PHASE I AND II GEO-ENVIRONMENTAL ASSESSMENT

PICADOR VAUXHALL, 95-101 BOURNEMOUTH ROAD, CHANDLER'S FORD, EASTLEIGH

REC REFERENCE: 1CO103133/P2R0

REPORT PREPARED FOR: GIBSON SURVEYORS LTD

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QUALITY ASSURANCE

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EXECUTIVE SUMMARY

Site Address	Picador Vauxhall, 95-101 Bournemouth Road, Chandler's Ford, Eastleigh, SO53 3AQ.	
Grid Reference	443099, 119752.	
Site Area	0.45 ha.	
Current Site Use	Details of site walkover indicate the site was an inverted L-shaped, generally flat, covered by hardstanding and located on the edge of Bournemouth Road and Leigh Road Junction. The site comprised a car showroom to the south, an operational petrol filling station with high roofed forecourt in the middle, sales office to the north and maintenance workshop/valet shop to the northeast. Car showroom comprised a heptagonal shaped single storey building surrounded by new cars on display. The petrol filling station comprised a high roofed forecourt with pump islands and vapour venting pipes suggestive of underground storage tanks. Sales office, maintenance workshop and valet shop are adjoining buildings surrounded by customers and new cars on display. Access through the site is off Bournemouth Road into the petrol filling station forecourt area and leading to the valet shop on the northeast corner. Site boundaries include Leigh Road, Bournemouth Road and brick walls.	
Proposed Use	The proposed development comprises extension of existing car showroom and sales office buildings with the demolition of the existing petrol filling station.	
Site Investigation Findings	**Made Ground**	Made Ground was encountered within all exploratory holes and typically comprised asphalt or concrete over soft dark grey to light brown occasionally black or orangeish or multicoloured clayey slightly sandy GRAVEL with low cobble content and occasional plant roots and rootlets. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse flint, brick, granite, concrete, black combustion material, asphalt, slate and rare lead-sheet. Cobbles are angular to subrounded flints, bricks, and concretes. A maximum thickness of 0.95m bgl was encountered within WS102.
	River Terrace Deposits	River Terrace Deposits was encountered in all exploratory holes and typically comprised firm to stiff light brown to orangeish brown gravelly CLAY overlying alternating medium dense bluish grey to yellowish brown slightly gravelly laminated CLAY and SAND. Sand is fine to medium. Gravel is subangular to rounded, fine to coarse flint with occasional subrounded flint cobbles. A maximum thickness of 4.10m was encountered within WS101 only.
	Wittering Formation	Wittering Formation was marginally encountered only within WS102 and comprised stiff dark grey to blueish grey laminated slightly sandy CLAY. Sand is fine to medium. A thickness of 0.20m was encountered within WS102.
	Groundwater	Groundwater strikes were observed within WS101 and WS102 during intrusive ground investigation at depths of 4.00m bgl and 3.50m bgl respectively. During return monitoring visits, the level of groundwater within the installations indicated levels ranging from 2.57 to 2.80m bgl (WS101) and 2.30 to 2.59m bgl (WS102).

Site History	Summarily, the earliest maps show the site is labelled Hambledon Cottage with building footprints on the southwest corner. The site is shown to be a combination of residential dwellings on 1931 map and on 1950 map edition labelled a shelter. Between 1950 and 1954, a Builder's Yard and Garage are shown on the northeast corner and near the centre of the site respectively. The site assumed its current building layout between 1988 and 1991. Over the years, the surrounding area continued to witness mainly residential developments with an industrial estate to the northwest of the site.
Ground Gases	Based on the gas monitoring undertaken, the site maximum site hazardous gas flow rate is recorded to be <0.0029 L/h, which is the worst case for both methane and carbon dioxide. A maximum site hazardous gas flow rate of <0.0029 L/h lies well within the range of GSV values for CS1. As such, the gas regime for the site can be classified as Characteristic Situation 1 (CS1) based on the limited monitoring visits undertaken. It is therefore considered that no gas protection measures are required to be installed within the proposed development, based on the available data. However, given the presence of hydrocarbons, it is deemed appropriate to install hydrocarbon resistant membranes to mitigate the vapour risk.
Radon	BRE211 Radon: Guidance on protective measures for new buildings (2007 Edition) indicates that the site lies within an area where less than 1% of properties are above the action level and thus no radon protective measures are deemed necessary.
Coal Mining / Land Stability	The site lies outside the influencing distance of any historic or current coal mining. However, there are 8no. records of historic ground working within 250m radius with the closest located 239m northwest. There are 5no. records of current ground workings related to clay and shale extraction from Chandler's Ford Brick Works and Marlbrook Brick Yard. Also, there is a moderate risk of shrink/swell for clay bearing stratum within the site.
Revised Conceptual Site Model (CSM)	Although, the Tier II Generic Quantitative Risk Assessment did not identify any exceedances within the tested soil samples, a fragment of asbestos containing material obtained from HP101 has indicated the presence of Chrysotile asbestos fibres. The extent of the distribution of ACM fragments is currently not known and given the historical development of the site its presence elsewhere cannot be ruled out. In addition to the above, excavating through soils containing ACM fragments may break fragments and release asbestos fibres into the air, creating a significant health risk to nearby personnel. Should ACM fragments be encountered during excavation, all work should stop immediately and REC should be contacted to determine the most appropriate remedial methodology and preventative measures. All open excavations which contain suspected asbestos fragments should be damped down and covered with plastic sheeting until a methodology has been determined. Groundwater samples obtained from WS101 and WS102 monitoring wells have identified elevated concentrations of TPHs, PAHs, VOCs and SVOCs. The types and nature of these elevated concentration suggests a likely hydrocarbon contamination of controlled waters beneath the site. Based on the proposed development plan and with respect to human health risk, WS101 is located within the proposed extension to the rear of the existing car showroom and as a result, the pathway between source and receptor would be broken by the building footprint, hence no potential risk to human health is

	anticipated. However, WS102 is located adjacent to the operational petrol filling station and as such it is recommended that areas within the petrol filling station is further investigated to delineate the depth and lateral extent of the identified contamination in view of any planned future use. Based on the identified exceedences stated above, there exists some residual risks with regards to human health and controlled waters. The site is underlain by superficial and bedrock Secondary 'A' Aquifers, highly permeable strata and strata with high leaching potential.
Preliminary Geotechnical Assessment	**Foundation Conditions and Bearing Capacity** Made Ground is not considered a suitable founding material due to the inherent variability of the material which may give rise to unpredictable total and differential settlements. During intrusive investigation, Made Ground was encountered at various depths ranging from ground level to 0.95m bgl. It is therefore recommended that foundations pass through this stratum and bear onto the underlying River Terrace Deposits. Based on SPT tests and assuming an average corrected 'N'-value of 15, an indicative allowable bearing pressure of 150kN/m^2 could be considered for the proposed development. This is based on limiting total settlements to 25mm, a factor of safety of 3 and a minimum founding depth of 1.5mbgl within the natural soils, and a strip foundation approximately 0.60m in width. Given the groundwater monitoring records stated above, it is highly unlikely that the foundation will be affected by the groundwater and as such no provision has been made for this. All foundations should be designed by suitably qualified structural engineers. **Pavements and Construction** The underlying River Terrace Deposits gives an indicative of a design CBR value of 20% based on predominantly coarse grained soils.
Recommendations and Conclusions	▶ Although, the Tier II Generic Quantitative Risk Assessment did not identify any exceedances within the tested soil samples, a fragment of asbestos containing material obtained from HP101 has indicated the presence of Chrysotile asbestos fibres. The extent of the distribution of ACM fragments is currently not known and given the historical development of the site its presence elsewhere cannot be ruled out. As such we would recommend that a watching brief is carried out by ground workers during excavation works to identify any additional fragments and appropriate mitigation measures put in place; ▶ Analysis of elevated concentrations and type of contaminants suggests a likely hydrocarbon contamination within controlled waters beneath the site. Given the location of WS101 which lies beneath the proposed development footprint to the rear of the car showroom, it is considered that the pathway would be broken by the footprint and no potential risk to human health is anticipated. With regards to controlled waters (Secondary 'A' Aquifers), there exists some residual risks based on the fact that the site is underlain by Secondary 'A' Aquifers, strata beneath the site are highly permeable with high leaching potential and the potential source of contamination (Petrol filling station) still exists. We note however that the intrusive construction work will only be where

	the exploratory holes were located and outside of the main existing petrol station so the Local Authority will ultimately decide the scope of any additional works. However, in our opinion this is likely to comprise positioning additional window sample holes around the existing tanks and on a general grid system across the forecourt area with supplementary analytical testing undertaken in order to further assess the risk; and ▶ For any future intrusive ground investigation works, it is recommended that a detailed utilities plan on the site is obtained in view of the high risk associated with intrusive investigation works within petrol filling stations. This will assist with design of future intrusive investigation and aid with risk assessment of any potential contamination therein. The above recommendations will need to be confirmed with the Local Authority prior to design.

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Appendix II Glossary

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Drawing No 1CO103133-001 – Site Location Plan

Drawing No 1CO103133-002 – Proposed Development Plan

Drawing No 1CO103133-003 – Exploratory Hole Location Plan

Drawing No 1CO103133-004 – Exploratory Hole Location Plan with Contamination

Appendix IV REC Exploratory Hole Logs

Appendix V Chemical Testing Results

Appendix VI Geotechnical Testing results

1. INTRODUCTION

1.1 Background

Resource and Environmental Consultants Ltd (REC) was commissioned by Gibson Surveyors Ltd ('the Client') to undertake a Phase I and II Geo-Environmental Assessment at Picador Vauxhall, 95-101 Bournemouth Road, Chandler's Ford, Eastleigh, SO53 3AQ. A site location plan (ref. 1CO103133-001) is presented within Appendix III.

The purpose of this report is to provide geo-environmental information with respect to the proposed extension of existing car showroom/sales office and to provide an assessment of potential contamination and geotechnical aspects relating to the scheme.

1.2 Proposed Development

REC has been provided a preliminary layout plan showing the proposed development to comprise extension of existing car showroom and sales office buildings with the demolition of the existing petrol filling station. A proposed site development plan (ref. 1CO103133-002) is presented within Appendix III.

1.3 Scope of Works

The objectives of the Geo-Environmental Assessment are to:

- Undertake a site walkover survey to evaluate the current condition of the site with respect to current and historic land uses and identify any current areas of potential environmental concern;
- Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Phase 1 Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));
- Undertake a preliminary stage of intrusive works including sampling and analysis to provide an overview of environmental issues identified;
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
- Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and,
- Provide recommendations regarding future works, if required.

1.4 Sources of Information

Background information was sought from the following sources:

- GroundSure data search: GS-3743484 & GS-3743485;

- Historical mapping dated 1868 to 2014;
- Online planning records held by Eastleigh Borough Council;
- Environment Agency Groundwater Vulnerability Map
- (http://maps.environment-agency.gov.uk/wiyby);
- HPA Indicative Atlas of Radon in England and Wales (HPA-RPD-033:2007);
- Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007); and
- British Geological Survey Online Mapping (http://www.bgs.ac.uk)

1.5 Risk Classification

REC has utilised the available data to classify the site on the basis of its likely contaminated land liability and potential for geotechnical constraints in relation to the property development. The risk classification definitions are summarised below:

Risk	Definition
Low	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property.
Low-Moderate	There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property with regard to the proposed use. However, minor issues may require further consideration in the event of a future redevelopment of the site etc.
Moderate	Some potential contaminated land liabilities/geotechnical constraints are likely to affect the property as a result of historical and/or current activities. The risks identified are unlikely to pose an immediate significant issue but the purchaser/developer may wish to make further enquiries of the vendor or undertake further environmental improvements. Redevelopment of the site will likely require further site investigation.
Moderate-High	Some potentially significant contaminated land liabilities/geotechnical constraints have been identified at the property that requires further assessment including intrusive ground investigations.
High	Significant potential contaminated land liabilities/geotechnical constraints have been identified at the property. Further assessment including intrusive ground investigation will be required to determine to level of risk and associated liability.

1.6 Limitations

The limitations of this report are presented in Appendix I.

No intrusive construction works are currently planned for the existing current petrol filling station area and as such these initial intrusive works were undertaken in more pertinent areas given the client's objectives with regards to the development.

As such, the investigation works completed to date are preliminary and may require supplementing depending on the view of the regulator and the final development plans.

1.7 Confidentiality

REC has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC. A charge may be levied against such approval.

2. SITE SETTING

2.1 Site Details

Site Address	Picador Vauxhall, 95-101 Bournemouth Road, Chandler's Ford, Eastleigh, SO53 3AQ.
National Grid Reference	443099, 119752
Site Area	0.45 ha

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location plan (Ref. 1CO103133-001) is presented in Appendix III.

2.2 Current Site Use

2.2.1 Site Description

A site walkover was undertaken by an REC representative on 17th February 2017 with details provided below:

The site was an inverted 'L' in shape, generally flat, predominantly covered with hardstanding and located on the edge of Bournemouth Road and Leigh Road Junction. The site comprised a car showroom to the south, an operational petrol filling station in the middle and adjoining sales office, maintenance workshop and valet shop to the north and northeast of the site. The car showroom was noted to be a heptagonal shaped single storey building surrounded by new cars on display. The petrol filling station had a high roofed forecourt area with petrol pump islands and vapour venting pipes suggesting underground storage tanks. Sales office, maintenance workshop and valet shop adjoining buildings were surrounded by customers and new cars on display.

Site primary vehicular access was noted off Bournemouth Road into the petrol filling station forecourt, sales office and car showroom. There was another access off Bournemouth Road leading to the valet shop on the northeast corner of the site. There was no restriction to pedestrian access to site along the south and west.

The site boundaries include Leigh Road (A335) to the south, Bournemouth Road (B3043) to the west and brick walls to the north and east.

2.3.2 Hazardous Materials Storage

Two above ground oil storage tanks were observed adjacent to the maintenance workshop. A number of diesel and petrol fuel storage tanks are known to be situated on the site.

2.3.3 Polychlorinated Biphenyls (PCBs)

No electricity substations were observed during the site walkover.

2.3.4 Asbestos Containing Materials (ACMs)

No potential ACMs were observed at the site, however buildings on northeast corner are likely to contain asbestos and a full asbestos survey should be carried out prior to any demolition or modification.

2.3.5 Waste Storage

During the site walkover, no potentially hazardous waste streams were identified or generated at the site.

2.3 Surrounding Area

The surrounding land uses are summarised below:

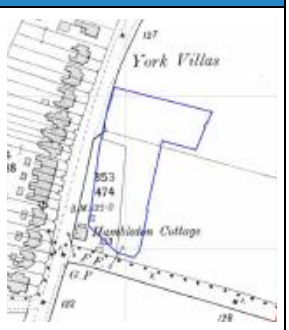
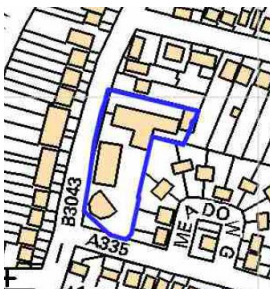
Direction	Land Use
North	Children's nursery with residential dwellings beyond.
East	Residential dwellings.
South	Leigh Road (A335) with residential dwellings beyond.
West	Bournemouth Road (B3043) with residential dwelling beyond.

3. SITE HISTORY

3.1 On-Site Historical Development

A review of historical mapping pertinent to the site is summarised in Table 3.1 below:

Table 3.1 Summary of Historical Land Uses

Dates	Historical Land Use	Historical Map Image
1868 - 1909 (1:10,560 & 1:2,500)	▶ The site is shown as an undeveloped open field with a number of buildings on the southwest corner labelled Hambledon Cottage. ▶ In the surrounding area, a junction of two unnamed roads are shown adjacent to the west and south boundaries. Other features in the area includes Marlbrook Brick Yard 280m southwest, old clay pit 270m northwest, South Hants Water Works Co. pumping station 90m southwest, ponds and new residential developments beyond the road adjacent to the west boundary.	
1931 - 1951 (1:10,560 & 1:2,500)	▶ A number of new residential dwellings with associated rear gardens are shown on the site. ▶ New residential developments are shown in the surrounding area. Bournemouth Road (old A33) and Leigh Road (old B3037) are shown adjacent to the west and south boundaries. Other features include allotment gardens 70m west, nursery 160m northeast and drain line 180m northwest.	
1952 – 1981 (1:10,560, 1:10,000, 1:2,500 & 1:1,250)	▶ Buildings within the site continued to undergo layout modification with a Builder's Yard shown on the northeast corner and Garage shown near the centre of the site. ▶ More residential dwellings are continually added to the north, east and south of the surrounding area with industrial estate shown on the northwest.	
1985 – Present (1:10,000 & 1:1,250)	▶ The current layout of the site is shown to include a car showroom to the south, petrol filling station at the centre and sales office, maintenance workshop and valet shop to the north and northeast. The site has remained unchanged to present. ▶ Additional residential dwellings and commercial units are shown in the surrounding area.	

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3.2 Historical Development

A review of potentially contaminative land uses identified on historical Ordnance Survey maps within influencing distance of the site is summarised in Table 3.2 below:

Table 3.2 Summary of Potentially Contaminative Off-Site Historical Land Uses

Surrounding Feature	Distance (m)	Dates	Direction
Petrol and Fuel Sites	On-site	1985 to present	-
Garages	On-site	1960 to present	-
Pumping Station	78	1908	W
Potentially Infilled Lands (Brick Works, Unspecified Ground Workings & Unspecified Pits)	143 to 250	1868 - 1958	N & NW
Nursery	148 to 197	1868 - 1976	NE & E
Industrial Estate	193 to 194	1973 - 1991	N
Unspecified Tanks	179 to 216	1950 - 1988	S & NW
Electricity Substations	181 to 229	1974 - 1997	S, W & N
Unspecified Disused Works	249	1957	NW

3.3 Planning History

REC has undertaken a review of on-line planning records held by the Eastleigh Borough Council. A single planning application has been recorded to Picador Vauxhall, Bournemouth Road, Chandler's Ford address and the detail is as follows:

- An application regarding display of 12no. internal illuminating fascia signs, 3no. internal illuminating free standing signs and 8no. non-illuminated wall mounted signs.

The above application was later withdrawn by the applicant and there are no records of other pertinent information.

4. GEO-ENVIRONMENTAL SETTING

4.1 Geology & Hydrogeology

A review of the online British Geological Survey (BGS) mapping for the site indicates that the site is underlain by the following geological sequence:

Geological Unit	Classification	Description	Aquifer Classification
Superficial	River Terrace Deposits	Sand and Gravel	Secondary 'A'
Bedrock	Earnley Sand Formation	Clay, Silt and Sand	Secondary 'A'
	Wittering Formation	Clay, Silt and Sand	Secondary 'A'

Information obtained from the British Geological Survey (BGS) online database indicates the site is underlain by superficial River Terrace Deposits (Sand and Gravel). The bedrock geology comprises Earnley Sand Formation (Clay, Silt and Sand) restricted to the northwest corner and Wittering Formation (Clay, Silt and Sand) which occupies the rest of the site.

A single historical borehole (SU41NW726) is recorded located within a 250m radius of the site. The borehole is located approximately 150m northwest and described the Wittering Formation as a reddish brown stained pale grey stiff CLAY (0.20m to 0.60m bgl) overlying a loose orange-brown medium grained SAND and laminated CLAY with partings and bands of fine sand (0.60m to 1.00m bgl).

There are no records of groundwater, surfacewater and potable water abstraction licences within 2.0km of the site.

The data search indicates the site is not within a groundwater Source Protection Zone (SPZ).

The site lies within a Groundwater Vulnerability area and the soils are classed as having a high leaching potential for category 'HU' within an urban and in restored mineral reworked area. These soils are assumed highly permeable in the absence of site specific information.

4.2 Geotechnical Data

Geotechnical Data presented within the Groundsure Report identifies the following ground conditions:

Hazard	Designation
Shrink-Swell Clay	Moderate
Landslides	Very Low
Ground Dissolution	Negligible
Compressible Ground	Negligible

Hazard	Designation
Collapsible Deposits	Very Low
Running Sand	Very Low

A moderate risk of shrink-swell clays recorded in the above table may be related to the bedrock geology (Earnley Sand Formation & Wittering Formation) clay and silt underlying the site. These strata are generally plastic in nature and precaution should be taken when building near trees and or removing trees near proposed new builds. It is important to seek proper advice by consulting National House Building Council (NHBC) and Building Research Establishment (BRE).

4.3 Coal Mining & Ground Workings

A review of available records has identified 8no. records of historic ground workings within a 250m radius of the site.

Name of Feature	Distance (m)	Dates	Direction
Brick Works	239 - 242	1868 - 1908	NW
Unspecified Ground Workings	241 & 246	1908 – 1931	NW
Unspecified Pits	241 - 250	1868 - 1958	NW

There are five records of current ground workings within a 500m radius of the site relating to clay and shale surface extraction at Chandler's Ford Brick Works (328m northwest, 350m northwest, 350 north and 458m north and Marlbrook Brick Yard (381m southwest).

A review of data search records did not identify any historic or active coal mining activity within 1km of the site boundary.

4.4 Railways and Tunnels

A review of data search records did not identify any historic and or active railway tunnel or tunnel features within a 250m radius of the site boundary.

4.5 Hydrology

A review of available data has identified 3no. records of detailed river networks within a 500m radius of the site relating to one undefined secondary river located 469m north and two tertiary rivers (likely a culvert) located 490m south and 491m southwest.

There is a single record of surface water features located 143m north which may be associated with the tertiary river network above.

There is no record of Environmental Agency Zone 2 and or Zone 3 flooding within a 250m radius of the site. The overall risk rating for flooding is reported as **Very Low**. The site lies within a 50m radius of groundwater flooding susceptible risk area reported to be potentially at the surface.

4.6 Radon Risk Potential

BRE211 Radon: Guidance on protective measures for new buildings (2007 Edition) indicates that the site lies within an area where less than 1% of properties are above the action level and thus no radon protective measures are deemed necessary.

4.7 Industrial Land Uses

The data search has identified 18no. records of current industrial land uses within 250m of the site and their details are presented in the table below:

Feature	Distance (m)	Direction	Activity
Esso	0	On-site	Petrol and Fuel Stations
Rowles Garage	0	On-site	Petrol and Fuel Stations
Picador Vauxhall	0	On-site	New Vehicles
Autogleam Southampton Ltd	32	NW	Vehicle Cleaning Services
Red Box Engineering Ltd	135	W	General Construction Supplies
Electricity Substations	139, 140, 194, 196 & 234	NW, W, S & N	Electrical features
G S T Racing Sales	141	N	Vehicle Repairs, Testing and Servicing
G E Nichols Flooring Ltd	157	N	Construction Completion Services
V E S	174	NW	Cooling and Refrigeration
Telmar C N C	211	W	Precision Engineers
Tank	216	NW	Tank (Generic)
Swiss Timing	233	N	Office and Shop Equipment
Churchesfire Security	235	NW	Electronic Equipment
G E A Pharma Systems	246	NW	Mechanical Engineers

Based on distances from the site and the nature of various industrial activities recorded, it is highly unlikely for all the above listed current industrial land uses (with the exception of onsite land uses) to pose any significant risk to the proposed scheme.

4.8 Sensitive Land Uses

The following sensitive land uses have been identified within close proximity to the site:

- 22no. records of Ancient and Semi-Natural Woodlands including Ancient Replanted Woodlands

within 2km of the site - the closest is located 421m south of the site;

- 2no. records of Local Nature Reserves (LNR) with the closest located over 1km northwest of the site; and
- The site lies within a Nitrate Vulnerable Zones as reported by DEFRA.

4.9 Site Sensitivity Assessment

The site is located within a '**Moderate to High'** sensitivity setting due to the following:

- Both superficial and bedrock geologies are designated Secondary 'A' aquifers with high to very high permeability;
- Site is underlain by clay with moderate shrink-swell potential;
- The site lies in an area with minor aquifer groundwater vulnerability and high soil leaching potential;
- An operational petrol filling station with above ground and underground fuel storage tanks is located within the site;
- A car maintenance workshop and valet shop is located north and northeast of the site respectively;
- Potentially infilled historic ground workings are reported within 250m radius of the site;
- A single surface water feature located 143m north; and,
- Site is located 421m south of closest designated Environmentally Sensitive Sites.

Based on the presence of an operational petrol filling station with above and underground storage tanks and the potential for the underlying superficial geology to act as a pathway for gas migration, the site is considered to be located within a **medium to high** sensitivity setting in respect of human health.

With regards to controlled waters, the site is considered to be at a **high to very high** sensitivity setting on the basis that there is an operational petrol filling station on site, site is underlain by Secondary 'A' Aquifers, highly permeable superficial geology, presence of ground conditions with potential high leaching potential and surface water features within 250m of the site.

5. REGULATORY INFORMATION

5.1 Contaminated Land Officer

A request for information regarding contaminated land concerning the site was sent to the environmental health services at Eastleigh Borough Council. However, further discussions indicated that the information provided by Eastleigh Borough Council would have been a duplication of the information gained from the data search and was therefore not obtained.

5.2 Landfill Sites and Waste Treatment Sites

A review of available information identified a number of landfills and other wastes sites within a 1.5km radius of the site and these are summarised below:

Table 5.1 Summary of Landfill and other waste sites

Location	Type of wastes	Distance (m)	Direction	Details
Common Barn Farm (EA Historic Landfill)	Inert	1333	S	License issued date 03/08/1990, Surrender date undefined.
Refuse Tip (Local Authority Historic Mapping Records)	Unspecified	902	S	1962 mapping
Public Refuse Tip (Local Authority Historic Mapping Records)	Unspecified	1407	E	1979 mapping
Unit 6, Speedwell Close (EA Licenced Waste Sites)	Clinical Waste Transfer Station	371	NW	Issue date: 18/07/1994 Surrender date: 01/11/2006
Eastleigh Household Waste Recycling Centre (HWRC) (EA Licenced Waste Sites)	Household Waste Amenity Site	1212	S	Issue date: 07/11/2016 Surrender date: Undefined
Unit 4, Peacock Trading Estate (EA Licenced Waste Sites)	Special Waste Transfer Station	1253	E	Issue date: 16/11/1998 Surrender date: Undefined
Eastleigh Household Waste Recycling Centre (HWRC) (EA Licenced Waste Sites)	Household Waste Amenity Site & Household, Commercial and industrial Waste Transfer Station	1435	E	Issue date: 01/07/1993 Surrender date: Undefined

5.3 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table only includes records not otherwise detailed in the report.

Table 5.2 Summary of Historical Data

Activity	0-249m	250-500m	Details
Part A (2) and Part B Activities and Enforcements	1	3	1no. onsite petrol vapour recovery process at Rowles Picador Ltd. Others include waste oil burning process at Rentool Ltd, respraying of road vehicles at Hartwell Southampton and Hendy Ford respectively.
Category 3 and 4 Radioactive Substances Authorisation	0	2	Both records relate to storing, use and disposal of radioactive material/wastes at Upstate Ltd.
Licensed Discharge Consents	0	3	2no. records of miscellaneous discharges at Red Lodge Nursery and a single sewage discharge consent at Hut Hill Substation.
National Incidents Recording System, List 2	0	5	3no. records of atmospheric pollutants from contaminated water on 28/09/2001. Records indicate no impact to land but minor impact to air and water. Sewage material incident (12/07/2013) and oils/fuel incident (02/07/2013). Both records have significant impact to water but minor impact to land and air.

6. INITIAL CONCEPTUAL SITE MODEL (CSM)

6.1 Initial CSM

In accordance with CLR11 - Model Procedures for the Management of Land Contamination (Environment Agency, 2004) and BS 10175:2011+A1:2013 (Investigation of Potentially Contaminated Land. Code of Practice), REC have developed a preliminary Conceptual Site Model (CSM) to identify potential contamination sources, migration pathways, and significant receptors within the site.

6.2 Contaminated Sources

On-site Potential Sources

Potential sources of contamination identified on site include;

- Made Ground associated with onsite historic development from 1868 to present;
- Potential fuel spillage associated with an operational petrol filling station and from underground storage tanks; and,
- Potential contamination from hydrocarbons and solvents from onsite car maintenance workshop and valeting shop.

Off-site Potential Sources

Limited potential off-site sources of contamination have been identified within influencing distance of the site, and these include;

- Potential ground gas generation from various potentially infilled ground workings with closest feature located approximately 143m north.

6.3 Potential Pathways

Receptors may be potentially at risk from the identified potential sources of contamination via the following pathways:

- Migration of mobile contaminants on or off site via services, sewers and manmade conduits;
- Migration of gases through permeable strata within the River Terrace Deposits;
- Direct contact, ingestion and inhalation of contaminants by future site user;
- Migration of contaminated dusts during earthworks;
- Migration of mobile contaminants into groundwater and transport into surface waters; and,
- Migration of hazardous gases via services conduits.

6.4 Potential Receptors

REC has identified the following potential receptors:

- Future site users (i.e. commercial end use); and,

- Controlled waters (Secondary 'A' Aquifers).

Construction workers are not considered to be a plausible receptor for contamination as exposure will be managed through the use of appropriate PPE and hygienic working practices, as required under HSE/ CDM regulations. Furthermore, potential exposure to possible contaminants is typically on a short term basis during the duration of works thereby limiting any potential impact to ground workers.

6.5 Risk Assessment

CIRIA 552: Contaminated Land Risk Assessment 'A Guide to Good Practice' provides guidance on risk assessment taking into account factors such as severity of the potential harm that may arise from a successful pollutant linkage, potential magnitude of the hazard, and the sensitivity of the target receptor. Risk assessment is initially assessed by determining the severity of the potential hazard, which takes into account receptor sensitivity and the magnitude of the potential impact as detailed in Tables 6.1 & 6.2 below:

6.3.1 Severity

Table 6.1 Receptor sensitivity

Category	Human sensitivity	Environmental sensitivity
Very Low	Ground workers	Non-sensitive water course
Low	Commercial / Industrial	Secondary Aquifer
Moderate	Residential without plant uptake	Principal Aquifer / Sensitive Watercourse
High	Residential with plant uptake	Groundwater Source Protection Zone

Table 6.2 Magnitude of Impact

Category	Example
No Impact	No identified or potential pollutants present
Slight Impact	Minor leaks and spills from fuel infrastructure, inert landfills
Moderate Impact	Major leaks and spills from fuel infrastructure
Gross Impact	Heavily contaminated industrial sites, hazardous landfills

Severity is subsequently assessed considering the potential receptor and magnitude of impact as outlined within Table 6.3 below:

Table 6.3 Determination of level of severity for potential hazards

	Receptor Sensitivity			
	Very Low	**Low**	**Moderate**	**High**
No Impact	Minor	Minor	Minor	Minor
Slight Impact	Minor	Minor	Minor	Mild
Moderate Impact	Minor	Minor	Mild	Medium
Gross Impact	Minor	Mild	Medium	Severe

6.3.2 Likelihood

The likelihood of an event is assessed while considering the potential for presence of a contaminant, presence of receptor, and the substantiality of the pollutant pathway. Likelihood is broken down into four separate categories within the CSM as shown in Table 6.4 below:

Table 6.4 Definitions of likelihood categories

Category	Definition
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable.
Low Likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
High Likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor.

6.3.3 Risk Rating

Table 6.5 demonstrates the methodology used to provide an overall risk rating within the preliminary CSM with respect to any potential sources of contamination that may affect the site. An overall risk rating is assigned to each potential contaminant considering the assessed likelihood and severity as determined using the methodologies within Tables 6.1 to 6.4.

Table 6.5 Level of risk rating for hazard definition

Likelihood	Severity			
	Minor	**Mild**	**Medium**	**Severe**
Unlikely	Very Low	Very Low	Low	Low / Moderate
Low Likelihood	Very Low	Low	Low / Moderate	Moderate

Likely	Low	Low / Moderate	Moderate	High
High Likelihood	Low / Moderate	Moderate	High	Very High

6.6 Conceptual Site Model

A site specific CSM has therefore been created using the above information and is provided on the following page.

Table 6.6 Conceptual Site Model

Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood	Severity	Overall Risk Rating	Active / Inactive
On-Site							
Made Ground associated with historical development	Heavy Metals (As, Cd, Cr, Pb, Hg, Se, Ni)	Ingestion of soils Dermal contact with soils	Future Site Users	**Low Likelihood**	**Minor**	**Very Low**	**Potentially Active –** further investigation necessary
		Vertical and lateral migration	Controlled Waters (Secondary 'A' Aquifers)	**Likely**	**Minor**	**Low**	
	Asbestos Fibres In Soil	Inhalation of fibres	Future Site Users	**Low Likelihood**	**Minor**	**Very Low**	
	Polycyclic Aromatic Hydrocarbons (PAHs)	Ingestion of soils Dermal contact with soils	Future Site Users	**Low Likelihood**	**Minor**	**Very Low**	
	Total Petroleum Hydrocarbons (TPHs)	Ingestion of soils Dermal contact with soils Inhalation of ground gases	Future site users	**High Likelihood**	**Minor**	**Low / Moderate**	
		Vertical and lateral migration	Controlled Waters (Secondary 'A' Aquifers)	**High Likelihood**	**Minor**	**Low / Moderate**	
	Potential production of ground gas (CH_4 and CO_2)	Inhalation of ground gases	Future Site Users	**Likely**	**Minor**	**Low**	
Fuel spillage associated with an operational petrol filling station and from underground storage tanks	Total Petroleum Hydrocarbons (TPHs)	Inhalation of vapours Ingestion of soils Dermal contact with soils	Future Site Users	**Likely**	**Medium**	**Moderate**	**Potentially Active –** further investigation necessary
		Vertical and lateral migration	Controlled Waters (Secondary 'A' Aquifers)	**Likely**	**Medium**	**Moderate**	
	Polycyclic Aromatic Hydrocarbons (PAHs)	Ingestion of soils Dermal contact with soils	Future Site Users	**Low Likelihood**	**Minor**	**Very Low**	

Potential contamination from hydrocarbons and solvents from onsite car maintenance workshop and valeting shop	Total Petroleum Hydrocarbons (TPHs)	Dermal contact with soils	Future Site Users	**High Likelihood**	**Minor**	**Low / Moderate**	**Potentially Active –** further investigation necessary
		Vertical and lateral migration	Controlled Waters (Secondary 'A' Aquifers)	**High Likelihood**	**Minor**	**Low / Moderate**	

Source	Contaminant	Potential migration pathway	Potential Receptors	Likelihood	Severity	Overall Risk Rating	Active / Inactive
Off-Site							
Potentially infilled grounds (Brick Works, Unspecified Ground Workings & Unspecified Pits) closest located 143m north	Potential production of ground gas (CH4 and CO2)	Lateral migration onto site	Future site users	**Likely**	**Minor**	**Low**	**Potentially Active –** further investigation necessary

7. SITE INVESTIGATION

7.1 Desk Study Information

Potential contamination sources have been identified from the desk study and these are listed in Table 7.1 below:

Table 7.1 Summary of Potential Contaminant Sources

Potential Source	Potential Contaminants	Potential Receptor
Made Ground associated with onsite historical development	Heavy metals, Asbestos fibres, PAHs, TPHs & Ground gases	Future users and Controlled waters (Secondary 'A' Aquifers)
Fuel spillage associated with an operational petrol filling station and leakage from underground storage tanks	TPHs	Future users and Controlled waters (Secondary 'A' Aquifers)
Potential contamination from hydrocarbons and solvents from onsite car maintenance workshop and valeting shop	TPHs	Future users and Controlled waters (Secondary 'A' Aquifers)
Potentially infilled grounds (Brick Works, Unspecified Ground Workings & Unspecified Pits) closest located 143m north	TPHs	Controlled waters (Secondary 'A' Aquifers)

7.2 Site Investigation

A ground investigation has been designed based on the findings of the desk study with exploratory holes advanced to target specific potential contaminant sources summarised in Table 7.1 above within the areas proposed for intrusive development.

In addition, exploratory holes have also been advanced to provide information on baseline ground conditions and to collect geotechnical information within the area of the proposed building extensions in accordance with the proposed development plan provided by the client. It is important to note that window sample locations were restricted to areas with very low risk of buried services in the absence of detailed utilities survey plan.

An Exploratory Hole Location Plan is presented as Drawing No. 1CO102438-003 contained in Appendix III.

Exploratory fieldwork was undertaken on 20th March 2017 and a single hand pit was undertaken on 12th April 2017. A summary of works undertaken are presented in Table 7.2 below.

Table 7.2 Summary of Fieldwork

Location Hole	Potential Source/Rationale	Type	Maximum Depth (m bgl)	Monitoring Wells Response Zone (m bgl)
WS101	To obtain information on baseline chemical and	Window Sample	5.00	3.50
WS102			5.00	3.50

WS103	geotechnical conditions across the site.		1.65	N/A
HP101	To obtain information on underlying geological conditions and any potential contamination.		0.70	N/A

Notes
m bgl – metres below ground level, N/A – Not applicable.

All samples submitted for laboratory analysis were collected in appropriate sampling containers and subsequently stored in appropriate containers/boxes prior to submission for analysis. The samples were collected using appropriate PPE and sampling equipment which was cleaned at each location. A detailed copy of REC sampling methodology, QA procedures and laboratory chain of custody forms can be provided upon request.

7.3 In-Situ Testing

7.3.1 Standard Penetration Tests

Standard Penetration Tests (SPT) were carried out within each of the window sample locations, from a depth of 1.20mbgl and at every metre thereafter, where possible. The testing was carried out to provide validation of ground consistency and strength observations. The results of the in-situ SPT testing are presented on the exploratory hole logs, included within Appendix IV.

7.3.2 Photoionization Detector (PID)

Samples from window sample locations were obtained and subsequently tested for Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs). The tests were undertaken due to the presence of an operational petrol filling station within the site. The results of the in-situ PID test are presented on the exploratory hole logs, included within Appendix IV.

7.4 Laboratory Analysis

7.4.1 Soil Chemical Analysis

Selected soil samples were submitted to UKAS accredited Scientific Analysis Laboratories (SAL) Ltd of Braintree for the following chemical analyses:

- Asbestos identification;
- Soil Organic Matter (SOM);
- Heavy metals;
- Total Cyanide;
- Total Phenols;
- Speciated Polycyclic Aromatic Hydrocarbons (PAH);
- Banded Total Petroleum Hydrocarbons;
- Banded TPH + CWG + BTEX + MBTE; and,
- VOCs and SVOCs.

The results of the chemical analyses are included in Appendix V and discussed in Section 9.

7.1.2 Water Chemical Analysis

Two groundwater samples were submitted to UKAS accredited Scientific Analysis Laboratories (SAL) Ltd of Braintree for chemical analysis comprising heavy metals, Speciated Polycyclic Aromatic Hydrocarbons (PAH), Banded Total Petroleum Hydrocarbons, VOCs, SVOCs and hardness. The results of the chemical analysis are included in Appendix V and discussed in Section 9.

7.4.3 Geotechnical Laboratory Analysis

Selected soil samples were submitted to UKAS accredited Professional Soil Laboratories (PSL) Ltd based in Doncaster, where the following geotechnical tests were undertaken:

- Moisture content;
- Atterberg limit; and,
- Particle Size Distribution (Wet/Dry Sieve Method).

The results of the geotechnical analysis are presented in Appendix VI and discussed in Sections 8 and 10.

7.5 Hand Excavated Pits

A single hand excavated pit (HP101) was undertaken adjacent to the north boundary as a replacement for one window sample location which was aborted due to excessively hard concrete. A single shallow soil sample and a suspected asbestos containing material (ACM) obtained from the hand pit were submitted to UKAS accredited Scientific Analysis Laboratories (SAL) Ltd of Braintree for chemical analysis. The pit was advanced to a depth of 0.70mbgl.

The location of the hand excavated pit is shown on the exploratory hole location plan (ref. 1CO103133-003) and the ground conditions encountered are shown on the exploratory hole logs included within Appendix IV.

7.6 Land Gas and Groundwater Monitoring

Two ground gas and groundwater monitoring wells were installed on site and three return monitoring visits were undertaken on 27th March, 4th and 11th April 2017.

Concentrations of methane (CH_4), carbon dioxide (CO_2) and Oxygen (O_2) were measured using a gas analyser (GFM435), calibrated to a reference standard (before and after each survey) and gas flow rates were measured using an internal flow pod. Gas measurements were recorded for a minimum of ninety seconds at each location, at which point the maximum concentration of CH_4 and CO_2 together with the lowest concentration of O_2 were recorded.

Groundwater level monitoring was undertaken using an electronic dip meter to record the depth to groundwater.

The results of ground gas and groundwater monitoring are presented within Table 8.6. Groundwater conditions are discussed within Section 8.2 and ground gas results are discussed in Section 9.3.

8.0 GROUND AND GROUNDWATER CONDITIONS

8.1 Ground Conditions

8.1.1 Summary of Ground Conditions

The ground investigation generally confirmed the published geology and identifies the strata set out in Table 8.1 below. Exploratory hole logs are included in Appendix IV.

Table 8.1 Summary of Strata

Stratum	Min Depth to Top of Strata (m)	Max Depth to Top of Strata (m)	Max Thickness(m)
Made Ground	Ground Level	Ground Level	0.95 (WS102)
River Terrace Deposits	0.60	0.95	4.10 (WS101)NP
Wittering Formation	4.80	4.80	0.20 (WS102)NP

NP – Not proven

8.1.2 Made Ground

Made Ground was encountered within all exploratory holes and typically comprised asphalt or concrete over soft dark grey to light brown occasionally black or orangeish or multicoloured clayey slightly sandy GRAVEL with low cobble content and occasional plant roots and rootlets. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse flint, brick, granite, concrete, black combustion material, asphalt, slate and rare lead-sheet. Cobbles are angular to subrounded flints, bricks, and concretes. A maximum thickness of 0.95m bgl was encountered within WS102.

8.1.3 Superficial Deposits (River Terrace Deposits)

River Terrace Deposits was encountered in all exploratory holes and typically comprised firm to stiff light brown to orangeish brown gravelly CLAY overlying alternating medium dense bluish grey to yellowish brown slightly gravelly laminated CLAY and SAND. Sand is fine to medium. Gravel is subangular to rounded, fine to coarse flint with occasional subrounded flint cobbles. A maximum thickness of 4.10m was encountered within WS101 only.

8.1.4 Solid Geology (Wittering Formation)

Wittering Formation was marginally encountered only within WS102 and comprised stiff dark grey to blueish grey laminated slightly sandy CLAY. Sand is fine to medium. A thickness of 0.20m was encountered within WS102.

8.1.5 Soil Consistency

Standard Penetration Test (SPT) results shown in Table 8.2 below indicates that the River Terrace Deposits has a varying 'n' values ranging from 8 to over 50 corresponding to relative density of medium dense to very dense and consistency of firm to very stiff. The density of the coarse grained material explains the SPT refusal recorded within WS103 which led to abrupt termination of the

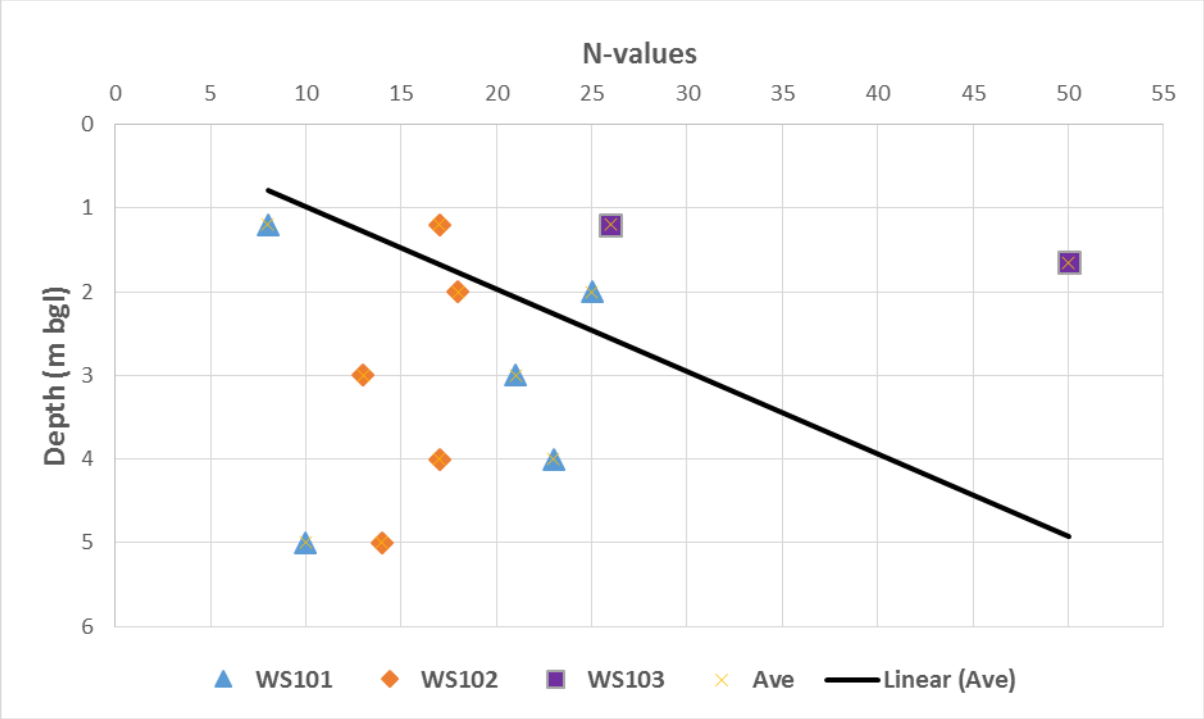
hole. The variation in SPT n-values recorded within the coarse grained strata may be related to the presence of groundwater within the strata resulting in lower blow counts. An SPT N value of 14 was noted in the Wittering Formation within WS102 which suggests a consistency equivalent of stiff corresponding to medium strength strata.

Table 8.2 Standard Penetration Test Results

Borehole	Start Depth (m bgl)	Strata Type	SPT "N" Value	Consistency / Density	Approximate Undrained Shear Strength (kN/m²)
WS101	1.2	Fine grained	8	Soft	39
	2	Coarse grained	25	Medium dense	-
	3	Coarse grained	21	Medium dense	-
	4	Coarse grained	23	Medium dense	-
	5	Coarse grained	10	Medium dense	-
WS102	1.20	Fine grained	17	Firm to Stiff	83
	2.00	Coarse grained	18	Medium dense	-
	3.00	Coarse grained	13	Medium dense	-
	4.00	Coarse grained	17	Medium dense	-
	5.00	Fine grained	14	Firm	58
WS103	1.20	Coarse grained	26	Medium Dense	-
	1.65	Coarse grained	50	Very Dense	-

Graphical representation of the SPT N - value for each stratum is presented in Figure 8.1 below:

Figure 8.1 Depth vs SPT 'N' - Value plot



8.1.6 pH and Sulphate

Chemical analysis for pH and water soluble sulphate is contained in Appendix V, shows that the made ground underlying the site ranging from ground level 0.95m bgl meets Class DS-1, Aggressive

Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005). In addition, the details of water sample pH and water soluble sulphate analysis meets DS-1 for Design Sulphate Class and AC-1d, Aggressive Chemical Environment for Concrete Classification (ACEC). These results indicate that the concrete classification will be DS-1, AC-1d. A summary of pH and soluble sulphate results are summarised in table 8.4 below:

Table 8.4 Summary of pH and Sulphate Data

Location	Depth (m)	pH Value	Water soluble SO4 (mg/l)	Acid soluble SO4 (%)	Total Sulphur (%)	Total Potential Sulphate (%)	Oxidisable Sulphides (%)	Concrete Classification
WS101	0.25 – 0.30	7.8	130	-	0.10	0.30	-	DS-1 / AC1s
WS102	0.20 – 0.30	10.4	50	-	0.10	0.30	-	DS-1 / AC1s
WS102	2.70 – 2.80	5.4	<10	-	<0.02	0.06	-	DS-1 / AC1s
WS103	0.50 – 0.60	7.4	70	-	0.05	0.15	-	DS-1 / AC1s
HP101	0.30 – 0.40	7.8	20		0.07	0.21		DS-1 / AC1s
WS101	Ground water	7.1	23	-	-	-	-	DS-1 / AC1d
WS102	Ground water	6.6	11	-	-	-	-	DS-1 / AC1d

8.2 Groundwater Conditions

Groundwater strikes were observed within WS101 and WS102 during intrusive ground investigation at depths of 4.00m bgl and 3.50m bgl respectively. During return monitoring visits, the level of groundwater within the installations indicated levels ranging from 2.57 to 2.80m bgl (WS101) and 2.30 to 2.59m bgl (WS102). Records of groundwater levels observed during return monitoring visits are presented in Table 8.5 below:

Table 8.5 Groundwater Records

Location	Date	Installation Response Zone	Depth to Base (m bgl)	Depth to Water (m bgl)
WS101	27/03/2017	1.00 - 4.50	4.30	2.57
	04/04/2017	1.00 - 4.50	4.38	2.58
	11/04/2017	1.00 - 4.50	4.31	2.80
WS102	27/03/2017	1.00 - 4.50	3.70	2.30
	04/04/2017	1.00 - 4.50	3.52	2.39
	11/04/2017	1.00 - 4.50	3.51	2.59

Based on the above records, it is fair to conclude that there is groundwater within the permeable River Terrace Deposit strata. Monitoring was undertaken using an electronic dip meter probe to record the depth to groundwater.

8.3 Ground Gas

The results of the ground gas monitoring are presented in Table 8.6 overleaf.

Table 8.6 Summary of ground gas and groundwater monitoring results

Well	Date	CH_4 Initial %v/v	CH_4 Steady %v/v	CH_4 GSV l/hr	CO_2 Initial %v/v	CO_2 Steady %v/v	CO_2 GSV l/hr	O_2 %v/v	Atmos (mb)	Atmos. Dynamic	Flow (l/hr)	Response Zone (m bgl)	Depth to Base (m bgl)	Depth to Water (m bgl)
WS101	27/03/2017	<0.1	<0.1	0.0001	1.4	1.4	0.0014	18.7	1015	Falling	<0.1	1.00 - 4.50	4.30	2.57
	04/04/2017	<0.1	<0.1	0.0001	1.8	1.8	0.0018	17.9	1021	Falling	<0.1	1.00 - 4.50	4.38	2.58
	11/04/2017	<0.1	<0.1	0.0001	1.6	1.6	0.0016	18.7	1025	Falling	<0.1	1.00 - 4.50	4.31	2.80
WS102	27/03/2017	<0.1	<0.1	0.0001	1.4	1.4	0.0014	19.4	1016	Falling	<0.1	1.00 - 4.50	3.70	2.30
	04/04/2017	<0.1	<0.1	0.0001	1.6	1.6	0.0016	19.4	1021	Falling	<0.1	1.00 - 4.50	3.52	2.39
	11/04/2017	<0.1	<0.1	0.0001	2.9	2.9	0.0029	18.5	1025	Falling	<0.1	1.00 - 4.50	3.51	2.59

9.0 TIER II GENERIC QUANTITATIVE CONTAMINATED LAND RISK ASSESSMENT

REC has undertaken a Tier II qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

9.1 Human Health

At a Tier II stage, the long term (chronic) toxicity risk to human health is assessed by utilising appropriate and conservative generic assessment criteria (GAC) to determine whether there are actual or potential unacceptable risks at the site and if any viable pollutant linkages are present.

To undertake the Tier II assessment within the context of the development proposal, REC has determined that the most appropriate GAC values available will be those based upon a commercial/industrial land use without plant uptake.

The following assessment, summarised below and overleaf in Table 9.1, has primarily adopted the S4UL (Suitable for Use Levels reference values published by LQM/CIEH in 2015, the S4ULs). Currently, no published GAC value is available for cyanide and therefore REC has utilised the Environment Agency Contaminated Land Exposure Assessment Tool (CLEA v1.06) to derive the relevant GAC for this proposed land use. Due to the absence of a published lead GAC for direct use within the planning regime, the 2014 Defra C4SL (Category 4 Screening Level) has been used as this value is considered to incorporate the latest toxicological, bioaccessibility and exposure modelling research to date.

Table 9.1 Summary of Generic Human Health Toxicity Assessment for Commercial/industrial end use Without Plant Uptake (2.5% SOM)

Determinand	Units	GAC	GAC Source	n	[mc] (WS)	Location / Strata	Primary Pathways	Assessment
Inorganics								
Arsenic	mg/kg	*640*	(i)	5	**15**	N/A	1	No Further Action
Barium	mg/kg	*22000*	(v)	5	**460**		1	
Beryllium	mg/kg	*12*	(i)	5	**1.7**		1,3	
Boron	mg/kg	*240000*	(i)	5	**<1**		1,2	
Cadmium	mg/kg	*190*	(i)	5	**1.0**		1, 2	
Chromium	mg/kg	*8600*	(i)	5	**33**			
Chromium (VI)	mg/kg	*33*	(i)	5	**<1**		3	
Copper	mg/kg	*68000*	(i)	5	**130**		1, 2, 3	
Lead	mg/kg	*2330*	(iv)	5	**800**		1, 2	
Mercury [Inorganic]	mg/kg	*1100*	(i)	5	**<1**		1, 2	
Nickel	mg/kg	*980*	(i)	5	**14**		1, 2	
Selenium	mg/kg	*12000*	(i)	5	**<3**		1	
Vanadium	mg/kg	*9000*	(i)	5	**40**		1, 2	
Zinc	mg/kg	*730000*	(i)	5	**440**		1, 2	
Cyanide [Total]	mg/kg	*1200*	(v)	5	**<1**		1, 2	
Asbestos	**-**	**D.**	**-**	**5**	**D**	**Fragment from HP101**	**3**	**See Discussion**
Organics – PAHs and Phenol								

Determinand	Units	GAC	GAC Source	n	[mc] (WS)	Location / Strata	Primary Pathways	Assessment
Phenols	mg/kg	*1500*	(ii)	5	**<1**	N/A	5	No Further Action
Naphthalene	mg/kg	*460*	(ii)	5	**0.1**		4	
Acenaphthylene	mg/kg	*97000*	(ii)	5	**<0.1**		1	
Acenaphthene	mg/kg	*97000*	(ii)	5	**1.1**		1	
Fluorene	mg/kg	*68000*	(ii)	5	**0.5**		1	
Phenanthrene	mg/kg	*22000*	(ii)	5	**4.3**		1	
Anthracene	mg/kg	*540000*	(ii)	5	**0.5**		1	
Fluoranthene	mg/kg	*23000*	(ii)	5	**2.7**		1	
Pyrene	mg/kg	*54000*	(ii)	5	**1.9**		1	
Benzo(a) Anthracene	mg/kg	*170*	(ii)	5	**0.7**		1	
Chrysene	mg/kg	*350*	(ii)	5	**0.7**		1	
Benzo(b) Fluoranthene	mg/kg	*44*	(ii)	5	**0.7**		1	
Benzo(k) Fluoranthene	mg/kg	*1200*	(ii)	5	**0.8**		1	
Benzo(a)Pyrene	mg/kg	*35*	(ii)	5	**0.7**		1	
Indeno (123-cd)Pyrene	mg/kg	*510*	(ii)	5	**0.4**		1	
Dibenzo(a,h) Anthracene	mg/kg	*3.6*	(ii)	5	**0.2**		1	
Benzo(ghi) Perylene	mg/kg	*4000*	(ii)	5	**0.4**		1	
Organics – TPH								
TPH C_5-C_6	mg/kg	*5900*	(iii)	5	**<0.10**	N/A	4	No Further Action
TPH C_6-C_8	mg/kg	*17000*	(iii)	5	**<0.10**		4	
TPH C_8-C_{10}	mg/kg	*4800*	(iii)	5	**0.16**		4	
TPH C_{10}-C_{12}	mg/kg	*23000*	(iii)	5	**<2**		4	
TPH C_{12}-C_{16}	mg/kg	*28000*	(iii)	5	**6**		1, 4	
TPH C_{16}-C_{21}	mg/kg	*28000*	(iii)	5	**18**		1	
TPH C_{21}-C_{35}	mg/kg	*28000*	(iii)	5	**180**		1	
Organics – TPH CWG								
Benzene	mg/kg	*47*	(ii)	1	**<0.01**	N/A	1	No Further Action
Toluene	mg/kg	*110000*	(ii)	1	**<0.01**		1	
Ethylbenzene	mg/kg	*13000*	(ii)	1	**<0.01**		1	
m/p-Xylene	mg/kg	*15000*	(ii)	1	**<0.01**		1	
o-Xylene	mg/kg	*14000*	(ii)	1	**<0.01**		1	
Methyltert-Butyl Ether	mg/kg	*LOD (0.01)*	(ii)	1	**<0.01**		1	
TPH Ali C5-C6	mg/kg	*5900*	(iii)	1	**<0.01**		4	
TPH Ali C6-C8	mg/kg	*17000*	(iii)	1	**0.10**		4	
TPH Ali C8-C10	mg/kg	*4800*	(iii)	1	**0.45**		4	
TPH Ali C10-12	mg/kg	*2300*	(iii)	1	**8**		4	
TPH Ali C12-C16	mg/kg	*82000*	(iii)	1	**24**		4	
TPH Ali C16-C21	mg/kg	*1700000*	(iii)	1	**17**		4	
TPH Ali C21-C35	mg/kg	*1700000*	(iii)	1	**10**		4	
TPH Aro C5-C7	mg/kg	*46000*	(iii)	1	**<0.01**		4	
TPH Aro C7-C8	mg/kg	*110000*	(iii)	1	**<0.01**		4	
TPH Aro C8-C10	mg/kg	*8100*	(iii)	1	**0.038**		4	

Determinand	Units	GAC	GAC Source	n	[mc] (WS)	Location / Strata	Primary Pathways	Assessment
TPH Aro C10-C12	mg/kg	*28000*	(iii)	1	**3**		4	
PH Aro C12-C16	mg/kg	*37000*	(iii)	1	**6**		4	
TPH Aro C16-C21	mg/kg	*28000*	(iii)	1	**2**		4	
TPH Aro C21-C35	mg/kg	*28000*	(iii)	1	**6**		4	
Volatile Organic Compounds (VOCs)								
n-Butylbenzene	mg/kg	*30000*	(iii)	1	**15**	N/A	4	No Further Action
sec-Butylbenzene	mg/kg	*33000*	(iii)	1	**25**		4	

Key
[mc] Maximum Concentration Recorded
D. Detected
N.D. None Detected (Limit of Detection = <0.0001%)

Primary Pathways
1 Ingestion of soil and indoor dust and / or oral background exposure;
2 Consumption of home-grown produce and attached soil;
3 Inhalation of dust (background and indoor);
4 Inhalation of vapour (background and indoor);
5 Direct dermal / skin contact.

Generic Assessment Criteria (GAC) Source
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);
(ii) S4UL – Conservative Assessment Approach of 1% SOM;
(iii) S4UL –1% SOM and assumed worst case aliphatic / aromatic compound;
(iv) Defra Category 4 Screening Level (2014);
(v) CLEA 1.06 Derived Value.

Based on the direct comparison, no concentrations of contaminants were encountered above the screening criteria for a commercial/industrial end use. Albeit a fragment of ACM was encountered within HP101 at a depth of 0.30m – 0.40m bgl.

9.1.1 Asbestos

Laboratory identification of the fragment of ACM recovered from HP101 has identified the material to contain Chrysotile asbestos fibres. Fragments of suspected ACM containing chrysotile are generally associated with cement bound asbestos, e.g. in materials such as roof sheeting, and the encountered fragment is likely to be associated with discarded materials from historic building redevelopment. The main exposure pathway for asbestos is inhalation of airborne fibres. No free fibres were detected within any of other soil samples.

HP101 lies close to the north site boundary and near the proposed building extension to the north. The proposed development and contamination plan (ref. 1CO103133-004) is presented within Appendix III.

9.2 Controlled Waters

The groundwater vulnerability map shows the site is underlain by Secondary 'A' Aquifers comprising superficial River Terrace Deposits and bedrock Earnley Formation / Wittering Formation. The records also indicate that the Secondary 'A' Aquifers are designated as aquifers with high leaching potential. Furthermore, groundwater strikes were recorded within WS101 and WS1102 during the site investigation. There are three records of secondary and tertiary river network within 500m radius of the site and a single surface water feature is recorded 143m to the north.

Given the presence of an operational petrol filling station on site, two groundwater samples, one

from each installed monitoring well were obtained and analysed for the following:

- Heavy metals;
- Speciated Polycyclic Aromatic Hydrocarbons (PAH);
- Banded Total Petroleum Hydrocarbons + CWG + BTEX + MTBE;
- Volatile Organic Compounds (VOCs);
- Semi-Volatile Organic Compounds (SVOCs); and,
- Hardness.

The test results were directly compared to Generic Assessment Criteria (GAC) based on surface water screening values, drinking water screening values and World Health Organisation Drinking Water Guideline Values. It is important to note that where there are no screening values for tested determinants, the Limit of Detection (LOD) values was adopted as the GAC. A direct comparison of test results and the GAC are presented in Table 9.2 below.

Table 9.2 Comparison of Groundwater Analysis with Tier II Screening Levels

Determinand	Units	Hardness Banding (mg/l $CaCO_3$)	Surface Water Screening Values	Drinking Water Screening Values	WHO	WS101	WS102
Inorganics							
Arsenic	µg/l	-	50 (1)	10 (7)	10	0.4	2.2
Barium	µg/l	-	-	LOD (1)	-	18	11
Beryllium	µg/l	-	-	LOD (0.05)	-	<0.05	<0.05
Boron	µg/l	-	2000(5)	1000(5)	2400	60	100
Cadmium	µg/l	50-100	0.60 (3)	5 (7)	3.0	0.03	<0.02
Chromium	µg/l	50-100	10(5)	15(5)	50	<1	<1
Chromium VI	µg/l	-	3.4(1)	-	-	<3	<3
Copper	µg/l	50 - 100	22(1)	2000	2000	1.2	1
Lead	µg/l	50 - 100	10 (4)	25 (7)	10	<3	<3
Mercury	µg/l	-	0.07 (3)	1 (7)	6.0	<0.05	<0.05
Nickel	µg/l	50 - 100	100 (4)	20 (7)	70	3	4
Selenium	µg/l	-	-	10 (7)	40	1.5	1.4
Vanadium	µg/l	-	-	LOD (2)	-	<2	<2
Zinc	µg/l	50-100	50 (1)	5000 (7)	3000	12	3
Cyanide (Total)	µg/l	-	5	LOD (10)	-	<10	<10
TPH C5-C6 (aliphatic)	µg/l	-	-	>LOD(13)	15000	<10	**180**
TPH C6-C8 (aliphatic)	µg/l	-	-	>LOD(13)	15000	<10	**310**
TPH C8-C10 (aliphatic)	µg/l	-	-	>LOD(13)	300	**310**	**1200**
TPH C10-C12 (aromatic)	µg/l	-	-	>LOD(13)	100	**50**	**100**
TPH C12-C16 (aromatic)	µg/l	-	-	>LOD(13)	100	**50**	**100**
TPH C16-C21 (aromatic)	µg/l	-	-	>LOD(13)	90	**50**	**150**

TPH C21-C35 (aromatic)	µg/l	-	-	>LOD[13]	90	**80**	**240**
PAHs							
Acenaphthene	µg/l	-	-	0.1	-	<0.01	**0.22**
Acenaphthylene	ug/l	-	-	0.1	-	<0.01	**0.05**
Anthracene	µg/l	-	0.4	0.1	-	0.02	0.03
Benzo(a)Anthracene	µg/l	-	-	0.1	-	<0.01	<0.01
Benzo(a)Pyrene	µg/l	-	0.03	0.01	0.7	<0.01	<0.01
Benzo(b)fluoranthene*	µg/l	-	-	0.1	-	<0.01	<0.01
Benzo(ghi)Perylene*	µg/l	-	-	0.1	-	<0.01	0.02
Benzo(k)fluoranthene*	µg/l	-	-	0.1	-	<0.01	<0.01
Chrysene	µg/l	-	-	0.1	-	<0.01	<0.01
Dibenzo(ah)Anthracene	µg/l	-	-	0.1	-	<0.01	<0.01
Fluoranthene	µg/l	-	1.0	0.1	-	<0.01	0.03
Fluorene	µg/l	-	-	0.1	-	**0.15**	**1.2**
Indeno(123-cd)Pyrene*	µg/l	-	-	0.1	-	<0.01	<0.01
Naphthalene	µg/l	-	10	0.1	-	**1.2**	**7.2**
Phenanthrene	µg/l	-	-	0.1	-	0.08	**0.54**
Pyrene	µg/l	-	-	0.1	-	0.02	0.08
Sum of 4 PAH (*)	µg/l	-	-	0.1	-	**1.5**	**9.3**
Semi-Volatile Organic Compounds (SVOCs)							
Diethylphthalate	µg/l	-	-	>LOD (1)	-	**13**	**4**
Volatile Organic Compounds (VOCs)							
Isopropylbenzene	µg/l	-	-	>LOD (1)	-	**2**	**7**
1,2,4-Trimethylbenzene	µg/l	-	-	>LOD (1)	-	**91**	**130**
m/p ethyl toluene	µg/l	-	-	>LOD (5)	-	**57**	**86**
n-Propylbenzene	µg/l	-	-	>LOD (1)	-	**4**	**24**
Ethyl-2-Methylbenzene	µg/l	-	-	>LOD (5)	-	**27**	**31**
S-Butylbenzene	µg/l	-	-	>LOD (1)	-	**4**	**10**
Toluene	µg/l	-	-	700 [11]	-	<1	3
n-Butylbenzene	µg/l	-	-	780[15]	-	14	29
EthylBenzene	µg/l	-	-	300 [11]	-	<1	22
p-Isopropyltoluene	µg/l	-	-	>LOD (1)	-	<1	**5**
Methyl tert-Butyl Ether	µg/l	-	-	>LOD (1)	-	<1	**61**
Benzene	µg/l	-	-	10 [11]	-	<1	**240**
m/p-xylene	µg/l	-	-	500 [11]	-	<1	5
1,3,5-Trimethylbenzene	µg/l	-	-	0.4	-	**42**	**36**
O-xylene	µg/l	-	-	500 [11]	-	2	3
T-Butylbenzene	µg/l	-	-	>LOD (1)	-	<1	12

Key for Table 9.3

(1) Water Framework Directive – Specific Pollutant
(2) Water Framework Directive – General Physico-chemical Standards
(3) Environmental Quality Standard – Priority Hazardous Substance
(4) Environmental Quality Standard – Other Pollutant
(5) Environmental Quality Standard – Other Substances
(6) Environmental Quality Standard – Non Statutory
(7) Water Framework Directive – Groundwater Impacts On Surface Water (Test 2)
(8) Water Framework Directive – General Quality of Groundwater Body (Test 5)
(9) Drinking Water Screening Values
(10) * - Below Laboratory Detection Limits
(11) WHO Drinking Water Criteria
(12) International Potable Standard
(13) In accordance with SoBRA Risk Assessment of Petroleum Hydrocarbons in Groundwater 2012.
(14) National Primary Drinking Water Regulations (NPDWRs)
(15) USEPA Regional Screening Level (drinking water standard)

The Tier II risk assessment indicates that the generic assessment criteria (GAC) have been exceeded for the following tested determinants:

- **TPH C8-C10** (aliphatic) (WS101 and WS101);
- **TPH C16-C21** (aromatic) (WS102);
- **TPH C21-C35** (aromatic) (WS102);
- **PAH -** Acenaphthene (WS102);
- **PAH -** Acenaphthylene (WS102);
- **PAH –** Fluorene (WS101 & WS102);
- **PAH –** Napthalene (WS101 & WS102) (Exceeds Drinking Water Standards);
- **PAH –** Phenanthrene (WS102);
- **PAH** - **Sum of 4 –** (WS101 & WS102);
- **SVOC –** Diethylphthalate (WS101 & WS102);
- **VOC –** Isopropylbenzene (WS101 & WS102);
- **VOC -** 1,2,4-Trimethylbenzene (WS101 & WS102);
- **VOC -** m/p ethyl toluene (WS101 & WS102);
- **VOC -** n-Propylbenzene (WS101 & WS102);
- **VOC -** Ethyl-2-Methylbenzene (WS101 & WS102);
- **VOC -** S-Butylbenzene (WS101 & WS102);
- **VOC -** p-Isopropyltoluene (WS102);
- **VOC -** Methyl tert-Butyl Ether (WS102);
- **VOC –** Benzene (WS102); and
- **VOC -** 1,3,5-Trimethylbenzene (WS101 & WS102)

It should additionally be noted that although the laboratory detection limits (LOD) for some of TPHs, PAHs, VOCs and SVOCs are above drinking water guidance criteria, (shown as >LOD in Table 9.2 above) samples with concentrations of these substances below LOD are generally considered unlikely to be of concern.

It is therefore considered that the risk posed to controlled waters within influencing distance of the site is considered **Moderate to High** based on the following rationale;

- The site is underlain by the River Terrace Deposits, Earnley Formation and Wittering Formation designated as a Secondary 'A' Aquifers;
- There are exceedances of drinking water screening values for TPHs, PAHs, VOCs and SVOC within the tested groundwater samples;
- Most of the exceedances are identified in the groundwater sample from monitoring installation located adjacent to the petrol filling station forecourt; and,
- The site is underlain by highly permeable strata which will aid mobility of any contaminant.

9.3 Ground Gas

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published within BS 8485:2015. However, it is recommended that a full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on-site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

In accordance with the methodology outlined within BS8485:2015, REC have utilised the results of the ground gas monitoring surveys to calculate a tentative borehole hazardous gas flow rate (Qhg), previously known as a Gas Screening Value (GSV).

Three monitoring visits have been completed over a period of three weeks, taking place on 27th March, 4th and 11th April 2017, with atmospheric pressure varying between 11015mbar and 1025mbar. A maximum concentration of 2.9% v/v carbon dioxide was recorded in WS102. Methane levels were generally <0.1% v/v. The flow rate was <0.1l/hr throughout the visits.

In accordance with the methodology outlined within BS8485:2015, REC have utilised the results of the ground gas monitoring surveys to calculate a tentative borehole hazardous gas flow rate (Qhg), previously known as a Gas Screening Value (GSV).

Table 9.3 Summary of Hazardous Gas Flow Rate

Flow rate (L/h)	Maximum CH_4 (%)	Maximum CO_2 (%)	CH_4 Qhg (L/h)	CO_2 Qhg Rate (L/h)	Implied CH_4 CS	Implied CO_2 CS
<0.1	<0.1	2.9	0.0001	0.0029	1	1

CS : Characteristic Situation
Qhg : Hazardous gas flow rate

The maximum implied characteristic situation for the site has therefore been calculated by combining the maximum observed flow rate and maximum observed concentrations methane and carbon dioxide during any monitoring event. This methodology provides a 'worst case scenario' in order to characterise the highest potential risk to human health from ground gas at the site.

On the basis of measurements in Table 9.3, the site maximum site hazardous gas flow rate is recorded to be <0.0029 L/h, which is the worst case for both methane and carbon dioxide. A maximum site hazardous gas flow rate of <0.0029 L/h lies well within the range of GSV values for CS1. As such, the gas regime for the site can be classified as Characteristic Situation 1 (CS1) based on the limited monitoring visits undertaken.

It is therefore considered that no gas protection measures are required to be installed within the proposed development, based on the available data. However, given the presence of hydrocarbons, it is deemed appropriate to install hydrocarbon resistant membranes to mitigate the vapour risk.

9.4 Revised Conceptual Site Model

The preliminary CSM, as outlined within the Phase 1 report and summarised within Section 7.1, has been updated and revised taking into account the data obtained during the intrusive investigation of the site. The revised summary of the residual potential contaminant sources and pathways is presented in Table 9.4 below:

Table 9.4 Revised Conceptual Site Model

Source	Contaminant	Pathway	Receptor
Made Ground	Asbestos fragments	Inhalation of airborne fibres	▶ Ground workers; and, ▶ Site end users.
Fuel spillage associated with an operational petrol filling station and leakage from underground storage tanks	TPHs, PAHs, SVOC and VOCs	Inhalation of vapours Ingestion of soils Dermal contact with soils Vertical and lateral migration	▶ Ground workers; ▶ Site end users; and, ▶ Controlled waters (Secondary 'A' Aquifers)

Although, the Tier II Generic Quantitative Risk Assessment did not identify any exceedances within the tested soil samples, a fragment of asbestos containing material obtained from HP101 has indicated the presence of Chrysotile asbestos fibres. The extent of the distribution of ACM fragments is currently not known and given the historical development of the site its presence elsewhere cannot be ruled out.

In addition to the above, excavating through soils containing ACM fragments may break fragments and release asbestos fibres into the air, creating a significant health risk to nearby personnel. Should ACM fragments be encountered during excavation, all work should stop immediately and REC should be contacted to determine the most appropriate remedial methodology and preventative measures. All open excavations which contain suspected asbestos fragments should be damped down and covered with plastic sheeting until a methodology has been determined.

Groundwater samples obtained from WS101 and WS102 monitoring wells have identified elevated concentrations of TPHs, PAHs, VOCs and SVOCs. The types and nature of these elevated concentration suggests a likely hydrocarbon contamination of controlled waters beneath the site.

Based on the proposed development plan and with respect to human health risk, WS101 is located within the proposed extension to the rear of the existing car showroom and as a result, the pathway between source and receptor would be broken by the building footprint, hence no potential risk to human health is anticipated.

However, WS102 is located adjacent to the operational petrol filling station and as such it is recommended that areas within the petrol filling station is further investigated to delineate the depth and lateral extent of the identified contamination in view of any planned future use.

Based on the identified exceedences stated above, there exists some residual risks with regards to human health and controlled waters. The site is underlain by superficial and bedrock Secondary 'A' Aquifers, highly permeable strata and strata with high leaching potential.

10. GEOTECHNICAL ASSESSMENT

10.1 Proposed Development

REC has been provided with a preliminary layout plan of the proposed development to comprise extension of existing showroom and workshop with the demolition of the current petrol filling station. The proposed development plan Drawing No. 1CO103133-002 is contained in Appendix III.

Details of the proposed loadings are not known, therefore no line loading has been assumed for preliminary assessment purposes only.

10.2 Summary of Ground and Groundwater Conditions

Ground conditions identified at the site are summarised in Section 8.1, and comprised Made Ground (concrete/asphalt over dark grey to light brown occasionally multicoloured clayey slightly sandy Gravel) overlying River Terrace Deposits (light brown to blueish grey gravelly alternating Clay and Sand. The River Terrace Deposits is underlain by stiff dark grey to blueish grey laminated slightly sandy CLAY.

During intrusive investigation groundwater strikes were encountered within WS101 at a depth of 4.00m bgl and within WS102 at a depth of 3.50m bgl. During three return monitoring visits, groundwater levels were recorded within the monitoring wells at depths ranging between 2.57m and 2.80m bgl (WS101), and 2.30m to 2.59m bgl (WS102).

10.3 Foundation Conditions and Bearing Capacity

10.3.1 Shallow Foundations

Made Ground is not considered a suitable founding material due to the inherent variability of the material which may give rise to unpredictable total and differential settlements. During intrusive investigation, Made Ground was encountered at various depths ranging from ground level to 0.95m bgl. It is therefore recommended that foundations pass through this stratum and bear onto the underlying River Terrace Deposits.

Based on SPT tests and assuming an average corrected 'N'-value of 15, an indicative allowable bearing pressure of 150kN/m^2 could be considered for the proposed development. This is based on limiting total settlements to 25mm, a factor of safety of 3 and a minimum founding depth of 1.5mbgl within the natural soils, and a strip foundation approximately 0.60m in width.

Given the groundwater monitoring records stated above, it is highly unlikely that the foundation will be affected by the groundwater and as such no provision has been made for this.

All foundations should be designed by suitably qualified structural engineers.

10.4 Concrete Durability

Based upon the results of the chemical analyses summarised in Table 8.4 above, it is considered that provided foundations are restricted to the superficial deposits, subsurface concrete can be designed

in accordance with Design Sulphate Class DS-1, and Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s.

Based on the chemical analysis of the groundwater samples and if the foundation is extended beyond the recorded groundwater levels, a subsurface concrete in accordance with Design Sulphate Class DS-1, and Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1d will be considered.

10.5 Excavations

It is recommended that where man entry into excavations deeper than 1.20m is required that either excavations are shored or that the sides of excavations are battered to a safe angle of repose.

Excavations should be protected during construction in order to avoid potentially excessive softening caused by wet weather or potential shrink and swell caused by periods of hot weather.

10.6 Floor Slabs

Given the nature of the proposed extensions and the potential volatile contaminant identified within the site, we would recommend that floor slabs are suspended in order to negate the possibility for differential settlements between the floor slab and the build-up volatiles to hazardous levels.

Where suspended floor slabs are employed, ventilation of the under floor void will be required to address condensation issues. Based on the ground gas risk assessment in Section 9.3 and summarised in Table 9.2, the site is considered a Characteristic Situation (CS-1) and therefore no gas protection measure required for the site.

It is recommended that advice should be sought from a suitably qualified structural engineer with regard to the design and construction of the floor slab.

10.7 Construction Activity and Inspection

The following activities and inspections should be incorporated in to the site works:

- It is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and floor slabs;
- Excavations should be protected during construction in order to avoid potentially excessive softening caused by wet weather or potential shrink and swell caused by periods of hot weather; and,
- Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 utilised.

10.8 Pavements and Construction

Given the nature of the site covered in hard standing and presence of an operational petrol filling station, it was considered high risk to undertake in-situ DCP testing. As a result, an average estimated CBR value has been determined in accordance with Design Manual for Roads and Bridges Volume 7: Pavement Design and Maintenance.

The underlying River Terrace Deposits gives an indicative of a design CBR value of 20% based on predominantly coarse grained soils.

As with good construction practice, it is recommended the formation level be inspected and that any areas of soft/loose deleterious strata are replaced with an appropriately compacted coarse grained medium. Likewise, any hard spots should also be removed to guard against reflective cracking in the pavement. Proof rolling/compaction of the formation level should be carried out prior to laying the new pavement.

10.9 Frost Susceptibility

The site may be classed as not susceptible to frost actions based on relative high permeability of the underlying natural River Terrace Deposits. However, the wet sieve analysis of the soil sample taken beneath the made ground at a depth of 1.20m to 1.30m bgl indicates that fine materials greater than 10% passes through 65 microns which may suggest susceptibility to frost.

Based on Transport and Road Research Laboratory (1970) table, a greater proportion of the depth is comprised of Made Ground which ideally will be stripped-off during construction and replaced with imported subgrade, which will decrease the percentage of fines making the site non susceptible to frost

11. CONCLUSIONS & RECOMMENDATIONS

An intrusive ground investigation was undertaken based on the recommendations of the preliminary desk study report which formed the front-end of this report.

Based on the above, some residual risk to human health and a significant risk to controlled waters is present and this is likely to require further works as detailed further below:

- Although, the Tier II Generic Quantitative Risk Assessment did not identify any exceedances within the tested soil samples, a fragment of asbestos containing material obtained from HP101 has indicated the presence of Chrysotile asbestos fibres. The extent of the distribution of ACM fragments is currently not known and given the historical development of the site its presence elsewhere cannot be ruled out;
- Analysis of elevated concentrations and type of contaminants suggests a likely hydrocarbon contamination within controlled waters beneath the site. Given the location of WS101 which lies beneath the proposed development footprint to the rear of the car showroom, it is considered that the pathway would be broken by the footprint and no potential risk to human health is anticipated. With regards to controlled waters (Secondary 'A' Aquifers), there exists some residual risks based on the fact that the site is underlain by Secondary 'A' Aquifers, strata beneath the site are highly permeable with high leaching potential and the potential source of contamination (Petrol filling station) still exists. We note however that the intrusive construction work will only be where the exploratory holes were located and outside of the main existing petrol station so the Local Authority will ultimately decide the scope of any additional works. However, in our opinion this is likely to comprise positioning additional window sample holes around the existing tanks and on a general grid system across the forecourt area with supplementary analytical testing undertaken in order to further assess the risk; and
- For any future intrusive ground investigation works, it is recommended that a detailed utilities plan on the site is obtained in view of the high risk associated with intrusive investigation works within petrol filling stations. This will assist with design of future intrusive investigation and aid with risk assessment of any potential contamination therein.

The above recommendations will need to be confirmed with the Local Authority prior to design.

END OF REPORT

APPENDIX I

LIMITATIONS



1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Ltd and the Client as indicated in Section 1.2.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.

5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

6. In addition to the above REC Ltd note that when investigating, or developing, potentially contaminated land it is important to recognise that sub-surface conditions may vary spatially and also with time. The absence of certain ground, ground gas, and contamination or groundwater conditions at the positions tested is not a guarantee that such conditions do not exist anywhere across the site. Due to the presence of existing buildings and structures access could not be obtained to all areas. Additional contamination may be identified following the removal of the buildings or hard standing.

7. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

8. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.

9. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

10. This report presents an interpretation of the geotechnical information established by excavation, observation and testing. Whilst every effort is made in interpretative reporting to assess the soil conditions over the Site it should be noted that natural strata vary from point to point and that man made deposits are subject to an even greater diversity. Groundwater conditions are dependent on seasonal and other factors. Consequently there may be conditions present not revealed by this investigation.

11. REC can not be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.

12. Rather, this investigation has been undertaken to provide a preliminary characterisation of the existing sub-surface geotechnical characteristics and make up and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

13. This investigation has been undertaken to reasonably characterise existing sub-surface conditions and the findings of this study are our best interpretation of the data collected, within the scope of work and agreed budget. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II

GLOSSARY



TERMS

AST	Above Ground Storage Tank
BGS	British Geological Survey
BSI	British Standards Institute
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CIEH	Chartered Institute of Environmental Health
CIRIA	Construction Industry Research Association
CLEA	Contaminated Land Exposure Assessment
CSM	Conceptual Site Model
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)
DWS	Drinking Water Standard
EA	Environment Agency
EQS	Environmental Quality Standard
GAC	General Assessment Criteria
GL	Ground Level
GSV	Gas Screening Value
HCV	Health Criteria Value
ICSM	Initial Conceptual Site Model
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)
ND	Not Detected
LMRL	Lower Method Reporting Limit
NR	Not Recorded
PAH	Poly Aromatic Hydrocarbon
PCB	Poly-Chlorinated Biphenyl
PID	Photo Ionisation Detector
QA	Quality Assurance
SGV	Soil Guideline Value
SPH	Separate Phase Hydrocarbon
Sp.TPH (CWG)	Total Petroleum Hydrocarbon (Criteria Working Group)
SPT	Standard Penetration Test
SVOC	Semi Volatile Organic Compound
UST	Underground Storage Tank
VCCs	Vibro Concrete Columns
VOC	Volatile Organic Compound
WTE	Water Table Elevation

UNITS

m	Metres
km	Kilometres
%	Percent
%v/v	Percent volume in air
mb	Milli Bars (atmospheric pressure)
l/hr	Litres per hour
µg/l	Micrograms per Litre (parts per billion)
ppb	Parts Per Billion
mg/kg	Milligrams per kilogram (parts per million)
ppm	Parts Per Million
mg/m^3	Milligram per metre cubed
m bgl	Metres Below Ground Level
m bcl	Metre Below Cover Level
mAOD	Metres Above Ordnance Datum (sea level)
kN/m^2	Kilo Newtons per metre squared
µm	Micro metre



APPENDIX III

DRAWINGS

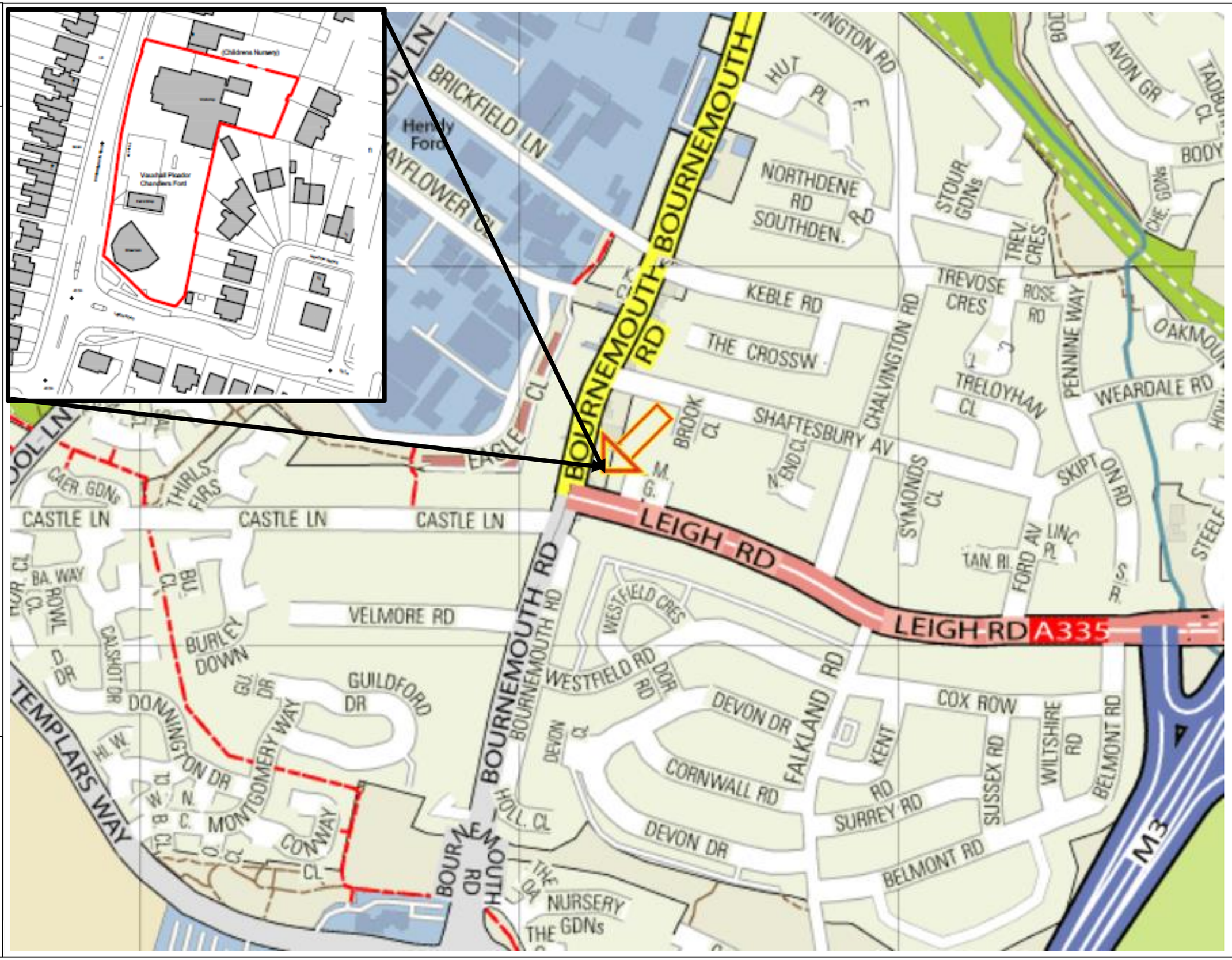


KEY:

N
W E
S

Red Line Site Boundary

Site Location



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Picador Vauxhall Chandler's Ford, Eastleigh.

Client:

Gibson Surveyors Ltd

Job No:	**1C0103133**
Drawn By:	**MN**
Approved by:	**CT**

Notes:

NOT DRAWN TO SCALE

Drawing Title:

1CO103133-001
Site Location Plan

KEY:

N
W E
S

Red Line Site Boundary

Proposed New Buildings

Existing Buildings

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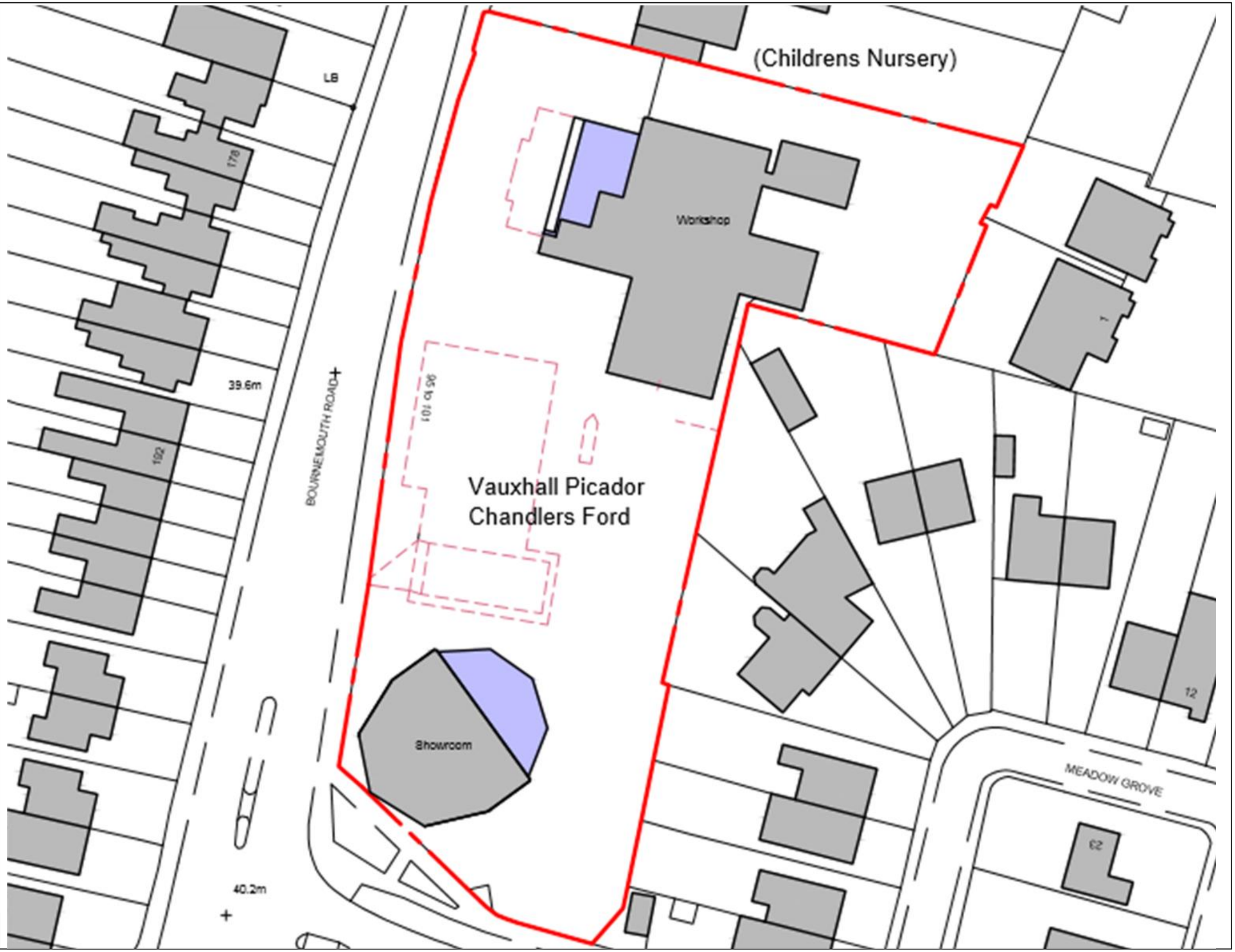

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Client:
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Drawn By:	**MN**
Approved by:	**CT**

Notes:
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Drawing Title:
1CO103133-002 Proposed Development Plan

KEY:

N
W E
S

Window Sampling Locations with installs

Window Sampling Location without install

Shallow Hand Pit Location

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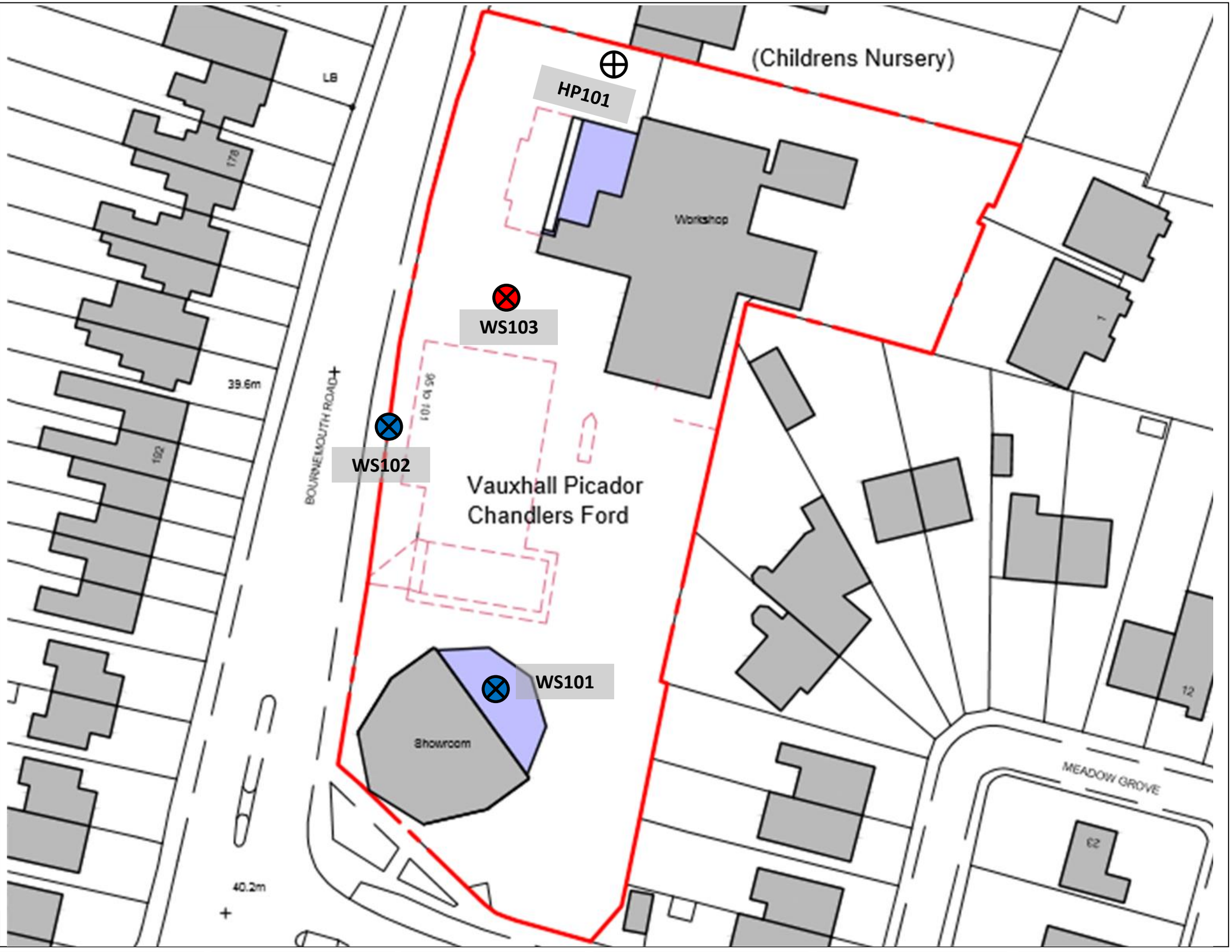

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Client:
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Job No:	**1C0103133**
Drawn By:	**MN**
Approved by:	**CT**

Notes:
NOT DRAWN TO SCALE

Drawing Title:
1CO103133-003 Exploratory Hole Location Plan

KEY:

N
W E
S

Window Sampling Locations with installs

Window Sampling Location without install

Shallow Hand Pit Location

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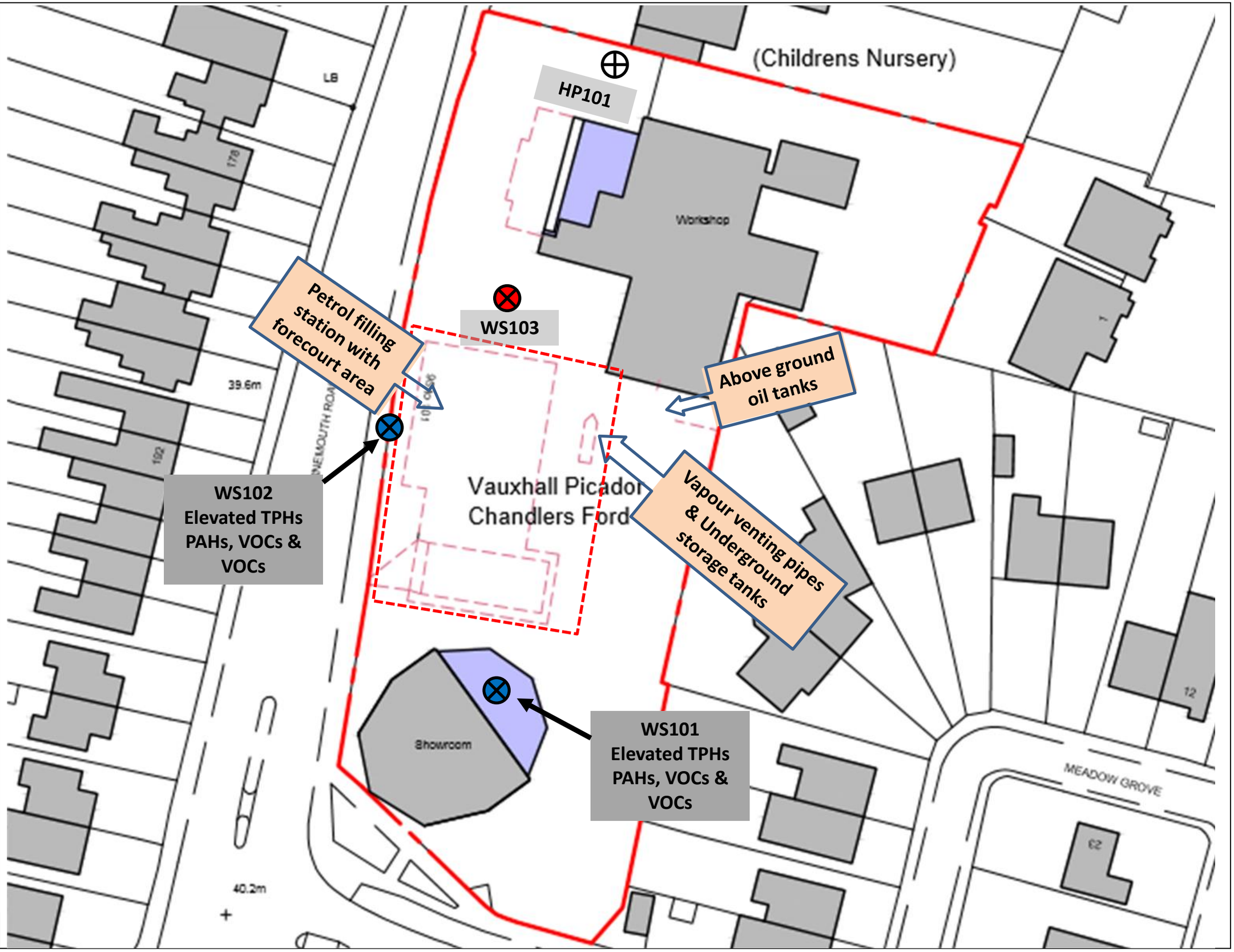

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Client: **Gibson Surveyors Ltd**

Job No:	**1C0103133**
Drawn By:	**MN**
Approved by:	**CT**

Notes: **NOT DRAWN TO SCALE**

Drawing Title: **1CO103133-004 Exploratory Hole Location-Contamination Plan**

APPENDIX IV

REC EXPLORATORY LOGS



Borehole Log

Borehole No. **WS101**

Sheet 1 of 1

Project Name:	Picador Vauxhall, 95-101 Bournemouth Road, Chandler's Ford, Eastleigh, SO53 3AQ	Proj. ID:	1CO103133	Easting: Northing:	Hole Type WS
Location:	Chandler's Ford	Plant:	Dando 2000	Level (m AOD): Final Depth (m): 5.00	Scale: 1:30
Client:	Gibbotech Ltd	Crew:	Geo Site & Testing Services Ltd	Start Date: 20/03/2017 End Date: 20/03/2017	REC Engineer: MN

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			Asphalt. [MADE GROUND]
		0.25 - 0.30	ES		0.20			Brown sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to medium granite. [MADE GROUND]
		0.50 - 0.60	ES		0.35 0.40			Dark grey to brown sandy GRAVEL with occasional roots and rootlets. sand is fine to coarse. Gravel is subangular to rounded fine to medium flint, concrete, asphalt and glass. [MADE GROUND]
					0.90			Layer of cemented brickwork. [MADE GROUND]
		1.20 - 1.30 1.20	D SPT	N=8 (0,1/1,2,2,3)				Soft grey to brown slightly gravelly sandy CLAY. sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, brick and combustion material. [MADE GROUND]
					1.40			Soft to firm light brown to orangeish brown gravelly CLAY. Gravel is subangular to rounded fine to coarse flint. [RIVER TERRACE DEPOSITS]
		1.80 - 2.00	D					Bluish grey CLAY interbedded with yellowish brown fine to medium SAND with occasional sub-rounded to rounded flint. [RIVER TERRACE DEPOSITS]
		2.00	SPT	N=25 (5,6/4,5,8,8)				
		2.40 - 2.60	D					
		2.90 - 3.00	D					
		3.00	SPT	N=21 (3,2/4,5,6,6)	3.00			
		3.10 - 3.20	D					Medium dense orangeish brown fine to medium SAND with occasional grey clay lenses. [RIVER TERRACE DEPOSITS]
	▼	3.90 - 4.00	D					
		4.00	SPT	N=23 (4,5/5,6,6,6)				
		4.90 - 5.00	D					
		5.00	SPT	N=10 (2,2/2,2,2,4)	5.00			End of Borehole at 5.00m

Remarks:

Location cleared for buried services using a Cable Avoidance Tool (CAT). Inspection pit hand excavated to 1.20m bgl. Groundwater encountered at 4.00m bgl. 50mm internal diameter monitoring standpipe installed to 4.50m bgl and finished with flush fitting cover set in concrete.

Borehole Log

Borehole No. **WS102**

Sheet 1 of 1

Project Name:	Picador Vauxhall, 95-101 Bournemouth Road, Chandler's Ford, Eastleigh, SO53 3AQ	Proj. ID:	1CO103133	Easting: Northing:	Hole Type WS
Location:	Chandler's Ford	Plant:	Dando 2000	Level (m AOD): Final Depth (m): 5.00	Scale: 1:30
Client:	Gibbotech Ltd	Crew:	Geo Site & Testing Services Ltd	Start Date: 20/03/2017 End Date: 20/03/2017	REC Engineer: MN

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 - 0.30	ES		0.10			Asphalt. [MADE GROUND]
					0.30			Grey sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, granite, brick, concrete and combustion material. Cobbles are flint and brick. [MADE GROUND]
					0.45 0.50			
		0.70 - 0.80	ES					Yellowish to brown to orange slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, brick and concrete. [MADE GROUND]
					0.95			Layer of cemented brickwork. [MADE GROUND]
		1.20 - 1.30 1.20	D SPT	N=17 (2,3/4,3,5,5)				Dark grey to black sandy GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, asphalt and brick. [MADE GROUND]
					1.40			Stiff light brown to orangeish brown gravelly CLAY. Gravel is subangular to rounded fine to coarse flint. [RIVER TERRACE DEPOSITS]
		1.90 - 2.00 2.00	D SPT	N=18 (4,3/4,5,4,5)				Bluish grey CLAY interbedded with yellowish brown fine to medium SAND with occasional sub-rounded to rounded flint. [RIVER TERRACE DEPOSITS]
					2.60			
		2.70 - 2.80	D		2.70			Medium dense brown slightly clayey SAND. Sand is fine to medium. [RIVER TERRACE DEPOSITS]
		3.00	SPT	N=13 (2,4/5,3,2,3)				Medium dense orangeish brown to blueish grey laminated CLAY and SAND with occasional off-white subangular to rounded fine to medium flints. Sand is fine to medium. [RIVER TERRACE DEPOSITS]
	▼							
		3.90 - 4.00 4.00	D SPT	N=17 (3,3/5,3,4,5)				
		4.80 - 5.00	D		4.80			Stiff dark grey - blueish grey laminated slightly sandy CLAY. Sandi is fine to medium. [WITTERING FORMATION]
		5.00	SPT	N=14 (2,2/3,4,3,4)	5.00			End of Borehole at 5.00m

Remarks:

Location cleared for buried services using a Cable Avoidance Tool (CAT). Inspection pit hand excavated to 1.20m bgl. Groundwater encountered at 3.50m bgl. 50mm internal diameter monitoring standpipe installed to 4.50m bgl and finished with flush fitting cover set in concrete.

Borehole Log

Borehole No. **WS103**

Sheet 1 of 1

Project Name:	Picador Vauxhall, 95-101 Bournemouth Road, Chandler's Ford, Eastleigh, SO53 3AQ	Proj. ID: 1CO103133	Easting: Northing:	Hole Type WS
Location:	Chandler's Ford	Plant: Dando 2000	Level (m AOD): Final Depth (m): 1.65	Scale: 1:30
Client:	Gibbotech Ltd	Crew: Geo Site & Testing Services Ltd	Start Date: 20/03/2017 End Date: 20/03/2017	REC Engineer: MN

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.15 - 0.20	ES		0.10			Asphalt. [MADE GROUND]
		0.50 - 0.60	ES		0.25			Light brown sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, brick, asphalt and concrete. Cobbles are flint, brick and asphalt. [MADE GROUND]
					0.80			Dark grey clayey slightly gravelly SILT. Gravel is subangular to rounded fine to coarse flint and black combustion material. Cobbles are flint. [MADE GROUND]
		1.20	SPT	N=26 (3,5/5,6,6,9)				*.. @ 0.300mm bgl: asphalt layer.* Medium dense to dense yellowish brown to blueish grey clayey slightly sandy GRAVEL with low cobble content. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse flint. Cobbles are flint. [RIVER TERRACE DEPOSITS]
		1.50 - 1.60	D					
		1.65	SPT	N=50 (9,9/50 for 250mm)	1.65			End of Borehole at 1.65m

Remarks:

Location cleared for buried srvices using a Cable Avoidance Tool (CAT). Inspection pit hand excavated to 1.20m bgl. No groundwater encountered. Hole terminated at 1.65m bgl due to refusal. Hole backfilled with arisings and reinstated with concrete at surface.

Borehole Log

Borehole No. **HP101**

Sheet 1 of 1

Project Name:	Picador Vauxhall, 95-101 Bournemouth Road, Chandler's Ford, Eastleigh, SO53 3AQ	Proj. ID: 1CO103133	Easting: Northing:	Hole Type HP
Location:	Chandler's Ford	Plant: Hand Tools	Level (m AOD): Final Depth (m): 0.70	Scale: 1:50
Client:	Gibbotech Ltd	Crew: REC	Start Date: 12/04/2017 End Date: 12/04/2017	REC Engineer: MN

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30 - 0.40	ES		0.15			Concrete. [MADE GROUND]
		0.60 - 0.70	D		0.20 0.25 0.60 0.70			Loose dark grey to light brown sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to rounded fine to medium flint, concrete, and brick. [MADE GROUND] Dark grey SLATE with occasional light brown fine to coarse sand. [MADE GROUND] Soft dark grey to orangeish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint, brick, lead-sheet, slate and black combustion material. Cobbles are angular to subrounded bricks. [MADE GROUND] Soft and wet light brown slightly sandy slightly gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to rounded fine to coarse flint. Cobbles are angular to rounded flints. [RIVER TERRACE DEPOSITS] End of Borehole at 0.70m

Remarks:

Location cleared of buried service using Cable Avoidance Tool (CAT) scan. Hand pit hand excavated to 0.70m bgl using digging tools. No groundwater encountered. Hole backfilled with arising and reinstated with cement mix.

APPENDIX V

CHEMICAL TESTING RESULTS



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Certificate of Analysis

3 Crittall Drive
Springwood Industrial Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 642683-1

Date of Report: 03-Apr-2017

Customer: Resource Environmental Consultants Ltd
UNIT 47
Basepoint Business Center
1 Winnall Valley Road
Winchester
Hampshire
SO23 0LD

Customer Contact: Miss Charlotte Toth

Customer Job Reference: 1CO103133
Customer Purchase Order: 002580
Customer Site Reference: Picador Vauxhall
Date Job Received at Concept: 27-Mar-2017
Date Analysis Started: 28-Mar-2017
Date Analysis Completed: 03-Apr-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with Concept SOPs

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Claire Brown Crociquia
Customer Service Manager

Issued by :
Claire Brown Crociquia
Customer Service Manager

Concept Reference: 642683
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
REC002S (SE)

				Concept Reference	**642683 001**	**642683 002**	**642683 003**	**642683 005**
				Customer Sample Reference	**WS101 @ 0.25-0.30m**	**WS102 @ 0.20-0.30m**	**WS102 @ 2.70-2.80m**	**WS103 @ 0.50-0.60m**
				Date Sampled	**20-MAR-2017**	**20-MAR-2017**	**20-MAR-2017**	**20-MAR-2017**
				Type	**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Arsenic	T257	A40	2	mg/kg	**15**	**10**	**9**	**8**
Barium	T257	A40	2	mg/kg	**410**	**460**	**18**	**35**
Beryllium	T245	A40	0.5	mg/kg	**0.7**	<0.5	**1.7**	<0.5
Boron (water-soluble)	T82	A40	1	mg/kg	<1	<1	<1	<1
Cadmium	T257	A40	0.1	mg/kg	**1.0**	**0.6**	<0.1	<0.1
Chromium	T257	A40	0.5	mg/kg	**18**	**13**	**33**	**11**
Copper	T257	A40	2	mg/kg	**130**	**37**	**19**	**23**
Lead	T257	A40	2	mg/kg	**500**	**170**	**20**	**55**
Mercury	T245	A40	1.0	mg/kg	<1.0	<1.0	<1.0	<1.0
Nickel	T257	A40	0.5	mg/kg	**11**	**13**	**13**	**5.7**
Selenium	T257	A40	3	mg/kg	<3	<3	<3	<3
Vanadium	T257	A40	0.1	mg/kg	**27**	**22**	**30**	**21**
Zinc	T257	A40	2	mg/kg	**440**	**170**	**42**	**43**
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected	Asbestos not detected	Asbestos not detected
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1
pH	T7	A40			**7.8**	**10.4**	**5.4**	**7.4**
Soil Organic Matter	T287	A40	0.1	%	**5.2**	**5.5**	**0.2**	**2.5**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.13**	**0.05**	<0.01	**0.07**
SO4(Total)	T102	A40	0.02	%	**0.10**	**0.10**	<0.02	**0.05**
Cyanide(Total)	T921	AR	1	mg/kg	<1	<1	<1	<1
Phenols(Mono)	T921	AR	1	mg/kg	<1	<1	<1	<1
Moisture @105C	T162	AR	0.1	%	**11**	**11**	**18**	**14**
Retained on 2mm	T2	A40	0.1	%	**38.5**	**49.3**	<0.1	**16.4**

Concept Reference: 642683
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

				Concept Reference	**642683 001**	**642683 002**	**642683 003**	**642683 005**
				Customer Sample Reference	**WS101 @ 0.25-0.30m**	**WS102 @ 0.20-0.30m**	**WS102 @ 2.70-2.80m**	**WS103 @ 0.50-0.60m**
				Date Sampled	**20-MAR-2017**	**20-MAR-2017**	**20-MAR-2017**	**20-MAR-2017**
				Type	**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Naphthalene	T16	AR	0.1	mg/kg	<0.1	**0.1**	<0.1	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1	**1.1**	<0.1	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1	**0.5**	<0.1	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	**0.5**	**4.3**	<0.1	**0.2**
Anthracene	T16	AR	0.1	mg/kg	**0.5**	**0.5**	<0.1	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	**1.2**	**2.7**	<0.1	**1.0**
Pyrene	T16	AR	0.1	mg/kg	**1.0**	**1.9**	<0.1	**0.9**
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	**0.7**	**0.7**	<0.1	**0.6**
Chrysene	T16	AR	0.1	mg/kg	**0.7**	**0.7**	<0.1	**0.6**
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	**0.5**	**0.7**	<0.1	**0.6**
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	**0.7**	**0.8**	<0.1	**0.7**
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	**0.6**	**0.4**	<0.1	**0.7**
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	**0.3**	**0.2**	<0.1	**0.4**
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	**0.2**	<0.1	<0.1	**0.1**
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	**0.4**	**0.2**	<0.1	**0.4**
PAH(total)	T16	AR	0.1	mg/kg	**7.2**	**15**	<0.1	**6.3**

Concept Reference: 642683
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625) (SE)

Concept Reference	**642683 003**
Customer Sample Reference	**WS102 @ 2.70-2.80m**
Date Sampled	**20-MAR-2017**
Type	**Clay**

Determinand	Method	Test Sample	LOD	Units	
Phenol	T207	AR	0.1	mg/kg	<0.1
Bis (2-chloroethyl) ether	T207	AR	0.1	mg/kg	<0.1
2-Chlorophenol	T207	AR	0.1	mg/kg	<0.1
1,3-Dichlorobenzene	T207	AR	0.1	mg/kg	<0.1
1,4-Dichlorobenzene	T207	AR	0.1	mg/kg	<0.1
1,2-Dichlorobenzene	T207	AR	0.1	mg/kg	<0.1
Bis (2-chloroisopropyl) ether	T207	AR	0.1	mg/kg	<0.1
2-methyl phenol	T207	AR	0.1	mg/kg	<0.1
3/4-Methylphenol	T207	AR	0.1	mg/kg	<0.1
Hexachloroethane	T207	AR	0.1	mg/kg	<0.1
Nitrobenzene	T207	AR	0.1	mg/kg	<0.1
Isophorone	T207	AR	0.1	mg/kg	<0.1
2-Nitrophenol	T207	AR	0.1	mg/kg	<0.1
2,4-Dimethylphenol	T207	AR	0.1	mg/kg	<0.1
Bis (2-chloroethoxy) methane	T207	AR	0.1	mg/kg	<0.1
2,4-Dichlorophenol	T16	AR	0.1	mg/kg	<0.1
1,2,4-Trichlorobenzene	T207	AR	0.1	mg/kg	<0.1
Carbazole	T207	AR	0.1	mg/kg	<0.1
Naphthalene	T207	AR	0.1	mg/kg	<0.1
4-Chloroaniline	T207	AR	0.1	mg/kg	<0.1
Hexachlorobutadiene	T207	AR	0.1	mg/kg	<0.1
4-Chloro-3-methylphenol	T207	AR	0.1	mg/kg	<0.1
2-Methylnaphthalene	T207	AR	0.1	mg/kg	<0.1
Hexachlorocyclopentadiene	T207	AR	0.1	mg/kg	<0.1
2,4,6-Trichlorophenol	T16	AR	0.1	mg/kg	<0.1
2,4,5-Trichlorophenol	T16	AR	0.1	mg/kg	<0.1
2-Chloronaphthalene	T207	AR	0.1	mg/kg	<0.1
2-Nitroaniline	T207	AR	0.1	mg/kg	<0.1
Dimethyl phthalate	T207	AR	0.1	mg/kg	<0.1
2,4-Dinitrotoluene	T207	AR	0.1	mg/kg	<0.1
Acenaphthylene	T207	AR	0.1	mg/kg	<0.1
Acenaphthene	T207	AR	0.1	mg/kg	<0.1
3-Nitroaniline	T207	AR	0.1	mg/kg	<0.1
Dibenzofuran	T207	AR	0.1	mg/kg	<0.1
2,6-Dinitrotoluene	T207	AR	0.1	mg/kg	<0.1
Diethyl phthalate	T207	AR	0.1	mg/kg	<0.1
Fluorene	T207	AR	0.1	mg/kg	<0.1
4-Chlorophenyl phenylether	T207	AR	0.1	mg/kg	<0.1
4-Nitroaniline	T207	AR	0.1	mg/kg	<0.1
Azobenzene	T207	AR	0.1	mg/kg	<0.1
4-Bromophenyl phenylether	T207	AR	0.1	mg/kg	<0.1
Hexachlorobenzene	T207	AR	0.1	mg/kg	<0.1
Pentachlorophenol	T207	AR	0.1	mg/kg	<0.1
Phenanthrene	T207	AR	0.1	mg/kg	<0.1
Anthracene	T207	AR	0.1	mg/kg	<0.1
Di-n-butylphthalate	T207	AR	0.1	mg/kg	<0.1
Fluoranthene	T207	AR	0.1	mg/kg	<0.1
Pyrene	T207	AR	0.1	mg/kg	<0.1
Butyl benzylphthalate	T207	AR	0.1	mg/kg	<0.1
Benzo(a)Anthracene	T207	AR	0.1	mg/kg	<0.1
Chrysene	T207	AR	0.1	mg/kg	<0.1
Bis (2-ethylhexyl)phthalate	T207	AR	0.1	mg/kg	<0.1
Di-n-octylphthalate	T207	AR	0.1	mg/kg	<0.1
Benzo(b/k)Fluoranthene	T207	AR	0.1	mg/kg	<0.1
Benzo(a)Pyrene	T207	AR	0.1	mg/kg	<0.1
Indeno(123-cd)Pyrene	T207	AR	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T207	AR	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T207	AR	0.1	mg/kg	<0.1

Concept Reference: 642683
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
Suite C

				Concept Reference	**642683 001**	**642683 002**	**642683 004**	**642683 005**
				Customer Sample Reference	**WS101 @ 0.25-0.30m**	**WS102 @ 0.20-0.30m**	**WS102 @ 3.90-4.00m**	**WS103 @ 0.50-0.60m**
				Date Sampled	**20-MAR-2017**	**20-MAR-2017**	**20-MAR-2017**	**20-MAR-2017**
				Type	**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
TPH (C5-C6)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10
TPH (C6-C8)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10)	T54	AR	0.10	mg/kg	<0.10	<0.10	**0.16**	<0.10
TPH (C10-C12)	T219	AR	2	mg/kg	<2	<2	<2	<2
TPH (C12-C16)	T219	AR	2	mg/kg	<2	**6**	<2	<2
TPH (C16-C21)	T219	AR	2	mg/kg	**7**	**18**	<2	**3**
TPH (C21-C35)	T219	AR	2	mg/kg	**140**	**180**	<2	**60**

Concept Reference: 642683
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
REC TPH CWG (SE)

				Concept Reference	**642683 003**	
				Customer Sample Reference	**WS102 @ 2.70-2.80m**	
				Date Sampled	**20-MAR-2017**	
				Type	**Clay**	
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
Benzene	T209	AR	10	µg/kg	<10	
Toluene	T209	AR	10	µg/kg	<10	
EthylBenzene	T209	AR	10	µg/kg	<10	
M/P Xylene	T209	AR	10	µg/kg	<10	
O Xylene	T209	AR	10	µg/kg	<10	
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	<10	
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010	
TPH (C5-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010	
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	**0.10**	
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010	
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	**0.45**	
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	**0.038**	
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	**8**	
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	**3**	
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	**24**	
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	**6**	
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	**17**	
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	**2**	
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	**10**	
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	**6**	

Concept Reference: 642683
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
VOC (SE)

Concept Reference	**642683 003**
Customer Sample Reference	**WS102 @ 2.70-2.80m**
Date Sampled	**20-MAR-2017**
Type	**Clay**

Determinand	Method	Test Sample	LOD	Units	
1,1,1,2-Tetrachloroethane	T209	AR	50	µg/kg	<50
1,1,1-Trichloroethane	T54	AR	5	µg/kg	<5
1,1,2,2-Tetrachloroethane	T209	AR	50	µg/kg	<50
1,1,2-Trichloroethane	T54	AR	5	µg/kg	<5
1,1-Dichloroethane	T54	AR	5	µg/kg	<5
1,1-Dichloroethylene	T54	AR	5	µg/kg	<5
1,1-Dichloropropene	T54	AR	5	µg/kg	<5
1,2,3-Trichlorobenzene	T54	AR	5	µg/kg	<5
1,2,3-Trichloropropane	T54	AR	5	µg/kg	<5
1,2,4-Trichlorobenzene	T54	AR	5	µg/kg	<5
1,2,4-Trimethylbenzene	T54	AR	50	µg/kg	<50
1,2-Dibromo-3-Chloropropane	T54	AR	10	µg/kg	<10
1,2-dibromoethane	T209	AR	50	µg/kg	<50
1,2-Dichlorobenzene	T54	AR	5	µg/kg	<5
1,2-Dichloroethane	T54	AR	5	µg/kg	<5
1,2-Dichloropropane	T54	AR	5	µg/kg	<5
1,3,5-Trimethylbenzene	T54	AR	5	µg/kg	<5
1,3-Dichlorobenzene	T54	AR	5	µg/kg	<5
1,3-Dichloropropane	T209	AR	50	µg/kg	<50
1,4-Dichlorobenzene	T54	AR	5	µg/kg	<5
Ethyl-2-Methylbenzene	T54	AR	5	µg/kg	<5
2,2-Dichloropropane	T54	AR	5	µg/kg	<5
2-Chlorotoluene	T54	AR	5	µg/kg	<5
4-Chlorotoluene	T54	AR	5	µg/kg	<5
Benzene	T209	AR	10	µg/kg	<10
Bromobenzene	T54	AR	5	µg/kg	<5
Bromochloromethane	T54	AR	5	µg/kg	<5
Bromodichloromethane	T54	AR	5	µg/kg	<5
Bromoform	T209	AR	50	µg/kg	<50
Bromomethane	T54	AR	5	µg/kg	<5
Carbon tetrachloride	T54	AR	5	µg/kg	<5
Chlorobenzene	T54	AR	5	µg/kg	<5
Chlorodibromomethane	T54	AR	5	µg/kg	<5
Chloroethane	T209	AR	50	µg/kg	<50
Chloroform	T54	AR	5	µg/kg	<5
Chloromethane	T209	AR	50	µg/kg	<50
Cis-1,2-Dichloroethylene	T54	AR	5	µg/kg	<5
Cis-1,3-Dichloropropene	T54	AR	5	µg/kg	<5
Dibromomethane	T54	AR	5	µg/kg	<5
Dichlorodifluoromethane	T209	AR	50	µg/kg	<50
EthylBenzene	T209	AR	10	µg/kg	<10
Hexachlorobutadiene	T209	AR	10	µg/kg	<10
Isopropyl benzene	T54	AR	50	µg/kg	<50
m/p ethyl toluene	T54	AR	5	µg/kg	<5
M/P Xylene	T209	AR	10	µg/kg	<10
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	<10
n-Butylbenzene	T54	AR	10	µg/kg	**15**
n-Propylbenzene	T54	AR	50	µg/kg	<50
O Xylene	T209	AR	10	µg/kg	<10
p-Isopropyltoluene	T54	AR	5	µg/kg	<5
S-Butylbenzene	T54	AR	5	µg/kg	**25**
Styrene	T54	AR	50	µg/kg	<50
T-Butylbenzene	T54	AR	5	µg/kg	<5
Tertiary amyl methyl ether	T54	AR	5	µg/kg	<5
Tetrachloroethene	T54	AR	5	µg/kg	<5
Toluene	T209	AR	10	µg/kg	<10
Trans-1,2-Dichloroethene	T54	AR	5	µg/kg	<5
Trans-1,3-Dichloropropene	T54	AR	5	µg/kg	<5
Trichloroethene	T54	AR	5	µg/kg	<5

Concept Reference:	642683
Project Site:	Picador Vauxhall
Customer Reference:	1CO103133

Soil Analysed as Soil
VOC (SE)

Concept Reference	**642683 003**
Customer Sample Reference	**WS102 @ 2.70-2.80m**
Date Sampled	**20-MAR-2017**
Type	**Clay**

Determinand	Method	Test Sample	LOD	Units	
Trichlorofluoromethane	T54	AR	5	µg/kg	<5
Vinyl chloride	T54	AR	10	µg/kg	<10

Index to symbols used in 642683-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

004 - TPH Banded - These samples were received in containers that are inappropriate for this parameter of interest. It is possible therefore that the results provided may be compromised.
Retained on 2mm is removed before analysis
Asbestos subcontracted to REC Limited
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except TPH c5-c35 aro/ali split and TPH Banded

Method Index

Value	Description
T2	Grav
T245	ICP/OES (Aqua Regia Extraction)
T287	Calc TOC/0.58
T16	GC/MS
T27	PLM
T54	GC/MS (Headspace)
T82	ICP/OES (Sim)
T162	Grav (1 Dec) (105 C)
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T7	Probe
T207	GC/MS (MCERTS)
T219	GC/FID (SE)
T6	ICP/OES
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T921	Colorimetry (CF) (MCERT)
T102	ICP/OES (HCl extract)
T209	GC/MS (Head Space)(MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Phenol	T207	AR	0.1	mg/kg	M	003
Bis (2-chloroethyl) ether	T207	AR	0.1	mg/kg	M	003
2-Chlorophenol	T207	AR	0.1	mg/kg	M	003
1,3-Dichlorobenzene	T207	AR	0.1	mg/kg	M	003
1,4-Dichlorobenzene	T207	AR	0.1	mg/kg	M	003
1,2-Dichlorobenzene	T207	AR	0.1	mg/kg	M	003
Bis (2-chloroisopropyl) ether	T207	AR	0.1	mg/kg	M	003
2-methyl phenol	T207	AR	0.1	mg/kg	U	003
3/4-Methylphenol	T207	AR	0.1	mg/kg	M	003
Hexachloroethane	T207	AR	0.1	mg/kg	M	003

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Nitrobenzene	T207	AR	0.1	mg/kg	M	003
Isophorone	T207	AR	0.1	mg/kg	M	003
2-Nitrophenol	T207	AR	0.1	mg/kg	N	003
2,4-Dimethylphenol	T207	AR	0.1	mg/kg	N	003
Bis (2-chloroethoxy) methane	T207	AR	0.1	mg/kg	M	003
2,4-Dichlorophenol	T16	AR	0.1	mg/kg	N	003
1,2,4-Trichlorobenzene	T207	AR	0.1	mg/kg	M	003
Carbazole	T207	AR	0.1	mg/kg	U	003
Naphthalene	T207	AR	0.1	mg/kg	U	003
4-Chloroaniline	T207	AR	0.1	mg/kg	U	003
Hexachlorobutadiene	T207	AR	0.1	mg/kg	M	003
4-Chloro-3-methylphenol	T207	AR	0.1	mg/kg	M	003
2-Methylnaphthalene	T207	AR	0.1	mg/kg	M	003
Hexachlorocyclopentadiene	T207	AR	0.1	mg/kg	N	003
2,4,6-Trichlorophenol	T16	AR	0.1	mg/kg	N	003
2,4,5-Trichlorophenol	T16	AR	0.1	mg/kg	N	003
2-Chloronaphthalene	T207	AR	0.1	mg/kg	M	003
2-Nitroaniline	T207	AR	0.1	mg/kg	M	003
Dimethyl phthalate	T207	AR	0.1	mg/kg	M	003
2,4-Dinitrotoluene	T207	AR	0.1	mg/kg	U	003
Acenaphthylene	T207	AR	0.1	mg/kg	U	003
Acenaphthene	T207	AR	0.1	mg/kg	M	003
3-Nitroaniline	T207	AR	0.1	mg/kg	U	003
Dibenzofuran	T207	AR	0.1	mg/kg	M	003
2,6-Dinitrotoluene	T207	AR	0.1	mg/kg	M	003
Diethyl phthalate	T207	AR	0.1	mg/kg	M	003
Fluorene	T207	AR	0.1	mg/kg	M	003
4-Chlorophenyl phenylether	T207	AR	0.1	mg/kg	M	003
4-Nitroaniline	T207	AR	0.1	mg/kg	U	003
Azobenzene	T207	AR	0.1	mg/kg	M	003
4-Bromophenyl phenylether	T207	AR	0.1	mg/kg	M	003
Hexachlorobenzene	T207	AR	0.1	mg/kg	M	003
Pentachlorophenol	T207	AR	0.1	mg/kg	N	003
Phenanthrene	T207	AR	0.1	mg/kg	U	003
Anthracene	T207	AR	0.1	mg/kg	M	003
Di-n-butylphthalate	T207	AR	0.1	mg/kg	U	003
Fluoranthene	T207	AR	0.1	mg/kg	N	003
Pyrene	T207	AR	0.1	mg/kg	N	003
Butyl benzylphthalate	T207	AR	0.1	mg/kg	N	003
Benzo(a)Anthracene	T207	AR	0.1	mg/kg	M	003
Chrysene	T207	AR	0.1	mg/kg	M	003
Bis (2-ethylhexyl)phthalate	T207	AR	0.1	mg/kg	N	003
Di-n-octylphthalate	T207	AR	0.1	mg/kg	M	003
Benzo(b/k)Fluoranthene	T207	AR	0.1	mg/kg	M	003
Benzo(a)Pyrene	T207	AR	0.1	mg/kg	M	003
Indeno(123-cd)Pyrene	T207	AR	0.1	mg/kg	M	003
Dibenzo(ah)Anthracene	T207	AR	0.1	mg/kg	M	003
Benzo(ghi)Perylene	T207	AR	0.1	mg/kg	M	003
1,1,1,2-Tetrachloroethane	T209	AR	50	µg/kg	U	003
1,1,1-Trichloroethane	T54	AR	5	µg/kg	M	003
1,1,2,2-Tetrachloroethane	T209	AR	50	µg/kg	U	003
1,1,2-Trichloroethane	T54	AR	5	µg/kg	U	003
1,1-Dichloroethane	T54	AR	5	µg/kg	M	003
1,1-Dichloroethylene	T54	AR	5	µg/kg	M	003
1,1-Dichloropropene	T54	AR	5	µg/kg	M	003
1,2,3-Trichlorobenzene	T54	AR	5	µg/kg	M	003
1,2,3-Trichloropropane	T54	AR	5	µg/kg	U	003
1,2,4-Trichlorobenzene	T54	AR	5	µg/kg	M	003
1,2,4-Trimethylbenzene	T54	AR	50	µg/kg	M	003
1,2-Dibromo-3-Chloropropane	T54	AR	10	µg/kg	U	003
1,2-dibromoethane	T209	AR	50	µg/kg	U	003
1,2-Dichlorobenzene	T54	AR	5	µg/kg	M	003
1,2-Dichloroethane	T54	AR	5	µg/kg	M	003
1,2-Dichloropropane	T54	AR	5	µg/kg	M	003
1,3,5-Trimethylbenzene	T54	AR	5	µg/kg	M	003
1,3-Dichlorobenzene	T54	AR	5	µg/kg	M	003
1,3-Dichloropropane	T209	AR	50	µg/kg	U	003
1,4-Dichlorobenzene	T54	AR	5	µg/kg	M	003
Ethyl-2-Methylbenzene	T54	AR	5	µg/kg	M	003
2,2-Dichloropropane	T54	AR	5	µg/kg	M	003

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
2-Chlorotoluene	T54	AR	5	µg/kg	M	003
4-Chlorotoluene	T54	AR	5	µg/kg	M	003
Benzene	T209	AR	10	µg/kg	M	003
Bromobenzene	T54	AR	5	µg/kg	M	003
Bromochloromethane	T54	AR	5	µg/kg	M	003
Bromodichloromethane	T54	AR	5	µg/kg	M	003
Bromoform	T209	AR	50	µg/kg	U	003
Bromomethane	T54	AR	5	µg/kg	U	003
Carbon tetrachloride	T54	AR	5	µg/kg	M	003
Chlorobenzene	T54	AR	5	µg/kg	M	003
Chlorodibromomethane	T54	AR	5	µg/kg	M	003
Chloroethane	T209	AR	50	µg/kg	U	003
Chloroform	T54	AR	5	µg/kg	M	003
Chloromethane	T209	AR	50	µg/kg	N	003
Cis-1,2-Dichloroethylene	T54	AR	5	µg/kg	M	003
Cis-1,3-Dichloropropene	T54	AR	5	µg/kg	M	003
Dibromomethane	T54	AR	5	µg/kg	M	003
Dichlorodifluoromethane	T209	AR	50	µg/kg	N	003
EthylBenzene	T209	AR	10	µg/kg	M	003
Hexachlorobutadiene	T209	AR	10	µg/kg	U	003
Isopropyl benzene	T54	AR	50	µg/kg	M	003
m/p ethyl toluene	T54	AR	5	µg/kg	M	003
M/P Xylene	T209	AR	10	µg/kg	M	003
n-Butylbenzene	T54	AR	10	µg/kg	U	003
n-Propylbenzene	T54	AR	50	µg/kg	M	003
p-Isopropyltoluene	T54	AR	5	µg/kg	M	003
S-Butylbenzene	T54	AR	5	µg/kg	M	003
Styrene	T54	AR	50	µg/kg	M	003
T-Butylbenzene	T54	AR	5	µg/kg	M	003
Tertiary amyl methyl ether	T54	AR	5	µg/kg	M	003
Tetrachloroethene	T54	AR	5	µg/kg	M	003
Trans-1,2-Dichloroethene	T54	AR	5	µg/kg	M	003
Trans-1,3-Dichloropropene	T54	AR	5	µg/kg	M	003
Trichloroethene	T54	AR	5	µg/kg	M	003
Trichlorofluoromethane	T54	AR	5	µg/kg	M	003
Vinyl chloride	T54	AR	10	µg/kg	M	003
Naphthalene	T16	AR	0.1	mg/kg	U	001-003,005
Acenaphthylene	T16	AR	0.1	mg/kg	U	001-003,005
Acenaphthene	T16	AR	0.1	mg/kg	M	001-003,005
Fluorene	T16	AR	0.1	mg/kg	M	001-003,005
Phenanthrene	T16	AR	0.1	mg/kg	U	001-003,005
Anthracene	T16	AR	0.1	mg/kg	M	001-003,005
Fluoranthene	T16	AR	0.1	mg/kg	N	001-003,005
Pyrene	T16	AR	0.1	mg/kg	N	001-003,005
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	M	001-003,005
Chrysene	T16	AR	0.1	mg/kg	M	001-003,005
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	001-003,005
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	001-003,005
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	M	001-003,005
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	M	001-003,005
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	M	001-003,005
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	M	001-003,005
PAH(total)	T16	AR	0.1	mg/kg	U	001-003,005
Arsenic	T257	A40	2	mg/kg	M	001-003,005
Barium	T257	A40	2	mg/kg	U	001-003,005
Beryllium	T245	A40	0.5	mg/kg	U	001-003,005
Boron (water-soluble)	T82	A40	1	mg/kg	N	001-003,005
Cadmium	T257	A40	0.1	mg/kg	M	001-003,005
Chromium	T257	A40	0.5	mg/kg	M	001-003,005
Copper	T257	A40	2	mg/kg	M	001-003,005
Lead	T257	A40	2	mg/kg	M	001-003,005
Mercury	T245	A40	1.0	mg/kg	U	001-003,005
Nickel	T257	A40	0.5	mg/kg	M	001-003,005
Selenium	T257	A40	3	mg/kg	U	001-003,005
Vanadium	T257	A40	0.1	mg/kg	U	001-003,005
Zinc	T257	A40	2	mg/kg	M	001-003,005
Asbestos ID	T27	A40			SU	001-003,005
Chromium VI	T6	A40	1	mg/kg	N	001-003,005
pH	T7	A40			M	001-003,005
Soil Organic Matter	T287	A40	0.1	%	N	001-003,005

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	001-003,005
SO4(Total)	T102	A40	0.02	%	M	001-003,005
Cyanide(Total)	T921	AR	1	mg/kg	M	001-003,005
Phenols(Mono)	T921	AR	1	mg/kg	M	001-003,005
Moisture @105C	T162	AR	0.1	%	N	001-003,005
Retained on 2mm	T2	A40	0.1	%	N	001-003,005
Toluene	T209	AR	10	µg/kg	M	003
O Xylene	T209	AR	10	µg/kg	M	003
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	M	003
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	003
TPH (C5-C7 aromatic)	T54	AR	0.010	mg/kg	N	003
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	003
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	003
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	003
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	003
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	003
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	003
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	003
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	003
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	003
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	003
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	N	003
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	N	003
TPH (C5-C6)	T54	AR	0.10	mg/kg	N	001-002,004-005
TPH (C6-C8)	T54	AR	0.10	mg/kg	N	001-002,004-005
TPH (C8-C10)	T54	AR	0.10	mg/kg	N	001-002,004-005
TPH (C10-C12)	T219	AR	2	mg/kg	U	001-002,004-005
TPH (C12-C16)	T219	AR	2	mg/kg	U	001-002,004-005
TPH (C16-C21)	T219	AR	2	mg/kg	U	001-002,004-005
TPH (C21-C35)	T219	AR	2	mg/kg	U	001-002,004-005

CONCEPT LIFE SCIENCES
DELIVERING SCIENCE

Concept Life Sciences is a trading name of Scientific Analysis Laboratories registered in England and Wales (No 2514788)

Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 647488-2

Date of Report: 21-Apr-2017

Customer: Resource Environmental Consultants Ltd
UNIT 47
Basepoint Business Center
1 Winnall Valley Road
Winchester
Hampshire
SO23 0LD

Customer Contact: Miss Charlotte Toth

Customer Job Reference: 1CO103133
Customer Purchase Order: 002730
Customer Site Reference: Picador Vauxhall
Date Job Received at Concept: 18-Apr-2017
Date Analysis Started: 18-Apr-2017
Date Analysis Completed: 21-Apr-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
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Tests covered by this certificate were conducted in accordance with Concept SOPs

UKAS TESTING
1549

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Claire Brown Crociquia
Customer Service Manager

Issued by :
Claire Brown Crociquia
Customer Service Manager

Concept Reference: 647488
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
REC002S (SE)

Concept Reference	**647488 001**
Customer Sample Reference	**HP101 ES @ 0.30m-0.40m**
Date Sampled	**12-APR-2017**
Type	**Clay**

Determinand	Method	Test Sample	LOD	Units	
Arsenic	T257	A40	2	mg/kg	**13**
Barium	T257	A40	2	mg/kg	**270**
Beryllium	T245	A40	0.5	mg/kg	**1.0**
Boron (water-soluble)	T82	A40	1	mg/kg	<1
Cadmium	T257	A40	0.1	mg/kg	**0.3**
Chromium	T257	A40	0.5	mg/kg	**21**
Copper	T257	A40	2	mg/kg	**55**
Lead	T257	A40	2	mg/kg	**800**
Mercury	T245	A40	1.0	mg/kg	<1.0
Nickel	T257	A40	0.5	mg/kg	**14**
Selenium	T257	A40	3	mg/kg	<3
Vanadium	T257	A40	0.1	mg/kg	**40**
Zinc	T257	A40	2	mg/kg	**190**
Asbestos ID	T27	A40			Asbestos not detected
Chromium VI	T6	A40	1	mg/kg	<1
pH	T7	A40			**7.8**
Soil Organic Matter	T287	A40	0.1	%	**4.3**
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	**0.02**
SO4(Total)	T102	A40	0.02	%	**0.07**
Cyanide(Total)	T921	AR	1	mg/kg	<1
Phenols(Mono)	T921	AR	1	mg/kg	<1
Moisture @105C	T162	AR	0.1	%	**19**
Retained on 2mm	T2	A40	0.1	%	**36.4**

Concept Reference: 647488
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Bulk Product Analysed as Bulk Product
Miscellaneous

Concept Reference	**647488 002**
Customer Sample Reference	**HP101**
Date Sampled	**12-APR-2017**

Determinand	Method	Test Sample	LOD	Units	
Asbestos	T27	AR			Chrysotile ACM Detected

Concept Reference: 647488
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
Total and Speciated USEPA16 PAH (SE) (MCERTS)

Concept Reference	**647488 001**
Customer Sample Reference	**HP101 ES @ 0.30m-0.40m**
Date Sampled	**12-APR-2017**
Type	**Clay**

Determinand	Method	Test Sample	LOD	Units	
Naphthalene	T16	AR	0.1	mg/kg	<0.1
Acenaphthylene	T16	AR	0.1	mg/kg	<0.1
Acenaphthene	T16	AR	0.1	mg/kg	<0.1
Fluorene	T16	AR	0.1	mg/kg	<0.1
Phenanthrene	T16	AR	0.1	mg/kg	<0.1
Anthracene	T16	AR	0.1	mg/kg	<0.1
Fluoranthene	T16	AR	0.1	mg/kg	**0.4**
Pyrene	T16	AR	0.1	mg/kg	**0.4**
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	**0.2**
Chrysene	T16	AR	0.1	mg/kg	**0.2**
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	**0.1**
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	**0.1**
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	<0.1
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	<0.1
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	<0.1
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	<0.1
PAH(total)	T16	AR	0.1	mg/kg	**1.4**

Concept Reference: 647488
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
Suite C

Concept Reference	**647488 001**
Customer Sample Reference	**HP101 ES @ 0.30m-0.40m**
Date Sampled	**12-APR-2017**
Type	**Clay**

Determinand	Method	Test Sample	LOD	Units	
TPH (C5-C6)	T54	AR	0.10	mg/kg	<0.10
TPH (C6-C8)	T54	AR	0.10	mg/kg	<0.10
TPH (C8-C10)	T54	AR	0.10	mg/kg	<0.10
TPH (C10-C12)	T219	AR	2	mg/kg	<2
TPH (C12-C16)	T219	AR	2	mg/kg	<2
TPH (C16-C21)	T219	AR	2	mg/kg	<2
TPH (C21-C35)	T219	AR	2	mg/kg	<2

Concept Reference: 647488
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Soil Analysed as Soil
REC TPH CWG (SE)

Concept Reference	**647488 001**
Customer Sample Reference	**HP101 ES @ 0.30m-0.40m**
Date Sampled	**12-APR-2017**
Type	**Clay**

Determinand	Method	Test Sample	LOD	Units	
Benzene	T209	AR	10	µg/kg	<10
Toluene	T209	AR	10	µg/kg	<10
EthylBenzene	T209	AR	10	µg/kg	<10
M/P Xylene	T209	AR	10	µg/kg	<10
O Xylene	T209	AR	10	µg/kg	<10
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	<10
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C5-C7 aromatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	<0.010
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	<2
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	<2
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	<2
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	<2
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	<2
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	<2
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	<2
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	<2

Index to symbols used in 647488-2

Value	Description
A40	Assisted dried < 40C
AR	As Received
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos subcontracted to REC Limited
Reported results on as received samples are corrected to a 105 degree centigrade dry weight basis except TPH Banded and TPH c5-c35 aromatic/aliphatic split
Retained on 2mm is removed before analysis

Method Index

Value	Description
T257	ICP/OES (SIM) (Aqua Regia Extraction)
T7	Probe
T54	GC/MS (Headspace)
T245	ICP/OES (Aqua Regia Extraction)
T287	Calc TOC/0.58
T921	Colorimetry (CF) (MCERT)
T27	PLM
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T16	GC/MS
T82	ICP/OES (Sim)
T162	Grav (1 Dec) (105 C)
T219	GC/FID (SE)
T2	Grav
T6	ICP/OES

T102	ICP/OES (HCl extract)
T209	GC/MS (Head Space)(MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Naphthalene	T16	AR	0.1	mg/kg	U	001
Acenaphthylene	T16	AR	0.1	mg/kg	U	001
Acenaphthene	T16	AR	0.1	mg/kg	M	001
Fluorene	T16	AR	0.1	mg/kg	M	001
Phenanthrene	T16	AR	0.1	mg/kg	U	001
Anthracene	T16	AR	0.1	mg/kg	M	001
Fluoranthene	T16	AR	0.1	mg/kg	N	001
Pyrene	T16	AR	0.1	mg/kg	N	001
Benzo(a)Anthracene	T16	AR	0.1	mg/kg	M	001
Chrysene	T16	AR	0.1	mg/kg	M	001
Benzo(b)fluoranthene	T16	AR	0.1	mg/kg	U	001
Benzo(k)fluoranthene	T16	AR	0.1	mg/kg	N	001
Benzo(a)Pyrene	T16	AR	0.1	mg/kg	M	001
Indeno(123-cd)Pyrene	T16	AR	0.1	mg/kg	M	001
Dibenzo(ah)Anthracene	T16	AR	0.1	mg/kg	M	001
Benzo(ghi)Perylene	T16	AR	0.1	mg/kg	M	001
PAH(total)	T16	AR	0.1	mg/kg	U	001
Arsenic	T257	A40	2	mg/kg	M	001
Barium	T257	A40	2	mg/kg	U	001
Beryllium	T245	A40	0.5	mg/kg	U	001
Boron (water-soluble)	T82	A40	1	mg/kg	N	001
Cadmium	T257	A40	0.1	mg/kg	M	001
Chromium	T257	A40	0.5	mg/kg	M	001
Copper	T257	A40	2	mg/kg	M	001
Lead	T257	A40	2	mg/kg	M	001
Mercury	T245	A40	1.0	mg/kg	U	001
Nickel	T257	A40	0.5	mg/kg	M	001
Selenium	T257	A40	3	mg/kg	U	001
Vanadium	T257	A40	0.1	mg/kg	U	001
Zinc	T257	A40	2	mg/kg	M	001
Asbestos ID	T27	A40			SU	001
Chromium VI	T6	A40	1	mg/kg	N	001
pH	T7	A40			M	001
Soil Organic Matter	T287	A40	0.1	%	N	001
(Water Soluble) SO4 expressed as SO4	T242	A40	0.01	g/l	M	001
SO4(Total)	T102	A40	0.02	%	M	001
Cyanide(Total)	T921	AR	1	mg/kg	M	001
Phenols(Mono)	T921	AR	1	mg/kg	M	001
Moisture @105C	T162	AR	0.1	%	N	001
Retained on 2mm	T2	A40	0.1	%	N	001
Benzene	T209	AR	10	µg/kg	M	001
Toluene	T209	AR	10	µg/kg	M	001
EthylBenzene	T209	AR	10	µg/kg	M	001
M/P Xylene	T209	AR	10	µg/kg	M	001
O Xylene	T209	AR	10	µg/kg	M	001
Methyl tert-Butyl Ether	T209	AR	10	µg/kg	M	001
TPH (C5-C6 aliphatic)	T54	AR	0.010	mg/kg	N	001
TPH (C5-C7 aromatic)	T54	AR	0.010	mg/kg	N	001
TPH (C6-C8 aliphatic)	T54	AR	0.010	mg/kg	N	001
TPH (C7-C8 aromatic)	T54	AR	0.010	mg/kg	N	001
TPH (C8-C10 aliphatic)	T54	AR	0.010	mg/kg	N	001
TPH (C8-C10 aromatic)	T54	AR	0.010	mg/kg	N	001
TPH (C10-C12 aliphatic)	T219	AR	2	mg/kg	N	001
TPH (C10-C12 aromatic)	T219	AR	2	mg/kg	N	001
TPH (C12-C16 aliphatic)	T219	AR	2	mg/kg	N	001
TPH (C12-C16 aromatic)	T219	AR	2	mg/kg	N	001
TPH (C16-C21 aliphatic)	T219	AR	2	mg/kg	N	001
TPH (C16-C21 aromatic)	T219	AR	2	mg/kg	N	001
TPH (C21-C35 aliphatic)	T219	AR	2	mg/kg	N	001
TPH (C21-C35 aromatic)	T219	AR	2	mg/kg	N	001
TPH (C5-C6)	T54	AR	0.10	mg/kg	N	001
TPH (C6-C8)	T54	AR	0.10	mg/kg	N	001
TPH (C8-C10)	T54	AR	0.10	mg/kg	N	001
TPH (C10-C12)	T219	AR	2	mg/kg	U	001

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
TPH (C12-C16)	T219	AR	2	mg/kg	U	001
TPH (C16-C21)	T219	AR	2	mg/kg	U	001
TPH (C21-C35)	T219	AR	2	mg/kg	U	001
Asbestos	T27	AR			SU	002

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Concept Life Sciences

Certificate of Analysis

3 Crittall Drive
Springwood Industrial Estate
Braintree
Essex
CM7 2RT
Tel : 01376 560120
Fax : 01376 552923

Report Number: 644028-1

Date of Report: 06-Apr-2017

Customer: Resource Environmental Consultants Ltd
UNIT 47
Basepoint Business Center
1 Winnall Valley Road
Winchester
Hampshire
SO23 0LD

Customer Contact: Miss Charlotte Toth

Customer Job Reference: 1CO103133
Customer Purchase Order: 002644
Customer Site Reference: Picador Vauxhall
Date Job Received at Concept: 29-Mar-2017
Date Analysis Started: 03-Apr-2017
Date Analysis Completed: 05-Apr-2017

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.
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Tests covered by this certificate were conducted in accordance with Concept SOPs

UKAS TESTING
1549

Report checked and authorised by :
Aislinn Arthey
Trainee Project Manager

Issued by :
Aislinn Arthey
Trainee Project Manager

Concept Reference: 644028
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Water Analysed as Water
REC 002W

Concept Reference	**644028 001**	**644028 002**
Customer Sample Reference	**WS101 W1**	**WS102 W1**
Date Sampled	**27-MAR-2017**	**27-MAR-2017**

Determinand	Method	Test Sample	LOD	Units		
As (Dissolved)	T281	F	0.0002	mg/l	**0.0004**	**0.0022**
Ba (Dissolved)	T281	F	0.001	mg/l	**0.018**	**0.011**
Be (Dissolved)	T281	F	0.00005	mg/l	<0.00005	<0.00005
B (Dissolved)	T281	F	0.05	mg/l	**0.06**	**0.10**
Cd (Dissolved)	T281	F	0.00002	mg/l	**0.00003**	<0.00002
Cr (Dissolved)	T281	F	0.001	mg/l	<0.001	<0.001
Cu (Dissolved)	T281	F	0.0005	mg/l	**0.0012**	**0.0010**
Pb (Dissolved)	T281	F	0.0003	mg/l	<0.0003	<0.0003
Hg (Dissolved)	T281	F	0.00005	mg/l	<0.00005	<0.00005
Ni (Dissolved)	T281	F	0.001	mg/l	**0.003**	**0.004**
Se (Dissolved)	T281	F	0.0005	mg/l	**0.0015**	**0.0014**
V (Dissolved)	T281	F	0.002	mg/l	<0.002	<0.002
Zn (Dissolved)	T281	F	0.002	mg/l	**0.012**	**0.003**
Total Hardness expressed as CaCO3	T649	F	10	mg/l	**62**	**58**
pH	T7	F			**7.1**	**6.6**
Chromium VI	T686	F	0.003	mg/l	<0.003	(2) <0.030
Sulphate	T686	F	0.5	mg/l	**23**	**11**
Cyanide(Total)	T546	F	0.01	mg/l	<0.01	<0.01
Phenols(Mono)	T546	F	0.02	mg/l	<0.02	<0.02

Concept Reference: 644028
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Water Analysed as Water
Total and Speciated USEPA16 PAH (SE)

Concept Reference	**644028 001**	**644028 002**
Customer Sample Reference	**WS101 W1**	**WS102 W1**
Date Sampled	**27-MAR-2017**	**27-MAR-2017**

Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T149	AR	0.01	µg/l	**1.2**	**7.2**
Acenaphthylene	T149	AR	0.01	µg/l	<0.01	**0.05**
Acenaphthene	T149	AR	0.01	µg/l	<0.01	**0.22**
Fluorene	T149	AR	0.01	µg/l	**0.15**	**1.2**
Phenanthrene	T149	AR	0.01	µg/l	**0.08**	**0.54**
Anthracene	T149	AR	0.01	µg/l	**0.02**	**0.03**
Fluoranthene	T149	AR	0.01	µg/l	<0.01	**0.03**
Pyrene	T149	AR	0.01	µg/l	**0.02**	**0.08**
Benzo(a)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01
Chrysene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(a)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	<0.01	<0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	<0.01	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	<0.01	**0.02**
PAH(total)	T149	AR	0.01	µg/l	**1.5**	**9.3**

Concept Reference: 644028
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Water Analysed as Water
Semi-Volatile Organic Compounds (USEPA 625) (SE)

					Concept Reference	644028 001	644028 002
					Customer Sample Reference	WS101 W1	WS102 W1
					Date Sampled	27-MAR-2017	27-MAR-2017
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
Phenol	T71	AR	1	µg/l		<1	<1
Bis (2-chloroethyl) ether	T71	AR	1	µg/l		<1	<1
2-Chlorophenol	T71	AR	1	µg/l		<1	<1
1,3-Dichlorobenzene	T71	AR	1	µg/l		<1	<1
1,4-Dichlorobenzene	T71	AR	1	µg/l		<1	<1
1,2-Dichlorobenzene	T71	AR	1	µg/l		<1	<1
Bis (2-chloroisopropyl) ether	T71	AR	1	µg/l		<1	<1
2-methyl phenol	T71	AR	1	µg/l		<1	<1
3/4-Methylphenol	T71	AR	1	µg/l		<1	<1
Hexachloroethane	T71	AR	1	µg/l		<1	<1
Nitrobenzene	T71	AR	1	µg/l		<1	<1
Isophorone	T71	AR	1	µg/l		<1	<1
2-Nitrophenol	T71	AR	1	µg/l		<1	<1
2,4-Dimethylphenol	T71	AR	1	µg/l		<1	<1
Bis (2-chloroethoxy) methane	T71	AR	1	µg/l		<1	<1
2,4-Dichlorophenol	T71	AR	1	µg/l		<1	<1
1,2,4-Trichlorobenzene	T71	AR	1	µg/l		<1	<1
Naphthalene	T71	AR	1	µg/l		<1	<1
4-Chloroaniline	T71	AR	1	µg/l		<1	<1
Hexachlorobutadiene	T71	AR	1	µg/l		<1	<1
4-Chloro-3-methylphenol	T71	AR	1	µg/l		<1	<1
2-Methylnaphthalene	T71	AR	1	µg/l		<1	<1
Hexachlorocyclopentadiene	T71	AR	1	µg/l		<1	<1
2,4,6-Trichlorophenol	T71	AR	1	µg/l		<1	<1
2,4,5-Trichlorophenol	T71	AR	1	µg/l		<1	<1
2-Chloronaphthalene	T71	AR	1	µg/l		<1	<1
2-Nitroaniline	T71	AR	1	µg/l		<1	<1
Dimethyl phthalate	T71	AR	1	µg/l		<1	<1
2,6-Dinitrotoluene	T71	AR	1	µg/l		<1	<1
Acenaphthylene	T71	AR	1	µg/l		<1	<1
Acenaphthene	T71	AR	1	µg/l		<1	<1
3-Nitroaniline	T71	AR	1	µg/l		<1	<1
Dibenzofuran	T71	AR	1	µg/l		<1	<1
2,4-Dinitrotoluene	T71	AR	1	µg/l		<1	<1
Diethyl phthalate	T71	AR	1	µg/l		**13**	**4**
Fluorene	T71	AR	1	µg/l		<1	<1
4-Chlorophenyl phenylether	T71	AR	1	µg/l		<1	<1
4-Nitroaniline	T71	AR	1	µg/l		<1	<1
Azobenzene	T71	AR	1	µg/l		<1	<1
4-Bromophenyl phenylether	T71	AR	1	µg/l		<1	<1
Hexachlorobenzene	T71	AR	1	µg/l		<1	<1
Phenanthrene	T71	AR	1	µg/l		<1	<1
Anthracene	T71	AR	1	µg/l		<1	<1
Carbazole	T71	AR	1	µg/l		<1	<1
Di-n-butylphthalate	T71	AR	1	µg/l		<1	<1
Fluoranthene	T71	AR	1	µg/l		<1	<1
Pyrene	T71	AR	1	µg/l		<1	<1
Butyl benzylphthalate	T71	AR	1	µg/l		<1	<1
Benzo(a)Anthracene	T71	AR	1	µg/l		<1	<1
Chrysene	T71	AR	1	µg/l		<1	<1
Bis (2-ethylhexyl)phthalate	T71	AR	1	µg/l		<1	<1
Di-n-octylphthalate	T71	AR	1	µg/l		<1	<1
Benzo(b/k)Fluoranthene	T71	AR	1	µg/l		<1	<1
Benzo(a)Pyrene	T71	AR	1	µg/l		<1	<1
Indeno(123-cd)Pyrene	T71	AR	1	µg/l		<1	<1
Dibenzo(ah)Anthracene	T71	AR	1	µg/l		<1	<1
Benzo(ghi)Perylene	T71	AR	1	µg/l		<1	<1

Concept Reference: 644028
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Water Analysed as Water
Suite C

				Concept Reference	**644028 001**	**644028 002**
				Customer Sample Reference	**WS101 W1**	**WS102 W1**
				Date Sampled	**27-MAR-2017**	**27-MAR-2017**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
TPH (C5-C6)	T215	AR	0.010	mg/l	<0.010	**0.18**
TPH (C6-C8)	T215	AR	0.010	mg/l	<0.010	**0.31**
TPH (C8-C10)	T215	AR	0.010	mg/l	**0.31**	**1.2**
TPH (C10-C12)	T219	AR	0.02	mg/l	**0.05**	**0.10**
TPH (C12-C16)	T219	AR	0.02	mg/l	**0.05**	**0.10**
TPH (C16-C21)	T219	AR	0.02	mg/l	**0.05**	**0.15**
TPH (C21-C35)	T219	AR	0.02	mg/l	**0.08**	**0.24**

Concept Reference: 644028
Project Site: Picador Vauxhall
Customer Reference: 1CO103133

Water Analysed as Water
VOC (SE)

					Concept Reference	644028 001	644028 002
					Customer Sample Reference	WS101 W1	WS102 W1
					Date Sampled	27-MAR-2017	27-MAR-2017
Determinand	**Method**	**Test Sample**	**LOD**	**Units**			
2,2-Dichloropropane	T54	AR	1	µg/l		<1	<1
Chlorobenzene	T54	AR	1	µg/l		<1	<1
Cis-1,2-Dichloroethylene	T54	AR	1	µg/l		<1	<1
Isopropyl benzene	T54	AR	1	µg/l		**2**	**7**
Trichloroethene	T54	AR	1	µg/l		<1	<1
Vinyl chloride	T54	AR	1	µg/l		<1	<1
1,2,4-Trichlorobenzene	T54	AR	1	µg/l		<1	<1
1,1-Dichloroethylene	T54	AR	1	µg/l		<1	<1
1,2,4-Trimethylbenzene	T54	AR	1	µg/l		**91**	**130**
Bromomethane	T54	AR	1	µg/l		<1	<1
Chloroethane	T54	AR	1	µg/l		<1	<1
Chloroform	T54	AR	1	µg/l		<1	<1
Dibromomethane	T54	AR	1	µg/l		<1	<1
m/p ethyl toluene	T54	AR	5	µg/l		**57**	**86**
n-Propylbenzene	T54	AR	1	µg/l		**4**	**24**
1,2-Dichlorobenzene	T54	AR	1	µg/l		<1	<1
1,1,2,2-Tetrachloroethane	T54	AR	1	µg/l		<1	<1
1,2-Dichloropropane	T54	AR	1	µg/l		<1	<1
Ethyl-2-Methylbenzene	T54	AR	5	µg/l		**27**	**31**
S-Butylbenzene	T54	AR	1	µg/l		**4**	**10**
Styrene	T54	AR	1	µg/l		<1	<1
Toluene	T54	AR	1	µg/l		<1	**3**
Trichlorofluoromethane	T54	AR	1	µg/l		<1	<1
1,3-Dichlorobenzene	T54	AR	1	µg/l		<1	<1
1,2,3-Trichlorobenzene	T54	AR	1	µg/l		<1	<1
1,2,3-Trichloropropane	T54	AR	1	µg/l		<1	<1
1,3-Dichloropropane	T54	AR	1	µg/l		<1	<1
Dichlorodifluoromethane	T54	AR	1	µg/l		<1	<1
n-Butylbenzene	T54	AR	1	µg/l		**14**	**29**
Hexachlorobutadiene	T54	AR	1	µg/l		<1	<1
1,1,1-Trichloroethane	T54	AR	1	µg/l		<1	<1
1,1,2-Trichloroethane	T54	AR	1	µg/l		<1	<1
1,1-Dichloroethane	T54	AR	1	µg/l		<1	<1
Bromodichloromethane	T54	AR	1	µg/l		<1	<1
Bromoform	T54	AR	1	µg/l		<1	<1
Dibromochloromethane	T54	AR	1	µg/l		<1	<1
EthylBenzene	T54	AR	1	µg/l		<1	**22**
Tertiary amyl methyl ether	T54	AR	1	µg/l		<1	<1
Trans-1,2-Dichloroethene	T54	AR	1	µg/l		<1	<1
p-Isopropyltoluene	T54	AR	1	µg/l		<1	**5**
1,4-Dichlorobenzene	T54	AR	1	µg/l		<1	<1
1,1,1,2-Tetrachloroethane	T54	AR	1	µg/l		<1	<1
4-Chlorotoluene	T54	AR	1	µg/l		<1	<1
Bromobenzene	T54	AR	1	µg/l		<1	<1
Cis-1,3-Dichloropropene	T54	AR	1	µg/l		<1	<1
Methyl tert-Butyl Ether	T54	AR	1	µg/l		<1	**61**
Tetrachloroethene	T54	AR	1	µg/l		<1	<1
1,2-Dichloroethane	T54	AR	1	µg/l		<1	<1
Benzene	T54	AR	1	µg/l		<1	**240**
M/P Xylene	T54	AR	1	µg/l		<1	**5**
1,1-Dichloropropene	T54	AR	1	µg/l		<1	<1
1,2-Dibromo-3-Chloropropane	T54	AR	1	µg/l		<1	<1
1,2-dibromoethane	T54	AR	1	µg/l		<1	<1
1,3,5-Trimethylbenzene	T54	AR	1	µg/l		**42**	**36**
2-Chlorotoluene	T54	AR	1	µg/l		<1	<1
Bromochloromethane	T54	AR	1	µg/l		<1	<1
Carbon tetrachloride	T54	AR	1	µg/l		<1	<1
Chloromethane	T54	AR	1	µg/l		<1	<1
O Xylene	T54	AR	1	µg/l		**2**	**3**
T-Butylbenzene	T54	AR	1	µg/l		<1	**12**

Concept Reference:	644028
Project Site:	Picador Vauxhall
Customer Reference:	1CO103133
Water	Analysed as Water
VOC (SE)	

Concept Reference	**644028 001**	**644028 002**
Customer Sample Reference	**WS101 W1**	**WS102 W1**
Date Sampled	**27-MAR-2017**	**27-MAR-2017**

Determinand	Method	Test Sample	LOD	Units		
Trans-1,3-Dichloropropene	T54	AR	1	µg/l	<1	<1

Index to symbols used in 644028-1

Value	Description
AR	As Received
F	Filtered
2	LOD Raised Due to Matrix Interference
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

TPH: These samples have been analysed exceeding recommended holding times. It is possible therefore that the results provided may be compromised.

Method Index

Value	Description
T546	Colorimetry (CF)
T7	Probe
T215	GC/MS (Headspace)(LV)
T281	ICP/MS (Filtered)
T71	GC/MS (1l ext.)
T54	GC/MS (Headspace)
T219	GC/FID (SE)
T649	ICP/OES (Calc)
T149	GC/MS (SIR)
T686	Discrete Analyser

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
As (Dissolved)	T281	F	0.0002	mg/l	U	001-002
Ba (Dissolved)	T281	F	0.001	mg/l	U	001-002
Be (Dissolved)	T281	F	0.00005	mg/l	U	001-002
B (Dissolved)	T281	F	0.05	mg/l	U	001-002
Cd (Dissolved)	T281	F	0.00002	mg/l	U	001-002
Cr (Dissolved)	T281	F	0.001	mg/l	U	001-002
Cu (Dissolved)	T281	F	0.0005	mg/l	U	001-002
Pb (Dissolved)	T281	F	0.0003	mg/l	U	001-002
Hg (Dissolved)	T281	F	0.00005	mg/l	U	001-002
Ni (Dissolved)	T281	F	0.001	mg/l	U	001-002
Se (Dissolved)	T281	F	0.0005	mg/l	U	001-002
V (Dissolved)	T281	F	0.002	mg/l	U	001-002
Zn (Dissolved)	T281	F	0.002	mg/l	U	001-002
Total Hardness expressed as CaCO3	T649	F	10	mg/l	U	001-002
pH	T7	F			U	001-002
Chromium VI	T686	F	0.003	mg/l	U	001-002
Sulphate	T686	F	0.5	mg/l	U	001-002
Cyanide(Total)	T546	F	0.01	mg/l	U	001-002
Phenols(Mono)	T546	F	0.02	mg/l	U	001-002
Phenol	T71	AR	1	µg/l	N	001-002
Bis (2-chloroethyl) ether	T71	AR	1	µg/l	U	001-002
2-Chlorophenol	T71	AR	1	µg/l	U	001-002
1,3-Dichlorobenzene	T71	AR	1	µg/l	U	001-002

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
1,4-Dichlorobenzene	T71	AR	1	µg/l	U	001-002
1,2-Dichlorobenzene	T71	AR	1	µg/l	U	001-002
Bis (2-chloroisopropyl) ether	T71	AR	1	µg/l	U	001-002
2-methyl phenol	T71	AR	1	µg/l	N	001-002
3/4-Methylphenol	T71	AR	1	µg/l	N	001-002
Hexachloroethane	T71	AR	1	µg/l	U	001-002
Nitrobenzene	T71	AR	1	µg/l	U	001-002
Isophorone	T71	AR	1	µg/l	U	001-002
2-Nitrophenol	T71	AR	1	µg/l	U	001-002
2,4-Dimethylphenol	T71	AR	1	µg/l	N	001-002
Bis (2-chloroethoxy) methane	T71	AR	1	µg/l	U	001-002
2,4-Dichlorophenol	T71	AR	1	µg/l	U	001-002
1,2,4-Trichlorobenzene	T71	AR	1	µg/l	U	001-002
Naphthalene	T71	AR	1	µg/l	U	001-002
4-Chloroaniline	T71	AR	1	µg/l	U	001-002
Hexachlorobutadiene	T71	AR	1	µg/l	U	001-002
4-Chloro-3-methylphenol	T71	AR	1	µg/l	U	001-002
2-Methylnaphthalene	T71	AR	1	µg/l	U	001-002
Hexachlorocyclopentadiene	T71	AR	1	µg/l	N	001-002
2,4,6-Trichlorophenol	T71	AR	1	µg/l	N	001-002
2,4,5-Trichlorophenol	T71	AR	1	µg/l	N	001-002
2-Chloronaphthalene	T71	AR	1	µg/l	U	001-002
2-Nitroaniline	T71	AR	1	µg/l	U	001-002
Dimethyl phthalate	T71	AR	1	µg/l	U	001-002
2,6-Dinitrotoluene	T71	AR	1	µg/l	U	001-002
Acenaphthylene	T71	AR	1	µg/l	U	001-002
Acenaphthene	T71	AR	1	µg/l	U	001-002
3-Nitroaniline	T71	AR	1	µg/l	U	001-002
Dibenzofuran	T71	AR	1	µg/l	U	001-002
2,4-Dinitrotoluene	T71	AR	1	µg/l	U	001-002
Diethyl phthalate	T71	AR	1	µg/l	U	001-002
Fluorene	T71	AR	1	µg/l	U	001-002
4-Chlorophenyl phenylether	T71	AR	1	µg/l	U	001-002
4-Nitroaniline	T71	AR	1	µg/l	U	001-002
Azobenzene	T71	AR	1	µg/l	U	001-002
4-Bromophenyl phenylether	T71	AR	1	µg/l	U	001-002
Hexachlorobenzene	T71	AR	1	µg/l	U	001-002
Phenanthrene	T71	AR	1	µg/l	U	001-002
Anthracene	T71	AR	1	µg/l	U	001-002
Carbazole	T71	AR	1	µg/l	U	001-002
Di-n-butylphthalate	T71	AR	1	µg/l	U	001-002
Fluoranthene	T71	AR	1	µg/l	U	001-002
Pyrene	T71	AR	1	µg/l	U	001-002
Butyl benzylphthalate	T71	AR	1	µg/l	U	001-002
Benzo(a)Anthracene	T71	AR	1	µg/l	U	001-002
Chrysene	T71	AR	1	µg/l	U	001-002
Bis (2-ethylhexyl)phthalate	T71	AR	1	µg/l	U	001-002
Di-n-octylphthalate	T71	AR	1	µg/l	U	001-002
Benzo(b/k)Fluoranthene	T71	AR	1	µg/l	U	001-002
Benzo(a)Pyrene	T71	AR	1	µg/l	U	001-002
Indeno(123-cd)Pyrene	T71	AR	1	µg/l	U	001-002
Dibenzo(ah)Anthracene	T71	AR	1	µg/l	U	001-002
Benzo(ghi)Perylene	T71	AR	1	µg/l	U	001-002
1,1,1,2-Tetrachloroethane	T54	AR	1	µg/l	N	001-002
1,1,1-Trichloroethane	T54	AR	1	µg/l	U	001-002
1,1,2,2-Tetrachloroethane	T54	AR	1	µg/l	N	001-002
1,1,2-Trichloroethane	T54	AR	1	µg/l	U	001-002
1,1-Dichloroethane	T54	AR	1	µg/l	U	001-002
1,1-Dichloroethylene	T54	AR	1	µg/l	U	001-002
1,1-Dichloropropene	T54	AR	1	µg/l	U	001-002
1,2,3-Trichlorobenzene	T54	AR	1	µg/l	U	001-002
1,2,3-Trichloropropane	T54	AR	1	µg/l	N	001-002
1,2,4-Trichlorobenzene	T54	AR	1	µg/l	U	001-002
1,2,4-Trimethylbenzene	T54	AR	1	µg/l	U	001-002
1,2-Dibromo-3-Chloropropane	T54	AR	1	µg/l	N	001-002
1,2-Dichlorobenzene	T54	AR	1	µg/l	U	001-002
1,2-Dichloroethane	T54	AR	1	µg/l	U	001-002
1,2-Dichloropropane	T54	AR	1	µg/l	U	001-002
1,2-dibromoethane	T54	AR	1	µg/l	N	001-002
1,3,5-Trimethylbenzene	T54	AR	1	µg/l	U	001-002

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
1,3-Dichlorobenzene	T54	AR	1	µg/l	U	001-002
1,3-Dichloropropane	T54	AR	1	µg/l	U	001-002
1,4-Dichlorobenzene	T54	AR	1	µg/l	U	001-002
Ethyl-2-Methylbenzene	T54	AR	5	µg/l	U	001-002
2,2-Dichloropropane	T54	AR	1	µg/l	U	001-002
2-Chlorotoluene	T54	AR	1	µg/l	U	001-002
4-Chlorotoluene	T54	AR	1	µg/l	U	001-002
Benzene	T54	AR	1	µg/l	U	001-002
Bromobenzene	T54	AR	1	µg/l	U	001-002
Bromochloromethane	T54	AR	1	µg/l	U	001-002
Bromodichloromethane	T54	AR	1	µg/l	U	001-002
Bromoform	T54	AR	1	µg/l	N	001-002
Bromomethane	T54	AR	1	µg/l	U	001-002
Carbon tetrachloride	T54	AR	1	µg/l	U	001-002
Chlorobenzene	T54	AR	1	µg/l	U	001-002
Chloroethane	T54	AR	1	µg/l	U	001-002
Chloroform	T54	AR	1	µg/l	U	001-002
Chloromethane	T54	AR	1	µg/l	U	001-002
Cis-1,2-Dichloroethylene	T54	AR	1	µg/l	U	001-002
Cis-1,3-Dichloropropene	T54	AR	1	µg/l	U	001-002
Dibromochloromethane	T54	AR	1	µg/l	U	001-002
Dibromomethane	T54	AR	1	µg/l	U	001-002
Dichlorodifluoromethane	T54	AR	1	µg/l	N	001-002
EthylBenzene	T54	AR	1	µg/l	U	001-002
Hexachlorobutadiene	T54	AR	1	µg/l	N	001-002
Isopropyl benzene	T54	AR	1	µg/l	U	001-002
M/P Xylene	T54	AR	1	µg/l	U	001-002
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	001-002
O Xylene	T54	AR	1	µg/l	U	001-002
S-Butylbenzene	T54	AR	1	µg/l	U	001-002
Styrene	T54	AR	1	µg/l	U	001-002
T-Butylbenzene	T54	AR	1	µg/l	U	001-002
Tertiary amyl methyl ether	T54	AR	1	µg/l	U	001-002
Tetrachloroethene	T54	AR	1	µg/l	U	001-002
Toluene	T54	AR	1	µg/l	U	001-002
Trans-1,2-Dichloroethene	T54	AR	1	µg/l	U	001-002
Trans-1,3-Dichloropropene	T54	AR	1	µg/l	U	001-002
Trichloroethene	T54	AR	1	µg/l	U	001-002
Trichlorofluoromethane	T54	AR	1	µg/l	U	001-002
Vinyl chloride	T54	AR	1	µg/l	U	001-002
m/p ethyl toluene	T54	AR	5	µg/l	U	001-002
n-Butylbenzene	T54	AR	1	µg/l	U	001-002
n-Propylbenzene	T54	AR	1	µg/l	U	001-002
p-Isopropyltoluene	T54	AR	1	µg/l	U	001-002
Naphthalene	T149	AR	0.01	µg/l	U	001-002
Acenaphthylene	T149	AR	0.01	µg/l	U	001-002
Acenaphthene	T149	AR	0.01	µg/l	U	001-002
Fluorene	T149	AR	0.01	µg/l	U	001-002
Phenanthrene	T149	AR	0.01	µg/l	U	001-002
Anthracene	T149	AR	0.01	µg/l	U	001-002
Fluoranthene	T149	AR	0.01	µg/l	U	001-002
Pyrene	T149	AR	0.01	µg/l	U	001-002
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	001-002
Chrysene	T149	AR	0.01	µg/l	U	001-002
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	N	001-002
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	001-002
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	001-002
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	001-002
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	001-002
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	001-002
PAH(total)	T149	AR	0.01	µg/l	N	001-002
TPH (C5-C6)	T215	AR	0.010	mg/l	N	001-002
TPH (C6-C8)	T215	AR	0.010	mg/l	N	001-002
TPH (C8-C10)	T215	AR	0.010	mg/l	N	001-002
TPH (C10-C12)	T219	AR	0.02	mg/l	U	001-002
TPH (C12-C16)	T219	AR	0.02	mg/l	U	001-002
TPH (C16-C21)	T219	AR	0.02	mg/l	U	001-002
TPH (C21-C35)	T219	AR	0.02	mg/l	U	001-002

APPENDIX VI

GEOTECHNICAL TESTING RESULTS



LABORATORY REPORT

4043

Contract Number: PSL17/1442

Report Date: 11 April 2017

Client's Reference: 2583

Client Name: REC Croydon
Osprey House
Pacific Quay
Broadway
Manchester
M50 2UE

For the attention of: Michael Nworah

Contract Title: Picador, Vauxhall

Date Received: 28/3/2017
Date Commenced: 28/3/2017
Date Completed: 11/4/2017

Notes: **Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	A Fry (Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS101	AMAL	D	1.20	2.60	Brown very gravelly very sandy CLAY.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Picador Vauxhall	Contract No: PSL17/1442 Client Ref: 2583

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS101	AMAL	D	1.20	2.60	15			36	18	18	66	Intermediate plasticity CI.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Picador Vauxhall

Contract No:

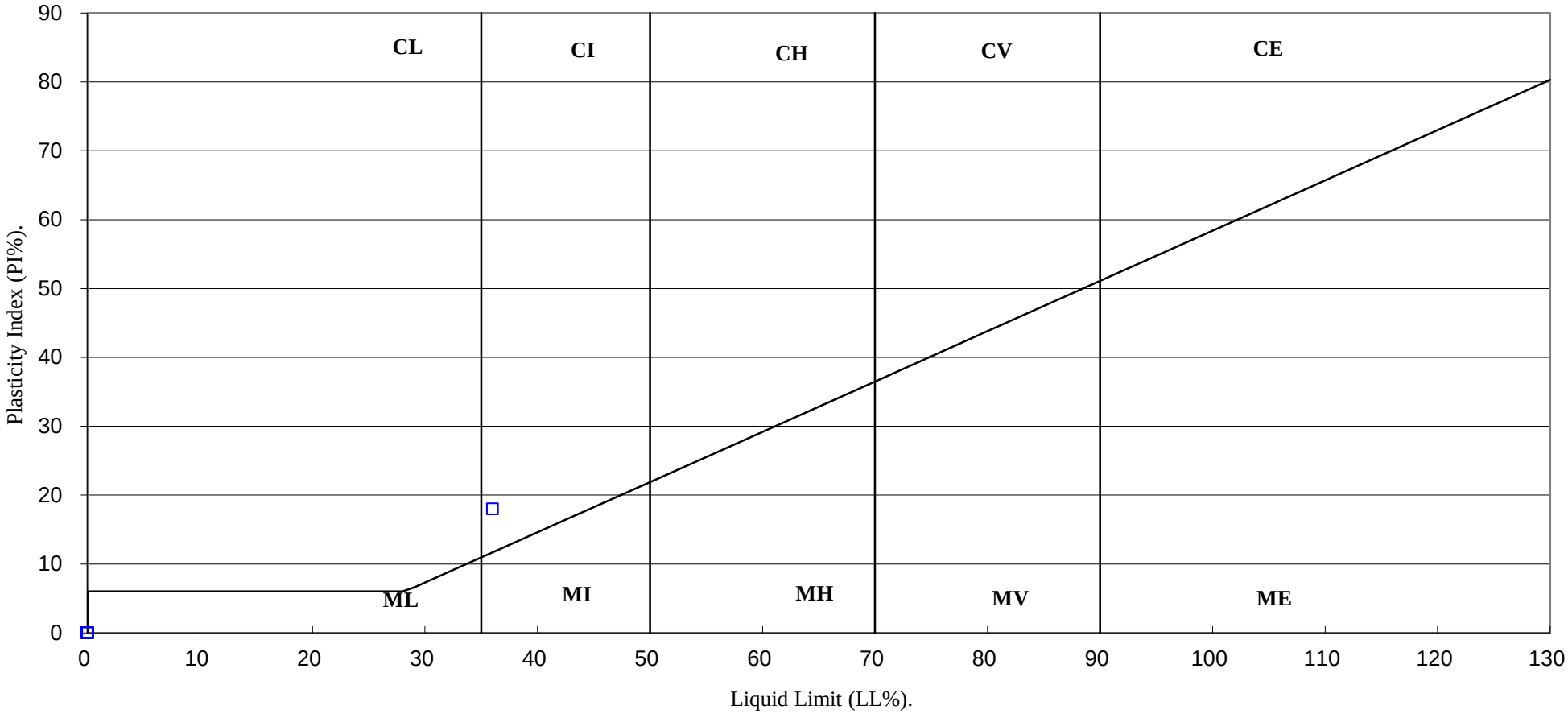
PSL17/1442

Client Ref:

2583

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



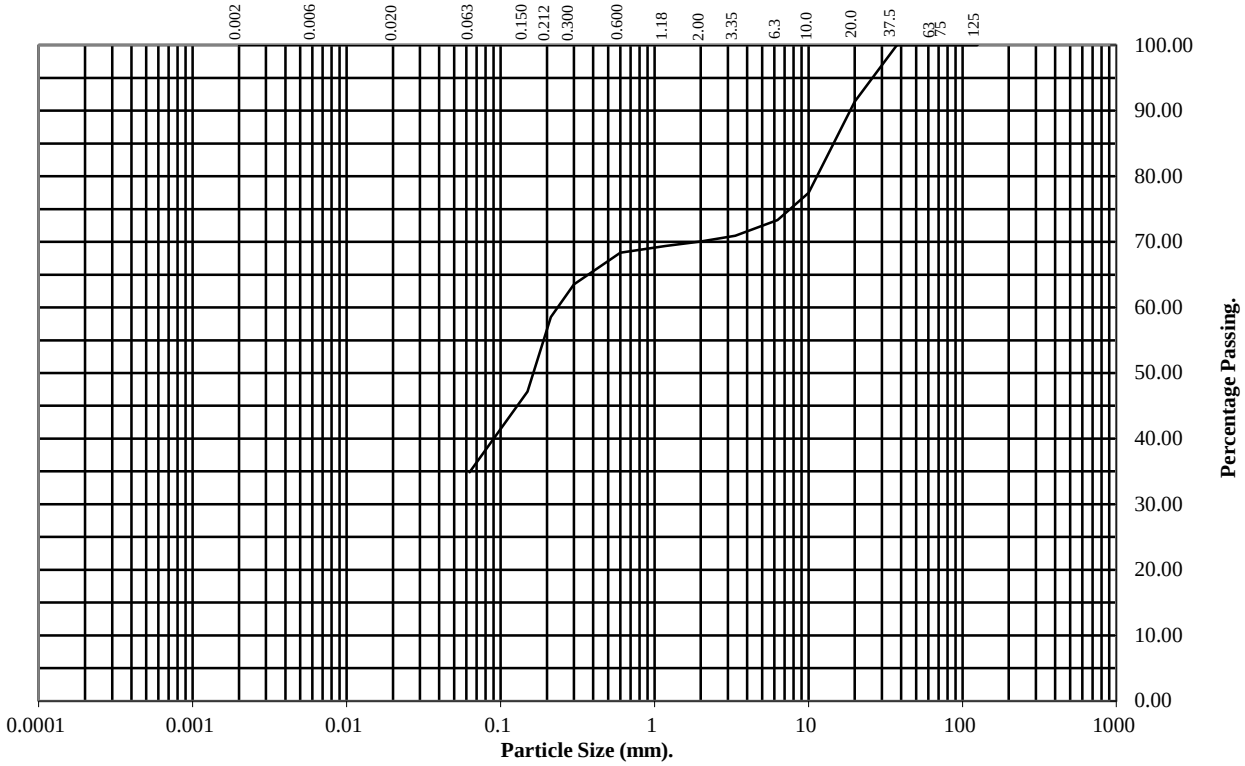
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Picador Vauxhall**	**Contract No:**
			PSL17/1442
			Client Ref:
			2583

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**WS101**	**Top Depth (m):**	**1.20**
Sample Number:	**AMAL**	**Base Depth(m):**	**2.60**
Sample Type:	**D**		



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	91
10	77
6.3	73
3.35	71
2	70
1.18	69
0.6	68
0.3	64
0.212	59
0.15	47
0.063	35

Soil Fraction	Total Percentage
Cobbles	0
Gravel	30
Sand	35
Silt/Clay	35

Remarks:

See summary of soil descriptions.