



Persimmon Homes East Midlands

High Road, Weston

Phase 2 Geo-environmental and Geotechnical Site
Investigation

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RSK GENERAL NOTES

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Revision control sheet

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Rev 00	26 th March 2020	First issue
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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK Environment Ltd.

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1 INTRODUCTION

1.1 Commissioning

RSK Environment Limited (RSK) was commissioned by Persimmon Homes East Midlands (the Client) to carry out a Phase 2 Geoenvironmental and Geotechnical Site Investigation of the land at High Road, Weston. The project was carried out to an agreed brief as set out in RSK's proposal (ref. 252231-T01 (00), dated 21st August 2019).

This report is subject to the RSK service constraints given in Appendix A and limitations that may be described through this document.

1.2 Proposed development

The site in question is being considered for development for primarily residential use. The planned layout of the site is shown as Figure 3.

1.3 Objectives

The objective of the work is:

- to identify any land contamination and/or geotechnical constraints to the proposed development and to support discharge of relevant planning conditions and relevant building control requirements
- to identify the need for any additional investigation works to demonstrate that the site is suitable for its proposed use

1.4 Scope of works

The scope of this assessment has been developed in accordance with relevant British Standards and authoritative technical guidance as referenced through the report. The assessment of the contamination status of the site is in line with the technical approach presented in CLR 11 Model Procedures for the Management of Land Contamination (Environment Agency, 2004) and in general accordance with BS 10175: 2011 + A2 2017 (BSI, 2017). It is also compliant with relevant planning policy and guidance.

The scope of the intrusive investigation has been designed in line with the recommendations of BS5930: 2015 Code of practice for ground investigations (BSI, 2016), which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. It has also been developed in general accordance with BS 10175: 2011 + A2 2017. Ground gas assessment has been undertaken in general accordance with BS8756: 2013 and BS 8485:2015+A1:2019.

A brief summary of relevant legislation and policy relating to contaminated land is given in Appendix C.

The scope of works for the assessment has included the following:

Intrusive Investigation

- design and implementation of an intrusive investigation, in situ testing, soil sampling, laboratory geo-environmental and geotechnical testing, groundwater and ground gas monitoring of installed boreholes;
- interpretation of data to develop a refined conceptual site model (CSM);
- generic quantitative risk assessment (GQRA) to evaluate potentially complete contaminant linkages identified in the refined CSM;
- identification of the need for further action, e.g. supplementary intrusive investigations/ monitoring, remediation works or other mitigation, if any;
- interpretation of ground conditions and geotechnical data to provide preliminary recommendations with respect to foundations and infrastructure design;
- preliminary assessment of the potential waste classification (hazardous / non-hazardous) implications of soil arisings; and
- preparation of this factual and interpretative report with recommendations for further works.

1.5 Existing reports

RSK has previously prepared a Phase 1 Desk Study report for the site (ref.: 252234-01 (00), dated November 2019); which should be considered in conjunction with this report.

1.6 Limitations

The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.

Asbestos is often present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of the site indicates that asbestos may be present in soils and could be encountered during more extensive ground works.

Preliminary geotechnical recommendations are presented and these should be verified in a Geotechnical Design Report once proposed construction and structural design proposals are confirmed.

2 SITE DETAILS

2.1 Site location

Site location details are presented in **Error! Reference source not found.** and a site location plan is provided on Figure 1.

Table 1 Site location details

Site name	Land north of High Road
Full site address and postcode	High Road, Weston, Spalding, PE12 6RQ
National Grid reference	528852, 324944

2.2 Site description

The site boundary and current site layout are shown on Figure 2. The site covers an area of approximately 6.2 hectares and is currently used as agricultural farmland.

2.3 Surrounding land uses

The site is located in Weston, within a predominantly residential setting. Immediate surrounding land uses are described in **Error! Reference source not found..**

Table 2 Surrounding land uses

North	Drainage ditches, further agricultural fields and the A151
East	Drainage ditch and residential dwellings
South	High Road with residential dwellings beyond
West	Residential dwelling with agricultural fields beyond

2.4 Development plans

The proposed layout of the site, at the time of preparing this report, is shown as Figure 3.

The current proposed development comprises of approximately 150 low-rise residential dwellings with associated private gardens and parking. In addition, a play area is proposed to be constructed at the centre of the site and a pond within the north western corner of the site.

3 SITE INVESTIGATION STRATEGY & METHODOLOGY

3.1 Introduction

RSK carried out intrusive investigation works between 17th and 19^h February 2020, and subsequent monitoring of boreholes between 24th February and 16th March 2020.

3.2 Objectives

The specific objectives of the investigation were as follows:

- to establish the ground conditions underlying the site including the extent and thickness of any made ground;
- to investigate specific potential sources of contamination identified in initial CSM;
- to determine the ground gas regime underlying the site; and
- to assess geotechnical properties of the shallow soils.

3.3 Selection of investigation methods

The techniques adopted for the investigation were chosen with consideration of the objectives and site constraints, which are described below.

Window sample boreholes were used to accurately log the shallow soil profile, obtain representative samples for environmental and geotechnical laboratory analysis, facilitate in-situ testing and to install monitoring wells.

Trial pits were used to accurately log the upper strata in non-targeted locations beneath the site, collect samples for geotechnical and environmental analysis, and to facilitate in-situ testing.

Prior to conducting intrusive works, utility service plans were obtained and buried service clearance undertaken in line with RSK's health and safety procedures. Copies of statutory service records obtained by RSK as part of the agreed scope of works are contained in Appendix F.

3.4 Investigation strategy

The ground investigation was carried out using intrusive ground investigation techniques in general accordance with the recommendations of BS5930: 2015 Code of practice for ground investigations, which maintains compliance with BS EN 1997-1 and 1997-2 and their related standards. Whilst every attempt was made to record full details of the strata encountered in the boreholes, techniques of hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks.

Details of the investigation locations, installations and rationale are presented in Table 3. 17no. machine excavated trial pits were dug to a maximum depth of 3.50m bgl before being backfilled with arisings. 6no. window sampler boreholes were drilled to a maximum depth of 5.45 m bgl.

Table 3 Exploratory hole and monitoring well location rationale

Investigation type	Number	Designation	Monitoring well installation	Rationale examples below
Boreholes by windowless sampling methods	6	WS01 to WS06	Gas/ groundwater	To determine the contamination status and geotechnical properties of the ground beneath the site and to install additional dual purpose groundwater and gas monitoring wells
Trial-pits excavated mechanical excavator	17	TP01 to TP14, SA01 to SA3	n/a	To accurately log the upper strata in non-targeted locations across the site; and to facilitate in-situ soakage and CBR testing

3.4.1 Implementation of investigation works

The exploratory holes were logged by an engineer in general accordance with the recommendations of BS 5930:2015 (which incorporates the requirements of BS EN ISO 14688-1, 14688-2 and 14689-1).

The monitoring well construction and associated response zones are detailed on the exploratory hole records in Appendix D.

The soil sampling and analysis strategy was designed to characterise each encountered soil strata, permit an assessment of the potential contaminant linkages identified and investigate the geotechnical characteristics of the shallow ground profile. In addition, samples were taken to allow for geo-environmental and geotechnical testing to be undertaken.

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite required. They were dispatched to the laboratory in cool boxes under chain of custody documentation. Samples were stored in accordance with the RSK quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination.

3.5 Monitoring programme

3.5.1 Ground gas monitoring

In line with the initial CSM, response zones were installed to target the sources or pathways as detailed within the previous Desk Study report. Dual gas taps were installed in line with BS8576.

4no. monitoring rounds have been undertaken to provide data to support refining of the CSM. The number of monitoring rounds undertaken is in general accordance with the decision matrix presented as Figure 6 of BS8576.

An infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO₂), methane (CH₄) and oxygen (O₂) in percentage by volume, while hydrogen sulphide (H₂S) and carbon monoxide (CO) were recorded in parts per million. Initial and steady state concentrations were recorded.

The atmospheric pressure before and during monitoring, together with the weather conditions, were recorded.

All ground gas monitoring results together with the temporal conditions are contained within Appendix E. Equipment calibration certificates are available on request.

3.5.2 Groundwater monitoring and sampling

4no. rounds of groundwater monitoring were undertaken during the reporting period. Depths to groundwater were recorded using an electronic dip meter on each of the return monitoring visits.

3.6 Laboratory testing

Laboratory testing was undertaken at a UKAS accredited laboratory with ISO17025 and MCERTS accredited test methods were specified where applicable for contamination testing and as shown in the laboratory test certificates appended.

3.6.1 Chemical analysis of soil samples

The soil sampling strategy was designed to characterise the shallow soil profile beneath the site.

The programme of chemical tests undertaken on soil samples obtained from the intrusive investigation is presented in Table 4 with the laboratory testing results contained in Appendix F.

Table 4 Summary of chemical testing of soil samples

Tests undertaken	No. of tests
Metals Suite - As Cd tCr, CrVI Pb Hg Se Cu Ni Zn	10
Polycyclic aromatic hydrocarbons (PAHs)	10
TPHCWG, BTEX and MTBE	10
pH	10
Asbestos screen	10
Pesticides (OCP and OPP)	5
Herbicides (ONP pesticides)	5
Total organic carbon (TOC)	10
Metals (leachable)	10

3.6.2 Geotechnical analysis of soils

Where appropriate disturbed, bulk and undisturbed soil samples were taken for geotechnical classification testing with the depth and nature of samples detailed within the exploratory hole records.

Where appropriate, testing was undertaken in accordance with BS 1377:1990 Method of Tests for Soils for Civil Engineering Purposes or, where superseded, by the relevant part of BS EN ISO 17892:2014 Geotechnical investigation and testing - Laboratory Testing of Soil. Tests carried out in order to classify the concrete class required on-site have been undertaken following the procedures within BRE SD1:2005.

The programme of geotechnical tests undertaken on samples obtained from the intrusive investigation is presented in Table 5. The results and UKAS accreditation of tests methods are shown in Appendix G.

Table 5 Summary of geotechnical testing undertaken

Tests undertaken	No. of tests
Moisture content	12
Atterberg limits	12
Water soluble sulphate and pH	10

3.6.3 Infiltration testing

Infiltration tests were carried out in SA01, SA02 and SA03, to establish the infiltration rate of the shallow strata. The tests were carried out generally in accordance with the method described in BRE Digest 365 (BRE, 2016). This involved filling the pits with water from a tanker and recording the drop in water level with time as the water soaked into the ground.

Copies of the testing records are included in Appendix D.

4 SITE INVESTIGATION FACTUAL FINDINGS

The results of the intrusive investigation and subsequent geo-environmental and geotechnical laboratory analysis undertaken are detailed below.

4.1 Ground conditions encountered

The descriptions of the strata encountered, notes regarding visual or olfactory evidence of contamination, list of samples taken, field observations of soil and groundwater, in-situ testing and details of monitoring well installations are included on the exploratory hole records presented in Appendix D.

The exploratory holes identified a soil profile comprising a limited thickness of agricultural topsoil over Tidal Flat Deposits.

This appears to confirm the stratigraphical succession described within the preliminary CSM.

For the purpose of discussion, the ground conditions encountered during the fieldworks are summarised in Table 6 with the strata discussed in subsequent subsections.

Table 6 General succession of strata encountered

Stratum	Exploratory holes encountered	Depth to top of stratum (m bgl)	Proven thickness (m)
Agricultural topsoil	All	Ground level	0.20 to 0.40
Tidal Flat Deposits	All	0.20 to 0.40	Proven to full depth of investigation (5.45m bgl)

4.1.1 Agricultural topsoil

Widespread made ground was not encountered at the site. Whilst rare fragments of brick and tile were recorded at the surface of a number of the trial pits, this is considered to be a product of recent tracking of vehicles rather than representative of 'made ground'.

On this basis, a surface layer of agricultural type topsoil was recorded at all locations across the rear of the site, ranging in thickness from 0.20m to 0.40m and typically comprising brown sandy silt with rootlets and occasional fragments of brick and ceramic.

4.1.2 Tidal Flat Deposits

Superficial Tidal Flat Deposits were encountered beneath the agricultural topsoil layer across the entirety of the site and were proven to the full depth of investigation (5.45m bgl).

Based on the site descriptions and laboratory and in-situ tests carried out this layer can generally be described as normally consolidated sandy clayey silt and silty fine sand, with subordinate sandy silty clay layers.

Pockets of organic material, and a frequent organic odour, were also recorded within this stratum.

A summary of the in-situ and laboratory test results recorded in the stratum are presented in Table 7.

Table 7 Summary of in-situ and laboratory test results for the Tidal Flat Deposits

Soil parameters	Min. Value	Max. Value	Reference
Moisture content (%)	24	60	Appendix G
Liquid limit (%)	38	77	Appendix G
Plasticity limit (%)	22	46	Appendix G
Plasticity index (%)	14	35	Appendix G
Modified plasticity index (%)	14	35	Appendix G
Plasticity term	Intermediate	Very high	Appendix G
Volume change potential	Low	Medium	Appendix G
SPT 'N' values	0 (self weight)	6	Appendix D
Undrained shear strength inferred from SPT 'N' values (kN/m ²)*	0	25	Appendix G
Consistency term from field description	Very soft	Soft	Appendix G
Density term	Very loose	Loose	Appendix G
Notes: *derived using a Stroud Factor of 4.2			

4.1.3 Visual/olfactory evidence of soil contamination

Visual or olfactory evidence of potential contamination was not encountered at the site, nor was any evidence of anthropogenic materials or made ground.

4.2 Groundwater

4.2.1 Groundwater encountered during intrusive works

Groundwater was encountered during the intrusive investigation works as detailed on the logs in Appendix D.

4.2.2 Groundwater encountered during monitoring

Rest groundwater levels recorded during the monitoring programme are summarised in Table 8 based on the data provided in Appendix E.

Table 8 Summary of groundwater monitoring results

Monitoring well	Response zone stratum	Depth to water (m BGL)
WS02	TFD	0.05 – 1.83
WS03A	TFD	0.00 – 1.77
WS04A	TFD	0.89 – 2.39
WS05	TFD	0.10 – 1.88
WS06	TFD	0.25 – 1.26

It should be noted that groundwater levels might fluctuate for a number of reasons including seasonal variations. On-going monitoring would be required to establish both the full range of conditions and any trends in groundwater levels.

4.3 Chemical laboratory results

Certificates of chemical laboratory analysis are presented in Appendix F; and the results discussed within Section 5, below.

4.4 Geotechnical laboratory results

The results of the geotechnical testing are discussed in Section 6 and presented in Appendix G.

4.5 Ground gas monitoring

The results of the ground gas monitoring and testing carried out are given in Appendix E and discussed in Section 5.

5 GEO-ENVIRONMENTAL ASSESSMENT

5.1 Refinement of initial CSM

Potentially complete contaminant linkages with a potential risk of moderate to low, identified within the initial CSM as requiring further consideration, are as follows:

- Ground gas produced by either the naturally occurring organic soils or from the made ground within the potentially infilled pond (off-site), affecting both future occupants of the site and future buildings and services; and
- Direct contact between future residential site users and residual pesticide / herbicide contamination within the shallow soils.

The initial CSM envisaged that the site would be directly underlain by the superficial Tidal Flat Deposits, with no significant made ground. This appears to have generally been confirmed by the intrusive investigation; with a nominal layer of agricultural topsoil being encountered over Tidal Flat deposits throughout.

Visual or olfactory evidence of potential gross contamination or widespread made ground was not encountered at the site.

Whilst rare fragments of brick, tile and plastic were recorded at the surface of a number of the trial pits, this is considered to be a product of recent tracking of vehicles rather than representative of 'made ground'.

Based on the above, no potentially complete pollutant linkages have been added or removed to the preliminary CSM.

5.2 Linkages for assessment

In line with CLR11 (Environment Agency, 2004), there are two stages of quantitative risk assessment, generic (GQRA) and detailed (DQRA). The GQRA comprises the comparison of soil, groundwater, soil gas and ground gas results with generic assessment criteria (GAC) that are appropriate to the linkage being assessed. This comparison can be undertaken directly against the laboratory results or following statistical analysis depending upon the sampling procedure that was adopted.

Following the refinement of the initial CSM, the potentially complete contaminant linkages that require further assessment and the methodology of assessment are presented in Table 9.

Table 9 Linkages for GQRA

Potentially relevant contaminant linkage	Assessment method
1. Direct contact (oral, dermal and inhalation exposure with impacted soil, soil vapour and dust by future residents)	Human health GAC in Appendix H for a proposed residential end use with home-grown produce since the proposed end use includes residential gardens.

Potentially relevant contaminant linkage	Assessment method
2. Inhalation exposure of future residents to asbestos fibres	Qualitative assessment based on the asbestos minerals present, their form, concentration, location and the nature of the proposed development.
3. Concentrations of methane and carbon dioxide in ground gas entering and accumulating in enclosed spaces or small rooms in new buildings, which could affect future site users.	Gas screening values (GSV) have been calculated using maximum methane and carbon dioxide concentrations with maximum flow rates recorded at the site. The GSV have been compared with the revised Wilson and Card classification presented in BS8485.

The analysis of laboratory results relating to soil samples submitted for testing, including leachate analysis, is included in the following sections.

5.3 Oral, dermal and inhalation exposure with impacted soil by future site users

End users of the site are defined as those who are exposed to sources of contamination on a regular and predictable basis. In the case of developments for a residential end use, the critical receptor is defined within SR3 as a 0 to 6-year-old female.

All results have been compared with the residential with home grown produce GAC. A soil organic matter (SOM) of 1% has been selected as a conservative means of assessment. The soil screening output spreadsheet is presented as Appendix K.

The results of the direct comparison indicate that within the agricultural topsoil and Tidal Flat Deposits, concentrations of contaminants are all below the relevant GAC. Concentrations of pesticides and herbicides were all below the Limit of Detection (LOD) except for Pendimethalin detected in TP06 at 0.2m at a concentration of 0.02mg/kg. There is no UK GAC available for this compound, however USEPA Region 3 RBCs provide a guideline value of 19400mg/kg for residential soils that can be used to ascertain whether a potential risk might exist. The concentration of Pendimethalin was significantly below the guideline value and as such it is considered that it does not represent a risk to human health.

It is therefore considered that a complete contaminant linkage is not associated with these strata.

5.4 Inhalation exposure of future occupants/site users to asbestos fibres

The visual inspection at the laboratory identified no materials suspected of potentially containing asbestos and the scheduled laboratory screening for asbestos found no detectable asbestos fibres within the samples obtained from the site.

5.5 Ground gas risk assessment

5.5.1 Appropriate guidance

The risks to development from ground gases have been assessed in accordance with BS8485:2015, which provides guidance on ground gas (methane and carbon dioxide) characterisation and hazard assessment, as well as a framework for the prescription of protection measures within new buildings.

The process involves characterising the gas hazard from combining the qualitative assessment of risk (using the conceptual site model) with ground investigation data so that a 'characteristic situation' (CS) can be derived for the site. Characteristic situations range from CS1 to CS6, the higher the CS the higher the hazard potential. Protection measures within new buildings can be prescribed using a point scoring system, taking in to consideration the CS and the proposed building type.

BS8485 indicates that the gas hazard can be characterised using the following methods:

- an empirical semi-quantitative approach using gas monitoring data to determine the 'characteristic situation' of the site (or zones of the site) and subsequent protective measures (Wilson and Card approach);
- an empirical semi-quantitative approach using TOC data to determine the 'characteristic situation' of the site (or zones of the site) and subsequent protective measures (CL:AIRE RB17 approach); or
- detailed quantitative assessment methodologies

For the purpose of this assessment, the first approach listed above has been used to characterise the gas hazard and provide advice on the protective measures likely to be required within new buildings at the site.

5.5.2 Summary of the refined conceptual site model for ground gas

In the assessment of risks and selection of appropriate mitigation measures, BS8485 highlights the importance of the conceptual model. In summary, potential sources of ground gas within influencing distance of the site identified within the initial CSM comprise:

- Ground gas produced by naturally occurring organic soils, affecting both future occupants of the site and future buildings and services.

This assessment has been undertaken to assess risks to building structures and proposed end users. The assessment has not taken into consideration the health and safety of construction workers. Risks may still be present to construction workers especially where works include the entry into excavations within the ground. Construction workers should undertake appropriate risk assessments and risks should be managed through health and safety procedures and safe systems of work.

The risk assessment has been undertaken based on the current understanding of the CSM.

5.5.3 Empirical semi-quantitative approach using borehole monitoring data (Wilson and Card approach)

5.5.3.1 Permanent gases – methane and carbon dioxide

The empirical semi quantitative approach using gas monitoring data is based on calculations of the gas screening value (GSV). BS8485 defines the GSV as the ‘flow rate (l/hr) of a specific hazardous gas representative of a site or zone, derived from assessment of borehole concentration and flow rate measurements and taking account of all other influencing factors, in accordance with a conceptual site model’.

Once derived for both methane and carbon dioxide the GSVs are compared to the thresholds presented in Table 2 of BS8485, so that a CS can be determined for the site, or a zone. It is important to note that the GSV thresholds are guideline values and not absolute. The GSV thresholds may be exceeded in certain circumstances, if the site conceptual model indicates it is safe to do so. Similarly, consideration of additional factors such as very high concentrations of methane, should lead to consideration of the need to adopt a higher risk classification than the GSV threshold indicates.

The results of the ground gas monitoring and testing undertaken at the site are given in Appendix E.

The maximum results recorded are presented in Table 10. It should be noted that during that during the 3rd gas monitoring visit monitoring wells (WS02, WS04A and WS06) were measured twice, initial monitoring was completed and then the wells were purged of groundwater and further measurements of flow and ground gas undertaken after 30mins. This was undertaken as it was noted that the groundwater level was very shallow in some of the standpipes and that this would have an effect on the measured conditions.

The range of atmospheric pressure over the 4no. monitoring rounds completed was 990 to 1023mbar.

Table 10 Summary of ground gas monitoring results

Borehole	Response zone/ stratum	Probable source(s) of ground gas	Number of monitoring visits	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Flow rate (l/hr)	Water level (m b TOC)	Atmospheric pressure (mbar)
WS02	3 to 5 (TFD)	TFD	4	25.3	5.1	11.4-20.9	4.7 (0.1)	0.05-1.83 (4.00*)	991-1023
WS03A	3 to 5 (TFD)	TFD	4	0.4	1.6	18.5-20.9	0.1	0.89-2.39	991-1023
WS04A	3 to 5 (TFD)	TFD	4	2.2	3.9	17.7-20.9	2.3	0.89 – 2.89	991-1023

Borehole	Response zone/ stratum	Probable source(s) of ground gas	Number of monitoring visits	Methane (%)	Carbon dioxide (%)	Oxygen (%)	Flow rate (l/hr)	Water level (m b TOC)	Atmospheric pressure (mbar)
								(4.39*)	
WS05	3 to 5 (TFD)	TFD	4	2.1	2.4	5.6-20.9	0.4	0.1-1.88	990-1022
WS06	3 to 5 (TFD)	TFD	4	2.7	3.5	16.9-21	0.6	0.25-1.26 (4.73*)	994-1022
Note: TFD – Tidal Flat Deposits Maximum concentrations and flows are presented in this table. *= water level after purging and before recovery									

As can be seen within the table above there was significant variation in the flow measurements undertaken. In regards to the high flow recorded within WS02 (4.7l/hr) during the 3rd monitoring event the groundwater level was measured at only 0.05m bgl and as such the flow recorded is not considered to be accurate as the shallow water level will have affected the flow measurement device. When the groundwater level was deeper (between 0.35mbgl and 4.00m bgl (30mins after purging)) flow measurements were recorded at a maximum of 0.1 l/hr and are considered more representative of the flows within that well. As such the next highest flow of 2.3l/hr recorded in WS04A has been used for the calculation of the GSV. This result is also potentially artificially high due to being recorded after purging of the well had been completed and potentially affected by groundwater recovery but is considered to add a level of conservatism to the assessment.

Methane was detected at high concentrations within WS02 (up to 25.3%) during the first and fourth monitoring events whilst in other monitoring wells methane was detected up to 2.7%. It is noted that during these two monitoring events the response zone was submerged and it is likely that the methane detected was caused by dissolved methane released by the groundwater and as such is likely to be an overestimation of the actual amount of methane that would be released from the ground. As noted in RB17 natural soils high in organics contain methane as trapped gas in pockets that have been generated historically and are not released quickly and will have limited transport within soils. This is also evidenced by the presence of lower concentrations of methane detected within the other wells onsite. For the purposes of conservatism the maximum concentration detected in WS02 has been used in the initial calculation of the GSV to determine whether the classification is consistent with the recommendations of RB17.

BS8485 suggests that the GSV should be derived by multiplying the worse credible (worst case) recorded flow value in any standpipe in that strata or zone with the maximum gas

concentration in any other standpipe in that strata or zone. Further guidance is given in BS8485 section 6.3.

Considering the assessment of the gas monitoring results the following maximum GSVs have been derived for the site.

- methane GSV (0.582 l/hr) = methane concentration (25.3 % v/v)/100 x flow rate (2.3 l/hr)
- Carbon Dioxide GSV (0.12 l/hr) = carbon dioxide concentration (5.1 % v/v)/100 x flow rate (2.3 l/hr).

Based on the GSVs derived and the method for determining the CS presented within Table 2 of BS8485, the site has been given a characterisation of CS2.

Considering that the source of the ground gas identified is from naturally occurring organic soils (Tidal Flat Deposits) the CS2 classification is consistent with that noted in RB17.

Given the low atmospheric conditions observed during the first visit and the conservatism within the assessment, the data obtained is considered to be a robust assessment of worst case conditions.

5.5.3.2 Trace gases

In addition to the above, concentrations of carbon monoxide were noted within some of the wells. These concentrations reduced significantly by the fourth visit and are likely to represent a rapid increase in microbial activity due to the introduction of oxygen to deep soils that would otherwise not be available. The activity initially increased and results in the production of carbon monoxide, and then as the activity reduces, the concentrations of carbon monoxide reduce. Given that the monitoring well is an artificial environment, the carbon monoxide recorded is not considered representative of site conditions and is not considered further in this assessment.

5.5.4 Implications

Based on the current understanding of the conceptual site model and the assessment undertaken, the site has been classified as CS2.

Ground gas protective measures within buildings include a combination of: structural barriers, ventilation systems and gas resistant membranes. Section 7 of BS8485 provides a point scoring system for ground gas protective measures, whereby different barriers (i.e. structural barriers, ventilation systems, and gas resistant membranes) are assigned different point scores. A combination of protective measures (minimum of 2 types) can be used to achieve a total minimum gas protection point score, the total minimum point score required is determined based on the building type (see Table 3 in BS8485) and the risk classification.

Considering the CS determined for the site (CS2) and the proposed buildings type (Type A) a minimum point score (see Table 4 in BS8485) of 3.5 will be required to achieve an adequate level of protection. As an example, a passive subfloor dispersal layer with a good performance (score of 1.5) and a proprietary gas resistant membrane (score of 2) would provide a total point score of 3.5, which would be considered adequate for the proposed development.

It should be noted that for membranes to achieve a point score greater than zero they should be:

- sufficiently impervious to methane and carbon dioxide
- capable after installation of providing a complete barrier to the entry of the relevant gas
- sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions
- sufficiently strong to withstand in service stresses (e.g. due to ground settlement if placed below a floor slab)
- sufficiently strong to withstand the installation process and following construction activities until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, and dropping tools)
- chemically resistant to degradation by other contaminants that might be present
- verified in accordance with CIRIA C735.

6 PRELIMINARY WASTE ASSESSMENT

In accordance with the definition provided in the Waste Framework Directive (WFD), materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Naturally occurring soils are not considered waste if reused on the site of origin for the purposes of development. Soils such as made ground that are not of clean and natural origin (irrespective of whether they are contaminated or not) and other materials such as recycled aggregate, do not become waste until the criteria above are met. Further background information is provided in Appendix C.

Excavation arisings from the development may therefore be classified as waste if surplus to requirements or unsuitable for reuse. The following assessments assume the material tested is classified subsequently as waste.

RSK recommends that a Sampling Plan be prepared to support any waste classifications and hazardous waste assessments, prior to any material being excavated. Given the level of data obtained, scale of the development and heterogeneity of the site soils, the following assessment should be considered indicative and further assessment should be undertaken following the preparation of a waste sampling plan.

6.1 Hazardous waste assessment

Technical Guidance WM3 (EA, 2018) sets out in Appendix D requirements for waste sampling. It is a legal requirement to correctly assess and classify waste. The level of sampling should be proportionate to the volume of waste and its heterogeneity. The preliminary assessment provided below is based only upon the available sample results and may not be sufficient to adequately classify the waste.

6.1.1 Chemical contaminants

EnviroLab, an RSK company, has developed a waste soils characterisation assessment tool (HASWASTE), which follows the guidance within Technical Guidance WM3. The analytical results have been assessed using this tool to assess the hazardous properties to support potential off-site disposal of materials in the future. Note that it is ultimately for landfills to confirm what wastes they are able to accept within the constraints of their permit.

No samples were found to have hazardous properties based on this assessment. This suggests that if applicable the waste would require disposal at a suitably permitted inert or non-hazardous waste landfill.

6.1.2 Asbestos within waste soils

Technical Guidance WM3 requires that within a mixed waste the separately identifiable wastes be assessed separately.

For instance, where waste soil contains identifiable pieces of asbestos (visible to the naked eye) the asbestos should, where feasible, be separated from the soil and classified separately. This should be disposed of within a hazardous, stable non-reactive hazardous waste landfill or a special cell in a non-hazardous waste landfill.



Samples of potential asbestos containing material were collected from site and analysed for the presence of asbestos, the results of which are presented in Appendix F. Analysis confirmed that asbestos is not present within any of the samples screened.

7 GEOTECHNICAL ASSESSMENT

7.1 Proposed development

The proposed layout of the site, at the time of preparing this report, is shown as Figure 3.

The current proposed development comprises of approximately 150no. low-rise residential dwellings with associated private gardens and parking. In addition, a play area is proposed to be constructed at the centre of the site and a pond within the north western corner of the site.

For the purpose of this assessment, it has been assumed that the proposed structures will be of a relatively lightly loaded construction. It is also assumed that ground bearing floor slabs will not be required, and that a beam and block solution will be used.

7.2 Key geotechnical constraints and general suitability

The following key risks identified from the available ground investigation data are discussed below:

- significant thickness of loose / soft deposits – likely to prove problematic for foundations and external works;
- blowing sand conditions encountered during borehole construction within the Tidal Flat Deposits;
- presence of shallow groundwater within the Tidal Flat Deposits; and
- instability of open excavations due to the presence of silts and fine sands in conjunction with shallow groundwater.

The intrusive investigation works encountered a ground profile comprising nominal agricultural topsoil over very loose to loose fine sands and soft clays / silts associated with the Tidal Flat Deposits to the full depth of investigation at 5.45m bgl.

The Tidal Flat Deposits are not considered to comprise a suitable founding stratum, given the low strengths and densities identified. Due to the significant thickness of these deposits, shallow foundation options are considered unsuitable for the proposed development, and it is recommended that piled foundations be used to transfer the anticipated loads through to the underlying, more competent soils.

The results of the groundwater monitoring programme indicate standing water at a depth of between 0.00m and 2.39m bgl; and the presence of a high groundwater table will therefore need to be considered within the design and construction of piled foundations.

Blowing sand conditions were also encountered during the formation of all boreholes within the Tidal Flat Deposits, which are likely to prove problematic for the use of certain piling techniques.

Excavations taken close to or below the groundwater table are likely to require continuous support and dewatering. Pumping from open sumps in non-cohesive soils should be avoided as this can result in instability and general loosening of the soils at the base of

the excavation. It is likely that dewatering in non-cohesive soils will require the use of well-pointing systems.

It should also be appreciated that, given the prevailing ground conditions, any increase in the applied effective stress (i.e. as a result of raising ground levels) could lead to significant settlements within the Tidal Flat Deposits. With regard to piling, these settlements could result in significant negative skin friction to any installed or proposed piles and therefore could reduce available pile capacities. Caution should therefore be exercised in relation to raising ground levels within the development, even by relatively small amounts, without seeking prior advice from a geotechnical specialist. If levels are to be raised, it will be necessary to mitigate any settlement prior to the main construction commencing.

7.3 Groundwater control

As discussed above, the results of the groundwater monitoring programme undertaken at the site to date suggest groundwater is likely to be encountered at depths of generally between ground level and 2m bgl.

On this basis the design of excavations, including foundations and drainage installation, will need to take into account the potential for groundwater ingress in both the temporary and permanent condition.

As the ground conditions encountered at shallow depth predominantly comprise silts and fine sands associated with the Tidal Flat Deposits, temporary groundwater control via sump pumping should be avoided due to the potential for removal of fines and the associated instability of the formation and settlement of the surrounding ground.

It is envisaged that the conditions encountered at the site will require the use of alternative groundwater control techniques, in order to temporarily lower the groundwater level before excavations commence, so that excavations can be progressed in 'dry conditions'.

A number of methods are available for controlling the inflow of water into excavations, and the advice of a specialist groundwater control contractor should be sought with regard to the most appropriate solution for the ground and groundwater conditions encountered at the site.

The site investigation report, borehole logs, laboratory certificates of geotechnical analysis, groundwater monitoring data, and results of in-situ soakaway testing, should be provided to the specialist groundwater control contractor, to inform their design.

Both construction and dewatering methods will need to be carefully considered in order to avoid the introduction of excessive compactive effort into the silts and fine sands of the Tidal Flat Deposits, with the associated potential for 'liquefaction' and instability.

Ultimately the choice of groundwater control technique will depend on the following criteria, which take into account the ground and groundwater conditions encountered, the current status of the site, and the nature of the proposed development and external works:

- the nature and permeability of the ground;
- the extent of the area to be dewatered;

- the depth of the water table below ground level and the amount by which it has to be lowered;
- the type of plant which is readily available at the site;
- the proposed methods of excavation and ground support;
- the integration of the dewatering process into the construction sequence;
- the proximity of existing structures;
- the proximity of water courses; and
- the proximity of water abstraction schemes

7.4 Floor slabs

The nature of the soils encountered during the investigation indicates that ground bearing floor slabs are unlikely to be suitable and suspended floor slabs should be adopted throughout the proposed development.

7.5 Roads and hardstanding

In the 1 m to 1.5 m below the proposed finished ground level the exploratory holes have revealed a soil profile comprising an occasionally organic silts and fine sands.

In pavement design terms, the groundwater conditions are anticipated to comprise a low water table, i.e. at least 1 m below the pavement formation level; however ongoing groundwater monitoring would be required to confirm this.

The estimated minimum, equilibrium soil-suction, California bearing ratio (CBR) value for the soils and groundwater conditions described above under a completed pavement is <2 %, based upon Table C1 in TRRL (1984) Report LR1132.

The results of in-situ testing are summarised in Table 11.

Table 11 Summary of CBR values derived from in-situ Clegg Impact Hammer tests

Test location	Estimated CBR value (%)
SA01	4.8
SA02	4.8
SA03	3.8
TP02	3.8
TP03	4.8
TP04	3.0
TP05	4.8
TP06	4.8
TP07	3.0
TP08	3.0

Test location	Estimated CBR value (%)
TP09	4.8
TP10	3.8
TP11	3.8
TP12	3.8
TP14	4.8

It is recommended that the equilibrium CBR value of <2% is assumed for the purpose of road pavement design. This value assumes that during construction the formation level will be carefully compacted, and any soft spots removed and replaced with well-compacted granular fill.

The sub-grade condition at the time of construction should be confirmed by testing at the final formation level by in situ CBR testing.

The sub-grade soils may be regarded as frost-susceptible, based upon the criteria given in Appendix 1 of TRRL (1970) Report Road Note 29. When the sub-grade is frost-susceptible the thickness of sub-base must be sufficient to give a total thickness of non-frost-susceptible pavement construction over the soil of not less than 450 mm.

7.6 Excavations for foundations and services

Some of the trial pits became unstable during excavation. It is therefore recommended that excavation support systems are made available during the groundwork stage of the development.

Man entry into any excavations should not be undertaken without provision of suitable shoring and support and dewatering or suitable regrading and battering of side slopes to safe angles. Confined spaces protocols for the Health and Safety of personnel should always be used where man entry into excavations is to be undertaken as low oxygen conditions may be present.

Excavation should be possible using conventional site plant. Breakers may be necessary to remove any concrete obstructions within the made ground.

Given the presence of silts and fine sands, it should be appreciated that the use of excessive compactive effort could effectively 'liquify' the shallow soils at the base of any excavations, and the use of appropriate construction techniques and methods will need to be carefully considered.

7.7 Chemical attack on buried concrete

This assessment of the potential for chemical attack on buried concrete at the site is based on BRE Special Digest 1: Concrete in aggressive ground, which represents the most up-to-date guidance on this topic currently available in the UK.

The desk study and site reconnaissance indicate that, for the purposes of assessing the aggressive chemical environment of the site, the shallow conditions at the site should be considered as comprising natural ground unlikely to contain pyrite.

Based on testing results, Table 12 gives the characteristic pH, and water soluble sulphate values for soils from each of the geological units encountered on-site.

Table 12 Characteristic pH, water soluble sulphate and total sulphate values

Stratum	pH	Water Soluble Sulphate (mg/l)
Agricultural topsoil	7.90	<10
Tidal Flat Deposits	8.33	562.50

Based on the results above and following the steps outlined in the BRE guidance, the Design Sulphate Classes and Aggressive Chemical Environment for Concrete classifications are summarised in Table 13, on the basis of water-soluble sulphate and pH.

Table 13 Concrete design class

Stratum	Ground water	Water Soluble Sulphate	
		DS Class	AC Class
Made ground / topsoil	Mobile	DS-1	AC-1
Tidal Flat Deposits	Mobile	DS-2	AC-2

7.8 Infiltration drainage

The results of soakaway testing are presented in Appendix I and summarised in Table 14.

Table 14 Infiltration test results

Trial pit	Stratum	Test result (m/s)
SA01	Tidal Flat Deposits	N/A*
SA02	Tidal Flat Deposits	N/A*
SA03	Tidal Flat Deposits	N/A*
Notes: *Insufficient drop in water level over the course of the test to enable an infiltration rate to be calculated		

Based upon the results of the soakaway tests the infiltration characteristics of the shallow soils are poor and are unlikely to be suitable for the use of soakaways to discharge surface run off. In addition, the use of soakaways at the site would be problematic due to the presence of shallow groundwater.

Consideration should therefore be given to discharging to the existing storm water/foul sewer system.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Geo-environmental assessment

The results of the site investigation and GQRA indicate that relevant contaminant linkages are absent based on the data available and therefore the site is suitable for the proposed end use. Although not encountered to date, localised sources of contamination could still be present, although they are unlikely to be widespread. Data gaps and uncertainties have been considered and no further assessment is considered to be required at this stage.

Should unforeseen contamination be encountered during the development then specialist advice should be sought to determine the appropriate course of action. Imported material (e.g. topsoil, subsoil) should be validated before use on-site to confirm its suitability.

Based on the current understanding of the conceptual site model and the assessment undertaken, the site has been classified as CS2. As the assessment to date has been carried out on the basis of 4no. monitoring events, consideration should be given to undertaking a series of additional monitoring events to provide a greater degree of confidence and a more robust means of assessment.

No samples were found to have hazardous properties based on the preliminary hazardous waste assessment. This suggests that if applicable the waste would require disposal at a suitably permitted inert facility (subject to appropriate WAC certificates) or non-hazardous waste landfill.

8.2 Geotechnical assessment

The key findings of the geotechnical assessment are as follows:

- a significant thickness of loose / soft and highly compressible deposits has been identified, and the depth to competent strata has not been proven;
- deeper boreholes are required to prove the depth to competent strata and provide the relevant parameters for final design of foundations. Consideration should also be given to the use of CPT probing to provide additional information on the characteristics of the Tidal Flat Deposits;
- piling is anticipated to be the most appropriate foundation solution, albeit there are a number of constraints with regard to potential piling technique and the advice of a specialist piling contractor conversant with the local ground conditions should be sought to confirm the most appropriate pile type and dimensions;
- shallow groundwater has been encountered during the site investigation and monitoring, and the design of excavations, including foundations and drainage, will need to take into account the potential for groundwater ingress in both the temporary and permanent condition;
- it should be appreciated that any surcharge of the site (i.e. increase in ground levels) could lead to significant ongoing settlements within the Tidal Flats; and this would need to be taken into account for both foundations and new infrastructure; and

- construction and dewatering methods should be given careful consideration in order to avoid de-stabilising excavations and 'liquefaction' of fine soils in the presence of groundwater.

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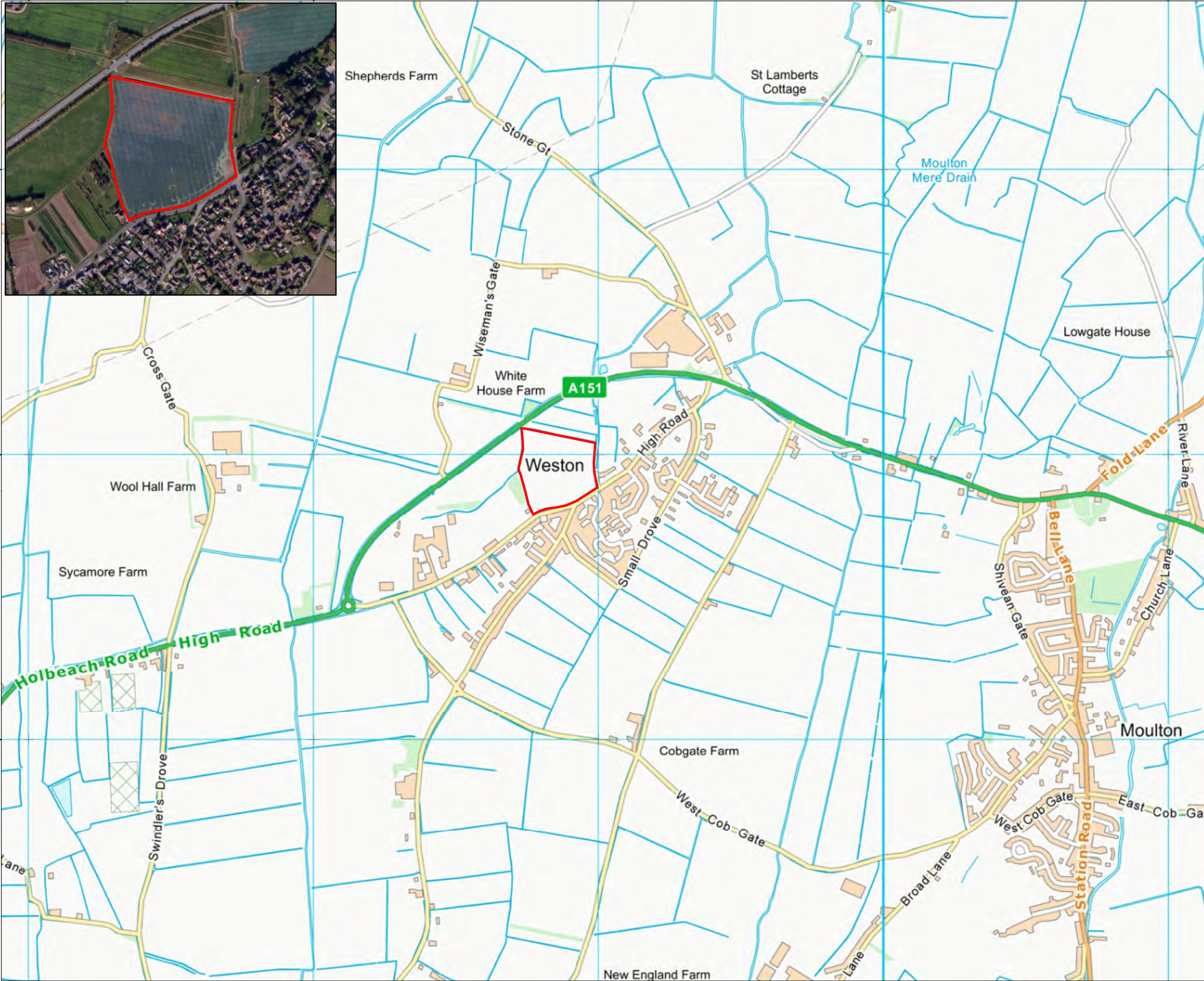
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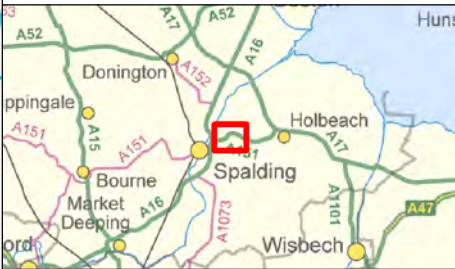
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Legend:
Site Boundary

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

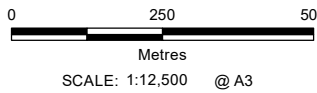


Rev	Date	Description	Drm	Chk	App
00	30/10/2019	First Draft	DR	EW	EW

Weston, Spalding

RSK

TITLE: Figure 1:
Site Location Plan



REV 00



Legend:
 Site Boundary

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

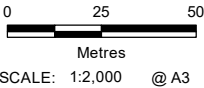


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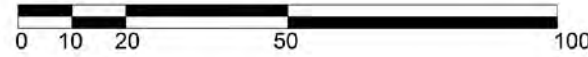
Weston, Spalding



TITLE: Figure 2:
Site Layout Plan



REV 00



Legend:

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drm	Chk	App
01	01/04/2020	Plan Replacement	AW	EW	EW
00	31/10/2019	First Draft	DR	EW	EW

Weston, Spalding



TITLE: Figure 3:
Proposed Development Plan

Not To Scale



REV 01



- Legend:
- Site Boundary
- Exploratory Hole Locations:
- Soakaway
 - Trial Pit
 - Window Sample

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

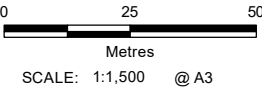


00	20/02/2020	First Draft	DR	EW	EW
Rev	Date	Description	Drm	Chk	App

Weston, Spalding



TITLE: Figure 4:
Exploratory Hole Location Plan



REV 00

APPENDIX A

SERVICE CONSTRAINTS

1. This report and the site investigation carried out in connection with the report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) for Persimmon Homes East Midlands (the "Client") in accordance with the terms of a contract [RSK Environment Standard Terms and Conditions] between RSK and the Client, dated 31st January 2020. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by an environmental consultant at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.
2. Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.
3. Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. **Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.**
4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date of this report, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.
5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the Client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.
6. The observations and conclusions described in this report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials, unless specifically identified in the Services.
7. The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services or accreditation system (such as UKAS ISO 17020:2012 clause 7.1.6):

- a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.
- b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.
- c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the Client and RSK.

8. The intrusive environmental site investigation aspects of the Services are a limited sampling of the site at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope between the client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species are not present.
9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for setting out and should be considered indicative only.
10. The comments given in this report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.
11. Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works.
12. Unless stated otherwise, only preliminary geotechnical recommendations are presented in this report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed.

APPENDIX B

SUMMARY OF LEGISLATION AND POLICY RELATING TO CONTAMINATED LAND

Part IIA of the Environmental Protection Act 1990

Part IIA of the Environmental Protection Act 1990 (Part IIA) and its associated Contaminated Land Regulations 2000 (SI 2000/227), which came into force in England on 1 April 2000, formed the basis for the current regulatory framework and the statutory regime for the identification and remediation of contaminated land. Part IIA of the EPA 1990 defines contaminated land as 'any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused'. Controlled waters are considered to include all groundwater, inland waters and estuaries.

In August 2006, the Contaminated Land (England) Regulations 2006 (SI 2006/1380) were implemented, which extended the statutory regime to include Part IIA of the EPA as originally introduced on 1 April 2000, together with changes intended chiefly to address land that is contaminated by virtue of radioactivity. These have been replaced subsequently by the Contaminated Land (England) (Amendment) Regulations 2012, which now exclude land that is contaminated by virtue of radioactivity.

The intention of Part IIA is to deal with contaminated land issues that are considered to cause significant harm on land that is not undergoing development (see Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance, April 2012). This document replaces Annex III of Defra Circular 01/2006, published in September 2006 (the remainder of this document is now obsolete).

Planning Policy

Contaminated land is often dealt with through planning because of land redevelopment. This approach was documented in Planning Policy Statement: Planning and Pollution Control PPS23, which states that it remains the responsibility of the landowner and developer to identify land affected by contamination and carry out sufficient remediation to render the land suitable for use. PPS23 was withdrawn early in 2012 and has been replaced by much reduced guidance within the National Planning Policy Framework (NPPF), reference ISBN: 978-1-5286-1033-9, February 2019.

The new framework has only limited guidance on contaminated land, as follows:

Chapter 11. Making effective use of land

- 117 Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land.
118. Planning policies and decisions should:

- c) give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land.

Chapter 15. Conserving and enhancing the natural environment

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

- f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

Ground conditions and pollution

178. Planning policies and decisions should ensure that:

- a) a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation);

- b) after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990; and

- c) adequate site investigation information, prepared by a competent person, is available to inform these assessments.

179. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.

Water Resources Act (WRA)

The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009 updated the Water Resources Act 1991, which introduced the offence of causing or knowingly permitting pollution of controlled waters. The Act provides the Environment Agency with powers to implement remediation necessary to protect controlled waters and recover all reasonable costs of doing so.

Water Framework Directive (WFD)

The Water Framework Directive 2000/60/EC is designed to:

- enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands that depend on the aquatic ecosystems
- promote the sustainable use of water
- reduce pollution of water, especially by 'priority' and 'priority hazardous' substances
- ensure progressive reduction of groundwater pollution.

The WFD requires a management plan for each river basin be developed every six years.

Groundwater Directive (GWD)

The 1980 Groundwater Directive 80/68/EEC and the 2006 Groundwater Daughter Directive 2006/118/EC of the WFD are the main European legislation in place to protect groundwater. The 1980 Directive is due to be repealed in December 2013. The European legislation has been transposed into national legislation by regulations and directions to the Environment Agency.

Priority Substances Directive (PSD)

The Priority Substances Directive 2008/105/EC is a 'Daughter' Directive of the WFD, which sets out a priority list of substances posing a threat to or via the aquatic environment. The PSD establishes environmental quality standards for priority substances, which have been set at concentrations that are safe for the aquatic environment and for human health. In addition, there is a further aim of reducing (or eliminating) pollution of surface water (rivers, lakes, estuaries and coastal waters) by pollutants on the list. The WFD requires that countries establish a list of dangerous substances that are being discharged and EQS for them. In England and Wales, this list is provided in the River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010. In order to achieve the objectives of the WFD, classification schemes are used to describe where the water environment is of good quality and where it may require improvement.

Environmental Permitting Regulations (EPR)

The Environmental Permitting (England and Wales) Regulations 2016 (as amended) provide a single regulatory framework that streamlines and integrates waste management licensing, pollution prevention and control, water discharge consenting, groundwater authorisations, and radioactive substances regulation. Schedule 22, paragraph 6 of EPR 2016 states: 'the regulator must, in exercising its relevant functions, take all necessary measures - (a) to prevent the input of any hazardous substance to groundwater; and (b) to limit the input of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater.'

Notes:

1. *The above information is provided for background but does not constitute site-specific advice*
2. *The above summary applies to England only. Variations exist within other countries of the United Kingdom*

APPENDIX C

TECHNICAL BACKGROUND

Site Investigation Methodology

Ground gas monitoring

An infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO₂), methane (CH₄) and oxygen (O₂) in percentage by volume, while hydrogen sulphide (H₂S) and carbon monoxide (CO) were recorded in parts per million. Initial and steady state concentrations were recorded. In addition, during the first monitoring round, all wells were screened with a PID to establish if there are any interferences and cross-sensitivity of other hydrocarbons with the infrared gas meter.

Low flow groundwater sampling

Groundwater samples were retrieved using a United States Environment Protection Agency (USEPA) approved low-flow purging and sampling methodology.

The low-flow method relies on moving groundwater through the well screen at approximately the same rate as it flows through the geological formation. This results in a significant reduction in the volume of water extracted before sampling and significantly reduces the amount of disturbance of the water in the monitoring well during purging and sampling. Drawdown levels in the monitoring well and water quality indicator parameters (pH, temperature, electrical conductivity, redox potential and dissolved oxygen) are monitored during low-flow purging and sampling, with stabilisation indicating that purging is complete and sampling can begin. As the flow rate used for purging, in most cases, is the same or only slightly higher than the flow rate used for sampling, and because purging and sampling are conducted as one continuous operation in the field, the process is referred to as low-flow purging and sampling.

Site Investigation Methodology

Statistical assessment

Statistical analysis of the results has been conducted in accordance with *Guidance on Comparing Soil Contamination Data with a Critical Concentration* (CIEH and CL:AIRE, 2008) as detailed in Appendix D.

Statistical analysis is utilised to establish whether the land is suitable for the proposed use under the land use planning system by attempting to answer a key question. For a site being developed the key question is: *'can we confidently say that the level of contamination on this land is low relative to some appropriate measure of risk?'* More specifically, this is expressed as *'Is there sufficient evidence that the true mean concentration of the contaminant (μ) is less than the critical concentration (C_c)?'*, where the critical concentration could be the GAC or a site-specific assessment criterion (SSAC). The true mean (μ) is unknown and therefore a conservative estimate, termed the upper confidence limit (UCL), of this value is derived from the data. The UCL is then compared against the GAC.

In statistical terms the question above is handled through the use of a formal hypothesis – the null hypothesis and the alternate hypothesis. The statistical tests are structured to show (with a defined level of confidence, in this case 95%) which of the two hypotheses is most likely to be true, by determining whether the null hypothesis can be rejected.

For consideration under the planning regime, the null (H_0) and alternative (H_1) hypotheses are presented below.

Null and alternative hypotheses

Hypothesis	Equation	Description
Null (H_0)	$\mu \geq C_c$	The true mean concentration is equal to, or greater than, the critical concentration
Alternative (H_1)	$\mu < C_c$	The true mean concentration is less than the critical concentration

Therefore, if the null hypothesis is accepted for a certain contaminant it can be concluded that its concentration is high relative to the critical concentration, which in the case of this assessment is taken to be the GAC/SSAC and as such the whole site may be classed as being contaminated by a particular substance.

In addition, the statistical guidance provides an outlier test (Grubbs' test) that has been used within this assessment for the identification of 'outliers' or 'hotspots'. The 'outlier' test is conducted before undertaking statistical analysis (and 'outliers' may be removed from the dataset) but **only** where the conceptual model supports this.

The statistical tests applied to the dataset are selected based on whether the data is normally or non-normally distributed. The distribution of the dataset has been assessed using the Shapiro-Wilks normality test. Where the dataset has been found to be normally distributed the one sample t-test is undertaken. Where data has been found to be non-normally distributed Chebyshev's theorem is utilised.

Reuse of suitable materials

The Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) (CoP) was developed in consultation with the Environment Agency and development industry to enable the re-use of materials under certain scenarios and subject to demonstrating that specific criteria are met. The current reuse scenarios covered by the CoP comprise

- reuse on the site of origin (with or without treatment)
- direct transfer of clean and natural soils between sites
- use in the development of land other than the site of origin following treatment at an authorised Hub site (including a fixed soil treatment facility).

The importation of made ground soils (irrespective of contamination status) or crushed demolition materials is not permitted currently under the CoP and requires either a standard rules environmental permit or a U1 waste exemption (see below).

In the context of excavated materials used on-sites undergoing development, four factors are considered to be of particular relevance in determining if the material is a waste or when it ceases to be waste:

- the aim of the Waste Framework Directive is not undermined, i.e. if the use of the material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be waste
- the material is certain to be used
- the material is suitable for use both chemically and geotechnically
- only the required quantity of material will be used.

The CoP requires the preparation of a materials management plan (MMP) that confirms the above factors will be met. This plan needs to be reviewed by a 'Qualified Person' (QP) who will then issue a declaration form to the EA. As the project progresses, data must be collated and on completion a verification report produced that shows the MMP was followed and describes any changes.

The MMP establishes whether specific materials are classified as waste and how excavated materials will be treated and/or reused in line with the CoP. The MMP is likely to form part of the site waste management plan.



APPENDIX D

EXPLORATORY HOLE RECORDS



TRIAL PIT LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: SA01
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.52	National Grid Co-ordinate: E:528765.8 N:325058.1		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES	4.8%			Brown slightly sandy SILT with frequent roots. Sand is fine. (AGRICULTURAL TOPSOIL)	0.20	
0.30		CBR				Brown mottled orange brown slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)		
0.80	2	D				... Occasional dark brown mottling from 1.00m bgl.	(1.25)	
						Trial pit terminated at 1.45m bgl.	1.45	

Plan (Not to Scale)		General Remarks			
		1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Groundwater seepage encountered at 1.45m bgl. 3. Trial pit backfilled with arisings upon completion of the soakaway.			
		All dimensions in metres		Scale: 1:25	
Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: EWild	Checked By:		



TRIAL PIT LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: SA02
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.40	National Grid Co-ordinate: E:528886.5 N:324950.9		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20 0.30	1	ES CBR	4.8%			Brown slightly gravelly SILT. Gravel is subangular to subrounded fine to medium mudstone. (AGRICULTURAL TOPSOIL)	(0.40)	
0.80	2	D				Light brown slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	0.40	
						... Occasional yellow brown mottles from 1.00m bgl.	(1.00)	
						Trial pit terminated at 1.40m bgl.	1.40	

Plan (Not to Scale)		General Remarks			
		1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Groundwater seepage encountered at 0.80m bgl. 3. Trial pit backfilled with arisings as soakaway not appropriate with groundwater seepage.			
		All dimensions in metres		Scale:	1:25
Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: EWild	Checked By:		

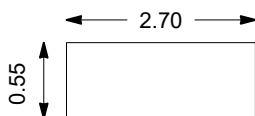


TRIAL PIT LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: SA02A
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: ---	National Grid Co-ordinate: E:528890.0 N:324953.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.30	1	ES				Brown slightly sandy SILT. Sand is fine. (AGRICULTURAL TOPSOIL) ... Occasional light brown mottling from 0.30m bgl.	(0.40) 0.40	x x x x x x x x x x x x
0.90	2	D				Light blueish grey slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Light brown mottling from sandy pockets from 0.80m bgl.	(1.40)	x x x x x x x x x x x x
1.20	3	B				... Becoming light brown from 1.10m bgl.	1.80	x x x x x x x x x x x x
Trial pit terminated at 1.80m bgl for soakaway testing.								

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater seepage encountered at 1.80m bgl.
3. Trial pit backfilled with arisings upon completion of the soakaway.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

Logged By:

EWild

Checked By:



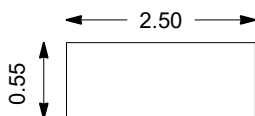


TRIAL PIT LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: SA03
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 3.00	National Grid Co-ordinate: E:528916.2 N:324900.3		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES	3.8%			Brown slightly sandy SILT. Sand is fine to coarse. (AGRICULTURAL TOPSOIL)	0.20	
0.30		CBR				Light brown and light grey silty fine SAND with occasional yellow brown mottling. (TIDAL FLAT DEPOSITS)		
0.50	2	B				. . . Rare red brown mottling from 0.80m bgl.	(1.30)	
						Trial pit terminated at 1.50m bgl.	1.50	

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater seepage encountered at 1.50m bgl.
3. Trial pit backfilled with arisings upon completion of the soakaway.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

Logged By:

EWild

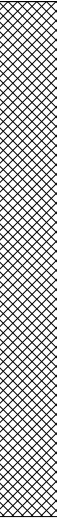
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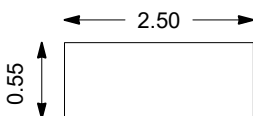


TRIAL PIT LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: SA03A
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: ---	National Grid Co-ordinate: E:528920.0 N:324900.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.80	1	B				Brown sandy SILT. Sand is fine. (AGRICULTURAL TOPSOIL) ... Occasional roots and rootlets between 0.10m and 0.30m bgl.	(0.40) 0.40	
						Light brown and grey silty fine SAND. (TIDAL FLAT DEPOSITS) ... Occasional orange brown mottling from 0.60m bgl.	(0.60) 1.00	
						Light brownish grey occasional mottled light orangish brown sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.70) 1.70	

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater seepage encountered at 1.65 bgl.
3. Trial pit backfilled with arisings upon completion of the soakaway.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

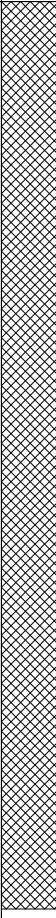
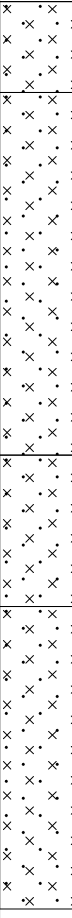
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EWild

Checked By:





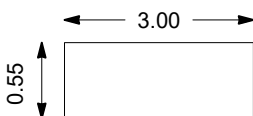
Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES				Brown slightly sandy SILT with frequent roots and rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.30)	
						0.30		
0.80	2	B				Light brown and brownish grey very sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(1.20)	
						... Occasional light orange brown mottling from 1.00m bgl.		
						1.50		
2.60	3	D				Brown and light brown slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.50)	
						... Becoming light blueish grey from 1.80m bgl.	2.00	
						Dark blueish grey slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(1.00)	
						... Occasional pockets of orange brown sand from 2.50m bgl.		
Trial pit terminated at 3.00m bgl.								

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Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: TP02
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.80	National Grid Co-ordinate: E:528916.7 N:325050.1		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES	3.8%			Brown slightly sandy SILT with frequent roots and rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.40)	x x x x
0.30		CBR					0.40	x x x x
0.50	2	B				Lightish brown slightly silty fine SAND with occasional roots. (TIDAL FLAT DEPOSITS) ... Occasional orange brown mottling from 0.60m bgl.	(0.80)	x x x x
							1.20	x x x x
1.50	3	D				Light orangish brown slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Becoming dark grey mottled from 2.20m bgl.	(1.30)	x x x x
							2.50	x x x x
2.60	4	D				Dark blueish grey slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Occasional orange brown pocket of sand at 3.00m bgl.	(0.60)	x x x x
							3.10	x x x x
						Trial pit terminated at 3.10m bgl.		

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater seepage encountered at 1.30m bgl.
3. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

Logged By:

EWild

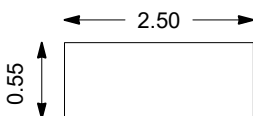
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Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: TP03
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.36	National Grid Co-ordinate: E:528737.0 N:325005.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES	4.8%			Brown slightly sandy SILT with frequent roots and rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	0.20	x . x . x
0.30		CBR				Orangish brown sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)		x . x . x
0.50	2	D						x . x . x
						. . . Becoming brown from 1.00m bgl.	(1.60)	x . x . x
						. . . Light grey mottled from 1.20m bgl.		x . x . x
						. . . Pockets of orange brown sand from 1.50m bgl.	1.80	x . x . x
						Dark grey and occasional mottled dark to light blueish grey slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(1.00)	x . x . x
						. . . Rare pockets of orange brown sand from 2.50m bgl.	2.80	x . x . x
2.80	3	D				Trial pit terminated at 2.80m bgl.		

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater seepage encountered at 2.20m bgl.
3. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

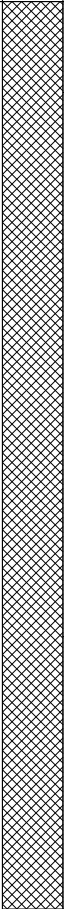
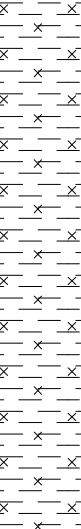
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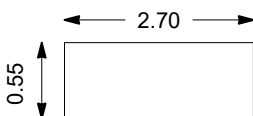
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Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: TP04
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: 2.40	National Grid Co-ordinate: E:528789.0 N:325022.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES	3%			Brown slightly sandy SILT with frequent roots. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.30)	
0.30		CBR					0.30	
0.40	2	D				Light brown mottled brown light orangish brown and grey silty CLAY. (TIDAL FLAT DEPOSITS)		
						... Becoming slightly mottled grey from 1.20m bgl.	(1.80)	
						... Mottled pale blueish grey from 1.40m bgl.		
2.40	3	D				Light blueish grey slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Pocket of orangish brown sand from 2.20m bgl. ... Occasional organic odour from 2.50m bgl.	(0.90)	
						Trial pit terminated at 3.00m bgl.	3.00	

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater seepage encountered at 1.70m bgl.
3. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

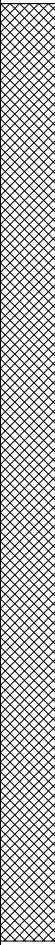
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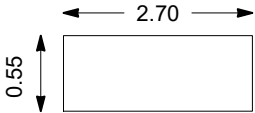
EWild

Checked By:



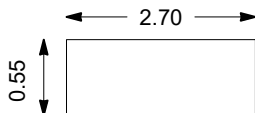
Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: TP05
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.48	National Grid Co-ordinate: E:528886.9 N:324976.1		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.30	1	CBR	4.8%			Brown slightly sandy SILT with occasional roots. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.30)	
0.50		B				Brown and light greyish brown silty fine SAND. (TIDAL FLAT DEPOSITS)	(0.90)	
						. . . Becoming light grey mottled orange brown from 0.80m bgl.		
			1.20					
	2	D				Light grey and light brown slightly sandy SILT. (TIDAL FLAT DEPOSITS)	(0.90)	
						. . . Becoming darker grey and blueish from 2.00m bgl.	2.10	
2.20						Dark blueish grey slightly sandy very sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(1.00)	
		. . . Occasional pockets of orange brown sand from 2.50m bgl.						
		. . . Occasional organic matter remnants black from 2.80m bgl.						
						3.10		
Trial pit terminated at 3.10m bgl.								

Plan (Not to Scale)		General Remarks			
		1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Groundwater seepage encountered at 1.50m bgl. 3. Trial pit backfilled with arisings upon completion.			
		All dimensions in metres		Scale:	1:25
Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: EWild	Checked By: 		

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: TP06
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.48	National Grid Co-ordinate: E:528916.5 N:325000.1		Sheet: 1 of 1

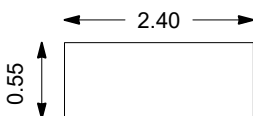
Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20 0.30	1	ES CBR	4.8%			Brown slightly sandy SILT with occasional roots and rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.40) 0.40	x x x x x x x x x x x x
0.90	2	D				Brown and orange brown slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)		x x x x x x x x x x x x
2.00	3	D				... Mottled light grey brown and orangish brown from 1.20m bgl.	(2.00)	x x x x x x x x x x x x
3.00	4	D				... Pockets of orange brown sand from 2.00m bgl.	2.40	x x x x x x x x x x x x
						Dark blueish grey slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.80)	x x x x x x x x x x x x
						... Occasional mottled light blueish grey from 3.00m bgl.	3.20	x x x x x x x x x x x x
Trial pit terminated at 3.20m bgl.								

Plan (Not to Scale)		General Remarks			
		1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Groundwater seepage encountered at 1.70m bgl. 3. Trial pit backfilled with arisings upon completion.			
		All dimensions in metres		Scale:	1:25
Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: EWild	Checked By:		

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: TP07
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.36	National Grid Co-ordinate: E:528766.0 N:324989.0		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES	3%			Brown slightly sandy SILT with occasional roots. Sand is fine. (AGRICULTURAL TOPSOIL)	0.20	
0.30		CBR				Brown mottled light orangish brown sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)		
1.00	2	D				. . . Becoming light greyish brown from 1.00m bgl.		
1.60	3	D				. . . Occasional light blueish grey mottled from 1.80m bgl.	(2.80)	
						. . . Becoming dark blueish grey from 2.20m bgl.		
						. . . Organic remnants present from 2.50m bgl.		
2.80	4	D					3.00	
Trial pit terminated at 3.00m bgl.								

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater not encountered.
3. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method Used: **Machine dug**

Plant Used: **13 Ton Tracked Excavator**

Logged By: **EWild**

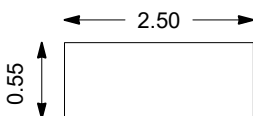
Checked By:



Contract: Weston Spalding		Client: Persimmon Homes East Midlands		Trial Pit: TP08
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.65	National Grid Co-ordinate: E:528917.2 N:324949.2	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.10	1	ES	3%			Brown slightly sandy SILT with frequent roots and rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.40)	
0.30		CBR				Light orangish brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS) ... Occasional grey mottle from 0.60m bgl.	0.40	
						Light greyish brown mottled orange brown slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.40)	
						... Becoming light blueish grey from 2.20m bgl.	(2.60)	
2.60	2	D				... Shell (bivalve) found at 2.50m bgl. ... Organic matter and dark brown staining encountered at 2.60m bgl. ... Dark blueish grey mottling from 2.70m bgl.		
3.40	3	D				Trial pit terminated at 3.40m bgl.	3.40	

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater seepage encountered at 1.80m bgl.
3. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

Logged By:

EWild

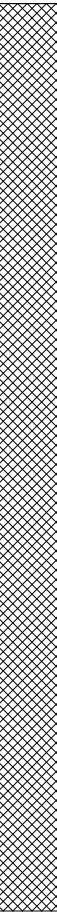
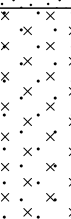
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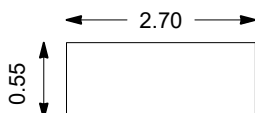


TRIAL PIT LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: TP09
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 2.64	National Grid Co-ordinate: E:528967.0 N:324949.9		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.30	1	CBR	4.8%		Brown slightly sandy SILT with occasional roots. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.40)		
0.60		B			Light brown and light orangish brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS)	0.40		
					. . . Occasional dark orange brown mottle from 1.00m bgl.	(1.10)		
						1.50		
	2	D			Light brown and mottled light orangish brown sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.70)		
						. . . Thin layer of very pale blueish grey SILT at 2.00m bgl.	2.20	
2.30					Dark blueish grey clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS) . . . Black patches with a strong organic odour at 2.30m bgl. . . . Occasional pockets of orange brown sand from 2.50m bgl.	(0.80)		
					3.00			
Trial pit terminated at 3.00m bgl.								

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater not encountered.
3. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

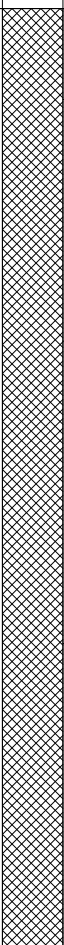
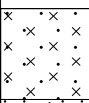
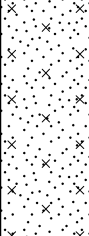
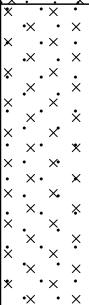
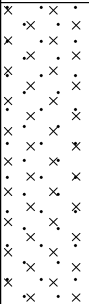
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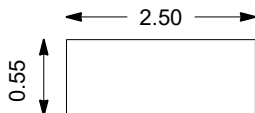
EWild

Checked By:



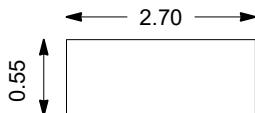
Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Trial Pit: TP10
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: 2.87	National Grid Co-ordinate: E:528767.1 N:324900.7		Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20 0.30	1	ES CBR	3.8%			Brown sandy SILT with frequent roots and rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.30) 0.30	
0.50	2	B				Light orangish brown and light brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS)	(0.80) 1.10	
1.20	3	D				Light greyish brown mottled light orangish brown slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Occasional darker brown mottling from 1.50m bgl. ... Becoming mostly grey from 1.70m bgl.	(1.00) 2.10	
2.30	4	ES				Dark blueish grey and dark grey slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Occasional pockets of orange brown sand from 2.50m bgl.	(1.00) 3.10	
						Trial pit terminated at 3.10m bgl.		

Plan (Not to Scale)		General Remarks			
		- Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. - Groundwater seepage encountered at 1.60m bgl. - Trial pit backfilled with arisings upon completion.			
		All dimensions in metres		Scale:	1:25
Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: EWild	Checked By:		

Contract: Weston Spalding		Client: Persimmon Homes East Midlands		Trial Pit: TP11
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: 2.71	National Grid Co-ordinate: E:528816.9 N:324899.5	Sheet: 1 of 1

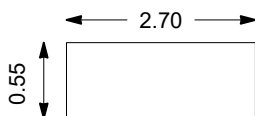
Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20 0.30	1	ES CBR	3.8%			Brown slightly sandy SILT. Sand is fine. Occasional fine to coarse brick and brick pipe. (AGRICULTURAL TOPSOIL)	(0.40) 0.40	
						Light brownish grey sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Occasional light orangish brown mottling from 0.50m bgl.	(0.60) 1.00	
1.20	2	D				Light brown and light grey clayey SILT. (TIDAL FLAT DEPOSITS) ... Occasional pockets of orange brown sand from 1.40m bgl.	(0.90) 1.90	
2.50	3	D				Dark blueish grey occasionally mottled light blueish grey slightly sandy SILT. sand is fine. (TIDAL FLAT DEPOSITS) ... Occasional organic odour from 2.10m bgl. ... Occasional pockets of orange brown sand from 2.30m bgl.	(0.90) 2.80	
						Trial pit terminated at 2.80m bgl.		

Plan (Not to Scale)		General Remarks		
		1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Groundwater seepage encountered at 1.70m bgl. 3. Trial pit backfilled with arisings upon completion.		
		All dimensions in metres	Scale:	1:25
Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: EWild	Checked By:	

Contract: Weston Spalding		Client: Persimmon Homes East Midlands		Trial Pit: TP12
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: 3.14	National Grid Co-ordinate: E:528766.5 N:324850.3	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.20	1	ES	3.8%			Brown sandy SILT with occasional rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.30)	x x x x
0.30		CBR					0.30	x x x x
0.40	2	B				Lightish brown fine SAND. (TIDAL FLAT DEPOSITS) ... Becoming light orange brown mottled from 0.50m bgl. ... Becoming slightly silty from 0.80m bgl.	(0.70)	x x x x
							1.00	x x x x
1.50	3	D				Light grey brown mottled light orangish brown and brown sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Band of light blueish grey between 1.70m and 1.80m bgl.	(0.90)	x x x x
							1.90	x x x x
2.50	4	ES				Dark blueish grey slightly sandy SILT with an organic odour. Sand is fine. (TIDAL FLAT DEPOSITS) ... Occasional black organic matter from 2.50m bgl.	(0.80)	x x x x
							2.70	x x x x
Trial pit terminated at 2.70m bgl.								

Plan (Not to Scale)



General Remarks

1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater not encountered.
3. Trial pit backfilled with arisings upon completion.
4. Sides of pits collapsing due to surrounding surface water.

All dimensions in metres

Scale: **1:25**

Method Used:

Machine dug

Plant Used:

13 Ton Tracked Excavator

Logged By:

EWild

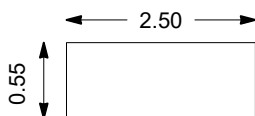
Checked By:



Contract: Weston Spalding		Client: Persimmon Homes East Midlands		Trial Pit: TP13
Contract Ref: 252234	Start: 18.02.20 End: 18.02.20	Ground Level: 3.22	National Grid Co-ordinate: E:528867.1 N:324850.1	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results					
0.40	1	ES				Brown sandy SILT with frequent roots and rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.30)	x x x x
						Light brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS)	0.30	x x x x
1.00	2	D				... Occasional greysih brown mottling from 0.60m bgl.	(0.60)	x x x x
						Light brownish grey sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	0.90	x x x x
						... Blueish grey mottling from 1.20m bgl.		x x x x
3.40	3	D				... Orange brown mottling from 1.50m bgl.	(1.90)	x x x x
						... Dark blueish grey mottling from 2.20m bgl.	2.80	x x x x
						Blueish grey and dark blueish grey slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.70)	x x x x
						Trail pit terminated at 3.50m bgl.	3.50	x x x x

Plan (Not to Scale)



General Remarks

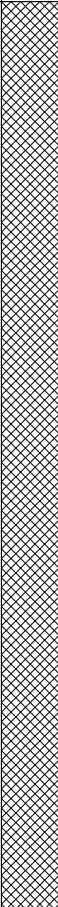
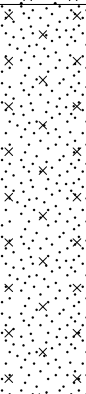
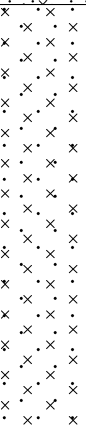
1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered.
2. Groundwater seepage encountered at 1.60m bgl and 3.30m bgl.
3. Trial pit backfilled with arisings upon completion.
4. Sides collapsing due to surrounding surface water.

All dimensions in metres

Scale: **1:25**

Method Used: Machine dug	Plant Used: 13 Ton Tracked Excavator	Logged By: EWild	Checked By:	
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Samples and In-situ Tests				Water	Backfill	Description of Strata	Depth (Thick ness)	Material Graphic Legend
Depth	No	Type	Results					
0.20 0.30	1	ES CBR	4.8%			Brown slightly sandy SILT with occasional rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.30) 0.30	
0.80	2	B				Light yellowish brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS) ... Occasional brown mottling from 0.50m bgl.	(1.30) 1.60	
2.00	3	D				Dark blueish grey slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Dark grey mottling from 1.70m bgl.	(1.40) 3.00	
						Trial pit terminated at 3.00m bgl.		

GINT LIBRARY_v8_07.GLB LibVersion: v8_07_001 PrjVersion: v8_07 | Log TRIAL PIT LOG - A4P | 252234- WESTON SPALDING.GPJ - v8_07.
RSK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600, Fax: 02476 501417, Web: www.rsk.co.uk | 18/03/20 - 13:20 | DM1 |



WINDOW SAMPLE LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS01
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: 2.43	National Grid Co-ordinate: E:528866.0 N:325048.8		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
1.20 - 2.00 (75mm dia) 90% rec 2.00 - 3.00 (75mm dia) 100% rec 3.00 - 4.00 (75mm dia) 60% rec 4.00 - 5.00 (75mm dia) 70% rec	0.20	1	ES				Brown slightly sandy SILT. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.40)	x x x x
							... Occasional dark brown mottling from 0.30m bgl.	0.40	x x x x
	0.60	2	D				Brown to light brown sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.80)	x x x x
							... Occasional grey and orange brown mottling from 0.80m bgl.	1.20	x x x x
	1.20-1.65	1	SPT	N=4			Light brown slightly sandy slightly gravelly SILT. Sand is fine. Gravel is subangular fine to medium sandstone. (TIDAL FLAT DEPOSITS)		x o x x
	1.40	3	D					(0.80)	x o x x
							... Becoming light grey and light orange brown mottled from 1.80m bgl.	2.00	x o x x
	2.00-2.45	2	SPT	N=1			Light brown and grey brown slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)		x x x x
								(1.40)	x x x x
	2.60	4	D				... Becoming blueish grey from 2.50m bgl.		x x x x
	3.00-3.45	3	SPT	N=0			Dark blueish grey slightly sandy slightly clayey SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	3.40	x x x x
									x x x x
							... Organic odour from 3.80m bgl.		x x x x
	4.00-4.45	4	SPT	N=2			... No recovery between 4m to 4.30m bgl.		x x x x
								(2.05)	x x x x
							... Light blueish grey mottling between 4.30m and 4.60m bgl.		x x x x

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 2.00m bgl. 4. Window sample cased to 3m bgl. 5. Window sample backfilled upon completion.	
All dimensions in metres						Scale:	1:25
Method Used:	Inspection pit + Tracked window		Plant Used:	Premier Compact 110		Drilled By:	DSUK LTD
						Logged By:	EWild
						Checked By:	AGS



Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS01
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: 2.43	National Grid Co-ordinate: E:528866.0 N:325048.8		Sheet: 2 of 2

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WINDOW SAMPLE LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS02
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: 2.58	National Grid Co-ordinate: E:528968.5 N:325000.7		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.10	1	ES				Brown sandy SILT with occasional rootlets. Sand is fine. ... Occasional grey mottling from 0.20m bgl.	(0.30) 0.30	
							Light orangish brown fine SAND. (TIDAL FLAT DEPOSITS) ... Occasional light grey mottles from 0.50m bgl.	(1.20)	
	1.20-1.65	1	SPT	N=5			... Occasional light blueish grey mottles from 1.30m bgl.	1.50	
	1.60	2	D				Light orangish brown and light greyish brown clayey SILT. (TIDAL FLAT DEPOSITS) ... Dark grey mottles from 1.80m bgl.	(0.50) 2.00	
	2.00-2.45	2	SPT	N=0			Dark blueish grey mottled light grey slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Occasional organic matter and an organic odour from 2.20m bgl. ... Becoming lightish brown grey from 2.50m bgl.		
	2.70	3	D						
	3.00-3.45	3	SPT	N=0			... No recovery between 3m and 3.50m bgl.		
	3.00 - 4.00 (75mm dia) 50% rec							(3.45)	
	4.00-4.45	4	SPT	N=2			... Black organic matter present at 4m bgl. ... No recovery between 4m and 4.30m bgl. ... Pockets of lightish orange brown sand from 4.30m bgl.		
	4.00 - 5.00 (75mm dia) 70% rec								

Drilling Progress and Water Observations						General Remarks				
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)					
						1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 2.00m bgl. 4. Window sample cased to 2m bgl. 5. Gas and groundwater monitoring well installed with 3m plain pipe and 2m slotted pipe.				
						All dimensions in metres		Scale: 1:25		
Method Used:	Inspection pit + Tracked window			Plant Used:	Premier Compact 110		Drilled By: DSUK LTD	Logged By: EWild	Checked By:	



WINDOW SAMPLE LOG

Contract: Weston Spalding		Client: Persimmon Homes East Midlands		Window Sample: WS02	
Contract Ref: 252234		Start: 19.02.20 End: 19.02.20	Ground Level: 2.58	National Grid Co-ordinate: E:528968.5 N:325000.7	Sheet: 2 of 2

Progress		Samples / Tests			Water	Backfill & Instru- mentation	Description of Strata	Depth (Thick- ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (75mm dia) 70% rec ▼	4.90	4	D	N=6			Dark blueish grey mottled light grey slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS) (stratum copied from 2.00m from previous sheet) ... Frequent oraganic matter and odour from 4.90m bgl.		
	5.00-5.45	5	SPT						
							Window sample hole terminated at 5m bgl.	5.45	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				



Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS03
Contract Ref: 252234	Start: 17.02.20 End: 17.02.20	Ground Level: 2.33	National Grid Co-ordinate: E:528766.6 N:324953.5		Sheet: 1 of 1

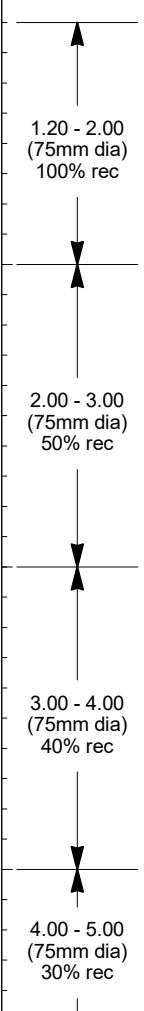
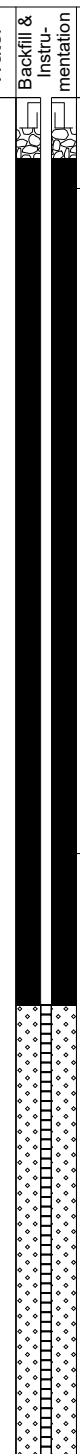
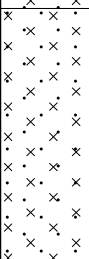
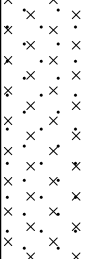
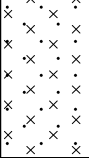
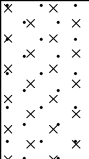
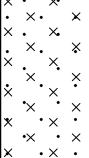
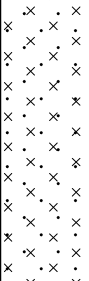
[illegible]

Drilling Progress and Water Observations						General Remarks						
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)							
						1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Groundwater not encountered. 3. Window sample relocated to WS03A due to lack of rig access.						
						All dimensions in metres		Scale:	1:25			
Method Used:	Tracked window sampling			Plant Used:	Hand tools		Drilled By:	PSUK LTD	Logged By:	EWild	Checked By:	



WINDOW SAMPLE LOG

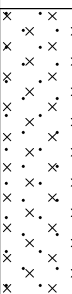
Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS03A
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: ---	National Grid Co-ordinate: E:528765.0 N:324954.0		Sheet: 1 of 2

Progress		Samples / Tests			Water Backfill & Instru- mentation	Description of Strata	Depth (Thick- ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results				
						Brown slightly sandy SILT with frequent rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.30)	
	0.40	1	ES			Orange brown mottled light grey slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	0.30	
	1.20-1.65	1	SPT	N=6		... Becoming sandy from 1.20m bgl.	(2.20)	
	2.00-2.45	2	SPT	N=0		... Occasional light grey brown mottling from 1.80m bgl. ... No recovery between 2m and 2.50m bgl.		
	2.50	2	D			Dark grey mottled dark blueish grey slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS) ... Occasional black organic matter from 2.70m bgl.	2.50	
	3.00-3.45	3	SPT	N=2		... No recovery between 3m and 3.60m bgl.		
	4.00-4.45	4	SPT	N=3		... Becoming lighter grey from 3.70m bgl. ... No recovery between 4m and 4.70m bgl.	(2.95)	

Drilling Progress and Water Observations						General Remarks		
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)			
						1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Window sample cased to 2m bgl. 5. Gas and groundwater monitoring well installed with 3m plain pipe and 2m slotted pipe.		
All dimensions in metres						Scale:	1:25	
Method Used:	Inspection pit + Tracked window		Plant Used:	Premier Compact 110		Drilled By:	DSUK LTD	Logged By: EWild
						Checked By:		



Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS03A
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: ---	National Grid Co-ordinate: E:528765.0 N:324954.0		Sheet: 2 of 2

Progress		Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (75mm dia) 30% rec ▼	4.70	3	D	N=4			Dark grey mottled dark blueish grey slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS) (stratum copied from 2.50m from previous sheet) ... Organic matter present at 4.80m bgl.	5.45		
	5.00-5.45	5	SPT				Window sample hole terminated at 5m bgl.			

Drilling Progress and Water Observations						General Remarks
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	
						6. Surrounded by standing surface water.
						All dimensions in metres Scale: 1:25
Method Used:	Inspection pit + Tracked window		Plant Used:	Premier Compact 110		Drilled By: DSUK LTD Logged By: EWild Checked By: 



WINDOW SAMPLE LOG

Contract: Weston Spalding		Client: Persimmon Homes East Midlands		Window Sample: WS04	
Contract Ref: 252234		Start: 17.02.20 End: 17.02.20	Ground Level: 2.88	National Grid Co-ordinate: E:528867.7 N:324900.1	Sheet: 1 of 1

Progress	Samples / Tests				Water	Backfill	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.20	1	ES				Brown and occasional light brown slightly sandy SILT with occasional rootlets. Sand is fine. (AGRICULTURAL TOPSOIL) ... Brick fragment present at 0.20m bgl. Light yellowish brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS)	0.25	
	0.60	2	ES				... Occasional dark brown and light orange brown mottling from 0.60m bgl.	(0.95)	
							Window sample hole terminated at 1.20m bgl.	1.20	

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Groundwater not encountered. 3. Window sample relocated to WS04A due to lack of rig access.			
Method Used: Tracked window sampling						All dimensions in metres		Scale: 1:25	
Plant Used: Hand tools			Drilled By: DSUK LTD		Logged By: EWild		Checked By:		



WINDOW SAMPLE LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS04A
Contract Ref: 252234	Start: 19.02.20 End: 19.02.20	Ground Level: ---	National Grid Co-ordinate: E:528868.0 N:324901.0		Sheet: 1 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
	0.20	1	ES				Brown sandy SILT with occasional rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.40)	
							Light brown mottled light grey and occasionally yellowish brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS)	(1.00)	
							... Occasional orangish brown mottling from 1m bgl.		
	1.20-1.65	1	SPT	N=4				1.40	
	1.40	2	D				Light brown occasionally mottled orangish brown sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.60)	
							... Becoming dark grey mottled from 1.80m bgl.	2.00	
	2.00-2.45	2	SPT	N=0			Dark grey and black slightly sandy SILT with an organic odour. Sand is fine. (TIDAL FLAT DEPOSITS)		
	2.20	3	D				... No recovery between 2.40m and 3m bgl.		
	3.00-3.45	3	SPT	N=2			... Blueish grey mottling from 3.20m bgl.		
							... No recovery between 3.30m and 4m bgl.		
	3.00-4.00 (75mm dia) 30% rec							(3.45)	
	4.00-4.45	4	SPT	N=4			... Black organic matter and an organic odour from 4.10m bgl.		
	4.10	4	D				... Light greyish brown mottling from 4.40m bgl.		
	4.00-5.00 (75mm dia) 70% rec								

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater not encountered. 4. Window sample cased to 2m bgl. 5. Gas and groundwater monitoring well installed with 3m plain pipe and 2m slotted pipe.			
All dimensions in metres						Scale: 1:25			
Method Used: Inspection pit + Tracked window	Plant Used: Premier Compact 110		Drilled By: DSUK LTD		Logged By: EWild		Checked By:		



WINDOW SAMPLE LOG

Contract: Weston Spalding		Client: Persimmon Homes East Midlands		Window Sample: WS04A	
Contract Ref: 252234		Start: 19.02.20 End: 19.02.20	Ground Level: ---	National Grid Co-ordinate: E:528868.0 N:324901.0	Sheet: 2 of 2

Progress		Samples / Tests			Water	Backfill & Instru- mentation	Description of Strata	Depth (Thick- ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results					
4.00 - 5.00 (75mm dia) 70% rec ▼	5.00-5.45	5	SPT	N=2			Dark grey and black slightly sandy SILT with an organic odour. Sand is fine. (TIDAL FLAT DEPOSITS) (stratum copied from 2.00m from previous sheet) ... No recovery between 4.70m and 5m bgl.	5.45	
							Window sample hole terminated at 5m bgl.		

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				

WINDOW SAMPLE LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS05
Contract Ref: 252234	Start: 17.02.19 End: 17.02.19	Ground Level: 2.81	National Grid Co-ordinate: E:528966.9 N:324898.1		Sheet: 1 of 2

Progress		Samples / Tests			Water Backfill & Instru- mentation	Description of Strata	Depth (Thick- ness)	Material Graphic Legend
Window Run	Depth	No	Type	Results				
	0.30	1	ES			Brown slightly sandy SILT with occasional rootlets. Sand is fine. (AGRICULTURAL TOPSOIL)	(0.40)	
						Light brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS) ... Occasional light orangish brown mottling from 0.60m bgl.	(0.80)	
						Light brown slightly clayey SILT. (TIDAL FLAT DEPOSITS) ... Band of dark brown mottling between 1.30m and 1.35m bgl.	1.20 1.35	
1.20 - 2.00 (75mm dia) 100% rec	1.20-1.65 1.20 1.40	1 2 3	SPT ES D	N=4		Orangish brown slightly clayey slightly gravelly SILT. Gravel is angular to subrounded fine mudstone. (TIDAL FLAT DEPOSITS) ... Occasional sandy pockets between 1.50m and 1.80m bgl.	(0.80)	
	2.00-2.45	2	SPT	N=0		... No recovery between 2m and 2.15m bgl.	2.15	
2.00 - 3.00 (75mm dia) 85% rec	2.50	4	D			Greyish brown slightly gravelly slightly clayey SILT. Gravel is subangular fine to medium mudstone. (TIDAL FLAT DEPOSITS) ... Mottled light grey and orangish brown from 2.20m bgl. ... Becoming blueish grey from 2.80m bgl.	(0.85)	
	3.00-3.45 3.10	3 5	SPT D	N=0		Blueish grey clayey SILT with occasional black organic matter. (TIDAL FLAT DEPOSITS) ... Becoming slightly sandy from 3.40m bgl. ... no recovery between 3.70m and 4m bgl. ... Black organic matter at 4.05m bgl. ... No recovery between 4.30m and 5m bgl.	3.00 (2.45)	
3.00 - 4.00 (75mm dia) 70% rec								
4.00 - 5.00 (75mm dia) 25% rec	4.00-4.45 4.10	4 6	SPT D	N=0				

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)	1. Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. 2. Hand dug inspection pit to 1.20m bgl. 3. Groundwater encountered at 1.20m bgl. 4. Window sample cased to 5m bgl. 5. Gas and groundwater monitoring well installed with 3m plain pipe and 2m slotted pipe.			
Method Used: Inspection pit + Tracked window						All dimensions in metres		Scale: 1:25	
Plant Used: Premier Compact 110		Drilled By: DSUK LTD		Logged By: EWild		Checked By:			



WINDOW SAMPLE LOG

Contract: Weston Spalding		Client: Persimmon Homes East Midlands		Window Sample: WS05	
Contract Ref: 252234		Start: 17.02.19 End: 17.02.19	Ground Level: 2.81	National Grid Co-ordinate: E:528966.9 N:324898.1	Sheet: 2 of 2

Progress		Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (75mm dia) 25% rec ▼	5.00-5.45	5	SPT	N=0			Blueish grey clayey SILT with occasional black organic matter. (TIDAL FLAT DEPOSITS) <i>(stratum copied from 3.00m from previous sheet)</i>	5.45		

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				



WINDOW SAMPLE LOG

Contract: Weston Spalding			Client: Persimmon Homes East Midlands		Window Sample: WS06
Contract Ref: 252234	Start: 17.02.20 End: 17.02.20	Ground Level: 3.13	National Grid Co-ordinate: E:528816.8 N:324850.4		Sheet: 1 of 2

Progress		Samples / Tests			Water Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend	
Window Run	Depth	No	Type	Results					
	0.10	1	ES	N=1		Brown slightly clayey slightly sandy SILT. Sand is fine. (AGRICULTURAL TOPSOIL)	0.20		
	0.40	2	ES			Light brown slightly sandy SILT. Sand is fine. (TIDAL FLAT DEPOSITS)	(0.30)		
	1.00	3	D			Light orangish brown slightly silty fine SAND. (TIDAL FLAT DEPOSITS)	(1.40)		
	1.20-1.65	1	SPT	N=1		... Light grey mottled from 1.50m bgl.	1.90		
	1.90	4	D			... Mottled light orangish brown and grey brown from 1.80m bgl.	(0.30)		
	2.00-2.45	2	SPT			Blueish grey slightly clayey SILT. (TIDAL FLAT DEPOSITS)	2.20		
	2.20	5	ES	N=0		... Pocket of orange brown sand at 1.95m bgl. ... No recovery between 2m and 2.20m bgl.	(3.25)		
	3.00-3.45	3	SPT			Black slightly sandy slightly clayey SILT with an organic odour. Sand is fine. (TIDAL FLAT DEPOSITS)			
	3.50	6	D			... Becoming grey mottled from 2.40m bgl. ... Grey from 2.60m bgl.			
	4.00-4.45	4	SPT	N=0		... Blueish grey black from 3m bgl.			
						... Black and brown organic matter present between 3.60m and 4m bgl.			
						... No recovery between 4m and 4.30m bgl.			

Drilling Progress and Water Observations						General Remarks		
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)			
						- Location cleared with GPR and CAT scanned prior to breaking ground. No services encountered. - Hand dug inspection pit to 1.20m bgl. - Groundwater not encountered. - Window sample cased to 5m bgl. - Gas and groundwater monitoring well installed with 3m plain pipe and 2m slotted pipe.		
All dimensions in metres						Scale:	1:25	
Method Used:	Inspection pit + Tracked window		Plant Used:	Premier Compact 110		Drilled By:	DSUK LTD	Logged By: EWild
						Checked By:		



Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Depth (Thickness)	Material Graphic Legend	
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (75mm dia) 70% rec ▼	4.60	7	D	N=0			Black slightly sandy slightly clayey SILT with an organic odour. Sand is fine. (TIDAL FLAT DEPOSITS) <i>(stratum copied from 2.20m from previous sheet)</i> . . . Light brown mottled from 4.50, bgl. . . . Frequent black organic matter between 4.60m and 5m bgl.	5.45		
	5.00-5.45	5	SPT							Window sample hole terminated at 5m bgl.

SINT LIBRARY_V8_07.GLB LibVersion: v8_07_001 PriVersion: v8_07 | Log WINDOW SAMPLE LOG - A4P | 252234- WESTON SPALDING.GPJ - v8_07.
RSK Environment Ltd, Abbey Park, Humber Road, Coventry, CV3 4AQ. Tel: 02476 505600. Fax: 02476 501417. Web: www.rsk.co.uk | 1803/20 - 13/14 | DM1



APPENDIX E

GROUND GAS MONITORING DATA

IN-SITU GAS MONITORING RESULTS

	Start Date	End Date	Previous	Pressures During	Start	End	Equipment Used & Remarks
Round 1	-	-	-	-	-	-	
Round 2	02/03/2020	02/03/2020	-	-	-	-	
Round 3	06/03/2020	06/03/2020	-	-	-	-	
Round 4	-	-	-	-	-	-	

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS02	1	50	1	5.00	4.89	3.00 to 5.00	24/02/2020 14:46:00	1006	999	0.0 _(l)	0.51	0.0	0.0	20.9	0.0	0	0
WS02	1	50	1		---	3.00 to 5.00	15 secs	-	-	0.1 _(ss)	-	0.0	0.1	20.9	2.0	4	0
WS02	1	50	1		---	3.00 to 5.00	30 secs	-	-	-	-	0.0	0.1	20.7	2.0	1	0
WS02	1	50	1		---	3.00 to 5.00	60 secs	-	-	-	-	0.0	0.3	20.4	6.0	0	0
WS02	1	50	1		---	3.00 to 5.00	90 secs	-	-	-	-	0.0	0.3	20.3	6.0	0	0
WS02	1	50	1		---	3.00 to 5.00	120 secs	-	-	-	-	0.0	0.3	20.3	6.0	0	0
WS02	1	50	2	5.00	4.89	3.00 to 5.00	02/03/2020 12:01:00	991	991	0.0 _(l)	0.35	0.1	0.0	20.9	0.0	0	0
WS02	1	50	2		---	3.00 to 5.00	15 secs	-	-	0.1 _(ss)	-	1.3	21.2	13.6	4.0	-	0
WS02	1	50	2		---	3.00 to 5.00	30 secs	-	-	-	-	1.2	19.1	13.5	2.0	-	0
WS02	1	50	3	5.00	---	3.00 to 5.00	06/03/2020 09:53:00	1013	1005	0.0 _(l)	0.05	0.1	0.0	20.7	0.0	1	0
WS02	1	50	3		---	3.00 to 5.00	15 secs	-	-	4.7 _(ss)	-	2.2	24.6	17.3	-	1	0
WS02	1	50	3		---	3.00 to 5.00	30 secs	-	-	-	-	2.3	24.7	13.3	-	2	0
WS02	1	50	3		---	3.00 to 5.00	60 secs	-	-	-	-	2.3	24.6	12.2	-	2	0
WS02	1	50	3		---	3.00 to 5.00	90 secs	-	-	-	-	2.3	24.5	12.1	-	2	0
WS02	1	50	3		---	3.00 to 5.00	120 secs	-	-	-	-	2.3	24.4	12.1	-	2	0
WS02	1	50	3		---	3.00 to 5.00	180 secs	-	-	-	-	1.8	19.2	15.7	-	1	0
WS02	1	50	3		---	3.00 to 5.00	240 secs	-	-	-	-	2.0	21.1	13.4	-	1	0
WS02	1	50	3 (2)	5.00	4.89	3.00 to 5.00	06/03/2020 15:47:00	1011	1008	0.0 _(l)	4.00	0.1	0.0	20.7	0.0	0	0

Key: l = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
		20/03/20			252234
	Contract: Weston Spalding				Page: 1 of 8 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS02	1	50	3 (2)		---	3.00 to 5.00	15 secs	-	-	0.0 _(SS)	-	0.1	0.1	20.7	2.0	13	0
WS02	1	50	3 (2)		---	3.00 to 5.00	30 secs	-	-	-	-	0.1	0.1	20.7	2.0	17	0
WS02	1	50	3 (2)		---	3.00 to 5.00	60 secs	-	-	-	-	0.1	0.1	20.7	2.0	18	0
WS02	1	50	3 (2)		---	3.00 to 5.00	90 secs	-	-	-	-	0.1	0.1	20.7	2.0	19	0
WS02	1	50	3 (2)		---	3.00 to 5.00	120 secs	-	-	-	-	0.1	0.1	20.7	2.0	19	0
WS02	1	50	3 (2)		---	3.00 to 5.00	180 secs	-	-	-	-	0.1	0.1	20.6	2.0	20	0
WS02	1	50	3 (2)		---	3.00 to 5.00	240 secs	-	-	-	-	0.1	0.1	20.6	2.0	21	1
WS02	1	50	3 (2)		---	3.00 to 5.00	300 secs	-	-	-	-	0.1	0.1	20.6	2.0	21	0
WS02	1	50	4	5.00	4.86	3.00 to 5.00	16/03/2020 13:10:00	1029	1022	0.0 _(I)	1.83	0.0	0.0	20.9	0.0	0	0
WS02	1	50	4		---	3.00 to 5.00	15 secs	-	-	0.0 _(SS)	-	4.8	24.0	14.9	0.0	3	0
WS02	1	50	4		---	3.00 to 5.00	30 secs	-	-	-	-	4.9	24.3	12.3	0.0	4	0
WS02	1	50	4		---	3.00 to 5.00	60 secs	-	-	-	-	4.9	24.7	12.0	0.0	4	0
WS02	1	50	4		---	3.00 to 5.00	90 secs	-	-	-	-	5.0	24.8	11.8	0.0	4	0
WS02	1	50	4		---	3.00 to 5.00	120 secs	-	-	-	-	5.0	25.0	11.7	0.0	4	0
WS02	1	50	4		---	3.00 to 5.00	180 secs	-	-	-	-	5.0	25.2	11.6	0.0	4	0
WS02	1	50	4		---	3.00 to 5.00	240 secs	-	-	-	-	5.1	25.3	11.5	0.0	4	0
WS02	1	50	4		---	3.00 to 5.00	300 secs	-	-	-	-	5.1	25.3	11.4	0.0	4	0
WS03A	1	50	1	5.00	4.99	3.00 to 5.00	24/02/2020 15:02:00	999	999	0.0 _(I)	1.77	0.1	0.0	20.9	0.0	0	0
WS03A	1	50	1		---	3.00 to 5.00	15 secs	-	-	0.0 _(SS)	-	1.4	0.4	19.6	8.0	8	0
WS03A	1	50	1		---	3.00 to 5.00	30 secs	-	-	-	-	0.9	0.3	19.8	6.0	6	0
WS03A	1	50	1		---	3.00 to 5.00	60 secs	-	-	-	-	0.4	0.1	20.3	2.0	3	0
WS03A	1	50	1		---	3.00 to 5.00	90 secs	-	-	-	-	0.2	0.1	20.6	2.0	2	0
WS03A	1	50	1		---	3.00 to 5.00	120 secs	-	-	-	-	0.2	0.1	20.7	2.0	1	0
WS03A	1	50	1		---	3.00 to 5.00	180 secs	-	-	-	-	0.1	0.0	20.8	0.0	1	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS03A	1	50	1		---	3.00 to 5.00	240 secs	-	-	-	-	0.1	0.0	20.8	0.0	1	0
WS03A	1	50	1		---	3.00 to 5.00	300 secs	-	-	-	-	0.1	0.0	20.8	0.0	1	0
WS03A	1	50	2	5.00	4.94	3.00 to 5.00	02/03/2020 11:46:00	991	991	-0.1 _(I)	2.24	0.1	0.0	20.9	0.0	0	0
WS03A	1	50	2		---	3.00 to 5.00	15 secs	-	-	0.0 _(SS)	-	1.5	0.4	18.5	8.0	5	0
WS03A	1	50	2		---	3.00 to 5.00	30 secs	-	-	-	-	1.6	0.4	18.5	8.0	5	0
WS03A	1	50	2		---	3.00 to 5.00	60 secs	-	-	-	-	1.6	0.4	18.5	8.0	5	0
WS03A	1	50	2		---	3.00 to 5.00	90 secs	-	-	-	-	1.5	0.4	18.5	8.0	5	0
WS03A	1	50	2		---	3.00 to 5.00	120 secs	-	-	-	-	1.2	0.3	18.7	6.0	4	0
WS03A	1	50	2		---	3.00 to 5.00	180 secs	-	-	-	-	0.9	0.2	18.9	4.0	3	0
WS03A	1	50	2		---	3.00 to 5.00	240 secs	-	-	-	-	0.6	0.2	19.2	4.0	1	0
WS03A	1	50	3	5.00	4.94	3.00 to 5.00	06/03/2020 11:24:00	1007	1007	0.0 _(I)	2.00	0.1	0.0	20.6	-	0	0
WS03A	1	50	3		---	3.00 to 5.00	15 secs	-	-	0.0 _(SS)	-	0.8	0.1	20.0	-	2	0
WS03A	1	50	3		---	3.00 to 5.00	30 secs	-	-	-	-	0.6	0.1	19.8	-	1	0
WS03A	1	50	3		---	3.00 to 5.00	60 secs	-	-	-	-	0.5	0.0	19.9	-	1	0
WS03A	1	50	3		---	3.00 to 5.00	90 secs	-	-	-	-	0.4	0.0	20.0	-	1	1
WS03A	1	50	3		---	3.00 to 5.00	120 secs	-	-	-	-	0.4	0.0	20.0	-	1	1
WS03A	1	50	3		---	3.00 to 5.00	180 secs	-	-	-	-	0.4	0.0	19.9	-	1	1
WS03A	1	50	3		---	3.00 to 5.00	240 secs	-	-	-	-	0.4	0.0	19.9	-	1	1
WS03A	1	50	3		---	3.00 to 5.00	300 secs	-	-	-	-	0.4	0.0	19.9	-	1	1
WS03A	1	50	4	5.00	3.71	3.00 to 5.00	16/03/2020 12:57:00	1023	1023	0.0 _(I)	0.00	0.0	0.0	21.0	2.0	0	0
WS03A	1	50	4		---	3.00 to 5.00	15 secs	-	-	0.1 _(SS)	-	0.9	0.0	20.4	2.0	1	0
WS03A	1	50	4		---	3.00 to 5.00	30 secs	-	-	-	-	0.9	0.0	20.2	2.0	2	0
WS03A	1	50	4		---	3.00 to 5.00	60 secs	-	-	-	-	0.9	0.0	20.2	2.0	2	0
WS03A	1	50	4		---	3.00 to 5.00	90 secs	-	-	-	-	0.9	0.0	20.2	2.0	2	0
WS03A	1	50	4		---	3.00 to 5.00	120 secs	-	-	-	-	0.9	0.0	20.2	2.0	2	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS03A	1	50	4		---	3.00 to 5.00	180 secs	-	-	-	-	0.8	0.0	20.3	0.0	2	0
WS03A	1	50	4		---	3.00 to 5.00	240 secs	-	-	-	-	0.5	0.0	20.3	0.0	1	0
WS03A	1	50	4		---	3.00 to 5.00	300 secs	-	-	-	-	0.3	0.0	20.4	0.0	1	0
WS04A	1	50	1	5.00	4.95	3.00 to 5.00	24/02/2020 15:28:00	999	999	0.1 _(I)	2.03	0.0	0.0	20.9	0.0	0	0
WS04A	1	50	1		---	3.00 to 5.00	15 secs	-	-	0.1 _(SS)	-	2.8	1.0	19.2	20.0	23	0
WS04A	1	50	1		---	3.00 to 5.00	30 secs	-	-	-	-	2.7	1.0	18.7	20.0	28	0
WS04A	1	50	1		---	3.00 to 5.00	60 secs	-	-	-	-	2.6	1.0	18.8	20.0	27	0
WS04A	1	50	1		---	3.00 to 5.00	90 secs	-	-	-	-	2.5	0.9	18.9	18.0	25	0
WS04A	1	50	1		---	3.00 to 5.00	120 secs	-	-	-	-	2.3	0.9	19.0	18.0	23	0
WS04A	1	50	1		---	3.00 to 5.00	180 secs	-	-	-	-	2.1	0.8	19.3	16.0	20	0
WS04A	1	50	1		---	3.00 to 5.00	240 secs	-	-	-	-	1.9	0.7	19.4	14.0	18	0
WS04A	1	50	1		---	3.00 to 5.00	300 secs	-	-	-	-	1.6	0.6	19.6	12.0	16	0
WS04A	1	50	2	5.00	4.92	3.00 to 5.00	02/03/2020 11:31:00	990	991	0.0 _(I)	0.89	0.2	0.0	20.9	0.0	1	0
WS04A	1	50	2		---	3.00 to 5.00	15 secs	-	-	0.0 _(SS)	-	1.7	0.9	19.7	18.0	22	0
WS04A	1	50	2		---	3.00 to 5.00	30 secs	-	-	-	-	1.7	0.8	19.8	16.0	18	0
WS04A	1	50	3	5.00	---	3.00 to 5.00	06/03/2020 10:06:00	1006	1006	-0.1 _(I)	-	0.1	0.0	20.6	0.0	0	0
WS04A	1	50	3		---	3.00 to 5.00	15 secs	-	-	-0.1 _(SS)	-	0.1	0.5	20.5	10.0	0	0
WS04A	1	50	3		---	3.00 to 5.00	30 secs	-	-	-	-	0.9	0.3	20.2	6.0	4	0
WS04A	1	50	3		---	3.00 to 5.00	60 secs	-	-	-	-	0.9	0.3	20.0	6.0	4	0
WS04A	1	50	3		---	3.00 to 5.00	90 secs	-	-	-	-	0.9	0.3	20.0	6.0	4	0
WS04A	1	50	3		---	3.00 to 5.00	120 secs	-	-	-	-	0.9	0.3	20.0	6.0	4	0
WS04A	1	50	3		---	3.00 to 5.00	180 secs	-	-	-	-	0.9	0.3	20.0	6.0	4	0
WS04A	1	50	3 (2)	5.00	4.95	3.00 to 5.00	06/03/2020 16:00:00	1015	1008	0.0 _(I)	4.39	0.1	0.0	20.6	0.0	0	0
WS04A	1	50	3 (2)		---	3.00 to 5.00	15 secs	-	-	0.1 _(SS)	-	0.1	0.0	20.3	0.0	1	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS04A	1	50	3 (2)		---	3.00 to 5.00	30 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS04A	1	50	3 (2)		---	3.00 to 5.00	60 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS04A	1	50	3 (2)		---	3.00 to 5.00	90 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS04A	1	50	3 (2)		---	3.00 to 5.00	120 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS04A	1	50	3 (2)		---	3.00 to 5.00	180 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS04A	1	50	3 (2)		---	3.00 to 5.00	240 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS04A	1	50	3 (2)		---	3.00 to 5.00	300 secs	-	-	-	-	0.1	0.0	20.3	0.0	0	0
WS04A	1	50	4	5.00	4.95	3.00 to 5.00	16/03/2020 12:35:00	1024	1022	10.1 _(I)	2.39	0.0	0.0	20.2	0.0	2	0
WS04A	1	50	4		---	3.00 to 5.00	15 secs	-	-	2.3 _(SS)	-	3.9	2.2	18.7	44.0	2	0
WS04A	1	50	4		---	3.00 to 5.00	30 secs	-	-	-	-	3.9	2.2	17.8	44.0	2	0
WS04A	1	50	4		---	3.00 to 5.00	60 secs	-	-	-	-	3.9	2.2	17.7	44.0	2	0
WS04A	1	50	4		---	3.00 to 5.00	90 secs	-	-	-	-	3.9	2.2	17.7	44.0	2	0
WS04A	1	50	4		---	3.00 to 5.00	120 secs	-	-	-	-	3.9	2.2	17.7	44.0	2	0
WS04A	1	50	4		---	3.00 to 5.00	180 secs	-	-	-	-	3.9	2.2	17.7	44.0	2	0
WS04A	1	50	4		---	3.00 to 5.00	240 secs	-	-	-	-	3.9	2.2	17.7	44.0	2	0
WS04A	1	50	4		---	3.00 to 5.00	300 secs	-	-	-	-	3.9	2.1	17.7	42.0	2	0
WS05	1	50	1	5.00	4.17	3.00 to 5.00	24/02/2020 14:32:00	1001	999	14.6 _(I)	1.86	0.0	0.0	20.9	0.0	0	0
WS05	1	50	1		---	3.00 to 5.00	15 secs	-	-	0.4 _(SS)	-	0.7	2.1	20.3	42.0	2	0
WS05	1	50	1		---	3.00 to 5.00	30 secs	-	-	-	-	0.7	2.0	20.1	40.0	3	0
WS05	1	50	1		---	3.00 to 5.00	60 secs	-	-	-	-	0.7	2.0	20.1	40.0	3	0
WS05	1	50	1		---	3.00 to 5.00	90 secs	-	-	-	-	0.7	2.0	20.1	40.0	3	0
WS05	1	50	1		---	3.00 to 5.00	120 secs	-	-	-	-	0.7	2.0	20.2	40.0	3	0
WS05	1	50	1		---	3.00 to 5.00	180 secs	-	-	-	-	0.7	2.0	20.3	40.0	3	0
WS05	1	50	1		---	3.00 to 5.00	240 secs	-	-	-	-	0.7	2.0	20.4	40.0	3	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

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IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS05	1	50	2	5.00	4.20	3.00 to 5.00	02/03/2020 11:22:00	990	990	0.0 _(l)	1.61	0.1	0.0	20.9	0.0	0	0
WS05	1	50	2		---	3.00 to 5.00	15 secs	-	-	0.0 _(ss)	-	0.6	1.4	13.9	28.0	3	0
WS05	1	50	2		---	3.00 to 5.00	30 secs	-	-	-	-	0.6	1.4	19.3	28.0	3	0
WS05	1	50	2		---	3.00 to 5.00	60 secs	-	-	-	-	0.6	1.4	19.3	28.0	3	0
WS05	1	50	2		---	3.00 to 5.00	90 secs	-	-	-	-	0.6	1.4	19.2	28.0	3	0
WS05	1	50	2		---	3.00 to 5.00	120 secs	-	-	-	-	0.6	1.4	19.2	28.0	3	0
WS05	1	50	2		---	3.00 to 5.00	180 secs	-	-	-	-	0.6	1.4	19.2	28.0	3	0
WS05	1	50	3	5.00	4.17	3.00 to 5.00	06/03/2020 11:36:00	1008	1008	0.0 _(l)	1.88	0.1	0.0	20.6	0.0	0	0
WS05	1	50	3		---	3.00 to 5.00	15 secs	-	-	0.1 _(ss)	-	0.6	0.6	19.2	12.0	2	0
WS05	1	50	3		---	3.00 to 5.00	30 secs	-	-	-	-	0.6	0.6	18.5	12.0	2	0
WS05	1	50	3		---	3.00 to 5.00	60 secs	-	-	-	-	0.3	0.3	19.2	6.0	1	0
WS05	1	50	3		---	3.00 to 5.00	90 secs	-	-	-	-	0.2	0.2	19.7	4.0	1	0
WS05	1	50	3		---	3.00 to 5.00	120 secs	-	-	-	-	0.2	0.2	19.9	4.0	1	1
WS05	1	50	3		---	3.00 to 5.00	180 secs	-	-	-	-	0.2	0.1	20.1	2.0	0	1
WS05	1	50	3		---	3.00 to 5.00	240 secs	-	-	-	-	0.1	0.1	20.2	2.0	0	0
WS05	1	50	3		---	3.00 to 5.00	300 secs	-	-	-	-	0.1	0.1	20.3	2.0	0	1
WS05	1	50	4	5.00	4.17	3.00 to 5.00	16/03/2020 12:23:00	1021	1022	-2.3 _(l)	0.10	0.0	0.0	20.6	2.0	0	0
WS05	1	50	4		---	3.00 to 5.00	15 secs	-	-	0.1 _(ss)	-	0.7	0.0	19.7	0.0	4	0
WS05	1	50	4		---	3.00 to 5.00	30 secs	-	-	-	-	0.7	0.0	19.0	0.0	5	0
WS05	1	50	4		---	3.00 to 5.00	60 secs	-	-	-	-	0.7	0.0	18.9	0.0	5	0
WS05	1	50	4		---	3.00 to 5.00	90 secs	-	-	-	-	0.7	0.0	18.9	0.0	5	0
WS05	1	50	4		---	3.00 to 5.00	120 secs	-	-	-	-	0.7	0.0	18.9	0.0	5	0
WS05	1	50	4		---	3.00 to 5.00	180 secs	-	-	-	-	1.2	0.0	15.3	0.0	5	0
WS05	1	50	4		---	3.00 to 5.00	240 secs	-	-	-	-	1.9	0.0	9.3	2.0	3	0
WS05	1	50	4		---	3.00 to 5.00	300 secs	-	-	-	-	2.4	0.0	5.6	2.0	1	0

Key: l = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
	 Contract:	20/03/20			252234
	Weston Spalding				Page: 6 of 8



IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS06	1	50	1	5.00	4.96	3.00 to 5.00	24/02/2020 15:15:00	999	999	0.0 _(l)	0.95	0.0	0.0	21.0	0.0	0	0
WS06	1	50	1		---	3.00 to 5.00	15 secs	-	-	0.0 _(ss)	-	0.7	2.5	20.1	50.0	2	0
WS06	1	50	1		---	3.00 to 5.00	30 secs	-	-	-	-	0.7	2.5	19.6	50.0	3	0
WS06	1	50	1		---	3.00 to 5.00	60 secs	-	-	-	-	0.7	2.5	19.6	50.0	3	0
WS06	1	50	1		---	3.00 to 5.00	90 secs	-	-	-	-	0.7	2.5	19.6	50.0	3	0
WS06	1	50	1		---	3.00 to 5.00	120 secs	-	-	-	-	0.7	2.5	19.6	50.0	3	0
WS06	1	50	1		---	3.00 to 5.00	180 secs	-	-	-	-	0.7	2.4	19.6	48.0	3	0
WS06	1	50	2	5.00	4.92	3.00 to 5.00	02/03/2020 11:40:00	994	994	0.2 _(l)	0.25	0.1	0.0	20.9	0.0	1	0
WS06	1	50	2		---	3.00 to 5.00	15 secs	-	-	0.0 _(ss)	-	0.8	1.1	19.8	22.0	5	0
WS06	1	50	2		---	3.00 to 5.00	30 secs	-	-	-	-	0.8	1.0	19.7	20.0	3	0
WS06	1	50	3	5.00	---	3.00 to 5.00	06/03/2020 10:16:00	1006	1007	0.0 _(l)	-	0.1	0.0	21.0	0.0	0	0
WS06	1	50	3		---	3.00 to 5.00	15 secs	-	-	-0.5 _(ss)	-	0.8	0.3	20.9	6.0	4	0
WS06	1	50	3		---	3.00 to 5.00	30 secs	-	-	-	-	0.8	0.2	20.6	4.0	5	0
WS06	1	50	3		---	3.00 to 5.00	60 secs	-	-	-	-	0.8	0.2	20.6	4.0	5	0
WS06	1	50	3		---	3.00 to 5.00	90 secs	-	-	-	-	0.8	0.2	20.6	4.0	5	0
WS06	1	50	3 (2)	5.00	4.96	3.00 to 5.00	06/03/2020 16:12:00	1032	1008	0.0 _(l)	4.73	0.1	0.0	20.5	0.0	0	0
WS06	1	50	3 (2)		---	3.00 to 5.00	15 secs	-	-	0.1 _(ss)	-	0.1	0.0	20.5	0.0	3	0
WS06	1	50	3 (2)		---	3.00 to 5.00	30 secs	-	-	-	-	0.1	0.0	20.5	0.0	3	0
WS06	1	50	3 (2)		---	3.00 to 5.00	60 secs	-	-	-	-	0.1	0.0	20.5	0.0	3	0
WS06	1	50	3 (2)		---	3.00 to 5.00	90 secs	-	-	-	-	0.1	0.0	20.5	0.0	3	0
WS06	1	50	3 (2)		---	3.00 to 5.00	120 secs	-	-	-	-	0.1	0.0	20.6	0.0	3	0
WS06	1	50	3	5.00	---	3.00 to 5.00	06/03/2020 16:15:00	-	-	-	-	0.1	0.0	20.6	0.0	3	0
WS06	1	50	3		---	3.00 to 5.00	240 secs	-	-	-	-	0.1	0.0	20.6	0.0	3	0
WS06	1	50	3		---	3.00 to 5.00	300 secs	-	-	-	-	0.1	0.0	20.6	0.0	3	0

Key: l = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
		20/03/20			252234
	Contract: Weston Spalding				Page: 7 of 8 

IN-SITU GAS MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe diameter (mm)	Monitoring Round	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring (elapsed time)	Borehole Pressure (mb)	Atmos Pressure (mb)	Gas Flow (l/hr)	Water Depth (mbgl)	Carbon Dioxide (% / vol)	Methane (% / vol)	Oxygen (% / vol)	LEL (%)	Carbon Monoxide (ppm)	Hydrogen Sulphide (ppm)
WS06	1	50	4	5.00	4.96	3.00 to 5.00	16/03/2020 12:47:00	1022	1022	3.5 _(l)	1.26	0.0	0.0	20.8	2.0	4	0
WS06	1	50	4		---	3.00 to 5.00	15 secs	-	-	0.6 _(ss)	-	3.5	2.7	18.1	54.0	5	0
WS06	1	50	4		---	3.00 to 5.00	30 secs	-	-	-	-	3.5	2.7	17.0	54.0	6	0
WS06	1	50	4		---	3.00 to 5.00	60 secs	-	-	-	-	3.5	2.6	16.9	52.0	6	0
WS06	1	50	4		---	3.00 to 5.00	90 secs	-	-	-	-	3.5	2.6	17.0	52.0	6	0
WS06	1	50	4		---	3.00 to 5.00	120 secs	-	-	-	-	3.5	2.6	17.0	52.0	6	0
WS06	1	50	4		---	3.00 to 5.00	180 secs	-	-	-	-	3.4	2.5	17.0	50.0	5	0
WS06	1	50	4		---	3.00 to 5.00	240 secs	-	-	-	-	3.4	2.5	17.1	50.0	5	0
WS06	1	50	4		---	3.00 to 5.00	300 secs	-	-	-	-	3.3	2.4	17.2	48.0	5	0

Key: I = Initial, Min = Minimum, P = Peak, SS = Steady State. Note: LEL = Lower Explosive Limit = 5% v/v.

 RSK Environment Ltd Abbey Park Humber Road Coventry CV3 4AQ	Compiled By	Date	Checked By	Date	Contract Ref:
		20/03/20			252234
	Contract: Weston Spalding				Page: 8 of 8 



APPENDIX F

LABORATORY CERTIFICATES FOR SOIL ANALYSIS

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 20/01779
Issue Number: 1
Date: 03 March, 2020

Client: RSK Environment Ltd Coventry
Humber Road, Abbey Park
Coventry
UK
CV3 4AQ

Project Manager: Emma Wild/Rowan Brown
Project Name: Weston, Spalding
Project Ref: 252234
Order No: N/A
Date Samples Received: 21/02/20
Date Instructions Received: 21/02/20
Date Analysis Completed: 03/03/20

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:


Holly Neary-King
Administration & Client Services Supervisor

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/1	20/01779/2	20/01779/3	20/01779/4	20/01779/5	20/01779/6	20/01779/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS04	WS06	SA01	SA02A	TP06	TP10			
Depth to Top	0.20	0.60	2.20	0.10	0.20	0.20	2.30			
Depth To Bottom										
Date Sampled	19-Feb-20	17-Feb-20	17-Feb-20	18-Feb-20	18-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6	6	6	6E	6E	6E	6A			
% Stones >10mm _A	<0.1	<0.1	6.6	<0.1	<0.1	<0.1	7.2	% w/w	0.1	A-T-044
pH _D ^{M#}	8.26	-	8.90	7.91	8.32	7.89	8.31	pH	0.01	A-T-031s
pH BRE _D ^{M#}	8.26	8.41	8.90	-	8.32	-	8.31	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1) _D ^{M#}	<10	48	119	-	<10	-	922	mg/l	10	A-T-026s
Total Organic Carbon _D ^{M#}	1.37	-	1.29	1.41	1.19	1.23	2.01	% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	6	-	3	7	5	6	7	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	<0.5	-	<0.5	<0.5	<0.5	<0.5	1.0	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	7	-	7	8	8	7	10	mg/kg	1	A-T-024s
Chromium _D ^{M#}	29	-	41	29	26	25	51	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead _D ^{M#}	17	-	15	18	19	17	32	mg/kg	1	A-T-024s
Mercury _D	<0.17	-	<0.17	<0.17	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	24	-	34	24	20	21	43	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	-	<1	<1	<1	<1	2	mg/kg	1	A-T-024s
Zinc _D ^{M#}	58	-	72	62	56	55	94	mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-1 (2:1) (1 no) _A	*	-	*	-	*	-	*			A-T-001
Arsenic (leachable) _A [#]	15	-	11	-	15	-	2	µg/l	1	A-T-025w
Boron (leachable) _A [#]	98	-	996	-	83	-	865	µg/l	10	A-T-025w
Cadmium (leachable) _A [#]	<1	-	<1	-	<1	-	<1	µg/l	1	A-T-025w
Copper (leachable) _A [#]	20	-	10	-	21	-	<1	µg/l	1	A-T-025w
Chromium (leachable) _A [#]	4	-	4	-	3	-	<1	µg/l	1	A-T-025w
Chromium (hexavalent) (leachable) _A	<0.05	-	<0.05	-	<0.05	-	<0.05	mg/l	0.05	A-T-040w
Lead (leachable) _A [#]	33	-	28	-	33	-	<1	µg/l	1	A-T-025w
Mercury (leachable) _A [#]	<0.1	-	0.2	-	<0.1	-	0.5	µg/l	0.1	A-T-025w
Nickel (leachable) _A [#]	16	-	13	-	13	-	2	µg/l	1	A-T-025w
Selenium (leachable) _A [#]	<1	-	<1	-	<1	-	<1	µg/l	1	A-T-025w
Zinc (leachable) _A [#]	41	-	45	-	39	-	5	µg/l	1	A-T-025w

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/1	20/01779/2	20/01779/3	20/01779/4	20/01779/5	20/01779/6	20/01779/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS04	WS06	SA01	SA02A	TP06	TP10			
Depth to Top	0.20	0.60	2.20	0.10	0.20	0.20	2.30			
Depth To Bottom										
Date Sampled	19-Feb-20	17-Feb-20	17-Feb-20	18-Feb-20	18-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6	6	6	6E	6E	6E	6A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	-	NAD	NAD	NAD	NAD	NAD			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? ^D	N/A	-	N/A	N/A	N/A	N/A	N/A			A-T-045
OCP+OPP Combined Pest Suite (excl. Atrazine and Simazine)										
Dichlobenil _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Tecnazene _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Trifluralin _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
alpha-Hexachlorocyclohexane (HCH) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Hexachlorobenzene (HCB) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
beta-Hexachlorocyclohexane (HCH) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Quintozone (PCNB) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
gamma-Hexachlorocyclohexane (HCH) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Chlorothalonil _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
delta-Hexachlorocyclohexane (HCH) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Triallate _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Heptachlor _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Aldrin _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Triadimefon _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Telodrin _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Isodrin _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Pendimethalin _A	-	<0.01	-	<0.01	-	0.02	-	mg/kg	0.01	A-T-056
Heptachlor epoxide _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
trans-Chlordane (Gamma) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
o,p-DDE (2,4) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Endosulphan I (Alpha) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
cis-Chlordane (Alpha) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
p,p-DDE (4,4) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Dieldrin _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
o,p-DDD (2,4) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Endrin _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Endosulphan II (Beta) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/1	20/01779/2	20/01779/3	20/01779/4	20/01779/5	20/01779/6	20/01779/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS04	WS06	SA01	SA02A	TP06	TP10			
Depth to Top	0.20	0.60	2.20	0.10	0.20	0.20	2.30			
Depth To Bottom										
Date Sampled	19-Feb-20	17-Feb-20	17-Feb-20	18-Feb-20	18-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6	6	6	6E	6E	6E	6A			
p,p-DDD (4,4) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
o,p-DDT (2,4) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Endrin Aldehyde _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Endrin Ketone _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Endosulphan Sulphate _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
p,p-DDT (4,4) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
o,p-Methoxychlor _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
p,p-Methoxychlor _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Permethrin I (cis) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Permethrin II (trans) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Dichlorvos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Mevinphos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Demeton-S _A	-	<0.50	-	<0.50	-	<0.50	-	mg/kg	0.5	A-T-056
Demeton-O _A	-	<0.50	-	<0.50	-	<0.50	-	mg/kg	0.5	A-T-056
Phorate _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Dimethoate _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Propetamphos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Diazinon (Dimpylate) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Disulfoton _A	-	<0.10	-	<0.10	-	<0.10	-	mg/kg	0.1	A-T-056
Etriphos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Chlorpyrifos-methyl _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Parathion (Ethyl Parathion) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Methyl Parathion _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Pirimiphos-methyl _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Fenitrothion _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Fensulphothion _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Fenthion _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Malathion _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Chlorfenvinphos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Chlorpyrifos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Trichloronate _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Prothiofos (Tokuthion) _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Ethion _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Triazophos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/1	20/01779/2	20/01779/3	20/01779/4	20/01779/5	20/01779/6	20/01779/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS04	WS06	SA01	SA02A	TP06	TP10			
Depth to Top	0.20	0.60	2.20	0.10	0.20	0.20	2.30			
Depth To Bottom										
Date Sampled	19-Feb-20	17-Feb-20	17-Feb-20	18-Feb-20	18-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6	6	6	6E	6E	6E	6A			
Sulprofos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Carbophenothion _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Phosalone _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Azinphos-methyl _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Azinphos-ethyl _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
Coumaphos _A	-	<0.01	-	<0.01	-	<0.01	-	mg/kg	0.01	A-T-056
ONP (Organonitrogen Pesticides) \$\$										
Ametryn _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Atraton _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Atrazine _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Prometon _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Propazine _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Prometryn _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Simazine _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Simetryn _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Terbuthylazine _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Terbutryn _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest
Secbumeton _A	-	<0.2	-	<0.2	-	<0.2	-	mg/kg	0.2	Subcon Chemtest

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Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/1	20/01779/2	20/01779/3	20/01779/4	20/01779/5	20/01779/6	20/01779/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS04	WS06	SA01	SA02A	TP06	TP10			
Depth to Top	0.20	0.60	2.20	0.10	0.20	0.20	2.30			
Depth To Bottom										
Date Sampled	19-Feb-20	17-Feb-20	17-Feb-20	18-Feb-20	18-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6	6	6	6E	6E	6E	6A			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	-	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	-	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	-	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	-	<0.08	<0.08	<0.08	<0.08	<0.08	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	-	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	-	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	-	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	-	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	-	<0.08	<0.08	<0.08	<0.08	<0.08	mg/kg	0.01	A-T-019s

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Client Project Name: Weston, Spalding

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Lab Sample ID	20/01779/1	20/01779/2	20/01779/3	20/01779/4	20/01779/5	20/01779/6	20/01779/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS04	WS06	SA01	SA02A	TP06	TP10			
Depth to Top	0.20	0.60	2.20	0.10	0.20	0.20	2.30			
Depth To Bottom										
Date Sampled	19-Feb-20	17-Feb-20	17-Feb-20	18-Feb-20	18-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6	6	6	6E	6E	6E	6A			
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C21-C35 _A	3	-	3	3	2	2	<1	mg/kg	1	A-T-055s
Total Aliphatics _A	3	-	3	3	2	2	<1	mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12 _A ^{M#}	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1	-	<1	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	1	-	4	1	1	2	1	mg/kg	1	A-T-055s
Total Aromatics _A	1	-	4	1	1	2	1	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	4	-	6	4	4	6	1	mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

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Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/8	20/01779/9	20/01779/10	20/01779/11	20/01779/12	20/01779/13	20/01779/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP13	TP11	TP04	TP12	WS05	TP07	WS03A			
Depth to Top	0.40	0.20	0.20	2.50	1.20	0.10	0.40			
Depth To Bottom										
Date Sampled	18-Feb-20	19-Feb-20	19-Feb-20	19-Feb-20	17-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6A	6AE	6AE	6AE	6AE	6A			
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH _D ^{M#}	8.48	8.23	8.42	-	-	-	-	pH	0.01	A-T-031s
pH BRE _D ^{M#}	8.48	-	-	9.31	8.35	7.99	8.91	pH	0.01	A-T-031s
Sulphate BRE (water sol 2:1) _D ^{M#}	31	-	-	160	203	<10	190	mg/l	10	A-T-026s
Total Organic Carbon _D ^{M#}	0.69	0.87	1.43	-	-	-	-	% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	3	4	11	-	-	-	-	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	<0.5	<0.5	0.6	-	-	-	-	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	4	7	19	-	-	-	-	mg/kg	1	A-T-024s
Chromium _D ^{M#}	14	22	37	-	-	-	-	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-040s
Lead _D ^{M#}	10	23	64	-	-	-	-	mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	-	-	-	-	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	11	19	32	-	-	-	-	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-024s
Zinc _D ^{M#}	32	58	95	-	-	-	-	mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-1 (2:1) (1 no) _A	*	*	*	*	*	-	-			A-T-001
Arsenic (leachable) _A [#]	4	1	16	9	<1	-	-	µg/l	1	A-T-025w
Boron (leachable) _A [#]	39	52	202	1100	291	-	-	µg/l	10	A-T-025w
Cadmium (leachable) _A [#]	<1	<1	<1	<1	<1	-	-	µg/l	1	A-T-025w
Copper (leachable) _A [#]	4	5	23	7	1	-	-	µg/l	1	A-T-025w
Chromium (leachable) _A [#]	<1	<1	4	6	<1	-	-	µg/l	1	A-T-025w
Chromium (hexavalent) (leachable) _A	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	mg/l	0.05	A-T-040w
Lead (leachable) _A [#]	4	4	42	17	<1	-	-	µg/l	1	A-T-025w
Mercury (leachable) _A [#]	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	µg/l	0.1	A-T-025w
Nickel (leachable) _A [#]	2	2	19	23	2	-	-	µg/l	1	A-T-025w
Selenium (leachable) _A [#]	<1	<1	<1	<1	<1	-	-	µg/l	1	A-T-025w
Zinc (leachable) _A [#]	7	8	103	24	1	-	-	µg/l	1	A-T-025w

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Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/8	20/01779/9	20/01779/10	20/01779/11	20/01779/12	20/01779/13	20/01779/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP13	TP11	TP04	TP12	WS05	TP07	WS03A			
Depth to Top	0.40	0.20	0.20	2.50	1.20	0.10	0.40			
Depth To Bottom										
Date Sampled	18-Feb-20	19-Feb-20	19-Feb-20	19-Feb-20	17-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6A	6AE	6AE	6AE	6AE	6A			
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	NAD	NAD	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? ^D	N/A	N/A	N/A	-	-	-	-			A-T-045
OCP+OPP Combined Pest Suite (excl. Atrazine and Simazine)										
Dichlobenil _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Tecnazene _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Trifluralin _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
alpha-Hexachlorocyclohexane (HCH) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Hexachlorobenzene (HCB) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
beta-Hexachlorocyclohexane (HCH) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Quintozene (PCNB) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
gamma-Hexachlorocyclohexane (HCH) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Chlorothalonil _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
delta-Hexachlorocyclohexane (HCH) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Triallate _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Heptachlor _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Aldrin _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Triadimefon _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Telodrin _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Isodrin _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Pendimethalin _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Heptachlor epoxide _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
trans-Chlordane (Gamma) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
o,p-DDE (2,4) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Endosulphan I (Alpha) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
cis-Chlordane (Alpha) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
p,p-DDE (4,4) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Dieldrin _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
o,p-DDD (2,4) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Endrin _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Endosulphan II (Beta) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056

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Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/8	20/01779/9	20/01779/10	20/01779/11	20/01779/12	20/01779/13	20/01779/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP13	TP11	TP04	TP12	WS05	TP07	WS03A			
Depth to Top	0.40	0.20	0.20	2.50	1.20	0.10	0.40			
Depth To Bottom										
Date Sampled	18-Feb-20	19-Feb-20	19-Feb-20	19-Feb-20	17-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6A	6AE	6AE	6AE	6AE	6A			
p,p-DDD (4,4) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
o,p-DDT (2,4) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Endrin Aldehyde _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Endrin Ketone _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Endosulphan Sulphate _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
p,p-DDT (4,4) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
o,p-Methoxychlor _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
p,p-Methoxychlor _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Permethrin I (cis) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Permethrin II (trans) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Dichlorvos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Mevinphos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Demeton-S _A	<0.50	-	<0.50	-	-	-	-	mg/kg	0.5	A-T-056
Demeton-O _A	<0.50	-	<0.50	-	-	-	-	mg/kg	0.5	A-T-056
Phorate _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Dimethoate _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Propetamphos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Diazinon (Dimpylate) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Disulfoton _A	<0.10	-	<0.10	-	-	-	-	mg/kg	0.1	A-T-056
Etrimphos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Chlorpyrifos-methyl _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Parathion (Ethyl Parathion) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Methyl Parathion _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Pirimiphos-methyl _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Fenitrothion _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Fensulphothion _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Fenthion _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Malathion _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Chlorfenvinphos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Chlorpyrifos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Trichloronate _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Prothiofos (Tokuthion) _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Ethion _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Triazophos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/8	20/01779/9	20/01779/10	20/01779/11	20/01779/12	20/01779/13	20/01779/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP13	TP11	TP04	TP12	WS05	TP07	WS03A			
Depth to Top	0.40	0.20	0.20	2.50	1.20	0.10	0.40			
Depth To Bottom										
Date Sampled	18-Feb-20	19-Feb-20	19-Feb-20	19-Feb-20	17-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6A	6AE	6AE	6AE	6AE	6A			
Sulprofos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Carbophenothion _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Phosalone _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Azinphos-methyl _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Azinphos-ethyl _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
Coumaphos _A	<0.01	-	<0.01	-	-	-	-	mg/kg	0.01	A-T-056
ONP (Organonitrogen Pesticides) \$\$										
Ametryn _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Atraton _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Atrazine _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Prometon _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Propazine _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Prometryn _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Simazine _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Simetryn _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Terbuthylazine _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Terbutryn _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest
Secbumeton _A	<0.2	-	<0.2	-	-	-	-	mg/kg	0.2	Subcon Chemtest

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/8	20/01779/9	20/01779/10	20/01779/11	20/01779/12	20/01779/13	20/01779/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP13	TP11	TP04	TP12	WS05	TP07	WS03A			
Depth to Top	0.40	0.20	0.20	2.50	1.20	0.10	0.40			
Depth To Bottom										
Date Sampled	18-Feb-20	19-Feb-20	19-Feb-20	19-Feb-20	17-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6A	6AE	6AE	6AE	6AE	6A			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02	<0.02	<0.02	-	-	-	-	mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04	<0.04	<0.04	-	-	-	-	mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04	<0.04	<0.04	-	-	-	-	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05	<0.05	<0.05	-	-	-	-	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05	<0.05	<0.05	-	-	-	-	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07	<0.07	<0.07	-	-	-	-	mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06	<0.06	<0.06	-	-	-	-	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04	<0.04	<0.04	-	-	-	-	mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08	<0.08	<0.08	-	-	-	-	mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03	<0.03	<0.03	-	-	-	-	mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03	<0.03	<0.03	-	-	-	-	mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03	<0.03	<0.03	-	-	-	-	mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07	<0.07	<0.07	-	-	-	-	mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08	<0.08	<0.08	-	-	-	-	mg/kg	0.01	A-T-019s

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/8	20/01779/9	20/01779/10	20/01779/11	20/01779/12	20/01779/13	20/01779/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	TP13	TP11	TP04	TP12	WS05	TP07	WS03A			
Depth to Top	0.40	0.20	0.20	2.50	1.20	0.10	0.40			
Depth To Bottom										
Date Sampled	18-Feb-20	19-Feb-20	19-Feb-20	19-Feb-20	17-Feb-20	18-Feb-20	19-Feb-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6A	6A	6AE	6AE	6AE	6AE	6A			
TPH CWG										
Ali >C5-C6 _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-055s
Ali >C21-C35 _A	4	1	1	-	-	-	-	mg/kg	1	A-T-055s
Total Aliphatics _A	4	1	1	-	-	-	-	mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-055s
Aro >C10-C12 _A ^{M#}	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1	<1	<1	-	-	-	-	mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	4	<1	1	-	-	-	-	mg/kg	1	A-T-055s
Total Aromatics _A	4	<1	1	-	-	-	-	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	8	1	4	-	-	-	-	mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01	<0.01	<0.01	-	-	-	-	mg/kg	0.01	A-T-022s

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/15							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS04									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	17-Feb-20									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
% Stones >10mm _A	<0.1							% w/w	0.1	A-T-044
pH _D ^{M#}	8.32							pH	0.01	A-T-031s
Total Organic Carbon _D ^{M#}	1.01							% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	6							mg/kg	1	A-T-024s
Cadmium _D ^{M#}	<0.5							mg/kg	0.5	A-T-024s
Copper _D ^{M#}	7							mg/kg	1	A-T-024s
Chromium _D ^{M#}	19							mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1							mg/kg	1	A-T-040s
Lead _D ^{M#}	16							mg/kg	1	A-T-024s
Mercury _D	<0.17							mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	15							mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1							mg/kg	1	A-T-024s
Zinc _D ^{M#}	45							mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-1 (2:1) (1 no) _A	*									A-T-001
Arsenic (leachable) _A [#]	16							µg/l	1	A-T-025w
Boron (leachable) _A [#]	60							µg/l	10	A-T-025w
Cadmium (leachable) _A [#]	<1							µg/l	1	A-T-025w
Copper (leachable) _A [#]	15							µg/l	1	A-T-025w
Chromium (leachable) _A [#]	2							µg/l	1	A-T-025w
Chromium (hexavalent) (leachable) _A	<0.05							mg/l	0.05	A-T-040w
Lead (leachable) _A [#]	23							µg/l	1	A-T-025w
Mercury (leachable) _A [#]	<0.1							µg/l	0.1	A-T-025w
Nickel (leachable) _A [#]	6							µg/l	1	A-T-025w
Selenium (leachable) _A [#]	<1							µg/l	1	A-T-025w
Zinc (leachable) _A [#]	27							µg/l	1	A-T-025w

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/15							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS04									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	17-Feb-20									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD									A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A									A-T-045

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/15							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS04									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	17-Feb-20									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
PAH-16MS										
Acenaphthene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Acenaphthylene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Anthracene _A ^{M#}	<0.02							mg/kg	0.02	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.04							mg/kg	0.04	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.04							mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.05							mg/kg	0.05	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.05							mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.07							mg/kg	0.07	A-T-019s
Chrysene _A ^{M#}	<0.06							mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.04							mg/kg	0.04	A-T-019s
Fluoranthene _A ^{M#}	<0.08							mg/kg	0.08	A-T-019s
Fluorene _A ^{M#}	<0.01							mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Naphthalene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Phenanthrene _A ^{M#}	<0.03							mg/kg	0.03	A-T-019s
Pyrene _A ^{M#}	<0.07							mg/kg	0.07	A-T-019s
Total PAH-16MS _A ^{M#}	<0.08							mg/kg	0.01	A-T-019s

Envirolab Job Number: 20/01779

Client Project Name: Weston, Spalding

Client Project Ref: 252234

Lab Sample ID	20/01779/15							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS04									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	17-Feb-20									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
TPH CWG										
Ali >C5-C6 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Ali >C6-C8 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Ali >C8-C10 _A	<1							mg/kg	1	A-T-055s
Ali >C10-C12 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C12-C16 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C16-C21 _A ^{M#}	<1							mg/kg	1	A-T-055s
Ali >C21-C35 _A	4							mg/kg	1	A-T-055s
Total Aliphatics _A	4							mg/kg	1	A-T-055s
Aro >C5-C7 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Aro >C7-C8 _A [#]	<0.01							mg/kg	0.01	A-T-022s
Aro >C8-C10 _A	<1							mg/kg	1	A-T-055s
Aro >C10-C12 _A ^{M#}	<1							mg/kg	1	A-T-055s
Aro >C12-C16 _A	<1							mg/kg	1	A-T-055s
Aro >C16-C21 _A ^{M#}	<1							mg/kg	1	A-T-055s
Aro >C21-C35 _A ^{M#}	4							mg/kg	1	A-T-055s
Total Aromatics _A	4							mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35) _A	7							mg/kg	1	A-T-055s
BTEX - Benzene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - Toluene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - m & p Xylene _A [#]	<0.01							mg/kg	0.01	A-T-022s
BTEX - o Xylene _A [#]	<0.01							mg/kg	0.01	A-T-022s
MTBE _A [#]	<0.01							mg/kg	0.01	A-T-022s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

Analytical results reflect the quality of the sample at the time of analysis only.

Opinions and interpretations expressed are outside the scope of our accreditation.

If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:

Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

Stones etc. are not removed from the sample prior to analysis.

Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:

1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable Sample for analysis.

NDP indicates No Determination Possible.

NAD indicates No Asbestos Detected.

N/A indicates Not Applicable.

Superscript # indicates method accredited to ISO 17025.

Superscript "M" indicates method accredited to MCERTS.

Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client:	RSK Environment Ltd Coventry, Humber Road, Abbey Park, Coventry, UK, CV3	Project No:	20/01779
	4AQ	Date Received:	21/02/2020 (am)
Project:	Weston, Spalding	Cool Box Temperatures (°C):	7.1, 7.5, 8.2
Clients Project No:	252234		

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.



APPENDIX G

LABORATORY CERTIFICATES FOR

GEOTECHNICAL ANALYSIS

F.A.O.

Final Test Report - 2280128 / 1

Site: Weston, Spalding
Job Number: 2280128
Originating Client: Persimmon Homes East Midlands
Originating Reference: 252234
Date Sampled: Not Given
Date Scheduled: 21/02/2020
Date Testing Started: 26/02/2020
Date Testing Finished: 02/03/2020

Previous Reports		Amendments	Date Issued

Amendments:

Authorised By:



Tim Robinson
Quality Technician

Report Issue Date: 02/03/2020



Site: Weston, Spalding

Job Number: 2280128

Client: Persimmon Homes East Midlands

Page: 2

**Determination of Water Content, Liquid Limit and Plastic Limit
and Derivation of Plasticity and Liquidity Index**

Borehole / Trial Pit	Depth (m)	Sample	Natural / Sieved	Natural Water Content %	Sample Passing 425 µm Sieve		Liquid Limit %	Plastic Limit %	Plasticity Index %	Liquidity Index	Class	Description / Remarks
					Percentage %	Water Content %						
SA01	0.80	D	Natural	27	100	27.0	41	22	19	0.26	CI	Brown slightly silty CLAY
SA02	0.80	D	Natural	24	84	28.0	38	22	16	0.34	CI	Brown slightly gravelly, silty CLAY
TP02	1.50	D	Natural	33	100	33.0	41	24	17	0.53	CI	Brown slightly silty CLAY
TP04	0.40	D	Natural	24	100	24.0	54	27	27	-0.11	CH	Brown silty CLAY
TP09	2.30	D	Natural	52	100	52.0	64	35	29	0.59	MH	Brown slightly gravelly CLAY
TP10	1.20	D	Natural	32	100	32.0	65	30	35	0.06	CH	Brown sandy CLAY
TP11	1.20	D	Natural	42	100	42.0	64	32	32	0.31	CH	Brown CLAY
TP14	2.00	D	Natural	60	100	60.0	41	27	14	2.36	MI	Brown slightly organic CLAY
WS02	1.60	D	Natural	54	61	85.0	67	46	21	1.86	MH	Brown gravelly, clayey SILT
WS03A	2.50	D	Natural	60	72	82.0	77	43	34	1.14	MV	Brown gravelly CLAY
WS04A	1.40	D	Natural	37	72	49.0	43	27	16	1.38	MI	Brown gravelly CLAY
WS06	1.90	D	Natural	50	100	50.0	62	32	30	0.60	MH	Brown CLAY

Method of Preparation: BS 1377 : Part 1 : 1990 : Clause 7 Preparation of disturbed samples for testing
BS 1377 : Part 1 : 2016 : Clause 8.4.3 Preparation of samples for plasticity tests
BS 1377 : Part 2 : 1990 : Clause 4.2 Preparation of samples for plastic limit tests

Method of Test: BS 1377 : Part 2 : 1990 : Clause 3.2 Determination of moisture content
BS 1377 : Part 2 : 1990 : Clause 4.3 or 4.4 Determination of the liquid limit
BS 1377 : Part 2 : 1990 : Clause 5.3 Determination of the plastic limit and plasticity index





Final Test Report - 2280128 / 1

Site: Weston, Spalding
Job Number: 2280128
Originating Client: Persimmon Homes East Midlands

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Report Issue Date: 02/03/2020



APPENDIX H

GENERIC ASSESSMENT CRITERIA FOR

HUMAN HEALTH

Generic assessment criteria for human health: residential scenario with home-grown produce

Background

RSK's generic assessment criteria (GAC) were initially prepared following the publication by the Environment Agency (EA) of soil guideline value (SGV) and toxicological (TOX) reports, and associated publications in 2009⁽¹⁾. RSK GAC were updated following the publication of GAC by LQM/CIEH in 2009⁽²⁾. RSK GAC are periodically revised when updated information on toxicological, land use or receptor parameters is published.

Updates to the RSK GAC

In 2014, the publication of Category 4 Screening Levels (C4SL)^(3,4), as part of the Defra-funded research project SP1010, included modifications to certain exposure assumptions documented within EA Science Report SC050221/SR3 (herein after referred to as SR3)⁽⁵⁾ used in the generation of SGVs.

C4SL were published for six substances (cadmium, arsenic, benzene, benzo(a)pyrene, chromium VI and lead) for a sandy loam soil type with 6% soil organic matter, based on a low level of toxicological concern (LLTC; see Section 2.3 of research project report SP1010⁽³⁾). Where a C4SL has been published, the RSK GAC duplicates the C4SL published values using all input parameters within the SP1010 final project report⁽³⁾ and associated appendices⁽⁶⁾, and adopts them as GAC for these six substances.

For all other substances the C4SL exposure modifications, with the exception of the “top two” produce type approach taken in the C4SL, have been applied to the current RSK GAC. These include alterations to daily inhalation rates for residential and commercial scenarios, reducing soil adherence factors in children (age classes 1 to 12 only) for residential land use, reducing exposure frequency for dermal contact outdoors for residential land use, and updated produce type consumption rates (90th percentile) based on recent data from the National Diet and Nutrition Survey.

The RSK GAC have also been revised with updated toxicology published by LQM/CIEH in 2015⁽⁷⁾ or by the USEPA⁽¹⁴⁾, where a C4SL has not been published.

RSK GAC derivation for metals and organic compounds

Model selection

Soil assessment criteria (SAC) were calculated using the Contaminated Land Exposure Assessment (CLEA) tool v1.071, supporting EA guidance^(5,8,9) and revised exposure scenarios published for the C4SL⁽³⁾. The SAC are also termed GAC.

Conceptual model

In accordance with SR3⁽⁵⁾, the residential with home-grown produce scenario considers risks to a female child between the ages of 0 and 6 years old as the highest risk scenario. In accordance with Box 3.1 of SR3⁽⁵⁾, the pathways considered for production of the SAC in the residential with home-grown produce scenario are

- direct soil and dust ingestion

- consumption of home-grown produce
- consumption of soil attached to home-grown produce
- dermal contact with soil and indoor dust
- inhalation of indoor and outdoor dust and vapours.

Figure 1 is a conceptual model illustrating these linkages.

In line with guidance in the EA SGV report for cadmium⁽¹⁾, the RSK GAC for cadmium has been derived based on estimates representative of lifetime exposure. Although young children are generally more likely to have higher exposures to soil contaminants, the renal toxicity of cadmium, and the derivation of the TDI_{oral} and TDI_{inh} , are based on considerations of the kidney burden accumulated over 50 years or so. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer period.

With respect to volatilisation, the CLEA model assumes a simple linear partitioning of a chemical in the soil between the sorbed, dissolved and vapour phase⁽⁹⁾. The upper boundaries of this partitioning are represented by the maximum aqueous solubility and pure saturated vapour concentration of the chemical. The CLEA model estimates saturated soil concentrations where these limits are reached⁽⁹⁾. The CLEA software uses a traffic light system to identify when individual and/or combined assessment criteria exceed the lower of either the aqueous- or vapour-based soil saturation limits. Model output cells are flagged red where the saturated soil concentration has been exceeded and the contribution of the indoor and outdoor vapour pathway to total exposure is greater than 10%. In this case, further consideration of the following is required⁽⁹⁾:

- Free phase contamination may be present.
- Exposure from the vapour pathways will be over-predicted by the model, as in reality the vapour phase concentration will not increase at concentrations above saturation limits
- Where the vapour pathway contribution is greater than 90%, it is unlikely the relevant health criteria value (HCV) will be exceeded at soil concentrations at least a factor of ten higher than the relevant HCV.

Where the vapour pathway is the predominant pathway (contributes greater than 90% of exposure) or the only exposure route considered and the cell is highlighted red (SAC exceeds saturation limit), the risk based on the assumed conceptual model is likely to be negligible as the vapour risk is assumed to be tolerable at maximum possible soil concentrations. In such circumstances, the vapour pathway exposure should be considered based on the presence of free phase or non-aqueous phase liquid sources and the measured concentrations of volatile organic compounds (VOC) in the vapour phase. Screening could be considered based on setting the SAC as the modelled soil saturation limits. However, as stated within the CLEA handbook⁽⁹⁾, this is likely to not be practical in many cases because of the very low saturation limits and, in any case, is highly conservative.

It should also be noted that for mixtures of compounds, free phase may be present where soil (or groundwater) concentrations are well below saturation limits for individual compounds.

Where the vapour pathway is only one of the exposure pathways considered, an additional approach can then be utilised as detailed within Section 4.12 of the CLEA model handbook⁽⁹⁾, which explains how to calculate an effective assessment criterion manually.

SR3⁽⁵⁾ states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase contamination by petroleum hydrocarbons are

at least a factor of ten higher than those likely to be measured on-site. RSK has therefore applied an empirical subsurface to indoor air correction factor of 10 into the CLEA model chemical database for all petroleum hydrocarbon fractions (including BTEX, trimethylbenzenes and the polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene) to reduce this conservatism.

Input selection

The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7⁽¹⁰⁾, the EA TOX⁽¹⁾ reports, the C4SL SP1010 project report and associated appendices^(3,6), the 2015 LQM/CIEH report⁽⁷⁾ or the USEPA IRIS database⁽¹⁴⁾. Where a C4SL has been published, the RSK GAC have duplicated the C4SL published values using all input parameters within the SP1010 final project report⁽³⁾ and associated appendices⁽⁶⁾, and has adopted them as GAC for these six substances. Toxicological and specific chemical parameters for 1,2,4-trimethylbenzene, barium and methyl tertiary-butyl ether (MTBE) were obtained from the CL:AIRE Soil Generic Assessment Criteria report⁽¹¹⁾.

For TPH, aromatic hydrocarbons C₅–C₈ were not modelled, as this range comprises benzene (>EC5-EC7) and toluene (>EC7-EC8), which are modelled separately.

Physical parameters

For the residential with home-grown produce scenario, the CLEA default building is a small, two-storey terrace house with a concrete ground-bearing slab. The house is assumed to have a 100m² private garden consisting of lawn and flowerbeds, incorporating a 20m² plot for growing fruit and vegetables consumed by the residents. SR3⁽⁵⁾ notes this residential building type to be the most conservative in terms of potential for vapour intrusion. The building parameters used in the production of the RSK GACs are the default CLEA v1.06 inputs presented in Table 3.3 of SR3⁽³⁾, with a dust loading factor detailed in Section 9.3 of SR3⁽⁵⁾. The parameters for a sandy loam soil type were used in line with Table 4.4 of SR3⁽⁵⁾. This includes a value of 6% for the percentage of soil organic matter (SOM) within the soil. In RSK's experience, this is rather high for many sites. To avoid undertaking site-specific risk assessments for SOM, RSK has produced an additional set of GAC for SOM of 1% and 2.5% for all substances using the CLEA tool.

Summary of modifications to the default CLEA SR3⁽⁵⁾ input parameters for residential with home-grown produce land-use scenario

In summary, the RSK GAC were produced using the default input parameters for soil properties, the air dispersion model, building properties and the vapour model detailed in SR3⁽⁵⁾. Modifications to the default SR3⁽⁵⁾ exposure scenarios based on the C4SL exposure scenarios⁽³⁾ are presented in Tables 2 and 3 below.

The final selected GAC are presented by pathway in Table 4 and the combined GAC in Table 5.

Figure 1: Conceptual model for residential scenario with home-grown produce

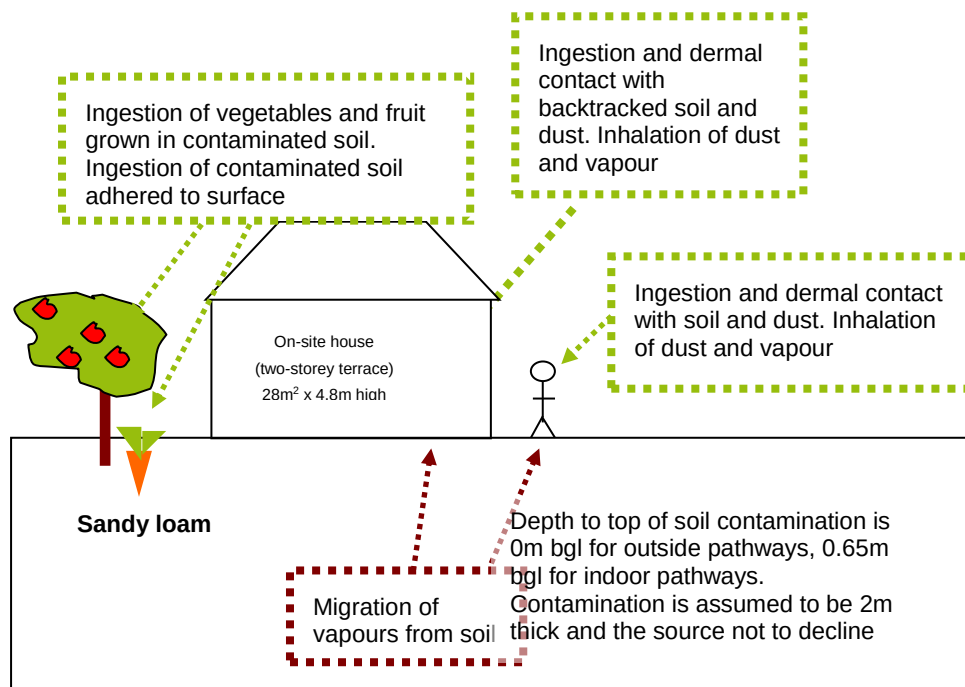


Table 1: Exposure assessment parameters for residential scenario with home-grown produce – inputs for CLEA model

Parameter	Value	Justification
Land use	Residential with homegrown produce	Chosen land use
Receptor	Female child age 1 to 6	Key generic assumption given in Box 3.1, SR3 ⁽⁵⁾
Building	Small terraced house	Key generic assumption given in Box 3.1, SR3. Small, two-storey terraced house chosen, as it is the most conservative residential building type in terms of protection from vapor intrusion (Section 3.4.6, SR3) ⁽⁵⁾
Soil type	Sandy Loam	Most common UK soil type (Section 4.3.1, from Table 3.1, SR3) ⁽⁵⁾
Start AC (age class)	1	Range of age classes corresponding to key generic assumption that the critical receptor is a young female child aged 0–6. From Box 3.1, SR3 ⁽⁵⁾
End AC (age class)	6	
SOM (%)	6	Representative of sandy loamy soil according to EA guidance note dated January 2009 entitled 'Changes We Have Made to the CLEA Framework Documents' ⁽¹³⁾
	1	To provide SAC for sites where SOM <6% as often observed by RSK
	2.5	
pH	7	Model default

Table 2: Residential with home-grown produce – modified home-grown produce data

Name	Consumption rate 90 th percentile (g FW kg ⁻¹ BW day ⁻¹) by age class						Dry weight conversion factor (g DW g ⁻¹ FW)	Home-grown fraction (average)	Home-grown fraction (high end)	Soil loading factor (g g ⁻¹ DW)	Preparation correction factor
	1	2	3	4	5	6					
Green vegetables	7.12	5.87	5.87	5.87	4.53	4.53	0.096	0.05	0.33	1.00E-03	2.00E-01
Root vegetables	10.7	2.83	2.83	2.83	2.14	2.14	0.103	0.06	0.4	1.00E-03	1.00E+00
Tuber vegetables	16	6.6	6.6	6.6	4.95	4.95	0.21	0.02	0.13	1.00E-03	1.00E+00
Herbaceous fruit	1.83	3.39	3.39	3.39	2.24	2.24	0.058	0.06	0.4	1.00E-03	6.00E-01
Shrub fruit	2.23	0.46	0.46	0.46	0.19	0.19	0.166	0.09	0.6	1.00E-03	6.00E-01
Tree fruit	3.82	10.3	10.3	10.3	5.16	5.16	0.157	0.04	0.27	1.00E-03	6.00E-01
Justification	Table 3.4, SP1010 ⁽³⁾						Table 6.3, SR3 ⁽⁵⁾	Table 4.19, SR3 ⁽⁵⁾		Table 6.3, SR3 ⁽⁵⁾	

Table 3: Residential with home-grown produce – modified use and receptor data

Parameter	Unit	Age class					
		1	2	3	4	5	6
EF (soil and dust ingestion)	day yr ⁻¹	180	365	365	365	365	365
EF (consumption of home-grown produce)	day yr ⁻¹	180	365	365	365	365	365
EF (skin contact, indoor)	day yr ⁻¹	180	365	365	365	365	365
EF (skin contact, outdoor)	day yr ⁻¹	170	170	170	170	170	170
EF (inhalation of dust and vapour, indoor)	day yr ⁻¹	365	365	365	365	365	365
EF (inhalation of dust and vapour, outdoor)	day yr ⁻¹	365	365	365	365	365	365
Justification		Table 3.5, SP1010 ⁽³⁾ ; Table 3.1, SR3 ⁽⁵⁾					
Soil to skin adherence factor (outdoor)	mg cm ⁻² day ⁻¹	0.1	0.1	0.1	0.1	0.1	0.1
Justification		Table 3.5, SP1010 ⁽³⁾					
Inhalation rate	m ³ day ⁻¹	5.4	8.0	8.9/f	10.1	10.1	10.1
Justification		Mean value USEPA, 2011 ⁽¹²⁾ ; Table 3.2, SP1010 ⁽³⁾					
Notes: For cadmium , the exposure assessment for a residential land use is based on estimates representative of lifetime exposure AC1-18. This is because the TDI _{oral} and TDI _{inh} are based on considerations of the kidney burden accumulated over 50 years. It is therefore reasonable to consider exposure not just in childhood but averaged over a longer period. See the Environment Agency Science Report SC05002/ TOX 3 ⁽¹⁾ , Science Report SC050021/Cadmium SGV ⁽¹⁾ and the project report SP1010 ⁽³⁾ for more information.							

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GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH HOME-GROWN PRODUCE



Table 4
Human Health Generic Assessment Criteria by Pathway for Residential With Home-Grown Produce Scenario

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)			Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)			Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined		Oral	Inhalation	Combined		Oral	Inhalation	Combined	
Metals													
Arsenic	(a,b)	3.71E+01	5.26E+02	NR	NR	3.71E+01	5.26E+02	NR	NR	3.71E+01	5.26E+02	NR	NR
Barium	(b)	1.34E+03	NR	NR	NR	1.34E+03	NR	NR	NR	1.34E+03	NR	NR	NR
Beryllium		1.13E+02	1.72E+00	NR	NR	1.13E+02	1.72E+00	NR	NR	1.13E+02	1.72E+00	NR	NR
Boron		3.00E+02	5.20E+06	NR	NR	3.00E+02	5.20E+06	NR	NR	3.00E+02	5.20E+06	NR	NR
Cadmium	(a)	2.30E+01	4.88E+02	2.21E+01	NR	2.30E+01	4.88E+02	2.21E+01	NR	2.30E+01	4.88E+02	2.21E+01	NR
Chromium (III) - trivalent	(c)	1.84E+04	9.07E+02	NR	NR	1.84E+04	9.07E+02	NR	NR	1.84E+04	9.07E+02	NR	NR
Chromium (VI) - hexavalent	(a,d)	5.85E+01	2.06E+01	NR	NR	5.85E+01	2.06E+01	NR	NR	5.85E+01	2.06E+01	NR	NR
Copper		2.72E+03	1.41E+04	2.47E+03	NR	2.72E+03	1.41E+04	2.47E+03	NR	2.72E+03	1.41E+04	2.47E+03	NR
Lead	(a)	2.01E+02	NR	NR	NR	2.01E+02	NR	NR	NR	2.01E+02	NR	NR	NR
Elemental Mercury (Hg ⁰)	(d)	NR	2.35E-01	NR	4.31E+00	NR	5.60E-01	NR	1.07E+01	NR	1.22E+00	NR	2.58E+01
Inorganic Mercury (Hg ²⁺)		3.95E+01	3.63E+03	3.91E+01	NR	3.95E+01	3.63E+03	3.91E+01	NR	3.95E+01	3.63E+03	3.91E+01	NR
Methyl Mercury (Hg ⁴⁺)		1.26E+01	1.87E+01	7.52E+00	7.33E+01	1.26E+01	3.62E+01	9.34E+00	1.42E+02	1.26E+01	7.68E+01	1.08E+01	3.04E+02
Nickel	(d)	1.27E+02	1.81E+02	NR	NR	1.27E+02	1.81E+02	NR	NR	1.27E+02	1.81E+02	NR	NR
Selenium	(b)	2.58E+02	NR	NR	NR	2.58E+02	NR	NR	NR	2.58E+02	NR	NR	NR
Vanadium		4.13E+02	1.46E+03	NR	NR	4.13E+02	1.46E+03	NR	NR	4.13E+02	1.46E+03	NR	NR
Zinc	(b)	3.86E+03	3.63E+07	NR	NR	3.86E+03	3.63E+07	NR	NR	3.86E+03	3.63E+07	NR	NR
Cyanide (free)		1.37E+00	1.37E+04	1.37E+00	NR	1.37E+00	1.37E+04	1.37E+00	NR	1.37E+00	1.37E+04	1.37E+00	NR
Volatile Organic Compounds													
Benzene	(a)	2.62E-01	9.01E-01	2.03E-01	1.22E+03	5.39E-01	1.68E+00	4.08E-01	2.26E+03	1.16E+00	3.48E+00	8.72E-01	4.71E+03
Toluene		1.53E+02	9.08E+02	1.31E+02	8.69E+02	3.49E+02	2.00E+03	2.97E+02	1.92E+03	7.95E+02	4.55E+03	6.77E+02	4.36E+03
Ethylbenzene		1.10E+02	8.34E+01	4.74E+01	5.18E+02	2.61E+02	1.96E+02	1.12E+02	1.22E+03	6.00E+02	4.58E+02	2.60E+02	2.84E+03
Xylene - m		2.10E+02	8.25E+01	5.92E+01	6.25E+02	5.01E+02	1.95E+02	1.40E+02	1.47E+03	1.15E+03	4.56E+02	3.27E+02	3.46E+03
Xylene - o		1.92E+02	8.87E+01	6.07E+01	4.78E+02	4.56E+02	2.08E+02	1.43E+02	1.12E+03	1.05E+03	4.86E+02	3.32E+02	2.62E+03
Xylene - p		1.98E+02	7.93E+01	5.66E+01	5.76E+02	4.70E+02	1.86E+02	1.33E+02	1.35E+03	1.08E+03	4.36E+02	3.10E+02	3.17E+03
Total xylene		1.92E+02	7.93E+01	5.66E+01	6.25E+02	4.56E+02	1.86E+02	1.33E+02	1.47E+03	1.05E+03	4.36E+02	3.10E+02	3.46E+03
Methyl tertiary-Butyl ether (MTBE)		1.54E+02	1.04E+02	6.22E+01	2.04E+04	2.97E+02	1.69E+02	1.08E+02	3.31E+04	6.03E+02	3.21E+02	2.10E+02	6.27E+04
1,1,1,2-Tetrachloroethane		5.39E+00	1.54E+00	1.20E+00	2.60E+03	1.27E+01	3.56E+00	2.78E+00	6.02E+03	2.92E+01	8.29E+00	6.46E+00	1.40E+04
1,1,2,2-Tetrachloroethane		2.81E+00	3.92E+00	1.64E+00	2.67E+03	6.10E+00	8.04E+00	3.47E+00	5.46E+03	1.36E+01	1.76E+01	7.67E+00	1.20E+04
1,1,1-Trichloroethane		3.33E+02	9.01E+00	8.77E+00	1.43E+03	7.26E+02	1.84E+01	1.80E+01	2.92E+03	1.62E+03	4.04E+01	3.94E+01	6.39E+03
1,1,2 Trichloroethane		1.95E+00	1.25E+00	7.62E-01	4.03E+03	4.21E+00	2.55E+00	1.59E+00	8.21E+03	9.35E+00	5.59E+00	3.50E+00	1.80E+04
1,1-Dichloroethene		1.93E+01	3.29E-01	3.23E-01	2.23E+03	3.85E+01	5.82E-01	5.74E-01	3.94E+03	8.15E+01	1.17E+00	1.16E+00	7.94E+03
1,2-Dichloroethane		3.17E-02	9.20E-03	7.13E-03	3.41E+03	5.73E-02	1.33E-02	1.08E-02	4.91E+03	1.09E-01	2.28E-02	1.88E-02	8.43E+03
1,2,4-Trimethylbenzene		NR	1.76E+00	NR	4.74E+02	NR	4.26E+00	NR	1.16E+03	NR	9.72E+00	NR	2.76E+03
1,3,5-Trimethylbenzene	(e)	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
1,2-Dichloropropane		4.28E+00	3.40E-02	3.37E-02	1.19E+03	8.44E+00	6.00E-02	5.96E-02	2.11E+03	1.77E+01	1.21E-01	1.20E-01	4.24E+03
Carbon Tetrachloride (tetrachloromethane)		3.10E+00	2.58E-02	2.57E-02	1.52E+03	7.11E+00	5.65E-02	5.62E-02	3.32E+03	1.62E+01	1.28E-01	1.27E-01	7.54E+03
Chloroethane		NR	1.17E+01	NR	2.61E+03	NR	1.59E+01	NR	3.54E+03	NR	2.57E+01	NR	5.71E+03
Chloromethane		NR	1.17E-02	NR	1.91E+03	NR	1.38E-02	NR	2.24E+03	NR	1.85E-02	NR	2.99E+03
Cis 1,2 Dichloroethene		1.56E-01	NR	NR	3.94E+03	2.66E-01	NR	NR	6.61E+03	5.18E-01	NR	NR	1.29E+04
Dichloromethane		7.04E-01	3.05E+00	6.24E-01	7.27E+03	1.27E+00	4.06E+00	1.08E+00	9.68E+03	2.33E+00	6.42E+00	1.92E+00	1.53E+04
Tetrachloroethene		4.49E+00	1.79E-01	1.76E-01	4.24E+02	1.04E+01	4.02E-01	3.94E-01	9.51E+02	2.38E+01	9.21E-01	9.04E-01	2.18E+03
Trans 1,2 Dichloroethene		6.45E+00	2.76E-01	NR	3.42E+03	1.29E+01	4.99E-01	NR	6.17E+03	2.74E+01	1.02E+00	NR	1.26E+04
Trichloroethene		2.83E-01	1.72E-02	1.62E-02	1.54E+03	6.26E-01	3.59E-02	3.40E-02	3.22E+03	1.41E+00	7.98E-02	7.55E-02	7.14E+03
Vinyl Chloride (chloroethene)		3.82E-03	7.73E-04	6.43E-04	1.36E+03	6.87E-03	1.00E-03	8.73E-04	1.76E+03	1.25E-02	1.53E-03	1.36E-03	2.69E+03
Semi-Volatile Organic Compounds													
2-Chloronaphthalene		2.76E+02	5.39E+00	5.29E+00	1.14E+02	6.59E+02	1.33E+01	1.30E+01	2.80E+02	1.45E+03	3.17E+01	3.10E+01	6.69E+02
Acenaphthene		2.27E+02	4.86E+04	2.26E+02	5.70E+01	5.41E+02	1.18E+05	5.38E+02	1.41E+02	1.18E+03	2.68E+05	1.17E+03	3.36E+02
Acenaphthylene		1.85E+02	4.59E+04	1.84E+02	8.61E+01	4.42E+02	1.11E+05	4.40E+02	2.12E+02	9.78E+02	2.53E+05	9.74E+02	5.06E+02
Anthracene		2.43E+03	1.53E+05	2.39E+03	1.17E+00	5.53E+03	3.77E+05	5.45E+03	2.91E+00	1.10E+04	8.76E+05	1.09E+04	6.96E+00

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH HOME-GROWN PRODUCE



Table 4

Human Health Generic Assessment Criteria by Pathway for Residential With Home-Grown Produce Scenario

Compound	Notes	SAC Appropriate to Pathway SOM 1% (mg/kg)				Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 2.5% (mg/kg)				Soil Saturation Limit (mg/kg)	SAC Appropriate to Pathway SOM 6% (mg/kg)				Soil Saturation Limit (mg/kg)
		Oral	Inhalation	Combined			Oral	Inhalation	Combined			Oral	Inhalation	Combined		
Benzo(a)anthracene		1.01E+01	2.47E+01	7.18E+00	1.71E+00	1.42E+01	4.37E+01	1.07E+01	4.28E+00	1.69E+01	6.26E+01	1.33E+01		1.03E+01		
Benzo(a)pyrene	(a)	4.96E+00	3.51E+01	NR	9.11E-01	4.96E+00	3.77E+01	NR	2.28E+00	4.96E+00	3.89E+01	NR		5.46E+00		
Benzo(b)fluoranthene		2.96E+00	1.93E+01	2.56E+00	1.22E+00	3.89E+00	2.13E+01	3.29E+00	3.04E+00	4.43E+00	2.22E+01	3.69E+00		7.29E+00		
Benzo(g,h,i)perylene		3.77E+02	1.87E+03	3.14E+02	1.54E-02	4.09E+02	1.94E+03	3.38E+02	3.85E-02	4.23E+02	1.97E+03	3.48E+02		9.23E-02		
Benzo(k)fluoranthene		8.92E+01	5.41E+02	7.66E+01	6.87E-01	1.10E+02	5.76E+02	9.22E+01	1.72E+00	1.21E+02	5.91E+02	1.00E+02		4.12E+00		
Chrysene		1.66E+01	1.19E+02	1.46E+01	4.40E-01	2.54E+01	1.49E+02	2.17E+01	1.10E+00	3.19E+01	1.66E+02	2.67E+01		2.64E+00		
Dibenzo(a,h)anthracene		2.90E-01	1.45E+00	2.41E-01	3.93E-03	3.43E-01	1.64E+00	2.84E-01	9.82E-03	3.69E-01	1.74E+00	3.04E-01		2.36E-02		
Fluoranthene		2.87E+02	3.83E+04	2.85E+02	1.89E+01	5.63E+02	8.87E+04	5.60E+02	4.73E+01	9.00E+02	1.83E+05	8.96E+02		1.13E+02		
Fluorene		1.77E+02	6.20E+03	1.72E+02	3.09E+01	4.19E+02	1.53E+04	4.07E+02	7.65E+01	8.98E+02	3.62E+04	8.77E+02		1.83E+02		
Hexachloroethane		2.68E-01	NR	NR	8.17E+00	6.57E-01	NR	NR	2.01E+01	1.55E+00	NR	NR		4.81E+01		
Indeno(1,2,3-cd)pyrene		3.09E+01	2.12E+02	2.70E+01	6.13E-02	4.22E+01	2.38E+02	3.59E+01	1.53E-01	4.92E+01	2.50E+02	4.11E+01		3.68E-01		
Naphthalene		2.78E+01	2.33E+01	1.27E+01	7.64E+01	6.66E+01	5.58E+01	3.04E+01	1.83E+02	1.53E+02	1.31E+02	7.06E+01		4.32E+02		
Phenanthrene		9.85E+01	7.17E+03	9.72E+01	3.60E+01	2.24E+02	1.76E+04	2.22E+02	8.96E+01	4.48E+02	4.07E+04	4.43E+02		2.14E+02		
Pyrene		6.25E+02	8.79E+04	6.20E+02	2.20E+00	1.25E+03	2.04E+05	1.24E+03	5.49E+00	2.05E+03	4.23E+05	2.04E+03		1.32E+01		
Phenol		1.60E+02	4.58E+02	1.20E+02	2.42E+04	2.96E+02	6.95E+02	2.09E+02	3.81E+04	5.86E+02	1.19E+03	3.93E+02		7.03E+04		
Total Petroleum Hydrocarbons																
Aliphatic hydrocarbons EC ₆ -EC ₆		4.99E+03	4.24E+01	4.23E+01	3.04E+02	1.13E+04	7.79E+01	7.78E+01	5.58E+02	2.50E+04	1.61E+02	1.60E+02		1.15E+03		
Aliphatic hydrocarbons >EC ₆ -EC ₈		1.49E+04	1.04E+02	1.03E+02	1.44E+02	3.43E+04	2.31E+02	2.31E+02	3.22E+02	7.11E+04	5.29E+02	5.28E+02		7.36E+02		
Aliphatic hydrocarbons >EC ₈ -EC ₁₀		1.61E+03	2.68E+01	2.67E+01	7.77E+01	2.91E+03	6.55E+01	6.51E+01	1.90E+02	4.26E+03	1.56E+02	1.54E+02		4.51E+02		
Aliphatic hydrocarbons >EC ₁₀ -EC ₁₂		4.57E+03	1.33E+02	1.32E+02	4.75E+01	5.51E+03	3.31E+02	3.26E+02	1.18E+02	5.98E+03	7.93E+02	7.65E+02		2.83E+02		
Aliphatic hydrocarbons >EC ₁₂ -EC ₁₆		6.27E+03	1.11E+03	1.06E+03	2.37E+01	6.34E+03	2.78E+02	2.41E+03	5.91E+01	6.36E+03	6.67E+03	4.34E+03		1.42E+02		
Aliphatic hydrocarbons >EC ₁₆ -EC ₃₅	(b)	6.46E+04	NR	NR	8.48E+00	9.17E+04	NR	NR	2.12E+01	1.10E+05	NR	NR		5.09E+01		
Aliphatic hydrocarbons >EC ₃₅ -EC ₄₄	(b)	6.46E+04	NR	NR	8.48E+00	9.17E+04	NR	NR	2.12E+01	1.10E+05	NR	NR		5.09E+01		
Aromatic hydrocarbons >EC ₈ -EC ₁₀		5.76E+01	4.74E+01	3.45E+01	6.13E+02	1.38E+02	1.16E+02	8.38E+01	1.50E+03	3.07E+02	2.77E+02	1.94E+02		3.58E+02		
Aromatic hydrocarbons >EC ₁₀ -EC ₁₂		8.29E+01	2.58E+02	7.52E+01	3.64E+02	1.96E+02	6.39E+02	1.79E+02	8.99E+02	4.25E+02	1.52E+03	3.91E+02		2.15E+03		
Aromatic hydrocarbons >EC ₁₂ -EC ₁₆		1.47E+02	2.85E+03	1.45E+02	1.69E+02	3.36E+02	7.07E+03	3.32E+02	4.19E+02	6.81E+02	1.68E+04	6.74E+02		1.00E+03		
Aromatic hydrocarbons >EC ₁₆ -EC ₂₁	(b)	2.63E+02	NR	NR	5.37E+01	5.45E+02	NR	NR	1.34E+02	9.34E+02	NR	NR		3.21E+02		
Aromatic hydrocarbons >EC ₂₁ -EC ₃₅	(b)	1.09E+03	NR	NR	4.83E+00	1.47E+03	NR	NR	1.21E+01	1.70E+03	NR	NR		2.90E+01		
Aromatic hydrocarbons >EC ₃₅ -EC ₄₄	(b)	1.09E+03	NR	NR	4.83E+00	1.47E+03	NR	NR	1.21E+01	1.70E+03	NR	NR		2.90E+01		

Notes:

EC - equivalent carbon. SAC - soil assessment criteria.

The CLEA model output is colour coded depending upon whether the soil saturation limit has been exceeded.

	Calculated SAC exceeds soil saturation limit and may significantly affect the interpretation of any exceedances as the contribution of the indoor and outdoor vapour pathway to total exposure is >10%.
	Calculated SAC exceeds soil saturation limit but the exceedance will not affect the SAC significantly as the contribution of the indoor and outdoor vapour pathway to total exposure is <10%.
	Calculated SAC does not exceed the soil saturation limit.

The SAC for organic compounds are dependant upon soil organic matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.

SAC for TPH fractions, PAHs naphthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway (Section 10.1.1, SR3)

(a) SAC for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead are derived using the C4SL toxicology data.

(b) SAC for boron and selenium should not include the inhalation pathway as no expert group HCV has been derived; aliphatic and aromatic hydrocarbons >EC16 should not include inhalation pathway due to their non-volatile nature and inhalation exposure being minimal (oral, dermal and inhalation exposure is compared to the oral HCV); arsenic should only be based on oral contribution (rather than combined) owing to the relative small contribution from inhalation in accordance with the SGV report. The Oral SAC should be adopted for zinc and benzo(a)pyrene.

(c) SAC for CrIII should be based on the lower of the oral and inhalation SAC (see LQM/CIEH 2015 Section 6.8)

(d) SAC for elemental mercury, chromium VI and nickel should be based on the inhalation pathway only.

(e) SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4-trimethylbenzene may be used.

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - RESIDENTIAL WITH HOME-GROWN PRODUCE



Table 5
Human Health Generic Assessment Criteria for Residential with home-grown produce

Compound	SAC for Soil SOM 1% (mg/kg)	SAC for Soil SOM 2.5% (mg/kg)	SAC for Soil SOM 6% (mg/kg)
Metals			
Arsenic	37	37	37
Barium	1,300	1,300	1,300
Beryllium	1.7	1.7	1.7
Boron	300	300	300
Cadmium	22	22	22
Chromium (III) - trivalent	910	910	910
Chromium (VI) - hexavalent	21	21	21
Copper	2,500	2,500	2,500
Lead	200	200	200
Elemental Mercury (Hg ⁰)	0.2	0.6	1.2
Inorganic Mercury (Hg ²⁺)	39	39	39
Methyl Mercury (Hg ⁴⁺)	10	10	10
Nickel	130	130	130
Selenium	258	258	258
Vanadium	410	410	410
Zinc	3,900	3,900	3,900
Cyanide (free)	1.4	1.4	1.4
Volatile Organic Compounds			
Benzene	0.20	0.41	0.87
Toluene	130	300	680
Ethylbenzene	50	110	260
Xylene - m	59	140	327
Xylene - o	61	143	332
Xylene - p	57	133	310
Total xylene	57	133	310
Methyl tertiary-Butyl ether (MTBE)	60	110	210
1,1,1,2-Tetrachloroethane	1.20	2.78	6.46
1,1,2,2-Tetrachloroethane	1.6	3.5	7.7
1,1,1-Trichloroethane	9	18	39
1,1,2-Trichloroethane	0.8	1.6	3.5
1,1-Dichloroethane	0.32	0.57	1.16
1,2-Dichloroethane	0.007	0.011	0.019
1,2,4-Trimethylbenzene	1.8	4.3	9.7
1,3,5-Trimethylbenzene	NR	NR	NR
1,2-Dichloropropane	0.034	0.060	0.120
Carbon Tetrachloride (tetrachloromethane)	0.026	0.056	0.127
Chloroethane	11.7	15.9	25.7
Chloromethane	0.012	0.014	0.019
Cis 1,2 Dichloroethene	0.16	0.27	0.52
Dichloromethane	0.62	1.08	1.92
Tetrachloroethene	0.2	0.4	0.9
Trans 1,2 Dichloroethene	0.28	0.50	1.02
Trichloroethene	0.02	0.03	0.08
Vinyl Chloride (chloroethene)	0.0006	0.0009	0.0014
Semi-Volatile Organic Compounds			
2-Chloronaphthalene	5	13	31
Acenaphthene	230	540	1,170
Acenaphthylene	180	440	970
Anthracene	2,400	5,500	10,900
Benzo(a)anthracene	7	11	13
Benzo(a)pyrene	5	5	5
Benzo(b)fluoranthene	2.6	3.3	3.7
Benzo(g,h,i)perylene	310	340	350
Benzo(k)fluoranthene	77	92	100
Chrysene	15	22	27
Dibenzo(a,h)anthracene	0.24	0.28	0.30
Fluoranthene	290	560	900
Fluorene	170	410	880
Hexachloroethane	0.27	0.66	1.55
Indeno(1,2,3-cd)pyrene	27	36	41
Naphthalene	13	30	71
Phenanthrene	100	220	440
Pyrene	620	1,240	2,040
Phenol	120	210	390
Total Petroleum Hydrocarbons			
Aliphatic hydrocarbons EC ₅ -EC ₆	42	78	160
Aliphatic hydrocarbons >EC ₆ -EC ₈	100	230	530
Aliphatic hydrocarbons >EC ₈ -EC ₁₀	27	65	154
Aliphatic hydrocarbons >EC ₁₀ -EC ₁₂	130 (48)	330 (118)	760 (283)
Aliphatic hydrocarbons >EC ₁₂ -EC ₁₆	1,100 (24)	2,400 (59)	4,300 (142)
Aliphatic hydrocarbons >EC ₁₆ -EC ₃₅	65,000 (8)	92,000 (21)	110,000
Aliphatic hydrocarbons >EC ₃₅ -EC ₄₄	65,000 (8)	92,000 (21)	110,000
Aromatic hydrocarbons >EC ₈ -EC ₁₀	30	80	190
Aromatic hydrocarbons >EC ₁₀ -EC ₁₂	80	180	390
Aromatic hydrocarbons >EC ₁₂ -EC ₁₆	140	330	670
Aromatic hydrocarbons >EC ₁₆ -EC ₂₁	260	540	930
Aromatic hydrocarbons >EC ₂₁ -EC ₃₅	1,100	1,500	1,700
Aromatic hydrocarbons >EC ₃₅ -EC ₄₄	1,100	1,500	1,700
Minerals			
Asbestos	Stage 1 test – No asbestos detected with ID; Stage 2 test - <0.001% dry weight (exceedance of either equates to an exceedance of the GAC) ¹		
Notes: NR - Generic assessment criteria not calculated owing to low volatility of substance and therefore no pathway, or an absence of toxicological data. NR - SAC for 1,3,5-trimethylbenzene is not recorded owing to the lack of toxicological data, SAC for 1,2,4 trimethylbenzene may be used EC - equivalent carbon. SAC - soil assessment criteria. ¹ LOD for weight of asbestos per unit weight of soil calculated on a dry weight basis using PLM, handpicking and gravimetry.			
The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 0.58. 1% SOM is 0.58% TOC. DL Rowell Soil Science: Methods and Applications, Longmans, 1994.			
SAC for TPH fractions, PAHs naphthalene, acenaphthene and acenaphthylene, BTEX and trimethylbenzene compounds were produced using an attenuation factor for the indoor air inhalation pathway of 10 to reduce conservatism associated with the vapour inhalation pathway, section 10.1.1, SR3.			
(VALUE IN BRACKETS)			
RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CIEH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.			

APPENDIX I

GENERIC ASSESSMENT CRITERIA FOR POTABLE WATER SUPPLY PIPES

A range of pipe materials is available and careful selection, design and installation is required to ensure that water supply pipes are satisfactorily installed and meet the requirements of the Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Byelaws 2000 in Scotland and the Northern Ireland Water Regulations. The regulations include a requirement to use only suitable materials when laying water pipes and laying water pipes without protection is not permitted at contaminated sites. The water supply company has a statutory duty to enforce the regulations.

Contaminants in the ground can pose a risk to human health by permeating potable water supply pipes. To fulfil their statutory obligation, UK water supply companies require robust evidence from developers to demonstrate either that the ground in which new plastic supply pipes will be laid is free from specific contaminants, or that the proposed remedial strategy will mitigate any existing risk. If these requirements cannot be demonstrated to the satisfaction of the relevant water company, it becomes necessary to specify an alternative pipe material on the whole development or in specific zones.

In 2010, UK Water Industry Research (UKWIR) published *Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites* (Report Ref. No. 10/WM/03/21). This report reviewed previously published industry guidelines and threshold concentrations adopted by individual water supply companies.

The focus of the UKWIR research project was to develop clear and concise procedures, which provide consistency in the pipe selection decision process. It was intended to provide guidance that can be used to ensure compliance with current regulations and to prevent water supply pipe failing prematurely due to the presence of contamination.

The report concluded that in most circumstances only organic contaminants pose a potential risk to plastic pipe materials and Table 3.1 of the report provides threshold concentrations for polyethylene (PE) and polyvinyl chloride (PVC) pipes for the organic contaminants of concern. The report also makes recommendations for the procedures to be adopted in the design of site investigations and sampling strategies, and the assessment of data, to ensure that the ground through which water supply pipes will be laid is adequately characterised.

Risks to water supply pipes have therefore been assessed against the threshold concentrations for PE and PVC pipe specified in Table 3.1 of Report 10/WM/03/21, which have been adopted as the GAC for this linkage and are reproduced in Table A3 below.

Since water supply pipes are typically laid at a minimum depth of 0.75 m below finished ground levels, sample results from depths between 0.5 m and 1.5 m below finished level are generally considered suitable for assessing risks to water supply. Samples outside these depths can be used, providing the stratum is the same as that in which water supply pipes are likely to be located. The report specifies that sampling should characterise the ground conditions to a minimum of 0.5 m below the proposed depth of the pipe.

It should be noted that the assessment provided in this report is a guide and the method of assessment and recommendations should be checked with the relevant water supply company.

Table Q1: Generic assessment criteria for water supply pipes

		Pipe material	
		GAC (mg/kg)	
	Parameter group	PE	PVC
1	Extended VOC suite by purge and trap or head space and GC-MS with TIC (Not including compounds within group 1a)	0.5	0.125
1a	BTEX + MTBE	0.1	0.03
2	SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C ₅ –C ₁₀) (Not including compounds within group 2e and 2f)	2	1.4
2e	Phenols	2	0.4
2f	Cresols and chlorinated phenols	2	0.04
3	Mineral oil C ₁₁ –C ₂₀	10	Suitable
4	Mineral oil C ₂₁ –C ₄₀	500	Suitable
5	Corrosive (conductivity, redox and pH)	Suitable	Suitable
Specific suite identified as relevant following site investigation			
2a	Ethers	0.5	1
2b	Nitrobenzene	0.5	0.4
2c	Ketones	0.5	0.02
2d	Aldehydes	0.5	0.02
6	Amines	Not suitable	Suitable
Notes: where indicated as 'suitable', the material is considered resistant to permeation or degradation and no threshold concentration has been specified by UKWIR.			

APPENDIX J

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

GENERIC ASSESSMENT CRITERIA FOR CONTROLLED WATERS

Protection of the water environment

The water environment in the United Kingdom is protected under a number of regulatory regimes. The relevant environmental regulator is consulted where there may be a risk that pollution of 'controlled waters' may occur or may have occurred in the past.

The term 'controlled waters' refers to coastal waters, inland freshwaters and groundwater. The EU Water Framework Directive (WFD) (2000/60/EC) is implemented via domestic regulations and guidance, covering aspects of groundwater and surface water protection as well as drinking water supply policy. Domestic legislation and guidance will vary across the United Kingdom. Therefore, the relevant legislation for England, Wales, Northern Ireland and Scotland should be reviewed, alongside guidance provided by the Environment Agency (EA), Natural Resource Wales (NRW), the Scottish Environmental Protection Agency (SEPA) or the Northern Ireland Environment Agency (NIEA), as appropriate.

The main objectives of the protection and remediation of groundwater under threat from land contamination are set out within "The Environment Agency's approach to groundwater protection", version 1.0 (March 2017)⁽¹⁾ and the associated guidance "Land contamination groundwater compliance points: quantitative risk assessments (March 2017)^(1a) that have replaced the previous guidance document "Groundwater Principles and Practice (GP3)". When assessing risks to groundwater, the following need to be considered:

- Where pollutants have not yet entered groundwater, all necessary and reasonable measures must be taken to:
 - ***prevent the input of hazardous substances into groundwater (see description of hazardous substances below)***
 - ***limit the entry of other (non-hazardous) pollutants into groundwater to avoid pollution, deterioration in the status of groundwater bodies and to prevent sustained, upward trends in pollutant concentrations in groundwater.***
- Where pollutants have already entered groundwater, the priority is to take all necessary and reasonable measures to:
 - ***minimise further entry of "contaminants" where there is a defined source***
 - ***limit the pollution of groundwater or any effect on the status of the groundwater body from the future expansion of the 'plume', if necessary, by actively reducing its extent.***

Within the context of groundwater risk assessments on sites affected by land contamination, "reasonable" means feasible without involving disproportionate costs. What costs are "disproportionate" depends on site-specific circumstances, which may include:

- Considerations of technical feasibility such as identified by the remedial options appraisal, this may be due to the distribution or nature of the contamination and the available remedial methods to treat the identified contamination;
- Sustainability considerations.

DEFINITIONS AND SUBSTANCE CLASSIFICATIONS

Risks to surface waters:

When assessing risks to surface waters, the following list of definitions should be understood:

Priority substances (PS) are harmful substances originally identified under the Water Framework Directive (WFD) 2000/60/EC as substances ‘presenting a significant risk to or via the aquatic environment’ at a European level. Member States are required to incorporate the identified **PS** into their country-wide monitoring programmes. There are currently 33 **PS** defined within the Priority Substances Directive (2013/39/EU; Annex 1), with a further 12 additional substances due to come into force from 22 December 2018. Directive 2013/39/EU has been transposed into domestic legislation for England and Wales by The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Under the umbrella of **PS**, there is a sub-set of substances identified as being “hazardous”, and these are referred to as **Priority hazardous substances (PHS)**. The list of **PHS** is defined at EU level within the Priority Substances Directive (2013/39/EU). The WFD defines hazardous substances as ‘substances (or groups of substances) that are toxic, persistent and liable to bio-accumulate, and other substances or groups of substances that give rise to an equivalent level of concern.’ There are currently 15 **PHS**, with a further 6 additional substances due to come into force from 22 December 2018.

There is also another group of substances defined at EU level and which are referred to as **other pollutants (OP)** in Directive 2013/39/EU. These are additional substances which although not **priority substances**, have EQS which are identical to those laid down in the legislation which applied prior to 13 January 2009 (Directive 2008/105/EU). The **OP** are listed along with the **priority substance (PS)** within the Priority Substances Directive (2013/39/EU), and their associated EQS are also listed therein. There are 6 **OP** defined within the Priority Substances Directive (2013/39/EU).

In addition to the EU level substances, there are also a group of pollutants defined at a Member State level, referred to as **Specific pollutants (SP)**. These substances are pollutants which are released in significant quantities into water bodies in each of the individual European Member States. Under the WFD, Member States are required to set their own EQS for these substances. An indicative list of **SP** is given in Annex VIII of the WFD. Many of the substances categorised as **SP** in the UK were formerly List 2 substances under the old Groundwater Directive (80/68/EEC). The **SP** are defined within Part 2 (Table 1) of The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

Risks to groundwater:

When assessing risks to groundwater, the following definitions should be understood:

Under the requirements of the Groundwater Daughter Directive (2006/118/EU), the UK has published a list of substances it considers to be **hazardous substances** with respect to groundwater. In their advisory capacity to the government, this list has been derived by the UK Joint Agencies Groundwater Directive Advisory Group (JAGDAG), of which the Environment Agency is a member. The JAGDAG list of **hazardous substances** was published in January 2017 and the Environment Agency will use the updated list of hazardous substances from this date for all new activities that may lead to the discharge of hazardous substances to groundwater. The list is extensive and can be found in full at:

<https://www.wfduk.org/stakeholders/jagdag>

Selecting the appropriate assessment criteria

When assessing the risks to controlled waters, various assessment criteria apply, depending on the nature of the assessment and the conceptual site model.

Where a surface water body is involved, then Environmental Quality Standards (EQS) are the relevant assessment criteria as they are designed to be protective of surface water ecology.

Where a public water supply or a Principal aquifer is involved, then the standards defined in The Water Supply (Water Quality) Regulations⁽²⁾ are the primary source of assessment criteria. The Private Water Supplies Regulations⁽³⁾ may also be applicable in some cases. For instances where there are no UK assessment criteria, then the World Health Organisation (WHO) drinking water guidelines⁽⁴⁾ may be used.

This appendix presents the generic assessment criteria (GAC) that RSK considers suitable for assessing risks to controlled waters for our most commonly encountered determinants. A full list of EQS for England and Wales are included in The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

The RSK GAC for controlled waters are presented in **Table 1** and **Table 2**. In line with the Environment Agency's Remedial Targets Methodology, the GAC for controlled waters are termed 'target concentrations'.

The appropriate target concentrations should be selected with consideration to:

- the site conceptual model (i.e. the receptor at potential risk);
- whether the substance is already present in groundwater at the site;
- whether or not the substance is classified as a priority hazardous substance under the Priority Substances Directive (2013/39/EC) (see above), or as a hazardous substance according to the current list of JAGDAG determinations⁽⁵⁾; and
- background concentrations in the aquifer (if applicable).

It is important to remember that the WFD and Environment Agency guidance^(1 & 1a) support a sustainable, risk-based approach be applied to groundwater contamination. Exceedance of any target concentration does not necessarily imply that an unacceptable risk exists or that remediation is inevitably required.

Target concentrations shaded in green are <u>statutory values</u>	Target concentrations shaded in orange are <u>non-statutory values</u>
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Note: Units µg/l throughout (unless otherwise stated)

Table 1: Target concentrations for controlled waters (excluding TPH CWG fractions)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Metals & other inorganics						
Hazardous substance	Specific pollutant	Arsenic	-	10 ⁽²⁾	50 ^(6a)	25 ^(6a)
Non-hazardous pollutant	Priority substance	Cadmium	0.1 ⁽⁷⁾	5 ⁽²⁾	≤0.08, 0.08, 0.09, 0.15, 0.25 ^(6b)	0.2 ^(6a)
(Not determined)	-	Chromium (total)	-	50 ⁽²⁾	8.1 Sum values for chromium III and VI	-
(None	Specific pollutant	Chromium (III)	-	Use value for total chromium	4.7 ^(6a)	-
Hazardous substance	Specific pollutant	Chromium (VI)			3.4 ^(6a)	0.6 ^(6a)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
(Not determined)	Specific pollutant	Copper	-	2,000 ⁽²⁾	1 bioavailable ^(6a)	3.76 dissolved, where DOC ≤1mg/l ^(6a)
						3.76µg/l + (2.677µg/l x ((DOC/2) – 0.5µg/l)) dissolved, where DOC >1mg/l ^(6a)
Hazardous substance	Priority substance	Lead	-	10 ⁽²⁾	1.2 bioavailable ^(6a)	1.3 ^(6a)
Hazardous substance	Priority hazardous substance	Mercury	0.01 ⁽⁷⁾	1 ⁽²⁾	0.07 ^(6c)	0.07 ^(6c)
Non-hazardous pollutant	Priority substance	Nickel	-	20 ⁽²⁾	4.0 bioavailable ^(6a)	8.6 ^(6a)
Non-hazardous pollutant	-	Selenium	-	10 ⁽²⁾	-	-
Non-hazardous pollutant	Specific pollutant	Zinc	-	3,000 ⁽⁸⁾	10.9 bioavailable ^(6a)	6.8 dissolved ^(6a)
None	Specific pollutant	Iron	-	200 ⁽²⁾	1000 ^(6a) *1	1000 ^(6a))*1
None	Specific pollutant	Manganese	-	50 ⁽²⁾ (0.05mg/l)	123 bioavailable ^(6a) (0.123mg/l)	-
(Not determined)	-	Aluminium	-	200 ⁽²⁾	-	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Priority hazardous substance	Tributyltin compounds (Tributyltin-cation)	0.001 ⁽⁷⁾	-	0.0002 ^(6a)	0.0002 ^(6a)
(Not determined)	-	Sodium	-	200,000 ⁽²⁾ (200 mg/l)	-	-
Non-hazardous pollutant	Specific pollutant	Cyanide (Hydrogen cyanide)	-	50 ⁽²⁾ (0.05 mg/l)	1 ^(6a) (0.001 mg/l)	1 ^(6a) (0.001 mg/l)
Non-hazardous pollutant	-	Total ammoniacal nitrogen ^s	-	500 ⁽²⁾ (0.5 mg/l) as NH ₄ (472 expressed as NH ₃ ; 389 expressed as N)	300 ^(6f) (0.3 mg/l) as N (364 expressed as NH ₃ ; 386 expressed as NH ₄)	-
Non-hazardous pollutant	Specific pollutant	Ammonia un-ionised (equilibrium ratio calculated) (NH ₃)	-	-	-	21 ^(6a) (0.021 mg/l)
Non-hazardous pollutant	Specific pollutant	Chlorine	-	-	2 ^(6a) (0.002 mg/l)	10 ^(6d) (0.01 mg/l)
(Not determined)	-	Chloride	-	250,000 ⁽²⁾ (250 mg/l)	-	-
(Not determined)	-	Sulphate	-	250,000 ⁽²⁾ (250 mg/l)	-	-
(Not determined)	-	Nitrate (as NO ₃)	-	50,000 ⁽²⁾ (50 mg/l)	-	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
(Not determined)	-	Nitrite (as NO ₂)	-	500 ⁽²⁾ (0.5 mg/l)	10 ⁽⁹⁾ (0.01 mg/l)	-
Volatile organic compounds (VOC)						
Non-hazardous pollutant	Other pollutant	Tetrachloroethene (tetrachloroethylene; PCE)	0.1 ⁽⁷⁾	10 ⁽²⁾ sum of TCE and PCE	10 ^(6a)	10 ^(6a)
Hazardous substance	Other pollutant	Trichloroethene (trichloroethylene; TCE)	0.1 ⁽⁷⁾		10 ^(6a)	10 ^(6a)
None	Specific pollutant	Tetrachloroethane	-	-	140 ^(6a)	-
Hazardous substance	Other pollutant	Carbon tetrachloride (tetrachloromethane)	0.1 ⁽⁷⁾	3.0 ⁽²⁾	12 ^(6a)	12 ^(6a)
Non-hazardous pollutant	Priority substance	1,2-Dichloroethane	1.0 ⁽⁷⁾	3.0 ⁽²⁾	10 ^(6a)	10 ^(6a)
Non-hazardous pollutant	-	1.2-Dichloroethene (DCE) sum of cis and trans	-	50.0 ⁽⁴⁾	-	-
Hazardous substance	-	Vinyl chloride (chloroethene)	-	0.5 ⁽²⁾	-	-
Non-hazardous pollutant	Priority substance	Dichloromethane	-	20 ⁽⁴⁾	20 ^(6a)	20 ^(6a)
Non-hazardous pollutant	Priority substance	Trichlorobenzenes	0.01 ⁽⁷⁾	-	0.4 ^(6a)	0.4 ^(6a)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Priority substance	Trichloromethane (Chloroform)	0.1 ⁽⁷⁾	100 ^(2a) (sum of trihalomethanes – chloroform, bromform, dibromochloromethane, bromodichloromethane)	2.5 ^(6a)	2.5 ^(6a)
(Not determined)	-	Bromoform	-		-	-
(Not determined)	-	Dibromochloromethane	-		-	-
(Not determined)	-	Bromodichloromethane	-		-	-
Non-hazardous pollutant	Priority hazardous substance	Di(2-ethylhexyl) phthalate (bis(2-ethylhexyl) phthalate, DEHP)	-	8 ⁽⁴⁾	1.3 ^(6a)	1.3 ^(6a)
None	Specific pollutant	Benzyl butyl phthalate	-	-	7.5 ^(6a)	0.75 ^(6e)
Hazardous substance	Priority hazardous substance	Hexachlorobutadiene (as a pesticide, but reported in a VOC suite)	0.005 ⁽⁷⁾	0.1 ⁽²⁾	0.6 ^(6c)	0.6 ^(6c)
Semi-volatile organic compounds (SVOC)						
(Not determined)	-	Acenaphthylene (Aro EC12-EC16)	-	-	5.8 ⁽¹⁰⁾	
Hazardous substance	Priority hazardous substance	Anthracene (Aro EC16-EC21)	-	-	0.1 ^(6a)	0.1 ^(6a)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Non-hazardous pollutant	Priority substance	Naphthalene (Aro EC10-EC12)	-	-	2 ^(6a)	2 ^(6a)
Hazardous substance	Priority substance	Fluoranthene (Aro EC21-EC35) not used as an indicator for this EC band	-	-	0.0063 ^(6a)	0.0063 ^(6a)
Hazardous substance(s)	Priority hazardous substance(s)	Benzo(a)pyrene (Aro EC21-EC35)	-	0.01 ⁽²⁾	0.00017 ^(6a)	0.00017 ^(6a)
		Benzo(b)fluoranthene (Aro EC21-EC35)	-	0.1 ⁽²⁾ sum of the concentration of the four specified compounds	No EQS for these substances. B(a)P should be used as the indicator compound instead.	
		Benzo(k)fluoranthene (Aro EC21-EC35)	-			
		Benzo(g,h,i)perylene (Aro EC21-EC35)	-			
		Indeno(1,2,3-cd) pyrene (Aro EC21-EC35)	-			
Non-hazardous pollutant	Specific pollutant	Phenol	-	-	7.7 ^(6a)	7.7 ^(6a)
Hazardous substance	Specific pollutant	2,4-Dichlorophenol	0.1 ⁽⁷⁾	-	4.2 ^(6a)	0.42 ^(6a)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Priority substance	Pentachloro-phenol (PCP) (as a pesticide, but reported in an SVOC suite)	0.1 ⁽⁷⁾	0.1 ⁽²⁾	0.4 ^(6a)	0.4 ^(6a)
Petroleum hydrocarbons						
Hazardous substance	-	Total petroleum hydrocarbons	-	See Table 2 for individual (non-statutory) TPH CWG fractions with respect to drinking water receptors	See individual risk driving compounds (i.e. BTEX and PAH) for specific EQS	
Hazardous substance	Priority substance	Benzene (Aro EC5-EC7)	1 ⁽⁷⁾	1 ⁽²⁾	10 ^(6a)	8 ^(6a)
Hazardous substance	Specific pollutant	Toluene (Aro EC7-EC8)	4 ⁽⁷⁾	700 ⁽⁴⁾	74 ^(6a)	74 ^(6a)
Hazardous substance	-	Ethylbenzene (Aro EC8-EC10)	-	300 ⁽⁴⁾	300 ⁽¹¹⁾	-
(Not determined)	-	Xylenes (Aro EC8-EC10)	3 ⁽⁷⁾	500 ⁽⁴⁾	30 ⁽¹¹⁾	-
Non-hazardous pollutant	-	Methyl tertiary butyl ether (MTBE)	-	15 ⁽¹²⁾	-	

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Pesticides, fungicides, insecticides and herbicides						
(Not determined) – assume to be Hazardous Substance	-	Total pesticides	-	0.5 ⁽²⁾	-	-
(Not determined) - assume to be Hazardous Substance	-	Other individual pesticides (unless otherwise detailed below)	-	0.1 ⁽²⁾	-	-
Hazardous substance(s)	Other pollutant (Cyclodiene pesticides)	Aldrin	0.003 ⁽⁷⁾	0.03 ⁽²⁾	0.01 ^(6a) (sum of all four)	0.005 ^(6a) (sum of all four)
		Dieldrin	0.003 ⁽⁷⁾	0.03 ⁽²⁾		
		Endrin	0.003 ⁽⁷⁾	0.1 ^(2b) ('other individual pesticide')		
		Isodrin* ²	0.003 ⁽⁷⁾	0.1 ^(2b) ('other individual pesticide')		
Hazardous substance	Other pollutant	DDT (total)	0.002 ⁽⁷⁾	0.1 ⁽²⁾ ('other individual pesticide')	0.025 ^(6a)	0.025 ^(6a)
Hazardous substance	Specific pollutant	Carbendazim	-	0.1 ⁽²⁾ ('other individual pesticide')	0.15 ^(6a)	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Chlorothalonil	-	0.1 ⁽²⁾ (‘other individual pesticide’)	0.035 ^(6a)	-
Hazardous substance	Specific pollutant (until 22/12/18, after which it becomes a Priority substance)	Cypermethrin	-	0.1 ⁽²⁾ (‘other individual pesticide’)	0.0001 ^(6a) From 22/12/18: 8.0E ^{-5(6a)}	0.0001 ^(6a) From 22/12/18: 8.0E ^{-6(6a)}
Hazardous substance	Specific pollutant	Dimethoate	0.01 ⁽⁷⁾	0.1 ⁽²⁾ (‘other individual pesticide’)	0.48 ^(6a)	0.48 ^(6a)
(Not determined)	Specific pollutant	Glyphosate	-	0.1 ⁽²⁾ (‘other individual pesticide’)	196 ^(6a)	196 ^(6a)
Hazardous substance	Specific pollutant	Linuron	-	0.1 ⁽²⁾ (‘other individual pesticide’)	0.5 ^(6a)	0.5 ^(6a)
Non-hazardous pollutant	Specific pollutant	Mecoprop	0.04 ⁽⁷⁾	0.1 ⁽²⁾ (‘other individual pesticide’)	18 ^(6a)	18 ^(6a)
Non-hazardous pollutant	Specific pollutant	Methiocarb	-	0.1 ⁽²⁾ (‘other individual pesticide’)	0.01 ^(6a)	-
Non-hazardous pollutant	Specific pollutant	Pendimethalin	-	0.1 ⁽²⁾ (‘other individual pesticide’)	0.3 ^(6a)	-

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
Hazardous substance	Specific pollutant	Permethrin	0.001 ⁽⁷⁾	0.1 ⁽²⁾ (‘other individual pesticide’)	0.001 ^(6a)	0.0002 ^(6a)
Hazardous substance	Priority substance	Alachlor	-	0.1 ⁽²⁾ (‘other individual pesticide’)	0.3 ^(6a)	0.3 ^(6a)
Hazardous substance	Priority substance	Atrazine	0.03 ⁽⁷⁾	100 ⁽⁴⁾ (‘other individual pesticide’)	0.6 ^(6a)	0.6 ^(6a)
Hazardous substance	Priority substance	Diuron	-	0.1 ⁽²⁾ (‘other individual pesticide’)	0.2 ^(6a)	0.2 ^(6a)
Hazardous substance	Priority hazardous substance	Endosulphan	0.005 ⁽⁷⁾	0.1 ⁽²⁾ (‘other individual pesticide’)	0.005 ^(6a)	0.0005 ^(6a)
Non-hazardous pollutant	Priority substance	Isoproturon	-	0.1 ⁽²⁾ (‘other individual pesticide’)	0.3 ^(6a)	0.3 ^(6a)
Hazardous substance	Priority substance	Simazine	0.03 ⁽⁷⁾	0.1 ⁽²⁾ (‘other individual pesticide’)	1 ^(6a)	1 ^(6a)
Hazardous substance	Priority hazardous substance	Trifluralin	0.01 ⁽⁷⁾	0.1 ⁽²⁾ (‘other individual pesticide’)	0.03 ^(6a)	0.03 ^(6a)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters
<i>(Not determined)</i>	From 22/12/18: Priority substance	Dichlorvos	-	0.1 ⁽²⁾ (‘other individual pesticide’)	From 22/12/18: 6.0E ^{-4(6a)}	From 22/12/18: 6.0E ^{-5(6a)}
Hazardous substance	From 22/12/18: Priority substance	Heptachlor and heptachlor epoxide	-	0.03 ⁽²⁾	From 22/12/18: 2.0E ^{-7(6a)}	From 22/12/18: 1.0E ^{-08(6a)}
Miscellaneous						
None	Specific pollutant	Triclosan (antibacterial agent)	-	-	0.1 ^(6a)	0.1 ^(6a)
Hazardous substance	From 22/12/18: Priority hazardous substance	Perfluoro-octane sulfonic acid (and its derivatives) (PFOS)	-	-	From 22/12/18: 6.5E ^{-4(6a)}	From 22/12/18: 1.3E ^{-4(6a)}
Hazardous substance	From 22/12/18: Priority hazardous substance	Hexabromo cyclododecane (HBCDD)	-	-	From 22/12/18: 0.0016 ^(6a)	From 22/12/18: 0.0008 ^(6a)

Substance classification		Determinant	Target concentrations (µg/l)			
Groundwater receptors ⁽⁵⁾	Surface water receptors ⁽⁶⁾		Minimum reporting value	UK drinking water standard (or best equivalent)	EQS or best equivalent	
					Freshwater	Transitional (estuaries) and coastal waters

Notes:

‘-’ A target concentration is not available.

\$Please note that total ammonia (NH₄⁺ and NH₃) is equivalent to ammoniacal nitrogen in laboratory reports

*¹ Please note that although iron is listed in the 2015 Direction as 1.000 µg/l, the EQS remains at 1mg/l in Scotland and it is assumed this is an error and should read either 1,000 or 1000µg/l.

*² Please note that although Isodrin is not listed in name within the group of “Cyclodiene pesticides” in Table 1 of Schedule 3 Part 3 of the 2015 Direction⁽⁶⁾, the CAS number for Isodrin (465-73-6) is listed and therefore it is assumed that it has been missed off the named list of substances.

*³ Total petroleum hydrocarbons is used for consistency, but is an analytical method-defined measurement for a mixture of hydrocarbons subject to environmental analysis¹¹.

“Bioavailable” in relation to copper, zinc, nickel and manganese (but not lead) is the generic EQSbioavailable^(6a) derived from the Metal Bioavailability Assessment Tool (M-BAT) developed by the Water Framework Directive UK Technical Advisory Group (WFDTAG). Exceedance of this value should prompt a site-specific assessment using the M-BAT with pH, DOC and Ca to derive a site-specific EQS termed the PNEC_{dissolved}.
<http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat>.

For zinc, if there is an exceedance of the EQSbioavailable in an initial GQRA, Tier 2 required that the EQS for zinc should also have the ambient background concentration of zinc added as well

Table 2: World Health Organization (WHO) guide values for TPH CWG fractions in drinking water⁽¹³⁾ (as referenced in CL:AIRE, 2017⁽¹¹⁾)

TPH CWG fraction	WHO guide value for drinking water ⁽¹³⁾ (µg/l)
Aliphatic fractions:	
Aliphatic EC5-EC6	15,000
Aliphatic >EC6-EC8	15,000
Aliphatic >EC8-EC10	300
Aliphatic >EC10-EC12	300
Aliphatic >EC12-EC16	300
Aliphatic >EC16-EC21	-
Aliphatic >EC21-EC35	-
Aromatic fractions:	
Aromatic EC5-EC6	10 (benzene)
Aromatic >EC6-EC8	700 (toluene)
Aromatic >EC8-EC10	300 (ethyl benzene) 500 (xylenes)
Aromatic >EC10-EC12	90
Aromatic >EC12-EC16	90
Aromatic >EC16-EC21	90
Aromatic >EC21-EC35	90
Reference: World Health Organisation (WHO), 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/05.08/123. World Health Organisation, Geneva ⁽¹³⁾ .	

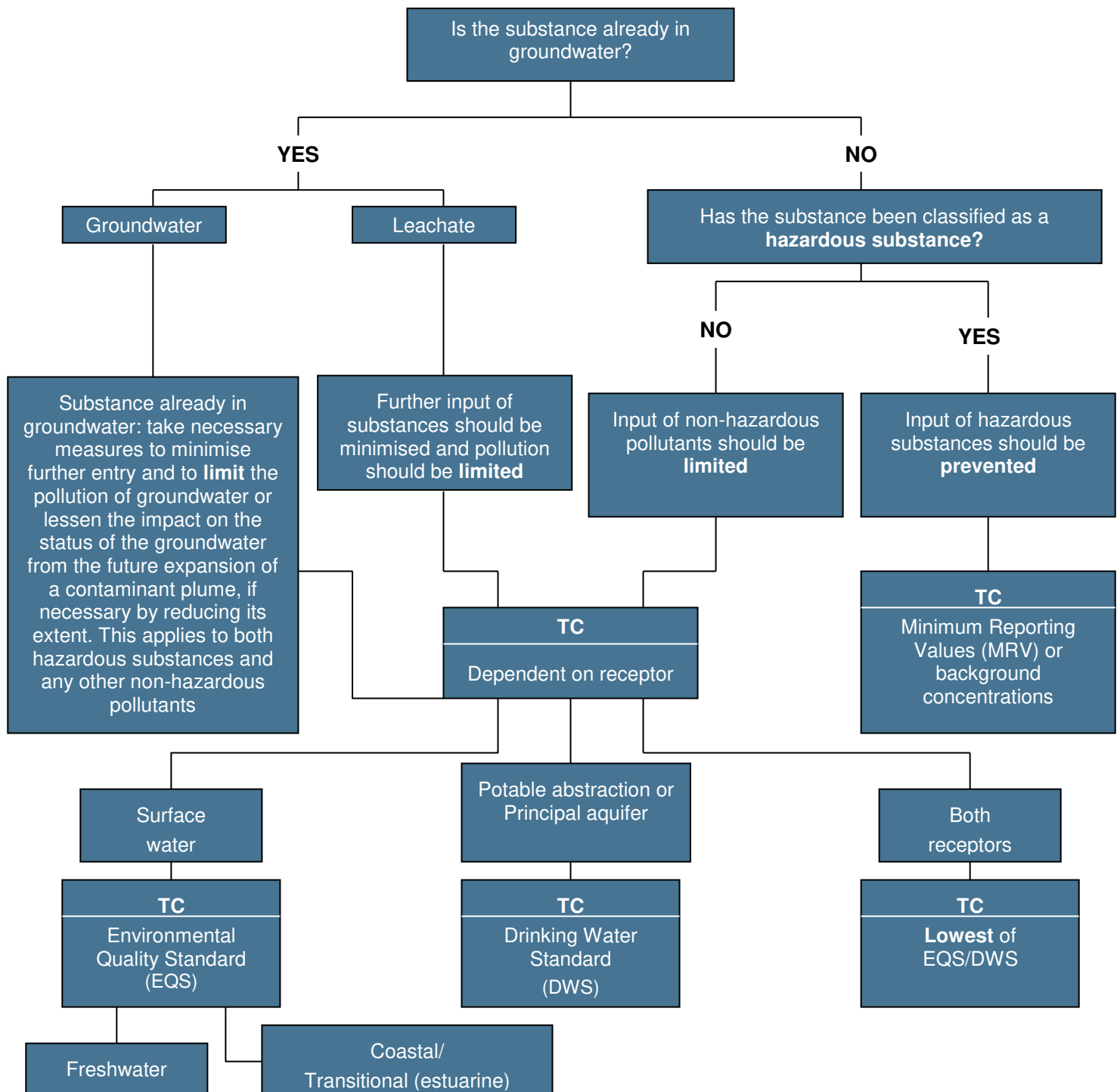
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1. Environment Agency (2017), 'The Environment Agency's approach to groundwater protection', version 1.0, March 2017 (formerly contained within GP3) [accessed 29 March 2017].
<https://www.gov.uk/government/collections/groundwater-protection>
- 1a. Environment Agency (2017), 'Land contamination groundwater compliance points: quantitative risk assessments', March 2017 (formerly contained within GP3) [accessed 29 March 2017].
<https://www.gov.uk/government/collections/groundwater-protection>
2. The Water Supply (Water Quality) Regulations 2016 (SI 2016/619)
 - 2a. Sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane
 - 2b. Standard applies to individual pesticides except aldrin, dieldrin, heptachlor and heptachlor epoxide, for which a separate standard is defined.
3. The Private Water Supplies (England) Regulations 2016. SI 2016 / 618
4. WHO (2011), ***Guidelines for drinking-water quality***, 4th edn
5. JAGDAG hazard substance determinations: This list contains substances that are determined to be hazardous substances or non-hazardous pollutants for the purposes of the groundwater directive 2006/118/EC. The absence of an assessment or substance from the list means an assessment has not been done yet and is presented as 'Not yet determined'; if a substance has been assessed but does not fall into either category it is presented as 'None'. For further details on how substances are assessed, see the Joint Agencies Groundwater Directive Advisory Group (JAGDAG) 'Methodology for the determination of hazardous substances in groundwater for the purposes of the groundwater directive 2006/118/EC' which is available from the JAGDAG website. The methodology is a UK –wide framework that sets criteria for how to assess whether a substance is a hazardous substances in groundwater. The list of substances can be found at:
<https://www.wfduk.org/stakeholders/jagdag>
6. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.
 - 6a. The EQS for these substances are based on a "long term mean" or an "annual average (AA)" EQS.
 - 6b. For cadmium and its compounds the EQS values vary depending on the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO₃/l, Class 2: 40 to < 50 mg CaCO₃/l, Class 3: 50 to < 100 mg CaCO₃/l, Class 4: 100 to < 200 mg CaCO₃/l and Class 5: ≥ 200 mg CaCO₃/l).
 - 6c. The EQS for Mercury and hexachlorobutadiene are based on a "maximum acceptable concentration (MAC)" EQS in absence of an "annual average (AA)" EQS.
 - 6d. The EQS for chlorine in saltwater is based on the 95th percentile concentration of total residual oxidant, which refers to the sum of all oxidising agents existing in water, expressed as available chlorine.
 - 6e. The recommended saltwater standard is derived using a safety factor of 100. Where the standard is failed, it is recommended that supporting evidence of ecological damage should be obtained before committing to expensive action.
 - 6f. EQS for total ammonia is as per Schedule 3, Part 1, Table 7 of of the above directions. EQS applies to river types 1, 2 and 4 and 6 (namely upland and low alkalinity). The EQS for a lowland and high alkalinity rivers (types 3, 5 and 7) is 600µg/l (0.6mg/l).

Additional information on the Metal Bioavailability Assessment Tool (M-BAT) is available at <http://www.wfduk.org/resources/rivers-lakes-metal-bioavailability-assessment-tool-m-bat>

7. Minimum reporting values listed at <https://www.gov.uk/government/publications/values-for-groundwater-risk-assessments/hazardous-substances-to-groundwater-minimum-reporting-values> (updated 13 January 2017; accessed 29 March 2017). Note target concentration for xylenes is 3 µg/l each for o-xylene and m/p xylene as it may not be possible to separate m- and p-xylene; 135 tcb, 124 tcb, 123 tcb each to 0.01 µg/l)
8. The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996 (as amended). SI 1996 / 3001
9. Council Directive on the Quality of Fresh Waters Needing Protection or Improvement in Order to Support Fish Life (Freshwater Fish Directive) (78/659/EEC)
10. WRc plc (2002), R&D Technical Report P45.
11. CL:AIRE, 2017. Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies. V1.1.
12. Drinking Water Inspectorate (London, UK). Environmental Information Request on MTBE in drinking water. Ref. DWI 1/10/18; dated 28 November 2006. Value is based on the odour threshold for MTBE, which is lower than a health-based guideline value
13. World Health Organisation (WHO), 2008. Petroleum products in drinking-water. Background document for development of WHO guidelines for drinking water quality. WHO/SDE/WSH/05.08/123. World Health Organisation, Geneva. [accessed 29 March 2017] [http://www.who.int/water sanitation health/dwq/chemicals/petroleumproducts_2add_june2008.pdf](http://www.who.int/water_sanitation_health/dwq/chemicals/petroleumproducts_2add_june2008.pdf)

FLOW CHART TO ASSIST WITH SELECTION OF TARGET CONCENTRATIONS



TC = Target concentration

When leachate is being assessed the 'compliance point' is the groundwater body. Therefore dilution within the groundwater body may be applied with caution before comparing with the TC.

When directly assessing a receptor, e.g., a river, the appropriate TC should be selected.



APPENDIX K

GQRA DATA SCREENING TABLES – SOILS

Project name	High Road, Weston, Spalding	Notes	
Project code	252234		
Client name	Persimmon Homes East Midlands		
Address			
NGR			
Land use	Residential with home-grown produce		
SOM	1%		
GAC version	2019_00		

									Lab sample ID	20/01779/4	20/01779/5	20/01779/10	20/01779/6	20/01779/13	20/01779/7	20/01779/9	20/01779/11	20/01779/8	20/01779/1	20/01779/14
									Client sample ID	SA01	SA02A	TP04	TP06	TP07	TP10	TP11	TP12	TP13	WS01	WS03A
									Depth to top	0.1	0.2	0.2	0.2	0.1	2.3	0.2	2.5	0.4	0.2	0.4
									Depth to bottom											
									Date sampled	18/02/20	18/02/20	19/02/20	18/02/20	18/02/20	19/02/20	19/02/20	19/02/20	18/02/20	19/02/20	19/02/20
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects												
Metals and Inorganics																				
Arsenic	mg/kg	37		11	3	10	10	0	7	5	11	6		7	4			3	6	
Cadmium	mg/kg	22		1	<0.5	10	2	8	<0.5	<0.5	0.6	<0.5		1	<0.5			<0.5	<0.5	
Chromium	mg/kg	910	21	51	14	10	10	0	29	26	37	25		51	22			14	29	
Chromium (hexavalent)	mg/kg	21			<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Copper	mg/kg	2500		19	4	10	10	0	8	8	19	7		10	7			4	7	
Lead	mg/kg	200		64	10	10	10	0	18	19	64	17		32	23			10	17	
Mercury	mg/kg	39	0.2		<0.17	10	0	10	<0.17	<0.17	<0.17	<0.17		<0.17	<0.17			<0.17	<0.17	
Nickel	mg/kg	130		43	11	10	10	0	24	20	32	21		43	19			11	24	
Selenium	mg/kg	258		2	<1	10	1	9	<1	<1	<1	<1		2	<1			<1	<1	
Zinc	mg/kg	3900		95	32	10	10	0	62	56	95	55		94	58			32	58	
Asbestos																				
Asbestos in soil						10	0	10	NAD	NAD	NAD	NAD		NAD	NAD			NAD	NAD	
Petroleum Hydrocarbons																				
Ali >C5-C6	mg/kg	42			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
Ali >C6-C8	mg/kg	100			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
Ali >C8-C10	mg/kg	27			<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Ali >C10-C12	mg/kg	130	48		<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Ali >C12-C16	mg/kg	1100	24		<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Ali >C16-C21	mg/kg				<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Ali >C21-C35	mg/kg			4	<1	10	9	1	3	2	1	2		<1	1			4	3	
Ali >C16-C35 calculated	mg/kg	65000	8	4	<1	10	9	1	3	2	1	2		<1	1			4	3	
Total Aliphatics	mg/kg			4	<1	10	9	1	3	2	1	2		<1	1			4	3	
Aro >C5-C7	mg/kg				<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
Aro >C7-C8	mg/kg				<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
Aro >C8-C10	mg/kg	30			<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Aro >C10-C12	mg/kg	80			<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Aro >C12-C16	mg/kg	140			<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Aro >C16-C21	mg/kg	260			<1	10	0	10	<1	<1	<1	<1		<1	<1			<1	<1	
Aro >C21-C35	mg/kg	1100		4	<1	10	9	1	1	1	1	2		1	<1			4	1	
Total Aromatics	mg/kg			4	<1	10	9	1	1	1	1	2		1	<1			4	1	
TPH (Ali & Aro)	mg/kg			8	1	10	10	0	4	4	4	6		1	1			8	4	
BTEX - Benzene	mg/kg	0.2			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
BTEX - Toluene	mg/kg	130			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
BTEX - Ethyl Benzene	mg/kg	50			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
BTEX - o Xylene	mg/kg	61			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
BTEX - m & p Xylene	mg/kg	57			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
MTBE	mg/kg	60			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
Polycyclic aromatic hydrocarbons																				
Acenaphthene	mg/kg	230			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
Acenaphthylene	mg/kg	180			<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01			<0.01	<0.01	
Anthracene	mg/kg	2400			<0.02	10	0	10	<0.02	<0.02	<0.02	<0.02		<0.02	<0.02			<0.02	<0.02	

Project code: 252234
High Road, Weston, Spalding

Land use: Residential with home-grown produce
SOM: 1%

Project name	High Road, Weston, Spalding	
Project code	252234	
Client name	Persimmon Homes East Midlands	
Address		
NGR		
Land use	Residential with home-grown produce	
SOM	1%	
GAC version	2019_00	

									Lab sample ID	20/01779/2	20/01779/15	20/01779/12	20/01779/3
									Client sample ID	WS04	WS04	WS05	WS06
									Depth to top	0.6	0.2	1.2	2.2
									Depth to bottom				
									Date sampled	17/02/20	17/02/20	17/02/20	17/02/20
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete					
Metals and Inorganics													
Arsenic	mg/kg	37		11	3	10	10	0		6			3
Cadmium	mg/kg	22		1	<0.5	10	2	8		<0.5			<0.5
Chromium	mg/kg	910	21	51	14	10	10	0		19			41
Chromium (hexavalent)	mg/kg	21			<1	10	0	10		<1			<1
Copper	mg/kg	2500		19	4	10	10	0		7			7
Lead	mg/kg	200		64	10	10	10	0		16			15
Mercury	mg/kg	39	0.2		<0.17	10	0	10		<0.17			<0.17
Nickel	mg/kg	130		43	11	10	10	0		15			34
Selenium	mg/kg	258		2	<1	10	1	9		<1			<1
Zinc	mg/kg	3900		95	32	10	10	0		45			72
Asbestos													
Asbestos in soil						10	0	10		NAD			NAD
Petroleum Hydrocarbons													
Ali >C5-C6	mg/kg	42			<0.01	10	0	10		<0.01			<0.01
Ali >C6-C8	mg/kg	100			<0.01	10	0	10		<0.01			<0.01
Ali >C8-C10	mg/kg	27			<1	10	0	10		<1			<1
Ali >C10-C12	mg/kg	130	48		<1	10	0	10		<1			<1
Ali >C12-C16	mg/kg	1100	24		<1	10	0	10		<1			<1
Ali >C16-C21	mg/kg				<1	10	0	10		<1			<1
Ali >C21-C35	mg/kg			4	<1	10	9	1		4			3
Ali >C16-C35 calculated	mg/kg	65000	8	4	<1	10	9	1		4			3
Total Aliphatics	mg/kg			4	<1	10	9	1		4			3
Aro >C5-C7	mg/kg				<0.01	10	0	10		<0.01			<0.01
Aro >C7-C8	mg/kg				<0.01	10	0	10		<0.01			<0.01
Aro >C8-C10	mg/kg	30			<1	10	0	10		<1			<1
Aro >C10-C12	mg/kg	80			<1	10	0	10		<1			<1
Aro >C12-C16	mg/kg	140			<1	10	0	10		<1			<1
Aro >C16-C21	mg/kg	260			<1	10	0	10		<1			<1
Aro >C21-C35	mg/kg	1100		4	<1	10	9	1		4			4
Total Aromatics	mg/kg			4	<1	10	9	1		4			4
TPH (Ali & Aro)	mg/kg			8	1	10	10	0		7			6
BTEX - Benzene	mg/kg	0.2			<0.01	10	0	10		<0.01			<0.01
BTEX - Toluene	mg/kg	130			<0.01	10	0	10		<0.01			<0.01
BTEX - Ethyl Benzene	mg/kg	50			<0.01	10	0	10		<0.01			<0.01
BTEX - o Xylene	mg/kg	61			<0.01	10	0	10		<0.01			<0.01
BTEX - m & p Xylene	mg/kg	57			<0.01	10	0	10		<0.01			<0.01
MTBE	mg/kg	60			<0.01	10	0	10		<0.01			<0.01
Polycyclic aromatic hydrocarbons													
Acenaphthene	mg/kg	230			<0.01	10	0	10		<0.01			<0.01
Acenaphthylene	mg/kg	180			<0.01	10	0	10		<0.01			<0.01
Anthracene	mg/kg	2400			<0.02	10	0	10		<0.02			<0.02

									Lab sample ID	20/01779/4	20/01779/5	20/01779/10	20/01779/6	20/01779/13	20/01779/7	20/01779/9	20/01779/11	20/01779/8	20/01779/1	20/01779/14
									Client sample ID	SA01	SA02A	TP04	TP06	TP07	TP10	TP11	TP12	TP13	WS01	WS03A
									Depth to top	0.1	0.2	0.2	0.2	0.1	2.3	0.2	2.5	0.4	0.2	0.4
									Depth to bottom											
									Date sampled	18/02/20	18/02/20	19/02/20	18/02/20	18/02/20	19/02/20	19/02/20	19/02/20	18/02/20	19/02/20	19/02/20
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects												
Benzo(a)anthracene	mg/kg		7		<0.04	10	0	10	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	
Benzo(a)pyrene	mg/kg		5		<0.04	10	0	10	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	
Benzo(b)fluoranthene	mg/kg		2.6		<0.05	10	0	10	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	
Benzo(ghi)perylene	mg/kg		310		<0.05	10	0	10	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05		<0.05	<0.05	
Benzo(k)fluoranthene	mg/kg		77		<0.07	10	0	10	<0.07	<0.07	<0.07	<0.07	<0.07		<0.07	<0.07		<0.07	<0.07	
Chrysene	mg/kg		15		<0.06	10	0	10	<0.06	<0.06	<0.06	<0.06	<0.06		<0.06	<0.06		<0.06	<0.06	
Dibenzo(ah)anthracene	mg/kg		0.24		<0.04	10	0	10	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	<0.04		<0.04	<0.04	
Fluoranthene	mg/kg		290		<0.08	10	0	10	<0.08	<0.08	<0.08	<0.08	<0.08		<0.08	<0.08		<0.08	<0.08	
Fluorene	mg/kg		170		<0.01	10	0	10	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01		<0.01	<0.01	
Indeno(123-cd)pyrene	mg/kg		27		<0.03	10	0	10	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	<0.03		<0.03	<0.03	
Naphthalene	mg/kg		13		<0.03	10	0	10	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	<0.03		<0.03	<0.03	
Phenanthrene	mg/kg		100		<0.03	10	0	10	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	<0.03		<0.03	<0.03	
Pyrene	mg/kg		620		<0.07	10	0	10	<0.07	<0.07	<0.07	<0.07	<0.07		<0.07	<0.07		<0.07	<0.07	
Total PAH-16MS	mg/kg				<0.08	10	0	10	<0.08	<0.08	<0.08	<0.08	<0.08		<0.08	<0.08		<0.08	<0.08	
Other analytes																				
% Stones >10mm	% w/w			7.2	<0.1	15	2	13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	7.2	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01	<0.01					<0.01		
alpha-Hexachlorocyclohexane (HCH)	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Ametryn	mg/kg				<0.2	5	0	5	<0.2			<0.2	<0.2					<0.2		
Atraton	mg/kg				<0.2	5	0	5	<0.2			<0.2	<0.2					<0.2		
Atrazine	mg/kg				<0.2	5	0	5	<0.2			<0.2	<0.2					<0.2		
Azinphos-ethyl	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Azinphos-methyl	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
beta-Hexachlorocyclohexane (HCH)	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Carbophenothion	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Chlorfenvinphos	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Chlorothalonil	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Chlorpyrifos	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Chlorpyrifos-methyl	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
cis-Chlordane (Alpha)	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Coumaphos	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
delta-Hexachlorocyclohexane (HCH)	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Demeton-O	mg/kg				<0.50	5	0	5	<0.50			<0.50	<0.50					<0.50		
Demeton-S	mg/kg				<0.50	5	0	5	<0.50			<0.50	<0.50					<0.50		
Diazinon (Dimpylate)	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Dichlobenil	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Dichlorvos	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Dieldrin	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Dimethoate	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Disulfoton	mg/kg				<0.10	5	0	5	<0.10			<0.10	<0.10					<0.10		
Endosulphan I (Alpha)	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Endosulphan II (Beta)	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Endosulphan Sulphate	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Endrin	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Endrin Aldehyde	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Endrin Ketone	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Ethion	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Etrimphos	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Fenitrothion	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Fensulphothion	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Fenthion	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
gamma-Hexachlorocyclohexane (HCH)	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Heptachlor	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		
Heptachlor epoxide	mg/kg				<0.01	5	0	5	<0.01			<0.01	<0.01					<0.01		

									Lab sample ID	20/01779/2	20/01779/15	20/01779/12	20/01779/3
									Client sample ID	WS04	WS04	WS05	WS06
									Depth to top	0.6	0.2	1.2	2.2
									Depth to bottom				
									Date sampled	17/02/20	17/02/20	17/02/20	17/02/20
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete					
Benzo(a)anthracene	mg/kg		7		<0.04	10	0	10		<0.04			<0.04
Benzo(a)pyrene	mg/kg		5		<0.04	10	0	10		<0.04			<0.04
Benzo(b)fluoranthene	mg/kg		2.6		<0.05	10	0	10		<0.05			<0.05
Benzo(ghi)perylene	mg/kg		310		<0.05	10	0	10		<0.05			<0.05
Benzo(k)fluoranthene	mg/kg		77		<0.07	10	0	10		<0.07			<0.07
Chrysene	mg/kg		15		<0.06	10	0	10		<0.06			<0.06
Dibenzo(ah)anthracene	mg/kg		0.24		<0.04	10	0	10		<0.04			<0.04
Fluoranthene	mg/kg		290		<0.08	10	0	10		<0.08			<0.08
Fluorene	mg/kg		170		<0.01	10	0	10		<0.01			<0.01
Indeno(123-cd)pyrene	mg/kg		27		<0.03	10	0	10		<0.03			<0.03
Naphthalene	mg/kg		13		<0.03	10	0	10		<0.03			<0.03
Phenanthrene	mg/kg		100		<0.03	10	0	10		<0.03			<0.03
Pyrene	mg/kg		620		<0.07	10	0	10		<0.07			<0.07
Total PAH-16MS	mg/kg				<0.08	10	0	10		<0.08			<0.08
Other analytes													
% Stones >10mm	% w/w			7.2	<0.1	15	2	13	<0.1	<0.1	<0.1		6.6
Aldrin	mg/kg				<0.01	5	0	5	<0.01				
alpha-Hexachlorocyclohexane (HCH)	mg/kg				<0.01	5	0	5	<0.01				
Ametryn	mg/kg				<0.2	5	0	5	<0.2				
Atraton	mg/kg				<0.2	5	0	5	<0.2				
Atrazine	mg/kg				<0.2	5	0	5	<0.2				
Azinphos-ethyl	mg/kg				<0.01	5	0	5	<0.01				
Azinphos-methyl	mg/kg				<0.01	5	0	5	<0.01				
beta-Hexachlorocyclohexane (HCH)	mg/kg				<0.01	5	0	5	<0.01				
Carbophenothion	mg/kg				<0.01	5	0	5	<0.01				
Chlorfenvinphos	mg/kg				<0.01	5	0	5	<0.01				
Chlorothalonil	mg/kg				<0.01	5	0	5	<0.01				
Chlorpyrifos	mg/kg				<0.01	5	0	5	<0.01				
Chlorpyrifos-methyl	mg/kg				<0.01	5	0	5	<0.01				
cis-Chlordane (Alpha)	mg/kg				<0.01	5	0	5	<0.01				
Coumaphos	mg/kg				<0.01	5	0	5	<0.01				
delta-Hexachlorocyclohexane (HCH)	mg/kg				<0.01	5	0	5	<0.01				
Demeton-O	mg/kg				<0.50	5	0	5	<0.50				
Demeton-S	mg/kg				<0.50	5	0	5	<0.50				
Diazinon (Dimpylate)	mg/kg				<0.01	5	0	5	<0.01				
Dichlobenil	mg/kg				<0.01	5	0	5	<0.01				
Dichlorvos	mg/kg				<0.01	5	0	5	<0.01				
Dieldrin	mg/kg				<0.01	5	0	5	<0.01				
Dimethoate	mg/kg				<0.01	5	0	5	<0.01				
Disulfoton	mg/kg				<0.10	5	0	5	<0.10				
Endosulphan I (Alpha)	mg/kg				<0.01	5	0	5	<0.01				
Endosulphan II (Beta)	mg/kg				<0.01	5	0	5	<0.01				
Endosulphan Sulphate	mg/kg				<0.01	5	0	5	<0.01				
Endrin	mg/kg				<0.01	5	0	5	<0.01				
Endrin Aldehyde	mg/kg				<0.01	5	0	5	<0.01				
Endrin Ketone	mg/kg				<0.01	5	0	5	<0.01				
Ethion	mg/kg				<0.01	5	0	5	<0.01				
Etrimphos	mg/kg				<0.01	5	0	5	<0.01				
Fenitrothion	mg/kg				<0.01	5	0	5	<0.01				
Fensulphothion	mg/kg				<0.01	5	0	5	<0.01				
Fenthion	mg/kg				<0.01	5	0	5	<0.01				
gamma-Hexachlorocyclohexane (HCH)	mg/kg				<0.01	5	0	5	<0.01				
Heptachlor	mg/kg				<0.01	5	0	5	<0.01				
Heptachlor epoxide	mg/kg				<0.01	5	0	5	<0.01				

									Lab sample ID	20/01779/4	20/01779/5	20/01779/10	20/01779/6	20/01779/13	20/01779/7	20/01779/9	20/01779/11	20/01779/8	20/01779/1	20/01779/14
									Client sample ID	SA01	SA02A	TP04	TP06	TP07	TP10	TP11	TP12	TP13	WS01	WS03A
									Depth to top	0.1	0.2	0.2	0.2	0.1	2.3	0.2	2.5	0.4	0.2	0.4
									Depth to bottom											
									Date sampled	18/02/20	18/02/20	19/02/20	18/02/20	18/02/20	19/02/20	19/02/20	19/02/20	18/02/20	19/02/20	19/02/20
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-detects												
Hexachlorobenzene (HCB)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Isodrin	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Malathion	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Methyl Parathion	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Mevinphos	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
o,p-DDD (2,4)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
o,p-DDE (2,4)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
o,p-DDT (2,4)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
o,p-Methoxychlor	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
p,p-DDD (4,4)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
p,p-DDE (4,4)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
p,p-DDT (4,4)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
p,p-Methoxychlor	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Parathion (ethyl)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Pendimethalin	mg/kg			0.02	<0.01	5	1	4	<0.01		<0.01	0.02					<0.01			
Permethrin I (cis)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Permethrin II (trans)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
pH	pH			8.9	7.89	10	10	0	7.91	8.32	8.42	7.89		8.31	8.23		8.48	8.26		
pH BRE	pH			9.31	7.99	10	10	0		8.32			7.99	8.31		9.31	8.48	8.26	8.91	
Phorate	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Phosalone	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Pirimiphos-methyl	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Prometon	mg/kg				<0.2	5	0	5	<0.2		<0.2	<0.2					<0.2			
Prometryn	mg/kg				<0.2	5	0	5	<0.2		<0.2	<0.2					<0.2			
Propazine	mg/kg				<0.2	5	0	5	<0.2		<0.2	<0.2					<0.2			
Propetamphos	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Prothiofos (Tokuthion)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Quintozene (PCNB)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Secbumeton	mg/kg				<0.2	5	0	5	<0.2		<0.2	<0.2					<0.2			
Simazine	mg/kg				<0.2	5	0	5	<0.2		<0.2	<0.2					<0.2			
Simetryn	mg/kg				<0.2	5	0	5	<0.2		<0.2	<0.2					<0.2			
Sulprofos	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Tecnazene	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Telodrin	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Terbutylazine	mg/kg				<0.2	5	0	5	<0.2		<0.2	<0.2					<0.2			
Terbutryn	mg/kg				<0.2	5	0	5	<0.2		<0.2	<0.2					<0.2			
Total Organic Carbon	% w/w			2.01	0.69	10	10	0	1.41	1.19	1.43	1.23		2.01	0.87		0.69	1.37		
Converted to SOM (x / 0.58)	% w/w			3.465517	1.189655	10	10	0	2.43103448	2.05172414	2.46551724	2.12068966		3.46551724	1.5		1.18965517	2.36206897		
trans-Chlordane (Gamma)	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Triadimefon	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Triallate	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Triazophos	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Trichloronate	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			
Trifluralin	mg/kg				<0.01	5	0	5	<0.01		<0.01	<0.01					<0.01			

									Lab sample ID	20/01779/2	20/01779/15	20/01779/12	20/01779/3
									Client sample ID	WS04	WS04	WS05	WS06
									Depth to top	0.6	0.2	1.2	2.2
									Depth to bottom				
									Date sampled	17/02/20	17/02/20	17/02/20	17/02/20
Analyte	Unit	GAC	T1	Max	Min	Count	# Detects	# Non-dete					
Hexachlorobenzene (HCB)	mg/kg				<0.01	5	0	5	<0.01				
Isodrin	mg/kg				<0.01	5	0	5	<0.01				
Malathion	mg/kg				<0.01	5	0	5	<0.01				
Methyl Parathion	mg/kg				<0.01	5	0	5	<0.01				
Mevinphos	mg/kg				<0.01	5	0	5	<0.01				
o,p-DDD (2,4)	mg/kg				<0.01	5	0	5	<0.01				
o,p-DDE (2,4)	mg/kg				<0.01	5	0	5	<0.01				
o,p-DDT (2,4)	mg/kg				<0.01	5	0	5	<0.01				
o,p-Methoxychlor	mg/kg				<0.01	5	0	5	<0.01				
p,p-DDD (4,4)	mg/kg				<0.01	5	0	5	<0.01				
p,p-DDE (4,4)	mg/kg				<0.01	5	0	5	<0.01				
p,p-DDT (4,4)	mg/kg				<0.01	5	0	5	<0.01				
p,p-Methoxychlor	mg/kg				<0.01	5	0	5	<0.01				
Parathion (ethyl)	mg/kg				<0.01	5	0	5	<0.01				
Pendimethalin	mg/kg			0.02	<0.01	5	1	4	<0.01				
Permethrin I (cis)	mg/kg				<0.01	5	0	5	<0.01				
Permethrin II (trans)	mg/kg				<0.01	5	0	5	<0.01				
pH	pH			8.9	7.89	10	10	0			8.32		8.9
pH BRE	pH			9.31	7.99	10	10	0	8.41			8.35	8.9
Phorate	mg/kg				<0.01	5	0	5	<0.01				
Phosalone	mg/kg				<0.01	5	0	5	<0.01				
Pirimiphos-methyl	mg/kg				<0.01	5	0	5	<0.01				
Prometon	mg/kg				<0.2	5	0	5	<0.2				
Prometryn	mg/kg				<0.2	5	0	5	<0.2				
Propazine	mg/kg				<0.2	5	0	5	<0.2				
Propetamphos	mg/kg				<0.01	5	0	5	<0.01				
Prothiofos (Tokuthion)	mg/kg				<0.01	5	0	5	<0.01				
Quintozene (PCNB)	mg/kg				<0.01	5	0	5	<0.01				
Secbumeton	mg/kg				<0.2	5	0	5	<0.2				
Simazine	mg/kg				<0.2	5	0	5	<0.2				
Simetryn	mg/kg				<0.2	5	0	5	<0.2				
Sulprofos	mg/kg				<0.01	5	0	5	<0.01				
Tecnazene	mg/kg				<0.01	5	0	5	<0.01				
Telodrin	mg/kg				<0.01	5	0	5	<0.01				
Terbutylazine	mg/kg				<0.2	5	0	5	<0.2				
Terbutryn	mg/kg				<0.2	5	0	5	<0.2				
Total Organic Carbon	% w/w			2.01	0.69	10	10	0			1.01		1.29
Converted to SOM (x / 0.58)	% w/w			3.465517	1.189655	10	10	0			1.74137931		2.22413793
trans-Chlordane (Gamma)	mg/kg				<0.01	5	0	5	<0.01				
Triadimefon	mg/kg				<0.01	5	0	5	<0.01				
Triallate	mg/kg				<0.01	5	0	5	<0.01				
Triazophos	mg/kg				<0.01	5	0	5	<0.01				
Trichloronate	mg/kg				<0.01	5	0	5	<0.01				
Trifluralin	mg/kg				<0.01	5	0	5	<0.01				



APPENDIX L

WM3 ASSESSMENT

High Road, Weston - 252234

TP/WS/BH
Depth (m)
Envirolab reference

% Moisture
pH (soil)
pH (leachate)
Arsenic
Cadmium
Copper
CrVI or Chromium
Lead
Mercury
Nickel
Selenium
Zinc

Barium
Beryllium
Vanadium
Cobalt
Manganese
Molybdenum
Antimony
Aluminium
Bismuth
Crill
Iron
Strontium
Tellurium
Thallium
Titanium
Tungsten
Ammoniacal N ws Boron

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene
Chrysene
Dibenzo(ah)anthracene
Fluoranthene
Fluorene
Indeno(123cd)pyrene
Naphthalene
Phenanthrene
Pyrene
Coronene
Total PAHs (16 or 17)

TPH
Petrol
Diesel
Lube Oil
Crude Oil

White Spirit / Kerosene
Creosote
Unknown TPH with ID

Unknown TPHCWG
Total Sulphide
Complex Cyanide
Free (or Total) Cyanide
Thiocyanate
Elemental/Free Sulphur

Phenol
Cresols
Xylenols
Resourcinol
Phenols Total by HPLC

Benzene
Toluene
Ethylbenzene
Xylenes
Total BTEX

PCBs (POPs)
PCBs Total (eg EC7/WHO12)

PBBs (POPs)
Hexabromobiphenyl (Total or PBB153; 2,2',4,4',5,5'- if only available)

WS01	WS04	WS06	SA01	SA02A	TP06	TP10	TP13	TP11
0.20	0.60	2.20	0.10	0.20	0.20	2.30	0.40	0.20

8.26		8.90	7.91	8.32	7.89	8.31	8.48	8.23
6		3	7	5	6	7	3	4
0.5		0.5	0.5	0.5	0.5	1.0	0.5	0.5
7		7	8	8	7	10	4	7
1		1	1	1	1	1	1	1
17		15	18	19	17	32	10	23
0.17		0.17	0.17	0.17	0.17	0.17	0.17	0.17
24		34	24	20	21	43	11	19
1		1	1	1	1	2	1	1
58		72	62	56	55	94	32	58

[illegible]

0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02		0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.04		0.04	0.04	0.04	0.04	0.04	0.04	0.04
0.04		0.04	0.04	0.04	0.04	0.04	0.04	0.04
<0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05
<0.05		0.05	0.05	0.05	0.05	0.05	0.05	0.05
<0.07		0.07	0.07	0.07	0.07	0.07	0.07	0.07
<0.06		0.06	0.06	0.06	0.06	0.06	0.06	0.06
<0.04		0.04	0.04	0.04	0.04	0.04	0.04	0.04
<0.08		0.08	0.08	0.08	0.08	0.08	0.08	0.08
<0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.01
<0.03		0.03	0.03	0.03	0.03	0.03	0.03	0.03
<0.03		0.03	0.03	0.03	0.03	0.03	0.03	0.03
<0.03		0.03	0.03	0.03	0.03	0.03	0.03	0.03
<0.07		0.07	0.07	0.07	0.07	0.07	0.07	0.07

4.0		6.0	4.0	4.0	6.0	1.0	8.0	1.0

0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.01

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Haswaste, developed by Dr. Iain Haslock.

High Road, Weston - 252234

TP/WS/BH

Depth (m)

Envirolab reference

Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

WS01	WS04	WS06	SA01	SA02A	TP06	TP10	TP13	TP11
0.20	0.60	2.20	0.10	0.20	0.20	2.30	0.40	0.20

POPs Dioxins and Furans Input Total Dioxins and Furans

OR individual Dioxin and Furan results.

2,3,7,8-TeCDD	mg/kg							
1,2,3,7,8-PeCDD	mg/kg							
1,2,3,4,7,8-HxCDD	mg/kg							
1,2,3,6,7,8-HxCDD	mg/kg							
1,2,3,7,8,9-HxCDD	mg/kg							
1,2,3,4,6,7,8-HpCDD	mg/kg							
OCDD	mg/kg							
2,3,7,8-TeCDF	mg/kg							
1,2,3,7,8-PeCDF	mg/kg							
2,3,4,7,8-PeCDF	mg/kg							
1,2,3,4,7,8-HxCDF	mg/kg							
1,2,3,6,7,8-HxCDF	mg/kg							
2,3,4,6,7,8-HxCDF	mg/kg							
1,2,3,7,8,9-HxCDF	mg/kg							
1,2,3,4,6,7,8-HpCDF	mg/kg							
1,2,3,4,7,8,9-HpCDF	mg/kg							
OCDF	mg/kg							
Total Dioxins and Furans	mg/kg							

Some Pesticides (POPs unless otherwise stated)

Aldrin	mg/kg	<0.01		<0.01		<0.01		<0.01
α Hexachlorocyclohexane (alpha-HCH) (leave empty if total HCH results used)	mg/kg							
β Hexachlorocyclohexane (beta-HCH) (leave empty if total HCH results used)	mg/kg							
α Cis-Chlordane (alpha) OR Total Chlordane	mg/kg							
δ Hexachlorocyclohexane (delta-HCH) (leave empty if total HCH results used)	mg/kg							
Dieldrin	mg/kg							
Endrin	mg/kg							
γ Hexachlorocyclohexane (gamma-HCH) (lindane) OR Total HCH	mg/kg							
Heptachlor	mg/kg							
Hexachlorobenzene	mg/kg							
o,p'-DDT (leave empty if total DDT results used)	mg/kg							
p,p'-DDT OR Total DDT	mg/kg							
γ Trans-Chlordane (gamma) (leave empty if total Chlordane results used)	mg/kg							
Chlordecone (kepone)	mg/kg							
Pentachlorobenzene	mg/kg							
Mirex	mg/kg							
Toxaphene (camphechlor)	mg/kg							

Tin

Tin (leave empty if Organotin and Tin excl Organotin results used)	mg/kg							
Organotin								
Dibutyltin; DiBT	mg/kg							
Tributyltin; TriBT	mg/kg							
Triphenyltin; TriPT	mg/kg							
Tetrabutyltin; TeBT	mg/kg							
Tin excluding Organotin								
Tin excl Organotin	mg/kg							



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Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
If any calculation cells below state "0.00000", testing has NOT been undertaken that contributes to that Hazardous Property.

Asbestos in Soil	Thresholds
Asbestos detected in Soil (enter Y or N)	Y

Asbestos % Composition in Soil (Matrix Loose Fibres or Microscopic Identifiable Pieces only)	see "Carc HP7 % Asbestos in Soil (Fibres)" below
Carcinogenic HP7 % Asbestos in Soil (fibres or micro pieces)	≥0.1%
<i>Please be advised, if the calculation cell is "0.00000" DOES NOT MEAN asbestos testing has been undertaken and the result is zero.</i>	

Asbestos Identifiable Pieces visible with the naked eye detected in the Soil (enter Y or N)	Y
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WS01	WS04	WS06	SA01	SA02A	TP06	TP10	TP13	TP11
0.20	0.60	2.20	0.10	0.20	0.20	2.30	0.40	0.20

N	N	N	N	N	N	N	N	N
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If Asbestos in Soil above is "Y", the soil is Hazardous Waste HP5 and HP7								
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

If Asbestos in Soil above is "Y", but Asbestos % above is "<0.1%", the soil is Non Hazardous Waste. You can only use Asbestos % results where loose fibres or micro pieces are only present. You cannot use Asbestos % results when visual identifiable pieces are present.

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If visual identifiable pieces of asbestos are present, you cannot use Asbestos % results and the whole soil sample is Hazardous Waste HP5 and HP7 Construction material containing Asbestos 17 06 05. Therefore, if Asbestos in Soil above is "Y", the Asbestos % above is "<0.1%", but the Asbestos Identifiable Pieces visible with the naked eye is "Y", the soil is Hazardous Waste.

Identifiable Pieces are Cement, Fragments, Board, Rope etc. ie anything ACM that is not Loose Fibres.

All visual asbestos pieces need to be removed leaving only fibres (or micro pieces) with an Asbestos % Composition in Soil result of <0.1% for the soil to become non-hazardous waste.

Hazardous Property	Thresholds	Cut Off Value
Corrosive HP8	≥5%	<1%
Irritant HP4	≥10%	<1%
Irritant HP4	≥20%	<1%
Specific Target Organ Toxicity HP5	≥1%	
Specific Target Organ Toxicity HP5	≥20%	
Specific Target Organ Toxicity HP5	≥1%	
Specific Target Organ Toxicity HP5	≥10%	
Aspiration Toxicity HP5	≥10%	
Acute Toxicity HP6	≥0.1%	<0.1%
Acute Toxicity HP6	≥0.25%	<0.1%
Acute Toxicity HP6	≥5%	<0.1%
Acute Toxicity HP6	≥25%	<1%
Acute Toxicity HP6	≥0.25%	<0.1%
Acute Toxicity HP6	≥2.5%	<0.1%
Acute Toxicity HP6	≥15%	<0.1%
Acute Toxicity HP6	≥55%	<1%
Acute Toxicity HP6	≥0.1%	<0.1%
Acute Toxicity HP6	≥0.5%	<0.1%
Acute Toxicity HP6	≥3.5%	<0.1%
Acute Toxicity HP6	≥22.5%	<1%
Carcinogenic HP7	≥0.1%	
Carcinogenic HP7	≥0.1%	
Carcinogenic HP7	≥1%	
Carcinogenic HP7 Unknown TPH with ID	≥1,000mg/kg	
Carcinogenic HP7 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%	
pH Corrosive HP8 pH (soil or leachate)	H8 ≥11.5	
pH Corrosive HP8 pH (soil or leachate)	H8 ≤2	
Toxic for Reproduction HP10	≥0.3%	
Toxic for Reproduction HP10	≥3%	
Mutagenic HP11	≥0.1%	
Mutagenic HP11 Unknown TPH with ID	≥1,000mg/kg	
Mutagenic HP11 b(a)p marker test (Unknown TPH with ID only) Cell only applicable if TPH >1,000mg/kg	≥0.01%	
Mutagenic HP11	≥1%	
Produces Toxic Gases HP12 Sulphide	≥1,400mg/kg	
Produces Toxic Gases HP12 Cyanide	≥1,200mg/kg	
Produces Toxic Gases HP12 Thiocyanate	≥2,600mg/kg	
HP13 Sensitising	≥10%	

If cells below turn yellow and the text turns red, the samples should be classified as Hazardous Waste.								
0.00098	0.00000	0.00059	0.00112	0.00085	0.00098	0.00112	0.00059	0.00072
0.00158	0.00000	0.00119	0.00183	0.00156	0.00158	0.00205	0.00085	0.00132
#VALUE!	0.00000	0.00768	0.00577	0.00496	0.00505	0.00983	0.00269	0.00465
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00485	0.00000	0.00687	0.00485	0.00404	0.00424	0.00869	0.00222	0.00384
0.00170	0.00000	0.00150	0.00180	0.00190	0.00170	0.00320	0.00100	0.00230
0.00040	0.00000	0.00060	0.00040	0.00040	0.00060	0.00010	0.00080	0.00010
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00081	0.00000	0.00041	0.00094	0.00068	0.00081	0.00094	0.00041	0.00055
#VALUE!	0.00000	#VALUE!	0.00033	#VALUE!	0.00033	#VALUE!	0.00033	#VALUE!
#VALUE!	0.00000	0.00822	0.00762	0.00691	0.00680	0.01313	0.00374	0.00699
0.00002	0.00000	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002	0.00002
0.00019	0.00000	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019	0.00019
#VALUE!	0.00000	#VALUE!	0.00000	#VALUE!	0.00000	#VALUE!	0.00000	#VALUE!
0.00005	0.00000	0.00005	0.00005	0.00005	0.00005	0.00010	0.00005	0.00005
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00026	0.00000	0.00026	0.00026	0.00026	0.00026	0.00031	0.00026	0.00026
0.00014	0.00000	0.00014	0.00014	0.00014	0.00014	0.00028	0.00014	0.00014
0.00734	0.00000	0.00916	0.00755	0.00685	0.00673	0.01302	0.00368	0.00693
0.00485	0.00000	0.00687	0.00485	0.00404	0.00424	0.00869	0.00222	0.00384
0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8.26	0.00	8.90	7.91	8.32	7.89	8.31	8.48	8.23
8.26	0.00	8.90	7.91	8.32	7.89	8.31	8.48	8.23
0.00485	0.00000	0.00687	0.00485	0.00404	0.00424	0.00869	0.00222	0.00384
0.00040	0.00000	0.00060	0.00040	0.00040	0.00060	0.00019	0.00080	0.00019
0.00040	0.00000	0.00060	0.00040	0.00040	0.00060	0.00019	0.00080	0.00019
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
0.00485	0.00000	0.00687	0.00485	0.00404	0.00424	0.00869	0.00222	0.00384
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.00485	0.00000	0.00687	0.00485	0.00404	0.00424	0.00869	0.00222	0.00384



Please enter available data in the rows associated with the test (grey) cells. Calculation cells initially display either "0.0000" or "#DIV/0!".
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WS01	WS04	WS06	SA01	SA02A	TP06	TP10	TP13	TP11
0.20	0.60	2.20	0.10	0.20	0.20	2.30	0.40	0.20

Ecotoxic HP14 amended v6	≥25%	<0.1%	#VALUE!	0.00000	#VALUE!	0.01669	#VALUE!	0.01486	#VALUE!	#VALUE!	0.00853	#VALUE!
Ecotoxic HP14 amended v6	≥25%	<0.1% (except Be, V, Te, Ti, Petrol, Diesel, Crude Oil, Kerosene, White Spirit, Crosote, TPH, TPHCWG, Phenol, Cresols, Xylenols, T-Phenols, CompCN, Thiocyanate, Toluene, Ethylbenzene, Xylene + BTEX 1%).	#VALUE!	0.00000	#VALUE!	0.01709	#VALUE!	0.01546	#VALUE!	0.00933	#VALUE!	#VALUE!
Ecotoxic HP14 amended v6	≥25%	<0.1% (except Be, V, Te, Ti, Petrol, Diesel, Crude Oil, Kerosene, White Spirit, Crosote, TPH, TPHCWG, Phenol, Cresols, Xylenols, T-Phenols, CompCN, Thiocyanate, Toluene, Ethylbenzene, Xylene + BTEX 1%).	#VALUE!	0.00000	#VALUE!	1.67260	#VALUE!	1.49200	#VALUE!	0.86100	#VALUE!	#VALUE!
Persistent Organic Pollutant (PCB, PBB or POP Pesticides)	>0.005%		0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000	0.000000000
Persistent Organic Pollutant (Total Dioxins+Furans)	>0.0000015%		0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000
Persistent Organic Pollutant (Individual Dioxins+Furans)	>0.0000015%		0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000	0.00000000000

If other contaminants need adding to Haswaste, please contact Envirolab.