

Oak Tree Lane, Woodgate

Ground Investigation Report



Report for:

Pye Homes

CS-J-0132

T & P Regeneration Ltd
Unit 4, Brunel Lock Development
Smeaton Road
Bristol
BS1 6SE

Document Revision

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EXECUTIVE SUMMARY

Project Information	
Project details	This Ground Investigation report has been prepared by T&P Regeneration Ltd (T&P) on behalf of Pye Homes for Oak Tree Lane, Woodgate PO20 3GU / NGR: 494160, 104140.
Site description and current land use	The site occupies approximately 8 hectares (ha), measuring approximately 390m east to west and 175m north to south. The site was found to be host to an arrangement of buildings located centrally, adjacent to the northern boundary comprising; two houses; three stable blocks together with some light commercial units, including a vehicle repair workshop located in the north east. The remaining area was broadly noted to be used as paddocks for horses. The north eastern field has been artificially raised. Anecdotal information suggests that a land filling/raising operation has been undertaken for a number of years and wastes may include animal carcasses, motor vehicles and animal wastes (faeces).
Proposed development	The proposed development is likely to comprise 159N° residential units including 36N° apartments and 123N° traditional two storey residential dwellings with associated areas of communal and private soft landscaping and hard landscaped access and parking.
Previous reports	This report has been prepared with reference to available previous reports including a Preliminary Investigation Report. The report comprised a Phase 1 Desk Study and development of a preliminary site conceptual model. (Soils Ltd. July 2019).
Site Setting	
Environmental setting	The environmental setting is summarised from previous third-party desk study information. The western and central portions of the site are shown to be underlain by Aeolian Deposits. These are described as mainly silt and formerly known as 'Brick earth'. The eastern site area is shown to be underlain by River Terrace Deposits that comprise sands and gravels. Beneath the superficial cover the London Clay Formation is indicated to be present. The underlying superficial deposits are classified as a Secondary A Aquifer. The bedrock geology is classified as an Unproductive Stratum. The site is not located within a groundwater Source Protection Zone. The nearest surface water feature is an undefined stream that forms the eastern site boundary. The majority of the site is located in a Flood Risk Zone 1, while the eastern site area is identified to cross Flood Risk Zone 2 and 3. Therefore, a Flood Risk Assessment will be required to support redevelopment. The site is not located within an environmentally sensitive area.
Site history	The earliest historical map of 1876 indicates the site to be undeveloped and spread across several agricultural fields. By 1974, Ryefields Piggeries is shown to have been constructed, comprising several rectangular buildings assumed to be housing pigs, two tanks are identified centrally within the buildings. The 1986 map shows the piggery is now identified as Ryefield Farm, the tanks are no longer shown. No further significant on-site changes are shown on the subsequent maps. The surrounding area is indicated to be broadly in agricultural use on the earliest map, with a railway track running from east to west approximately 100m north of the site. By 1937 an area of excavation is identified within 'Brick Field' located adjacent to the central section of the southern boundary. By 1979, the excavation is no longer shown and the 'Brick Field' is identified as a caravan park. No further significant changes other than the continued residential development of the area is shown to have occurred up to the present day.
Areas of potential concern	The following areas of potential concern were identified within the previous third-party desk study report: On-site: • Made ground associated with previous site development/activities. • Application of pesticides/herbicides associated with former agricultural practices. • Made ground associated with landfilling in the north eastern area of the site. • Historic tanks with unconfirmed storage/ contents. Off-site: • Potentially infilled pit located adjacent to the southern boundary. • Railway located 100m north of the site boundary.

Ground investigation	
Scope of work	An intrusive ground investigation was undertaken on 25th November 2019 which comprised: - Excavation of 4N° trial pits to a maximum depth of 3.7 metres below ground level (mbgl). - Infiltration testing within 1N° trial pits. - Drilling of 7N° windowless soil sampling boreholes. Groundwater and gas monitoring points were installed in 4N° locations. - Three return groundwater and ground gas monitoring visits. The ground investigation coverage was restricted by the existing tenants due to the presence of animals across the fields and within the stables and restrictions in the active farm area. In order to minimise distress and possible injury to the animals, the area available for investigation was therefore considerably reduced as illustrated upon the attached GI plan. As a result, the main area of suspected infilled ground and the active farm area where the main contaminants sources were present were not accessible and require further investigation in due course.
Ground conditions	Made ground was only encountered in the north eastern site area at the edge of the area known to have been subject to landfilling. Made ground was found to comprise gravelly clay, which included brick, concrete, plastic and metal. Due to the anecdotal information that suggests further potentially significant sources of contamination may be present within the landfill area, additional more widespread investigation is required. Topsoil was encountered in the majority of exploratory locations with a typical thickness ranging between 0.15 and 0.20m. In general, the topsoil was found to comprise brown fine sand silt or silty clay. The western site area was found to be underlain by a succession of sandy, occasionally gravelly silt overlying silty fine, occasionally gravelly silty sandy gravel considered to represent the Aeolian deposits. In-situ density testing has indicated that the granular bands vary from very loose to medium dense. While, the eastern area was found to be underlain by a veneer of firm gravelly clay and loose clayey gravel considered to represent River Terrace Deposits to depths ranging from 0.70 to 1.50m. However, greater depths were recorded due to the raised levels within the north eastern field that has been subject to landfilling. Beneath the superficial cover firm to stiff and stiff silty clay was encountered considered to represent the London Clay Formation. With the exception of made ground within the north eastern field, no significant visible or olfactory evidence of any contamination was noted during the ground investigation.
Groundwater	Groundwater was encountered within the superficial deposits, with typical depths to groundwater strike ranging between 1.0 and 2.5mbgl.
Principal Findings and Conclusions	
Human health	All soil concentrations in made ground, topsoil and natural soils were recorded below adopted screening levels for residential use with vegetable uptake or considered not to present an unacceptable risk to human health. However, due to access restrictions during the ground investigation supplementary investigation will be required to assess the potential human health risk across the remaining areas of the site. It is recommended that provision of a clean capping layer in accordance with BRE guidance should be anticipated in the area of existing development and where development encroaches into the area of landfilling to mitigate human health risks.
Controlled waters	Due to the access restrictions encountered during the investigation the potential sources of contamination that include; historic tanks, vehicle repair workshop and landfill could not be fully investigated and characterised. Due to the presence of both surface and groundwater receptors and the presence of viable pathways and potential sources further investigation and assessment is warranted. It is recommended that supplementary investigation should comprise testing of surface waters up and down gradient of the landfill area to assess potential effects on surface water quality. Dependent of the findings of any supplementary investigation, groundwater monitoring and testing may also be required to evaluate the potential impacts to groundwaters.

Gas protection	Radon protection measures are not considered necessary for the proposed development. Based upon the findings of the monitoring completed, it is considered that gas resistant membranes are unlikely to be required throughout the development. However, an allowance should be made for the provision of Amber 1 gas mitigation measures in the north-eastern section where the marginally elevated concentrations of carbon dioxide have been recorded in WS04 and across the area of infilled ground until further monitoring can be completed. Based upon the current guidance together with the sensitivity of the residential development, it is advised the ground gas monitoring programme is continued for a further 3N° rounds, making 6N° in total, preferably with at least 1N° completed during a period of low pressure <1000mB. This is also likely to be a regulator requirement to fully assess the ground gas regime beneath the inaccessible infilled parts of the site. Furthermore, and dependant on the findings during the demolition/supplementary ground investigation, it is likely that additional wells to increase coverage will be required.
Plant growth and buried potable supply pipework	Made ground and natural soils are not considered to pose a significant risk to the existing and proposed flora. However, with consideration of the physical composition of on-site made ground, which includes concrete, metal and plastic, that this will may be unsuitable to remain within areas of soft landscaping. It is considered likely that the majority of the site area will be suitable for standard pipework, however upgraded barrier pipework is considered likely to be required by the local water authority in the north eastern site area.
Waste	The made ground and natural soils are likely to be classified as non-hazardous waste. Based on the chemical data the soils should be treated as inert or stable non-reactive. The waste material present across the inaccessible north eastern section of the site may contain hazardous waste materials based upon the descriptions of the materials believed to have been placed there. Further evaluation post supplementary investigation is recommended. Further Waste Acceptance Criteria (WAC) testing may be required by the receiving site.
Infiltration testing	Based upon infiltration testing, site observations that recorded shallow groundwater, it is considered unlikely that traditional soakaways are likely to offer a viable solution for surface water discharge.
Engineering design	The cohesive soils have shown to be of medium to high shrinkage potential and as a result will be susceptible to the influence of trees. The western superficial deposits were found to be unstable below the groundwater level during the ground investigation. The instability suggests that the excavation of foundations to the formation level may not be achieved. CBR values of 3% are assumed for design purposes subject to firm clay being encountered at formation level. Sulphate testing of selected soil samples indicates that a suitable design mix for concrete for buried structures is likely to be DS1-AC1. It is noted that sulphate testing was limited to the shallow superficial deposits and any supplementary investigation should include further sulphate testing to fully characterise the London Clay beneath the site. Within the eastern area of the site, foundations could be overdeepened and placed depths of >1.0m within the London Clay Formation which was encountered at depths between 0.70 to 2.30m. Foundations placed within the firm to stiff and stiff London Clay may be designed for an allowable bearing capacity of 100kPa for acceptable settlement. However, when overdeepening foundations consideration should be given to the possibility of rapid groundwater ingress into excavations with may be problematic. In the western area, due to the thickness of superficial cover together with the instability and groundwater ingress observed within TP02 overdeepening of traditional foundations to a suitable formation is likely to be problematic and uneconomical. Given the above, it is likely that the western area of proposed development will require specialist foundations such as piles or that ground improvement could be carried out. The advice of specialist piling or ground improvement contractors should be sought to determine the most appropriate technique and method.

Considerations and Recommendations for Further Work	
Considerations	• The depth to competent founding strata was found to vary significantly across the site. • Relatively shallow groundwater was found in many areas across the site which may prove problematic for deeper foundation excavations and related construction. • The extent of investigation was limited by access restrictions, as a result supplementary investigation will be required. • Due to the restricted access further investigation will be required. • Infiltration testing was not undertaken in accordance with BRE Digest DG-365 (2016) as it was not possible to complete three infiltration tests at each location in the time available. However, because shallow groundwater was encountered in the monitoring wells, soakaways are unlikely to provide a viable drainage solution for this site. • The site is located within a Flood Risk Zone 2/3. As such, a Flood Risk Assessment will be required to support future development. • A large water supply pipeline is present within the central section of the site running north to south.

Recommendations	<u>Human health/Controlled Waters/ Ground gas</u> • It is recommended that further investigation and laboratory testing is undertaken in areas that have been identified as potential sources of contamination not accessible during this investigation. • It is recommended that that provision of a clean capping layer in accordance with BRE guidance should be anticipated in the area of existing development/farm and where development encroaches into the area of landfilling to mitigate human health risks. It is anticipated this will likely comprise up to 300mm in common areas of proposed public open space and up to 600mm in private garden areas with a geotextile separation/no-dig layer at the base/sides of excavations, where residual made ground is present. • Due to the access restrictions encountered during the investigation the potential sources of contamination that include; historic tanks, vehicle repair workshop and landfill could not be fully investigated and characterised. It is recommended that supplementary investigation should comprise testing of surface waters up and down gradient of the landfill area to assess potential effects on surface water quality. Dependent of the findings of any supplementary investigation, groundwater monitoring and testing may also be required to evaluate the potential impacts to groundwaters. • Subject to confirmation of physical suitability, it is considered that on-site made ground may be suitable for re-use within areas of shared soft landscaping or beneath hard landscaping. In the event that on-site re-use of soils is planned, a Materials Management Plan (MMP) may be required, in line with the CL:AIRE Definition of Waste Code of Practice. • Following the completion of supplementary investigation, a remediation strategy should be prepared detailing the recommended risk mitigation actions. • It is advised the ground gas monitoring programme is continued for a further 3N^o rounds, to increase the number to 6N^o in total, in line with CIRIA/NHBC guidelines. Furthermore, dependant on the findings during the supplementary ground investigation, additional wells may be required. <u>Plant growth and potable water supply pipework</u> • No significantly elevated phytotoxic contaminant compounds were detected in soils, and it was noted that existing vegetation was generally healthy. It should however be noted that further investigation is recommended to fully characterise the site. • It is recommended that testing in line with BS3882 requirements is undertaken to confirm suitability of site won topsoil for re-use aligned to the development landscaping proposals. • Elevated contaminants within the made ground with respect to the UKWIR guidelines indicate that upgraded water supply pipework will be required for any services installed in the made ground. • The statutory water provider should be consulted regarding suitable water supply pipework requirements. <u>Engineering</u> • Further investigation is recommended to provide further confidence in the extent and volume change potential of the near surface clay in the central northern section of the site. Following this a zonal plan should be produced to illustrate where differing floor slab solutions can be used. • Further investigation is also recommended to provide further confidence to the current foundation recommendations and to possibly zone areas of loose material which may lead to more favourable recommendations within the western area of the site. • Supplementary groundwater monitoring should be carried out to further assess the potential for significant groundwater ingress into foundation excavations. • The advice of specialist piling contractors should be sought to discuss the most cost-effective method of pile emplacement taking into account the ground and groundwater conditions described in this report. Piling contractors should also be made aware of very loose sand encountered beneath the water table in TP03 which could cause problems with rising/running sands within uncased boreholes. • Should any exceptionally soft spots or oversized material be noted during construction, they should be removed and replaced with compacted granular fill for road construction. • Based upon the recorded pH levels revealed on site when considered against the assessment levels in BRE Special Digest 1 (2005) a DS1-AC1 concrete design mix should be suitable for subsurface concrete across the site however, this should be confirmed following further assessment.
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	<u>General</u> • Discussions should be held with local landfill/soil waste treatment facilities to agree material classification/pre-treatment required for any soils to be disposed off-site as a result of proposed construction works. • Ground workers should remain vigilant for visible and olfactory signs of contamination following demolition of on-site buildings. • Although no areas of made ground were encountered during the investigation vigilance should be employed by the groundworks contractor during works. In the event that significant made ground is encountered, advice from a specialist geoenvironmental consultancy should be sought. • On-site monitoring wells should be protected from damage until such time as additional gas/groundwater monitoring has been completed and conclusions/recommendations within this report are agreed with the regulators. • On-site monitoring installations should be decommissioned in accordance with Environment Agency guidelines. • A site-specific health and safety plan should be prepared to inform on risks posed from the previous site use and mitigations for ground workers developing the site e.g. requirements for appropriate PPE, hygiene practices, environmental monitoring and requirements for mitigation measures during construction works. • A copy of this report should be provided to the relevant regulatory authorities to confirm that they are in agreement with the report findings.
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1 INTRODUCTION

1.1 Contract Details

Following instruction from Pye Homes (the 'client'), this report presents the results of a Ground Investigation undertaken for a proposed residential development at Oak Tree Lane, Woodgate (the 'site').

1.2 Proposed Development

Information presented to T&P Regeneration Ltd (T&P) indicates that the proposed development is likely to comprise 159N° residential units including 36N° apartments and 123N° traditional two storey residential dwellings with associated areas of communal and private soft landscaping and hard landscaped access and parking.

1.3 Objectives

The purpose of the assessment is to establish the environmental and geotechnical conditions of the site to support a future planning application. A development layout plan is included in Appendix A.

This report also considers the likely foundation options appropriate to the proposed development, along with requirements for any related ground improvement works and/or remediation considered necessary to mitigate potentially unacceptable risks resulting from current and/or historical land uses.

1.4 Previous Reports

A Phase 1 Desk Study was previously completed for the site by a third party¹. Pertinent information from this report has been considered within this assessment, and is summarised where relevant. Where possible, copies of this report/these reports should be made available to the reader.

1.5 Scope of Works

The scope of works to fulfil the purpose of the assessment has included the following:

- Review of third-party report/reports;
- Presentation of a preliminary site conceptual model and environmental risk assessment based on previous desk study information;
- Intrusive ground investigation comprising trial pitting and dynamic windowless sampling;
- Collection of soil samples for chemical and geotechnical laboratory analysis;
- Infiltration and CBR testing;
- Groundwater and ground gas monitoring visits;
- Assessment of chemical and geotechnical test results;
- Interrogation of preliminary conceptual site model and update to environmental risk assessment; and,
- Presentation of geotechnical information to assist with foundation design.

¹ Preliminary Investigation Report. Soils Ltd. July 2018.

1.6 Report Limitations

The recommendations, interpretations and conclusions of this report are based on the historical and current site conditions reported by database and mapping sources as supplemented with information gathered during on-site visits. No responsibility can be accepted for the accuracy of third-party information including reference data contained within site specific database reports. Due to the inherent variability of the ground conditions between exploratory hole positions interpretations are accurate only for the date of the investigation works.

2 SITE INFORMATION AND SETTING

2.1 Site Location

Site location information is summarised in Table 2.1. A Site Location Plan is presented within Appendix A.

Table 2.1 Site Location Information

Information	Description
Full postal address	Oak Tree Lane, Woodgate PO20 3GU
National Grid Reference (NGR)	494160, 104140

2.2 Site Description

A site walkover was undertaken by T&P on 25th June 2019. A summary of pertinent site information gathered during the survey is provided in Table 2.2. A selection of photographs is provided within Appendix B.

Table 2.2 Summary of Site Information

Information	Description
Site description including current site use and dimensions/area (ha)	The site occupies approximately 8 hectares (ha), measuring approximately 390m east to west and 175m north to south. The site was found to be host to an arrangement of buildings located centrally, adjacent to the northern boundary comprising; two houses; three stable blocks together with some light commercial units, including a vehicle repair workshop located in the north east. The remaining area was broadly noted to be used as paddocks for horses.
Surrounding land uses	North Farmland is present adjacent to the northern site boundary.
	South The site is bounded by a caravan park.
	East The site is bounded by farmland.
	West Residential properties are located to the west of the site.
Significant site features	- The north eastern field has been artificially raised. Anecdotal information suggests that a land filling operation has been undertaken for a number of years, and wastes may include animal carcasses, motor vehicles and animal wastes (faeces). - A concrete marker thought to indicate the location of a substantial water main that bisects the site north to south. - An east to west alignment of metal utility covers demarking a foul sewer. - Tanks were suspected in the farmyard area but not inspected at the time of the investigation works.

2.3 Environmental Setting

Pertinent environmental information within the available third party Desk Study report² has been reviewed and is summarised in Table 2.3.

² Preliminary Investigation Report. Soils Ltd. July 2018.

Table 2.3 Summary of Site Setting from Desk Study Information

Information	Description
Site history	The earliest historical map of 1876 indicates the site to be undeveloped and spread across several agricultural fields. By 1974, Ryefields Piggeries is shown to have been constructed, centrally, adjacent to the northern boundary. The piggery comprises several rectangular buildings assumed to be housing pigs, two tanks are identified centrally within the buildings. The 1986 map shows the piggery is now identified as Ryefield Farm. Additional buildings are shown to have been constructed adjoining and adjacent to the previous development, the tanks are no longer identified. Two oval shaped areas are shown in the western area thought to be for the training of horses. No further significant on-site changes are shown on the subsequent maps. The surrounding area is shown to be broadly in agricultural use on the earliest map, with a railway track running from east to west approximately 100m north of the site. By 1937 an area of excavation is identified within 'Brick Field' located adjacent to the central section of the southern boundary, a residential development is also shown to the west of the site. By 1979, the excavation is no longer shown and the 'Brick Field' is identified as a caravan park. No further significant changes other than the continued residential development of the area is shown to have occurred up to the present day.
Geology	The western and central portions of the site are shown to be underlain by Aeolian Deposits. These are described as mainly silt and formerly known as 'Brick earth'. The eastern site area is shown to be underlain by River Terrace Deposits that comprise sands and gravels. Beneath the superficial cover the London Clay Formation is indicated to be present.
Mining and geotechnical hazards	The site is not located within an area of historical coal mining.
Hydrology and hydrogeology	The underlying superficial deposits are classified as a Secondary A Aquifer. The bedrock geology is classified as an Unproductive Stratum. The site is not located within a groundwater Source Protection Zone. There is 1N° groundwater abstraction 110m north east of the site for irrigation purposes. Groundwater vulnerability is classified by the Environment Agency as medium-low. The nearest surface water feature is an undefined stream that forms the eastern site boundary.
Environmental designations	There are no sensitive environmental designations on or near the site.
Radon	No radon protection measures are required.
Background soil geochemistry	The site is not located within an area of naturally elevated metalliferous elements.
Flood risk	The majority of the site is located in a Flood Risk Zone 1, while the eastern site area is identified to cross Flood Risk Zone 2 and 3. Therefore, a Flood Risk Assessment will be required to support redevelopment.
UXO	The site is located in a low UXO risk area.
Areas of Potential Concern	- On-site made ground associated with previous and current development/ site activities. - On-site Pesticide/ herbicide use associated with former agricultural practice - On-site made ground associated with landfilling in the north eastern site area. - On-site historic tanks with unconfirmed storage/contents. - Off-site potentially infilled pit located adjacent to the southern boundary. - Off-site railway located 100m north of the site boundary.

3 PRELIMINARY CONCEPTUAL SITE MODEL

3.1 Background

A risk assessment has been carried out under the governing terms set by Part 2A of the Environmental Protection Act 1990, statutory guidance entitled 'Contaminated Land Statutory Guidance (April 2012)' and in accordance with UK's risk assessment framework³.

The conceptual site model for the site has been developed with consideration of national guidance⁴ which provides a framework for risk estimation and evaluation of plausible source-pathway-receptor linkages identified in the context of a proposed residential development.

3.2 Potential Contamination Sources

Following the review of previous reports as summarised in Sections 2.3, potential on- and off-site sources of contamination have been identified as listed in Table 3.1.

Table 3.1 Summary of Potential Contamination Sources

Areas of potential concern (APC No)		Source/hazard description	Source contaminants
On-site sources/hazards	1	Made ground associated with previous / current site uses and development of unknown composition.	Metals, hydrocarbons, asbestos, pesticides and herbicides, ground gases and vapours, animal remains; possible pathogens.
	2	Agricultural pest/weed control associated with former agricultural practice.	
	3	Made ground associated with landfilling in the north eastern site area.	
	4	On site historic tanks with unconfirmed storage / contents.	
Off-site sources/hazards	5	Potentially infilled pit located adjacent to the southern boundary.	
	6	Possible contaminants migrating from railway located 100m north of the site boundary.	

3.3 Potential Receptors

With regard to the site setting and future proposed development, the following receptors have been identified:

- Future residents.
- Future maintenance workers (including intrusive workers).
- Off-site residents/workers.
- Groundwater – The underlying superficial deposits are classified as Secondary A Aquifers. While, the underlying London Clay Formation is classified as Unproductive. The site is not recorded to lie within a SPZ and no potable water or groundwater abstraction points are recorded within a 500m radius. With reference to national guidance⁵, the sensitivity of

³ CLR 11. Model Procedures for the Management of Contaminated Land. Defra & Environment Agency. 2004.

⁴ Annex 4 - Guidance for the Safe Development of Housing on land Affected by Contamination R&D66. NHBC. 2008

⁵ Annex 2 - Guidance for the Safe Development of Housing on land Affected by Contamination R&D66. NHBC. 2008

groundwater as a potential receptor to contaminant impact beneath the site is considered to be Moderate (M2).

- Surface water - the nearest surface water feature forms the eastern site boundary. No licensed abstractions are recorded within 500m. With reference to the same national guidance, the sensitivity of surface water as a potential receptor to contaminant impact beneath the site is considered to be Moderate (M2).
- Potable water supply pipework and buried concrete associated with the proposed development - Underground services associated with the proposed development may be affected by the chemical characteristics of the soil through direct chemical attack.
- Existing/future flora and fauna - The proposed development is shown to include private and communal areas of soft landscaping which will present viable flora receptors via plant root uptake.

The following receptors have been discounted from further consideration:

- Construction workers – it is considered that risks during the construction works will be managed appropriately to mitigate short term risks through measures such as use of Personal Protective Equipment (PPE), hygiene practices and other on-site controls as outlined in their Construction Phase Health and Safety Plan and method statements/risk assessments.
- Current site users – in the context of the proposed development for the site, future residents represent a more sensitive receptor than current site users, and as such, consideration of potential risks to future residents will be suitably protective of current site users. As such, current site users will not be considered separately.

3.4 Exposure and Migration Pathways

With consideration of the site setting and proposed development, the following exposure pathways are considered to be potentially active:

- Direct contact with contaminated soils/water;
- Dust migration with inhalation;
- Oral ingestion including vegetable uptake;
- Vapour/gas inhalation (including gas explosion risk);
- Permeation into drinking water supplies;
- Leaching/dissolution with vertical migration to groundwater;
- Leaching/dissolution with lateral migration of dissolved phase contamination in groundwater to surface water;
- Soil erosion/overland flow to surface water;
- Direct contact (buildings/property); and,
- Uptake by flora.
- Migration via service trenches.

3.5 Preliminary Qualitative Risk Assessment

Table 3.2 highlights the source-pathway-receptor relationships or “contaminant linkages” that may potentially be active in consideration of both the site’s current use and proposed future use. Those contaminant linkages assessed as low or very low risk at this stage will not be considered further.

Table 3.2 Summary of Source-Pathway-Receptor Relationships

APC N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk*	Comment
1	On-site Localised made ground associated with previous and current development/site activities.	Oral ingestion	Future residents and maintenance workers	Medium	Low likelihood	Moderate/ Low Risk	-
		Vegetable uptake	Future residents	Medium	Low likelihood	Moderate/ Low Risk	-
		Dermal contact	Future residents, maintenance workers and fauna	Medium	Low likelihood	Moderate/ Low Risk	-
		Dust migration/inhalation	Future residents, maintenance workers and off-site residents/workers	Medium	Low likelihood	Moderate/ Low Risk	-
		Gas / vapour inhalation/explosion	Future residents and maintenance workers	Medium	Low likelihood	Moderate/ Low Risk	Localised low to medium vapour risk associated with vehicle workshop located in the north east.
		Permeation into drinking water supplies	Future residents	Medium	Low likelihood	Moderate/ Low Risk	-
		Leaching/dissolution with vertical migration to groundwater	Groundwater	Medium	Low likelihood	Moderate/ Low Risk	-
		Leaching/dissolution with vertical migration to groundwater, and lateral migration in groundwater	Surface water	Medium	Low likelihood	Moderate/ Low Risk	-
		Overland flow	Surface water	Medium	Low likelihood	Moderate/ Low Risk	-
		Migration via service trenches	Surface water	Medium	Low likelihood	Moderate/ Low Risk	-

APC N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk*	Comment
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater and subsequent volatilisation	Future residents, maintenance workers and off-site residents/workers	Medium	Low likelihood	Moderate/ Low Risk	-
		Direct contact	Buildings	Medium	Low likelihood	Moderate/ Low Risk	-
		Uptake via root system	On-site flora	Mild	Low likelihood	Low Risk	No evidence of distress or die back in existing vegetation.
2	<u>On-site</u> Agricultural pest/weed control associated with former agricultural practices.	Oral ingestion	Future residents and maintenance workers	Medium	Unlikely	Low Risk	History of the site indicates it has been in pastoral use. Therefore, the extensive use of pesticide and herbicides is considered low. Furthermore, pesticide and herbicide chemicals have a low environmental persistence.
		Vegetable uptake	Future residents	Medium	Unlikely	Low Risk	
		Dermal contact	Future residents, maintenance workers and fauna	Medium	Unlikely	Low Risk	
		Dust migration/inhalation	Future residents, maintenance workers and off-site residents/workers	Medium	Unlikely	Low Risk	
		Leaching/dissolution with vertical migration to groundwater	Groundwater	Medium	Unlikely	Low Risk	
		Leaching/dissolution with vertical migration to groundwater, and lateral migration in groundwater	Surface water	Medium	Unlikely	Low Risk	
		Overland flow	Surface water	Medium	Unlikely	Low Risk	
		Migration via service trenches	Surface water	Medium	Unlikely	Low Risk	

APC N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk*	Comment
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater and subsequent volatilisation	Future residents, maintenance workers and off-site residents/workers	Medium	Unlikely	Low Risk	
		Direct contact	Buildings	Medium	Unlikely	Low Risk	
		Uptake via root system	On-site flora	Mild	Unlikely	Very Low Risk	
3	On-site Made ground associated with landfilling/land raising in the north eastern site area.	Oral ingestion	Future residents and maintenance workers	Medium	Likely	Moderate Risk	-
		Vegetable uptake	Future residents	Medium	Likely	Moderate Risk	-
		Dermal contact	Future residents, maintenance workers and fauna	Medium	Likely	Moderate Risk	-
		Dust migration/inhalation	Future residents, maintenance workers and off-site residents/workers	Medium	Likely	Moderate Risk	-
		Gas / vapour inhalation/explosion	Future residents and maintenance workers	Medium	Likely	Moderate Risk	-
		Permeation into drinking water supplies	Future residents	Medium	Likely	Moderate Risk	-
		Leaching/dissolution with vertical migration to groundwater	Groundwater	Medium	Likely	Moderate Risk	-
		Leaching/dissolution with vertical migration to groundwater, and lateral migration in groundwater	Surface water	Medium	Likely	Moderate Risk	-
		Overland flow	Surface water	Medium	Likely	Moderate Risk	-

APC N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk*	Comment
		Migration via service trenches	Surface water	Medium	Likely	Moderate Risk	-
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater and subsequent volatilisation	Future residents, maintenance workers and off-site residents/workers	Medium	Likely	Moderate Risk	-
		Direct contact	Buildings	Medium	Likely	Moderate Risk	-
		Uptake via root system	On-site flora	Mild	Likely	Moderate/ Low Risk	-
4	<u>On-site</u> Historic tanks with unconfirmed storage / contents.	Oral ingestion	Future residents and maintenance workers	Medium	Low likelihood	Moderate/ Low Risk	-
		Vegetable uptake	Future residents	Medium	Low likelihood	Moderate/ Low Risk	-
		Dermal contact	Future residents, maintenance workers and fauna	Medium	Low likelihood	Moderate /Low Risk	-
		Dust migration/inhalation	Future residents, maintenance workers and off-site residents/workers	Medium	Low likelihood	Moderate /Low Risk	-
		Gas / vapour inhalation/explosion	Future residents and maintenance workers	Medium	Low likelihood	Moderate /Low Risk	-
		Permeation into drinking water supplies	Future residents	Medium	Low likelihood	Moderate /Low Risk	-
		Leaching/dissolution with vertical migration to groundwater	Groundwater	Medium	Low likelihood	Moderate/ Low Risk	-
		Leaching/dissolution with vertical migration to groundwater, and lateral migration in groundwater	Surface water	Medium	Low likelihood	Moderate/ Low Risk	-

APC N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk*	Comment
		Overland flow	Surface water	Medium	Low likelihood	Moderate/ Low Risk	-
		Migration via service trenches	Surface water	Medium	Low likelihood	Moderate/ Low Risk	-
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater and subsequent volatilisation	Future residents, maintenance workers and off-site residents/workers	Medium	Low likelihood	Moderate/ Low Risk	-
		Direct contact	Buildings	Medium	Low likelihood	Moderate/ Low Risk	-
		Uptake via root system	On-site flora	Mild	Low likelihood	Low Risk	-
5	Off-site Potentially infilled former surface workings.	Dust migration	Future residents	Mild	Low likelihood	Low Risk	Given the ground cover, potential for dust generation is low.
		Lateral migration and gas / vapour inhalation	Future residents	Medium	Low likelihood	Moderate/ Low Risk	-
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with subsequent volatilisation and inhalation	Future residents and maintenance workers	Medium	Low likelihood	Moderate/ Low Risk	
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with subsequent vegetable uptake/direct contact	Future residents	Medium	Low likelihood	Moderate/ Low Risk	

APC N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk*	Comment
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with permeation into drinking water supplies	Future residents	Medium	Low likelihood	Moderate/ Low Risk	
6	<u>Off-site</u> Possible contaminants migrating from railway located 100m north of the site boundary.	Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with subsequent volatilisation and inhalation	Future residents and maintenance workers	Medium	Unlikely	Low Risk	There are no reported nearby pollution incidents associated with the railway. Furthermore, given the distance from site migratory routes are considered limited.
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with subsequent vegetable uptake/direct contact	Future residents	Medium	Unlikely	Low Risk	
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with permeation into drinking water supplies	Future residents	Medium	Unlikely	Low Risk	

*Where multiple receptors exist the risk classification is based on most sensitive receptor for conservatism.

4 SCOPE OF WORK

4.1 Summary of Fieldwork

An intrusive ground investigation was undertaken by T&P across the site between 25th and 26th June 2019, comprising the following:

- Excavation of 4N° trial pits;
- Infiltration testing within 1N° trial pit;
- Drilling of 7N° dynamic windowless soil sampling boreholes;
- *In situ* vehicle mounted California Bearing Ratio (CBR) tests in 5N° locations;
- Installation of 4N° boreholes as environmental monitoring wells;
- Logging of ground conditions in accordance with BS5930⁶; and,
- Soil sampling.

An exploratory hole location plan is presented within Appendix A and the exploratory hole logs are presented as Appendix D.

4.2 Exploratory Locations and Access Restrictions

A summary of exploratory locations with supporting rationale is provided in Table 4.1.

Table 4.1 Rationale for Exploratory Locations

Exploratory location(s)	Rationale/justification
TP01, TP02 & TP04 WS01 – WS03, WS05 & WS06	General coverage
TP03 & WS04	Area of landfill in the north eastern site area.
TP01	Infiltration testing.
WS01	Off-site potentially infilled area.

The ground investigation was restricted due to the presence of animals across the fields and within the stables and in the area of the active farmyard. In order to minimise distress and possible damage to the animals, the area available for investigation was considerably limited. A plan indicating the area of restricted access is included within Appendix A.

4.3 Trial Pits

T&P supervised the excavation of 4N° trial pits (TP01 – TP04) using a wheeled JCB 3CX backhoe excavator. The trial pits were terminated at depths ranging between 2.00 and 3.70 metres below ground level (mbgl) either as directed by the T&P engineer or due to side wall collapse/water ingress (TP02).

⁶ BS5930. *Code of Practice for Ground Investigations*. 2015.

4.4 Dynamic Windowless Soil Sampling Boreholes

T&P supervised the drilling of 4N° windowless sample boreholes (WS01 – WS06) which were terminated at depths between 4.0 and 5.0mbgl. *In situ* standard penetration testing (SPT) was undertaken at 1.0m intervals or where the geology was noted to change within each borehole.

4.5 *In situ* CBR Testing

T&P supervised the completion of 5N° vehicle mounted California Bearing Ratio (CBR) tests using the plunger method in accordance with BS1377⁷ to assist with carriageway design.

4.6 Infiltration Testing

T&P supervised infiltration testing within 1N° trial pit (TP01) at approximate invert level of proposed drainage.

4.7 Environmental Monitoring

Monitoring wells were installed to assess ground gases from potential on-/off-site sources. Measurements of ground gases were recorded on 3N° monitoring visits which were completed at weekly/ biweekly intervals. Full details of monitoring installations are provided on exploratory logs included in Appendix D. Discussion on ground gas monitoring results is provided in later sections of this report.

⁷ BS1377-Part 9: 1990. *Methods of Tests for Soils for Civil Engineering Purposes – Part 9. In Situ Tests.*

5 SUMMARY OF GROUND CONDITIONS

5.1 Recorded Ground Conditions

The geological sequence encountered during the ground investigation is summarised in Table 5.1 and described further in the following sub-sections. Ground conditions were found to broadly correspond with published geological information. Exploratory logs are included in Appendix D.

Table 5.1 Summary of Ground Conditions

Top depth range (mbgl)	Base depth range (mbgl)	Exploratory holes	Area of site	General description/comments
Ground level	0.15-0.20	TP01, TP02 & TP04 WS01- WS03 WS05 – WS07	General	Fine sandy SILT/ silty CLAY. (TOPSOIL)
1.25	1.50	TP03	North east	Silty CLAY (Relict TOPSOIL)
Ground level	1.25-2.10	TP03 WS04	North east	MADE GROUND: Gravelly CLAY. Gravel is flint, brick, concrete, plastic and metal.
0.15-1.80	0.80-1.45	TP01 & TP02 WS01, WS02 & WS03	West	Firm slightly gravelly sandy SILT. (AEOLIAN DEPOSITS)
0.80-1.45	2.00->5.00	TP01, TP02 WS01, WS02 & WS03	West	Silty fine SAND, locally GRAVEL (WS03). (Very loose to medium dense) (AEOLIAN DEPOSITS)
0.15-2.10	0.70-2.80	TP04 WS04-WS07	East	Firm gravelly CLAY/ loose clayey GRAVEL. (RIVER TERRACE DEPOSITS)
0.70-3.75	>2.70->5.00	TP03 & TP04 WS01, WS03, WS04 -WS07	General	Firm to stiff, stiff silty CLAY. (LONDON CLAY FORMATION)

5.1.1 Made ground

Made ground was only encountered in the north eastern site area known to have been subject to landfilling. Made ground was found to comprise gravelly clay, which included brick, concrete, plastic and metal. Due to the anecdotal information that suggests further potentially significant sources of contamination may be present within the landfill area, additional more widespread investigation is advised.

5.1.2 Topsoil

Topsoil was encountered in the majority of exploratory locations with a typical thickness ranging between 0.15 and 0.20m. In general, the topsoil was found to comprise brown fine sand silt or silty clay.

5.1.3 Superficial Geology

The western site area was found to be underlain by a succession of sandy, occasionally gravelly silt overlying silty fine, occasionally gravelly sand/silty sandy gravel considered to represent the Aeolian deposits. A band of silty clay was noted within the sand in TP02 and between the silt

and the sand in WS02. In-situ density testing has indicated that the granular bands vary from very loose to medium dense.

While, the eastern area was found to be underlain by a veneer of firm gravelly clay and loose clayey gravel considered to represent River Terrace Deposits to depths ranging from 0.70 to 1.50m. However, greater depths were recorded due to the raised levels within the north eastern field that has been subject to landfilling/land raising.

5.1.4 Bedrock Geology – London Clay Formation

Beneath the superficial cover firm to stiff and stiff silty clay was encountered with in the majority of the exploratory holes. These deposits were considered to represent the London Clay Formation and were noted to increase in consistency with depth.

5.1.5 Evidence of Contamination

No significant visible or olfactory evidence of any contamination was noted during the ground investigation. Made ground was present within the north eastern field however, due to the restricted access for investigation close to and beneath buildings in the farmyard and across the main area of infilled ground further evaluation is required.

5.1.6 Below Ground Structures and Obstructions

No below ground structures or obstructions were encountered during the ground investigation.

5.2 Groundwater

Groundwater was encountered within the majority of trial pits and windowless sample boreholes during the ground investigation, with typical depths to groundwater strike ranging between 1.0 and 2.5mbgl.

Groundwater levels were recorded during 3N^o subsequent monitoring visits. Recorded groundwater elevation data is summarised in Table 5.2.

Table 5.2 Summary of Groundwater Elevation Data

Monitoring Well ID	Screened Geological Unit	22/07/19	30/07/19	07/08/2019	Comment
		mbgl	mbgl	mbgl	
WS01	Aeolian Deposits	1.20	1.78	1.88	-
WS02	Aeolian Deposits	3.10	2.02	ND	-
WS04	Made Ground	ND	ND	ND	-
WS05	River Terrace/ London Clay	2.40	0.87	2.00	-

*Inferred from topographical base plan.

In consideration of the observed groundwater strikes and elevation data, groundwater is considered to be perched within the superficial deposits above the London Clay and likely to be affected by seasonal and climatic events. Furthermore, hydraulic connectivity between underlying shallow groundwater and the stream running along the eastern boundary is assumed.

6 SUMMARY OF LABORATORY ANALYSES

6.1 Geotechnical Testing

The geotechnical testing deemed necessary to adequately characterise the site from a geotechnical perspective in the context of the proposed development is summarised in Table 6.1.

Samples from the investigation were forwarded to a UKAS accredited laboratory. Complete results are provided in Appendix D.

Table 6.1 Summary of Geotechnical Testing

Test	Notes	Quantity
Moisture content	5No. tests carried out in conjunction with <i>in situ</i> CBR testing	13 soils
Atterberg limits	-	8 soils

6.2 Chemical Testing – Soil

The soil testing deemed necessary to adequately characterise the site from a contamination perspective in the context of the conceptual site model and proposed development is summarised in Table 6.2.

Samples from the investigation were forwarded to a UKAS and MCERTS accredited laboratory. Complete chemical results are provided in Appendix E.

Table 6.2 Summary of Chemical Testing

Test type	Quantity
<i>Soils</i>	
Arsenic, Boron, Cadmium, Chromium, Lead, Mercury, Nickel, Copper, Zinc, Selenium, Phenols and US EPA 16 Polycyclic Aromatic Hydrocarbons (PAH).	10 soils
Asbestos screening/ID.	2 soils
TPH CWG including benzene, toluene, ethylbenzene and xylenes (BTEX).	2 soil

7 HUMAN HEALTH RISK ASSESSMENT

7.1 Introduction

A human health generic quantitative risk assessment (GQRA) has been undertaken in accordance with the UK regulatory framework and current guidance on assessment of risks presented by land affected by contamination⁸.

7.2 Determination of Averaging Areas/Zones

For the purposes of investigation and assessment a site can be divided into zones based on historical uses or proposed end use. These zones can be further divided into averaging areas, which can be used to assess different soil types or different potential exposure pathways etc. for the purposes of risk evaluation. Each averaging area can be considered independently for human health exposure assessment.

Based upon the proposed end use of the site and the findings of the ground investigation it is proposed that two zones with one averaging area is appropriate for the site as follows:

Zone 1 – Site wide

- Topsoil/ natural soils

Zone 2 – Landfill (north eastern site area)

- Made ground

7.3 Screening Assessment

For each zone/averaging area, the analytical data has been evaluated directly against adopted screening levels⁹ for a 'residential with consumption of home-grown produce' end use.

Where elevated concentrations of contaminants have been identified and the data set is considered suitable for statistical analysis, the 95th percentile Upper Confidence Limit (95th UCL) of the data set (and/or an indication on whether any of the values are considered to be outliers for each contaminant) has been calculated in accordance with national guidance¹⁰. A copy of the statistical analysis is provided within Appendix G.

A review of Zone 1 (topsoil/ natural ground) soil data has not identified any elevated soil contaminant concentrations with respect to adopted human health screening levels for a 'residential with homegrown produce' end use.

Table 7.1 summarises the results of the screening assessment for Zone 2 (made ground) site wide topsoil/natural soils where soil exceedances against adopted screening levels have been identified.

⁸ Environmental Protection Act 1990.

Contaminated Land Statutory Guidance (April 2012).

CLR11 – Model procedures for the management of land contamination. DEFRA/Environment Agency. 2004.

⁹ The LQM/CIEH S4ULs for Human Health Risk Assessment. 2015.

SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. CL:AIRE. 2013.

¹⁰ Guidance on Comparing Soil Contamination Data with a Critical Concentration. CL:AIRE. 2008.

Table 7.1 Summary of Soil Screening – Zone 2 Made Ground

Determinant	Screening level (mg/kg) ¹	Screening level source	Min (mg/kg)	Max (mg/kg)	N° of exceedances	Calculated 95 th UCL (mg/kg)
Organics						
Benzo(b) fluoranthene	2.6	S4UL	0.1	3.8	1 of 3	n/a
Dibenz(a,h) anthracene	0.24	S4UL	<0.1	0.7	1 of 3	n/a

1. Category 4 Screening Level (C4SL) based on 1% Soil Organic Matter (SOM). SP1010 Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. Rev 2. CL:AIRE. 2014; Suitable 4 Use Level (S4UL) based on 1% SOM, where appropriate, as a conservative assessment. (The LQM/CIEH S4ULs for Human Health Risk Assessment (Land Quality Management, 2005). 'Residential with homegrown produce' end use.

No asbestos was detected in the analysed made ground samples.

The distribution of elevated soil concentrations is summarised within Table 7.2. Those determinants identified as Contaminants of Potential Concern (COPC) are discussed further in Section 7.4. All other contaminant concentrations were found to be either below the adopted screening levels or otherwise professionally judged to be below levels of concern.

Table 7.2 Summary of Elevated Soil Concentrations

Exploratory location	Location	Depth (mbgl)	Stratum	Contaminant of potential concern (COPC)	Soil Concentration (mg/kg)
WS04	North East – landfill area	0-0.2	Made ground	Benzo(b)fluoranthene	3.80
				Dibenzo(a,h)anthracene	0.70

7.4 Discussion

A single elevated concentration of dibenz(ah)anthracene of 0.5mg/kg and Benzo(b)fluoranthene was detected within made ground in WS04 (0.0-0.2mbgl) above the adopted screening level of 0.24mg/kg and 2.6mg/kg respectively.

In accordance with HPA guidance¹¹ and as detailed in SP1010¹², PAH profiling has been undertaken to determine the suitability of the Benzo(a)pyrene (BaP) surrogate marker approach in assessing the significance of the elevated PAH in WS01. A copy of the PAH profiling is provided in Appendix F. Ratios of relevant PAHs are consistent with the Culp Study and as such, it is considered appropriate to apply the BaP surrogate marker approach. In consideration of BaP concentrations in the soil sample from 0.1-0.3mbgl in WS01, which is below the adopted screening level, it is concluded that the concentration of dibenz(a,h)anthracene and benzo(b)fluoranthene do not present an unacceptable risk to human health.

All other tested contaminants within natural soils were found to be below the adopted screening levels or otherwise below levels of concern.

However, due to access restrictions during the ground investigation supplementary investigation will be required to assess the potential human health risk across the remaining areas of the site.

It is recommended that provision of a clean capping layer in accordance with BRE guidance should be anticipated in the area of existing development and where development encroaches into the area of landfilling to mitigate human health risks. It is anticipated this will likely comprise

¹¹ Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs). HPA Contaminated Land Information Sheet. 2010.

¹² SP1010. Appendix E. Development of Category 4 Screening Levels. Defra. 2014.

up to 300mm in common areas of proposed public open space and up to 600mm in private garden areas with a geotextile separation/no-dig layer at the base/sides of excavations, where residual made ground is present.

8 CONTROLLED WATERS RISK ASSESSMENT

8.1 Overview of Hydrogeological Setting

The underlying superficial deposits are designated as a Secondary A Aquifer. While, the underlying London Clay Formation is classified as Unproductive. The site is not recorded to lie within an SPZ and nor are there any licensed abstraction recorded within a 500m radius.

The nearest surface water feature is an undefined stream that forms the eastern boundary which flows from north to south. It is considered likely that groundwater within the underlying Secondary A aquifer may be in hydraulic connectivity with nearby surface water features.

On the basis of the above, the sensitive Controlled Waters receptors relating to the site are considered to be:

- Groundwater in Superficial Deposits (Secondary A Aquifer); and,
- On-site stream.

8.2 Risk Evaluation

Due to the access restrictions encountered during the investigation the potential sources of contamination that include; historic tanks, vehicle repair workshop and landfill could not be fully investigated and characterised.

Due to the presence of both surface and groundwater receptors and the presence of viable pathways and potential sources further investigation and assessment is warranted.

It is recommended that supplementary investigation should comprise testing of surface waters up and down gradient of the landfill area to assess potential effects on surface water quality. Dependent of the findings of any supplementary investigation, groundwater monitoring and testing may also be required to evaluate the potential impacts to groundwater.

9 GAS/VAPOUR RISK ASSESSMENT

9.1 Overview of Conceptual Model

Through the development of the preliminary conceptual model potential, the following sources of ground gas/vapour have been identified:

- Made ground associated with former on-site development.
- Made ground associated with the landfilling/land raising in the north eastern site area.
- Off-site potentially infilled former surface working located adjacent to the southern boundary.

The ground investigation identified made ground which was limited to the north-east corner of the site comprising slightly sandy gravel. No significant organic or putrescible material was encountered. In consideration of the ground investigation findings, no additional potential sources of ground gas have been identified on-site.

9.2 Ground Gas/Vapour Monitoring Results

Three ground gas monitoring visits were undertaken over a month period between July and August 2019 within WS01, WS02, WS04 and WS05, the results of which are summarised below. The full monitoring results are included in Appendix G.

- Ground gas monitoring visits were undertaken under varying atmospheric conditions. Atmospheric pressures were recorded between 1008mB and 1025mB. The first monitoring round recorded steady pressure conditions, with the subsequent two monitoring rounds all under rising pressure conditions.
- Methane levels were recorded below instrument detection level (0.1% by volume) in all monitoring locations.
- Peak carbon dioxide levels were found to range between 0.1% and 6.5% by volume. The maximum recorded concentration was encountered within WS04 with concentrations greater than 5% on one occasions.
- Oxygen levels were found to vary between 15.0% and 20.4% by volume. Depleted oxygen concentrations were found in conjunction with elevated carbon dioxide concentrations. The lowest oxygen concentration was found in WS04 and is coincident with elevated carbon dioxide levels.
- Hydrogen sulphide concentrations were all found to be below instrument detection level (<0.1 parts per million (ppm)).
- Carbon monoxide concentrations were all found to be below instrument detection level (<0.1 ppm).
- Steady soil gas flow rates were recorded below the instrument detection level (0.1litres/hour (l/h)) on the majority of occasions. A peak flow rate of 0.2l/h was recorded in WS04 during the first monitoring round only.
- VOCs were found to be below instrument detection level <0.1ppm and 0.2ppm. The maximum recorded concentration was encountered within WS04 on the second monitoring round.
- Groundwater within the natural ground was recorded between 0.87 and 3.10 during the gas monitoring programme. Groundwater was not detected within WS04 that is screened within made ground.

9.3 Gas screening values

Guideline gas screening values (GSV) (Q_{hg}) for maximum methane and carbon dioxide concentrations recorded at the site can be considered through calculation of the hazardous gas flow rate (Q_{hg}) in accordance with CIRIA 665¹³ and NHBC guidance¹⁴ using the following equation:

$$Q_{hg} = (C_{hg}/100) \times q$$

Where ' C_{hg} ' is the gas concentration measured as a percentage and ' q ' is the flow rate.

This calculation is undertaken separately for both carbon dioxide and methane and the maximum Q_{hg} for each, has been calculated and listed below. For conservatism, the peak gas flow of 0.2l/hr has been employed in the calculation:

$$Q_{hg} \text{ (GSV) – methane} = 0.0002$$

$$Q_{hg} \text{ (GSV) – carbon dioxide} = 0.013$$

9.4 Discussion and Risk Evaluation

In accordance with the guidance documents and the data set gathered thus far from the gas monitoring, it is considered appropriate to adopt the calculated hazardous gas flow rates as the GSVs. The adopted GSV is consistent with a "Green" classification, whereby no ground gas protection measures would be required.

However, concentrations of carbon dioxide have been found to be marginally greater than 5% within a single borehole WS04.

Based upon the findings of the monitoring completed, it is considered that gas resistant membranes are unlikely to be required throughout the development. However, an allowance should be made for the provision of Amber 2 gas mitigation measures in the north-eastern section where the land filling/raising has been undertaken to reflect the marginally elevated concentrations of carbon dioxide have been recorded in WS04 (at its southern edge) and the uncertainty of the nature of the fill material present beneath it until further investigation and monitoring can be completed.

Based upon the current guidance together with the sensitivity of the residential development, it is advised the ground gas monitoring programme is continued for a further 3N° rounds, making 6N° in total, preferably with at least 1N° completed during a period of low pressure <1000mB.

It will also be necessary to fully assess the ground gas regime beneath the infilled part of the site and to install additional wells to increase coverage are likely to be required in order to satisfy regulatory concerns.

¹³ Assessing risks posed by hazardous ground gases for buildings. CIRIA C665. 2007.

¹⁴ Guidance on evaluation of development proposals on sites where methane and carbon dioxide are present. Report edition No. 4. NHBC. March 2007.

10 PLANT GROWTH AND POTABLE SUPPLY PIPEWORK RISK ASSESSMENT

10.1 Phytotoxic Risk Estimation

When considering phytotoxic risks, contaminants selected are those listed within Annex 3 of 'Guidance for the Safe Development of Housing on Land Affected by Contamination. R&D66: 2008 Volume 2' as being 'phytotoxic'.

Where available, assessment values have been chosen based on the criteria within (in priority order) SGV Documents, ICRCL 59/83 phytotoxic threshold levels, Dutch RIVM Serious Risk Concentrations (SRC) for ecological receptors (amended for a UK soil of 10% clay and 2% soil organic matter) and US EPA Soil Screening Levels for plants.

A summary of soil concentrations compared with adopted screening levels is provided in Table 10.1 and Table 10.2. Where elevated concentrations of contaminants have been revealed and the data set is considered suitable for statistical analysis, the 95th percentile and Upper Confidence Limit (UCL) of the data set (and/or an indication on whether any of the values are considered to be outliers for each contaminant) has been calculated in accordance with national guidance¹⁵.

A copy of the statistical analysis undertaken is included within Appendix G.

Table 10.1 Summary of Phytotoxic Soil Screening – Made Ground

Determinant	Adopted screening level (mg/kg)	Min (mg/kg)	Max (mg/kg)	N° of exceedances	Calculated 95 th UCL (mg/kg)
Selenium	10	<1.0	<1.0	0 of 3	-
Boron	3	2.4	2.7	0 of 3	-
Copper	130	17	34.9	0 of 3	-
Nickel	70	17.8	21.9	0 of 3	-
Zinc	300	92.8	176	0 of 3	-
Cadmium	8	<0.5	0.7	0 of 3	-
Chromium	154	27.5	34.7	0 of 3	-
Mercury	28	<0.5	<0.5	0 of 3	-

Table 10.2 Summary of Phytotoxic Soil Screening – Topsoil/ Natural Soils

Determinant	Adopted screening level (mg/kg)	Min (mg/kg)	Max (mg/kg)	N° of exceedances	Calculated 95 th UCL (mg/kg)
Selenium	10	<1.0	<1.0	0 of 7	-
Boron	3	0.7	1.2	0 of 7	-
Copper	130	10.6	16	0 of 7	-
Nickel	70	11.7	33	0 of 7	-
Zinc	300	38.8	60.9	0 of 7	-
Cadmium	8	<0.5	<0.5	0 of 7	-
Chromium	154	24.1	43.9	0 of 7	-

¹⁵ Guidance on Comparing Soil Contamination Data with a Critical Concentration. CL:AIRE. 2008.

Determinant	Adopted screening level (mg/kg)	Min (mg/kg)	Max (mg/kg)	Nº of exceedances	Calculated 95 th UCL (mg/kg)
Mercury	28	<0.5	<0.5	0 of 7	-

As indicated by Table 10.1 and Table 10.2, concentrations for all the determinants were found to be below the adopted screening levels in all soil samples. As such, made ground and natural soils are not considered to pose a significant risk to the existing and proposed flora. However, in consideration of the physical composition of on-site made ground, which includes concrete, metal and plastic, will be needed as it may be unsuitable to remain within areas of soft landscaping. As such, a suitable topsoil should be provided as a growth medium in areas of proposed planting in accordance with recommendations from a specialist landscaping consultant.

10.2 Potable Water Supply Pipework Risk Estimation

Water industry guidance¹⁶ states that only organic contaminants pose a potential risk to plastic pipe materials. The UKWIR report provides threshold values for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The results are summarised in Table 10.3 with exceedances against are highlighted in **bold**. It should be noted that the made ground samples taken from the landfill area in the north east of the site have not been included within this assessment.

Table 10.3 Summary of Soil Screening Against UKWIR Criteria

Determinant	Pipe material Generic Assessment Criteria (mg/kg)		Min (mg/kg)	Max (mg/kg)
	PE	PVC		
Extended VOC suite ²	0.5	0.125	<0.1	4.0
BTEX + MTBE ¹	0.1	0.03	-	-
SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C ₅ -C ₁₀)	2	1.4	-	-
Phenols ¹	2	0.4	-	-
Cresols and chlorinated phenols ^{1 3}	2	0.04	-	-
Mineral oil C ₁₁ -C ₂₀ ¹	10	Suitable	<1.0	<1.0
Mineral oil C ₂₁ – C ₄₀ ¹	500	Suitable	<1.0	6.7
Corrosive (conductivity, redox and pH)	Suitable	Suitable	-	-
Specific suite identified as relevant following site investigation				
Ethers ¹	0.5	1	-	-
Nitrobenzene ¹	0.5	0.4	-	-
Ketones ¹	0.5	0.02	-	-
Aldehydes ¹	0.5	0.02	-	-
Amines ¹	Not suitable	Suitable	-	-

1. Determinant not tested.

2. Based upon recorded BaP concentrations.

¹⁶ Guidance for the selection of water supply pipes to be used in brownfield sites (UK Water Industry Research Limited (UKWIR) - Ref: 10/WM/03/21) - 2010

3. Total Monohydric Phenols – Limit of Detection (LOD) is 5.0mg/kg. All speciated phenols are below LOD of 1.0mg/kg.

Given no evidence of visual or olfactory evidence of hydrocarbon or solvent based contamination was encountered on-site during the ground investigation, and the greenfield history of the site, most of the determinants of concern in relation to water supply pipework were not tested.

However, an elevated soil concentration of benzo(a)pyrene (BaP) was recorded within the made ground in WS04 (0.00-0.20mbgl) at 4.0mg/kg. All other concentrations recorded within the made ground and natural ground were found below levels of concern.

Given this concentration is this is an isolated result, recorded within an area of made ground, and considering the remaining dataset it is considered likely that the majority of the site area will be suitable for standard pipework, however upgraded barrier pipework is considered likely to be required by the local water authority in the north eastern site area. The degree of protection will need to be assessed following completion of further ground investigation works across the infilled area.

11 REFINED CONCEPTUAL SITE MODEL

11.1 Overview

Following completion of the ground investigation, collection and interrogation of site data with consideration of the outcome of generic quantitative risk assessment discussed in preceding sections of this report, the conceptual site model has been revised.

11.2 Sources

Further to completion of ground investigation, the sources identified within the preliminary conceptual model to require further consideration include:

- On-site made ground associated with previous and current development/site activities.
- On-site made ground associated with landfilling/land raising in the north eastern site area.
- On-site historic tanks with unconfirmed storage / contents.
- Off-site potentially infilled former surface workings located adjacent to southern boundary.

No further potential sources of impact were identified during the subsequent ground investigation works.

11.3 Risk Evaluation

Those SPRs identified within Table 3.2 as presenting a moderate/low or moderate risk have been further interrogated in accordance with UK national guidance and regulatory framework¹⁷ following completion of ground investigation and risk assessment. Table 11.1 presents the revised SPRs with associated classification of risk as appropriate following re-evaluation of risks.

¹⁷ Annex 4 - Guidance for the Safe Development of Housing on land Affected by Contamination R&D66: 2008.
CLR11. Model Procedures for the Management of Land Contamination. Defra & EA. 2004.

Table 11.1 Revised Source-Pathway-Receptor Relationships

Area of potential concern N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk classification*	Comment
1	<u>On-site</u> Made ground associated with previous and current development/ site activities	Oral ingestion	Future residents and maintenance workers	Medium	Low likelihood	Moderate/ Low Risk	No elevated soil concentrations currently identified when compared with adopted screening levels. However, due to the restricted access, further investigation will be required.
		Vegetable uptake	Future residents	Medium	Low likelihood	Moderate/ Low Risk	
		Dermal contact	Future residents, maintenance workers and fauna	Medium	Low likelihood	Moderate /Low Risk	
		Dust migration/inhalation	Future residents, maintenance workers and off-site residents/workers	Medium	Low likelihood	Moderate /Low Risk	
		Gas / vapour inhalation/explosion	Future residents and maintenance workers	Medium	Low likelihood	Moderate /Low Risk	
		Permeation into drinking water supplies	Future residents	Medium	Low likelihood	Moderate /Low Risk	
		Leaching/dissolution with vertical migration to groundwater	Groundwater	Medium	Low likelihood	Moderate/ Low Risk	
		Leaching/dissolution with vertical migration to groundwater, and lateral migration in groundwater	Surface water	Medium	Low likelihood	Moderate/ Low Risk	
		Overland flow	Surface water	Medium	Low likelihood	Moderate/ Low Risk	
		Migration via service trenches	Surface water	Medium	Low likelihood	Moderate/ Low Risk	

Area of potential concern N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk classification*	Comment
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater and subsequent volatilisation	Future residents, maintenance workers and off-site residents/workers	Medium	Low likelihood	Moderate/ Low Risk	
		Direct contact	Buildings	Medium	Low likelihood	Moderate/ Low Risk	
		Uptake via root system	On-site flora	Mild	Low likelihood	Low Risk	
2	On-site Made ground associated with landfilling in the north eastern site area	Oral ingestion	Future residents and maintenance workers	Medium	Likely	Moderate Risk	No elevated soil concentrations identified when compared with adopted screening levels. However, due to the restricted access, further investigation will be required. Capping of soft landscaping area should be anticipated in this area at this stage as a precautionary measure
		Vegetable uptake	Future residents	Medium	Likely	Moderate Risk	
		Dermal contact	Future residents, maintenance workers and fauna	Medium	Likely	Moderate Risk	
		Dust migration/inhalation	Future residents, maintenance workers and off-site residents/workers	Medium	Likely	Moderate Risk	
		Gas / vapour inhalation/explosion	Future residents and maintenance workers	Medium	Likely	Moderate Risk	
		Permeation into drinking water supplies	Future residents	Medium	Likely	Moderate Risk	
		Leaching/dissolution with vertical migration to groundwater	Groundwater	Medium	Likely	Moderate Risk	

Area of potential concern N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk classification*	Comment
		Leaching/dissolution with vertical migration to groundwater, and lateral migration in groundwater	Surface water	Medium	Likely	Moderate Risk	
		Overland flow	Surface water	Medium	Likely	Moderate Risk	
		Migration via service trenches	Surface water	Medium	Likely	Moderate Risk	
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater and subsequent volatilisation	Future residents, maintenance workers and off-site residents/workers	Medium	Likely	Moderate Risk	
		Direct contact	Buildings	Medium	Likely	Moderate Risk	
		Uptake via root system	On-site flora	Mild	Likely	Moderate/ Low Risk	
3	On-site Historic tanks with unconfirmed storage/ contents.	Oral ingestion	Future residents and maintenance workers	Medium	Low likelihood	Moderate/ Low Risk	Due to restricted access, this area was not investigated.
		Vegetable uptake	Future residents	Medium	Low likelihood	Moderate/ Low Risk	
		Dermal contact	Future residents, maintenance workers and fauna	Medium	Low likelihood	Moderate /Low Risk	
		Dust migration/inhalation	Future residents, maintenance workers and off-site residents/workers	Medium	Low likelihood	Moderate /Low Risk	
		Gas / vapour inhalation/explosion	Future residents and maintenance workers	Medium	Low likelihood	Moderate /Low Risk	

Area of potential concern N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk classification*	Comment
		Permeation into drinking water supplies	Future residents	Medium	Low likelihood	Moderate /Low Risk	
		Leaching/dissolution with vertical migration to groundwater	Groundwater	Medium	Low likelihood	Moderate/ Low Risk	
		Leaching/dissolution with vertical migration to groundwater, and lateral migration in groundwater	Surface water	Medium	Low likelihood	Moderate/ Low Risk	
		Overland flow	Surface water	Medium	Low likelihood	Moderate/ Low Risk	
		Migration via service trenches	Surface water	Medium	Low likelihood	Moderate/ Low Risk	
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater and subsequent volatilisation	Future residents, maintenance workers and off-site residents/workers	Medium	Low likelihood	Moderate/ Low Risk	
		Direct contact	Buildings	Medium	Low likelihood	Moderate/ Low Risk	
		Uptake via root system	On-site flora	Mild	Low likelihood	Low Risk	
4	Off-site potentially infilled former	Lateral migration and gas / vapour inhalation	Future residents	Medium	Low likelihood	Moderate/ Low Risk	Based upon the current gas monitoring data the

Area of potential concern N°	Source	Pathway (s)	Receptor	Consequence	Probability	Risk classification*	Comment
	surface workings located adjacent to southern boundary	Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with subsequent volatilisation and inhalation	Future residents and maintenance workers	Medium	Low likelihood	Moderate/ Low Risk	potential risk posed by this feature is considered to be low. However, supplementary ground gas monitoring is advised to fully assess the ground gas regime beneath the site.
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with subsequent vegetable uptake/direct contact	Future residents	Medium	Low likelihood	Moderate/ Low Risk	
		Leaching/dissolution with vertical migration to groundwater, lateral migration in groundwater with permeation into drinking water supplies	Future residents	Medium	Low likelihood	Moderate/ Low Risk	

**Where multiple receptors exist the risk classification is based on most sensitive receptor for conservatism.*

12 PRELIMINARY WASTE ASSESSMENT

12.1 Waste Hierarchy

In line with the requirements of the Waste Framework Directive, the principles of the “waste hierarchy” should be applied to management options for on-site generated wastes, giving priority to the prevention of waste in the first instance, before considering re-use, recycling, recovery and lastly disposal. Principal considerations are set out in subsequent sections, although it is recommended that advice of a geo-environmental/waste specialists is sought at an early stage in the development process to ensure opportunities for minimisation of waste volumes are maximised.

12.2 On-site Re-Use of Materials

It may be possible to demonstrate through application of the CL:AIRE Definition of Waste Code of Practice (DoW CoP) that site won excavated soils are not classified as waste, and in doing so, permit this material to be re-used as part of proposed site redevelopment works. The DoW CoP may also apply to source segregated material arising from demolition activities. In determining the suitability of this approach, early consideration should be given to being able to demonstrate a specific planning requirement for the re-use of the excavated material. It is noted this approach cannot be applied retrospectively.

It should be noted that on-site re-use of “uncontaminated soil or other naturally occurring material” excavated as part of construction works for the purposes of construction is excluded from waste regulation.

Alternative mechanisms for on-site re-use of soils or aggregate may also be appropriate, on a site specific basis, depending on the volume/nature of the materials, and their intended use, such as:

- Waste exemptions under the Environmental Permitting (England and Wales) Regulations 2010, which are operations which are exempt from requiring permits, providing certain conditions are met. This typically applies to small volumes of non-hazardous soils although may also apply to other material types.
- Environmental permit under the Environmental Permitting (England and Wales) Regulations 2010 (standard or bespoke depending on the material and the activity).
- WRAP Aggregates Quality protocol¹⁸ for the production and use of aggregates from inert waste, providing certain criteria are met.

12.3 Waste Disposal to Landfill

When waste is intended for disposal at a suitably licensed landfill site it is necessary for the waste producer (i.e. the developer or consultant on their behalf) to have completed a basic waste characterisation assessment, including:

- Description of the waste;
- List of Waste (LoW) code or codes if mixed waste;
- Determine the chemical composition to identify if waste has hazardous properties or Persistent Organic Pollutants (POPs) are present;

¹⁸ *Aggregates from inert waste. End of waste criteria for the production of aggregates from inert waste. WRAP.*

- Determination of hazardous properties;
- Waste Acceptance Criteria (WAC) testing (if required) to determine landfill acceptance;

Relevant information on the above can be found in WM3¹⁹ and is discussed further in the context of ground investigation findings in subsequent sections.

It should be noted that alternative off-site disposal routes may be available, such as recycling/treatment facilities, and that in these instances, waste classification would not be appropriate, and instead, it will be necessary to confirm with the destination facility that the material complies with their permit criteria. Further testing in addition to the available ground investigation data may be required by them.

12.3.1 Waste Classification

A preliminary waste classification exercise has been undertaken with reference to available ground investigation data. Hazardous properties of the soils have been assessed using the HazWaste program. A copy of the HazWaste report is included in Appendix H. All results have been assessed as non-hazardous.

12.3.2 Landfill Tax

Unless specifically exempt landfill tax applies to disposal of material at a landfill that's covered by a permit under specific environmental legislation and at any unauthorised waste site. Currently this tax rate is set at £91.35/tonne (2019/2020)²⁰.

There are some circumstances where material placed within a landfill cell is excepted from the charge to Landfill Tax, including use of material for creation of capping, drainage or otherwise meets conditions of other Landfill Tax exemptions e.g. dredgings, mining and quarrying materials.

A lower rate of landfill tax set at £2.90/tonne does apply to less polluting material listed in the landfill tax (qualifying material) order 2011²¹, including naturally occurring rocks and soils, excluding topsoil (group 1) and ceramic or concrete (group 2).

12.4 Recommendations

- Waste management options should be considered in line with the Waste Hierarchy, with priority placed on prevention, re-use, recycling and recovery in order to reduce off-site disposal volumes. Sorting and segregation of excavated soils/materials may also enable reduction in off-site disposal volumes.
- In the event that off-site disposal of surplus excavated soils to landfill is intended, chemical results should be supplied to the receiving facility to confirm they will be able to accept the material. Supplementary testing may be required by the receiving facility, including WAC testing, to confirm the preliminary waste characterisation assessment and to ensure WM3 requirements have been met.
- Should on-site made ground/ natural soils be intended for re-use within the proposed development, it may be possible to demonstrate this material is not waste through preparation of an MMP to fulfil the requirements of the CL:AIRE DoW CoP. It is

¹⁹ Guidance on the classification and assessment of waste - Technical Guidance WM3. Environment Agency 2015.

²⁰ Details on landfill tax rates can be found at: <https://www.gov.uk/government/publications/rates-and-allowances-landfill-tax/landfill-tax-rates-from-1-april-2012>

²¹ Landfill Tax (Qualifying Material) Order 2011 can be found at <http://www.legislation.gov.uk/uk/si/2011/1017/contents/made>

recommended that soil re-use opportunities are considered in the context of the development earthworks strategy, cut/fill and remedial strategy (if appropriate) with input from a specialist geoenvironmental consultant.

- The chemical and physical nature of the waste materials which have been used to infill/raise ground levels across the north eastern part of the site have not been fully investigated/defined and there is a potential that hazardous waste material may be present across this section of the site. Further investigation and characterisation is required in order to evaluate this.

13 INFILTRATION TESTING

13.1 Summary of Field Testing

Infiltration testing was undertaken within 1N° trial pit (TP1) at approximate assumed deep soakaway formation level (i.e. 2m below existing levels) to assess the viability of using traditional soakaway drainage within the proposed redevelopment. Graphical representations of the data are contained within Appendix I.

The trial pits were positioned as per the exploratory hole location plan contained within Appendix A. Infiltration tests were not completed in the north eastern area of the site where made ground was encountered in order to prevent mobilisation of potential contaminants into the controlled waters receptors beneath the site

The infiltration testing and subsequent calculation of soil infiltration rates were carried out in general accordance with the methodologies detailed within BRE 365²².

Ideally, to fully comply with the BRE methodology, infiltration tests should be undertaken a minimum of three times. However, due to the limited time available and the slow infiltration rates recorded, it was not possible to complete the repeat testing. Therefore, the results for these tests should be considered as preliminary only and may not be a suitable basis for final drainage design.

13.2 Soil Infiltration Rate Calculations

The infiltration rates (F) have been calculated in accordance with BRE Digest DG-365 (2016). A summary of the results of the infiltration tests and calculated infiltration rates is provided in Table 13.1.

Table 13.1 Summary of Calculated Infiltration Rates

Exploratory Location	Date	Total Measured water level change (m)	Time Period (mins)	Calculated infiltration rate (m/s)
TP01 (T1)	25/06/2019	0.07	120	n/a

13.3 Discussion

The site was found to be underlain at shallow by superficial deposits that were generally silt or silty fine sand. Ground water was typically encountered at approximately 2.00mbgl during the investigation and recorded between 0.87 to 3.10mbgl during the on-site monitoring. Furthermore, due to slow rates of infiltration an accurate rate of infiltration could not be calculated by the test completed.

Based upon the ground conditions and test result observed, it is considered unlikely that traditional soakaways are likely to offer an effective solution for surface water discharge. Further testing to increase coverage may however be worthwhile to evaluate further when supplementary investigations are undertaken.

²² Soakaway Design BRE Digest DG-365 (2016).

14 COMMENTS ON ENGINEERING DESIGN

14.1 General

Eurocode 7 (Section 2)²³ advocates the use of geotechnical categorisation of the proposed structures to establish the design requirements. Information presented to T&P indicates that the proposed development is to comprise 159N° residential units including 36N° apartments and 123N° traditional two storey residential dwellings with associated areas of communal and private soft landscaping and hard landscaped access and parking. It has been assumed that the dwellings will be of masonry construction with line loads of between 50-70kN/m.

In consideration of the available information on the development proposals, for the purposes of this investigation the proposed structures have been classified as follows:

- Geotechnical category 1: Small and relatively simple buildings (houses) with strip or piled foundations, roads, pavements, car parks, retaining walls below 2m, small excavations for drainage works, with the proposed housing development considered to be within this category.

14.2 Summary of Geotechnical Parameters

Stratum thicknesses and geotechnical parameters for the strata encountered in the investigation are summarised in the following sections. The level of confidence in the derived parameters is provided in Table 14.1.

Table 14.1 Confidence Levels

Key	Description
value	High level of confidence - based on information from investigation.
value	Medium level of confidence - based on published data.
value	Low level of confidence – more data required if parameter to be used in design.

14.2.1 Aeolian Deposits

The design thicknesses and geotechnical parameters for use in the Northmoor Sand and Gravel Formation are described in Table 14.2.

Table 14.2 Summary of Geotechnical Parameters – Aeolian Deposits

Parameter	Units	Min	Max	Design	Comments
Top Depth	mbgl	0.15	0.20	-	-
Base Depth	mbgl	3.70	>5.00	-	-
Thickness	m	3.55	>5.00	-	Thickness not proven.
Moisture Content	%	19	24	-	-
Liquid Limit	%	32	42	-	1N° sample non-plastic (WS01 0.90-1.00m)
Plastic Limit	%	16	21	-	1N° sample non-plastic (WS01 0.90-1.00m)
Plasticity Index	-	16	21	-	1N° sample non-plastic (WS01 0.90-1.00m)

²³ BS EN 1997 – Part 2. Geotechnical Design.

Parameter	Units	Min	Max	Design	Comments
% passing 425µm sieve	%	99	100	-	-
Modified Plasticity Index	-	16	21	20-40	Based on current NHBC guidance, results are indicative of soils of a medium volume change potential
pH	-	-	6.0	-	
Water soluble sulphate (SO42-)	mg/l	-	<20	<20	Design value should be worst case if less than 5 samples. (Ref = BRE Special Digest 1).

14.2.2 River Terrace Deposits

The design thicknesses and geotechnical parameters for use in the River Terrace Deposits are described in Table 14.3.

Table 14.3 Summary of Geotechnical Parameters – River Terrace Deposits

Parameter	Units	Min	Max	Design	Comments
Top Depth	mbgl	0.15	0.20	-	Greater top depths were recorded due to the raised levels within the north eastern field that has been subject to landfilling.
Base Depth	mbgl	0.70	1.50	-	-
Thickness	m	0.50	1.30	-	-
Moisture Content	%	14	38	-	-
Liquid Limit	%	35	70	-	
Plastic Limit	%	14	23	-	
Plasticity Index	-	21	47	-	
% passing 425µm sieve	%	100	100	-	-
Modified Plasticity Index	-	21	47	>40	Based on current NHBC guidance, results are indicative of soils of a high volume change potential
pH	-	7.1	8.5	-	
Water soluble sulphate (SO42-)	mg/l	<20	40	40	Design value should be worst case if less than 5 samples. (Ref = BRE Special Digest 1).

14.2.3 London Clay Formation

The design thicknesses and geotechnical parameters for use in the London Clay Formation are described in **Error! Reference source not found.**

Table 14.4 Summary of Geotechnical Parameters – London Clay Formation

Parameter	Units	Min	Max	Design	Comments
Top Depth	mbgl	0.70	>5.00	-	Greater top depths were recorded due to the raised levels within the north eastern field that has been subject to landfilling.

Parameter	Units	Min	Max	Design	Comments
Base Depth	mbgl	>5.00	>5.00	-	-
Thickness	m	-	-	-	Thickness not proven.
Moisture Content	%	29	34	-	-
Liquid Limit	%	61	63	-	-
Plastic Limit	%	22	25	-	-
Plasticity Index	-	36	41	-	-
% passing 425µm sieve	%	100	100	-	-
Modified Plasticity Index	-	36	41	>40	Based on current NHBC guidance, results are indicative of soils of a high volume change potential

14.3 Construction Considerations

14.3.1 Subsurface Concrete

Based on the pH values and water-soluble sulphate concentrations recorded by the chemical and geotechnical laboratory analysis, together with the calculated oxidisable sulphide, a DS1-AC1 design mix concrete should be suitable for buried structures placed within the shallow soils when compared against the BRE²⁴ assessment levels.

Sulphate testing was confined to the shallow superficial deposits and supplementary investigations should include further sulphate testing within the deeper London Clay to fully characterise the soils beneath the site.

14.3.2 Floor Slabs

The results of the investigation indicate that the cohesive shallow soils on site vary from medium to high volume change potential. Given the limited data-set available to date it is not considered appropriate to zone the site with respect to volume change potential. As such, based upon the high volumes change potential, proprietary suspended ground floor slabs should be designed with a minimum 300mm void based upon NHBC guidance.

14.3.3 Building Near Trees

The cohesive soils found beneath the site have been found to be of medium to high volume change potential. As such, based upon the high volume change potential and in accordance with NHBC guidelines the minimum founding depth of traditional foundations would be 1.00mbgl. At this stage due to the high volume change potential provision should be made for the use of void formers where shallow strip foundations are to be placed at a depth greater than 1.50mbgl due to the impact of existing trees. The impact of any new planting associated with future potential development of the site should take into account the volume change potential of the soils.

Due to the medium to high volume change potential of the soils, foundations will be highly susceptible to the influence of trees. It is recommended the findings of this report are considered in conjunction with an arboricultural survey and the recommendations given by the NHBC regarding the over deepening of foundations in the vicinity of trees.

²⁴ BRE Special Digest 1:2005 – Third edition – Concrete in aggressive ground.

14.3.4 Deep Excavations

The superficial sand was found to be highly unstable during the ground investigation with numerous side wall collapses noted during trial pitting. Man entry into any excavations should be avoided where possible. However, if man entry is required, the excavation sides should be adequately shored and supported or battered back to a safe angle in accordance with appropriate temporary works design.

14.3.5 Groundwater

Groundwater was encountered during the ground investigation at depths ranging between 1.0 and 2.5mbgl, as outlined in Section 5.2. It is considered that this is likely to be representative of shallow laterally discontinuous perched groundwater. Excavations below the water level in the western site area were found to become unstable, whereas, only seepages and slow ingress was noted in excavations in the eastern site area.

As such, it is considered that groundwater ingress into excavations to <2.0m depth in the eastern site area will be relatively slow and should be adequately dealt with via sump pumping. However, excavations in the western site area below approximately 1.5m depth are likely to encounter relatively rapid groundwater ingress which is unlikely to be dealt with adequately via traditional methods such as sump pumping and will probably be associated with sidewall instability. Therefore, should excavation beneath groundwater level be required, specialist dewatering is likely to be required together with adequate excavation support. Advice from a specialist dewatering contractor should be sought to determine the most suitable dewatering method.

14.3.6 Buried Utilities

It is recommended that existing live services are accurately located by careful hand digging and liaison undertaken with the utility companies with regard any required works in these areas. The services should be clearly marked and taken into account in the construction design process. The approximate position of the water supply pipeline and sewer are marked on the site features plan within Appendix A.

Excavation in close proximity to live services will need to ensure that the excavation walls are stable or appropriately battered to a safe angle. Temporary slope stability works and pumping of groundwater may be required in any deep excavations.

14.3.7 Earthworks and Material Handling

Currently it is anticipated that site levels will remain relatively neutral. As such, it is likely that extensive re-use of existing soils will not be required as part of redevelopment proposals. Should earthworks be required, an earthworks specification will be necessary to ensure the appropriate management and reuse of the existing soils.

14.3.8 Road Construction

In total 5N° vehicle mounted CBR tests (CBR01 – CBR05) were undertaken along the proposed roadways across the site. The results of the CBR tests are shown in Appendix D.

The *in situ* vehicle mounted CBR test results recorded across the site range from 4.7% - 6.9%. Based on the test results a lower general design CBR value of 3% is currently recommended based upon the common presence of firm cohesive soils being encountered at formation level. It should be noted however that where revealed the clay soils are moisture sensitive and will be prone to deterioration to give lower CBR values if left exposed during periods of wet weather.

In such circumstances the use of geotextile at the base of construction may be prudent to reduce the potential loss of granular sub-base if placed during periods of inclement weather.

Illustrative typical adoptable road construction thicknesses for a CBR of 2.5% are given below based on current guidance²⁵:

- Foundation Class 1 – 550mm capping.
- Foundation Class 2 – 450mm sub-base.
- Foundation Class 3 – 340mm sub-base.
- 350mm Foundation Class 2 sub-base with 250mm Foundation Class 1 capping.
- 290mm Foundation Class 3 sub-base with 250mm Foundation Class 1 capping.

Where granular deposits are revealed at formation level higher CBR values of >5% are likely to be achievable, however due to the spatial distribution and variability of soil types further investigation along the proposed road lines will be required to evaluate where higher CBR's may be adopted.

14.4 Preliminary Foundation Recommendations

The proposed development is to comprise 159N° residential units including 36N° apartments and 123N° traditional two storey residential dwellings with assumed line loads of between 50-70kN/m.

The shallow ground conditions across the site were variable and challenging, with the western site area found to be underlain by a succession of silt, clay and fine sand, thought to represent Aeolian deposits. *In situ* density testing has indicated that the granular bands are highly variable in relative density rapidly changing from very loose to medium dense. While the cohesive silt was described as firm it is considered likely to be highly sensitive to changes in moisture content and disturbance that may cause rapid softening and loss of strength.

The eastern area was found to be underlain by a veneer of firm gravelly clay and loose clayey gravel considered to represent River Terrace Deposits to depths ranging from 0.70 to 2.30m.

Within the north eastern site area made ground comprising gravelly clay, which included brick, concrete, plastic and metal was encountered. Made ground in this area was noted to thicken from west to east, towards the eastern boundary.

Beneath the superficial cover and made ground firm to stiff and stiff silty clay was encountered within the majority of holes. These deposits were considered to represent the London Clay Formation and noted to increase in consistency with depth.

Cohesive fractions of both the River Terrace and Aeolian Deposits along with the London Clay Formation are considered to be of high-volume change potential and, as such, a minimum foundation depth of 1.0m is required across the site. However, the in-situ testing, has shown that the granular fraction within the superficial soils varies from very loose to medium dense and shows no spatial correlation. As such, at this stage, the superficial deposits are not considered a suitable founding stratum.

This is further reinforced by the groundwater ingress observed within these soils which is likely to compromise over deepening of traditional foundations to a suitable formation due to groundwater ingress and instability.

²⁵ Interim Advice Note 73/06 Revision 1 (2009)

Within the eastern area of the site, foundations could be overdeepened and placed at depths of >1.0m within the London Clay Formation which was encountered at depths between 0.70 to 2.30m. Foundations placed within the firm to stiff and stiff London Clay may be designed for an allowable bearing capacity of 100kPa for acceptable settlement.

However, when overdeepening foundations consideration should be given to the potential for rapid groundwater ingress into excavations which may be problematic and could hinder associated traditional foundation construction.

In the western area, due to the thickness of superficial cover together with the instability and groundwater ingress observed within TP02, overdeepening of traditional foundations to a suitable formation is likely to be problematic and uneconomical.

Given the above, it is likely that the western area of proposed development will require specialist foundations such as piles or ground improvement such as vibro compaction could be carried out. The advice of specialist piling or ground improvement contractors should be sought to determine the most cost-effective technique and method.

It should be noted that the scope of the investigation carried out to date was limited and, as such, the recommendations given above should be considered as preliminary. Further investigation should be carried out to confirm the above findings.

15 CONSIDERATIONS AND RECOMMENDATIONS

15.1 Considerations

The following uncertainties/data gaps have been identified which may require further consideration:

- The depth to competent founding strata was found to vary significantly across the site.
- Relatively shallow groundwater was found in many areas across the site which may prove problematic for foundation excavations.
- The extent of investigation was limited by access restrictions, as a result supplementary investigation will be required.
- Due to the restricted access further investigation will be required.
- Infiltration testing was not undertaken in accordance with BRE Digest DG-365 (2016) as it was not possible to complete three infiltration tests at each location in the time available. However, because shallow groundwater was encountered in the monitoring wells, soakaways are unlikely to provide a viable drainage solution for this site.
- The site is located within a Flood Risk Zone 2/3. As such, a Flood Risk Assessment will be required to support future development.
- A large water supply pipeline is present within the central section of the site running north to south.

15.2 Recommendations

15.2.1 Human Health/Controlled Waters

- It is recommended that further investigation and laboratory testing is undertaken in areas that have been identified as a potential source of contamination not accessible during this investigation. It is recommended that that provision of a clean capping layer in accordance with BRE guidance should be anticipated in the area of existing development and where development encroaches into the area of landfilling to mitigate human health risks. It is anticipated this will likely comprise up to 300mm in common areas of proposed public open space and up to 600mm in private garden areas with a geotextile separation/no-dig layer at the base/sides of excavations, where residual made ground is present.
- Due to the access restrictions encountered during the investigation the potential sources of contamination that include; historic tanks, vehicle repair workshop and landfill could not be fully investigated and characterised. It is recommended that supplementary investigation should also comprise testing of surface waters up and down gradient of the landfill area to assess potential effects on surface water quality. Dependent of the findings of any supplementary investigation, groundwater monitoring and testing may also be required to evaluate the potential impacts to groundwaters.
- Subject to confirmation of physical suitability, it is considered that on-site made ground may be suitable for re-use within areas of shared soft landscaping or beneath hard landscaping. In the event that on-site re-use of soils is planned, a Materials Management Plan (MMP) may be required, in line with the CL:AIRE Definition of Waste Code of Practice.
- Following the completion of supplementary investigation, a remediation strategy should be prepared detailing the recommended risk mitigation actions.

15.2.2 Ground Gas

- It is advised the ground gas monitoring programme is continued for a further 3N^o rounds, to increase the number to 6N^o in total, in line with CIRIA/NHBC guidelines. Furthermore,

dependant on the findings during the supplementary ground investigation, additional wells and monitoring across the landfilled area are likely to be required.

15.2.3 *Plant Growth*

- No significantly elevated phytotoxic contaminant compounds were detected in soils, and it was noted that existing vegetation was generally healthy. It should however be noted that further investigation is recommended to fully characterise the site.
- It is recommended that testing in line with BS3882 requirements is undertaken to confirm suitability of site won topsoil for re-use aligned to the development landscaping proposals.

15.2.4 *Potable Water Supply Pipework*

- Elevated contaminants within the made ground with respect to the UKWIR guidelines indicate that upgraded water supply pipework will be required for any services installed in the made ground.
- The statutory water provider should be consulted regarding suitable water supply pipework requirements.

15.2.5 *Engineering*

- Further investigation is recommended to provide further confidence in the extent and volume change potential of the near surface clay in the central northern section of the site. Following this a zonal plan should be produced to illustrate where differing floor slab solutions might be used.
- Further investigation is also recommended to provide further confidence to the current foundation recommendations and to possibly zone areas of loose material which may demonstrate more favourable foundation options within the western part of the site.
- Supplementary groundwater monitoring should be carried out to further assess the potential for significant groundwater ingress into foundation excavations.
- The advice of specialist piling/ground improvement contractors should be sought to discuss the most cost-effective method of pile emplacement taking into account the ground and groundwater conditions described in this report. Piling contractors should also be made aware of very loose sand encountered beneath the water table in TP3 which could cause problems with rising/running sands within uncased boreholes.
- Should any exceptionally soft spots or oversized material be noted during construction, they should be removed and replaced with compacted granular fill for road construction.
- Based upon the recorded pH levels revealed on site when considered against the assessment levels in BRE Special Digest 1 (2005) a DS1-AC1 concrete design mix should be suitable for subsurface concrete across the site however, this should be confirmed following further assessment.

15.2.6 *General*

- Discussions should be held with local landfill/soil waste treatment facilities to agree material classification/pre-treatment required for any soils to be disposed off-site as a result of proposed construction works.
- Ground workers should remain vigilant for visible and olfactory signs of contamination following demolition of on-site buildings.
- Although no areas of made ground were encountered during the investigation vigilance should be employed by the groundworks contractor during works. In the event that

significant made ground is encountered, advice from a specialist geoenvironmental consultancy should be sought.

- On-site monitoring wells should be protected from damage until such time as additional gas/groundwater monitoring has been completed and conclusions/recommendations within this report are agreed with the regulators.
- On-site monitoring installations should be decommissioned in accordance with Environment Agency guidelines.
- A site-specific health and safety plan should be prepared to inform on risks posed from the previous site use and mitigations for ground workers developing the site e.g. requirements for appropriate PPE, hygiene practices, environmental monitoring and requirements for mitigation measures during construction works.
- A copy of this report should be provided to the relevant regulatory authorities to confirm that they are in agreement with the report findings.

Appendix A – Drawings



ACCOMMODATION SCHEDULE

Private Dwellings

No.	Dwelling Type	Size
6no.	1-Bedroom Apartments	50sqm
4no.	2-Bed Flat Over Garaging	70sqm
49no.	2-Bed House Type A	79sqm
26no.	2-Bed House Type B	93sqm
8no.	3-Bed House Type C	102sqm
13no.	3-Bed House Type D	102sqm
10no.	4-Bed House Type E	106sqm
2no.	4-Bed House Type F	124sqm

Total 118 Dwellings

Affordable Dwellings

No.	Dwelling Type	Size
21no.	1-Bedroom Apartments	50sqm
5no.	2-Bed Flat Over Garaging	70sqm
14no.	2-Bed House Type A	79sqm
5no.	3-Bed House Type B	93sqm
3no.	3-Bed House Type D	102sqm
2no.	4-Bed House Type G	106sqm
1no.	4-Bed House Type H	106sqm

Total 51 Dwellings (30%)

Totals

169 Dwellings

Car Parking - generally;

1no. spaces per 1-bedroom Flat & 2 bed FOG

2no. spaces per House

34no. visitor parking spaces *

Cycle Parking - generally;

1no. space per 1 bedroom Flat

2no. spaces per 2-bedroom Dwelling

3no. spaces per 3-bedroom Dwelling

4no. spaces per 4-bedroom Dwelling

Cycle storage generally provided within garages, rear garden sheds or communal cycle stores.

Rev Date Revision Details Dr Ch



Client's Name
Pye Homes

Job Title
Land east of Woodgate Lane,
Woodgate

Drawing Title
Site Layout

Scale
1:500 @ A0 / 1:1000 @ A2

Drawn KE Checked LT Date 15.07.19

Job No 6781 Drawing No 02 Rev

Status
PRELIMINARY

CAD Plot Date: 15/07/2019 - 16:35:23

8761-001.dwg

- Windowless Sampling Locations
(WS01 - WS07)
- Trial Pit Locations
(TP01 - TP04)
- CBR Locations
(CBR01 - CBR05)
- No Access
- Site Boundary

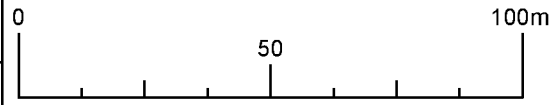


Base Map
Company: - Offington Land Surveys
DWG Title: - Topographical Survey
DWG Number: - 9370211 Site Plan
Date: - Feb 2011

Drawn	Checked	Amendment	Date	Rev.
Pye Homes Group				
Woodgate, Sussex				
Exploratory Hole Location Plan				
Scale	Date	Drawn by	Check by	Rev.
1:1500	03/01/07/19	AW	JF	-



Unit 4 Brunel Lock Development, Smeaton
Road, Bristol, BS1 6SE
Tel: 0117 927 7756
Email: info@TP-regen.co.uk



- ① Made ground associated with previous/ current site uses and development of unknown composition.
- ② Agricultural pest/weed control associated with former agricultural practice.
- ③ Made ground associated with landfilling in the north eastern site area.
- ④ Historic tanks with unconfirmed storage/ contents.
- ⑤ Potentially infilled pit located adjacent to the southern boundary.
- ⑥ Possible contaminants migrating from railway located 100m north of the site boundary.

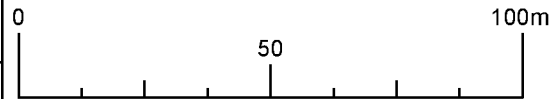


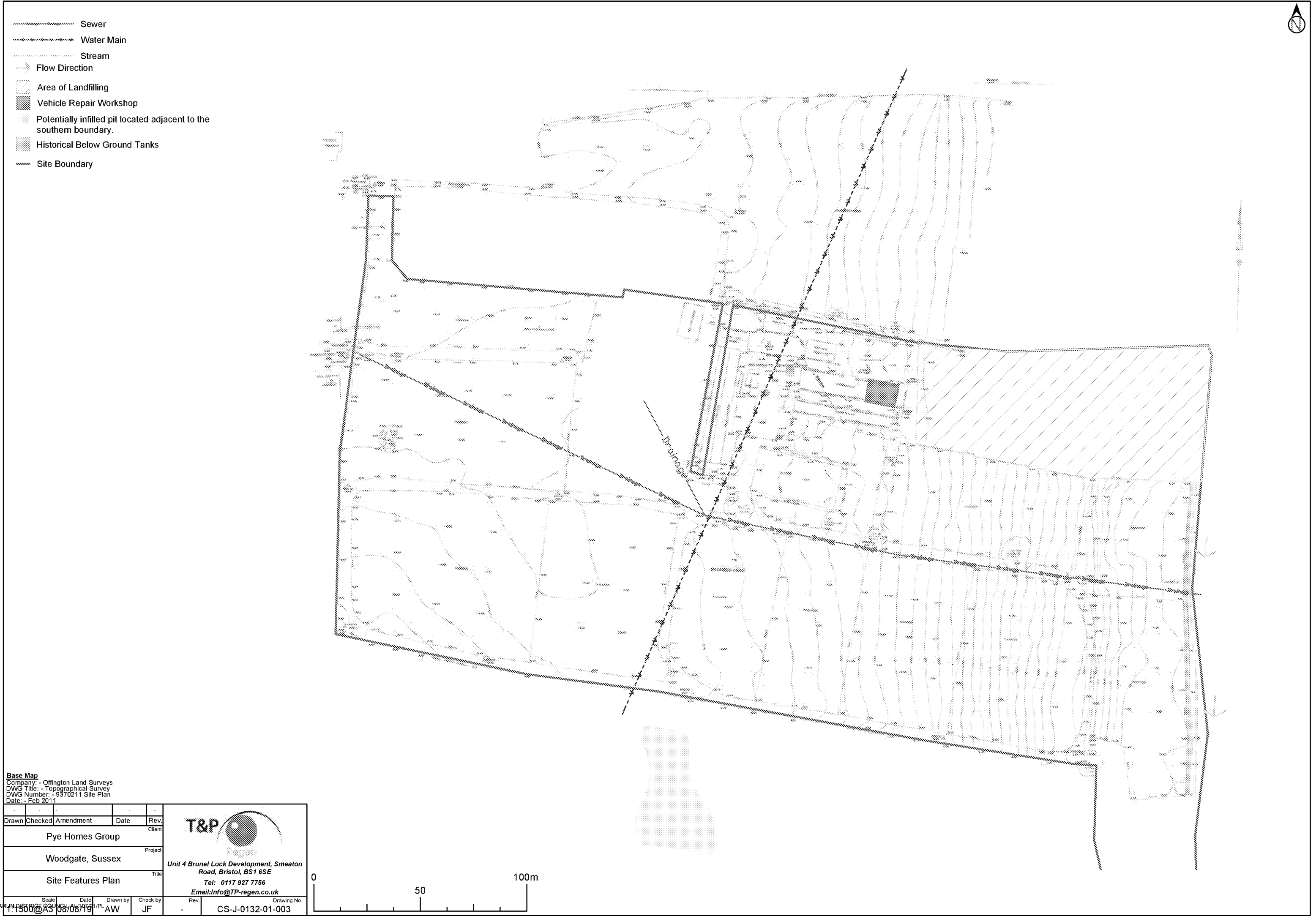
Base Map
Company: - Offington Land Surveys
DWG Title: - Topographical Survey
DWG Number: - 9370211 Site Plan
Date: - Feb 2011

Drawn	Checked	Amendment	Date	Rev.
Pye Homes Group				Client
Woodgate, Sussex				Project
Areas of Potential Concern Plan				Title
Scale	Date	Drawn by	Check by	Rev.
1:1500	03/08/19	AW	JF	-



Unit 4 Brunel Lock Development, Smeaton
Road, Bristol, BS1 6SE
Tel: 0117 927 7756
Email: info@TP-regen.co.uk





Base Map
Company: - Offington Land Surveys
DWG Title: - Topographical Survey
DWG Number: - 9370211 Site Plan
Date: - Feb 2011

Drawn	Checked	Amendment	Date	Rev.
				Client
Pye Homes Group				Project
Woodgate, Sussex				Title
Site Features Plan				
Scale	Date	Drawn by	Check by	Rev.
1:1500 @ A3	08/08/19	AW	JF	-

T&P
Regen

Unit 4 Brunel Lock Development, Smeaton Road, Bristol, BS1 6SE
Tel: 0117 927 7756
Email: info@TP-regen.co.uk

Drawing No.
CS-J-0132-01-003

Appendix B – Photographs

	
Plate 1 – View north across farmyard area.	Plate 2 – View South west across farmyard area.
	
Plate 3 – View east across farmyard area.	Plate 4 – View south east across paddocks.

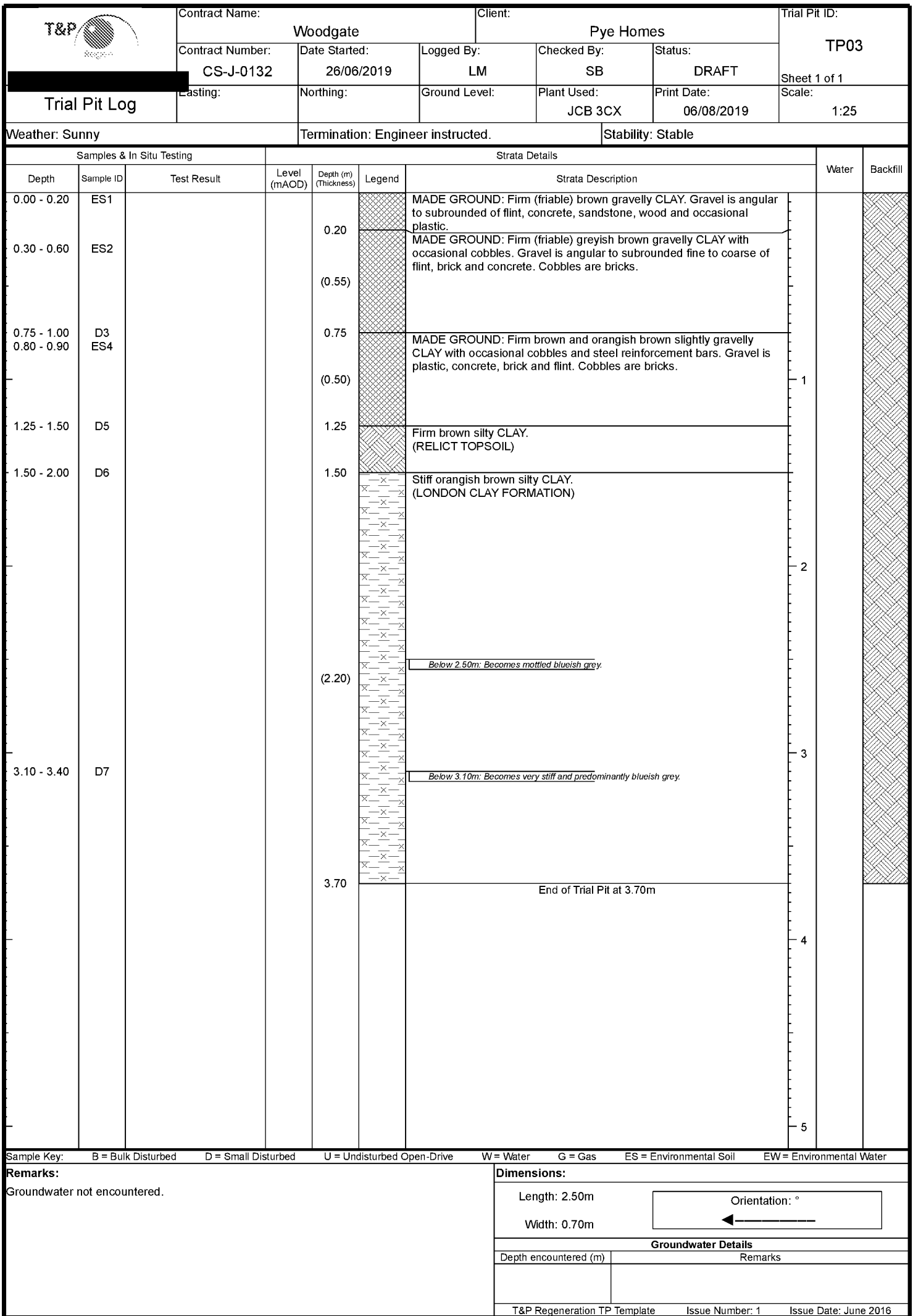
	
Plate 5 – Entrance to paddock area.	Plate 6 – View south west across paddocks.
	
Plate 7 – View south from north eastern field.	Plate 8 – View north across paddocks.

	
Plate 9 – WS01 soil samples.	Plate 10 - WS05 soil samples
	
Plate 11 – Trial pit 3 excavation	Plate 12 – Trial pit spoil

Appendix C – Exploratory Logs

	Contract Name: Woodgate		Client: Pye Homes			Trial Pit ID: TP01		
	Contract Number: CS-J-0132	Date Started: 25/06/2019	Logged By: LM	Checked By: SB	Status: DRAFT	Sheet 1 of 1		
Trial Pit Log	Easting:	Northing:	Ground Level:	Plant Used: JCB 3CX	Print Date: 06/08/2019	Scale: 1:25		
	Weather: Overcast		Termination: Engineer instructed.			Stability: Stable		
Samples & In Situ Testing			Strata Details				Water	Backfill
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.00 - 0.20	ES1					Firm (friable) brown fine sandy SILT. (TOPSOIL)		
0.20 - 0.40	D3			0.20		Firm (friable) orangish brown slightly gravelly SILT. Gravel is angular to subrounded of flint. (AEOLIAN DEPOSITS)		
0.20 - 0.40	ES2							
0.50 - 0.80	D4			(0.60)				
0.80 - 1.10	D5			0.80		Orangish brown silty fine SAND. (AEOLIAN DEPOSITS)	1	
								
				(1.20)				
1.50 - 2.00	D6			2.00		End of Trial Pit at 2.00m	2	
							3	
							4	
							5	
Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water								
Remarks: Groundwater not encountered.						Dimensions:		
						Length: 2.30m		
						Width: 0.70m		
						Orientation: °		
						Groundwater Details		
						Remarks		
						Depth encountered (m)		
T&P Regeneration TP Template Issue Number: 1 Issue Date: June 2016								

		Contract Name: Woodgate		Client: Pye Homes		Trial Pit ID: TP02				
		Contract Number: CS-J-0132	Date Started: 25/06/2019	Logged By: LM	Checked By: SB			Status: DRAFT		
Trial Pit Log		Easting:		Northing:	Ground Level:	Plant Used: JCB 3CX	Print Date: 06/08/2019	Sheet 1 of 1		
								Scale: 1:25		
Weather: Overcast				Termination: Engineer instructed.			Stability: Sidewalls undermined by water ingress.			
Samples & In Situ Testing				Strata Details				Water	Backfill	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				
0.00 - 0.20	ES1					Firm (friable) brown fine sandy SILT. (TOPSOIL)				
0.20 - 0.40	ES2			0.20		Firm (friable) orangish brown slightly gravelly SILT. Gravel is angular to subrounded of flint. (AEOLIAN DEPOSITS)				
0.80 - 1.00	D3			(1.20)				1		
1.50 - 1.80	D4			1.40 (0.40)		Orangish brown mottled yellowish brown and grey slightly silty fine SAND with occasional gravel. Gravel is subangular fine to coarse of flint. (AEOLIAN DEPOSITS)				
				1.80 (0.60)		Firm orangish brown mottled grey sandy CLAY with occasional gravel. Gravel is angular to subangular fine to coarse of flint. (AEOLIAN DEPOSITS)		2		
2.40 - 2.50	D5			2.40 2.50		Orangish brown silty fine SAND. (AEOLIAN DEPOSITS)				
							End of Trial Pit at 2.50m			
									3	
									4	
									5	
Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water										
Remarks: Groundwater inflow at 2.40m.										
Dimensions: Length: 2.40m Width: 0.70m Orientation: °										
Groundwater Details Depth encountered (m): 2.40 Remarks:										
T&P Regeneration TP Template Issue Number: 1 Issue Date: June 2016										



		Contract Name: Woodgate		Client: Pye Homes		Trial Pit ID: TP04		
		Contract Number: CS-J-0132	Date Started: 26/06/2019	Logged By: LM	Checked By: SB			Status: DRAFT
Trial Pit Log		Easting:	Northing:	Ground Level:	Plant Used: JCB 3CX	Print Date: 06/08/2019	Sheet 1 of 1	
							Scale: 1:25	
Weather: Sunny				Termination: Engineer instructed.		Stability: Stable		
Samples & In Situ Testing				Strata Details			Water	Backfill
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description		
0.00 - 0.15	ES1			0.15		Firm brown silty CLAY. (TOPSOIL)		
0.30 - 0.60	ES2			(0.75)		Firm orangish brown slightly gravelly slightly sandy CLAY. Gravelly is angular to subrounded of flint. (RIVER TERRACE DEPOSITS)		
0.90 - 1.00	ES4			0.90		Orangish brown sandy clayey GRAVEL with occasional cobbles. Gravel is angular to subangular fine to coarse of flint. Cobbles are subrounded of flint. (RIVER TERRACE DEPOSITS)	1	
1.00 - 1.50	D3			(0.90)				
1.80 - 2.00	D5			1.80		Firm orangish brown gravelly CLAY with a low cobble content. Gravel is angular to subrounded fine to coarse of flint. Cobbles are subrounded of flint. (RIVER TERRACE DEPOSITS)	2	
2.30 - 2.70	D6			2.30		Firm to stiff orangish brown mottled bluesih grey silty CLAY. (LONDON CLAY FORMATION)		
				(0.40)		Below 2.50m: Becomes stiff.		
				2.70		End of Trial Pit at 2.70m	3	
							4	
							5	
Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water								
Remarks: Groundwater seepage between 1.30 to 1.80m.								
Dimensions: Length: 2.20m Width: 0.70m Orientation: °								
Groundwater Details								
Depth encountered (m)				Remarks				
T&P Regeneration TP Template Issue Number: 1 Issue Date: June 2016								

		Contract Name: Woodgate			Client: Pye Homes			Borehole ID: WS01			
		Contract Number: CS-J-0132	Date Started: 25/06/2019	Logged By: JF	Checked By: SB	Status: DRAFT	Sheet 1 of 1				
Windowless Sample Borehole Log		Easting:	Northing:	Ground Level:	Plant Used: Archway Dart	Print Date: 06/08/2019	Scale: 1:25				
Weather: Overcast				Termination: Engineer instructed.			SPT Hammer: N/R, Energy Ratio: N/R				
Samples & In Situ Testing					Strata Details				Groundwater		
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation		
0.00 - 0.15	ES1	0.00 - 1.00 = 100%			0.15		Firm (friable) brown fine sandy SILT. (TOPSOIL)				
0.15 - 0.60	ES2						Firm (friable) orangish brown slightly fine sandy slightly clayey SILT. (AEOLIAN DEPOSITS)				
0.90 - 1.00	D3	1.00 - 2.00 = 70%	SPT(C) 1.00m, N=11 (1,2/2,3,3,3)		(1.25)			1			
1.50 - 1.60	D4			1.40	Orangish brown silty fine SAND. (AEOLIAN DEPOSITS)			2			
		2.00 - 3.00 = 100%	SPT(C) 2.00m, N=9 (1,2/2,2,3,2)		(1.20)		At 2.00m: Loose.				
2.60 - 2.70	D5			2.60	Orangish brown slightly gravelly silty fine SAND. Gravel is angular to subangular fine of flint. (AEOLIAN DEPOSITS)			3			
		3.00 - 4.00 = 70%	SPT(C) 3.00m, N=14 (2,3/4,3,4,3)		(1.10)		At 3.00m: Medium dense.				
3.70 - 3.90	D6			3.70	Stiff blueish grey silty CLAY. (LONDON CLAY FORMATION)			4			
		4.00 - 5.00 = 10%	SPT(C) 4.00m, N=15 (3,4/3,4,4,4)		(1.30)						
			SPT(C) 5.00m, N=20 (5,4/5,5,5,5)		5.00				End of Borehole at 5.00m	5	
Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water											
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:		
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth	Dia (mm)	Groundwater encountered between 1.00 - 2.00m.		
Water Strikes					Installation						
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Type	Dia (mm)		
						0.00	1.00	PLAIN	50		
						1.00	3.00	SLOTTED	50		
T&P Regeneration WS Template										Issue Number: 1 Issue Date: June 2016	



Contract Name:

Woodgate

Client:

Pye Homes

Contract Number:

CS-J-0132

Date Started:

25/06/2019

Logged By:

JF

Checked By:

SB

Status:

DRAFT

Borehole ID:

WS02

Windowless Sample Borehole Log

Easting:

Northing:

Ground Level:

Plant Used:

Archway Dart

Print Date:

06/08/2019

Scale:

1:25

Weather: Overcast

Termination: Engineer instructed.

SPT Hammer: N/R, Energy Ratio: N/R

Sample Key:

B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

T&P Regeneration WS Template

Issue Number: 1

Issue Date: June 2016

		Contract Name: Woodgate			Client: Pye Homes			Borehole ID: WS03	
		Contract Number: CS-J-0132	Date Started: 25/06/2019	Logged By: JF	Checked By: SB	Status: DRAFT			
Windowless Sample Borehole Log		Easting:	Northing:	Ground Level:	Plant Used: Archway Dart	Print Date: 06/08/2019	Sheet 1 of 1		
						Scale: 1:25			
Weather: Overcast				Termination: Engineer instructed.			SPT Hammer: N/R, Energy Ratio: N/R		

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
0.00 - 0.15	ES1	0.00 - 1.00 = 100%			0.15		Firm (friable) brown fine sandy SILT. (TOPSOIL)		
0.15 - 0.60	ES2				0.15		Firm (friable) orangish brown slightly fine sandy SILT. (AEOLIAN DEPOSITS)		
0.70 - 0.90	D3		SPT(C) 1.00m, N=14 (3,4/4,4,3,3)		(1.30)			1	
1.50 - 1.70	D4	2.00 - 3.00 = 100%	SPT(C) 2.00m, N=6 (1,2/2,1,1,2)		1.45		Orangish brown silty fine SAND. (AEOLIAN DEPOSITS)	2	
			SPT(C) 2.00m, N=6 (1,2/2,1,1,2)		(1.35)		At 2.00m: Loose.		
2.80 - 3.00	D5	3.00 - 4.00 = 90%	SPT(C) 3.00m, N=16 (10,10/8,3,2,3)		2.80		Orangish brown mottled brown sandy slightly silty GRAVEL. (AEOLIAN DEPOSITS)	3	
			SPT(C) 3.00m, N=16 (10,10/8,3,2,3)		(0.95)		At 3.00m: Medium dense.		
3.80 - 4.00	D6		SPT(C) 4.00m, N=21 (3,4/4,5,6,6)		3.75		Stiff blueish grey silty CLAY. (LONDON CLAY FORMATION)	4	
			SPT(C) 4.00m, N=21 (3,4/4,5,6,6)		4.00		End of Borehole at 4.00m		
								5	

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water									
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Groundwater encountered between 1.00 - 2.00m.
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth	Dia (mm)	
Water Strikes					Installation				
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Type	Dia (mm)

		Contract Name: Woodgate		Client: Pye Homes			Borehole ID: WS04	
		Contract Number: CS-J-0132	Date Started: 26/06/2019	Logged By: JF	Checked By: SB	Status: DRAFT	Sheet 1 of 1	
Windowless Sample Borehole Log		Easting:	Northing:	Ground Level:	Plant Used: Archway Dart	Print Date: 06/08/2019	Scale: 1:25	
Weather: Sunny			Termination: Engineer instructed.			SPT Hammer: N/R, Energy Ratio: N/R		

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
0.00 - 0.40	ES1	0.00 - 1.00 = 100%					MADE GROUND: Firm (friable) brown gravelly CLAY. Gravel is angular to subrounded of flint, concrete, sandstone and occasional plastic.		
0.60 - 0.80	ES2								
1.00 - 2.00		= 100%	SPT(C) 1.00m, N=6 (1,1/1,1,2,2)		(2.10)			1	
1.50 - 1.70	ES3								
2.00 - 3.00		= 70%	SPT(C) 2.00m, N=7 (1,2/2,2,1,2)		2.10		Firm to stiff orangish brown gravelly CLAY. Gravel is angular to subangular fine to medium of flint. (RIVER TERRACE DEPOSITS)	2	
2.10 - 2.20	ES4								
2.20 - 2.50	D5				(0.70)				
3.00 - 4.00		= 100%	SPT(C) 3.00m, N=12 (3,2/2,3,4,3)		2.80		Firm to stiff orangish brown silty CLAY. (LONDON CLAY FORMATION)	3	
3.50 - 3.60	D6						Below 3.3m: Becomes stiff and mottled blueish grey.		
4.00 - 5.00		= 5%	SPT(C) 4.00m, N=14 (3,3/2,4,3,5)		(2.20)		Below 3.9m: Becomes predominantly blueish grey.	4	
					5.00		End of Borehole at 5.00m	5	

Sample Key: B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water									
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Groundwater not encountered.
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth	Dia (mm)	
Water Strikes					Installation				
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Type	Dia (mm)
						0.00	1.00	PLAIN	50
						1.00	2.00	SLOTTED	50



Contract Name:

Woodgate

Client:

Pye Homes

Contract Number:

CS-J-0132

Date Started:

26/06/2019

Logged By:

JF

Checked By:

SB

Status:

DRAFT

Borehole ID:

WS05

Windowless Sample Borehole Log

Easting:

Northing:

Ground Level:

Plant Used:

Archway Dart

Print Date:

06/08/2019

Scale:

1:25

Weather: Sunny

Termination: Engineer instructed.

SPT Hammer: N/R, Energy Ratio: N/R

Sample Key:

B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

Start & End of Shift Observations

Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth	Dia (mm)

Water Strikes

Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks

Installation

Top (m)	Base (m)	Type	Dia (mm)
0.00	1.00	PLAIN	50
1.00	4.00	SLOTTED	50

Remarks:

Groundwater encountered between 1.20 - 1.40m.

T&P Regeneration WS Template

Issue Number: 1

Issue Date: June 2016



Contract Name:

Woodgate

Client:

Pye Homes

Contract Number:

CS-J-0132

Date Started:

26/06/2019

Logged By:

JF

Checked By:

SB

Status:

DRAFT

Borehole ID:

WS06

Windowless Sample Borehole Log

Easting:

Northing:

Ground Level:

Plant Used:

Archway Dart

Print Date:

06/08/2019

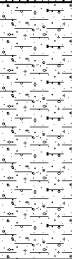
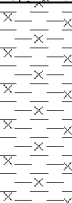
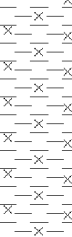
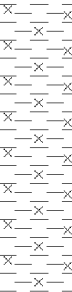
Scale:

1:25

Weather: Sunny

Termination: Engineer instructed.

SPT Hammer: N/R, Energy Ratio: N/R

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
0.00 - 0.15	ES1	0.00 - 1.00 = 100%			0.15		Firm brown silty CLAY. (TOPSOIL)	1	
0.30 - 0.60	ES2				(0.85)		Firm orangish brown mottled brown slightly gravelly sandy CLAY. Gravel is angular to subangular fine to medium of flint. (RIVER TERRACE DEPOSITS)		
0.80 - 1.00	D3				1.00		Orangish brown slightly gravelly SAND. Gravel is angular to subangular fine to medium of flint. (RIVER TERRACE DEPOSITS)		
1.00 - 1.30	D4	1.00 - 2.00 = 100%	SPT(C) 1.00m, N=8 (1,1/2,2,2,2)		1.30		Firm to stiff orangish brown mottled blueish grey silty CLAY. (LONDON CLAY FORMATION)	2	
1.80 - 2.00	D5	2.00 - 3.00 = 80%	SPT(C) 2.00m, N=9 (2,2/2,3,2,2)		(2.70)		Below 2.40m: Becomes stiff.		
2.80 - 3.00	D6	3.00 - 4.00 = 90%	SPT(C) 3.00m, N=13 (3,3/3,4,3,3)				Below 2.80m: Becomes predominantly blueish grey.	3	
3.80 - 4.00	D7		SPT(C) 4.00m, N=14 (2,2/3,4,3,4)		4.00		End of Borehole at 4.00m	4	
								5	

Sample Key:

B = Bulk Disturbed

D = Small Disturbed

U = Undisturbed Open-Drive

W = Water

G = Gas

ES = Environmental Soil

EW = Environmental Water

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth	Dia (mm)	
									Groundwater encountered between 1.00 - 1.30m.
Water Strikes						Installation			
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Type	Dia (mm)

T&P Regeneration WS Template

Issue Number: 1

Issue Date: June 2016



Contract Name:

Woodgate

Client:

Pye Homes

Contract Number:

CS-J-0132

Date Started:

26/06/2019

Logged By:

JF

Checked By:

SB

Status:

DRAFT

Borehole ID:

WS07

Windowless Sample Borehole Log

Easting:

Nothing:

Ground Level:

Plant Used:

Archway Dart

Print Date:

06/08/2019

Scale:

1:25

Weather: Sunny

Termination: Engineer instructed.

SPT Hammer: N/R, Energy Ratio: N/R

Samples & In Situ Testing				Strata Details				Groundwater	
Depth	Sample ID	Windowless Sample Recovery	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill / Installation
0.00 - 0.20	ES1	0.00 - 1.00 = 100%					Firm brown silty CLAY. (TOPSOIL)		
0.20 - 0.60	ES2				0.20		Firm orangish brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine of flint. (RIVER TERRACE DEPOSITS)		
0.60 - 0.70	D3				(0.50)				
0.90 - 1.00	D4	1.00 - 2.00 = 90%	SPT(C) 1.00m, N=7 (1,2/2,1,2,2)		0.70		Firm orangish brown mottled blueish grey silty CLAY. (LONDON CLAY FORMATION)	1	
1.50 - 1.60	D5						Below 1.5m: Becomes stiff.		
		2.00 - 3.00 = 90%	SPT(C) 2.00m, N=14 (2,4/3,3,4,4)		(3.30)			2	
							Below 2.60m: Becomes predominantly blueish grey.		
		3.00 - 4.00 = 90%	SPT(C) 3.00m, N=20 (5,4/5,5,5,5)					3	
3.50 - 3.60	D6						Below 3.80m: Becomes very stiff.		
			SPT(C) 4.00m, N=15 (3,3/3,4,4,4)		4.00		End of Borehole at 4.00m	4	
								5	

Sample Key:

B = Bulk Disturbed D = Small Disturbed U = Undisturbed Open-Drive W = Water G = Gas ES = Environmental Soil EW = Environmental Water

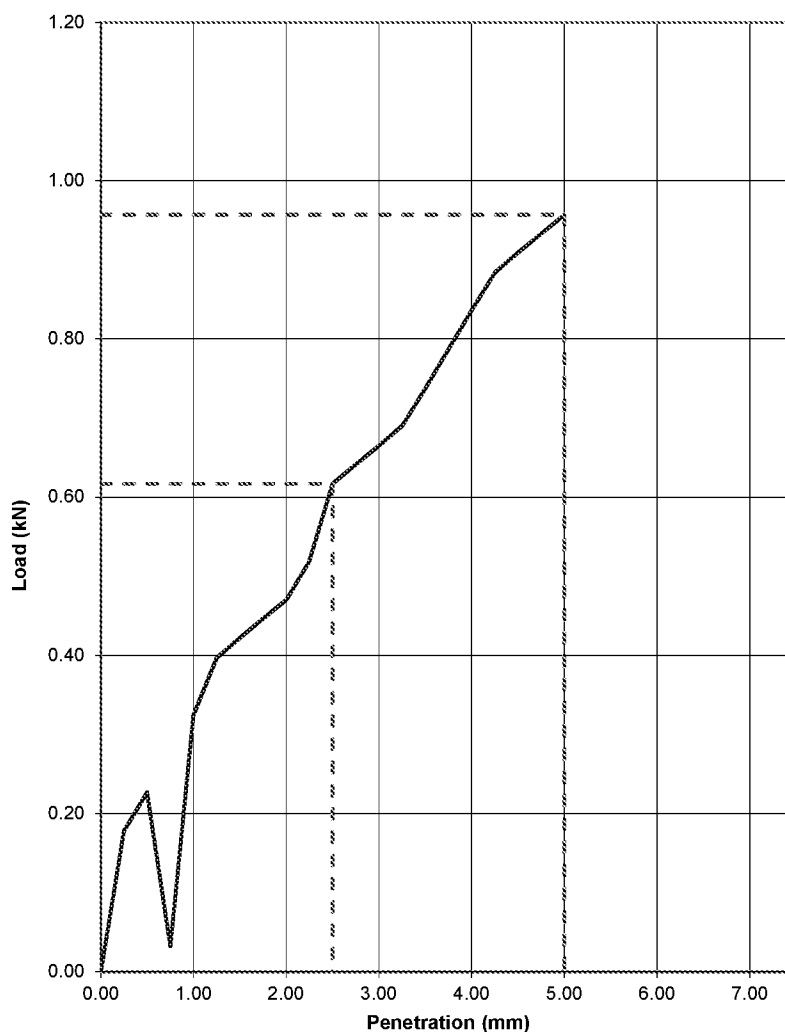
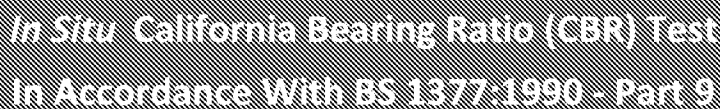
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth	Dia (mm)	
									Groundwater not encountered.
Water Strikes						Installation			
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	Top (m)	Base (m)	Type	Dia (mm)

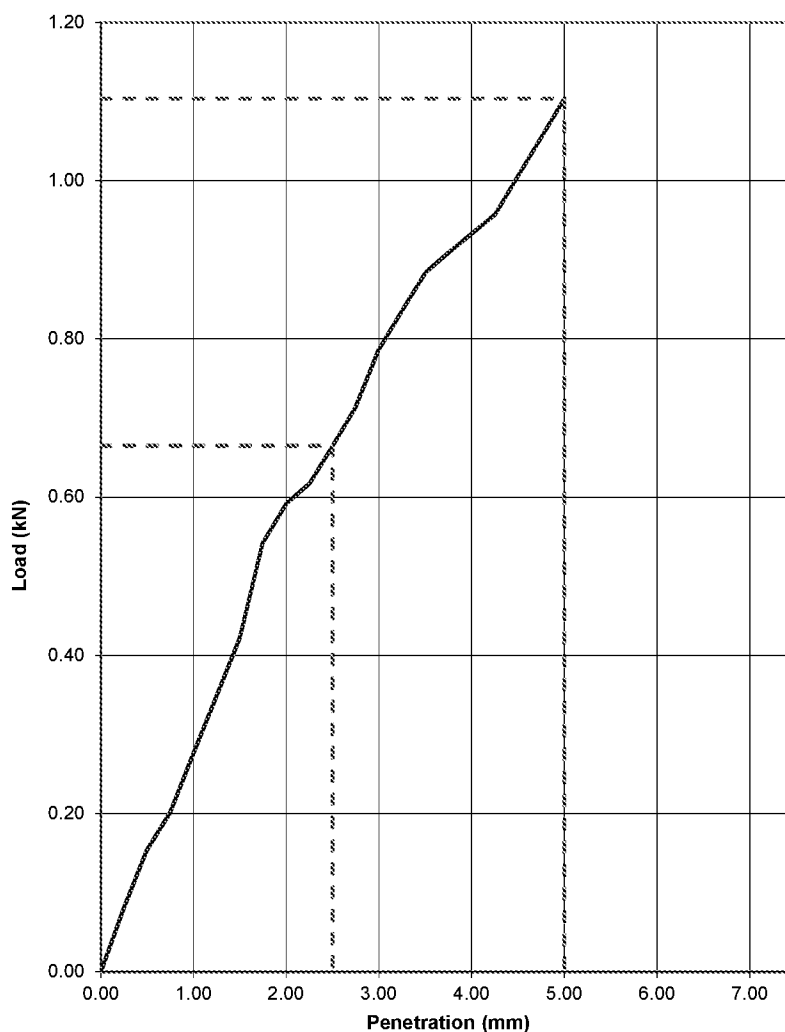
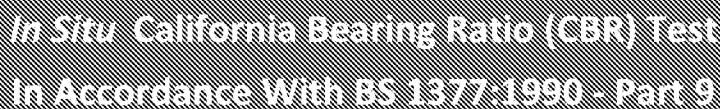
T&P Regeneration WS Template

Issue Number: 1

Issue Date: June 2016

Appendix D – Geotechnical Results

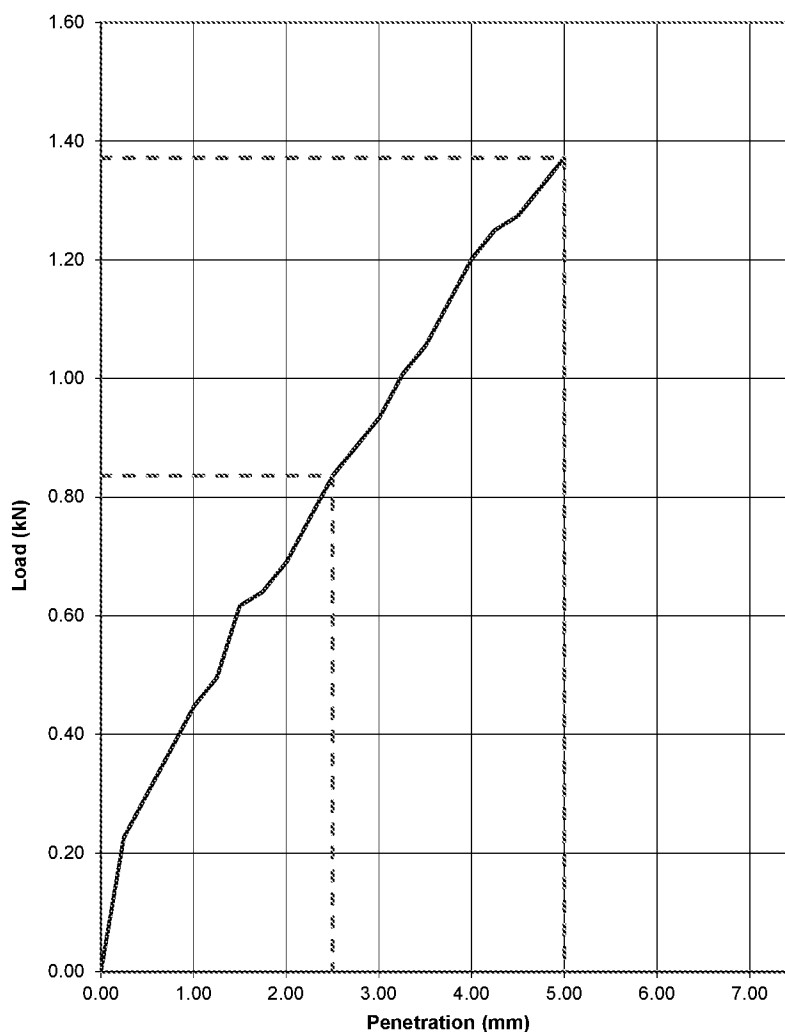




Penetration and force readings zeroed after seating load. Particle size below plunger <20mm. Loading applied at a rate of 1.0mm/min.

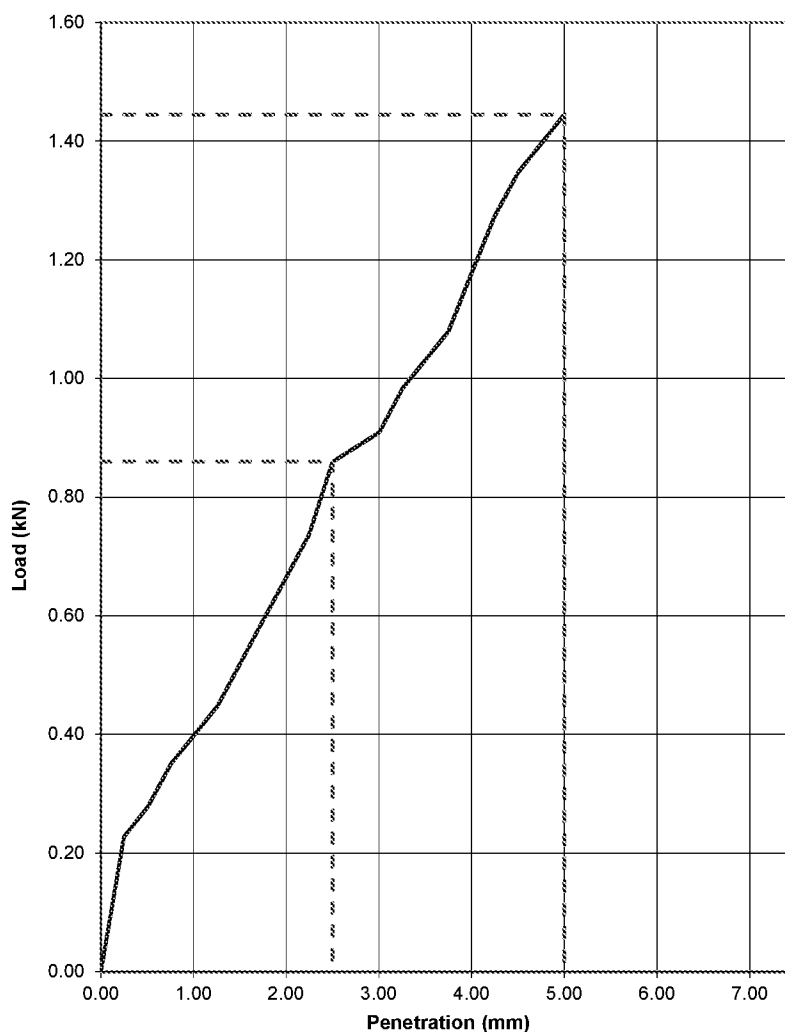
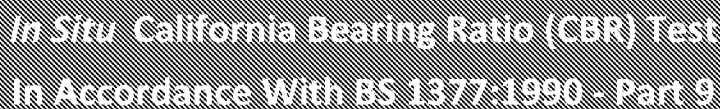


Project Name:	Woodgate				Project ID:	CS-J-0132	
Client:	Pye Homes				Test Date:	26/07/2019	
Test ID:	CBR03	Depth (m):	0.60	Operator:	AD	Checked:	JF
Coordinates:			Existing Ground Level (mAOD):				
Soil Description: Orangish brown slightly gravelly silty SAND			Weather:		Sunny		
			Seating Reading:		0.036		
			Seating Load (kN):		0.88		
			Mass of Surcharge (kg):				

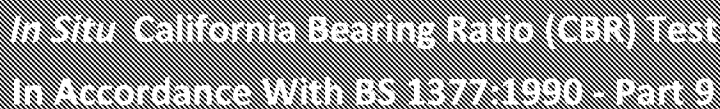
[illegible]

Moisture Content (%)	Penetration (mm)	Load (kN)	CBR (%)
11%	2.5	0.84	6.3%
	5.0	1.37	6.9%
Design CBR Value			6.6%

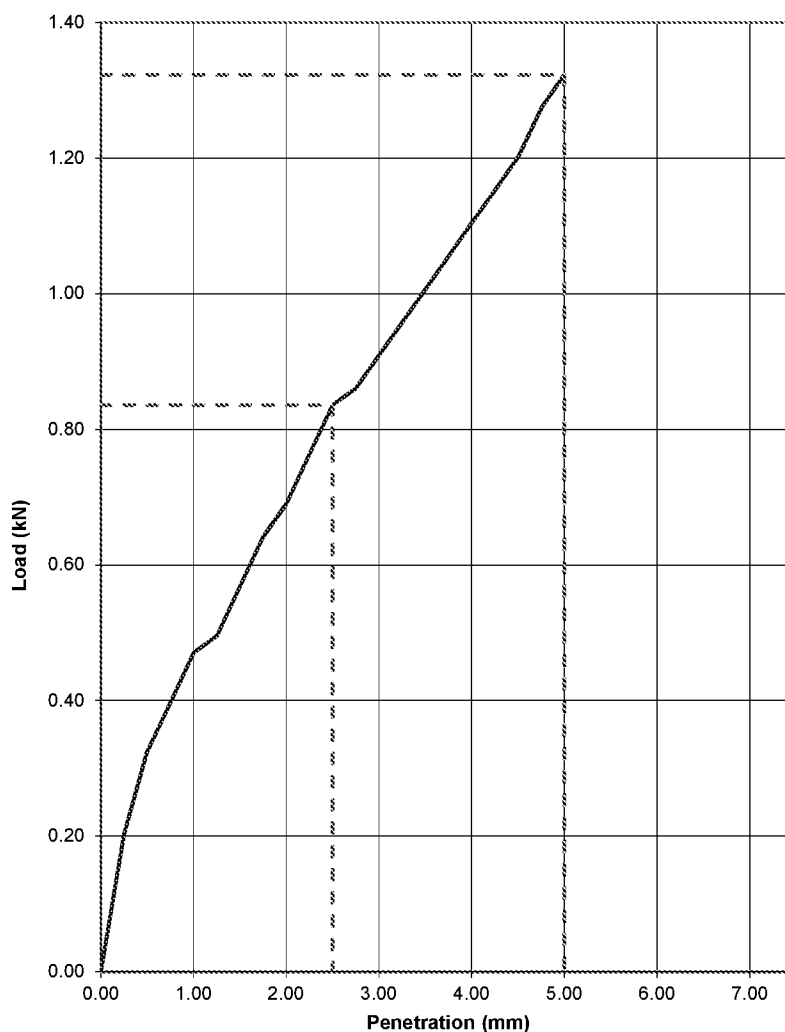
Penetration and force readings zeroed after seating load. Particle size below plunger <20mm. Loading applied at a rate of 1.0mm/min.



Penetration and force readings zeroed after seating load. Particle size below plunger <20mm. Loading applied at a rate of 1.0mm/min.



Project Name:	Woodgate				Project ID:	CS-J-0132	
Client:	Pye Homes				Test Date:	26/07/2019	
Test ID:	CBR05	Depth (m):	0.60	Operator:	AD	Checked:	JF
Coordinates:			Existing Ground Level (mAOD):				
Soil Description: Orangish brown slightly gravelly silty SAND			Weather:		Sunny		
			Seating Reading:		0.036		
			Seating Load (kN):		0.88		
			Mass of Surcharge (kg):				

[illegible]

Moisture Content (%)	Penetration (mm)	Load (kN)	CBR (%)
24%	2.5	0.84	6.3%
	5.0	1.32	6.6%
Design CBR Value			6.5%

Penetration and force readings zeroed after seating load. Particle size below plunger <20mm. Loading applied at a rate of 1.0mm/min.

T & P Regeneration

Unit 4

Brunel Lock Development

Smeaton Road

Bristol

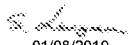
BS1 6SE

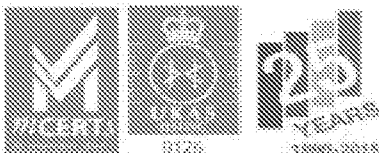
For the attention of John Flannery

Report No: B22948-2

Issue No 01

LABORATORY TEST REPORT

Project Name	WOODGATE		
Project Number	B22948-2	Date samples received	16/07/2019
Your Ref	CS-J-0132	Date written instructions received	16/07/2019
Purchase Order	CS-J-0132-5843	Date testing commenced	16/07/2019
Please find enclosed the results as summarised below			
Figure / Table	Test Quantity	Description	ISO 17025 Accredited
1	5	Moisture Content	Yes
Remarks :			
Issued by : Stephen Langman		Date of Issue : 01/08/2019	Key to symbols used in this report S/C : Testing was sub-contracted
Approved Signatories :  01/08/2019 G Wilson (JMD/Laboratories Director), S Langman (Laboratory Coordinator)			
Unless we are notified to the contrary, samples will be disposed after a period of one month from this date. The results reported relate to samples received in the laboratory only. All results contained in this report are provisional unless signed by an approved signatory This report should not be reproduced except in full without the written approval of the laboratory. Under multisite accreditation the testing contained in this report may have been performed at another Terra Tek laboratory. The enclosed results remain the property of Terra Tek Limited and we reserve the right to withdraw our report if we have not received cleared funds in accordance with our standard terms and conditions Only those results indicated in this report are UKAS accredited and any opinions or interpretations expressed are outside the scope of UKAS accreditation. Feedback on the this report may be left via our website www.terratek.co.uk/contact-us			



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www.terratek.co.uk
 Terra Tek Ltd is registered in England No. 121594
 Offices in Woking, Birmingham, Bristol and Chatham

TERRA TEK

SITE INVESTIGATION AND LABORATORY SERVICES

Site WOODGATE

Client

Engineer

Contract No **CS-J-0132**

Sample Identification				Lab Sample ID	Non Engineering Sample Description	Moisture Content	Atterberg limits					Particle Density	Density		Total Stress			Other Tests	
Exploratory Hole	Depth m	Sample Ref	Sample Type				Liquid Limit	Plastic Limit	Plasticity Index	Percentage retained 425µm	Atterberg Classification		Bulk	Dry	Shear Strength	Apparent Cohesion C	Angle of Shearing Resistance Phi		
																			%
HD01	0.50		T	494292	Light brown silty CLAY with some gravel and organics. Gravel is fine.	19													
HD02	0.50		T	494291	Light brown silty CLAY with some gravel and organics. Gravel is fine.	11													
HD03	0.50		T	494293	Light brown silty SAND with some gravel and organics. Gravel is fine to coarse.	15													
HD04	0.50		T	494294	Light brown silty SAND with some gravel and organics. Gravel is fine to coarse.	14													
HD05	0.50		T	494295	Light brown silty SAND with some gravel and organics. Gravel is fine to coarse.	24													
Notes Opinions and interpretations are outside the scope of UKAS accreditation				UKAS Accredited Test Y/N		Test details are given on the 'Notes on Laboratory Procedures' sheet												See individual report sheets	
						Y	Y	Y	Y	Y	-	Y	Y	Y	Y	Y	Y		
Originator		Approved		SUMMARY OF GEOTECHNICAL TESTS														TK Figure 1	
PM																			
																		Sheet 1 of 1	

SUMMARY OF GEOTECHNICAL TESTS**Figure 1**

Sheet 1 of 1

T & P Regeneration

Unit 4

Brunel Lock Development

Smeaton Road

Bristol

BS1 6SE

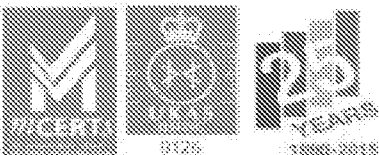
For the attention of John Flannery

Report No: B22948

Issue No 01

LABORATORY TEST REPORT

Project Name	WOODGATE		
Project Number	B22948	Date samples received	01/07/2019
Your Ref	CS-J-0132	Date written instructions received	01/07/2019
Purchase Order		Date testing commenced	01/07/2019
Please find enclosed the results as summarised below			
Figure / Table	Test Quantity	Description	ISO 17025 Accredited
1 2 - 9	~ 8	Summary of Geotechnical Tests Atterberg Limit	See Report Yes
Remarks :			
Issued by : Stephen Langman		Date of Issue : 10/07/2019	Key to symbols used in this report S/C : Testing was sub-contracted
Approved Signatories : G Wilson (JMD/Laboratories Director), S Langman (Laboratory Coordinator)			
Unless we are notified to the contrary, samples will be disposed after a period of one month from this date. The results reported relate to samples received in the laboratory only. All results contained in this report are provisional unless signed by an approved signatory This report should not be reproduced except in full without the written approval of the laboratory. Under multisite accreditation the testing contained in this report may have been performed at another Terra Tek laboratory. The enclosed results remain the property of Terra Tek Limited and we reserve the right to withdraw our report if we have not received cleared funds in accordance with our standard terms and conditions Only those results indicated in this report are UKAS accredited and any opinions or interpretations expressed are outside the scope of UKAS accreditation. Feedback on the this report may be left via our website www.terratek.co.uk/contact-us			



TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES				Site WOODGATE												Contract No CS-J-0132							
				Client																			
				Engineer																			
Sample Identification					Non Engineering Sample Description	Moisture Content	Atterberg limits					Particle Density	Density		Total Stress			Other Tests					
Exploratory Hole	Depth m	Sample Ref	Sample Type				Liquid Limit	Plastic Limit	Plasticity Index	Percentage retained 425µm	Atterberg Classification		Bulk	Dry	Shear Strength	Apparent Cohesion C	Angle of Shearing Resistance Phi						
TP02	0.80-1.00		T	494277	Brown CLAY.	%	%	%		%		Mg/m³	Mg/m³	Mg/m³	kPa	kPa							
TP02	1.50-1.80		T	494278	Brown sandy CLAY.	24	42	21	21	0	CI												
WS01	0.90-1.00		T	494245	Brown sandy CLAY.	19	32	16	16	0	CL												
WS01	1.50-1.60		T	494246	Brown silty SAND.	20	38	17	21	1	CI												
WS01	1.50-1.60		T	494246	Brown silty SAND.	23		non plastic	~	0													
WS06	0.80-1.00		T	494264	Brown CLAY.	36	70	23	47	0	CH												
Notes				Opinions and interpretations are outside the scope of UKAS accreditation		UKAS Accredited Test Y/N		Test details are given on the 'Notes on Laboratory Procedures' sheet										See individual report sheets					
Y								Y						Y						Y			
Originator		Approved		SUMMARY OF GEOTECHNICAL TESTS														Tk Figure 1 Sheet 1 of 2					
ME		DAB																					

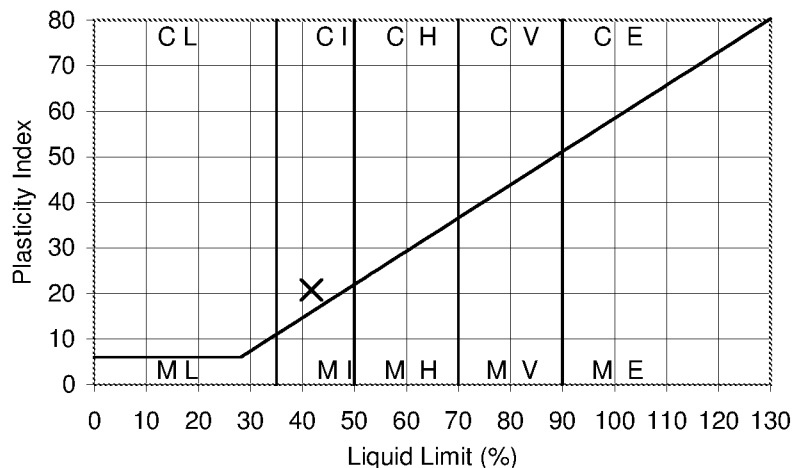
TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES				Site WOODGATE												Contract No CS-J-0132				
				Client																
				Engineer																
Sample Identification					Non Engineering Sample Description	Moisture Content	Atterberg limits					Particle Density	Density		Total Stress			Other Tests		
Exploratory Hole	Depth m	Sample Ref	Sample Type				Liquid Limit	Plastic Limit	Plasticity Index	Percentage retained 425µm	Atterberg Classification		Bulk	Dry	Shear Strength	Apparent Cohesion C	Angle of Shearing Resistance Phi			
WS06	1.80-2.00		T	494265	Brown organic CLAY.	%	%	%			%	Mg/m³	Mg/m³	Mg/m³	kPa	kPa				
WS07	0.60-0.70		T	494268	Brown sandy CLAY.	34	61	25	36	0	CH									
WS07	1.50-1.60		T	494270	Brown CLAY.	14	35	14	21	0	CL									
						29	63	22	41	0	CH									
Notes				Opinions and interpretations are outside the scope of UKAS accreditation		UKAS Accredited Test Y/N		Test details are given on the 'Notes on Laboratory Procedures' sheet										See individual report sheets		
Y								Y			Y			Y			Y			
Originator		Approved		SUMMARY OF GEOTECHNICAL TESTS															Tk Figure 1	
ME		DAB																		



Site	WOODGATE	Contract No.	CS-J-0132
Client		Hole ID	TP02
Engineer		Sample Ref	
		Depth (m)	0.80-1.00
		Sample Type	T

Non Engineering Description : Brown CLAY.

Preparation : Sample as received



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990) 24 %
 Percentage retained on 425µm sieve : 0 %
 Liquid Limit : 42 %
 Plastic Limit : 21 %
 Plasticity Index : 21

Equivalent moisture content of material passing 425µm sieve : 24 %
 Liquidity Index : 0.14

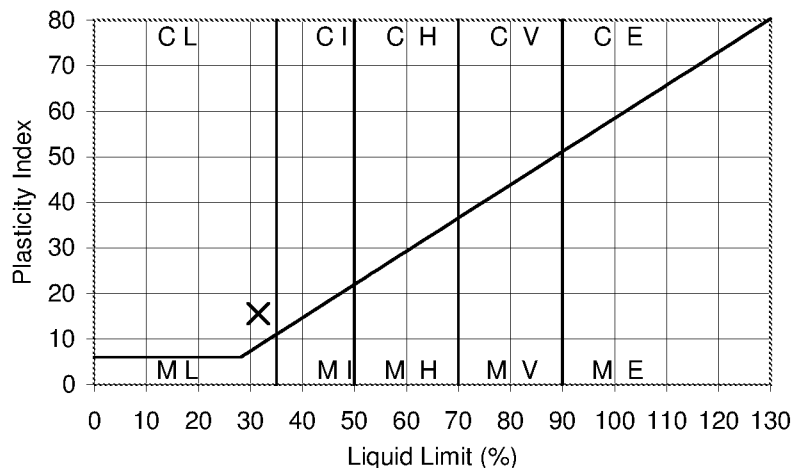
Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	 Figure 2 Sheet 1 of 1
CR	DAB		



Site	WOODGATE	Contract No.	CS-J-0132
Client		Hole ID	TP02
Engineer		Sample Ref	
		Depth (m)	1.50-1.80
		Sample Type	T

Non Engineering Description : Brown sandy CLAY.

Preparation : Sample as received



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	19 %
Percentage retained on 425µm sieve :	0 %
Liquid Limit :	32 %
Plastic Limit :	16 %
Plasticity Index :	16
Equivalent moisture content of material passing 425µm sieve :	19 %
Liquidity Index :	0.19

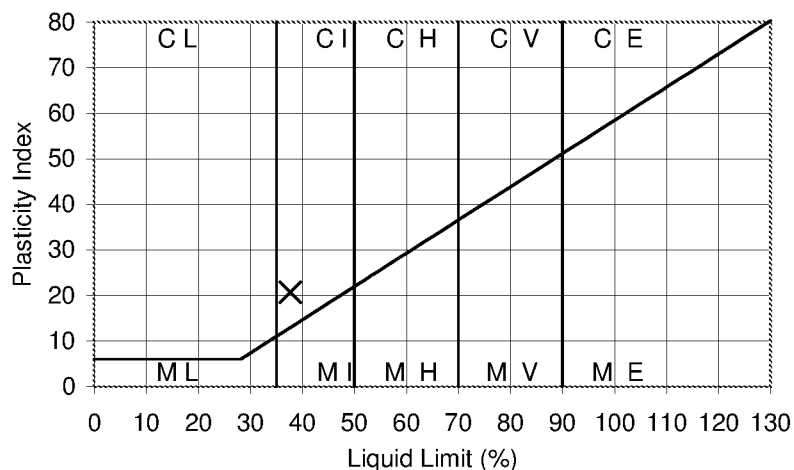
Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	 Figure 3 Sheet 1 of 1
CB	DAB		



Site	WOODGATE	Contract No.	CS-J-0132
Client		Hole ID	WS01
Engineer		Sample Ref	
		Depth (m)	0.90-1.00
		Sample Type	T

Non Engineering Description : Brown sandy CLAY.

Preparation : Sample as received



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990) 20 %
 Percentage retained on 425µm sieve : 1 %
 Liquid Limit : 38 %
 Plastic Limit : 17 %
 Plasticity Index : 21

Equivalent moisture content of material passing 425µm sieve : 20 %
 Liquidity Index : 0.14

Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	 Figure 4 Sheet 1 of 1
SB	DAB		



Site WOODGATE

Client

Engineer

Contract No. CS-J-0132

Hole ID WS01

Sample Ref

Depth (m) 1.50-1.60

Sample Type T

Non Engineering Description : Brown silty SAND.

Preparation : Sample as received

Sample was determined to be Non-Plastic after preparation

Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)

23 %

Percentage retained on 425µm sieve :

0 %

Equivalent moisture content of material passing 425µm sieve :

23 %

Originator

Checked &
Approved

SB

Plastic Limit

BS 1377:Part 2:Clause 5:1990



Figure 5

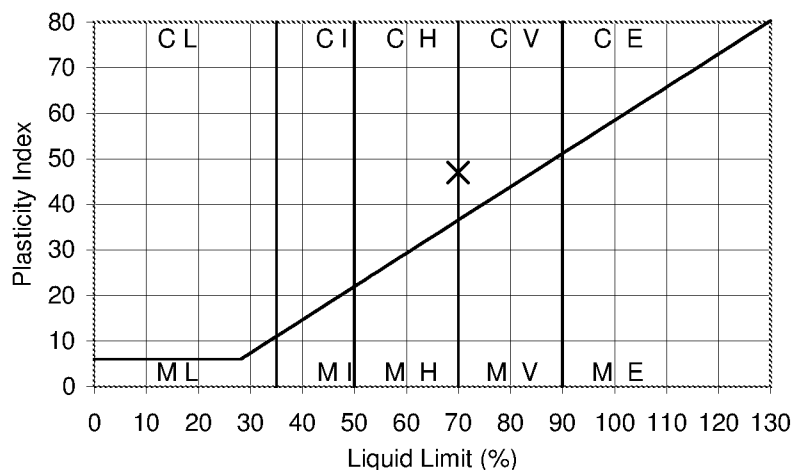
Sheet 1 of 1



Site	WOODGATE	Contract No.	CS-J-0132
Client		Hole ID	WS06
Engineer		Sample Ref	
		Depth (m)	0.80-1.00
		Sample Type	T

Non Engineering Description : Brown CLAY.

Preparation : Sample as received



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	36 %
Percentage retained on 425µm sieve :	0 %
Liquid Limit :	70 %
Plastic Limit :	23 %
Plasticity Index :	47
Equivalent moisture content of material passing 425µm sieve :	36 %
Liquidity Index :	0.28

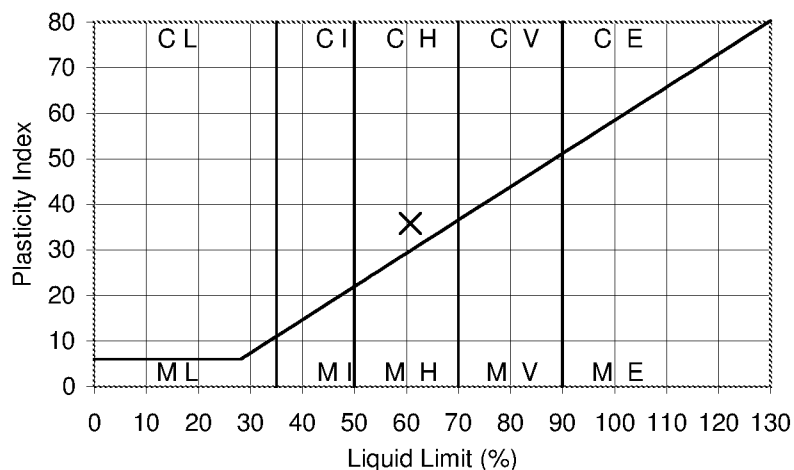
Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	Figure 6 Sheet 1 of 1
TJH	DAB		



Site	WOODGATE	Contract No.	CS-J-0132
Client		Hole ID	WS06
Engineer		Sample Ref	
		Depth (m)	1.80-2.00
		Sample Type	T

Non Engineering Description : Brown organic CLAY.

Preparation : Sample as received



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	34 %
Percentage retained on 425µm sieve :	0 %
Liquid Limit :	61 %
Plastic Limit :	25 %
Plasticity Index :	36
Equivalent moisture content of material passing 425µm sieve :	34 %
Liquidity Index :	0.25

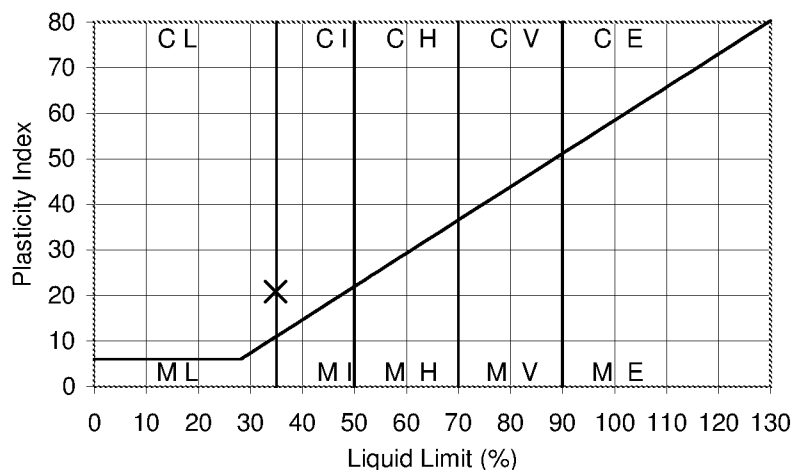
Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	Figure 7 Sheet 1 of 1
CT	DAB		



Site	WOODGATE	Contract No.	CS-J-0132
Client		Hole ID	WS07
Engineer		Sample Ref	
		Depth (m)	0.60-0.70
		Sample Type	T

Non Engineering Description : Brown sandy CLAY.

Preparation : Sample as received



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	14 %
Percentage retained on 425µm sieve :	0 %
Liquid Limit :	35 %
Plastic Limit :	14 %
Plasticity Index :	21
Equivalent moisture content of material passing 425µm sieve :	14 %
Liquidity Index :	0.00

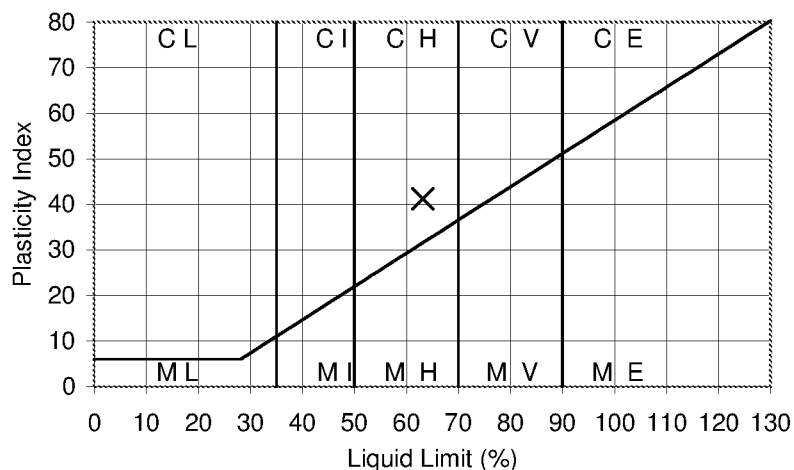
Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	Figure 8 Sheet 1 of 1
CT	DAB		



Site	WOODGATE	Contract No.	CS-J-0132
Client		Hole ID	WS07
Engineer		Sample Ref	
		Depth (m)	1.50-1.60
		Sample Type	T

Non Engineering Description : Brown CLAY.

Preparation : Sample as received



Results :

As Received Moisture Content : (BS1377:Part 2:Clause 3:1990)	29 %
Percentage retained on 425µm sieve :	0 %
Liquid Limit :	63 %
Plastic Limit :	22 %
Plasticity Index :	41
Equivalent moisture content of material passing 425µm sieve :	29 %
Liquidity Index :	0.17

Originator	Checked & Approved	Liquid Limit (One Point Cone Penetrometer Method) Plastic Limit, Plasticity Index & Liquidity Index BS 1377:Part 2:Clause 4.4:1990 BS 1377:Part 2:Clause 5:1990	Figure 9 Sheet 1 of 1
CB	DAB		

Appendix E – Chemical Results



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

THE ENVIRONMENTAL LABORATORY LTD

Analytical Report Number: 19-23743

Issue: 1

Date of Issue: 04/07/2019

Contact: John Flannery

Customer Details: T & P Regeneration Ltd (Smeaton Road)
Unit 4
Brunel Lock Development
Bristol
BS1 6SE

Quotation No: Q15-00390

Order No: 5840-CS-J-0132

Customer Reference: CS-J-0132

Date Received: 28/06/2019

Date Approved: 04/07/2019

Details: Woodgate

Approved by:

Mike Varley, Technical Manager

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

Sample Summary

Report No.: 19-23743, issue number 1

Elab No.	Client's Ref.	Date Sampled	Date Scheduled	Description	Deviations
177529	TP01 1 0.00 - 0.20	25/06/2019	28/06/2019		
177530	TP01 2 0.20 - 0.40	25/06/2019	28/06/2019		
177531	TP02 1 0.00 - 0.20	25/06/2019	28/06/2019	Silty loam	
177532	TP02 2 0.20 - 0.40	25/06/2019	28/06/2019	Silty loam	
177533	TP03 1 0.00 - 0.20	25/06/2019	28/06/2019		
177534	TP03 2 0.30 - 0.60	25/06/2019	28/06/2019	Silty loam	
177535	TP03 4 0.80 - 0.90	25/06/2019	28/06/2019		
177536	TP04 1 0.00 - 0.15	25/06/2019	28/06/2019		
177537	TP04 2 0.30 - 0.60	25/06/2019	28/06/2019		
177538	TP04 4 0.90 - 1.00	25/06/2019	28/06/2019		
177539	WS01 1 0.00 - 0.15	25/06/2019	28/06/2019		
177540	WS01 2 0.15 - 0.60	25/06/2019	28/06/2019		
177541	WS02 1 0.00 - 0.20	25/06/2019	28/06/2019		
177542	WS02 2 0.20 - 0.60	25/06/2019	28/06/2019		
177543	WS03 1 0.00 - 0.15	25/06/2019	28/06/2019	Silty loam	
177544	WS03 2 0.15 - 0.60	25/06/2019	28/06/2019		
177545	WS04 1 0.00 - 0.20	26/06/2019	28/06/2019	Sandy silty loam	
177546	WS04 2 0.60 - 0.80	26/06/2019	28/06/2019		
177547	WS04 3 1.50 - 1.70	26/06/2019	28/06/2019	Silty loam	
177548	WS04 4 2.10 - 2.20	26/06/2019	28/06/2019	Silty clayey loam	
177549	WS05 1 0.00 - 0.20	26/06/2019	28/06/2019	Silty loam	
177550	WS05 2 0.20 - 0.60	26/06/2019	28/06/2019		
177551	WS06 1 0.00 - 0.15	26/06/2019	28/06/2019		
177552	WS06 2 0.30 - 0.60	26/06/2019	28/06/2019		
177553	WS07 1 0.00 - 0.20	26/06/2019	28/06/2019	Silty loam	
177554	WS07 2 0.20 - 0.60	26/06/2019	28/06/2019	Silty loam	
177555	HD01 0.00 - 0.20	26/06/2019	28/06/2019		
177556	HD01 0.20 - 0.50	26/06/2019	28/06/2019		
177557	HD02 0.00 - 0.20	26/06/2019	28/06/2019		
177558	HD02 0.20 - 0.40	26/06/2019	28/06/2019		
177559	HD03 0.00 - 0.20	26/06/2019	28/06/2019		
177560	HD03 0.30 - 0.60	26/06/2019	28/06/2019		
177561	HD04 0.00 - 0.20	26/06/2019	28/06/2019		
177562	HD04 0.20 - 0.50	26/06/2019	28/06/2019		
177563	HD05 0.00 - 0.20	26/06/2019	28/06/2019		
177564	HD05 0.20 - 0.40	26/06/2019	28/06/2019		



Results Summary

2683

Report No.: 19-23743, issue number 1

ELAB Reference	177531	177532	177534	177543	177545
Customer Reference	1	2	2	1	1
Sample ID					
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP02	TP02	TP03	WS03	WS04
Sample Depth (m)	0.00 - 0.20	0.20 - 0.40	0.30 - 0.60	0.00 - 0.15	0.00 - 0.20
Sampling Date	25/06/2019	25/06/2019	25/06/2019	25/06/2019	26/06/2019

Determinand	Codes	Units	LOD					
Soil sample preparation parameters								
Material removed	N	%	0.1	5.5	< 0.1	38.3	< 0.1	< 0.1
Description of Inert material removed	N		0	Stones	None	Stones	None	None
Metals								
Arsenic	M	mg/kg	1	8.0	6.8	12.0	7.1	11.0
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5
Chromium	M	mg/kg	5	25.2	24.1	32.6	24.8	27.5
Copper	M	mg/kg	5	13.1	10.8	34.9	13.1	24.8
Lead	M	mg/kg	5	24.9	15.8	106	32.1	144
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	13.2	12.6	21.9	11.7	17.8
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	49.9	38.8	176	55.2	128
Anions								
Water Soluble Sulphate	M	g/l	0.02	< 0.02	< 0.02	0.02	0.02	< 0.02
Inorganics								
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	0.9	0.7	2.4	2.2	2.4
Miscellaneous								
pH	M	pH units	0.1	6.7	7.0	8.0	6.2	7.7
Total Organic Carbon	N	%	0.01	1.6	0.67	3.6	2.6	3.5
Phenols								
Phenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
M,P-Cresol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
O-Cresol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
3,4-Dimethylphenol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
2,3-Dimethylphenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
2,3,5-trimethylphenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
Total Monohydric Phenols	N	mg/kg	5	< 5	< 5	< 5	< 5	< 5

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Results Summary

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Report No.: 19-23743, issue number 1

ELAB Reference	177531	177532	177534	177543	177545
Customer Reference	1	2	2	1	1
Sample ID					
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	TP02	TP02	TP03	WS03	WS04
Sample Depth (m)	0.00 - 0.20	0.20 - 0.40	0.30 - 0.60	0.00 - 0.15	0.00 - 0.20
Sampling Date	25/06/2019	25/06/2019	25/06/2019	25/06/2019	26/06/2019

Determinand	Codes	Units	LOD					
Polyaromatic hydrocarbons								
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.4
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	1.9
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	0.6
Fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	0.7	0.3	5.9
Pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.7	0.1	5.3
Benzo(a)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	0.6	1.0	3.5
Chrysene	M	mg/kg	0.1	< 0.1	< 0.1	0.6	0.8	4.1
Benzo(b)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	0.6	0.1	3.8
Benzo(k)fluoranthene	M	mg/kg	0.1	< 0.1	< 0.1	0.7	0.2	3.9
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.5	< 0.1	4.0
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	0.5	< 0.1	3.2
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	0.2	< 0.1	0.7
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	< 0.1	0.4	< 0.1	3.0
Total PAH(16)	M	mg/kg	0.4	< 0.4	< 0.4	5.9	2.7	40.5
BTEX								
Benzene	M	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
Toluene	M	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
Ethylbenzene	M	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
Xylenes	M	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
MTBE	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
TPH CWG								
>C5-C6 Aliphatic	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
>C6-C8 Aliphatic	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
>C8-C10 Aliphatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C10-C12 Aliphatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C12-C16 Aliphatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C16-C21 Aliphatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C21-C35 Aliphatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C35-C40 Aliphatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C5-C7 Aromatic	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
>C7-C8 Aromatic	N	mg/kg	0.01	n/t	n/t	< 0.01	n/t	n/t
>C8-C10 Aromatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C10-C12 Aromatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C12-C16 Aromatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C16-C21 Aromatic	N	mg/kg	1	n/t	n/t	< 1.0	n/t	n/t
>C21-C35 Aromatic	N	mg/kg	1	n/t	n/t	3.7	n/t	n/t
>C35-C40 Aromatic	N	mg/kg	1	n/t	n/t	3.0	n/t	n/t
Total (>C5-C40) Ali/Aro	N	mg/kg	1	n/t	n/t	6.7	n/t	n/t

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Results Summary

2683

Report No.: 19-23743, issue number 1

ELAB Reference	177547	177548	177549	177553	177554
Customer Reference	3	4	1	1	2
Sample ID					
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS04	WS04	WS05	WS07	WS07
Sample Depth (m)	1.50 - 1.70	2.10 - 2.20	0.00 - 0.20	0.00 - 0.20	0.20 - 0.60
Sampling Date	26/06/2019	26/06/2019	26/06/2019	26/06/2019	26/06/2019

Determinand	Codes	Units	LOD					
Soil sample preparation parameters								
Material removed	N	%	0.1	< 0.1	28.0	< 0.1	< 0.1	< 0.1
Description of Inert material removed	N		0	None	Stones	None	None	None
Metals								
Arsenic	M	mg/kg	1	10.3	14.2	9.0	9.7	9.2
Cadmium	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	M	mg/kg	5	34.7	43.9	27.9	25.0	29.1
Copper	M	mg/kg	5	17.0	16.0	10.8	13.3	10.6
Lead	M	mg/kg	5	34.2	20.1	21.0	20.4	15.6
Mercury	M	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	M	mg/kg	5	17.8	33.0	16.5	14.2	17.3
Selenium	M	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	M	mg/kg	5	92.8	58.8	60.9	55.4	44.1
Anions								
Water Soluble Sulphate	M	g/l	0.02	0.04	0.04	< 0.02	< 0.02	< 0.02
Inorganics								
Hexavalent Chromium	N	mg/kg	0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Water Soluble Boron	N	mg/kg	0.5	2.7	0.9	1.2	1.2	0.8
Miscellaneous								
pH	M	pH units	0.1	8.1	8.5	8.3	6.8	7.1
Total Organic Carbon	N	%	0.01	2.3	0.34	1.8	1.4	0.63
Phenols								
Phenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
M,P-Cresol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
O-Cresol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
3,4-Dimethylphenol	N	mg/kg	1	< 1	< 1	< 1	< 1	< 1
2,3-Dimethylphenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
2,3,5-trimethylphenol	M	mg/kg	1	< 1	< 1	< 1	< 1	< 1
Total Monohydric Phenols	N	mg/kg	5	< 5	< 5	< 5	< 5	< 5



Results Summary

2683

Report No.: 19-23743, issue number 1

ELAB Reference	177547	177548	177549	177553	177554
Customer Reference	3	4	1	1	2
Sample ID					
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
Sample Location	WS04	WS04	WS05	WS07	WS07
Sample Depth (m)	1.50 - 1.70	2.10 - 2.20	0.00 - 0.20	0.00 - 0.20	0.20 - 0.60
Sampling Date	26/06/2019	26/06/2019	26/06/2019	26/06/2019	26/06/2019

Determinand	Codes	Units	LOD					
Polyaromatic hydrocarbons								
Naphthalene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	M	mg/kg	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	M	mg/kg	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	M	mg/kg	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	M	mg/kg	0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	M	mg/kg	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	M	mg/kg	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo[g,h,i]perylene	M	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total PAH(16)	M	mg/kg	0.4	1.2	< 0.4	0.5	< 0.4	< 0.4
BTEX								
Benzene	M	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
Toluene	M	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
Ethylbenzene	M	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
Xylenes	M	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
MTBE	N	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
TPH CWG								
>C5-C6 Aliphatic	N	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
>C6-C8 Aliphatic	N	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
>C8-C10 Aliphatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C10-C12 Aliphatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C12-C16 Aliphatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C16-C21 Aliphatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C21-C35 Aliphatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C35-C40 Aliphatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C5-C7 Aromatic	N	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
>C7-C8 Aromatic	N	mg/kg	0.01	< 0.01	n/t	n/t	n/t	n/t
>C8-C10 Aromatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C10-C12 Aromatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C12-C16 Aromatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C16-C21 Aromatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C21-C35 Aromatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
>C35-C40 Aromatic	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t
Total (>C5-C40) Ali/Aro	N	mg/kg	1	< 1.0	n/t	n/t	n/t	n/t

Tests marked N are not UKAS accredited.

The Environmental Laboratory Ltd. Reg. No. 3882193

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Results Summary

Report No.: 19-23743, issue number 1

Asbestos Results

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

Elab No	Depth (m)	Clients Reference	Description of Sample Matrix #	Asbestos Identification	Gravimetric Analysis Total (%)	Gravimetric Analysis by ACM Type (%)	Free Fibre Analysis (%)	Total Asbestos (%)
177534	0.30 - 0.60	TP03 2	Brown Soil, Stones, Clinker, Wood	No asbestos detected	n/t	n/t	n/t	n/t
177545	0.00 - 0.20	WS04 1	Brown Soil, Stones, Clinker, Plant	No asbestos detected	n/t	n/t	n/t	n/t
177547	1.50 - 1.70	WS04 3	Brown Soil, Stones	No asbestos detected	n/t	n/t	n/t	n/t

Method Summary

Report No.: 19-23743, issue number 1

Parameter	Codes	Analysis Undertaken On	Date Tested	Method Number	Technique
Soil					
Hexavalent chromium	N	As submitted sample	02/07/2019	110	Colorimetry
pH	M	Air dried sample	02/07/2019	113	Electromeric
Aqua regia extractable metals	M	Air dried sample	02/07/2019	118	ICPMS
Phenols in solids	M	As submitted sample	02/07/2019	121	HPLC
PAH (GC-FID)	M	As submitted sample	02/07/2019	133	GC-FID
Water soluble anions	M	Air dried sample	02/07/2019	172	Ion Chromatography
Low range Aliphatic hydrocarbons soil	N	As submitted sample	02/07/2019	181	GC-MS
Low range Aromatic hydrocarbons soil	N	As submitted sample	02/07/2019	181	GC-MS
BTEX in solids	M	As submitted sample	02/07/2019	181A	GC-MS
Water soluble boron	N	Air dried sample	02/07/2019	202	Colorimetry
Total organic carbon/Total sulphur	N	Air dried sample	03/07/2019	210	IR
Aliphatic hydrocarbons in soil	N	As submitted sample	02/07/2019	214	GC-FID
Aliphatic/Aromatic hydrocarbons in soil	N	As submitted sample	03/07/2019	214	GC-FID
Aromatic hydrocarbons in soil	N	As submitted sample	02/07/2019	214	GC-FID
Asbestos identification	U	Air dried sample	02/07/2019	PMAN	Microscopy

Tests marked N are not UKAS accredited



Report Information

Report No.: 19-23743, issue number 1

Key

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

Soil sample results are expressed on an air dried basis (dried at < 30°C), and are uncorrected for inert material removed.

ELAB are unable to provide an interpretation or opinion on the content of this report.

The results relate only to the sample received.

PCB congener results may include any coeluting PCBs

Uncertainty of measurement for the determinands tested are available upon request

Unless otherwise stated, sample information has been provided by the client

Deviation Codes

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

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

Sample Retention and Disposal

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

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

Charges may apply to extended sample storage

Appendix F – Surrogate Marker Assessment



Polycyclic Aromatic Hydrocarbon (PAH) Profiling to Determine Suitability of Benzo(a)pyrene (BaP) Surrogate Marker Approach

Project Name:

Oaktree Lane, Woodgate

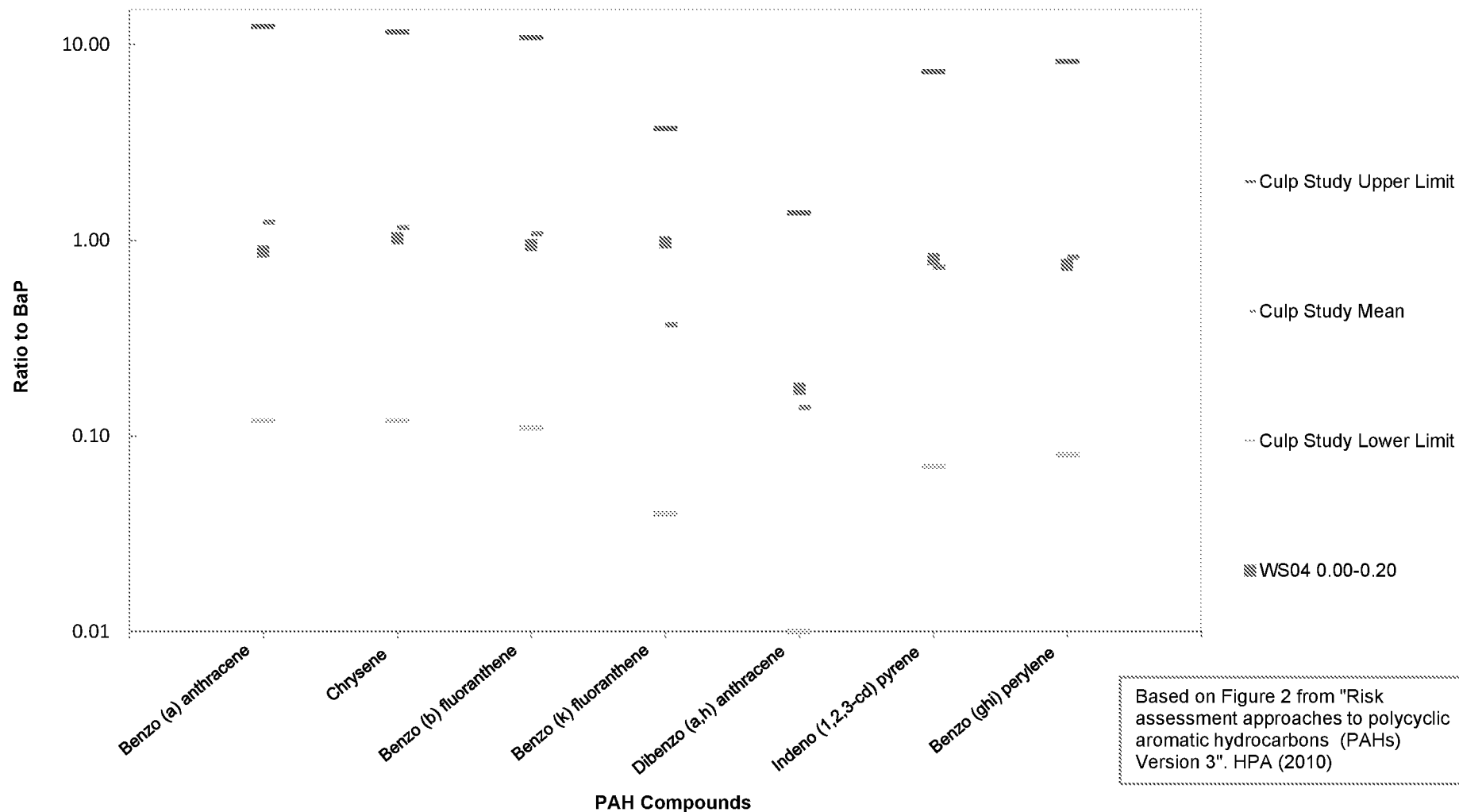
Project ID:

CS-J-0132

Client:

Pye Homes

Profile of PAHs in selected soil samples expressed as a ratio to benzo(a)pyrene compared with Culp Study results (Culp, S.J., et al., 1998)



Appendix G – Gas Monitoring Records

GAS MONITORING RECORD



Client: Pye Homes
Site: Woodgate
Date: 22-07-19

Job No:
Visit No: 1 of 3
Operator: AD
Project Manager: JF

Monitoring Location	VOLATILES	FLOW DATA				GAS CONCENTRATIONS												WELL AND WATER DATA								Comments
		Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (sec)	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		Run time (min)	Ground Level (mAOD)	NAPL Level (mbgl)	NAPL level (mAOD)	Water level (mbgl)	Water level (mAOD)	Base of well (mbgl)	Response zone depth range (m)	
		Peak	Steady			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min.	Steady									
WS01	0.2	0	0	-	-	<0.1	<0.1	<0.1	<0.1	0.4	0.3	<0.1	<0.1	<1	<1	19.8	19.8	4	-	-	-	1.20		2.28	1.0-3.0	
WS02	0	-0.1	0	-	60	<0.1	<0.1	<0.1	<0.1	0.2	0.2	1	1	<1	<1	19.8	19.7	4	-	-	-	3.10		2.92	1.0-3.0	
WS04	0.1	0.2	0	-	-	<0.1	<0.1	<0.1	<0.1	6.5	6.4	<0.1	<0.1	<1	<1	15	15	4	-	-	-	ND		1.91	1.0-2.0	
WS05	0	0.1	0	-	-	<0.1	<0.1	<0.1	<0.1	3.1	3.1	1	1	<1	<1	18.3	18.3	4	-	-	-	2.40		4.03	1.0-4.0	
Max	0.2	0.2	0.0	0.0		0.0	0.0	0.0	0.0	6.5	6.4	1.0	1.0	0.0	0.0	19.8	19.8									
Min	0.0	-0.1	0.0	0.0		0.0	0.0	0.0	0.0	0.2	0.2	1.0	1.0	0.0	0.0	15.0	15.0									

ND - Not detected

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	Dry	Moist	Wet	Snow	Frozen
Wind:	Calm	Light	Moderate	Strong	
Cloud cover:	None	Slight	Cloudy	Overcast	
Precipitation:	None	Slight	Moderate	Heavy	
Time monitoring performed:	Start		End		
Barometric pressure (mbar):	Start	1025	End	1025	
Pressure trend (Preceding 3 days):	Falling	Steady	Rising		
Air temperature (degree C):	Before		After		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter:	GAS DATA LMS xl				
Gas range:	CH ₄ :	0 - 100%	CO ₂ :	0 - 100%	O ₂ : 0 -25%
Gas flow range:	+30/-10 l/hr				
Differential pressure:	+300/-30 Pa				
Date of last calibration:	27-02-19				
Date of next calibration:	27-02-20				

PID:	Mini Rae Lite
Calibrated range:	0-99 ppm
Calibration gas:	Isobutylene
Response time:	2 seconds
Accuracy:	0.1 ppm
Date of last calibration:	22-11-18
Date of next calibration:	22-11-19

GAS MONITORING RECORD



Client: Pye Homes
Site: Woodgate
Date: 30-07-19

Job No:
Visit No: 2 of 3
Operator: CT
Project Manager: JF

Monitoring Location	VOLATILES	FLOW DATA				GAS CONCENTRATIONS												WELL AND WATER DATA								Comments
		Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (sec)	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		Run time (min)	Ground Level (mAOD)	NAPL Level (mbgl)	NAPL level (mAOD)	Water level (mbgl)	Water level (mAOD)	Base of well (mbgl)	Response zone depth range (m)	
		Peak	Steady			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min	Steady									
WS01	<0.1	0	0	0.07	-	<0.1	<0.1	-	-	0.5	0.2	<0.1	<0.1	<1	<1	20.4	20.6	3				1.78		2.17	1.0-3.0	-
WS02	<0.1	0.1	0	0.05	10	<0.1	<0.1	-	-	2.8	2.8	<0.1	<0.1	<1	<1	19	19	3				2.02		2.92	1.0-3.0	-
WS04	<0.1	0.1	0	-0.02	10	<0.1	<0.1	-	-	4.6	4.6	<0.1	<0.1	<1	<1	16.6	16.6	6.5				ND		1.95	1.0-2.0	-
WS05	<0.1	0	0	-0.03	10	<0.1	<0.1	-	-	0.1	0.1	<0.1	<0.1	<1	<1	20.4	20.4	3				0.87		4.10	1.0-4.0	-
Max	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.0	4.6	4.6	0.0	0.0	0.0	0.0	20.4	20.6									
Min	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	16.6	16.6									

ND - Not detected

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	Dry	Most	Wet	Snow	Frozen
Wind:	Calm	Light	Moderate	Strong	
Cloud cover:	None	Slight	Cloudy	Overcast	
Precipitation:	None	Slight	Moderate	Heavy	
Time monitoring performed:	Start 11:04		End 12:19		
Barometric pressure (mbar):	Start 1014		End 1015		
Pressure trend (Preceding 3 days):	Falling	Steady	Rising		
Air temperature (degree C):	Before 19		After 20		

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter: GAS DATA LMS xl
Gas range: CH₄: 0 - 100% CO₂: 0 - 100% O₂: 0 -25%
Gas flow range: +30/-10 l/hr
Differential pressure: +300/-30 Pa
Date of last calibration: 27-02-19
Date of next calibration: 27-02-20

PID: Mini Rae Lite
Calibrated range: 0-99 ppm
Calibration gas: Isobutylene
Response time: 2 seconds
Accuracy: 0.1 ppm
Date of last calibration: 22-11-18
Date of next calibration: 22-11-19

GAS MONITORING RECORD



Client: Pye Homes
Site: Woodgate
Date: 07-08-19

Job No:
Visit No: 3 of 3
Operator: CP
Project Manager: JF

Monitoring Location	VOLATILES	FLOW DATA				GAS CONCENTRATIONS												WELL AND WATER DATA								Comments
		Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (sec)	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Carbon monoxide (ppmv)		Hydrogen sulphide (ppmv)		Oxygen (%v/v)		Run time (min)	Ground Level (mAOD)	NAPL Level (mbgl)	NAPL level (mAOD)	Water level (mbgl)	Water level (mAOD)	Base of well (mbgl)	Response zone depth range (m)	
		Peak	Steady			Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Min	Steady									
WS01	<0.1	0	0	0.1	-	<0.1	<0.1	-	-	0.4	0.3	<0.1	<0.1	<1	<1	20.1	20.4	3		ND		1.88		2.17	1.0-3.0	-
WS02	<0.1	0.1	0	0.04	10	<0.1	<0.1	-	-	2.9	2.8	<0.1	<0.1	<1	<1	19	19	4		ND		2.11		2.92	1.0-3.0	-
WS04	<0.1	0	0	0.12	-	<0.1	<0.1	-	-	2.3	1.7	<0.1	<0.1	<1	<1	19	19.3	4		ND		ND		1.95	1.0-2.0	-
WS05	<0.1	0.1	0	0.1	10	<0.1	<0.1	-	-	0.2	0.1	<0.1	<0.1	<1	<1	20.4	20.4	4		ND		1.02		4.10	1.0-4.0	-
Max	0.0	0.1	0.0	0.1		0.0	0.0	0.0	0.0	2.9	2.8	0.0	0.0	0.0	0.0	20.4	20.4									
Min	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	19.0	19.0									

ND - Not detected

METEOROLOGICAL AND SITE INFORMATION:

State of ground:	Dry	Moist	Wet	Snow	Frozen
Wind:	Calm	Light	Moderate	Strong	
Cloud cover:	None	Slight	Cloudy	Overcast	
Precipitation:	None	Slight	Moderate	Heavy	
Time monitoring performed:	Start 09:30:00	End 10:30			
Barometric pressure (mbar):	Start 1008	End 1009			
Pressure trend (Preceding 3 days):	Falling	Steady	Rising		
Air temperature (degree C):	Before 19	After 20			

INSTRUMENTATION TECHNICAL SPECIFICATIONS:

Ground gas meter:	GAS DATA LMS xl				
Gas range:	CH ₄ :	0 - 100%	CO ₂ :	0 - 100%	O ₂ : 0 -25%
Gas flow range:	+30/-10 l/hr				
Differential pressure:	+300/-30 Pa				
Date of last calibration:	27-02-19				
Date of next calibration:	27-02-20				

PID:	Mini Rae Lite
Calibrated range:	0-99 ppm
Calibration gas:	Isobutylene
Response time:	2 seconds
Accuracy:	0.1 ppm
Date of last calibration:	22-11-18
Date of next calibration:	22-11-19

Appendix H – HazWaste Report

Waste Classification Report



RN6E8-CJY6X-2RRR4

Job name

Woodgate

Description/Comments

Project

CS-J-0132

Site

Woodgate

Related Documents

#	Name	Description
None		

Waste Stream Template

T&P 2 Standard

Classified by

Name:
Alessandro Dunne
Date:
05 Aug 2019 17:00 GMT
Telephone:
[REDACTED]

Company:
T&P Regeneration Ltd
Unit 4
Brunel Lock Development, Smeaton Road
Bristol
BS1 6SE

Report

Created by: Alessandro Dunne
Created date: 05 Aug 2019 17:00 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	TP02	0.00 - 0.20	Non Hazardous		3
2	TP02[2]	0.20 - 0.40	Non Hazardous		5
3	TP03	0.30 - 0.60	Non Hazardous		7
4	WS03	0.00 - 0.15	Non Hazardous		10
5	WS04	0.00 - 0.20	Non Hazardous		12
6	WS04[2]	1.50 - 1.70	Non Hazardous		14
7	WS04[3]	2.10 - 2.20	Non Hazardous		16
8	WS05	0.00 - 0.20	Non Hazardous		18
9	WS07	0.00 - 0.20	Non Hazardous		20
10	WS07[2]	0.20 - 0.60	Non Hazardous		22

Appendices	Page
Appendix A: Classifier defined and non CLP determinands	24
Appendix B: Rationale for selection of metal species	25
Appendix C: Version	26

Classification of sample: TP02

☉ **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **TP02** LoW Code: Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: **0.00 - 0.20 m** Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				8	mg/kg	1.32	10.563	mg/kg	0.00106 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium sulfide }			1	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %		<LOD
	048-010-00-4	215-147-8	1306-23-8									
3	chromium { * chromium(III) oxide }				25.2	mg/kg	1.462	36.831	mg/kg	0.00368 %	✓	
		215-169-9	1308-38-9									
4	copper { dicopper oxide; copper (I) oxide }				13.1	mg/kg	1.126	14.749	mg/kg	0.00147 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }			1	24.9	mg/kg		24.9	mg/kg	0.00249 %	✓	
	062-001-00-6											
6	mercury { mercury dichloride }				<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
	060-010-00-X	231-289-8	7487-94-7									
7	nickel { nickel dihydroxide }				13.2	mg/kg	1.579	20.849	mg/kg	0.00208 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	034-002-00-6											
9	zinc { zinc sulphate }				49.9	mg/kg	2.469	123.218	mg/kg	0.0123 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
10	boron { * boron tribromide/trichloride/trifluoride (combined) }				0.9	mg/kg	13.43	12.087	mg/kg	0.00121 %	✓	
			10294-33-4, 10294-34-5, 7637-07-2									
11	pH				6.7	pH		6.7	pH	6.7 pH		
			pH									
12	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	004-001-00-2	203-632-7	108-95-2									
13	naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	001-052-00-2	202-049-5	91-20-3									

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	M/C Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	✧ acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
15	✧ acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
16	✧ fluorene	201-895-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
17	✧ phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
18	✧ anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19	✧ fluoranthene	205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20	✧ pyrene	204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22	chrysene	601-048-00-0	205-923-4	218-01-9	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
23	benzo[b]fluoranthene	601-034-00-4	205-911-6	205-99-2	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24	benzo[k]fluoranthene	601-036-00-5	205-915-8	207-08-9	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
26	✧ indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28	✧ benzo[ghi]perylene	205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
Total:										0.025 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- ✧ Determinand defined or amended by HazWasteOnline (see Appendix A)
- ✧ Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Classification of sample: TP02[2]

☉ **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **TP02[2]** LoW Code: Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: **0.20 - 0.40 m** Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				6.8	mg/kg	1.32	8.978	mg/kg	0.000898 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium sulfide }			1	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %		<LOD
	048-010-00-4	215-147-8	1306-23-8									
3	chromium { * chromium(III) oxide }				24.1	mg/kg	1.462	35.223	mg/kg	0.00352 %	✓	
		215-169-9	1308-38-9									
4	copper { dicopper oxide; copper (I) oxide }				10.8	mg/kg	1.126	12.16	mg/kg	0.00122 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }			1	15.8	mg/kg		15.8	mg/kg	0.00158 %	✓	
	062-001-00-6											
6	mercury { mercury dichloride }				<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
	060-010-00-X	231-289-8	7487-94-7									
7	nickel { nickel dihydroxide }				12.6	mg/kg	1.579	19.902	mg/kg	0.00199 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	034-002-00-6											
9	zinc { zinc sulphate }				38.8	mg/kg	2.469	95.809	mg/kg	0.00958 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
10	boron { * boron tribromide/trichloride/trifluoride (combined) }				0.7	mg/kg	13.43	9.401	mg/kg	0.00094 %	✓	
			10294-33-4, 10294-34-5, 7637-07-2									
11	pH				7	pH		7	pH	7pH		
			pH									
12	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	004-001-00-2	203-632-7	108-95-2									
13	naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	001-052-00-2	202-049-5	91-20-3									

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	M/C Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	✧ acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
15	✧ acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
16	✧ fluorene	201-895-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
17	✧ phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
18	✧ anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19	✧ fluoranthene	205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20	✧ pyrene	204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22	chrysene	601-048-00-0	205-923-4	218-01-9	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
23	benzo[b]fluoranthene	601-034-00-4	205-911-6	205-99-2	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24	benzo[k]fluoranthene	601-036-00-5	205-916-8	207-08-9	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
26	✧ indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28	✧ benzo[ghi]perylene	205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
Total:										0.0204 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- ✧ Determinand defined or amended by HazWasteOnline (see Appendix A)
- ✧ Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Classification of sample: TP03

☉ **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **TP03** LoW Code: Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: **0.30 - 0.60 m** Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }				12	mg/kg	1.32	15.844	mg/kg	0.00158 %	✓	
	033-003-00-0	215-481-4	1327-53-3									
2	cadmium { cadmium sulfide }			1	0.7	mg/kg	1.285	0.9	mg/kg	0.00007 %	✓	
	048-010-00-4	215-147-8	1306-23-8									
3	chromium { * chromium(III) oxide }				32.6	mg/kg	1.462	47.647	mg/kg	0.00476 %	✓	
		215-169-9	1308-38-9									
4	copper { dicopper oxide; copper (I) oxide }				34.9	mg/kg	1.126	39.294	mg/kg	0.00393 %	✓	
	029-002-00-X	215-270-7	1317-39-1									
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }			1	106	mg/kg		106	mg/kg	0.0106 %	✓	
	062-001-00-6											
6	mercury { mercury dichloride }				<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
	060-010-00-X	231-289-8	7487-94-7									
7	nickel { nickel dihydroxide }				21.9	mg/kg	1.579	34.591	mg/kg	0.00346 %	✓	
	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]									
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
	034-002-00-6											
9	zinc { zinc sulphate }				176	mg/kg	2.469	434.596	mg/kg	0.0435 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]									
10	boron { * boron tribromide/trichloride/trifluoride (combined) }				2.4	mg/kg	13.43	32.232	mg/kg	0.00322 %	✓	
			10294-33-4, 10294-34-5, 7637-07-2									
11	pH				8	pH		8	pH	8pH		
12	phenol				<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
	004-001-00-2	203-632-7	108-95-2									
13	naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
	001-052-00-2	202-049-5	91-20-3									

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	M/C Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	✧ acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
15	✧ acenaphthene	201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
16	✧ fluorene	201-895-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
17	✧ phenanthrene	201-581-5	85-01-8		0.2	mg/kg		0.2	mg/kg	0.00002 %	✓	
18	✧ anthracene	204-371-1	120-12-7		0.2	mg/kg		0.2	mg/kg	0.00002 %	✓	
19	✧ fluoranthene	205-912-4	206-44-0		0.7	mg/kg		0.7	mg/kg	0.00007 %	✓	
20	✧ pyrene	204-927-3	129-00-0		0.7	mg/kg		0.7	mg/kg	0.00007 %	✓	
21	benzo[a]anthracene	601-033-00-9	200-280-6		0.6	mg/kg		0.6	mg/kg	0.00006 %	✓	
22	chrysene	601-048-00-0	205-923-4		0.6	mg/kg		0.6	mg/kg	0.00006 %	✓	
23	benzo[b]fluoranthene	601-034-00-4	205-911-6		0.6	mg/kg		0.6	mg/kg	0.00006 %	✓	
24	benzo[k]fluoranthene	601-036-00-5	205-916-8		0.7	mg/kg		0.7	mg/kg	0.00007 %	✓	
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		0.5	mg/kg		0.5	mg/kg	0.00005 %	✓	
26	✧ indeno[123-cd]pyrene	205-893-2	193-39-5		0.5	mg/kg		0.5	mg/kg	0.00005 %	✓	
27	dibenz[a,h]anthracene	601-041-00-2	200-181-8		0.2	mg/kg		0.2	mg/kg	0.00002 %	✓	
28	✧ benzo[ghi]perylene	205-883-8	191-24-2		0.4	mg/kg		0.4	mg/kg	0.00004 %	✓	
29	benzene	601-020-00-8	200-753-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
30	toluene	601-021-00-3	203-825-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
31	✧ ethylbenzene	601-023-00-4	202-848-4		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
32	xylene	601-022-00-9	202-422-2 [1] 203-398-5 [2] 203-576-3 [3] 215-535-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
33	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-853-1		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
34	✧ TPH (C6 to C40) petroleum group		TPH		6.7	mg/kg		6.7	mg/kg	0.00067 %	✓	
Total:										0.0728 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- ✧ Determinand defined or amended by HazWasteOnline (see Appendix A)
- ✧ Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"

Force this Hazardous property to non hazardous because Minimal concentrations recorded from soil sample, with no odour or free product observed.

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00067%)

Classification of sample: WS03

 **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **WS03** LoW Code: **17: Construction and Demolition Wastes (including excavated soil from contaminated sites)**
Sample Depth: **0.00 - 0.15 m** Chapter: **17 05 04 (Soil and stones other than those mentioned in 17 05 03)**
Entry:

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	7.1	mg/kg	1.32	9.374	mg/kg	0.000937 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1308-23-6	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %		<LOD
3	chromium { * chromium(III) oxide }		215-160-9	1308-38-9	24.8	mg/kg	1.462	36.247	mg/kg	0.00362 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	13.1	mg/kg	1.126	14.749	mg/kg	0.00147 %	✓	
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }	062-001-00-6			32.1	mg/kg		32.1	mg/kg	0.00321 %	✓	
6	mercury { mercury dichloride }	030-010-00-X	231-299-8	7487-94-7	<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]	11.7	mg/kg	1.579	18.48	mg/kg	0.00185 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8			<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
9	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]	55.2	mg/kg	2.469	136.305	mg/kg	0.0136 %	✓	
10	boron { * boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		2.2	mg/kg	13.43	29.546	mg/kg	0.00295 %	✓	
11	pH		pH		6.2	pH		6.2	pH	6.2 pH		
12	phenol	604-001-00-2	203-632-7	108-95-2	<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
13	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number								
14	acenaphthylene	205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
15	acenaphthene	201-489-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
16	fluorene	201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
17	phenanthrene	201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
18	anthracene	204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
19	fluoranthene	205-912-4	208-44-0		0.3 mg/kg		0.3 mg/kg	0.00003 %		✓	
20	pyrene	204-927-3	128-09-0		0.1 mg/kg		0.1 mg/kg	0.00001 %		✓	
21	benzo[a]anthracene	601-033-00-9	200-280-6		1 mg/kg		1 mg/kg	0.0001 %		✓	
22	chrysene	601-048-00-0	205-923-4		0.8 mg/kg		0.8 mg/kg	0.00008 %		✓	
23	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.1 mg/kg		0.1 mg/kg	0.00001 %		✓	
24	benzo[k]fluoranthene	601-036-00-5	205-916-8		0.2 mg/kg		0.2 mg/kg	0.00002 %		✓	
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
26	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
27	dibenz[a,h]anthracene	601-041-00-2	200-161-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
28	benzo[ghi]perylene	205-883-8	161-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %			<LOD
Total:									0.0285 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Classification of sample: WS04

 **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **WS04** LoW Code: **17: Construction and Demolition Wastes (including excavated soil from contaminated sites)**
Sample Depth: **0.00 - 0.20 m** Chapter: **17 05 04 (Soil and stones other than those mentioned in 17 05 03)**
Entry:

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	11	mg/kg	1.32	14.524	mg/kg	0.00145 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1308-23-6	1	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %	<LOD
3	chromium { * chromium(III) oxide }		215-160-9	1308-38-9	27.5	mg/kg	1.462	40.193	mg/kg	0.00402 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	24.8	mg/kg	1.126	27.922	mg/kg	0.00279 %	✓	
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }	062-001-00-6			1	144	mg/kg	144	mg/kg	0.0144 %	✓	
6	mercury { mercury dichloride }	030-010-00-X	231-299-8	7487-94-7	<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	233-008-3 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]	17.8	mg/kg	1.579	28.115	mg/kg	0.00281 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8			<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
9	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]	128	mg/kg	2.469	316.07	mg/kg	0.0316 %	✓	
10	boron { * boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		2.4	mg/kg	13.43	32.232	mg/kg	0.00322 %	✓	
11	pH		pH		7.7	pH		7.7	pH	7.7 pH		
12	phenol	604-001-00-2	203-632-7	108-95-2	<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
13	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	acenaphthylene	205-917-1	208-96-8		0.4	mg/kg		0.4	mg/kg	0.00004 %	✓	
15	acenaphthene	201-489-6	83-32-9		0.1	mg/kg		0.1	mg/kg	0.00001 %	✓	
16	fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
17	phenanthrene	201-581-5	85-01-8		1.9	mg/kg		1.9	mg/kg	0.00019 %	✓	
18	anthracene	204-371-1	120-12-7		0.6	mg/kg		0.6	mg/kg	0.00006 %	✓	
19	fluoranthene	205-912-4	208-44-0		5.9	mg/kg		5.9	mg/kg	0.00059 %	✓	
20	pyrene	204-927-3	128-09-0		5.3	mg/kg		5.3	mg/kg	0.00053 %	✓	
21	benzo[a]anthracene	601-033-00-9	200-280-6		3.5	mg/kg		3.5	mg/kg	0.00035 %	✓	
22	chrysene	601-048-00-0	205-923-4		4.1	mg/kg		4.1	mg/kg	0.00041 %	✓	
23	benzo[b]fluoranthene	601-034-00-4	205-911-9		3.8	mg/kg		3.8	mg/kg	0.00038 %	✓	
24	benzo[k]fluoranthene	601-036-00-5	205-916-6		3.9	mg/kg		3.9	mg/kg	0.00039 %	✓	
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		4	mg/kg		4	mg/kg	0.0004 %	✓	
26	indeno[123-cd]pyrene	205-893-2	193-39-5		3.2	mg/kg		3.2	mg/kg	0.00032 %	✓	
27	dibenz[a,h]anthracene	601-041-00-2	200-161-8		0.7	mg/kg		0.7	mg/kg	0.00007 %	✓	
28	benzo[ghi]perylene	205-883-8	161-24-2		3	mg/kg		3	mg/kg	0.0003 %	✓	
Total:										0.0648 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Classification of sample: WS04[2]

 **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **WS04[2]** LoW Code: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: 1.50 - 1.70 m Chapter: Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	10.3	mg/kg	1.32	13.599	mg/kg	0.00136 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1308-23-6	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %		<LOD
3	chromium { * chromium(III) oxide }	215-160-9	1308-38-9		34.7	mg/kg	1.462	50.716	mg/kg	0.00507 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	17	mg/kg	1.126	19.14	mg/kg	0.00191 %	✓	
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }	062-001-00-6			34.2	mg/kg		34.2	mg/kg	0.00342 %	✓	
6	mercury { mercury dichloride }	030-010-00-X	231-299-8	7487-94-7	<0.5	mg/kg	1.353	<0.877	mg/kg	<0.0000677 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-3 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]	17.8	mg/kg	1.579	28.115	mg/kg	0.00281 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8			<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
9	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]	92.8	mg/kg	2.469	229.151	mg/kg	0.0229 %	✓	
10	boron { * boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		2.7	mg/kg	13.43	36.261	mg/kg	0.00363 %	✓	
11	pH		pH		8.1	pH		8.1	pH	8.1 pH		
12	phenol	604-001-00-2	203-632-7	108-95-2	<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
13	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	✱ acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
15	✱ acenaphthene	201-489-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
16	✱ fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
17	✱ phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
18	✱ anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19	✱ fluoranthene	205-912-4	208-44-0		0.1	mg/kg		0.1	mg/kg	0.00001 %	✓	
20	✱ pyrene	204-927-3	128-00-0		0.2	mg/kg		0.2	mg/kg	0.00002 %	✓	
21	benzo[a]anthracene	601-033-00-9	200-280-6		0.2	mg/kg		0.2	mg/kg	0.00002 %	✓	
22	chrysene	601-048-00-0	205-923-4		0.2	mg/kg		0.2	mg/kg	0.00002 %	✓	
23	benzo[b]fluoranthene	601-034-00-4	205-911-9		0.1	mg/kg		0.1	mg/kg	0.00001 %	✓	
24	benzo[k]fluoranthene	601-036-00-5	205-916-6		0.1	mg/kg		0.1	mg/kg	0.00001 %	✓	
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
26	✱ indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27	dibenz[a,h]anthracene	601-041-00-2	200-161-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28	✱ benzo[ghi]perylene	205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
29	benzene	601-020-00-8	200-753-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
30	toluene	601-021-00-3	203-625-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
31	✱ ethylbenzene	601-023-00-4	202-849-4		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
32	xylene	601-022-00-9	202-422-2 [1] 203-396-6 [2] 203-576-3 [3] 215-535-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
33	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	215-653-1		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
34	✱ TPH (C6 to C40) petroleum group		TPH		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
Total:										0.0419 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- ✱ Determinand defined or amended by HazWasteOnline (see Appendix A)
- ✱ Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Classification of sample: WS04[3]

☉ **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **WS04[3]** LoW Code: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: **2.10 - 2.20 m** Chapter: Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	14.2	mg/kg	1.32	18.749	mg/kg	0.00187 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1308-23-6	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %		<LOD
3	chromium { * chromium(III) oxide }		215-160-9	1308-38-9	43.9	mg/kg	1.462	64.162	mg/kg	0.00642 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	16	mg/kg	1.126	18.014	mg/kg	0.0018 %	✓	
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }	062-001-00-6			20.1	mg/kg		20.1	mg/kg	0.00201 %	✓	
6	mercury { mercury dichloride }	030-010-00-X	231-299-8	7487-94-7	<0.5	mg/kg	1.353	<0.877	mg/kg	<0.0000677 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]	33	mg/kg	1.579	52.123	mg/kg	0.00521 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8			<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
9	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]	58.8	mg/kg	2.469	145.195	mg/kg	0.0145 %	✓	
10	boron { * boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.9	mg/kg	13.43	12.087	mg/kg	0.00121 %	✓	
11	pH		pH		8.5	pH		8.5	pH	8.5 pH		
12	phenol	604-001-00-2	203-632-7	108-95-2	<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
13	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
14	acenaphthylene	205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene	201-489-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
16	fluorene	201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
17	phenanthrene	201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
18	anthracene	204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
19	fluoranthene	205-912-4	208-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
20	pyrene	204-927-3	129-00-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
21	benzo[a]anthracene	601-033-00-9	200-280-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
22	chrysene	601-048-00-0	205-923-4		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
23	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
24	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
26	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	dibenz[a,h]anthracene	601-041-00-2	200-161-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
28	benzo[ghi]perylene	205-883-8	161-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
Total:								0.0337 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Classification of sample: WS05

 **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **WS05** LoW Code: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: **0.00 - 0.20 m** Chapter: Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	9	mg/kg	1.32	11.883	mg/kg	0.00119 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1308-23-6	1	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %	<LOD
3	chromium { * chromium(III) oxide }		215-160-9	1308-38-9	27.9	mg/kg	1.462	40.777	mg/kg	0.00408 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	10.8	mg/kg	1.126	12.16	mg/kg	0.00122 %	✓	
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }	062-001-00-6			1	21	mg/kg	21	mg/kg	0.0021 %	✓	
6	mercury { mercury dichloride }	030-010-00-X	231-299-8	7487-94-7	<0.5	mg/kg	1.353	<0.877	mg/kg	<0.0000677 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]	16.5	mg/kg	1.579	26.062	mg/kg	0.00261 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8			<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
9	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]	60.9	mg/kg	2.469	150.38	mg/kg	0.015 %	✓	
10	boron { * boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		1.2	mg/kg	13.43	16.116	mg/kg	0.00161 %	✓	
11	pH		pH		8.3	pH		8.3	pH	8.3 pH		
12	phenol	604-001-00-2	203-632-7	108-95-2	<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
13	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
14	acenaphthylene	205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
15	acenaphthene	201-489-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
16	fluorene	201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
17	phenanthrene	201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
18	anthracene	204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
19	fluoranthene	205-912-4	208-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
20	pyrene	204-927-3	128-09-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
21	benzo[a]anthracene	601-033-00-9	200-280-6		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
22	chrysene	601-048-00-0	205-923-4		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
23	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
24	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
26	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
27	dibenz[a,h]anthracene	601-041-00-2	200-161-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
28	benzo[ghi]perylene	205-883-8	161-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
Total:										0.0285 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Classification of sample: WS07

☉ **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **WS07** LoW Code: **17: Construction and Demolition Wastes (including excavated soil from contaminated sites)**
Sample Depth: **0.00 - 0.20 m** Chapter: **17 05 04 (Soil and stones other than those mentioned in 17 05 03)**
Entry:

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	9.7	mg/kg	1.32	12.807	mg/kg	0.00128 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1308-23-6	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %		<LOD
3	chromium { * chromium(III) oxide }	215-160-9	1308-38-9		25	mg/kg	1.462	36.539	mg/kg	0.00365 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	13.3	mg/kg	1.126	14.974	mg/kg	0.0015 %	✓	
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }	062-001-00-6			20.4	mg/kg		20.4	mg/kg	0.00204 %	✓	
6	mercury { mercury dichloride }	030-010-00-X	231-299-8	7487-94-7	<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]	14.2	mg/kg	1.579	22.429	mg/kg	0.00224 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8			<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
9	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]	55.4	mg/kg	2.469	136.799	mg/kg	0.0137 %	✓	
10	boron { * boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		1.2	mg/kg	13.43	16.116	mg/kg	0.00161 %	✓	
11	pH		pH		6.8	pH		6.8	pH	6.8 pH		
12	phenol	604-001-00-2	203-632-7	108-95-2	<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
13	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
14	acenaphthylene	205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene	201-489-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
16	fluorene	201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
17	phenanthrene	201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
18	anthracene	204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
19	fluoranthene	205-912-4	208-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
20	pyrene	204-927-3	128-09-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
21	benzo[a]anthracene	601-033-00-9	200-280-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
22	chrysene	601-048-00-0	205-923-4		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
23	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
24	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
26	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	dibenz[a,h]anthracene	601-041-00-2	200-161-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
28	benzo[ghi]perylene	205-883-8	161-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
Total:								0.0266 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Classification of sample: WS07[2]

 **Non Hazardous Waste**
Classified as 17 05 04
in the List of Waste

Sample details

Sample Name: **WS07[2]** LoW Code: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth: **0.20 - 0.60 m** Chapter: Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 0% Dry Weight Moisture Correction applied (MC)

#	Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number									
1	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3	9.2	mg/kg	1.32	12.147	mg/kg	0.00121 %	✓	
2	cadmium { cadmium sulfide }	048-010-00-4	215-147-8	1308-23-6	<0.5	mg/kg	1.285	<0.643	mg/kg	<0.00005 %		<LOD
3	chromium { * chromium(III) oxide }	215-160-9	1308-38-9		29.1	mg/kg	1.462	42.531	mg/kg	0.00425 %	✓	
4	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1	10.6	mg/kg	1.126	11.934	mg/kg	0.00119 %	✓	
5	lead { * lead compounds with the exception of those specified elsewhere in this Annex }	062-001-00-6			15.6	mg/kg		15.6	mg/kg	0.00156 %	✓	
6	mercury { mercury dichloride }	030-010-00-X	231-299-8	7487-94-7	<0.5	mg/kg	1.353	<0.677	mg/kg	<0.0000677 %		<LOD
7	nickel { nickel dihydroxide }	028-008-00-X	235-008-5 [1] 234-348-1 [2]	12054-48-7 [1] 11113-74-9 [2]	17.3	mg/kg	1.579	27.325	mg/kg	0.00273 %	✓	
8	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8			<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
9	zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]	44.1	mg/kg	2.469	108.896	mg/kg	0.0109 %	✓	
10	boron { * boron tribromide/trichloride/trifluoride (combined) }		10294-33-4, 10294-34-5, 7637-07-2		0.8	mg/kg	13.43	10.744	mg/kg	0.00107 %	✓	
11	pH		pH		7.1	pH		7.1	pH	7.1 pH		
12	phenol	604-001-00-2	203-632-7	108-95-2	<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
13	naphthalene	601-052-00-2	202-049-5	91-20-3	<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD

#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	CLP index number	EC Number	CAS Number							
14	acenaphthylene	205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
15	acenaphthene	201-489-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
16	fluorene	201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
17	phenanthrene	201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
18	anthracene	204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
19	fluoranthene	205-912-4	208-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
20	pyrene	204-927-3	128-09-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
21	benzo[a]anthracene	601-033-00-9	200-280-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
22	chrysene	601-048-00-0	205-923-4		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
23	benzo[b]fluoranthene	601-034-00-4	205-911-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
24	benzo[k]fluoranthene	601-036-00-5	205-916-6		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
25	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
26	indeno[123-cd]pyrene	205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	dibenz[a,h]anthracene	601-041-00-2	200-161-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
28	benzo[ghi]perylene	205-883-8	161-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
Total:								0.0236 %		

Key

- User supplied data
- Determinand values ignored for classification, see column 'Conc. Not Used' for reason
- Determinand defined or amended by HazWasteOnline (see Appendix A)
- Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
- <LOD Below limit of detection
- CLP: Note 1 Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

* chromium(III) oxide (EC Number: 215-160-9, CAS Number: 1308-38-9)

Conversion factor: 1.462

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Repr. 1B H360FD , Skin Sens. 1 H317 , Resp. Sens. 1 H334 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302 , Acute Tox. 4 H332

* lead compounds with the exception of those specified elsewhere in this Annex

CLP index number: 082-001-00-6

Description/Comments: Least-worst case: Lead REACH Consortium considers some lead compounds Carcinogenic category 2B

Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)

Additional Hazard Statement(s): Carc. 2 H351

Reason for additional Hazard Statement(s)/Risk Phrase(s):

03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium

www.reach-lead.eu/substanceinformation.html. Review date 29/09/2015

* boron tribromide/trichloride/trifluoride (combined) (CAS Number: 10294-33-4, 10294-34-5, 7637-07-2)

Conversion factor: 13.43

Description/Comments: Combines the hazard statements and the average of the conversion factors for boron tribromide, boron trichloride and boron trifluoride

Data source: N/A

Data source date: 06 Aug 2015

Hazard Statements: Skin Corr. 1B H314 , Skin Corr. 1A H314 , Acute Tox. 2 H300 , Acute Tox. 2 H330 , EUH014

* pH (CAS Number: PH)

Description/Comments: Appendix C4

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

* acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 1 H310 , Acute Tox. 1 H330 , Acute Tox. 4 H302

* acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 2 H411 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

* fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

* phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Skin Irrit. 2 H315 , Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Carc. 2 H351 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Acute Tox. 4 H302

* anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 17 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Skin Sens. 1 H317 , Skin Irrit. 2 H315 , STOT SE 3 H335 , Eye Irrit. 2 H319

✱ **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , Acute Tox. 4 H302

✱ **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 21 Aug 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400 , STOT SE 3 H335 , Eye Irrit. 2 H319 , Skin Irrit. 2 H315

✱ **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 06 Aug 2015

Hazard Statements: Carc. 2 H351

✱ **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015

Data source: <http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database>

Data source date: 23 Jul 2015

Hazard Statements: Aquatic Chronic 1 H410 , Aquatic Acute 1 H400

✱ **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4

Description/Comments:

Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)

Additional Hazard Statement(s): Carc. 2 H351

Reason for additional Hazards Statement(s)/Risk Phrase(s):

03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

✱ **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: Aquatic Chronic 2 H411 , Repr. 2 H361d , Carc. 1B H350 , Muta. 1B H340 , STOT RE 2 H373 , Asp. Tox. 1 H304 , Flam. Liq. 3 H226

Appendix B: Rationale for selection of metal species

arsenic {arsenic trioxide}

Worst case species based on risk phrases

cadmium {cadmium sulfide}

Worst case species based on risk phrases

chromium {chromium(III) oxide}

Total Chromium excluding Chromium VI

copper {dicopper oxide; copper (I) oxide}

Most likely common species

lead {lead compounds with the exception of those specified elsewhere in this Annex}

Chromium VI below detection

mercury {mercury dichloride}

Worst case species based on risk phrases

nickel {nickel dihydroxide}

Worst case species based on risk phrases

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Worst case species based on risk phrases

zinc {zinc sulphate}

Chromium VI below detection levels so insufficient to form compound zinc chromate

boron {boron tribromide/trichloride/trifluoride (combined)}

Worst case species based on risk phrases

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018

HazWasteOnline Classification Engine Version: 2019.197.3909.7942 (16 Jul 2019)

HazWasteOnline Database: 2019.197.3909.7942 (16 Jul 2019)

This classification utilises the following guidance and legislation:

WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018

CLP Regulation - Regulation 1272/2008/EC of 16 December 2008

1st ATP - Regulation 790/2009/EC of 10 August 2009

2nd ATP - Regulation 286/2011/EC of 10 March 2011

3rd ATP - Regulation 618/2012/EU of 10 July 2012

4th ATP - Regulation 487/2013/EU of 8 May 2013

Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013

5th ATP - Regulation 944/2013/EU of 2 October 2013

6th ATP - Regulation 605/2014/EU of 5 June 2014

WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014

Revised List of Wastes 2014 - Decision 2014/955/EU of 18 December 2014

7th ATP - Regulation 2015/1221/EU of 24 July 2015

8th ATP - Regulation (EU) 2016/918 of 19 May 2016

9th ATP - Regulation (EU) 2016/1179 of 19 July 2016

10th ATP - Regulation (EU) 2017/776 of 4 May 2017

HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017

13th ATP - Regulation (EU) 2018/1480 of 4 October 2018

POPs Regulation 2004 - Regulation 850/2004/EC of 29 April 2004

1st ATP to POPs Regulation - Regulation 756/2010/EU of 24 August 2010

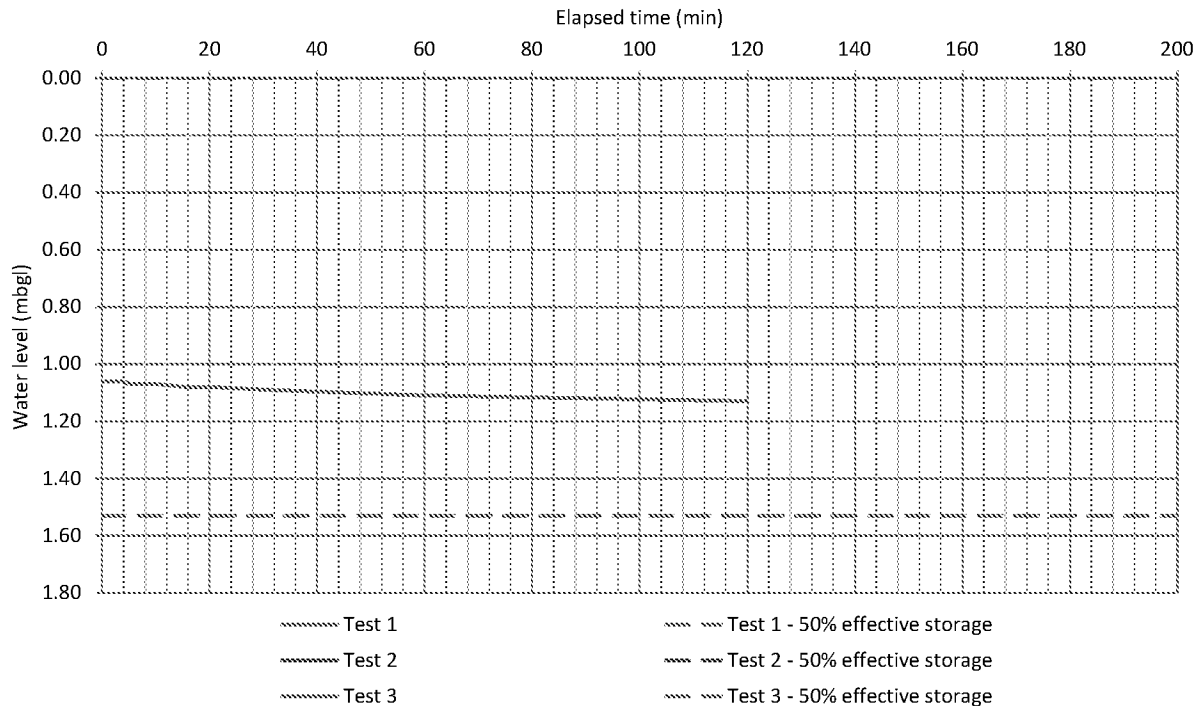
2nd ATP to POPs Regulation - Regulation 757/2010/EU of 24 August 2010

Appendix I – Infiltration Results



Infiltration Test Results in Accordance with BRE Digest 365:2016

Project Name:		Woodgate				Project ID:		CS-J-0132								
Client:		Pye Homes														
Hole ID:		TP01		Test Date:		25/06/2019		Logged:	JF	Checked:	SB					
Test 1		Test 2		Test 3		Soakaway Dimensions:				Length (m)		2.30				
Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)					Width (m)		0.70				
0	1.06	0		0						Test 1 - Depth (m)		2.00				
1	1.06	1		1						Test 2 - Depth (m)						
2	1.06	2		2						Test 3 - Depth (m)						
3	1.06	3		3						Test 1	Test 2	Test 3				
4	1.06	4		4		Depth to water at start of test (m)				1.06						
5	1.07	5		5		Depth to water at end of test (m)				1.13						
10	1.07	10		10		Total head drop (m)				0.07						
15	1.08	15		15		Depth to water at 75% level (m)				1.30						
20	1.08	20		20		Depth to water at 50% level (m)				1.53						
30	1.09	30		30		Depth to water at 25% level (m)				1.77						
45	1.10	45		45		Computed Internal Surface Area A_{p50} (m ²)				1.61						
60	1.11	60		60						Base area of pit (m ²)	4.43					
120	1.13	120		120						Effective Storage Volume V_{p75-25} (m ³)	0.76					
180		180		180												
240		240		240		Elapsed time at 75% level (mins)				403						
300		300		300						Elapsed time at 25% level (mins)				1209		
360		360		360												
420		420		420		50% discharge in 24 Hours				Yes						
										Soil infiltration rate f (m/s)				N/a		
										Design soil infiltration rate f (m/s)				n/a (not BRE365 compliant)		



Remarks:

Where highlighted in red, calculations have been inferred from the graph.