hexavalent chromium	As submitted sample	19/03/2015	110	Colorimetry
pH	Air dried sample	20/03/2015	113	Electromeric
Aqua regia extractable metals	Air dried sample	19/03/2015	118	ICPMS
SVOC in solids	As submitted sample	18/03/2015	167	GC-MS
Organochlorine Pesticides in solids	As submitted sample	18/03/2015	173	GC-MS
Organophosphorus Pesticides in solids	As submitted sample	18/03/2015	173	GC-MS
Water soluble boron	Air dried sample	19/03/2015	202	Colorimetry
Basic carbon banding in soil	As submitted sample	18/03/2015	218	GC-FID
Soil organic matter	Air dried sample	19/03/2015	BS1377:P3	Titrimetry
Asbestos identification	As submitted sample	19/03/2015	PMAN	Microscopy



Report Information

Report No.: 15-01073

Key

U	hold UKAS accreditation
M	hold MCERTS and UKAS accreditation
N	do not currently hold UKAS accreditation
^	MCERTS accreditation not applicable for sample matrix
*	UKAS accreditation not applicable for sample matrix
S	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
I/S	Insufficient Sample
U/S	Unsuitable sample
n/t	Not tested
<	means "less than"
>	means "greater than"

Soil sample results are expressed on an air dried basis

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Deviation Codes

-
- | | |
|---|--|
| a | No date of sampling supplied |
| b | No time of sampling supplied (Waters Only) |
| c | Sample not received in appropriate containers |
| d | Sample not received in cooled condition |
| e | The container has been incorrectly filled |
| f | Sample age exceeds stability time (sampling to receipt) |
| g | Sample age exceeds stability time (sampling to analysis) |

Where a sample has a deviation code, the applicable test result may be invalid.

Sample Retention and Disposal

All soil samples will be retained for a period of one month

All water samples will be retained for 7 days following the date of the test report

Charges may apply to extended sample storage

APPENDIX D

Guidance on Comparing Soil Contamination Data with a Critical Concentration
Statistical Analysis Summary Sheets

ASHDOWN SITE INVESTIGATION LIMITED

Notes on the “Guidance on Comparing Soil Contamination Data with a Critical Concentration” (CIEH & CL: AIRE, May 2008)

The Chartered Institute of Environmental Health & CL:AIRE, have published updated guidance on the statistical assessment of contaminated land data, “*Guidance on Comparing Soil Contamination Data with a Critical Concentration*” (May 2008). This is an update to previous guidance published within Contaminated Land Report CLR7 (Defra, 2002).

The CIEH/CL:AIRE guidance forms part of a package of proposed improved UK guidance highlighted in the Defra discussion paper, “*Assessing risks from land contamination –a proportionate approach. Soil guideline values: The Way Forward (CLAN 06/2006)*”. This discussion paper discussed the role and use of SGVs for managing the risks associated with soil contamination.

The guidance states that its overall aim is to “increase understanding amongst stakeholders of the role that statistics can play in quantifying the uncertainty attached to estimates of the mean concentration of contaminants in soil, thereby creating a more informed basis for regulatory decision-making”.

The initial question, on which the guidance is based, is whether the Site under consideration is to be assessed under the Planning System or under Part 2A of the Environmental Protection Act 1990. The key questions asked when considering contaminant concentrations vary depending on the scenario under consideration. The key questions will generally be:

- **Planning Scenario** – “can we confidently say that the level of contamination on this land is low relative to some appropriate measure of risk?” or “that the level of contamination is lower than the critical concentration” (alternative hypothesis).
- **Part 2A Scenario** – “can we confidently say that the level of contamination on this land is high relative to some appropriate measure of risk?” or “that the level of contamination is higher than the critical concentration” (alternative hypothesis).

Within the guidance, to ‘answer’ the relevant question above, a null hypothesis has been outlined for each scenario, which, if rejected with a high degree of confidence, means that the alternative hypothesis can be accepted. The null hypothesis for a planning scenario is that the soils contain levels of contamination above the critical concentration (i.e. the soils are assumed to be unsuitable for use until proven otherwise). Under the Part 2A scenario, the null hypothesis is that the soils contain levels of contamination below the critical concentration (i.e. the land is assumed not to fall within Part 2A legislation until proved otherwise).

For the planning scenario the null hypothesis may be rejected if it is considered that the 95th percentile of the normally distributed population as a whole lies below the critical concentration i.e. there is a 95% probability that your true population mean lies below the critical concentration. A lower probability of the true mean lying below the critical concentration may be used, but deviation from the standard 95% requires justification.

For the Part 2A scenario the null hypothesis may be rejected if it can be shown that the lower 95th percentile lies above the critical concentration. If the lower 95th percentile lies below the critical concentration but the true population mean lies above the critical concentration further assessment should be undertaken before the Site can be classified under Part 2A.

Guidance on the treatment of outliers (results that are not representative of a sample population), is also provided in the report. The guidance confirms that outliers should only be excluded from the dataset where they are either demonstrably the result of an error that can be identified and explained, or clearly indicate that more than one soil population exists within the dataset.

Where an individual result is recognised as a ‘statistical outlier’ or ‘contamination hot-spot’ within the data set (and where the critical concentration for that contaminant is exceeded), remediation work and or further investigation may be required.

Client/enrol ref:
Project ref: LW26073
Site ref: Manor Nursery
Data description: Made Ground and Topsoil
Contaminant(s): Arsenic, Cadmium,
Chromium, Lead, Mercury, Nickel, Copper,
Zinc, Selenium, Boron
Test scenario: Planning
Date: 8 April 2019

	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Zinc (mg/kg)	Hexavalent Chromium (mg/kg)	Water Soluble Boron (mg/kg)
Critical concentration, C _c	37	11	910	2400	200	40	180	250	3700	6	290
Notes	S4UL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce	C4SL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce	S4UL Residential with Homegrown Produce
Sample size, n	8	8	8	8	8	8	8	8	8	8	8
Sample mean, $\bar{x}$	7.8375	0.29375	17.95	16.5375	31.7625	0.25	14.55	0.575	76.2	0.4	0.475
Standard deviation, s	3.16856773	0.12374369	7.86801845	8.55852749	14.8262256	0	7.91508506	0.21213203	67.6086216	5.9344E-17	0.29880715
Number of non-detects	0	7	0	1	0	6	1	7	2	8	4
Self non-detect values to	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	No	Yes	No	No	No	No	No	Yes	Yes	No	Yes
Distribution	Normal	Non-normal	Normal	Normal	Normal	Single value	Normal	Non-normal	Non-normal	Non-normal	Non-normal
Statistical approach	Auto: One-sample t; Auto: Chebyshev	Auto: One-sample t; Auto: Chebyshev	Auto: One-sample t; Auto: One-sample t; Auto: One-sample t; Auto: One-sample t; Auto: One-sample t; Auto: Chebyshev	Auto: One-sample t; Auto: Chebyshev	Auto: One-sample t; Auto: Chebyshev	Auto: One-sample t; Auto: Chebyshev	Auto: One-sample t; Auto: Chebyshev	Auto: Chebyshev	Auto: Chebyshev	Auto: Chebyshev	Auto: Chebyshev

Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)?				Evidence level required		95%	Use Normal distribution to test for outliers			
Statistical test(s)	26.03195298	244.7142857	320.6777454	787.6880679	32.09498645	N/A	59.12296135	3325.666667	-151.6027686	2.66905E+17	-2740.564799
Upper confidence limit on true population value, μ	9.95991658	0.48445183	23.2202717	22.2702986	41.6936202	0.25	19.8517985	0.90191742	180.391883	0.4	0.93549275
Evidence level	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Base decision rule	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$

Client/client ref:
 Project ref: LW26073
 Site ref: Manor Nursery
 Data description: Made ground and topsoil
 Contaminant(s): Naphthalene,
 Acenaphthylene, Acenaphthene, Fluorene,
 Phenanthrene, Anthracene, Fluoranthene,
 Pyrene, Benz(a)anthracene, Chrysene,
 Benzo(b)fluoranthene, Benzo(k)fluoranthene

	Naphthalene (mg/kg)	Acenaphthylene (mg/kg)	Acenaphthene (mg/kg)	Fluorene (mg/kg)	Phenanthrene (mg/kg)	Anthracene (mg/kg)	Fluoranthene (mg/kg)	Pyrene (mg/kg)
Critical concentration, C_c	2.3	170	210	170	95	2400	280	620
Notes	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)
Sample size, n	8	8	8	8	8	8	8	8
Sample mean, $\bar{x}$	0.0075	0.0125	0.006875	0.005	0.059375	0.020625	0.215	0.19625
Standard deviation, s	0.00534522	0.01224745	0.0053033	0	0.05199159	0.01916796	0.18079191	0.17492345
Number of non-detects	6	4	7	8	1	3	0	0
Get non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	Yes	Yes	Yes	No	Yes	No	No	No
Distribution	Non-normal	Non-normal	Non-normal	Single value	Normal	Non-normal	Normal	Normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t	Auto: Chebychev	Auto: One-sample t	Auto: One-sample t

Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)?				Evidence level required:		95%	Use Normal distribution
t statistic, t₀ (or k₀)	1213.076976	39256.93155	111996.3333	N/A	5164.92495	-354141.3141	-4377.13993	-10021.92509
Upper confidence limit (on true mean concentration, μ)	0.01573754	0.03137459	0.01504794	0.005	0.09420077	0.05016481	0.33610069	0.3134198
Evidence level	100%	100%	100%	100%	100%	100%	100%	100%
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$

Client/client ref:
 Project ref: LW26073
 Site ref: Manor Nursery
 Data description: Made ground and topsoil
 Contaminant(s): Naphthalene,
 Acenaphthylene, Acenaphthene, Fluorene,
 Phenanthrene, Anthracene, Fluoranthene,
 Pyrene, Benz(a)anthracene, Chrysene,
 Benzo(b)fluoranthene, Benzo(k)fluoranthene

	Benz(a)anthracene (mg/kg)	Chrysene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Benzo(a)pyrene (mg/kg)	Indeno(123-cd)pyrene (mg/kg)	Dibenz(ah)anthracene (mg/kg)	Benzo(ghi)perylene (mg/kg)
Critical concentration, C_c	7.2	15	2.6	77	2.2	27	0.24	320
Notes	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)	S4UL Residential With Homegrown Produce (1% SOM)
Sample size, n	8	8	8	8	8	8	8	8
Sample mean, $\bar{x}$	0.116875	0.13	0.14875	0.143125	0.16625	0.095	0.03	0.18
Standard deviation, s	0.12886697	0.13617216	0.14035033	0.15424789	0.18220377	0.10528872	0.03412163	0.16894631
Number of non-detects	1	0	0	1	0	0	2	0
Get non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Outliers?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Distribution	Normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Normal
Statistical approach	Auto: One-sample t	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: One-sample t

Test scenario:	Don't test for outliers ▼							
t statistic, t₀ (or k₀)	155.463441	308.8642448	49.39911533	1409.316354	31.57077169	722.7633951	17.40742384	5354.290008
Upper confidence limit (on true mean concentration, μ)	0.20319457	0.33985539	0.36504438	0.38083696	0.44704487	0.25726081	0.08258497	0.2931661
Evidence level	100%	100%	100%	100%	100%	100%	100%	100%
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$

APPENDIX E

Classification of Probability, Consequence and Risk

LW26073

Probability of risk being realised	
Classification	Definition
High	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Moderate	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Very Low	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Consequence of risk being realised		
Classification	Category	Definition
Severe	Human Health	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA.
	Controlled Waters	Short term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource.
	Property	Catastrophic damage to buildings/property.
	Ecological Systems	A short term risk to a particular ecosystem or organisation forming part of such ecosystem.
Moderate	Human Health	Chronic damage to Human Health.
	Controlled Waters	Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution).
	Ecological System	A significant change in a particular ecosystem or organism forming part of such ecosystem.
Minor	Controlled Waters	Pollution of non-sensitive water resources.
	Property	Significant damage to crops, buildings, structures and services.
	Ecological Systems	Damage to sensitive buildings/structures/services or the environment.
Very Minor	Human Health	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing, etc).
	Property	Easily repairable effects of damage to buildings, structures and services.
	Project	Harm, although not necessarily significant harm, which may result in a financial loss or expenditure to resolve.

Risk classification definitions	
Very High	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the long term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but there is a low likelihood of this hazard occurring and if realised, harm would at worst normally be mild.
Very Low	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised, it is not likely to be severe.