



Fulflood Road, Havant

Interpretive Report on Ground Investigation

Project No: 733845

Client: Mipa Paints Ltd

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1 INTRODUCTION

This investigation was carried out by Structural Soils Ltd (SSL) on the instructions of AKS Ward (the Engineer) on behalf of Mipa Paints Ltd (the Client) at the site of Fulflood Road, in Havant. The purpose of the work was to obtain geoenvironmental information in order to assist with the discharge of contamination planning conditions relating to the proposed construction of a warehouse, office and training school facility with associated loading areas, car parking and refuse storage (Ref: APP/15/01233). Specifically this report is aimed at better defining the risk that the site poses to controlled waters.

The scope of the investigation comprised machine dug trial pitting, window sampling, laboratory testing and the preparation of this report. The report contains a description of the site and the works carried out, the exploratory hole logs, in-situ and laboratory testing results.

The ground investigation has been carried out in accordance the general requirements of BS 5930:2015, BS 10175:2011+A2:2017, BS EN 1997-2 (2007), BS EN ISO 22475-1 (2006) and other relevant standards as identified below.

This report presents the factual records of the fieldwork and laboratory testing together with an interpretation of the findings with respect to the proposed development. The report presents an appraisal of geoenvironmental aspects such as soil contamination and gives recommendations on risk reduction. It should not be assumed that these would meet the requirements of the local authority, whose advice should be sought regarding planning permission.

SSL have undertaken a previous ground investigation at this site, which are detailed in our report 730438 – Proposed MIPA Paints Site, Fulflood Road, Havant (see References). In addition, the Client has provided a number of full and partial desk study and ground investigation reports pertaining to the study site and the wider surroundings. These are detailed in Section 2.2.

All information, comments and opinions given in this report are based on the ground conditions encountered during the site work, and on the results of laboratory and field tests performed during the investigation. Whilst every attempt is made to record full details of the strata encountered in the exploratory holes, techniques of hole formation and sampling will inevitably lead to disturbance, mixing or loss of material in some soils and rocks. All information given in this report is based on the ground conditions encountered during the site work, and on the results of laboratory and field tests performed during the investigation. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations and water conditions between or below exploratory holes.

This report was prepared by SSL for the sole and exclusive use of Mipa Paints Ltd in response to particular instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded. No liability will be accepted after a period of 6 years from the date of the report.

2 SITE DESCRIPTION

2.1 Location and Topography

The site is located in a small industrial estate on Fulflood Road in Havant approximately 2 km north of the town centre (see Site Location Map in Appendix A). The British National Grid Reference of the site is SU 714 083. The site is set at an elevation of approximately 16 m above Ordnance Datum (AOD). At the time of these works access was gained via a set of gates off from the eastern corner of the site.

The site is rectangular in shape and measures approximately 95 m by 60 m in size (see Exploratory Hole Location Plan in Appendix A). The long axis of the site is aligned east-north-east to west-south-west. The site has been previously developed, but at the time of the works had a generally level surface comprised largely of unbound gravel with a few small remaining concrete slabs. Sporadic scrub vegetation was present and was particularly thick in the south-west of the site.

An area of gravel hardstanding is present across the centre of the site, which may have recently been used, since the demolition of the previous buildings. Two concrete slabs are located near the southern corner of the site. The large concrete slab is approximately 20 m long by 9 m wide whilst the small concrete slab is approximately 18 m long by 6 m wide. A third concrete slab is present near the western corner of the site adjacent to an apparently unused sliding steel gate which would have crossed Fulflood Road itself.

The site is secured to the south and west by a steel palisade fence whilst the north and east sides of the site are secured by heras and steel wire fencing.

The site is bordered to the north by Fulflood Road on the far side of which are a set of relatively modern industrial units occupied by and a number of businesses including vehicle service garages and a gym. To the east is a car park beyond which lies the current Mipa Paints factory building, whilst to the west of the site is a yard and buildings occupied by a vehicle hire business.

The site is bounded to the south by the channel of the Riders Lane stream, with water levels in the stream being approximately 4.5 m below ground level on the site. The difference in height is accommodated by a combination of a concrete retaining wall, and a steep earth bank below, both of which run the length of the boundary. The full height of the retaining wall is unknown but up to 2.2 m is exposed and it is anticipated that a similar height is present below ground level on the low side. The bank of the stream is heavily vegetated with scrub and numerous mature and semi-mature trees, including a number of poplars which are estimated to be 30 m tall.

The Riders Lane stream is a shallow and narrow channel which flows to the south-west, and at the start of the site works period at the end of a dry summer, flow was very low. Periods of heavy rain prior to the second and third monitoring visits generated some flow within the stream, which was turbid from mobile sediment.

Beyond the stream channel is a public footpath and the residential area around High Lawn Way.

At the time of the works two upstanding ground investigation monitoring standpipes were present from previous works undertaken by Soiltechnics (BH1 and DTS04). None of the earlier monitoring standpipes could be located.

2.2 Previous Reports

This section aims to provide a brief precis of the most salient points from each of the pre-existing reports available for the site and is not aiming to present a full critique of those documents. For further details reference should be made to the original documents.

2.2.1 Entec Phase 1 Desk Study - July 2003

This report relates to the wider Procter & Gamble land holding including the then sanitary product manufacturing works to the north-west of the study site, and a distribution warehouse which is now the Mipa Paints site.

The south western third of the study site is recorded to have been a sewage treatment works for a brief period of the middle part of the 20th century prior to the redevelopment of the site around 1960 and the construction of a toy manufacturing plant originally run by Mini Models and later by Scalextric. The part of the original factory building that was present on the study site was demolished in 1991.

A large (27,420 lt) underground fuel-oil storage tank was formerly located adjacent to the eastern corner of the site, and potentially encroaching on to it. This tank fed an above ground boiler house on the current study site and also four oil fired space heaters within the remaining part of the factory (now Mipa Paints premises to the north-east of the current study site).

This tank was the source of a pollution incident in March/April 1994 when, during works to decommission the tank, rainwater was allowed to fill the void and displace residual fuel which was allowed to drain into the adjacent stream. Steps were reportedly taken to remove the remaining product from the tank and contain that within the stream, as well as remove contaminated soils from the vicinity of the tank.

An above ground petroleum and solvent stores associated with the Scalextric factory was located within the study site adjacent to the stream boundary, and an interceptor for an area of car parking is recorded as having been present in the north-western corner of the site.

Elsewhere on the wider site, some localised hydrocarbon contamination was noted in the vicinity of the "new" plant room whilst excavating trenches for new services, and also outside of the former Canteen whilst installing a fire hydrant main. Both of these areas are believed to be within area that have since been redeveloped as the industrial units immediately to the north of the site, and further north again as the residential developments of Billys Copse and Little Hackets.

2.2.2 Entec Phase 2 Site Investigation Report - August 2003

This report also relates to the wider Procter & Gamble site but does include a small number of positions on or close to the current study site (DS6, DS7, DS8 and DS9). Of these position DS8 at the eastern corner of the current study site recorded some slight hydrocarbon odours from 1.55 to 1.85 m depth, and DS9 some 20 m from site boundary

recorded strong hydrocarbons odours at 3.0 m depth. The accompanying petrol range and diesel range test results indicated the presence of some mid-range hydrocarbons within the soils.

Groundwater sampling from DS6 in the south-western corner of the site indicated little in terms of organic contaminants with the BTEX species and mineral oil being present at less than 10 µg/l.

2.2.3 Enviros Ground Investigation in Support of Planning Permission – October 2004 (Fragment)

Only the borehole location plan and the appendices of this report are available, and show that no additional ground investigation work was undertaken on the study site. A single additional position (EWS3) is recorded within an access road or car park adjacent to the north-eastern boundary of the site, and inspection of the log shows records of a slight hydrocarbon odour in the shallow made ground. The laboratory results record the presence of low concentrations of EPH (DRO) at this position in both the shallow soil and a water sample, all of which are tentatively identified by the laboratory as being related to the presence of humic acids.

2.2.4 Enviros Southern Area Former Proctor & Gamble site, Havant – Remediation of hydrocarbon contamination letter report – April 2006

This letter report contains information on the investigation of the area of the former below ground gas-oil tank which was present adjacent to the study site. The report details a trial pitting exercise undertaken straddling what appears to be the live sewer which still passes through the site.

An area of visibly contaminated soils was encountered at approximately 2.8 m depth around the boundary between the made ground and underlying natural clays, which was excavated and disposed of. Enviros considered the residual risk to controlled waters in the Raiders (*sic*) Lane stream to be low.

2.2.5 Structural Soils Interpretive Report on Ground Investigation at Fulflood Road, Havant – September 2015

This work was undertaken for Mipa Paints on the instruction of AKS Ward.

At the time of this work part of the site was being used for the storage of coaches by an operator based nearby, with the remainder of the site split into a number of smaller sub-plots used variably for storage, maintenance and dismantling of vehicles. Coverage of the whole site was prevented at the time by the presence of temporary offices, vehicles and sub-plot yard space with no access. Point sources identified from the then use were limited to an above ground bunded diesel tank in the west of the site which was not proven to be in use or redundant.

The investigation undertaken comprised two cable percussion boreholes, four window sample boreholes and a number of trial pits for either soakaway testing or shallow geotechnical testing.

The works identified increasingly thick made ground (up to 4.7 mbgl) towards the channel of the Riders Lane Stream. The made ground was found to be underlain variably by silty and clayey sands of the Bognor Sand Member, or a variable mix of sandy gravels and

gravelly sands or clays which were identified as being Head Deposits. Firm to stiff clays of the London Clay Formation were proven around 5.0 m to 6.0 m below the site and were found to be low permeability in the near surface with occasional seepages at depth. Groundwater observations in the near surface were limited to seepages within the deeper made ground or the Bognor Sand/Head Deposits.

Indications of contamination were limited to the presence of a strong hydrocarbon odour at 3.50m depth within made ground at WS1 located in the south-west of the site. This observation was not supported by the laboratory analysis undertaken on the sample recovered.

Further work was recommended to investigate the other areas of the site as access became possible, but this work was not instructed.

2.2.6 Soiltechnics Ground Investigation Report on Proposed Industrial Development, Land adjacent to MIPA Paints Ltd, Fulflood Road, Havant, PO9 5AX - December 2016

This report was undertaken for Mipa Paints on the instruction of Greenwood Management Services Limited. The report makes reference to our September 2015 report but does not appear to include those findings.

The ground investigation works comprised three cable percussion boreholes and seven window sample holes across the site, proving similar ground conditions to the previous investigations, but ascribing all of the superficial deposits to the Bognor Sand Member and concluding that that unit was essentially impermeable and that perched groundwater water was locally present within the made ground. Groundwater strikes in the London Clay were noted to be related to the presence of claystone bands within the clays.

Indications of contamination were noted in DTS01b with a slight hydrocarbon odour noted from 3.1 m to 4.5 m depth, and in DTS02 from 1.3 m to 1.5 m with an organic odour. A slight hydrocarbon odour was also noted in the water encountered in DTS04 at 1.35 m and a very slight odour in DTS05 at 2.6 m depth.

The soil contamination testing undertaken did not identify any evidence of gross contamination. Groundwater analysis was restricted to a sample collected from the BH01 and DTS04 in the centre of the site, with the latter sample indicating the presence of 8900 µg/l of total TPH which was primarily within equivalent carbon bands >C12-C21 with a bias towards aliphatic compounds. Notably this sample was collected on the day of drilling this exploratory hole, and that only a partial suite of analysis containers were supplied to the laboratory, suggesting that the volume of available water was very limited.

No evidence of the location of DTS04 could be identified by the latest phase of site work, including the monitoring well which is recorded as being present at that position.

2.3 Published Geology

Information on the geology of the site was obtained from the following sources published by the British Geological Survey (BGS):

- BGS map (sheet 316, scale 1:50,000, published 1998).
- The BGS digital geology map, which utilises the most up to date names for geological units (www.bgs.ac.uk/data).

- The BGS Lexicon of Named Rock Units, which provides typical descriptions for most geological units (www.bgs.ac.uk/lexicon).

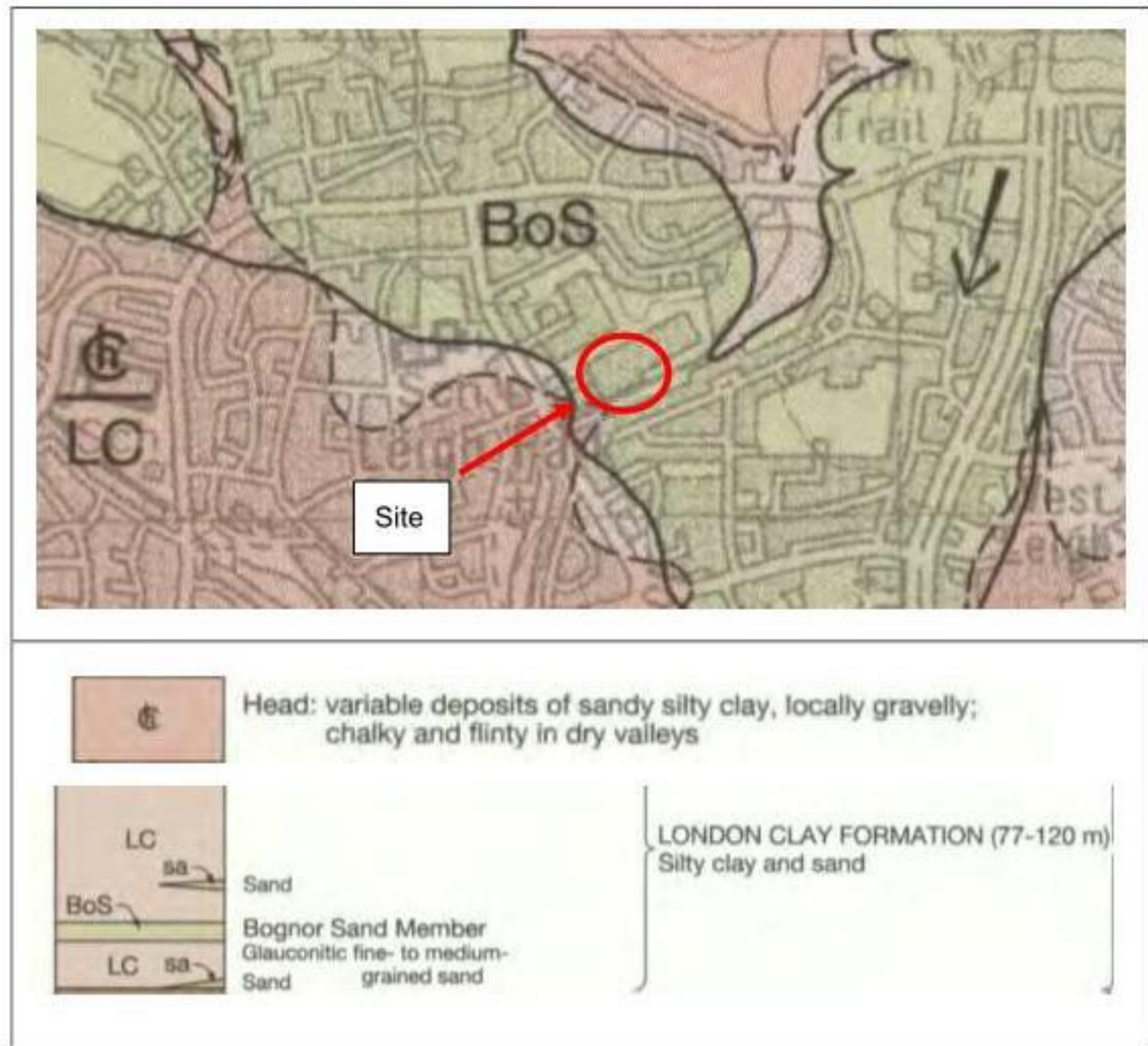
The site is shown to be underlain by the Bognor Sand Member which is a sand unit within the London Clay Formation, which is itself recorded to outcrop around 50 m to the west of the site and 100 m to the east indicating that the Bognor Sand is likely to be thin. The Bognor Sand Member is shown to dip gently to the south-southwest.

TABLE 1 : SUMMARY OF EXPECTED SITE GEOLOGY	
Geological Unit Name	Description
Bognor Sand Member	<i>Glauconitic bioturbated or cross-bedded fine- and medium-grained sands, partially cemented.</i>
London Clay Formation	<i>Bioturbated or poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.</i>

Note: Information obtained from BGS digital records © NERC.

No drift is recorded at the site although Head Deposits are shown to lie close to its southwest corner. The Head Deposits are given a generic description of *polymict deposit: comprises gravel, sand and clay depending on upslope source and distance from source. Poorly sorted and poorly stratified deposits formed mostly by solifluction and/or hillwash and soil creep. Essentially comprises sand and gravel, locally with lenses of silt, clay or peat and organic material.*

The BGS online maps portal provides access to scans of almost all maps produced by the BGS since 1932. An extract of the most recent available scanned map for the site is included below:



Note: Above images contain British Geological Survey materials ©NERC [2018].

2.4 Hydrogeology and Hydrology

2.4.1 Aquifer Designation

The Environment Agency (EA) website (<http://apps.environment-agency.gov.uk/wiyby/default.aspx>) has classified the geological units underlying the site as follows:

- Superficial Head Deposits as a Secondary 'Undifferentiated' Aquifer (variably permeable).
- The Bognor Sand Member as a Secondary 'A' Aquifer (variably permeable).
- The London Clay Formation as Unproductive Strata (negligibly permeable).

'Secondary' aquifers include a wide range of rock layers or superficial deposits with an equally wide range of water permeability and storage. Secondary 'A' Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. Secondary 'Undifferentiated' Aquifers are cases where it has not been possible to attribute either Secondary category

'A' or 'B' to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

'Unproductive Strata' are rock layers or superficial deposits with low permeability that have negligible significance for water supply or river base flow.

2.4.2 Groundwater Vulnerability Zones

The soils on this site have not been classed with regard to leaching potential, however the nearest soils to this site have been classified as having a high (urban) leaching potential (HU), as soil information for restored mineral workings and urban areas is based on fewer observations than elsewhere. A worst-case vulnerability (HU) classification is assumed for these areas and for current mineral workings until proved otherwise.

2.4.3 Source Protection Zones

The site is located within a groundwater source protection zone. Inner Zone – Subsurface activity only (Zone 1c)

2.4.4 Anticipated Groundwater flow / direction

Groundwater beneath the site is expected to be present within the Bognor Sand Member and any existing head deposits. Based on the geological mapping this is expected to be an unconfined aquifer and it is expected to be recharged by precipitation which infiltrates at the site. Groundwater flow within these deposits are expected to be dominated by intergranular flow and is expected to be towards the south. The presence or otherwise of groundwater within the made ground will depend on the permeability of the underlying natural deposits, and the prospect of perched water has been raised by others.

The closest down hydraulic gradient surface water body to the site is Riders Lane Stream located adjacent immediately adjacent to the south-east edge of the site. Groundwater is likely to be in feeding baseflow to this feature, but continuity may be limited by the presence of the concrete retaining wall along this boundary.

The site is crossed by a foul sewer which runs parallel to the long axis, some 5 m to 10 m inside of the retaining wall. This is crossed surface water sewer which crosses the site sub-parallel to the sites short axis and approximately 10 m from the south-western boundary via a manhole and onto an existing headwall in the channel of the Riders Lane Stream. Both of these features and their expected permeable backfill have the ability to modify groundwater flow across the site.

3 UPDATED PRELIMINARY RISK ASSESSMENT

3.1 Conceptual Model and Risk Assessment

The information presented in Sections 2.1 to 2.4 has been used to compile an updated initial conceptual model for the site. This is presented below in text and included graphically as the Conceptual Site Model in Appendix A. The identified potential sources of contamination, associated contaminants and receptors have been considered with plausible pathways that may link them. The resulting potential pollutant linkages are considered in Section 3.1.4.

3.1.1 Summary of Potential Contamination Sources

Potential sources and their associated contaminants of concern are summarised in Table 4 below and presented on the Contamination Source Location Plan in Appendix A.

TABLE 4: SUMMARY OF POTENTIAL SOURCES AND CONTAMINANTS	
On Site (Historical)	Contaminants of Concern
Car park interceptor	Fuel hydrocarbons – petrol and diesel
Boiler house & pipework	Fuel hydrocarbons – gas oil (diesel) and asbestos from insulation/gaskets
Solvent and petroleum store	Light hydrocarbons including volatile organic contaminants(VOCs)
Above ground diesel tank	Fuel hydrocarbons – diesel
Sewage works	Pathogens, heavy metals
Car breaking/maintenance	Fuel hydrocarbons – petrol and diesel, glycols, lubricating oils, volatile organic contaminants(VOCs)
On Site (Current)	Contaminants of Concern
Demolition rubble and made ground (general)	Asbestos, ground gas (methane, carbon dioxide)
Off Site (Historical)	Contaminants of Concern
Former gas oil tank	Fuel hydrocarbons – gas oil (diesel)
Former above ground fuel tanks	Fuel hydrocarbons – gas oil (diesel)
Transformer (electrical sub-station)	PCBs from dielectric fluids and possible other hydrocarbons
Garages	Fuel hydrocarbons – petrol and diesel, glycols, lubricating oils, volatile organic contaminants(VOCs)

3.1.2 Summary of Potential Receptors

Considering the setting of the site and the proposed redevelopment, sensitive receptors are considered to include:

- future site users
- construction workers
- adjacent site users
- potable water supply pipes
- groundwater beneath the site
- surface water in the adjacent Riders Lane Stream.

3.1.3 Pathways

Pathways that could result in a potentially complete contaminant linkage include:

- vertical and lateral migration of vapour or ground gas and ingress into structures or buildings
- direct contact and permeation of plastic water supply pipes
- preferential pathways including permeable pipe surrounds
- leaching by infiltrating percolation
- lateral migration of dissolved phase contaminants

Direct contact of the end users of this commercial development with soils is not considered to be a pathway as there are no proposed areas of soft landscaping on the development.

3.1.4 Potentially Complete Contaminant Linkages

The potentially complete contaminant linkages identified for the proposed end use are considered to be:

1. direct contact of construction workers or future site users with soils contaminated with asbestos.
2. vertical and lateral migration of hydrocarbon vapour and ingress into structures or buildings and inhalation by future site users
3. leaching of contaminants from the unsaturated zone to groundwater in the Secondary A Aquifer
4. lateral migration of dissolved phase contaminants to adjacent Riders Lane Stream.
5. vertical and lateral migration of ground gas and ingress into structures or buildings leading to asphyxiation or explosion.

3.1.5 Risk Estimation for Potentially Complete Contaminant Linkages

The potentially complete contaminant linkages identified in Section 3.1.4 above are considered with the information available on the ground conditions at the site to inform the estimation of the risk associated with each, as detailed in Table 5 below. The risk

classification has been undertaken in accordance with CIRIA C552, with a summary of the relevant section being included in Appendix D.

TABLE 5: RISK ESTIMATION FOR POTENTIALLY COMPLETE CONTAMINANT LINKAGES			
Contaminant Linkage	Likelihood	Severity	Risk and justification
1. Direct contact of construction workers or future site users with soils contaminated with asbestos	Likely	Medium	Moderate – Investigations undertaken to date have identified only low levels of contamination in the soils, below generic assessment criteria for a commercial end use, but those investigations have included limited testing for asbestos.
2. Vertical and lateral migration of hydrocarbon vapour and ingress into structures or buildings and inhalation by future site users	Low Likelihood	Medium	Low – Previous ground investigations have identified little evidence of hydrocarbon odours in the soil which may have a volatile fraction. Most indications of impact have been in the vicinity of the former gas oil tanks which is expected to be of low volatility, however the use and storage of VOCs appears to have occurred on the site and this warrants further consideration.
3. Leaching of contaminants from the unsaturated zone to groundwater in the Secondary A Aquifer	Likely	Medium	Moderate – Groundwater may be present in the Bognor Sand Member which is classed as a Secondary A aquifer, however flow direction is likely to be towards the south towards the channel of the Riders Lane Stream. Some evidence of possible hydrocarbon contamination, including potential free-product, has been identified in the centre of the site, and historically in the strip of the site adjacent to the Riders Lane Stream. The presence of VOCs has not been investigated.
4. Lateral migration of dissolved phase contaminants to adjacent Riders Lane Stream	Likely	Medium	Moderate – no pollution incidents have been reported for the stretch of the Riders Lane Stream adjacent to the site. Contamination to the stream occurred in 2004 during the decommissioning of a below ground gas oil tank adjacent to the north-east of the site, but this appears to have been from overtopping and overland flow. Some remedial works were undertaken to remove grossly contaminated soils from the vicinity of the tank at a later date. Some contamination potential remains, including for VOCs which have not been investigated.

TABLE 5: RISK ESTIMATION FOR POTENTIALLY COMPLETE CONTAMINANT LINKAGES			
Contaminant Linkage	Likelihood	Severity	Risk and justification
5. vertical and lateral migration of ground gas and ingress into structures or buildings leading to asphyxiation or explosion	Low Likelihood	Severe	Moderate – Ground gas monitoring to date by SSL and Soiltechnics has identified very low to moderately elevated concentrations of ground gas ranging up to 11.4% carbon dioxide. Recorded flow rates are typically 0.0 l/hr and there is no evidence of gas generation in the ground driving positive flow. Gas protection measures will be required in the new buildings.

The review of the available information and the production of the initial conceptual model and risk assessment has identified risks associated with potentially complete pollutant linkages that vary from low to moderate.

Further data has been collected to inform on these potential linkages, which are revisited in Section 7.

4 FIELDWORK

4.1 General

The ground investigation was carried out by SSL between 29 August and 11 September 2018. The investigation was supervised by an engineer from SSL. The scope of works and positions were selected, set out and adjusted by SSL where necessary to take account of buried or overhead services, or other restrictions. The exploratory hole and in-situ test locations are shown on the Exploratory Hole Location Plan presented in Appendix A.

4.2 Exploratory Holes

The exploratory holes are listed in the following table.

TABLE 2 :SCOPE OF INTRUSIVE WORKS			
Quantity	Exploratory Hole Type	Maximum depth (m)	Hole / Test Numbers
16	Machine Dug Trial Pits.	3.90	TP1-TP16
8	Window Sample Boreholes	5.00	WS1-WS7 & WS2A

The exploratory hole logs are presented in Appendix B. These provide information including the equipment and methods used, samples taken, tests carried out, water observations and descriptions of the strata encountered. Explanation of the terms and abbreviations used on the logs is given in the Key to Exploratory Hole Records in Appendix B, together with other explanatory information.

The 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). Detailed descriptions, together with relevant comments, are given on the logs.

Prior to the commencement of any exploratory hole or intrusive test all positions were checked for buried services by a specialist utility surveyor using a cable avoidance tool (CAT), signal generator ('genny'), and ground penetrating radar (GPR). The survey was carried out by RSK SafeGround.

Inspection pits were hand dug at exploratory locations where noted on the relevant exploratory hole logs or in-situ test results.

On completion of the works, a survey of the exploratory hole locations was undertaken using specialist Global Positioning System (GPS) equipment. The coordinates of each exploratory hole were measured relative to British National Grid, and the level relative to Ordnance Datum. These are shown on the exploratory hole logs contained in Appendix B which have been printed with a reduced level column. In addition levels were taken for the level of the adjacent Rider Lane stream at a point next to the site where sufficient satellite coverage could be obtained to provide sufficient accuracy.

4.3 Location Rationale

The exploratory holes are listed in the following table.

TABLE 3 : EXPLORATORY HOLE LOCATION RATIONALE	
Location	Target/Comments
WS1	For installation of a monitoring well for groundwater monitoring and sampling. Approximate SW boundary of former below ground gas-oil fuel tank area and to target position of DTS01a which identified olfactory evidence of hydrocarbon contamination within deep made ground. Also on expected down-hydraulic gradient edge of site.
WS2/WS2A	For installation of a monitoring well for groundwater monitoring and sampling. Beneath former boiler house and also expected down-hydraulic gradient edge of site
WS3	For installation of a monitoring well for groundwater monitoring and sampling. Beneath former petroleum and solvent stores and also expected down-hydraulic gradient edge of site
WS4	For installation of a monitoring well for groundwater monitoring and sampling. Within former sewage works and targeting area of SSL WS1 from 2015 which identified olfactory evidence of hydrocarbon contamination in deep made ground. Also close to expected down-hydraulic gradient edge of site
WS5	For installation of a monitoring well for groundwater monitoring and sampling. Targeting expected down-hydraulic gradient area of DTS04 which had identified some evidence of potential groundwater impact.
WS6	For installation of a monitoring well for groundwater monitoring and sampling. On expected up hydraulic gradient edge of site to investigate potential for cross-boundary migration of contamination from off-site sources.
WS7	For installation of a monitoring well for groundwater monitoring and sampling. On expected up hydraulic gradient edge of site to investigate potential for cross-boundary migration of contamination from off-site sources. Also located to be down expected hydraulic gradient of former above ground tanks and electrical transformer.
TP1	Within former sewage works. Targeting area of car park surface water interceptors.
TP2, TP3, TP11	For general site coverage and to investigate potential for cross-boundary migration of contamination from off-site sources.
TP4	General site coverage.
TP5	Approximate SW boundary of former below ground gas-oil fuel tank area.

TABLE 3 : EXPLORATORY HOLE LOCATION RATIONALE	
TP6 – TP8	Beneath former boiler house – reported in 2003 to potentially contain relict fuel pipework in the ground.
TP9, TP13	General site coverage and down expected hydraulic gradient of the position of DTS04.
TP12, TP16	Targeted at the believed position of DTS04 based on apparent ground disturbance, but later investigation suggest that this was not the true location of DTS04 which remains uncertain.
TP10	Site coverage in south of site and within the former sewage works.
TP14	General site coverage and within the former sewage works.
TP15	Approximate location of above ground bunded diesel tank identified by SSL in 2015 and within the former sewage works.

The exploratory hole logs are presented in Appendix B. These provide information

4.4 Backfill and Instrumentation

On completion 40 mm diameter gas/groundwater monitoring wells were installed in all of the window sample hole, the design having been decided by SSL. The installation details are shown on the exploratory hole logs and on a summary table presented within Appendix B.

On completion the trial pits were backfilled with arisings, compacted in layers by the excavator bucket.

4.5 In-Situ Testing

The in-situ tests are listed in the following table. The test results are recorded on the exploratory hole logs in Appendix B.

TABLE 4 :SCOPE OF IN-SITU TESTING		
Quantity	In-situ Test	Remarks
36	Hand Penetrometer (HP).	Carried out in trial pits; test results included on exploratory hole logs presented in Appendix B.
157	Photoionisation Detector Headspace Screening	Modified USEPA "foil and jar" headspace technique with Ion Sciences Tiger PID equipped with a 10.6 eV bulb to produce reading in ppm (isobutylene equivalent). Results are included on exploratory hole logs presented on in Appendix B

4.6 Monitoring and Post Fieldwork Environmental Sampling

Groundwater levels were recorded in the monitoring wells on 18 September, 25 September and 15 October 2018 by SSL engineers. The results together with the temporal (weather) conditions are tabulated in Appendix E.

Development of the monitoring wells following installation, and redevelopment of the existing monitoring wells was undertaken on 18 September, with subsequent sampling rounds undertaken on 25 September and 15 October.

PID screening of the headspace in the well were undertaken on the first sampling visit, and no elevated results were returned.

It should be noted that groundwater levels vary due to seasonal, atmospheric and/or other effects and may at times differ to those measured during the investigation.

The wells were developed by surging and over pumping, with all bar position WS4 running dry during this exercise. Later sampling was undertaken using the USEPA low-flow purging and sampling techniques to try and minimise drawdown of the water table and the mobilisation of sediment during sampling. Low disturbance sampling was challenging in WS1 particularly where the installation was found to have very low recharge rates and accordingly drawdown of the water surface and the mobilisation of sediment was unavoidable.

5 LABORATORY TESTING

Samples for potential geoenvironmental testing were sent to a sister company Envirolab Limited, a MCERTS and UKAS accredited testing laboratory. Laboratory tests were scheduled by SSL. Tests carried out in accordance with MCERTS/UKAS standards where noted on the results sheets.

5.1 Geoenvironmental Laboratory Testing

The geoenvironmental testing carried out is summarised in the following table. The results are included as Appendix C of this report, and include details of the test method.

TABLE 5 : SUMMARY OF GEOENVIRONMENTAL LABORATORY TESTING		
Numbers of tests	Description	Notes
SOIL		
13	Speciated TPH CWG	VPH and PH with CWG banding, plus BTEX and MTBE (C5-C35).
7	VOC plus TICs	Volatile organic compounds (VOC) & Tentatively Identified Compounds (TIC).
4	Polychlorinated bipheynls (PCBS).	PCB EC7 and WHO12 congeners.
5	Fraction of Organic Carbon (FOC)	
30	Asbestos presence screen.	Identification was undertaken if/where asbestos fibres were detected.
2	Asbestos bulk fibre ID	
WATER		
18	SSL GWS Groundwater Screening suite.	Comprises arsenic, cadmium, chromium (total), lead, mercury, selenium, copper, nickel, zinc, speciated polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPHCWG (speciated)), sulphate, hardness and pH.
18	Volatile organic compounds (VOC) & Tentatively Identified Compounds (TIC).	
18	Dissolved Oxygen (Do)	
18	Nitrate (NO ₃)	
18	Nitrate (NO ₂)	
18	Ferrous Iron (Fe ²⁺)	
18	Sulphate (SO ₄)	
18	Alkalinity	
18	Dissolved Inorganic Carbon (DIC)	

6 GROUND CONDITIONS

6.1 General

Descriptions of the strata encountered are given on the exploratory holes logs presented in Appendix B. The downward succession encountered is broadly consistent with the published geology and with the conditions as previously identified on the site. This sequence is summarised in Table 6 below:

TABLE 6 : SUMMARY OF GROUND CONDITIONS			
Strata Encountered	Depth to top of stratum m bgl	Range of Thicknesses (m)	Exploratory holes encountered in
Made Ground	0.0	0.6 - 4.7	All positions
Head Deposits	1.6 – 3.8	0.5 - 1.7	WS1, WS2A, WS5, TP5, TP6, TP7, TP8, TP13, TP14, BH1 (2015)
Bognor Sand Member	0.5 – 2.1	1.1 – 3.9	TP1, TP2, TP3, TP4, TP11, TP12, TP13, WS6, WS7, TP2 (2015), WS2 (2015), WS3 (2015), WS4 (2015),
London Clay Formation	2.6 – 6.5	>13.0 (not proven)	WS1, WS2A, WS3, WS5, WS6, WS7, TP1, TP3, TP4, TP5, TP11, TP12, TP13, BH1 (2015), BH2 (2015) WS3 (2015)

The ground conditions are summarised below.

6.2 Made Ground

The exploratory holes encountered a variable and significant thickness of made ground (0.6 m to 4.0 m) which accords with the previous works where made ground was proven up to 4.7 m below the then site levels.

The made ground was generally deeper in the along the south-east edge of the site towards the retaining wall and the Riders Lane Stream, and also in the south-east of the site within the bounds of the former sewage treatment works, which are anticipated to have been constructed at a lower level. Positions TP15 and WS4 encountered obstructions within the ground within this area at 1.6 m and 4.0 m respectively.

From these areas of deep made ground the surface of the natural soils decreases steadily to the north of the site where WS7, TP2, TP2 (2015), TP3 and TP11 all encountered made ground of less than 1 m depth.

The Made Ground generally comprised sandy clayey gravel hardstanding and shrub vegetation over light brown to light grey sandy gravelly clays and light brown gravelly clayey sands. The gravel in the made ground comprised flint and anthropogenic components including asphalt, brick, concrete, clinker, slate tile, ceramic fragments with occasional glass, polystyrene and plastic.

In-situ concrete floor slabs and brick foundations were encountered at a number of exploratory positions and found to range from 0.60 m to 2.00 m below ground level as noted on the logs in Appendix B.

6.3 Head Deposits

Natural soils distinct from the Bognor Sand Member and the London Clay Formation were encountered in a number of locations beneath the made ground. These soils were distinguished here by the presence of flint gravel within the deposits which is typically absent from the Bognor Sand Member save for near the top of the sequence which is not seen here on the site. Some of these deposits appear to be reworked Bognor Sand with occasional clasts of gravel whilst others are more alluvial and organic in character, especially near the channel of Rider Lane Stream. For simplicity all are referred to as Head Deposits.

Where present, the Head Deposits are present beneath the base of the made ground, and were proven to overlie clays of the London Clay Formation in WS1, WS2A, WS5 and suspected of the same in TP6, TP7m TP8 and TP14 where the base of the Head Deposits was not proven. These deposits were only found to overlie the Bognor Sand Member in TP13.

6.4 Bognor Sand Member

The Bognor Sand Member was proven beneath the made ground in the north of the site, typically up to 2.0 m thick and thinning both to the south-east where it is replaced by Head Deposits near to the retaining wall and the channel of the Riders Lane Stream, and abruptly to the southwest in the region of the former sewage treatment plant where the Bognor Sand Member has apparently been replaced by deep made ground. The exception to this is the location of TP1 where Bognor Sand was encountered from the base of the made ground at 1.1 m depth, to the base of the hole at 3.2 m depth.

This unit generally comprised orangish brown occasionally mottled light grey interbedded sand, silty sand, sandy silt and sandy clays. The boundary with the underlying London clay is gradational and is taken to be the top of the uppermost soils which would be described as a clay.

6.5 London Clay Formation (Clay, Undifferentiated)

The London Clay Formation is present beneath the Bognor Sand Member at approximately 2.80 m to 3.20 m depth across the northern and central parts of the site. This formation generally comprised firm to stiff light grey and dark grey sandy silty clays and clays. The soft consistencies ascribed to these clays in the trial pits are considered likely to be due to the degree of disturbance caused to the sandy clays close to the boundary with the Bognor Sand Member. The depth to the top of the London Clay

Formation increases towards the south corner of the site near Riders Lane Stream as the thickness of the made ground increases. The top of the clay was encountered at 3.6 m depth in WS3 and reported as deep as 6.5 m in BH1 (2015).

6.6 Groundwater

Groundwater was encountered during the investigation at typically 2.8 to 3.0m depth in the centre and north of the site, and locally down to 3.3 to 3.6 m depth in the south-east. Accordingly, the seepages were noted in the Bognor Sand Formation in the north and centre of the site, and within the made ground in the south and south-east.

Water levels during monitoring have been used to produce reduced levels from the monitoring visits undertaken. The depths are tabulated in the water monitoring records in Appendix E, whilst the reduced levels are presented graphically on the Piezometric Surface Plan included in Appendix A.

Contours used have been generated by linear interpolation using Surfer 2015 to ensure complete reliance on the actual values recorded. The first visit undertaken on 18 September 2015 shows very linear and uniform shape to the piezometric surface across the site, including wells screened into the made ground and those set within the Bognor Sand Formation. This visit was undertaken at the end of a prolonged very dry spell of weather and is considered likely to represent equilibrium groundwater conditions at this time. It is clear that the Bognor Sand Member and the Made Ground are in hydraulic continuity and acting as a single body of groundwater flowing to the south-south-east.

The steepening of the displayed piezometric surface in the south is an artefact of the inclusion of a control point representing the surface of the stream. This point is 1.2 m lower than the lowest water levels recorded on the site at WS3. The steepening of the hydraulic gradient indicates a decrease in hydraulic conductivity which is considered likely to be due to the presence of the retaining wall and its foundations.

The second and third monitoring visits were undertaken after periods of steady and heavy rain respectively. These mark out the positions of WS5 and WS7 as being in parts of the site which respond rapidly to rainfall, with the water levels in WS7 approaching ground level during the third visit on 15 October when water would have been present within the base of the made ground across the site. Notes from the technician attending record that this part of the site may be receiving direct run-off from the adjacent areas of roadway to the north, which may explain a potentially accentuated response. Irrespective of this the monitoring shows a consistent trend in flow direction across the site through the made ground and Bognor Sand Member towards the channel of the Riders Lane Stream.

6.7 Indications of Contamination

Olfactory or visual indications of contamination were noted as summarised below:

TABLE 7 : OLFACTORY OR VISUAL INDICATIONS OF CONTAMINATION			
Location of contamination:	Hole(s) noted in:	Depth (m) (range):	Comments (e.g. staining, odours (inc strength), sheens, free product, etc):
Made ground	WS4	0.70	Asphalt odour
		2.90	Mild hydrocarbon odour
		3.20 – 4.00	Moderate hydrocarbon odour
	TP5	2.10 – 3.00	Possible asbestos containing cement
	TP9	3.00 – 3.90	Black staining emitting moderate hydrocarbon odour
	TP11	0.25 – 0.50	Possible asbestos containing cement
	TP14	0.55 – 0.80	Mild asphalt odour
Bognor Sand Member	TP2	1.10 – 1.50	Rare black staining emitting mild hydrocarbon odour.
Groundwater	TP9	3.60	Hydrocarbon sheen on groundwater.

Olfactory or visual indications of chemical contamination were not identified in any of the other exploratory holes.

7 GEOENVIRONMENTAL ASSESSMENT

7.1 General

In line with CLR11 (EA, 2014), 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.

7.2 Linkages for Assessment

Based on the additional data from the recent ground investigation, all the linkages identified as being potentially complete in the Preliminary Risk Assessment remain so and have been taken forward for reassessment. Those considered are detailed in Table 6 below, together with the method of assessment.

TABLE 8 : LINKAGES FOR GENERIC QUANTITATIVE RISK ASSESSMENT	
Potentially relevant pollutant linkage	Assessment method
1. Direct contact of construction workers with soils contaminated with asbestos.	Qualitative assessment based on the asbestos minerals present, their form, concentration, location and the nature of the proposed development.
2. Vertical and lateral migration of vapour and ingress into structures or buildings and inhalation by future site users.	Qualitative assessment of PID headspace screening results and comparison of soil and groundwater data against human health GAC in Appendix D for a proposed commercial end use based on indoor inhalation exposure to vapour-phase volatile organic compounds.
3. Leaching of contaminants from the unsaturated zone to groundwater in the Secondary A Aquifer	Qualitative assessment of indications of contamination and soil analysis results with consideration of site conceptualisation.
4. Lateral migration of dissolved phase contaminants to adjacent Riders Lane Stream	Assessed through the direct comparison of groundwater data to controlled waters GAC for surface water, and by direct assessment of surface water data in Appendix D.
5. Vertical and lateral migration of ground gas and ingress into structures or buildings leading to asphyxiation or explosion	Gas screening values (GSV) have been calculated using maximum methane and carbon dioxide concentrations with the flow rates recorded at the site. The GSV have been compared with the revised Wilson and Card classification presented in CIRIA report C665

TABLE 8 : LINKAGES FOR GENERIC QUANTITATIVE RISK ASSESSMENT

Potentially relevant pollutant linkage	Assessment method
	owing to the development comprising commercial warehouse and office structure. In addition the gas regime is considered within the context of a conceptual model as required by this guidance and BS8576

7.3 Methodology and Results

The methodology and results of the GQRA are presented for each relevant pollutant linkage in turn.

7.3.1 Linkage 1 - Contact by construction workers or future site users with soils contaminated with asbestos

The laboratory screening for asbestos identified three positive asbestos results within the 30 samples screened. In addition, one positive laboratory bulk identification was made on a fragment of chrysotile asbestos cement sheet identified by eye in TP11 at 0.40m depth.

The positive screen results are detailed below in Table 9:

TABLE 9 : SUMMARY OF ASBESTOS SCREENING

No. of asbestos presence screens		No. of non-detects		
30		27		
Details of positive asbestos screens and quantifications				
Exploratory hole	Depth (m)	Asbestos type and form	Mode of detection in laboratory	Quantification (%)
TP3	0.30	Chrysotile – Loose fibres	microscopy	<0.001
WS1	0.20	Chrysotile – Loose fibres	microscopy	<0.001
WS2A	0.30	Chrysotile – Bitumen bound	microscopy	<0.001

These results identify the sporadic presence of typically low concentrations of dispersed asbestos fibres within the soils on the site, and the occasional presence of identifiable fragments of asbestos containing material (ACM). In this instance the ACM is cement sheet which is considered to be a lower risk form as free fibre release does not readily occur unless abraded.

Risks to the end commercial users of the site is not considered plausible as there are to be no areas of soft landscaping by which the soils could be contacted.

Risks to construction workers remains plausible, and the developer should take all reasonable steps to minimise contact with asbestos. This should be considered in

accordance with the current CDM regulations to ensure that a safe system of work is adopted, but should include as a minimum, the minimisation of dust generation during the groundworks phase when any of the existing soils are exposed.

7.3.2 Vertical and lateral migration of hydrocarbon vapour and ingress into structures or buildings and inhalation by future site users

Inhalation exposure to vapours, including volatile hydrocarbons has initially been assessed through the consideration of the soil and groundwater (monitoring) Photoionisation Detector screening results.

157 PID screening tests were undertaken on soil samples recovered during the recent works, with the highest results being 22.3 ppm isobutylene equivalent, from 3.2 m depth in TP9 where the made ground had a moderate hydrocarbon odour. The second highest PID screening results was 21.2 ppm from 1.0 m depth in TP4 where the made had a mild hydrocarbon odour. Of the remaining screens undertaken the peak results was 6.6 ppm and none are considered significant.

None of the results of the laboratory analysis undertaken on the soil samples, including those soils with the highest PID screening results, exceeded the human health GAC which include inhalation exposure pathways. Similarly, none of the results of the laboratory analysis undertaken on the waters exceeded the human health groundwater assessment criteria specific to inhalation exposure pathways (Appendix D)

Accordingly it is considered that no source of hydrocarbon vapour which could drive an inhalation risk to the future users has been identified, and this linkage is considered incomplete.

7.3.3 Linkage 3 - leaching of contaminants from the unsaturated zone to groundwater in the Secondary A Aquifer

The ground investigation and the data collected indicates that the Bognor Sand Member and the superficial deposits, along with the made ground which overlies them, are in hydraulic continuity, and contain a single body of groundwater.

Flow in this body of groundwater water is towards the nearby Riders Lane Stream which itself is underlain at shallow depth by clays of the London Clay Formation. These are expected to act as an aquitard and prevent the vertical movement of groundwater beyond the base of the Bognor Sand Member.

The investigations undertaken on the site to date have not identified any significant indications of soil contamination within the shallow soils, however odours of hydrocarbons have been encountered sporadically in the deeper made ground made ground in the south-east of the site and occasionally in the centre of the site. Apart from two instances of a mild asphalt odour in WS4 at 0.70 m and TP14 at 0.55-0.80 m, all of the indications of contamination have been below groundwater levels, and thus in saturated soils.

Accordingly, the scope for the generation of impacted leachate from the infiltration of precipitation through the unsaturated zone on the site appears limited. Furthermore, the movement of groundwater to the south and towards the stream means that there is no pathway to the wider Bognor Sand Member aquifer as any dissolved phase contamination would need to migrate up hydraulic gradient of the site.

The current proposals allow for the entire site to be surfaced with impermeable finishes which will prevent the infiltration of precipitation on the site. There is an element of permeable paving proposed in the south-west of the site within a car parking area, but this is to be underlain by an impermeable membrane and the water routed, along with all other water from areas of external hardstanding, through a full retention Class 1 separator prior to discharge via an attenuation tank to the existing storm sewer and on into the Riders Lane Stream. Roof water is also to be collected and routed to the attenuation tank.

Accordingly, the development of the site will markedly reduce the already limited scope for the generation of contaminated leachate on the development site, and this linkage is considered to be incomplete.

7.3.4 Linkage 4 - Lateral migration of dissolved phase contaminants to adjacent Riders Lane Stream

The results of the water analysis undertaken on samples obtained from the monitoring wells and from the Riders Lane Stream have been screened against the Environmental Quality Standards (EQS) for freshwater as they are protective of surface water.

TABLE 10 : SUMMARY OF TARGET CONCENTRATION EXCEEDANCES				
Determinant	Freshwater EQS (µg/l)	Concentration (µg/l)	Location	Sampling Round
Benzo(a)pyrene	0.00017	0.01	WS3	1
Fluoranthene	0.0063	0.04	WS3	1
		0.03	WS3	2
		0.01	WS1	2
		0.03	WS2a	2
		0.01	WS5	2
Nitrite	30 ^a	100	WS2a	1
		170	WS4	1
		290	WS5	1
		120	SW2	1

a – EQS for cyprinid freshwaters

The nitrite levels recorded on the site are elevated in the south and west of the site relative to the environmental quality standard. The research undertaken into the past uses of the site has not identified significant sources of nitrite or ammoniacal nitrogen other than the former sewage treatment plant, however in the absence of significant quantities of organic fill material this is considered unlikely to be the source of the nitrite detected. The foul sewer present which traverses the site is a plausible source of ammonia which could lead the generation of nitrite by partial nitrification in mildly oxidising conditions. A foul sewage odour was identified in WS2A during drilling and sampling and it is certainly the

case that levels of dissolved oxygen at all locations were depleted during the first monitoring round in all groundwater samples compared to those recorded on the second round following a period of increased rainfall. Notably no concentrations of nitrate were recorded exceeding the method limit of detection during this second round of sampling.

The presence of detectable nitrite in SW2, the downstream surface water monitoring point, may suggest impact from the groundwater on the site upon the Riders Lane Stream particularly during periods of very low flow in the stream.

The sampling and analysis has identified the presence of benzo(a)pyrene and fluoranthene in the groundwater on the site at concentrations which exceed the EQS values. There is no evidence of impact with these compounds within the Riders Lane Stream.

There are no EQS values for total petroleum hydrocarbons. The sampling and analysis undertaken has identified trace concentrations of TPH in a number of locations with total TPH only exceeding the method limits of detection in WS1, WS2A, WS4 and WS7. For the samples taken from Riders Lane Stream, TPH has only been detected in the upstream sampling location (SW1) where 30 µg/l was recorded on the second sampling round.

The trace results from WS1, WS2A, WS4 and WS7 range up to 56 µg/l of total TPH and are principally identified within fractions aliphatic >C21-C35, and aromatic >C12-C16, >C16-C21 and C21-C35.

Greater concentrations of TPH have been identified in WS4, but only on the second monitoring round where with total TPH was recorded at 874 µg/l. The breakdown for this is recorded in Table 11

TABLE 11 : SUMMARY OF TPH ANALYSES - WS4				
Location	Date	TPH Fraction	Concentration (µg/l)	Pure phase solubility limits (µg/l)
WS4	15 October 2018	Ali >C5-C6	<1	36000
		Ali >C6-C8	<1	5400
		Ali >C8-C10	<5	430
		Ali >C10-C12	<5	34
		Ali >C12-C16	<5	0.76
		Ali >C16-C21	55	0.0025
		Ali >C21-C35	329	0.0013
		Aro >C5-C7	<1	1800000
		Aro >C7-C8	<1	520000
		Aro >C8-C10	11	65000

		Aro >C10-C12	7	25000
		Aro >C12-C16	19	5800
		Aro >C16-C21	127	650
		Aro >C21-C35	326	6.6
		TPH (sum of fractions)	874	-

The water monitoring results from WS4 show some exceedances of the theoretical pure phase solubility limits for aliphatic >C16-C21, aliphatic >C21-C35 and aromatic >C21-C35 (values given in bold in Table 11), suggesting that some free phase hydrocarbon may be present. C16-C35 is also the carbon range where the bulk of the hydrocarbon has been recorded and compounds within this ranges are typically low solubility with low to very low mobility in groundwater.

WS4 was noted to have some indications of hydrocarbon contamination with a moderate odour in the deep made ground, but no evidence of a sheen or mobile free product has been identified during drilling or monitoring and sampling. Additionally, no impact at all was identified by the testing undertaken on the first round of sampling and it is considered likely that these results represent residual hydrocarbon contamination mobilised by the sampling.

There is no evidence of any TPH or PAH impact within the downstream sampling point and accordingly this linkage is considered to be incomplete for these contaminants.

7.3.5 Linkage 5 - Vertical and lateral migration of ground gas and ingress into structures or buildings leading to asphyxiation or explosion

In order to assess the significance of ground gases at the site, measured concentrations (by volume in air) and flow rates have been used to generate Gas Screening Values (GSVs). These have then been compared to the assessment criteria presented for the modified Wilson and Card method contained within CIRIA Report C665. BS8485 has also been referenced.

The following ground gas parameters have been recorded over the 6 gas monitoring rounds undertaken by SSL and Soiltechnics in 2015:

- A peak methane concentration of 7.3 %;
- A maximum carbon dioxide concentration of 11.4 %;
- A maximum 'initial' flow rate of 2.9 l/hr; (one position on one occasion only, and 0.2 l/hr besides)
- A maximum 'steady state' flow rate of 0.1 l/hr.

The gas monitoring data is considered typical for a site with some deep made ground, locally present below groundwater levels, and suggests ground gas with has been generated and collected over extended periods of time. The peak methane concentration recorded by SSL in 2015 in BH2 peaked during the first monitoring visit and decreased over the course of the monitoring campaign.

Utilising worst case concentrations and flows from across the site to calculate conservative hazardous gas screening values (GSVs) produces values of 0.33 l/hr for carbon dioxide and 0.21 l/hr for methane. Both fall within Characteristic Situation 2 as defined by Table 2 of BS8485:2015. By comparison using the next highest peak flow rate generates GSVs of 0.02 l/hr and 0.01 l/hr for carbon dioxide and methane respectively; both within Characteristic Situation 1.

Given the nature and location of the ground gas source on the site it is not considered likely that additional monitoring would identify positions with a combination of gas concentrations and flow rates required to generate a GSV which exceeds the threshold for Characteristic Situation 3.

On balance, and given the presence of gas concentration of methane exceeding 1% and Carbon dioxide concentrations exceeding 5%, we consider that the gas regime at the site should be classified as Characteristic Situation 2, and that appropriate gas protection measures should be included within the proposed development.

7.4 Assessment Summary

7.4.1 Current Position

Some evidence of residual hydrocarbon contamination has been identified on site, principally within the deep made ground soils in the south-east and below standing groundwater levels. This residual contamination has lead to sporadic low level impact within the groundwaters on the site, but there is no evidence of hydrocarbon contamination of the adjacent Riders Lane Stream.

No volatile contamination has been identified and there is considered to be no hydrocarbon vapour risk to the proposed development.

Low level asbestos contamination has been identified in the form of cement sheet fragments, loose fibres and bitumen bound material. Risks to the end users of the site are considered to be low, but appropriate precautions should be taken to manage potential risks to site workers during the construction phase.

Moderately elevated concentrations of nitrite has been identified in the groundwater in the south and west the site which is tentatively related to potential leakage of the foul sewer which crosses the site. There is some evidence of potential impact on the adjacent Riders Lane Stream with the downstream surface water monitoring point recording increased concentrations of nitrite during a period of very low flow.

Levels of ground gas on the study site are elevated and the gas regime is considered to fall within Characteristic Situation 2 as defined by BS8485:2015. Appropriate gas protection measures should be designed into the development.

7.4.2 Impacts of the future development

The development will entail the capture and collection of all rainwater from across the entire site, for ultimate discharge to the Riders Lane Stream. Draining pipework and tanks within the ground are expected to be designed and constructed to minimise leakage of these collected waters to the ground reducing the scope for leachate generation and the flux of groundwater to the stream.

The proposed works also include the diversion of approximately 75% of the existing foul sewer across the site, which will reduce the scope for leakage and provide the opportunity of repair on the remainder of the pipe run.

The foundations for the building are proposed to be CFA piles taken down into the London Clay Formation. This technique will not significantly alter the contamination risks on the site as made ground and Bognor Sand Member are already in hydraulic continuity, and the underlying clays will remain an effective aquitard.

On balance the development is expected to reduce the existing low risks from the site to controlled waters, and no further specific investigation or assessment is considered warranted.

7.5 Recommendations

Given the presence of made ground on the site it would be prudent to remain vigilant during groundworks to the potential for previously unexpected contamination. If such is encountered it should be notified to the local planning authority and investigated and assessed by an experienced environmental consultant. Work in the vicinity of the contamination should cease until the assessment, and any resulting actions required have been agreed between the interested parties.

A number of potential obstructions have been identified in the ground in the form of relic foundations or slabs, including at 4.0 m below ground level in the vicinity of the position WS4. The potential presence of these should be considered when determining the method of piling and any enabling works required.

The existing monitoring well array should be retained until there is agreement from the local planning authority that it is no longer required.

Levels of ground gas on the study site are elevated and the gas regime is considered to fall within Characteristic Situation 2 as defined by BS8485:2015. Appropriate gas protection measures should be designed into the development. All below ground voids and excavations should be checked for the presence of harmful atmospheres prior to man entry.

8 REFERENCES

- 8.1 BS 5930:2015 *Code of practice for ground investigations*
- 8.2 BS EN 1997-1:2004 *Eurocode 7 — Geotechnical Design Part 1 - General Rules* incorporating corrigendum Feb 2009 and Amendment A1 2013
- 8.3 BS EN 1997-2:2007 *Eurocode 7 — Geotechnical design Part 2: Ground Investigation and testing*
- 8.4 BS 10175:2011 *Investigation of potentially contaminated sites: Code of practice*, including amendment A2 2017
- 8.5 British Geological Survey sheet 316 scale 1:50,000, published 1998
- 8.6 British Geological Survey online digital geological map, www.bgs.ac.uk/data
- 8.7 British Geological Survey Lexicon of Named Rock Units, www.bgs.ac.uk/lexicon
- 8.8 Entec Uk Limited Phase 1 Desk Study, Proctor & Gamble Product Supply (Uk) Ltd, Havant - July 2003
- 8.9 Entec Uk Limited Phase 2 Site Investigation, Proctor & Gamble Product Supply (Uk) Ltd, Havant - August 2003
- 8.10 Enviro Consulting Ltd, Environmental Investigation to support planning application, former Procter & Gamble Site, Havant, DW018001A October 2004 (Fragment)
- 8.11 Enviro Consulting Ltd Letter Report - Southern Area Former Procter & Gamble site, Havant - Remediation of hydrocarbon – April 2006
- 8.12 Structural Soils Ltd. Interpretive Report on Ground Investigation at Fulflood Road, Havant, 730438, September 2015
- 8.13 Soiltechnics Ltd. Ground Investigation Report, Proposed Industrial development, Land adjacent to MIPA Paints Limited, Fulflood Road, Havant, PO9 5AX, December 2016
- 8.14 CIRIA Report C552 (2001), *Contaminated Land Risk Management; A Guide to Good Practice*

- 8.15** R & D Publication CLR 11 (September 2004). *Model Procedures for the Management of Contaminated Land*. Environment Agency
- 8.16** CIRIA Report C515 (2000) *Groundwater Control – design and practice*
- 8.17** Environment Agency Policy. Part IIA – *Detailed Quantitative Assessment of Chronic Risks to Human Health from Contaminated Soils*. Policy Number 199_04, dated 9 March 2004
- 8.18** Environment Agency Science Report SR2: *Human health toxicological assessment of contaminants in soil* (Final SC050021/SR2).
- 8.19** Environment Agency Science Report SR3: *Updated technical background to the CLEA model* (Final SC050021/SR3).
- 8.20** CL:AIRE, 2017. *Petroleum Hydrocarbons in Groundwater: Guidance in assessing Petroleum hydrocarbons using existing hydrogeological risk assessment methodologies*.

APPENDIX A - PLANS AND DRAWINGS

- (i) Site Location Plan
- (ii) Contamination Source Location Plan
- (iii) Exploratory Hole Location Plan
- (iv) Piezometric Surface Plan
- (v) Conceptual Site Model
- (vi) Proposed Development & Drainage Layout Plan



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STRUCTURAL SOILS

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CLIENT

Mipa Paints Ltd

PROJECT

Fulflood Road, Havant

TITLE

SITE LOCATION MAP

00	26.10.2018	-	NP	JE	-
REV.	DATE	DESCRIPTION	BY	CHD.	APR.
DIMENSION		SCALE	DRAWING STATUS		
m		1:25,000	-		

JOB NO

733845

GRID REF

SU 714 083

SCALE BAR

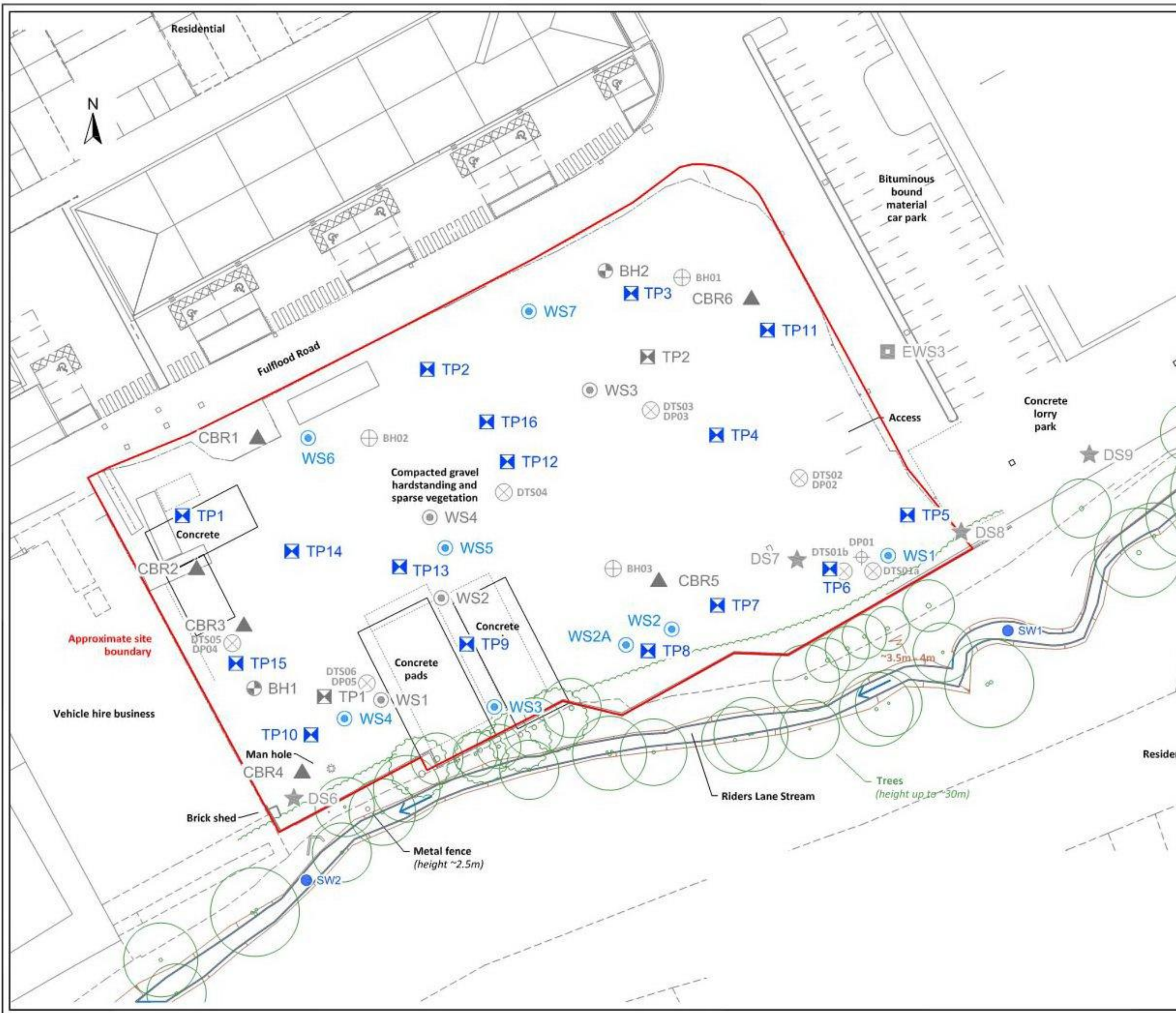


ORIGIN SIZE

A4

FIGURE

1



- LEGEND**
- SSL Trial Pit Location 2018
 - SSL Window Sample Location 2018
 - Surface Water Sampling Point 2018
 - SSL Trial Pit Location 2015
 - SSL Window Sample Location 2015
 - SSL California Bearing Ratio Location 2015
 - Entec Hole Locations 2003
 - Enviros 2004
 - Soiltechnics Hole Locations 2016

00	08.11.2018		NP	JE	-
REV	DATE	DESCRIPTION	BY	CHD	APR
DIMENSION		SCALE	ORIGIN SIZE		
m		1:500	A4		

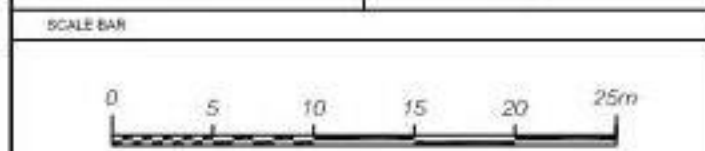


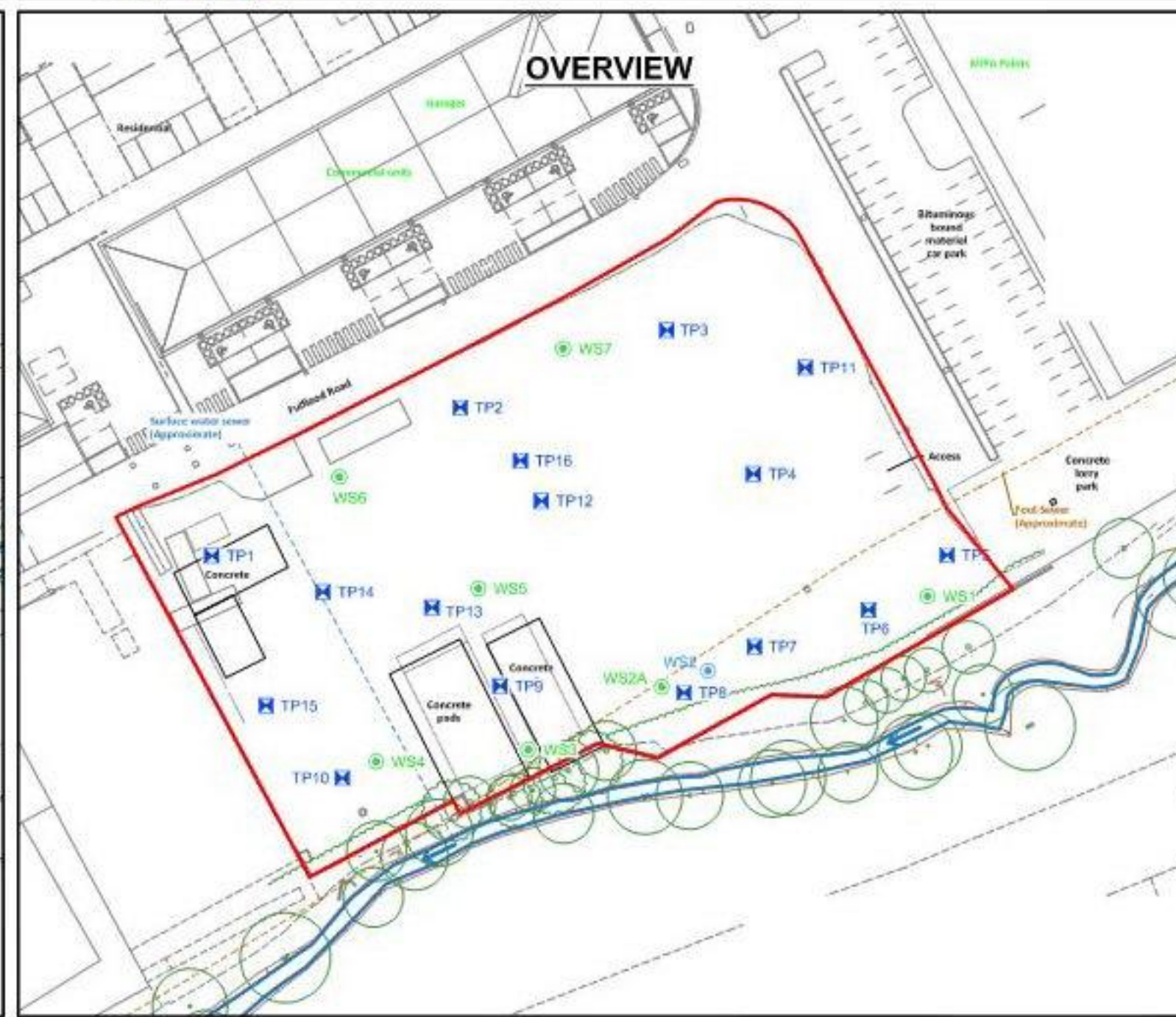
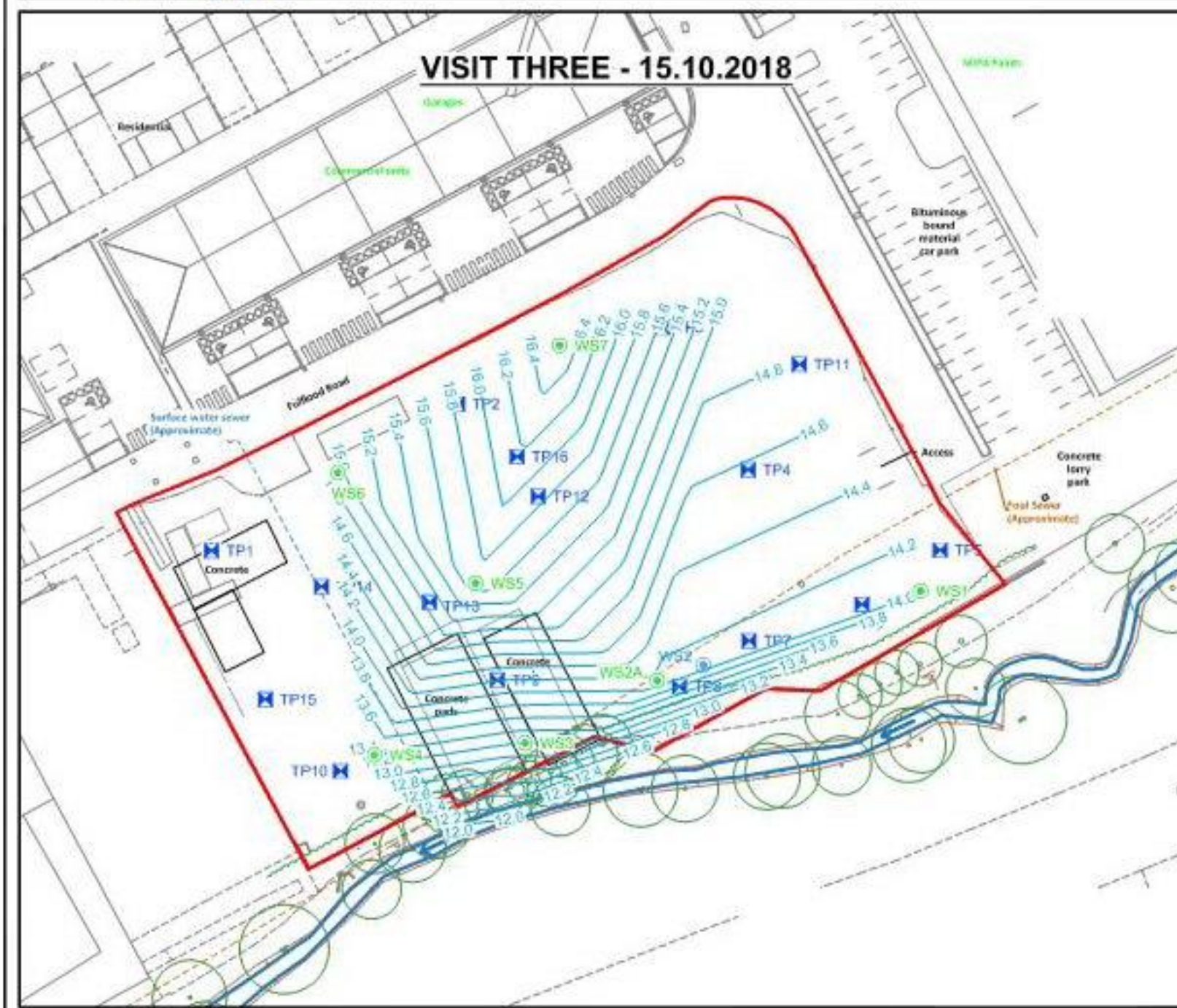
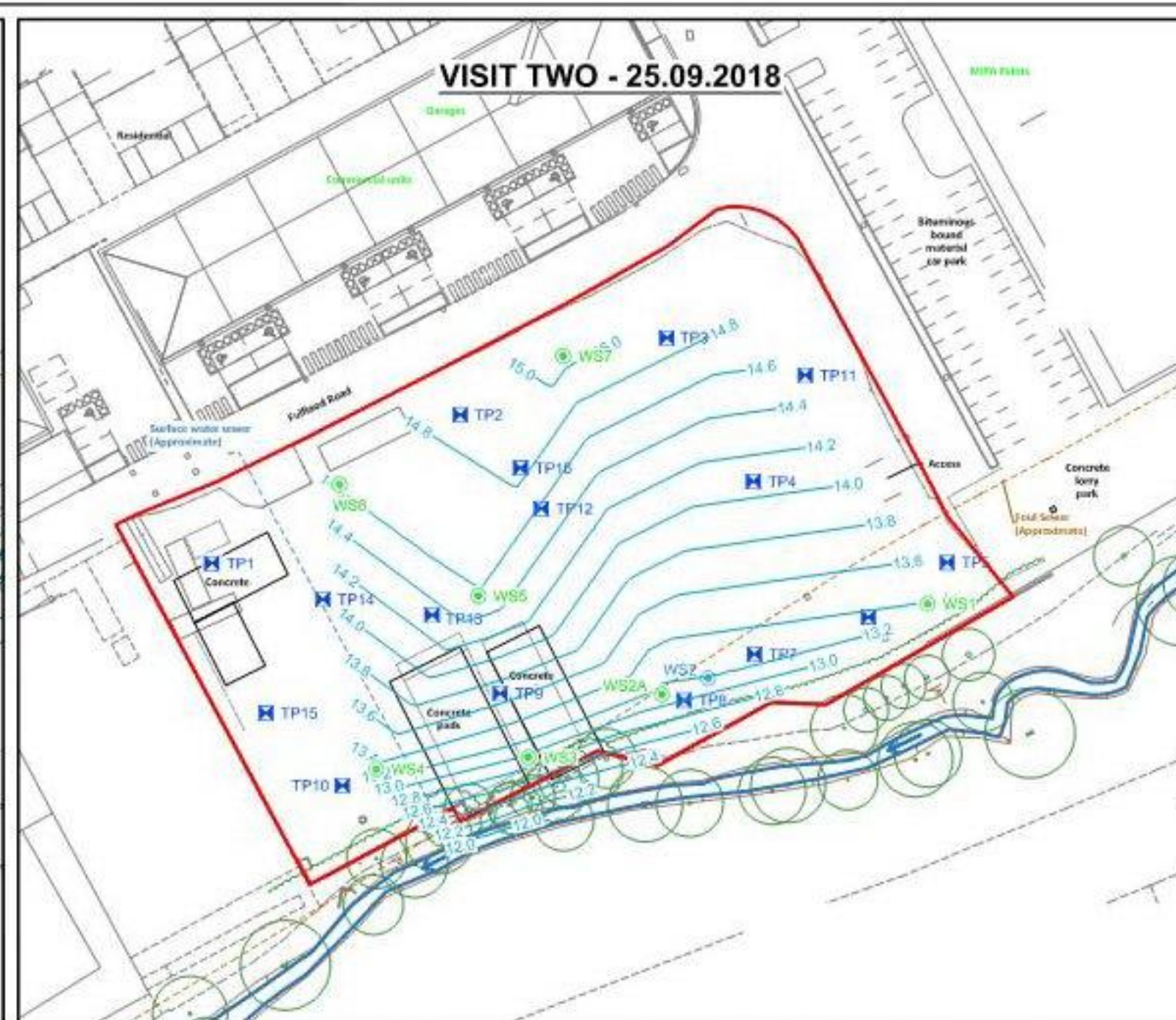
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CLIENT	Mipa Paints Ltd.
PROJECT	Fulford Road, Havant
TITLE	EXPLORATORY HOLE LOCATION PLAN
JOB NO	733845
FIGURE	3
DRAWING STATUS	REV
	00





LEGEND

- Window Sample Location
- Trial Pit Location



00	02.11.2018		MW	AW	-
REV	DATE	DESCRIPTION	BY	CHD	APR
DIMENSION		SCALE		ORIGIN SIZE	
m		1:1000		A3	

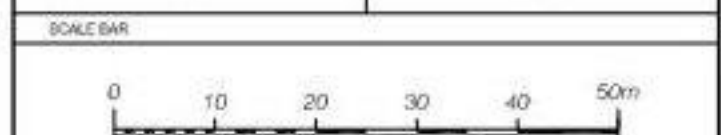


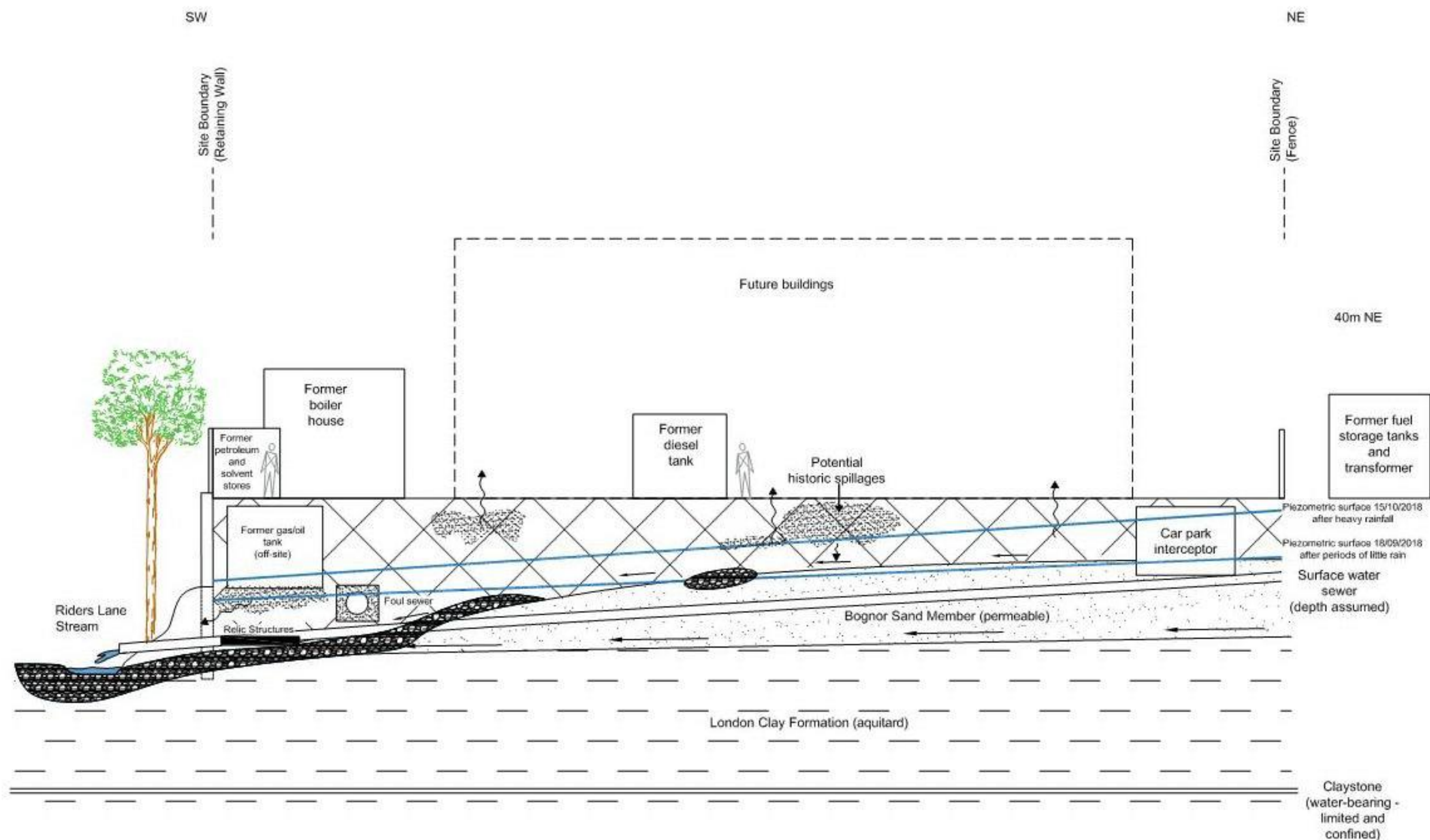
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CLIENT		Mipa Paints Ltd.			
PROJECT		Fulllood Road, Havant			
TITLE		PIEZOMETRIC PLAN			
JOB NO	FIGURE				
733845	4				
DRAWING STATUS	REV				
-	00				





Potential sources of contamination

On-Site (Historic)

- Made ground
- Former underground gas storage tank
- Former underground fuel pipework and boiler house
- Former sewage works
- Factory
- Carpark interceptor
- Former above ground diesel tanks

On-Site (Current)

- Made ground
- Potential underground fuel pipework

Offsite (Current and historic)

- Garages and commercial units 15m to North
- Former fuel storage tanks and transformer 40m NE

Receptors

- Future site users/construction workers
- Groundwater below site (Secondary aquifer)
- Surface water (Riders Lane stream 4m to South)

Pathways

- Direct contact
- Vapour migration and inhalation
- Leaching
- Vertical migration
- Direct solubilisation
- Lateral migration of dissolved phase contaminants
- Preferential pathways such as permeable pipe surrounds

LEGEND

- ☒ Made Ground
- ☒ Bognor Sand Member
- ☒ London Clay Formation
- ☒ Head Deposits
- ← Groundwater Flow Direction

00	01.11.2018	-	NP	JE	-
REV	DATE	DESCRIPTION	BY	CHD	APR
DIMENSION		SCALE	ORIGIN SIZE		
m		NTS	A3		



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CLIENT	
Mipa Paints Ltd.	
PROJECT	
Fullflood Road, Havant	
TITLE	
CONCEPTUAL SITE MODEL	
JOB NO	FIGURE
733845	5
DRAWING STATUS	REV
-	00
SCALE BAR	

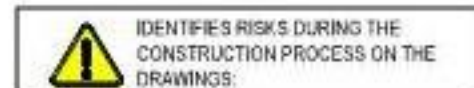
GENERAL NOTES

1. This drawing is to be read in conjunction with all Engineer's, Architect's or relevant drawings and specifications.
2. All dimensions and levels are to be checked on site by the contractor prior to preparing any working drawings or commencing on site.
3. The contractor must ensure and will be held responsible for the overall stability of the building structure/retention at all stages of the work.
4. All work by the contractor must be carried out in such a way that all requirements under the Health and Safety at Work Act are satisfied.
5. All work is to be carried out in compliance with the requirements of the relevant statutory authorities and regulations.
6. Refer to General Notes Drawing WMP-AKSW-XX-XX-DR-C-00000

Architect's Drawings

This drawing has been created based on the following
pdp architecture & Architects Drawings

27674-TD000-208 Tender Drawings (Preliminary)



IDENTIFIES RISKS DURING THE CONSTRUCTION PROCESS ON THE DRAWINGS.
NOTE: The list below and notes on the drawing identify risks which are deemed to be unusual, abnormal, residual or unexpected to a competent contractor carrying out the works. These notes relate to risks which we have been unable to design out.

All information shown on this drawing is for Design and Build Tender purposes only and is subject to final design and co-ordination.

T02: Extent of permeable paving revised. MDL R/S 04.10.18
T01: Issued for Design and Build Tender. MDL R/S 07.09.18
Rev. Author: J. Smith Date: 04.10.18

Proj. Name: **Tender** Status: **D2**

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Tel: 02380 335340
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web: www.aksward.com

Client: **MIPA Paints**

Project: **Proposed Development
Fulford Road
Leigh Park**

Title: **Drainage Layout**

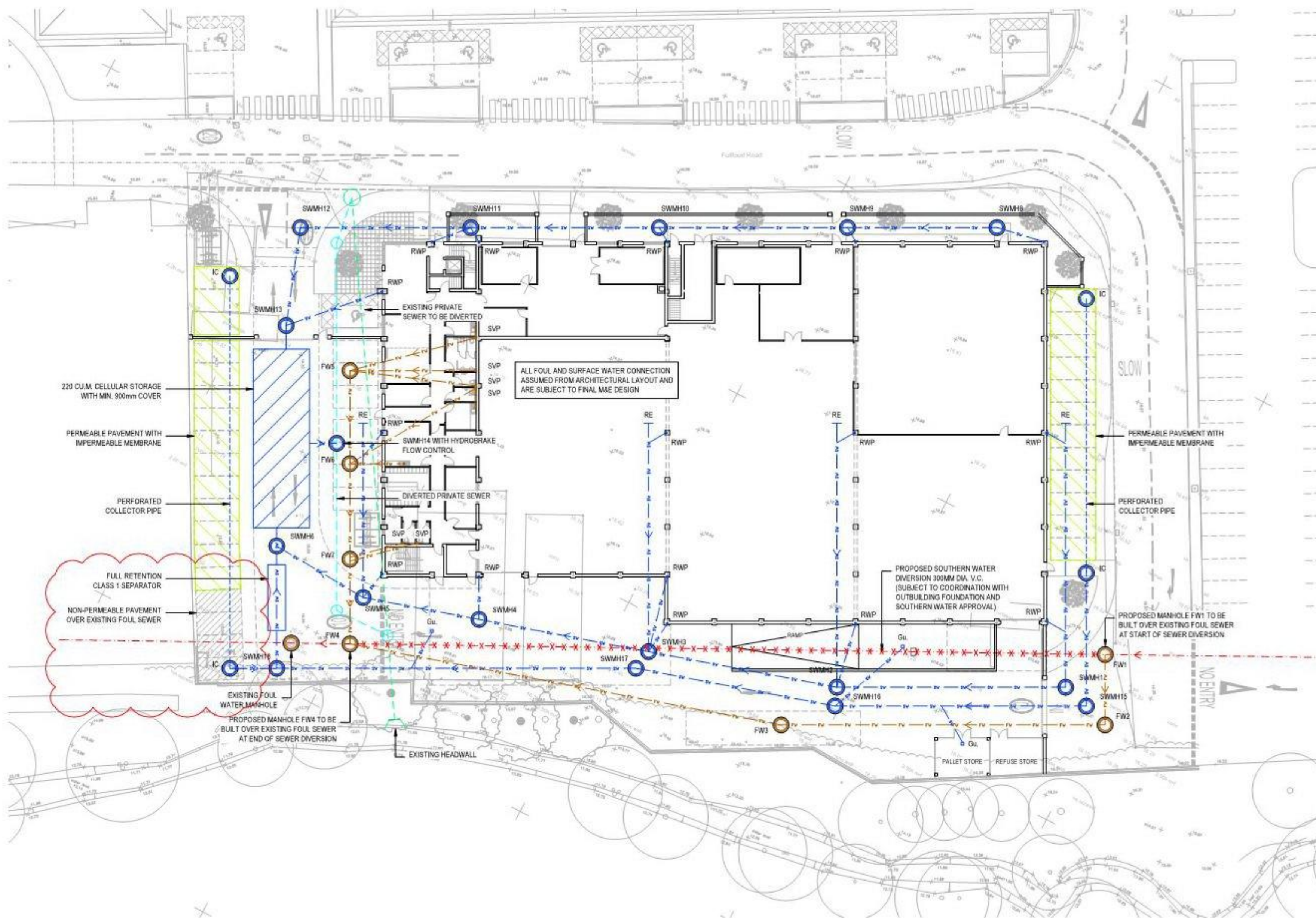
Reviewed Scheme: RJS Date: 30.08.18

Reviewed Final: Date:

Scales of A1: 1:200 Project No: **S158024**

Project Ref: 00000000 Zone: Level: Type: Role: Date: Rev:

WMP AKSW XX-XX-DR-C-92005 T02



APPENDIX B - EXPLORATORY HOLE RECORDS

- (i) Key to Exploratory Hole Logs
- (ii) Trial Pit Logs
- (iii) Window Sample Logs
- (iv) Standpipe Summary Table



KEY TO EXPLORATORY HOLE LOGS - SUMMARY OF ABBREVIATIONS

SAMPLING

Sample type codes

ES = Soil sample for environmental testing.
W = Water sample.

IN-SITU TESTING

HP = Hand Penetrometer Test. Value given as shear strength c_u , in kPa.
PID = Photo Ionisation Detector Results, in ppm.

ADDITIONAL NOTES

1. All soil and rock descriptions and legends in general accordance with BS EN ISO 14688-1, 14688-2, 14689-1, and BS5930:2015.
2. Material types divided by a broken line (- - -) indicates an unclear boundary.
3. The data on any sheet within the report showing the AGS icon is available in the AGS format.



KEY TO EXPLORATORY HOLE LOGS - SUMMARY OF GRAPHIC SYMBOLS

WATER COLUMN SYMBOLS



First water strike, second water strike etc.

Standing water level following first strike, standing water level following second strike etc.

Seepage.

Standing water level recorded at documented date.

MATERIAL GRAPHIC LEGENDS



Clayey
SAND



Gravelly
CLAY



Gravelly
silty CLAY



MADE
GROUND



Sandy
CLAY



Sandy silty
CLAY



Sandy
gravelly
CLAY



Sandy
gravelly
SILT



Sandy
SILT



Clayey
SILT



Silty CLAY



Silty
SAND



CLAY



SILT



SAND

INSTRUMENTATION SYMBOLS



Backfill



Bentonite
seal



Concrete



Gravel
filter



Flush
cover



Plain pipe



Slotted
pipe



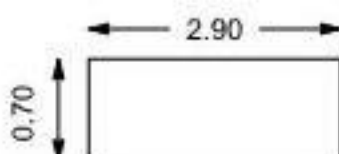
STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP1
Contract Ref:	733845	Start: 30.8.18 End: 30.8.18	Ground Level:	16.30	National Grid Co-ordinate:	E:471374.9 N:108288.5	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.10 0.10	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over grey and dark brown sandy clayey angular to subangular fine to coarse GRAVEL of limestone, flint, brick and concrete. Abundant rootlets.	16.15	0.15	
0.50		HP	$c_u=75/85/60$			MADE GROUND: Firm fissured light brown slightly sandy gravelly CLAY with medium cobble content and low boulder content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, concrete, clinker and flint. Cobbles are angular of brick and concrete. Boulder is angular of concrete.		(0.95)	
0.65 0.65	102	ES PID	1xT,1xJ,1xV 0.0ppm						
							15.20	1.10	
1.50 1.50	103	ES PID	1xT,1xJ,1xV 0.0ppm			Yellowish brown thickly laminated mottled light grey silty fine to medium SAND. (BOGNOR SAND MEMBER)		(2.10)	
2.70 2.70	104	ES PID	1xT,1xJ,1xV 0.0ppm						
3.20 3.20	105	ES PID	1xT,1xJ,1xV 0.0ppm			Trial pit terminated at 3.20m depth.	13.10	3.20	

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Concrete foundations encountered at 1.90m depth in north-east pit corner.
3. Trial pit damp but pit walls stable.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: 1:25

Method Used:	Machine dug	Plant Used:	Tracked excavator	Logged By:	JDEvans	Checked By:	AW.	AGS
--------------	-------------	-------------	-------------------	------------	---------	-------------	-----	-----



Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP2	
Contract Ref:	733845		Start:	29.8.18	Ground Level:	16.77	National Grid Co-ordinate:	E:471408.4 N:108308.5
	End: 29.8.18						Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.25 0.25	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over multicolored sandy angular to subangular fine to coarse GRAVEL of brick, concrete, flint, clinker and slate with medium cobble content. Cobbles are angular of brick and concrete. Abundant rootlets, glass and plastic fragments.	16.72	0.05	
							16.47	0.30	
						MADE GROUND: Reddish brown very sandy clayey angular to subangular fine to coarse GRAVEL of concrete, brick, flint, clinker and ceramic tile with medium cobble content. Sand is fine to coarse. Cobbles are angular of brick and concrete. Rare plastic fragments.		(0.30)	
0.60 0.60	102	ES PID	1xT,1xJ,1xV 0.0ppm				16.17	0.60	
						MADE GROUND: Yellowish brown very sandy clayey subangular to subrounded fine to coarse GRAVEL of flint, brick and concrete with low cobble content. Sand is fine to coarse. Cobbles are angular of concrete and ceramic pipe fragments.			
1.10 1.10	103	ES PID	1xT,1xJ,1xV 4.9ppm			Orangish brown mottled light grey thickly laminated silty fine to medium SAND. (BOGNOR SAND MEMBER) ... From 1.10m to 1.50m depth, rare black staining and minor hydrocarbon odour.			
1.60 1.60	104	ES PID	1xT,1xJ,1xV 1.3ppm					(2.60)	
2.30 2.30	105	ES PID	1xT,1xJ,1xV 0.0ppm						
3.30 3.30 3.30	106	ES HP PID	1xT,1xJ,1xV c _v =45/50/60 0.1ppm			Soft dark grey slightly sandy silty CLAY. Sand is fine to medium. (LONDON CLAY FORMATION)	13.57	3.20	
								(0.30)	
						Trial pit terminated at 3.50m depth.	13.27	3.50	

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Trial pit damp but pit walls stable.
3. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale:

1:25

Method
Used:

Machine dug

Plant
Used:

Tracked excavator

Logged
By:

JDEvans

Checked
By:

AW.

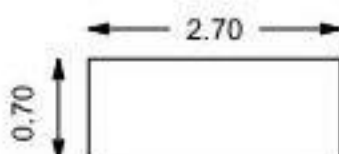




Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP3	
Contract Ref:	733845		Start:	29.8.18	Ground Level:	16.62	National Grid Co-ordinate:	E:471436.3 N:108318.9
	End: 29.8.18						Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.30	101	ES	1xT,1xJ,1xV	~		MADE GROUND: Scrub vegetation over light brown slightly gravelly clayey fine to medium SAND with low cobble content. Gravel is angular to subangular fine to coarse of flint and brick. Cobbles are angular of brick. Abundant rootlets with rare plastic fragments, sheeting and burnt wood.	16.55	0.07	
0.30		PID	0.0ppm				16.32	0.30	
0.40	102	ES	1xT,1xJ,1xV			MADE GROUND: Reddish brown very sandy silty GRAVEL in sand wall only of brick, concrete and limestone.		(0.45)	
0.40		PID	0.0ppm				15.87	0.75	
1.00	103	ES	1xT,1xJ,1xV			MADE GROUND: Scrub vegetation over light brown slightly gravelly clayey SAND with low cobble content. Sand is fine to medium. Gravel is angular to subangular fine to coarse of flint and brick. Cobbles are angular of brick. Abundant rootlets. Rare plastic fragments, sheeting and burnt wood. Yellowish brown mottled light grey silty fine to medium SAND containing thin laminations of light grey sandy silt. (BOGNOR SAND MEMBER)		(1.75)	
1.00		PID	0.0ppm						
2.00	104	ES	1xT,1xJ,1xV						
2.00		PID	0.6ppm				14.12	2.50	
2.60	105	ES	1xT,1xJ,1xV			Soft greyish brown mottled orangish brown slightly sandy silty CLAY. Sand is fine to medium. (LONDON CLAY FORMATION)		(0.50)	
2.60		HP	c _u =40/45/50				13.62	3.00	
2.60	106	PID	3.6ppm					(0.30)	
3.10		ES	1xT,1xJ,1xV			Soft grey slightly sandy silty CLAY. Sand is fine to medium. (LONDON CLAY FORMATION)			
3.10		HP	c _u =100/40/40				13.32	3.30	
3.10		PID	0.4ppm			Trial pit terminated at 3.30m depth.			

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Groundwater seepage encountered at 0.50m depth.
3. Trial pit damp but pit walls stable except at location of seepage.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: 1:25

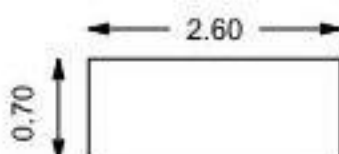
Method Used:	Machine dug	Plant Used:	Tracked excavator	Logged By:	JDEvans	Checked By:	AW.	AGS
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Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP4
Contract Ref:	733845	Start: 29.8.18 End: 29.8.18	Ground Level:	16.83	National Grid Co-ordinate:	E:471447.9 N:108299.5	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.20 0.20	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over brown very gravelly clayey fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, concrete, flint, slate, clinker and limestone. Abundant rootlets and occasional glass, wood and plastic fragments.	16.23	(0.60)	
1.00 1.00 1.00	102	ES HP PID	1xT,1xJ,1xV c _u =50/60/70 21.2ppm			MADE GROUND: Soft to firm light brown mottled dark brown gravelly slightly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, brick, concrete and clinker. Rare black stains emitting mild hydrocarbon odour. ... at 0.60m depth, plastic membrane.	15.33	(0.90)	
1.60 1.60	103	ES PID	1xT,1xJ,1xV 0.1ppm			Light grey mottled brownish grey clayey fine to medium SAND. Occasional odourless black mottling. (BOGNOR SAND MEMBER)	14.93	(0.40)	
2.30 2.30	104	ES PID	1xT,1xJ,1xV 0.0ppm			Soft light brown mottled light grey silty clayey fine to medium SAND. (BOGNOR SAND MEMBER)	13.83	(1.10)	
3.20 3.20	105	ES PID	1xT,1xJ,1xV 0.0ppm			Very soft dark grey slightly sandy silty CLAY. Sand is fine to medium. (LONDON CLAY FORMATION) Trial pit terminated at 3.20m depth.	13.63	3.20	

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Concrete foundations encountered at 0.60m depth along western side of pit.
3. Groundwater encountered at 2.90m depth.
4. Trial pit walls unstable and collapsing.
5. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale:

1:25

Method
Used:

Machine dug

Plant
Used:

Tracked excavator

Logged
By:

JDEvans

Checked
By:

AW.





STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP5	
Contract Ref:	733845		Start:	30.8.18	Ground Level:	16.19	National Grid Co-ordinate:	E:471474.0 N:108288.6
	End: 30.8.18						Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.10 0.10	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over brown very gravelly clayey fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, clinker, flint and ceramic tile fragments. Cobbles are angular of brick and asphalt. Abundant rootlets.	15.89	(0.30)	
0.60 0.60 0.60	102	ES HP PID	1xT,1xJ,1xV c _v =40/30/25 0.0ppm			MADE GROUND: Soft light brown mottled dark brown slightly sandy very gravelly CLAY with medium cobble content. Gravel is angular to subangular fine to coarse of brick, flint, concrete and clinker. Cobbles are angular of flint, brick and concrete.	15.49	(0.40)	
1.30 1.30 1.30	103	ES HP PID	1xT,1xJ,1xV c _v =35/25/45 0.0ppm			MADE GROUND: Soft light brown mottled light grey and dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, brick and clinker with occasional black organic matter and rare burnt wood.	14.09	(1.40)	
2.20 2.30 2.30	104	HP ES PID	c _v =30/35/25 1xT,1xJ,1xV 0.4ppm			MADE GROUND: Soft dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of brick, flint, ceramic tile fragments and clinker. Abundant black organic matter.	13.19	(0.90)	
3.30 3.30 3.30	105	ES HP PID	1xT,1xJ,1xV c _v =55/65/65 0.1ppm			Firm light grey mottled light brown silty CLAY. (LONDON CLAY FORMATION)	12.69	(0.50)	
						Trial pit terminated at 3.50m depth.			

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Groundwater seepage at 2.80m depth. Water has slight hydrocarbon sheen.
3. Trial pit walls stable except at location of seepage.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale:

1:25

Method
Used:

Machine dug

Plant
Used:

Tracked excavator

Logged
By:

JDEvans

Checked
By:

AW.

AGS



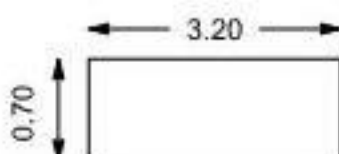
STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP6	
Contract Ref:	733845		Start:	31.8.18	Ground Level:	16.17	National Grid Co-ordinate:	E:471463.4 N:108281.2
	End: 31.8.18						Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.15 0.15	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, clinker, flint and ceramic tile fragments. Cobbles are angular of brick and concrete. Abundant rootlets, plastic fragments and polystyrene with rare glass fragments.	15.77	0.40	
0.60		PID	0.0ppm			MADE GROUND: Greyish brown mottled red very gravelly silty fine to coarse SAND with medium cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, clinker, slate and ceramic tile fragments. Cobbles are angular of brick.	15.37	0.80	
0.90		PID	0.0ppm			MADE GROUND: Yellowish brown mottled light grey and dark brown gravelly silty fine to medium SAND. Gravel is angular to subangular fine to coarse of flint with rare brick and wood fragments.	15.07	1.10	
1.50 1.50		HP PID	c _u =35/25/25 0.0ppm			MADE GROUND: Soft dark brown mottled light grey slightly gravelly sandy SILT. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, clinker, brick and burnt wood fragments.	14.47	1.70	
2.10 2.10		HP PID	c _u =20/35/25 0.5ppm			MADE GROUND: Soft light grey mottled light brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of flint, brick, concrete and burnt wood fragments. Abundant black organic matter and root fragments.		(1.20)	
3.00 3.00		HP PID	c _u =0/0/0 0.0ppm			Very soft becoming soft light grey slightly gravelly sandy SILT. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of flint. (HEAD)	12.87	3.30	
3.60 3.60		HP PID	c _u =55/50/50 0.1ppm			Firm light grey mottled light brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to medium of flint. (HEAD)	12.47	3.70	
						Trial pit terminated at 3.70m depth.			

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Groundwater seepage at approximately 2.90m depth.
3. Trial pit walls relatively stable except at location of seepage.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: 1:25

Method Used:	Machine dug	Plant Used:	Tracked excavator	Logged By:	JDEvans	Checked By:	AW.	AGS
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP7
Contract Ref:	733845	Start: 31.8.18	End: 31.8.18	Ground Level:	16.09	National Grid Co-ordinate:	E:471448.0 N:108276.2
						Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.20 0.20	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over cream light brown very sandy silty angular to subangular fine to coarse GRAVEL of brick, concrete, flint, clinker and ceramic tile fragments with medium cobble content. Cobbles are angular of brick and concrete. Occasional rootlets.	15.49	0.60	
0.70 0.70	102	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, slate, ceramic tile fragments, concrete and clinker. Cobbles are angular of brick and concrete.	15.24	0.85	
1.00 1.00 1.00	103	ES HP PID	1xT,1xJ,1xV c _u =35/30/50 0.0ppm			... at 0.60m depth black plastic membrane. MADE GROUND: Soft to firm yellowish brown mottled light grey sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse of flint with rare brick, ceramic fragments and clinker.	14.44	1.65	
1.80 1.80	104	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Dark brown gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of concrete, clinker, ceramic tile fragments, brick and burnt wood. Cobbles are angular of brick. Occasional plastic fragments.	14.19	1.90	
2.40 2.40 2.40	105	ES HP PID	1xT,1xJ,1xV c _u =85/75/60 0.1ppm			MADE GROUND: Firm to stiff yellowish brown mottled light grey slightly gravelly silty CLAY. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of flint with rare clinker, ceramic and brick fragments. Occasional rootlets and black organic matter.	13.09	3.00	
3.20 3.20 3.20	106	ES HP PID	1xT,1xJ,1xV c _u =30/30/20 0.4ppm			Soft brownish grey slightly gravelly sandy SILT. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of flint. Abundant black organic matter and rootlets. (HEAD)	12.69	3.40	
						Firm light grey mottled light brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to medium of flint. (HEAD)		(0.50)	
3.90 3.90 3.90	107	ES HP PID	1xT,1xJ,1xV c _u =55/50/60 0.2ppm			Trial pit terminated at 3.90m depth.	12.19	3.90	

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Minor groundwater seepage at approximately 3.00m depth.
3. Trial pit walls relatively stable except at location of seepage.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale:

1:25

Method
Used:

Machine dug

Plant
Used:

Tracked excavator

Logged
By:

JDEvans

Checked
By:

AW.





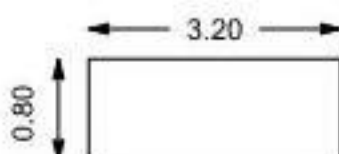
STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP8
Contract Ref:	733845	Start: 31.8.18	End: 31.8.18	Ground Level:	16.12	National Grid Co-ordinate:	E:471438.6 N:108270.0
						Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.30 0.30	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over creamish brown very sandy angular to subangular fine to coarse GRAVEL of brick, concrete, clinker and flint with low cobble content. Cobbles are angular of concrete. Occasional rootlets.	15.52	(0.60)	
0.90 0.90	102	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Yellowish brown slightly gravelly silty fine to medium SAND. Gravel is angular to subangular fine to coarse of flint, brick and concrete.	14.72	(0.80)	
1.90 1.90 1.90	103	ES HP PID	1xT,1xJ,1xV c _v =45/50/60 0.0ppm			MADE GROUND: Soft to firm light grey mottled light brown slightly gravelly silty CLAY. Gravel is angular to subangular fine to medium of flint. Rare brick fragments.	13.32	(1.40)	
3.00 3.00 3.00	104	ES HP PID	1xT,1xJ,1xV c _v =5/0/0 0.0ppm			Very soft brownish grey slightly gravelly silty CLAY. Gravel is angular to subangular fine to medium of flint. Abundant black organic matter and roots. (HEAD)		(1.10)	
3.80 3.80 3.80	105	ES HP PID	1xT,1xJ,1xV c _v =15/10/15 0.0ppm			Trial pit terminated at 3.90m depth.	12.22	3.90	

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Concrete foundation encountered at 0.70m depth.
3. Minor groundwater seepage at approximately 2.80m depth.
4. Trial pit walls relatively stable except at location of seepage.
5. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale: 1:25

Method Used:	Machine dug	Plant Used:	Tracked excavator	Logged By:	JDEvans	Checked By:	AW.	AGS
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STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP9
Contract Ref:	733845	Start: 31.8.18 End: 31.8.18	Ground Level:	16.48	National Grid Co-ordinate:	E:471413.8 N:108270.9	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.20 0.20	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation and bark chippings over light brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of clinker, brick, concrete and flint. Cobbles are angular of brick.	16.08	(0.40) 0.40	
0.70 0.70	102	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Cream and red COBBLES of angular of brick and concrete with light greyish brown sandy GRAVEL of angular to subangular fine to coarse of brick, slate, concrete, flint and clinker.	15.38	(0.70) 1.10	
1.30 1.30	103	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Light brown very sandy clayey angular to subangular fine to coarse GRAVEL of brick, concrete, clinker, slate and flint with low cobble content. Cobbles are angular of brick.	15.08	(0.30) 1.40	
1.50 1.50 1.50	104	ES HP PID	1xT,1xJ,1xV c _u =30/25/40 0.0ppm			MADE GROUND: Soft dark grey mottled light and dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of clinker, brick, flint and concrete. Occasional burnt wood fragments and black organic matters.	14.78	(0.30) 1.70	
2.10 2.10 2.10	105	ES HP PID	1xT,1xJ,1xV c _u =45/45/50 0.0ppm			MADE GROUND: Soft to firm light brown mottled light grey and dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, clinker, brick and mortar.		(1.30)	
2.80 2.80 2.80	106	ES HP PID	1xT,1xJ,1xV c _u =60/50/50 0.0ppm				13.48	3.00	
3.20 3.20 3.20	107	ES HP PID	1xT,1xJ,1xV c _u =10/10/15 22.3ppm			MADE GROUND: Very soft light grey mottled light and dark brown slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse of brick, flint and clinker. Abundant black staining emitting moderate hydrocarbon odour.		(0.90)	
3.80 3.80 3.80	108	ES HP PID	1xT,1xJ,1xV c _u =5/10/10 6.6ppm			... From 3.50m depth, black staining rare but moderate hydrocarbon odour remains.	12.58	3.90	
						Trial pit terminated at 3.90m depth.			

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Groundwater encountered at 3.80m depth rising to 3.60m depth. Water has slight hydrocarbon sheen.
3. Trial pit walls relatively stable.
4. Trial pit backfilled with arising upon completion.

All dimensions in metres

Scale: 1:25

Method Used:	Machine dug	Plant Used:	Tracked excavator	Logged By:	JDEvans	Checked By:	AW.	AGS
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Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP10	
Contract Ref:	733845		Start:	31.8.18	Ground Level:	16.25	National Grid Co-ordinate:	E:471392.5 N:108258.5
	End:		31.8.18				Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.25 0.25	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over light brown and blackish brown very gravelly silty fine to coarse SAND with medium cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, clinker and flint. Cobbles are angular of brick and concrete.	15.65	(0.60) 0.60	
0.70 0.70	102	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Light brown sandy very clayey angular to subangular fine to coarse GRAVEL of flint, brick, clinker, ceramic tile fragments and concrete with low cobble content. Sand is fine to coarse.	15.15	(0.50) 1.10	
1.40 1.40	103	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Soft to firm light brown mottled light grey and reddish brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, brick, clinker and concrete. Cobbles are angular to subangular of brick, slate and flint.	14.15	(1.00) 2.10	
2.40 2.40	104	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Firm to stiff dark brownish grey mottled light grey and light brown slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of flint, clinker, brick and concrete. Rare rootlets.		(1.40)	
3.10 3.20 3.20	105	W ES PID	1xT,1xJ,1xV 0.0ppm			... From 2.70m depth, shingle encountered in northern wall of pit. ... At 3.00m depth, plastic pipe observed in northern wall of pit.	12.75	3.50	
						Trial pit terminated at 3.50m depth.			

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Trial pit damp.
3. Trial pit collapsed to 1.40m depth.
4. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale:

1:25

Method
Used:

Machine dug

Plant
Used:

Tracked excavator

Logged
By:

JDEvans

Checked
By:

AW.





Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP11	
Contract Ref:	733845		Start:	30.8.18	Ground Level:	16.65	National Grid Co-ordinate:	E:471454.9 N:108313.9
	End:		30.8.18				Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.15 0.15	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over reddish brown very sandy clayey angular to subangular fine to coarse GRAVEL of brick, concrete, clinker and flint. Occasional rootlets and rare plastic packaging.	16.40	0.25	
0.40 0.40	102	ES PID	2xT,1xJ,1xV 0.0ppm			MADE GROUND: Yellowish brown gravelly clayey fine to medium SAND with medium cobble content. Gravel is angular to subangular fine to coarse of flint, brick and concrete. Cobbles are angular of brick and concrete. Suspected asbestos containing cement fragment.	16.15	0.50	
0.60 0.60	103	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Greyish brown gravelly silty fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, flint, concrete, slate and clinker. Rare glass fragments.	15.95	0.70	
0.90 0.90	104	ES PID	1xT,1xJ,1xV 0.0ppm			Yellowish brown mottled light grey silty fine to medium SAND. (BOGNOR SAND MEMBER)			
2.00 2.00	105	ES PID	1xT,1xJ,1xV 0.0ppm			... Pocket of made ground present in western wall from 1.50m to pit base comprising light and dark brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, flint and clinker. Cobbles are angular of brick, large fragments of wooden boards and paint.		(2.10)	
2.50 2.50	106	ES PID	1xT,1xJ,1xV 0.0ppm						
2.80 2.90 2.90 2.90	107	W ES HP PID	1xT,1xJ,1xV c _v =15/15/25 0.0ppm			Soft dark grey silty CLAY. (LONDON CLAY FORMATION) Trial pit terminated at 2.90m depth.	13.85 13.75	2.80 2.90	

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Groundwater seepage encountered at 2.40m depth in made ground.
3. Groundwater encountered at 2.80m depth in made ground rising to 2.40m depth.
4. Trial pit damp but pit walls stable.
5. Trial pit backfilled with arisings upon completion.

All dimensions in metres

Scale:

1:25

Method
Used:

Machine dug

Plant
Used:

Tracked excavator

Logged
By:

JDEvans

Checked
By:

AW.

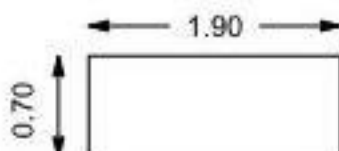




Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP12
Contract Ref:	733845	Start: 29.8.18 End: 29.8.18	Ground Level:	16.87	National Grid Co-ordinate:	E:471419.3 N:108295.9	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.20 0.20	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Light grey sandy angular to subangular fine to coarse GRAVEL of limestone, brick, concrete and flint. Occasional glass and plastic fragments.	16.84	0.03 (0.37)	
0.47 0.47	102	ES PID	1xJ,1xV 0.1ppm			MADE GROUND: Yellowish brown very sandy angular to subangular fine to coarse GRAVEL of brick, flint, concrete and clinker with low cobble content. Sand is fine to coarse. Cobbles are angular of brick.	16.47	0.40	
0.70 0.70	103	ES PID	1xT,1xJ,1xV 1.4ppm			MADE GROUND: Multicoloured angular COBBLES of brick and concrete with sandy angular to subangular fine to coarse GRAVEL of brick and concrete. ... From 0.45m to 0.50m depth, black layer of ash and burnt wood fragments.	16.27	0.60 (0.40)	
1.40 1.40	104	ES PID	1xT,1xJ,1xV 0.6ppm			MADE GROUND: Brown very sandy clayey angular to subangular fine to coarse GRAVEL of brick, concrete, coal, flint and clinker with medium cobble content. Sand is fine to coarse. Cobbles are angular of brick and concrete. Light grey mottled brownish grey clayey fine to medium SAND. Abundant odourless black mottling decreasing in frequency with depth. (BOGNOR SAND MEMBER)	15.87	1.00 (1.20)	
2.20 2.20	105	ES PID	1xT,1xJ,1xV 0.0ppm			Orangish brown mottled light grey clayey fine to medium SAND. (BOGNOR SAND MEMBER) ... From 2.20m depth, black mottling absent.	14.67	2.20 (0.50)	
2.50 2.50	106	ES PID	1xT,1xJ,1xV 0.0ppm			Soft orangish brown mottled brownish grey slightly sandy silty CLAY. (LONDON CLAY FORMATION)	14.17	2.70 (0.30)	
3.00 3.00 3.00	107	ES HP PID	1xT,1xJ,1xV c _u =25/25/15 0.0ppm			Trial pit terminated at 3.00m depth.	13.87	3.00	

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
3. Trial pit damp but pit walls stable.
4. Trial pit backfilled with arising upon completion.

All dimensions in metres

Scale:

1:25

Method
Used:

Machine dug

Plant
Used:

Tracked excavator

Logged
By:

JDEvans

Checked
By:

AW.





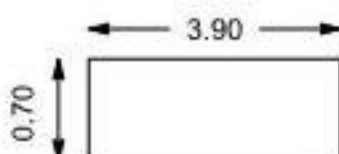
STRUCTURAL SOILS

TRIAL PIT LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP13	
Contract Ref:	733845		Start:	30.8.18	Ground Level:	16.68	National Grid Co-ordinate:	E:471404.6 N:108281.5
	End: 30.8.18						Sheet:	1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.25	101	ES	1xT, 1xJ, 1xV			MADE GROUND: Dark brown mottled light brown very sandy clayey angular to subangular fine to coarse GRAVEL of brick, flint, concrete, clinker and asphalt with low cobble content. Cobbles are angular of asphalt, brick and concrete.	16.38	(0.30)	
0.25		PID	0.0ppm						
0.40	102	ES	1xT, 1xJ, 1xV			MADE GROUND: Light brown very gravelly very clayey fine to coarse SAND with medium cobble content. Gravel is angular to subangular fine to coarse of brick, clinker, slate, concrete and flint. Cobbles are angular of brick and concrete.	16.18	0.50	
0.40		PID	0.0ppm			... at 0.30m fabric membrane.			
						MADE GROUND: Soft light brown slightly sandy gravelly CLAY with medium cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, flint, concrete and clinker. Cobbles are angular of brick and concrete.		(0.60)	
0.90	103	ES	1xT, 1xJ, 1xV				15.58	1.10	
0.90		PID	0.0ppm						
						MADE GROUND: Pink and dark brown very sandy angular to subangular fine to coarse GRAVEL of concrete, flint and clinker with medium cobble content. Cobbles are angular of concrete.		(0.50)	
1.40	104	ES	1xT, 1xJ, 1xV				15.08	1.60	
1.40		PID	0.0ppm						
						Soft light brown slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular fine to medium of flint. Occasional dark brown rootlet structures. (HEAD)		(0.50)	
1.70	105	HP	c _u =20/25/35				14.58	2.10	
1.80		ES	1xT, 1xJ, 1xV						
1.80		PID	0.0ppm						
						Yellowish brown mottled light grey silty clayey fine to medium SAND. Occasional laminations of light grey silty CLAY. (BOGNOR SAND MEMBER)		(1.10)	
2.50	106	ES	1xT, 1xJ, 1xV				13.48	3.20	
2.50		PID	0.0ppm						
						Soft yellowish brown mottled light grey slightly sandy silty CLAY. Sand is fine to medium. (LONDON CLAY FORMATION)		(0.60)	
3.40	107	ES	1xT, 1xJ, 1xV				12.88	3.80	
3.40		PID	0.0ppm						
3.60		HP	c _u =40/50/40						
						Trial pit terminated at 3.80m depth.			

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Concrete foundations encountered in north-east corner of pit at 1.50m depth.
3. Trial pit damp but pit walls stable.
4. Trial pit backfilled with arisings upon completion.

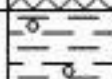
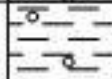
All dimensions in metres

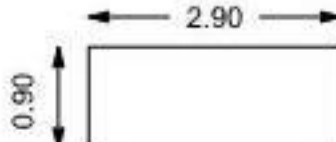
Scale: 1:25

Method Used:	Machine dug	Plant Used:	Tracked excavator	Logged By:	JDEvans	Checked By:	AW.	AGS
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Contract:		Client:		Trial Pit:	
Fulflood Road, Havant		Mipa Paints Ltd		TP14	
Contract Ref:	Start:	Ground Level:	National Grid Co-ordinate:		Sheet:
733845	30.8.18	16.35	E:471389.9 N:108283.6		1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend			
Depth	No	Type	Results									
0.15 0.15	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Brownish black very sandy clayey angular to subangular fine to coarse GRAVEL of brick, concrete, limestone, flint, clinker with medium cobble content. Cobbles are angular of brick. Occasional rootlets, burnt wood and plastic fragments.	16.15	0.20				
											(0.35)	
0.45 0.45	102	ES PID	1xT,1xJ,1xV 0.0ppm					MADE GROUND: Light brown sandy clayey angular to subangular fine to coarse GRAVEL of brick, flint, concrete and clinker with medium cobble content and low boulder content. Cobbles are angular of brick and concrete. Boulder is angular of concrete. Rare glass fragments.	15.80	0.55		
0.70 0.70 0.70	103	ES HP PID	1xT,1xJ,1xV $c_u=90/90/75$ 0.1ppm					MADE GROUND: Stiff dark brown mottled light grey and light brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, asphalt, concrete and brick. Occasional burnt wood fragments. Mild asphalt/hydrocarbon odour.	15.55	0.80		
1.40 1.40 1.40	104	ES HP PID	1xT,1xJ,1xV $c_u=70/70/55$ 0.0ppm					MADE GROUND: Firm light brown mottled light grey slightly gravelly CLAY. Gravel is subangular to subrounded of flint and brick. Occasional rootlets and rare burnt wood fragments.			(1.40)	
							14.15	2.20				
2.30 2.30 2.30	105	ES HP PID	1xT,1xJ,1xV $c_u=10/10/15$ 0.2ppm			Very soft to soft light grey mottled light brown slightly gravelly CLAY. Occasional rootlets and black organic matter. (HEAD)			(0.60)			
							13.55	2.80				
						Soft dark grey slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of flint and chalk. (HEAD)			(0.40)			
							13.15	3.20				
3.20 3.20 3.20	106	ES HP PID	1xT,1xJ,1xV $c_u=30/40/40$ 0.1ppm			Trial pit terminated at 3.20m depth due to collapse of pit walls.						

Plan (Not to Scale) 		General Remarks		
		1. GPR and CAT & genny scan prior to commencement. 2. Brick foundations encountered in east and west pit walls from 0.40m to 2.00m depth. 3. Groundwater seepage from 2.00m at base of brick walls. 4. Trial pit collapsed to 1.40m depth. 5. Trial pit backfilled with arisings upon completion.		
		All dimensions in metres		Scale: 1:25
Method Used: Machine dug	Plant Used: Tracked excavator	Logged By: JDEvans	Checked By: AW.	



Contract: Fulflood Road, Havant		Client: Mipa Paints Ltd		Trial Pit: TP15	
Contract Ref: 733845		Start: 31.8.18 End: 31.8.18	Ground Level: 16.26	National Grid Co-ordinate: E:471382.2 N:108268.3	
				Sheet: 1 of 1	

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend	
Depth	No	Type	Results							
0.10 0.10	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Scrub vegetation over brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, clinker, flint and concrete. Cobbles are angular of brick. Abundant rootlets.	16.16	0.10		
0.30 0.30	102	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Greyish brown very sandy silty angular to subangular fine to coarse GRAVEL of brick, clinker, concrete, flint and ceramic tile fragments. Cobbles are angular of concrete.	15.86	0.40		
0.45 0.45 0.60	103	ES PID HP	1xT,1xJ,1xV 0.0ppm $c_u=35/30/30$			MADE GROUND: Soft yellowish brown mottled light grey and light brown slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, concrete, clinker and brick. Cobbles are angular of brick.	15.71	0.55		
1.10 1.10 1.10	104	ES HP PID	1xT,1xJ,1xV $c_u=50/40/50$ 0.0ppm			MADE GROUND: Soft to firm brown mottled light brown slightly sandy gravelly CLAY with low cobble content. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, concrete, flint and clinker. Cobbles are subangular to subrounded of flint. ... at 1.60m concrete slab encountered.		(1.75)		
2.00 2.00	105	ES PID	1xT,1xJ,1xV 0.0ppm				13.96	2.30		
2.50 2.50 2.50	106	ES HP PID	1xT,1xJ,1xV $c_u=60/50/50$ 0.0ppm			MADE GROUND: Firm orangish brown mottled light grey slightly gravelly silty CLAY. Gravel is angular to subangular fine to medium of flint, burnt wood and brick fragments.		(1.50)		
3.20 3.20	107	ES PID	1xT,1xJ,1xV 0.0ppm							
							12.46	3.80		
3.90 3.90 3.90	108	ES HP PID	1xT,1xJ,1xV $c_u=25/25/30$ 0.0ppm			Soft light grey mottled light brown clayey SILT with occasional dark grey organic matter. (HEAD) Trial pit terminated at 3.90m depth.	12.36	3.90		

GINT_LIBRARY_v8_06 GLB LibVersion: v8_06 - Core+Logs+Contam Scheduling - 002 | Log TRIAL PIT LOG - A4P 733B45_FULFLOOD_ROAD_HAVANT GPJ - v8_06;
Structural Soils Ltd, Head Office - Bristol: The Old School, Salthouse Lane, Bedminster, Bristol, BS3 4EB. Tel: 0117-947-1004. Web: www.soils.co.uk, Email: ask@soils.co.uk, 30/11/18 - 10:59 | AW2 |

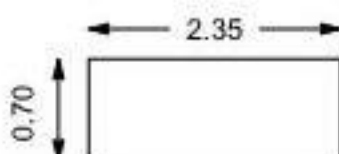
Plan (Not to Scale) 		General Remarks		
		1. GPR and CAT & genny scan prior to commencement. 2. Concrete foundations encountered in south-west wall of pit at 1.60m depth. 3. Groundwater encountered at 3.80m depth. 4. Trial pit walls collapsed to 3.30m depth. 5. Trial pit backfilled with arising upon completion.		
		All dimensions in metres		Scale: 1:25
Method Used: Machine dug	Plant Used: Tracked excavator	Logged By: JDEvans	Checked By: AW.	



Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Trial Pit:	TP16
Contract Ref:	733845	Start: 29.8.18 End: 29.8.18	Ground Level:	16.84	National Grid Co-ordinate:	E:471416.5 N:108301.3	Sheet: 1 of 1

Samples and In-situ Tests				Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Depth	No	Type	Results						
0.30 0.30	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Light grey sandy angular to subangular fine to coarse GRAVEL of brick, concrete, flint and limestone. Occasional glass and plastic fragments.	16.80	0.04 (0.31)	
0.50 0.50	102	ES PID	1xT,1xJ,1xV 0.1ppm			MADE GROUND: Light brown very sandy angular to subangular fine to coarse GRAVEL of brick, concrete, flint, clinker, coal and ceramic tile fragment with medium cobble content. Sand is fine to coarse. Cobbles are angular to subangular of brick and concrete. Rare plastic packaging.	16.49	0.35 (0.30)	
0.90 0.90	103	ES PID	1xT,1xJ,1xV 0.7ppm			MADE GROUND: Multicolored COBBLES of angular brick and concrete with sandy angular to subangular fine to coarse GRAVEL of brick, concrete, limestone and flint. Sporadic pockets of burnt material approx 0.10cm thick from 0.40m.	16.19	0.65 0.80	
1.20 1.20	104	ES PID	1xT,1xJ,1xV 0.6ppm			MADE GROUND: Dark brown slightly gravelly clayey SAND. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of brick, flint, limestone and concrete.	16.04	1.00	
1.90 1.90	105	ES PID	1xT,1xJ,1xV 0.2ppm			MADE GROUND: Dark brown slightly gravelly clayey SAND. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of brick, flint, limestone and concrete. Light grey mottled brownish grey clayey SAND. Sand is fine to medium. Rare block mottling (no odour). (BOGNOR SAND MEMBER)	15.84	(1.00)	
2.40 2.40	106	ES PID	1xT,1xJ,1xV 0.0ppm			Orangish brown mottled light grey clayey SAND. Sand is fine to medium. (BOGNOR SAND MEMBER)	14.84	2.00 (0.90)	
3.10 3.10	107	ES PID	1xT,1xJ,1xV 0.0ppm			Greyish brown slightly sandy silty CLAY with orangish brown laminations of sand. Sand is fine to medium. (BOGNOR SAND MEMBER)	13.94	2.90 (0.30)	
						Trial pit terminated at 3.20m depth.	13.64	3.20	

Plan (Not to Scale)



General Remarks

1. GPR and CAT & genny scan prior to commencement.
2. Trial pit damp but pit walls stable.
3. Trial pit backfilled with arising upon completion.

All dimensions in metres

Scale:

1:25

Method
Used:

Machine dug

Plant
Used:

Tracked excavator

Logged
By:

JDEvans

Checked
By:

AW.





STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Fulflood Road, Havant			Client:	Mipa Paints Ltd			Window Sample:	WS1	
Contract Ref:	733845		Start:	10.9.18	Ground Level:	16.27		National Grid Co-ordinate:	E:471471.4 N:108283.0	
			End:	10.9.18				Sheet:	1 of 1	

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
1.00 - 2.00 (115mm dia) 80% rec 2.00 - 3.00 (98mm dia) 90% rec 3.00 - 4.00 (85mm dia) 100% rec	0.20 0.20	101	ES PID	1xT,1xJ,1xV 2.1ppm			MADE GROUND: Scrub vegetation over dark brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete and flint. Cobbles are angular of brick. Abundant rootlets.	15.97	(0.30) 0.30	
	0.50 0.50	102	ES PID	1xT,1xJ,1xV 0.2ppm			MADE GROUND: Light brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, slate and flint. Cobbles are angular of brick and concrete.	15.52	(0.45) 0.75	
	1.00		HP	$c_u=85/125/130$			MADE GROUND: Firm to stiff light brown mottled light grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint and brick. ... between 1.40m and 1.43m depth, orange brick recovered of very sandy GRAVEL.		(1.10)	
	1.65 1.65	103	ES PID	1xT,1xJ,1xV 0.2ppm				14.42	1.85	
	2.00 2.00	104	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Firm yellowish brown mottled light grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to medium of brick.		(0.45)	
	2.20 2.20	105	ES PID	1xT,1xJ,1xV 0.0ppm				13.97	2.30	
	2.50 2.50	106	ES HP PID	1xT,1xJ,1xV $c_u=65/60/65$ 0.0ppm			MADE GROUND: Firm light brown mottled light grey slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint and brick fragments. Rare rootlets and block organic matter.	13.57	2.70	
	2.90 2.90	107	ES HP PID	1xT,1xJ,1xV $c_u=30/35/30$ 0.2ppm			Soft dark brown slightly gravelly sandy SILT. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of flint. Occasional black organic matter. Abundant fibres organic matter. (HEAD)	13.47	2.80	
	3.00 3.00						Soft light grey slightly gravelly sandy SILT. Sand is fine to medium. Gravel is subangular to subrounded fine to medium of flint. Occasional block organic matter. (HEAD)	12.87	3.40	
	3.80 3.80	108	ES HP PID	1xT,1xJ,1xV $c_u=85/85/90$ 0.0ppm			... between 3.00m and 3.40m, very damp. Stiff thinly laminated bluish grey mottled light brown silty CLAY. (LONDON CLAY FORMATION) ... between 3.70m and 3.75m occasional subangular to subrounded fine to coarse gravel of flint.	12.27	4.00	
	3.80						Trial pit terminated at 4.00m depth.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
10/09/18	10:30	4.00	-	50	3.00				
1. GPR and CAT & genny scan prior to commencement.									
2. Inspection pit dug to 1.20m depth.									
3. Window sample hole stable with groundwater encountered at approximately 3.00m depth.									
4. Groundwater/gas installation comprising 1.00m of 40mm plain and 3.00m of 40mm slotted pipe with flush cover.									
All dimensions in metres						Scale: 1:25			
Method Used:	Tracked window sampling		Plant Used:	Dando Terrier		Drilled By: P. Guinness & J. Evans	Logged By: JDEvans	Checked By: AW.	



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract: Fulflood Road, Havant		Client: Mipa Paints Ltd		Window Sample: WS2
Contract Ref: 733845	Start: 10.9.18 End: 10.9.18	Ground Level: 16.26	National Grid Co-ordinate: E:471441.8 N:108273.0	Sheet: 1 of 1

Progress		Samples / Tests			Water	Backfill	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
1.00 - 1.50 (98mm dia) 50% rec							MADE GROUND: Scrub vegetation over light brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, flint and concrete. Cobbles are angular of concrete.	15.86	0.40	
							MADE GROUND: Stiff light brown mottled light grey and dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, flint, concrete and clinker. Occasional black matter and burnt wood fragments.		(1.10)	
							Trial pit terminated at 1.50m depth due to refusal on buried foundations.	14.76	1.50	

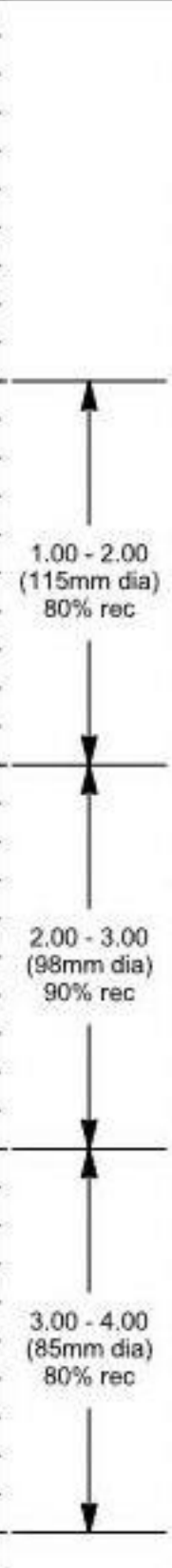
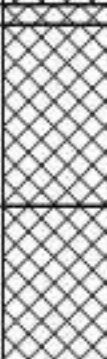
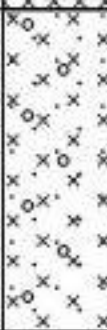
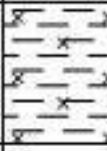
Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
10/09/18	11:55	1.50	-	98	Dry	1. GPR and CAT & genny scan prior to commencement. 2. Inspection pit dug to 1.20m depth. 3. Concrete foundations encountered at 1.50m depth. 4. Window sample hole dry and stable. 5. Window sample hole backfilled with arisings.			
						All dimensions in metres Scale: 1:25			
Method Used: Tracked window sampling	Plant Used: Dando Terrier		Drilled By: P. Guinness & J. Evans		Logged By: JDEvans		Checked By: AW.		



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Window Sample:	WS2A	
Contract Ref:	733845		Start:	10.9.18	Ground Level:	16.14	National Grid Co-ordinate:	E:471435.5 N:108270.8
	End: 10.9.18						Sheet:	1 of 1

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
 1.00 - 2.00 (115mm dia) 80% rec 2.00 - 3.00 (98mm dia) 90% rec 3.00 - 4.00 (85mm dia) 80% rec	0.30 0.30	101	ES PID	1xT,1xJ,1xV 0.1ppm			MADE GROUND: Scrub vegetation over light brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, flint and cobbles. Cobbles are angular of concrete. (SAND)	15.64	(0.50) 0.50	
	0.90 0.90 0.90	102	ES HP PID	1xT,1xJ,1xV c _u =100/150/135 0.1ppm			MADE GROUND: Stiff light brown mottled light grey and dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, flint, concrete and clinker. Occasional black organic matter and burnt wood fragments.	14.74	(0.90) 1.40	
	1.70 1.70 1.70	103	ES HP PID	1xT,1xJ,1xV c _u =100/85/60 0.2ppm			MADE GROUND: Firm to stiff light grey mottled light brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick fragments and flint.	14.19 14.14	(0.55) 1.95 2.00	
	2.40 2.40 2.40	104	ES HP PID	1xT,1xJ,1xV c _u =100/65/60 0.4ppm			MADE GROUND: Firm dark brown slightly sandy silty CLAY. Sand is fine to coarse of brick. MADE GROUND: Stiff becoming firm light grey mottled light brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium of flint and rare brick fragments.	13.69	(0.45) 2.45	
	3.30 3.30 3.30	105	ES HP PID	1xT,1xJ,1xV c _u =30/20/25 0.1ppm			MADE GROUND: Firm becoming soft brown slightly gravelly silty CLAY containing occasional pockets of light grey mottled light brown slightly sandy clay. Gravel is subangular to subrounded fine to medium of flint and rare brick fragments. Soft dark brownish grey slightly sandy slightly gravelly SILT. Sand is fine to medium. Gravel is angular to subangular fine of flint. Occasional roots and rootlets. (HEAD) ... between 2.90m and 3.65m depth, damp.	13.29 12.49	(0.40) 2.85 3.65	
	3.90 3.90 3.90	106	ES HP PID	1xT,1xJ,1xV c _u =50/45/55 0.1ppm			Firm light grey mottled light brown silty CLAY. (LONDON CLAY FORMATION)	12.14	(0.35) 4.00	
							Trial pit terminated at 4.00m depth.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
10/09/18	12:40	4.00	-	85	Dry	1. GPR and CAT & genny scan prior to commencement. 2. Inspection pit dug to 1.20m depth. 3. Window sample hole dry and stable. 4. Groundwater/gas installation comprising 1.00m of 40mm plain and 3.00m of 40mm slotted pipe with flush cover.			
						All dimensions in metres	Scale: 1:25		
Method Used:	Tracked window sampling		Plant Used:	Dando Terrier		Drilled By: P. Guinness & J. Evans	Logged By: JDEvans	Checked By: AW.	



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Window Sample:	WS3
Contract Ref:	733845	Start: 10.9.18 End: 10.9.18	Ground Level:	16.32	National Grid Co-ordinate:	E:471416.5 N:108264.4	Sheet: 1 of 2

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
							MADE GROUND: Scrub vegetation over light brown very gravelly silty fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, concrete, clinker and flint. Occasional rootlets.	16.02	(0.30)	
	0.40 0.40	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Dark brown very gravelly silty fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, clinker and flint. Cobbles are angular of concrete. Rebar fragment.	15.72	(0.30)	
	0.80 0.80 0.80	102	ES HP PID	1xT,1xJ,1xV c _u =70/100/105 0.0ppm			MADE GROUND: Firm to stiff light brown mottled dark brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of brick, flint, concrete and clinker. Occasional burnt wood fragments.		(1.05)	
	1.70 1.70	103	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Soft light brown mottled dark brown slightly sandy very gravelly fine to coarse CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, flint, clinker, concrete and burnt wood fragments.	14.67	1.65	
	2.30 2.30	104	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Stiff light grey mottled light brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of flint with rare brick fragments. Rare rootlets.		(0.75)	
	2.90 2.90 2.90	105	ES HP PID	1xT,1xJ,1xV c _u =105/135/95 0.0ppm				13.92	2.40	
	3.80 3.80 3.80	106	ES HP PID	1xT,1xJ,1xV c _u =70/75/85 0.0ppm			Stiff thinly laminated light grey mottled light brown silty CLAY. (LONDON CLAY FORMATION)	12.72	3.60	
	4.00 - 5.00 (75mm dia) 100% rec								(1.40)	

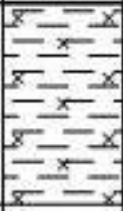
Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
10/09/18	14:40	5.00	-	75	Dry	1. GPR and CAT & genny scan prior to commencement. 2. Inspection pit dug to 1.20m depth. 3. Window sample hole dry and stable. 4. Groundwater/gas installation comprising 1.00m of 40mm plain and 4.00m of 40mm slotted pipe with flush cover.			
						All dimensions in metres	Scale: 1:25		
Method Used:	Tracked window sampling		Plant Used:	Dando Terrier		Drilled By: P. Guinness & J. Evans	Logged By: JDEvans	Checked By: AW.	



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract: Fulflood Road, Havant		Client: Mipa Paints Ltd		Window Sample: WS3
Contract Ref: 733845	Start: 10.9.18 End: 10.9.18	Ground Level: 16.32	National Grid Co-ordinate: E:471416.5 N:108264.4	Sheet: 2 of 2

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (75mm dia) 100% rec ▼	4.60 4.60 4.60	107	ES HP PID	1xT, 1xJ, 1xV $c_u = 75/90/95$ 0.0ppm			Stiff thinly laminated light grey mottled light brown silty CLAY. (LONDON CLAY FORMATION) (stratum copied from 3.60m from previous sheet)	11.32	5.00	
							Trial pit terminated at 5.00m depth.			

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



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Window Sample:	WS4	
Contract Ref:	733845		Start:	10.9.18	Ground Level:	16.29	National Grid Co-ordinate:	E:471397.1 N:108260.7
	End: 10.9.18						Sheet:	1 of 2

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.20	101	ES	1xT,1xJ,1xV			MADE GROUND: Scrub vegetation over greyish brown very gravelly silty fine to coarse SAND with medium cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, flint, asphalt and clinker. Cobbles are angular of brick.	16.09	0.20	
	0.20		PID	2.7ppm					(0.30)	
	0.40	102	ES	1xT,1xJ,1xV				15.79	0.50	
	0.40		PID	0.1ppm						
	0.70	103	ES	1xT,1xJ,1xV			MADE GROUND: Brown very gravelly clayey fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse of brick, concrete, flint and clinker. Cobbles are angular of brick.		(0.60)	
	0.70		PID	0.0ppm				15.19	1.10	
	1.30	104	ES	1xT,1xJ,1xV			MADE GROUND: Soft brown mottled orange, dark red and light grey slightly sandy very gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, flint, asphalt and concrete.		(0.40)	
	1.30		HP	c _u =55/50/40			... at 0.70m depth, asphalt odour present.	14.79	1.50	
	1.30		PID	0.0ppm			MADE GROUND: Soft to firm light brown mottled brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, brick, concrete, chalk, clinker and burnt wood fragments.		(0.90)	
	1.80	105	ES	1xT,1xJ,1xV			MADE GROUND: Soft grey mottled light brown and orangish brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of flint, brick, clinker and burnt wood fragments.	13.89	2.40	
	1.80		HP	c _u =20/20/25						
	1.80		PID	0.0ppm						
	2.70	106	ES	1xT,1xJ,1xV			MADE GROUND: Soft light brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick, flint, slag, clinker and burnt wood fragments.	13.39	2.90	
	2.70		HP	c _u =25/20/15						
	2.70		PID	0.0ppm						
	2.95	107	ES	1xJ,1xV			MADE GROUND: Black sandy angular to subangular fine to medium GRAVEL of coal, brick and burnt wood fragments. Sand is fine to coarse.	13.09	3.20	
	2.95		PID	0.2ppm			... at 2.90m depth, mild hydrocarbon odour.			
	3.30		PID	0.0ppm			MADE GROUND: Multicolored sandy angular to subangular, medium to coarse GRAVEL of flint. Sand is fine to coarse.		(0.80)	
	3.50	108	ES	1xT,1xJ,1xV			... from 3.20m depth, moderate hydrocarbon odour.	12.29	4.00	
							Trial pit terminated at 4.00m depth on obstruction.			

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
10/09/18	16:20	4.00	4.00	75	3.40	1. GPR and CAT & genny scan prior to commencement. 2. Inspection pit dug to 1.20m depth. 3. Inspection pit dry and stable. 4. Window sample hole unstable below 3.00m depth. Casing used to 4.00m depth. 5. Groundwater seepage encountered at 3.50m depth. 6. Groundwater/gas installation comprising 1.00m of 40mm plain and 2.70m of			
						All dimensions in metres	Scale: 1:25		
Method Used:	Tracked window sampling		Plant Used:	Dando Terrier		Drilled By: P. Guinness & J. Evans	Logged By: JDEvans	Checked By: AW.	

STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract: Fulflood Road, Havant		Client: Mipa Paints Ltd		Window Sample: WS4
Contract Ref: 733845	Start: 10.9.18 End: 10.9.18	Ground Level: 16.29	National Grid Co-ordinate: E:471397.1 N:108260.7	Sheet: 2 of 2

[illegible]

Drilling Progress and Water Observations						General Remarks	
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)		
						40mm slotted pipe with flush cover.	
All dimensions in metres						Scale:	1:25
Method Used:	Tracked window sampling		Plant Used:	Dando Terrier		Drilled By:	P. Guinness & J. Evans
						Logged By:	JDEvans
						Checked By:	AW.
							AGS



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract: Fulflood Road, Havant			Client: Mipa Paints Ltd			Window Sample: WS5			
Contract Ref: 733845		Start: ??? End: ???	Ground Level: 16.66		National Grid Co-ordinate: E:471410.8 N:108284.1			Sheet: 1 of 2	

Progress		Samples / Tests			Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.10	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Light grey white and brown angular to subangular fine to coarse GRAVEL of quartzite, flint, brick and concrete (hard standing).	16.63	0.03	
	0.10									
	0.60	102	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Light greyish brown very gravelly silty fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, concrete and flint.		(1.27)	
	0.60									
1.00 - 2.00 (98mm dia) 30% rec	1.60	103	ES HP PID	1xT,1xJ,1xV c _u =35/25/25 0.2ppm			MADE GROUND: Light orangish brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subangular fine to medium of brick, flint and concrete.	15.36	1.30	
	1.60							15.26	1.40	
	1.60	104	ES PID	1xT,1xJ,1xV 0.1ppm			MADE GROUND: Soft dark greyish brown slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium of flint and brick fragments. Rare rootlets and block organic matter.	14.96	1.70	
	1.90								(0.40)	
2.00 - 3.00 (85mm dia) 100% rec	2.50	105	ES HP PID	1xT,1xJ,1xV c _u =60/70/60 0.0ppm			Soft light greyish brown slightly gravelly silty CLAY. Gravel is subangular to subrounded fine to medium of flint. Occasional black organic matter. (HEAD) Firm thinly laminated light grey mottled light brown silty CLAY. Rare subangular fine to medium gravel of flint. (HEAD)	14.56	2.10	
	2.50								(1.30)	
3.00 - 4.00 (85mm dia) 100% rec	3.70	106	ES HP PID	1xT,1xJ,1xV c _u =55/45/50 0.0ppm			Firm light grey mottled orangish brown slightly sandy silty CLAY. Sand is fine. (LONDON CLAY FORMATION)	13.26	3.40	
	3.70								(0.50)	
4.00 - 5.00 (85mm dia) 100% rec	4.20	107	ES HP PID	1xT,1xJ,1xV c _u =90/75/75 0.0ppm			Stiff thinly laminated orangish brown mottled grey slightly sandy silty CLAY. Sand is fine. (LONDON CLAY FORMATION)	12.76	3.90	
	4.20								(0.40)	
	4.20						Description on next sheet	12.36	4.30	

Drilling Progress and Water Observations						General Remarks						
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)							
11/09/18	10:30	5.00	-	85	Dry							
						1. GPR and CAT & genny scan prior to commencement. 2. Inspection pit dug to 1.20m depth. 3. Window sample hole dry and stable. 4. Groundwater/gas installation comprising 1.00m of 40mm plain and 4.00m of 40mm slotted pipe with flush cover.						
						All dimensions in metres	Scale:	1:25				
Method Used:	Tracked window sampling		Plant Used:	Dando Terrier		Drilled By:	P. Guinness & J. Evans	Logged By:	JDEvans	Checked By:	AW.	AGS



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract: Fulflood Road, Havant		Client: Mipa Paints Ltd		Window Sample: WS5	
Contract Ref: 733845	Start: ??? End: ???	Ground Level: 16.66	National Grid Co-ordinate: E:471410.8 N:108284.1	Sheet: 2 of 2	

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (85mm dia) 100% rec ▼	4.50	108	ES	1xT,1xJ,1xV			Stiff brown mottled light brown slightly sandy silty CLAY. Sand is fine. (LONDON CLAY FORMATION) (stratum copied from 4.30m from previous sheet)	11.91	4.75	
	4.50		HP	$c_u = 125/120/110$						
	4.50		PID	0.0ppm						
	4.80	109	ES	1xT,1xJ,1xV						
	4.80		HP	$c_u = 135/110/120$						
	4.80		PID	0.0ppm						
							Stiff thinly laminated dark grey slightly sandy silty CLAY. Sand is fine. (LONDON CLAY FORMATION)	11.66	5.00	
							Trial pit terminated at 5.00m depth.			

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



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Window Sample:	WS6	
Contract Ref:	733845		Start:	11.9.18	Ground Level:	16.67	National Grid Co-ordinate:	E:471392.1 N:108299.1
	End: 11.9.18						Sheet:	1 of 1

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.20 0.20	101	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Light grey white and brown GRAVEL of flint, quartzite, concrete and brick.	16.62	0.05	
							MADE GROUND: Light brown very gravelly silty fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, flint, concrete and clinker.	16.27	0.40	
	0.45 0.45	102	ES PID	1xT,1xJ,1xV 0.0ppm			... at 0.27m fabric membrane encountered.	16.17	0.50	
							MADE GROUND: Yellowish brown very gravelly silty fine to coarse SAND. Gravel is angular to subangular fine to coarse of flint, brick and concrete.	16.07	0.60	
	0.90 0.90	103	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Brownish grey gravelly silty fine to coarse SAND. Gravel is angular to subangular fine to medium of brick and flint.	15.57	1.10	
	1.50 1.50	104	ES PID	1xT,1xJ,1xV 0.0ppm			MADE GROUND: Light brown gravelly clayey fine to medium SAND. Gravel is angular to subangular fine to medium of flint and rare brick fragments.		(1.00)	
							Orangish brown mottled light grey fine to medium silty SAND. (BOGNOR SAND MEMBER) ... between 1.40m and 2.90m damp encountered.	14.57	2.10	
	2.30 2.30	105	ES PID	1xT,1xJ,1xV 0.0ppm			Light grey mottled orangish brown silty fine to medium SAND. (BOGNOR SAND MEMBER)		(0.50)	
							Orangish brown mottled light grey silty clayey fine to medium SAND. (BOGNOR SAND MEMBER)	14.07	2.60	
	2.70 2.70	106	ES PID	1xT,1xJ,1xV 0.0ppm			Stiff light brown mottled dark grey slightly sandy silty CLAY. Sand is fine to medium. (LONDON CLAY FORMATION)	13.77	2.90	
	3.10 3.10 3.10	107	ES HP PID	1xT,1xJ,1xV c _u =85/85/80 0.0ppm			Firm to stiff dark grey slightly sandy silty CLAY. Sand is fine. (LONDON CLAY FORMATION)	13.37	3.30	
	3.70 3.70 3.70	108	ES HP PID	1xT,1xJ,1xV c _u =95/90/70 0.0ppm					(0.70)	
							Trial pit terminated at 4.00m depth.	12.67	4.00	

Drilling Progress and Water Observations						General Remarks						
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)							
11/09/18	12:40	4.00	-	75	Dry	1. GPR and CAT & genny scan prior to commencement. 2. Inspection pit dug to 1.20m depth. 3. Groundwater seepage at 0.85m depth. 4. Window sample hole stable. 5. Groundwater/gas installation comprising 1.00m of 40mm plain and 3.00m of 40mm slotted pipe with flush cover.						
All dimensions in metres						Scale:	1:25					
Method Used:	Tracked window sampling		Plant Used:	Dando Terrier		Drilled By:	P. Guinness & J. Evans	Logged By:	JDEvans	Checked By:	AW.	



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract:	Fulflood Road, Havant		Client:	Mipa Paints Ltd		Window Sample:	WS7	
Contract Ref:	733845		Start:	11.9.18	Ground Level:	16.75	National Grid Co-ordinate:	E:471422.3 N:108316.4
	End: 11.9.18						Sheet:	1 of 2

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
	0.10	101	ES	1xT,1xJ,1xV			MADE GROUND: White, red and brown sandy angular to subangular fine to coarse GRAVEL of concrete, flint, brick, asphalt and ceramic tile fragments.	16.60	0.15	
	0.10		PID	0.0ppm						
	0.20	102	ES	1xT,1xJ,1xV				16.45	0.30	
	0.20		PID	0.0ppm			MADE GROUND: Reddish brown very gravelly silty fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, clinker, concrete, flint and ceramic tile fragments.		(0.50)	
	0.60	103	ES	1xT,1xJ,1xV			MADE GROUND: Light brown gravelly silty fine to coarse SAND. Gravel is angular to subangular fine to coarse of flint, brick, concrete and clinker.	15.95	0.80	
	0.60		PID	0.0ppm						
	1.00	104	ES	1xT,1xJ,1xV			Orangish brown mottled light grey silty fine to medium SAND. (BOGNOR SAND MEMBER)		(1.10)	
	1.00		PID	0.0ppm			... at 1.55m damp encountered.			
	1.80	105	ES	1xT,1xJ,1xV				14.85	1.90	
	1.80		PID	0.0ppm			Soft orangish brown mottled light grey sandy CLAY. Sand is fine to medium. (BOGNOR SAND MEMBER)		(0.40)	
	2.10	106	ES	1xT,1xJ,1xV				14.45	2.30	
	2.10		PID	0.0ppm						
	2.50	107	ES	1xT,1xJ,1xV			Soft light brown sandy SILT. Sand is fine to medium. (BOGNOR SAND MEMBER)	14.15	2.60	
	2.50		PID	0.1ppm					(0.30)	
	2.70	108	ES	1xT,1xJ,1xV			Stiff grey mottled orangish brown slightly sandy silty CLAY. Sand is fine to medium. (LONDON CLAY FORMATION)	13.85	2.90	
	2.70		PID	0.2ppm						
	2.90	109	ES	1xT			Stiff orangish brown mottled brownish grey slightly sandy silty CLAY. Sand is fine to medium. (LONDON CLAY FORMATION)	13.65	3.10	
	2.90		HP	$c_u=95/100/80$						
	2.90		PID	0.4ppm			Firm to stiff dark grey slightly sandy CLAY. Sand is fine to medium. (LONDON CLAY FORMATION)		(1.90)	
	3.60	110	ES	1xT,1xJ,1xV						
	3.60		HP	$c_u=85/65/60$						
	3.60		PID	0.3ppm						
	4.20		HP	$c_u=95/60/85$						

Drilling Progress and Water Observations						General Remarks			
Date	Time	Borehole Depth (m)	Casing Depth (m)	Borehole Diameter (mm)	Water Depth (m)				
11/09/18	15:20	5.00	-	75	Dry				
						1. GPR and CAT & genny scan prior to commencement. 2. Inspection pit dug to 1.20m depth. 3. Window sample hole dry and stable. 4. Groundwater/gas installation comprising 1.00m of 40mm plain and 4.00m of 40mm slotted pipe with flush cover.			
All dimensions in metres						Scale: 1:25			
Method Used:	Tracked window sampling		Plant Used:	Dando Terrier		Drilled By: P. Guinness & J. Evans	Logged By: JDEvans	Checked By: AW.	AGS



STRUCTURAL SOILS

WINDOW SAMPLE LOG

Contract: Fulflood Road, Havant		Client: Mipa Paints Ltd		Window Sample: WS7
Contract Ref: 733845	Start: 11.9.18 End: 11.9.18	Ground Level: 16.75	National Grid Co-ordinate: E:471422.3 N:108316.4	Sheet: 2 of 2

Progress	Samples / Tests				Water	Backfill & Instrumentation	Description of Strata	Reduced Level	Depth (Thickness)	Material Graphic Legend
Window Run	Depth	No	Type	Results						
4.00 - 5.00 (75mm dia) 90% rec ▼	4.70 4.70 4.90	111	ES PID HP	1xT, 1xJ, 1xV 0.0ppm $c_u = 125/140/135$			Firm to stiff dark grey slightly sandy CLAY. Sand is fine to medium. (LONDON CLAY FORMATION) (stratum copied from 3.10m from previous sheet)	11.75	5.00	
							Trial pit terminated at 5.00m depth.			

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

STANDPIPE SUMMARY TABLE

Exploratory Position ID	Pipe ref/ Caption	Ground Level	Length of Pipe (m)	Response Zone Top (m)	Response Zone Base (m)	Slotted Pipe Top (m)	Slotted Pipe Base (m)	Pipe Internal Diameter (mm)	Remarks
BH01	1	16.54	9.00	6.00	9.00	6.00	9.00	50	
DTS06	1	16.31	2.00	1.00	2.00	1.00	2.00	50	
EWS3	1	---	4.07	1.00	4.00	1.00	4.07	19	
WS1	1	16.27	4.00	1.00	4.00	1.00	4.00	40	
WS2A	1	16.14	4.00	1.00	3.00	1.00	4.00	40	
WS3	1	16.32	5.00	1.00	5.00	1.00	5.00	40	
WS4	1	16.29	3.70	1.00	3.00	1.00	3.70	40	
WS5	1	16.66	5.00	1.00	5.00	1.00	5.00	40	
WS6	1	16.67	4.00	1.00	4.00	1.00	4.00	40	



STRUCTURAL SOILS
The Old School
Stillhouse Lane
Bedminster
Bristol BS3 4EB

Compiled By

J. Evans

JONATHAN EVANS

Date

15.11.18

Contract Ref:

733845

Contract:

Fulflood Road, Havant

Page:

1 of **2**



STANDPIPE SUMMARY TABLE

[illegible]

STRUCTURAL SOILS
The Old School
Stillhouse Lane
Bedminster
Bristol BS3 4EB

Compiled By

J. Evans

JONATHAN EVANS

Date _____

15.11.18

Contract Ref:

733845

Contract:

Fulflood Road, Havant

Page:

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APPENDIX C - GEOENVIRONMENTAL TESTING

- (i) Laboratory Test Results
- (ii) Laboratory UKAS Accreditation Certificate

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/07150
Issue Number: 1
Date: 17 September, 2018

Client: Structural Soils Limited (Bristol)
The Old School
Stillhouse Lane
Bedminster
Bristol
UK
BS3 4EB

Project Manager: Adam Watts/enviro@soils.co.uk
Project Name: Fulflood Road, Havant
Project Ref: 733845
Order No: N/A
Date Samples Received: 06/09/18
Date Instructions Received: 06/09/18
Date Analysis Completed: 13/09/18

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
% Stones >10mm _A	-	<0.1	-	<0.1	<0.1	-	-	28.7	% w/w	A/T-044
Asbestos in soil (*concrete, ballast, rocks and aggregates) _A	Appended	Appended	Appended	Appended	Appended	Appended	Appended	-		Subcom DET5

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
Speciated PCB-EC7 & WHO12										
PCB BZ 28 _A ^{MF}	-	<0.002	-	-	-	-	-	<0.002	mg/kg	A-T-004a
PCB BZ 52 _A ^{MF}	-	<0.002	-	-	-	-	-	<0.002	mg/kg	A-T-004a
PCB BZ 81 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 101 _A ^{MF}	-	<0.004	-	-	-	-	-	<0.004	mg/kg	A-T-004a
PCB BZ 105 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 114 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 118 _A ^{MF}	-	<0.007	-	-	-	-	-	<0.007	mg/kg	A-T-004a
PCB BZ 123 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 126 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 138 _A ^{MF}	-	<0.006	-	-	-	-	-	<0.006	mg/kg	A-T-004a
PCB BZ 153 _A ^{MF}	-	<0.004	-	-	-	-	-	<0.004	mg/kg	A-T-004a
PCB BZ 156 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 157 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 167 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 169 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 180 _A ^{MF}	-	<0.004	-	-	-	-	-	<0.004	mg/kg	A-T-004a
PCB BZ 189 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
PCB BZ 77 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004a
Total Speciated PCB-EC7 & WHO12 _A	-	<0.007	-	-	-	-	-	<0.007	mg/kg	A-T-004a

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
VOC+TICs										
Dichlorodifluoromethane _A	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Chloromethane _A	-	<10	-	-	-	-	-	-	µg/kg	A-T-006a
Vinyl Chloride _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromomethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Chloroethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Trichlorofluoromethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Carbon Disulphide _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Dichloromethane _A	-	<5	-	-	-	-	-	-	µg/kg	A-T-006a
trans 1,2-Dichloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloroethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
cis 1,2-Dichloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
2,2-Dichloropropane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromochloromethane _A [†]	-	<5	-	-	-	-	-	-	µg/kg	A-T-006a
Chloroform _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1,1-Trichloroethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloropropene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Carbon Tetrachloride _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dichloroethane _A [†]	-	<2	-	-	-	-	-	-	µg/kg	A-T-006a
Benzene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Trichloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dichloropropane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Dibromomethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromodichloromethane _A [†]	-	<10	-	-	-	-	-	-	µg/kg	A-T-006a
cis 1,3-Dichloropropene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Toluene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
trans 1,3-Dichloropropene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1,2-Trichloroethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,3-Dichloropropane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Tetrachloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Dibromochloromethane _A [†]	-	<3	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dibromoethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
Chlorobenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1,1,2-Tetrachloroethane _A	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Ethylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
m & p Xylene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
o-Xylene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Styrene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromoform _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Isopropylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1,2,2-Tetrachloroethane _A	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2,3-Trichloropropane _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromobenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
n-Propylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
2-Chlorotoluene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,3,5-Trimethylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
4-Chlorotoluene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
tert-Butylbenzene _A [®]	-	<2	-	-	-	-	-	-	µg/kg	A-T-006a
1,2,4-Trimethylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
sec-Butylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
4-Isopropyltoluene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,3-Dichlorobenzene _A	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,4-Dichlorobenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
n-Butylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dichlorobenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dibromo-3-chloropropane _A	-	<2	-	-	-	-	-	-	µg/kg	A-T-006a
1,2,4-Trichlorobenzene _A	-	<3	-	-	-	-	-	-	µg/kg	A-T-006a
Hexachlorobutadiene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2,3-Trichlorobenzene _A	-	<3	-	-	-	-	-	-	µg/kg	A-T-006a
VOC TICs _A	-	None detected	-	-	-	-	-	-		A-T-006a

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
TPH CWG										
Ali >C5-C6 _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
Ali >C6-C8 _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
Ali >C8-C10 _A ^{MS}	-	<1	-	<1	<1	-	-	-	mg/kg	A-T-455a
Ali >C10-C12 _A ^{MS}	-	<1	-	<1	<1	-	-	-	mg/kg	A-T-455a
Ali >C12-C16 _A ^{MS}	-	<1	-	7	<1	-	-	-	mg/kg	A-T-455a
Ali >C16-C21 _A ^{MS}	-	<1	-	7	<1	-	-	-	mg/kg	A-T-455a
Ali >C21-C35 _A	-	<1	-	4	<1	-	-	-	mg/kg	A-T-455a
Total Aliphatics >C5-C35 _A	-	<1	-	17	<1	-	-	-	mg/kg	A-T-455a
Aro >C5-C7 _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
Aro >C7-C8 _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
Aro >C8-C10 _A ^{MS}	-	<1	-	1	<1	-	-	-	mg/kg	A-T-455a
Aro >C10-C12 _A ^{MS}	-	<1	-	<1	<1	-	-	-	mg/kg	A-T-455a
Aro >C12-C16 _A	-	<1	-	2	<1	-	-	-	mg/kg	A-T-455a
Aro >C16-C21 _A ^{MS}	-	<1	-	2	<1	-	-	-	mg/kg	A-T-455a
Aro >C21-C35 _A ^{MS}	-	<1	-	5	4	-	-	-	mg/kg	A-T-455a
Total Aromatics >C5-C35 _A	-	<1	-	11	4	-	-	-	mg/kg	A-T-455a
TPH (Ali & Aro >C5-C35) _A	-	<1	-	28	4	-	-	-	mg/kg	A-T-455a
BTEX - Benzene _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
BTEX - Toluene _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
BTEX - Ethyl Benzene _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
BTEX - m & p Xylene _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
BTEX - o Xylene _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
MTBE _A [†]	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/9	18/07150/10	18/07150/11	18/07150/12	18/07150/13	18/07150/14	18/07150/15	18/07150/16	Units	Method ref
Client Sample No	102	107	108	104	106	104	102	103		
Client Sample ID	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14		
Depth to Top	0.90	3.20	3.80	2.40	2.50	1.40	0.40	0.70		
Depth To Bottom										
Date Sampled	31-Aug-18	31-Aug-18	31-Aug-18	30-Aug-18	30-Aug-18	29-Aug-18	30-Aug-18	30-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	1A	5A	5	5A	5	5	5AB	5A		
% Stones >10mm	-	8.8	<0.1	-	<0.1	<0.1	-	11.1	% w/w	A/T-044
Asbestos in soil (+concrete, ballast, rocks and aggregates)	Appended	Appended	-	Appended	Appended	Appended	Appended	Appended		Subcom DETS

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/9	18/07150/10	18/07150/11	18/07150/12	18/07150/13	18/07150/14	18/07150/15	18/07150/16	Units	Method ref
Client Sample No	102	107	108	104	106	104	102	103		
Client Sample ID	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14		
Depth to Top	0.90	3.20	3.80	2.40	2.50	1.40	0.40	0.70		
Depth To Bottom										
Date Sampled	31-Aug-18	31-Aug-18	31-Aug-18	30-Aug-18	30-Aug-18	29-Aug-18	30-Aug-18	30-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	1A	5A	5	5A	5	5	5AB	5A		
VOC+TICs										
Dichlorodifluoromethane _A	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Chloromethane _A	-	<10	-	-	-	<10	-	<10	µg/kg	A-T-006a
Vinyl Chloride _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromomethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Chloroethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Trichlorofluoromethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1-Dichloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Carbon Disulphide _A [†]	-	1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Dichloromethane _A	-	<5	-	-	-	<5	-	<5	µg/kg	A-T-006a
trans 1,2-Dichloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1-Dichloroethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
cis 1,2-Dichloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
2,2-Dichloropropane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromochloromethane _A [†]	-	<5	-	-	-	<5	-	<5	µg/kg	A-T-006a
Chloroform _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1,1-Trichloroethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1-Dichloropropene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Carbon Tetrachloride _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2-Dichloroethane _A [†]	-	<2	-	-	-	<2	-	<2	µg/kg	A-T-006a
Benzene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Trichloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2-Dichloropropane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Dibromomethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromodichloromethane _A [†]	-	<10	-	-	-	<10	-	<10	µg/kg	A-T-006a
cis 1,3-Dichloropropene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Toluene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
trans 1,3-Dichloropropene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1,2-Trichloroethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,3-Dichloropropane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Tetrachloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Dibromochloromethane _A [†]	-	<3	-	-	-	<3	-	<3	µg/kg	A-T-006a
1,2-Dibromoethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/9	18/07150/10	18/07150/11	18/07150/12	18/07150/13	18/07150/14	18/07150/15	18/07150/16	Units	Method ref
Client Sample No	102	107	108	104	106	104	102	103		
Client Sample ID	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14		
Depth to Top	0.90	3.20	3.80	2.40	2.50	1.40	0.40	0.70		
Depth To Bottom										
Date Sampled	31-Aug-18	31-Aug-18	31-Aug-18	30-Aug-18	30-Aug-18	29-Aug-18	30-Aug-18	30-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	1A	5A	5	5A	5	5	5AB	5A		
Chlorobenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1,1,2-Tetrachloroethane _A	-	<1	-	-	-	1	-	<1	µg/kg	A-T-006a
Ethylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
m & p Xylene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
o-Xylene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Styrene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromoform _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Isopropylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1,2,2-Tetrachloroethane _A	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2,3-Trichloropropane _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromobenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
n-Propylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
2-Chlorotoluene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,3,5-Trimethylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
4-Chlorotoluene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
tert-Butylbenzene _A [®]	-	<2	-	-	-	<2	-	<2	µg/kg	A-T-006a
1,2,4-Trimethylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
sec-Butylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
4-Isopropyltoluene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,3-Dichlorobenzene _A	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,4-Dichlorobenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
n-Butylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2-Dichlorobenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2-Dibromo-3-chloropropane _A	-	<2	-	-	-	5	-	<2	µg/kg	A-T-006a
1,2,4-Trichlorobenzene _A	-	<3	-	-	-	<3	-	<3	µg/kg	A-T-006a
Hexachlorobutadiene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2,3-Trichlorobenzene _A	-	<3	-	-	-	<3	-	<3	µg/kg	A-T-006a
VOC TICs _A	-	None detected	-	-	-	None detected	-	None detected		A-T-006a

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/9	18/07150/10	18/07150/11	18/07150/12	18/07150/13	18/07150/14	18/07150/15	18/07150/16	Units	Method ref
Client Sample No	102	107	108	104	106	104	102	103		
Client Sample ID	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14		
Depth to Top	0.90	3.20	3.80	2.40	2.50	1.40	0.40	0.70		
Depth To Bottom										
Date Sampled	31-Aug-18	31-Aug-18	31-Aug-18	30-Aug-18	30-Aug-18	29-Aug-18	30-Aug-18	30-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	1A	5A	5	5A	5	5	5AB	5A		
TPH CWG										
Ali >C5-C6 _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
Ali >C6-C8 _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
Ali >C8-C10 _A ^{MS}	-	2	6	-	<1	<1	-	<1	mg/kg	A-T-455a
Ali >C10-C12 _A ^{MS}	-	15	25	-	<1	<1	-	<1	mg/kg	A-T-455a
Ali >C12-C16 _A ^{MS}	-	98	88	-	<1	<1	-	<1	mg/kg	A-T-455a
Ali >C16-C21 _A ^{MS}	-	184	162	-	<1	<1	-	<1	mg/kg	A-T-455a
Ali >C21-C35 _A	-	36	31	-	<1	<1	-	3	mg/kg	A-T-455a
Total Aliphatics >C5-C35 _A	-	338	313	-	<1	<1	-	3	mg/kg	A-T-455a
Aro >C5-C7 _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
Aro >C7-C8 _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
Aro >C8-C10 _A ^{MS}	-	2	2	-	<1	<1	-	1	mg/kg	A-T-455a
Aro >C10-C12 _A ^{MS}	-	4	17	-	<1	<1	-	<1	mg/kg	A-T-455a
Aro >C12-C16 _A	-	54	114	-	<1	<1	-	<1	mg/kg	A-T-455a
Aro >C16-C21 _A ^{MS}	-	126	115	-	<1	<1	-	1	mg/kg	A-T-455a
Aro >C21-C35 _A ^{MS}	-	56	49	-	<1	<1	-	6	mg/kg	A-T-455a
Total Aromatics >C5-C35 _A	-	243	300	-	<1	<1	-	8	mg/kg	A-T-455a
TPH (Ali & Aro >C5-C35) _A	-	580	613	-	<1	<1	-	11	mg/kg	A-T-455a
BTEX - Benzene _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
BTEX - Toluene _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
BTEX - Ethyl Benzene _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
BTEX - m & p Xylene _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
BTEX - o Xylene _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a
MTBE _A ²	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-422a

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/17	18/07150/18							Units	Method ref
Client Sample No	101	104								
Client Sample ID	TP15	TP16								
Depth to Top	0.10	1.20								
Depth To Bottom										
Date Sampled	31-Aug-18	29-Aug-18								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	4AE	4								
% Stones >10mm _A	-	<0.1							% w/w	A/T-044
Asbestos in soil (*concrete, ballast, rocks and aggregates) _A	Appended	-								Subcom DET5

Envirolab Job Number: 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/17	18/07150/18								
Client Sample No	101	104								
Client Sample ID	TP15	TP16								
Depth to Top	0.10	1.20								
Depth To Bottom										
Date Sampled	31-Aug-18	29-Aug-18								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	4AE	4								
									Units	Method ref
TPH CWG										
Ali >C5-C6 _A ²	-	<0.01							mg/kg	A-T-622a
Ali >C6-C8 _A ²	-	<0.01							mg/kg	A-T-622a
Ali >C8-C10 _A ^{MS}	-	<1							mg/kg	A-T-655a
Ali >C10-C12 _A ^{MS}	-	<1							mg/kg	A-T-655a
Ali >C12-C16 _A ^{MS}	-	<1							mg/kg	A-T-655a
Ali >C16-C21 _A ^{MS}	-	<1							mg/kg	A-T-655a
Ali >C21-C35 _A	-	<1							mg/kg	A-T-655a
Total Aliphatics >C5-C35 _A	-	<1							mg/kg	A-T-655a
Aro >C5-C7 _A ²	-	<0.01							mg/kg	A-T-622a
Aro >C7-C8 _A ²	-	<0.01							mg/kg	A-T-622a
Aro >C8-C10 _A ^{MS}	-	<1							mg/kg	A-T-655a
Aro >C10-C12 _A ^{MS}	-	<1							mg/kg	A-T-655a
Aro >C12-C16 _A	-	<1							mg/kg	A-T-655a
Aro >C16-C21 _A ^{MS}	-	<1							mg/kg	A-T-655a
Aro >C21-C35 _A ^{MS}	-	<1							mg/kg	A-T-655a
Total Aromatics >C5-C35 _A	-	<1							mg/kg	A-T-655a
TPH (Ali & Aro >C5-C35) _A	-	<1							mg/kg	A-T-655a
BTEX - Benzene _A ²	-	<0.01							mg/kg	A-T-622a
BTEX - Toluene _A ²	-	<0.01							mg/kg	A-T-622a
BTEX - Ethyl Benzene _A ²	-	<0.01							mg/kg	A-T-622a
BTEX - m & p Xylene _A ²	-	<0.01							mg/kg	A-T-622a
BTEX - o Xylene _A ²	-	<0.01							mg/kg	A-T-622a
MTBE _A ²	-	<0.01							mg/kg	A-T-622a

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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 and there is insufficient sample to repeat the analysis. 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.

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.



Certificate of Analysis

Certificate Number 18-21391-1

28-Sep-18

Client Envirolab Ltd
Units 7&8
Sandpits,
Business Park
Mottram Road
Hyde
SK14 3AR

Our Reference 18-21391-1

Client Reference 18/07150

Order No P0738975

Contract Title 733845

Description 15 Soil samples.

Date Received 07-Sep-18

Date Started 07-Sep-18

Date Completed 28-Sep-18

Test Procedures Identified by prefix DETSn (details on request).

Notes **This report supersedes 18-21391. Extra testing.**

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager



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Summary of Asbestos Analysis Soil Samples

Our Ref 18-21391-1
Client Ref 18/07150
Contract Title 733845

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1389496	TP1 18/07150/1 101 0.10	SOIL	NAD	none	A Christodoulou
1389497	TP2 18/07150/2 103 1.10	SOIL	NAD	none	A Christodoulou
1389498	TP 3 18/07150/3 101 0.30	SOIL	Chrysotile	Chrysotile Present as small bundle	A Christodoulou
1389499	TP4 18/07150/4 102 1.00	SOIL	NAD	none	A Christodoulou
1389500	TP5 18/07150/5 104 2.30	SOIL	NAD	none	A Christodoulou
1389501	TP6 18/07150/6 101 0.15	SOIL	NAD	none	A Christodoulou
1389502	TP7 18/07150/7 101 0.20	SOIL	NAD	none	A Christodoulou
1389503	TP8 18/07150/9 102 0.90	SOIL	NAD	none	A Christodoulou
1389504	TP9 18/07150/10 107 3.20	SOIL	NAD	none	A Christodoulou
1389505	TP10 18/07150/12 104 2.40	SOIL	NAD	none	A Christodoulou
1389506	TP11 18/07150/13 106 2.50	SOIL	NAD	none	A Christodoulou
1389507	TP12 18/07150/14 104 1.40	SOIL	NAD	none	A Christodoulou
1389508	TP13 18/07150/15 102 0.40	SOIL	NAD	none	A Christodoulou
1389509	TP14 18/07150/16 103 0.70	SOIL	NAD	none	A Christodoulou
1389510	TP15 18/07150/17 101 0.10	SOIL	NAD	none	A Christodoulou

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 18-21391-1
 Client Ref 18/07150
 Contract Title 733845

Lab No	1389498
Sample ID	TP 3
Depth	0.30
Other ID	101
Sample Type	SOIL
Sampling Date	29/08/18
Sampling Time	

Test	Method	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	< 0.001
Gravimetric Quantification (a)	DETSC 1102	Mass %	na
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	<0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na
Breakdown of Gravimetric Analysis (a)			
Mass of Sample		g	286.73
ACMs present*		type	
Mass of ACM in sample		g	
% ACM by mass		%	
% asbestos in ACM		%	
% asbestos in sample		%	
Breakdown of Detailed Gravimetric Analysis (b)			
% Amphibole bundles in sample		Mass %	na
% Chrysotile bundles in sample		Mass %	<0.001
Breakdown of PCOM Analysis (c)			
% Amphibole fibres in sample		Mass %	na
% Chrysotile fibres in sample		Mass %	na
Breakdown of Potentially Respirable Fibre Analysis (d)			
Amphibole fibres		Fibres/g	na
Chrysotile fibres		Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
 % asbestos in Asbestos Containing Materials (ACMs) is determined by
 by reference to HSG 264.
 Recommended sample size for quantification is approximately 1kg
 # denotes deviating sample

Information in Support of the Analytical Results

Our Ref 18-21391-1

Client Ref 18/07150

Contract 733845

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1389496	TP1 18/07150/1 0.10 SOIL	30/08/18	GJ 250ml		
1389497	TP2 18/07150/2 1.10 SOIL	29/08/18	GJ 250ml		
1389498	TP 3 18/07150/3 0.30 SOIL	29/08/18	GJ 250ml		
1389499	TP4 18/07150/4 1.00 SOIL	29/08/18	GJ 250ml		
1389500	TP5 18/07150/5 2.30 SOIL	30/08/18	GJ 250ml		
1389501	TP6 18/07150/6 0.15 SOIL	31/08/18	GJ 250ml		
1389502	TP7 18/07150/7 0.20 SOIL	31/08/18	GJ 250ml		
1389503	TP8 18/07150/9 0.90 SOIL	31/08/18	GJ 250ml		
1389504	TP9 18/07150/10 3.20 SOIL	31/08/18	GJ 250ml		
1389505	TP10 18/07150/12 2.40 SOIL	30/08/18	GJ 250ml		
1389506	TP11 18/07150/13 2.50 SOIL	30/08/18	GJ 250ml		
1389507	TP12 18/07150/14 1.40 SOIL	29/08/18	GJ 250ml		
1389508	TP13 18/07150/15 0.40 SOIL	30/08/18	GJ 250ml		
1389509	TP14 18/07150/16 0.70 SOIL	30/08/18	GJ 250ml		
1389510	TP15 18/07150/17 0.10 SOIL	31/08/18	GJ 250ml		

Key: G-Glass J-Jar

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/07548
Issue Number: 1
Date: 05 October, 2018

Client: Structural Soils Limited (Bristol)
The Old School
Stillhouse Lane
Bedminster
Bristol
UK
BS3 4EB

Project Manager: Adam Watts/enviro@soils.co.uk
Project Name: Fulflood Road, Havant
Project Ref: 733845
Order No: N/A
Date Samples Received: 19/09/18
Date Instructions Received: 19/09/18
Date Analysis Completed: 02/10/18

Prepared by:


Melanie Marshall
Laboratory Coordinator

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/1	18/07548/2	18/07548/3	18/07548/4	18/07548/5	18/07548/6	18/07548/7	18/07548/8	Units	Method ref
Client Sample No	101	102	103	105	101	104	102	104		
Client Sample ID	WS1	WS1	WS1	WS1	WS2A	WS2A	WS3	WS3		
Depth to Top	0.20	0.50	1.65	2.50	0.30	2.40	0.80	2.30		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4ABE	4AB	6	6E	4AB	5	5A	6AE		
% Stones >10mm _A	-	25.9	-	4.2	-	<0.1	-	-	% w/w	A-T-044
Fraction of organic carbon _{OC} *	-	-	-	-	-	0.0052	-	-	N/A	A-T-032 PDC

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/1	18/07548/2	18/07548/3	18/07548/4	18/07548/5	18/07548/6	18/07548/7	18/07548/8	Units	Method ref
Client Sample No	101	102	103	105	101	104	102	104		
Client Sample ID	WS1	WS1	WS1	WS1	WS2A	WS2A	WS3	WS3		
Depth to Top	0.20	0.50	1.65	2.50	0.30	2.40	0.80	2.30		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4ABE	4AB	6	6E	4AB	5	5A	6AE		
Asbestos in Soil (inc. matrix)										
Asbestos in soil ^a	Chrysotile	-	NAD	NAD	Chrysotile	NAD	NAD	NAD		A-T-045
Asbestos Matrix (microscope) _a	Loose fibres	-	-	-	Bitumen	-	-	-		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	-	N/A	N/A	N/A	N/A	N/A	N/A		
Asbestos in Soil Quantification % (Hand Picking & Weighing)										
Asbestos in soil % composition (hand picking and weighing) _b	0.001	-	-	-	<0.001	-	-	-	% w/w	A-T-054

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/1	18/07548/2	18/07548/3	18/07548/4	18/07548/5	18/07548/6	18/07548/7	18/07548/8	Units	Method ref
Client Sample No	101	102	103	105	101	104	102	104		
Client Sample ID	WS1	WS1	WS1	WS1	WS2A	WS2A	WS3	WS3		
Depth to Top	0.20	0.50	1.65	2.50	0.30	2.40	0.80	2.30		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4ABE	4AB	6	6E	4AB	5	5A	6AE		
Speciated PCB-EC7 & WHO12										
PCB BZ 28 _A ^{MF}	-	<0.002	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 52 _A ^{MF}	-	<0.002	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 81 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 101 _A ^{MF}	-	<0.004	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 105 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 114 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 118 _A ^{MF}	-	<0.007	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 123 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 126 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 138 _A ^{MF}	-	<0.006	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 153 _A ^{MF}	-	<0.004	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 156 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 157 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 167 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 169 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 180 _A ^{MF}	-	<0.004	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 189 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
PCB BZ 77 _A	-	<0.005	-	-	-	-	-	-	mg/kg	A-T-004s
Total Speciated PCB-EC7 & WHO12 _A	-	<0.007	-	-	-	-	-	-	mg/kg	A-T-004s

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/1	18/07548/2	18/07548/3	18/07548/4	18/07548/5	18/07548/6	18/07548/7	18/07548/8	Units	Method ref
Client Sample No	101	102	103	105	101	104	102	104		
Client Sample ID	WS1	WS1	WS1	WS1	WS2A	WS2A	WS3	WS3		
Depth to Top	0.20	0.50	1.65	2.50	0.30	2.40	0.80	2.30		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4ABE	4AB	6	6E	4AB	5	5A	6AE		
VOC+TICs										
Dichlorodifluoromethane _A	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Chloromethane _A	-	-	-	<10	-	-	-	-	µg/kg	A-T-006a
Vinyl Chloride _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Bromomethane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Chloroethane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Trichlorofluoromethane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloroethene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Carbon Disulphide _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Dichloromethane _A	-	-	-	<5	-	-	-	-	µg/kg	A-T-006a
trans 1,2-Dichloroethene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloroethane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
cis 1,2-Dichloroethene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
2,2-Dichloropropane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Bromochloromethane _A ^g	-	-	-	<5	-	-	-	-	µg/kg	A-T-006a
Chloroform _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,1,1-Trichloroethane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloropropene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Carbon Tetrachloride _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,2-Dichloroethane _A ^g	-	-	-	<2	-	-	-	-	µg/kg	A-T-006a
Benzene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Trichloroethene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,2-Dichloropropane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Dibromomethane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Bromodichloromethane _A ^g	-	-	-	<10	-	-	-	-	µg/kg	A-T-006a
cis 1,3-Dichloropropene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Toluene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
trans 1,3-Dichloropropene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,1,2-Trichloroethane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,3-Dichloropropane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Tetrachloroethene _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Dibromochloromethane _A ^g	-	-	-	<3	-	-	-	-	µg/kg	A-T-006a
1,2-Dibromoethane _A ^g	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/1	18/07548/2	18/07548/3	18/07548/4	18/07548/5	18/07548/6	18/07548/7	18/07548/8	Units	Method ref
Client Sample No	101	102	103	105	101	104	102	104		
Client Sample ID	WS1	WS1	WS1	WS1	WS2A	WS2A	WS3	WS3		
Depth to Top	0.20	0.50	1.65	2.50	0.30	2.40	0.80	2.30		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4ABE	4AB	6	6E	4AB	5	5A	6AE		
Chlorobenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,1,1,2-Tetrachloroethane _A	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Ethylbenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
m & p Xylene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
o-Xylene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Styrene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Bromoform _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Isopropylbenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,1,2,2-Tetrachloroethane _A	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,2,3-Trichloropropane _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
Bromobenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
n-Propylbenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
2-Chlorotoluene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,3,5-Trimethylbenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
4-Chlorotoluene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
tert-Butylbenzene _A [®]	-	-	-	<2	-	-	-	-	µg/kg	A-T-006a
1,2,4-Trimethylbenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
sec-Butylbenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
4-Isopropyltoluene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,3-Dichlorobenzene _A	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,4-Dichlorobenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
n-Butylbenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,2-Dichlorobenzene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,2-Dibromo-3-chloropropane _A	-	-	-	<2	-	-	-	-	µg/kg	A-T-006a
1,2,4-Trichlorobenzene _A	-	-	-	<3	-	-	-	-	µg/kg	A-T-006a
Hexachlorobutadiene _A [®]	-	-	-	<1	-	-	-	-	µg/kg	A-T-006a
1,2,3-Trichlorobenzene _A	-	-	-	<3	-	-	-	-	µg/kg	A-T-006a
VOC TICs _A	-	-	-	None detected	-	-	-	-		A-T-006a

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/1	18/07548/2	18/07548/3	18/07548/4	18/07548/5	18/07548/6	18/07548/7	18/07548/8	Units	Method ref
Client Sample No	101	102	103	105	101	104	102	104		
Client Sample ID	WS1	WS1	WS1	WS1	WS2A	WS2A	WS3	WS3		
Depth to Top	0.20	0.50	1.65	2.50	0.30	2.40	0.80	2.30		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4ABE	4AB	6	6E	4AB	5	5A	6AE		
TPH CWG										
Ali >C5-C6 _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
Ali >C6-C8 _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
Ali >C8-C10 _A ^{MS}	-	-	-	<1	-	-	-	-	mg/kg	A-T-655a
Ali >C10-C12 _A ^{MS}	-	-	-	<1	-	-	-	-	mg/kg	A-T-655a
Ali >C12-C16 _A ^{MS}	-	-	-	<1	-	-	-	-	mg/kg	A-T-655a
Ali >C16-C21 _A ^{MS}	-	-	-	<1	-	-	-	-	mg/kg	A-T-655a
Ali >C21-C35 _A	-	-	-	3	-	-	-	-	mg/kg	A-T-655a
Total Aliphatics >C5-C35 _A	-	-	-	3	-	-	-	-	mg/kg	A-T-655a
Aro >C5-C7 _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
Aro >C7-C8 _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
Aro >C8-C10 _A ^{MS}	-	-	-	1	-	-	-	-	mg/kg	A-T-655a
Aro >C10-C12 _A ^{MS}	-	-	-	<1	-	-	-	-	mg/kg	A-T-655a
Aro >C12-C16 _A	-	-	-	1	-	-	-	-	mg/kg	A-T-655a
Aro >C16-C21 _A ^{MS}	-	-	-	<1	-	-	-	-	mg/kg	A-T-655a
Aro >C21-C35 _A ^{MS}	-	-	-	10	-	-	-	-	mg/kg	A-T-655a
Total Aromatics >C5-C35 _A	-	-	-	14	-	-	-	-	mg/kg	A-T-655a
TPH (Ali & Aro >C5-C35) _A	-	-	-	16	-	-	-	-	mg/kg	A-T-655a
BTEX - Benzene _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
BTEX - Toluene _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
BTEX - Ethyl Benzene _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
BTEX - m & p Xylene _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
BTEX - o Xylene _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a
MTBE _A [†]	-	-	-	<0.01	-	-	-	-	mg/kg	A-T-622a

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/9	18/07548/10	18/07548/11	18/07548/12	18/07548/13	18/07548/14	18/07548/15	18/07548/16	Units	Method ref
Client Sample No	105	101	103	105	107	101	103	104		
Client Sample ID	WS3	WS4	WS4	WS4	WS4	WS5	WSX5	WS5		
Depth to Top	2.90	0.20	0.70	1.80	2.95	0.10	1.60	1.90		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5	4AE	6AB	5A	4A	4AE	6A	6A		
% Stones >10mm _A	<0.1	-	18.5	-	41.8	-	-	7.9	% w/w	A-T-044
Fraction of organic carbon _C [*]	0.0027	-	-	-	-	-	-	0.0047	N/A	A-T-032 PDC

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/9	18/07548/10	18/07548/11	18/07548/12	18/07548/13	18/07548/14	18/07548/15	18/07548/16	Units	Method ref
Client Sample No	105	101	103	105	107	101	103	104		
Client Sample ID	WS3	WS4	WS4	WS4	WS4	WS5	WSX5	WS5		
Depth to Top	2.90	0.20	0.70	1.80	2.95	0.10	1.60	1.90		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5	4AE	6AB	5A	4A	4AE	6A	6A		
Asbestos in Soil (inc. matrix)										
Asbestos in soil [†]	-	NAD	-	NAD	-	NAD	NAD	-		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	-	N/A	-	N/A	-	N/A	N/A	-		

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/9	18/07548/10	18/07548/11	18/07548/12	18/07548/13	18/07548/14	18/07548/15	18/07548/16	Units	Method ref
Client Sample No	105	101	103	105	107	101	103	104		
Client Sample ID	WS3	WS4	WS4	WS4	WS4	WS5	WSX5	WS5		
Depth to Top	2.90	0.20	0.70	1.80	2.95	0.10	1.60	1.90		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5	4AE	6AB	5A	4A	4AE	6A	6A		
VOC+TICs										
Dichlorodifluoromethane _A	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Chloromethane _A	-	-	<10	-	<10	-	-	-	µg/kg	A-T-006a
Vinyl Chloride _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Bromomethane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Chloroethane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Trichlorofluoromethane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,1-Dichloroethene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Carbon Disulphide _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Dichloromethane _A	-	-	<5	-	<5	-	-	-	µg/kg	A-T-006a
trans 1,2-Dichloroethene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,1-Dichloroethane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
cis 1,2-Dichloroethene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
2,2-Dichloropropane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Bromochloromethane _A [†]	-	-	<5	-	<5	-	-	-	µg/kg	A-T-006a
Chloroform _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,1,1-Trichloroethane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,1-Dichloropropene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Carbon Tetrachloride _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,2-Dichloroethane _A [†]	-	-	<2	-	<2	-	-	-	µg/kg	A-T-006a
Benzene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Trichloroethene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,2-Dichloropropane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Dibromomethane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Bromodichloromethane _A [†]	-	-	<10	-	<10	-	-	-	µg/kg	A-T-006a
cis 1,3-Dichloropropene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Toluene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
trans 1,3-Dichloropropene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,1,2-Trichloroethane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,3-Dichloropropane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Tetrachloroethene _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Dibromochloromethane _A [†]	-	-	<3	-	<3	-	-	-	µg/kg	A-T-006a
1,2-Dibromoethane _A [†]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/9	18/07548/10	18/07548/11	18/07548/12	18/07548/13	18/07548/14	18/07548/15	18/07548/16	Units	Method ref
Client Sample No	105	101	103	105	107	101	103	104		
Client Sample ID	WS3	WS4	WS4	WS4	WS4	WS5	WSX5	WS5		
Depth to Top	2.90	0.20	0.70	1.80	2.95	0.10	1.60	1.90		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5	4AE	6AB	5A	4A	4AE	6A	6A		
Chlorobenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,1,1,2-Tetrachloroethane _A	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Ethylbenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
m & p Xylene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
o-Xylene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Styrene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Bromoform _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Isopropylbenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,1,2,2-Tetrachloroethane _A	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,2,3-Trichloropropane _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
Bromobenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
n-Propylbenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
2-Chlorotoluene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,3,5-Trimethylbenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
4-Chlorotoluene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
tert-Butylbenzene _A [®]	-	-	<2	-	<2	-	-	-	µg/kg	A-T-006a
1,2,4-Trimethylbenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
sec-Butylbenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
4-Isopropyltoluene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,3-Dichlorobenzene _A	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,4-Dichlorobenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
n-Butylbenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,2-Dichlorobenzene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,2-Dibromo-3-chloropropane _A	-	-	<2	-	<2	-	-	-	µg/kg	A-T-006a
1,2,4-Trichlorobenzene _A	-	-	<3	-	<3	-	-	-	µg/kg	A-T-006a
Hexachlorobutadiene _A [®]	-	-	<1	-	<1	-	-	-	µg/kg	A-T-006a
1,2,3-Trichlorobenzene _A	-	-	<3	-	<3	-	-	-	µg/kg	A-T-006a
VOC TICs _A	-	-	None detected	-	None detected	-	-	-		A-T-006a

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/9	18/07548/10	18/07548/11	18/07548/12	18/07548/13	18/07548/14	18/07548/15	18/07548/16	Units	Method ref
Client Sample No	105	101	103	105	107	101	103	104		
Client Sample ID	WS3	WS4	WS4	WS4	WS4	WS5	WSX5	WS5		
Depth to Top	2.90	0.20	0.70	1.80	2.95	0.10	1.60	1.90		
Depth To Bottom										
Date Sampled	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	10-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	5	4AE	6AB	5A	4A	4AE	6A	6A		
TPH CWG										
Ali >C5-C6 _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
Ali >C6-C8 _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
Ali >C8-C10 _A ^{MS}	<1	-	<1	-	<1	-	-	-	mg/kg	A-T-655a
Ali >C10-C12 _A ^{MS}	<1	-	<1	-	<1	-	-	-	mg/kg	A-T-655a
Ali >C12-C16 _A ^{MS}	<1	-	<1	-	<1	-	-	-	mg/kg	A-T-655a
Ali >C16-C21 _A ^{MS}	<1	-	<1	-	<1	-	-	-	mg/kg	A-T-655a
Ali >C21-C35 _A	46	-	21	-	12	-	-	-	mg/kg	A-T-655a
Total Aliphatics >C5-C35 _A	46	-	21	-	12	-	-	-	mg/kg	A-T-655a
Aro >C5-C7 _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
Aro >C7-C8 _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
Aro >C8-C10 _A ^{MS}	1	-	2	-	1	-	-	-	mg/kg	A-T-655a
Aro >C10-C12 _A ^{MS}	<1	-	<1	-	<1	-	-	-	mg/kg	A-T-655a
Aro >C12-C16 _A	1	-	<1	-	1	-	-	-	mg/kg	A-T-655a
Aro >C16-C21 _A ^{MS}	<1	-	<1	-	4	-	-	-	mg/kg	A-T-655a
Aro >C21-C35 _A ^{MS}	8	-	6	-	38	-	-	-	mg/kg	A-T-655a
Total Aromatics >C5-C35 _A	12	-	10	-	44	-	-	-	mg/kg	A-T-655a
TPH (Ali & Aro >C5-C35) _A	57	-	30	-	55	-	-	-	mg/kg	A-T-655a
BTEX - Benzene _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
BTEX - Toluene _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
BTEX - Ethyl Benzene _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
BTEX - m & p Xylene _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
BTEX - o Xylene _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a
MTBE _A ^g	<0.01	-	<0.01	-	<0.01	-	-	-	mg/kg	A-T-622a

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/17	18/07548/18	18/07548/19	18/07548/21	18/07548/22	18/07548/23			Units	Method ref
Client Sample No	108	101	103	106	102	103				
Client Sample ID	WS5	WS6	WS6	WS6	WS7	WS7				
Depth to Top	4.50	0.20	0.90	2.70	0.20	0.60				
Depth To Bottom										
Date Sampled	11-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6	4AE	4A	5	4AB	4AB				
% Stones >10mm _A	<0.1	-	-	<0.1	-	-			% w/w	A-T-044
Fraction of organic carbon _C *	0.0021	-	-	0.0016	-	-			N/A	A-T-032 PDC

Envirolab Job Number: 18/07548

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07548/17	18/07548/18	18/07548/19	18/07548/21	18/07548/22	18/07548/23			Units	Method ref
Client Sample No	108	101	103	106	102	103				
Client Sample ID	WS5	WS6	WS6	WS6	WS7	WS7				
Depth to Top	4.50	0.20	0.90	2.70	0.20	0.60				
Depth To Bottom										
Date Sampled	11-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18	11-Sep-18				
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES				
Sample Matrix Code	6	4AE	4A	5	4AB	4AB				
Asbestos in Soil (inc. matrix)										
Asbestos in soil [†]	-	NAD	NAD	-	NAD	NAD				A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	-	N/A	N/A	-	N/A	N/A				

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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.

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.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/08070 and 18/07150
Issue Number: 1 **Date:** 15 October, 2018

Client: Structural Soils Limited (Bristol)
The Old School
Stillhouse Lane
Bedminster
Bristol
UK
BS3 4EB

Project Manager: Adam Watts/enviro@soils.co.uk/Jonathan Evans
Project Name: Fulflood Road, Havant
Project Ref: 733845
Order No: N/A
Date Samples Received: 02/10/18
Date Instructions Received: 03/10/18
Date Analysis Completed: 09/10/18

Prepared by:

G Walker

Gill Walker
Director/Laboratory Manager

Approved by:

D Brierley

Danielle Brierley
Client Manager

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
% Stones >10mm _A	-	<0.1	-	<0.1	<0.1	-	-	28.7	% w/w	A-T-044
Asbestos in soil (+concrete, ballast, rocks and aggregates) _A ^B	Appended	Appended	Appended	Appended	Appended	Appended	Appended	-		Subcom DET5
Asbestos % composition (SOIL) Gravimetric Stage 2 only _A ^B	-	-	Appended	-	-	-	-	-	%	Subcom DET5

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
Speciated PCB-EC7 & WHO12										
PCB BZ 28 _A ^{MF}	-	<0.002	-	-	-	-	-	<0.002	mg/kg	A-T-004s
PCB BZ 52 _A ^{MF}	-	<0.002	-	-	-	-	-	<0.002	mg/kg	A-T-004s
PCB BZ 81 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 101 _A ^{MF}	-	<0.004	-	-	-	-	-	<0.004	mg/kg	A-T-004s
PCB BZ 105 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 114 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 118 _A ^{MF}	-	<0.007	-	-	-	-	-	<0.007	mg/kg	A-T-004s
PCB BZ 123 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 126 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 138 _A ^{MF}	-	<0.006	-	-	-	-	-	<0.006	mg/kg	A-T-004s
PCB BZ 153 _A ^{MF}	-	<0.004	-	-	-	-	-	<0.004	mg/kg	A-T-004s
PCB BZ 156 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 157 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 167 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 169 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 180 _A ^{MF}	-	<0.004	-	-	-	-	-	<0.004	mg/kg	A-T-004s
PCB BZ 189 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
PCB BZ 77 _A	-	<0.005	-	-	-	-	-	<0.005	mg/kg	A-T-004s
Total Speciated PCB-EC7 & WHO12 _A	-	<0.007	-	-	-	-	-	<0.007	mg/kg	A-T-004s

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
VOC+TICs										
Dichlorodifluoromethane _A	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Chloromethane _A	-	<10	-	-	-	-	-	-	µg/kg	A-T-006a
Vinyl Chloride _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromomethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Chloroethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Trichlorofluoromethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Carbon Disulphide _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Dichloromethane _A	-	<5	-	-	-	-	-	-	µg/kg	A-T-006a
trans 1,2-Dichloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloroethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
cis 1,2-Dichloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
2,2-Dichloropropane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromochloromethane _A [†]	-	<5	-	-	-	-	-	-	µg/kg	A-T-006a
Chloroform _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1,1-Trichloroethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1-Dichloropropene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Carbon Tetrachloride _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dichloroethane _A [†]	-	<2	-	-	-	-	-	-	µg/kg	A-T-006a
Benzene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Trichloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dichloropropane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Dibromomethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromodichloromethane _A [†]	-	<10	-	-	-	-	-	-	µg/kg	A-T-006a
cis 1,3-Dichloropropene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Toluene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
trans 1,3-Dichloropropene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1,2-Trichloroethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,3-Dichloropropane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Tetrachloroethene _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Dibromochloromethane _A [†]	-	<3	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dibromoethane _A [†]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
Chlorobenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1,1,2-Tetrachloroethane _A	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Ethylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
m & p Xylene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
o-Xylene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Styrene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromoform _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Isopropylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,1,2,2-Tetrachloroethane _A	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2,3-Trichloropropane _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
Bromobenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
n-Propylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
2-Chlorotoluene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,3,5-Trimethylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
4-Chlorotoluene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
tert-Butylbenzene _A [®]	-	<2	-	-	-	-	-	-	µg/kg	A-T-006a
1,2,4-Trimethylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
sec-Butylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
4-Isopropyltoluene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,3-Dichlorobenzene _A	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,4-Dichlorobenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
n-Butylbenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dichlorobenzene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2-Dibromo-3-chloropropane _A	-	<2	-	-	-	-	-	-	µg/kg	A-T-006a
1,2,4-Trichlorobenzene _A	-	<3	-	-	-	-	-	-	µg/kg	A-T-006a
Hexachlorobutadiene _A [®]	-	<1	-	-	-	-	-	-	µg/kg	A-T-006a
1,2,3-Trichlorobenzene _A	-	<3	-	-	-	-	-	-	µg/kg	A-T-006a
VOC TICs _A	-	None detected	-	-	-	-	-	-		A-T-006a

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/1	18/07150/2	18/07150/3	18/07150/4	18/07150/5	18/07150/6	18/07150/7	18/07150/8	Units	Method ref
Client Sample No	101	103	101	102	104	101	101	102		
Client Sample ID	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP7		
Depth to Top	0.10	1.10	0.30	1.00	2.30	0.15	0.20	0.70		
Depth To Bottom										
Date Sampled	30-Aug-18	29-Aug-18	29-Aug-18	29-Aug-18	30-Aug-18	31-Aug-18	31-Aug-18	31-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AE	1	4AE	6	5	4ABE	4AE	4ABE		
TPH CWG										
Ali >C5-C6 _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
Ali >C6-C8 _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
Ali >C8-C10 _A ^{MS}	-	<1	-	<1	<1	-	-	-	mg/kg	A-T-455a
Ali >C10-C12 _A ^{MS}	-	<1	-	<1	<1	-	-	-	mg/kg	A-T-455a
Ali >C12-C16 _A ^{MS}	-	<1	-	6	<1	-	-	-	mg/kg	A-T-455a
Ali >C16-C21 _A ^{MS}	-	<1	-	6	<1	-	-	-	mg/kg	A-T-455a
Ali >C21-C35 _A	-	<1	-	3	<1	-	-	-	mg/kg	A-T-455a
Total Aliphatics >C5-C35 _A	-	<1	-	14	<1	-	-	-	mg/kg	A-T-455a
Aro >C5-C7 _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
Aro >C7-C8 _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
Aro >C8-C10 _A ^{MS}	-	<1	-	1	<1	-	-	-	mg/kg	A-T-455a
Aro >C10-C12 _A ^{MS}	-	<1	-	<1	<1	-	-	-	mg/kg	A-T-455a
Aro >C12-C16 _A	-	<1	-	2	<1	-	-	-	mg/kg	A-T-455a
Aro >C16-C21 _A ^{MS}	-	<1	-	2	<1	-	-	-	mg/kg	A-T-455a
Aro >C21-C35 _A ^{MS}	-	<1	-	4	3	-	-	-	mg/kg	A-T-455a
Total Aromatics >C5-C35 _A	-	<1	-	9	3	-	-	-	mg/kg	A-T-455a
TPH (Ali & Aro >C5-C35) _A	-	<1	-	23	3	-	-	-	mg/kg	A-T-455a
BTEX - Benzene _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
BTEX - Toluene _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
BTEX - Ethyl Benzene _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
BTEX - m & p Xylene _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
BTEX - o Xylene _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a
MTBE _A ^g	-	<0.01	-	<0.01	<0.01	-	-	-	mg/kg	A-T-422a

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/9	18/07150/10	18/07150/11	18/07150/12	18/07150/13	18/07150/14	18/07150/15	18/07150/16	Units	Method ref
Client Sample No	102	107	108	104	106	104	102	103		
Client Sample ID	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14		
Depth to Top	0.90	3.20	3.80	2.40	2.50	1.40	0.40	0.70		
Depth To Bottom										
Date Sampled	31-Aug-18	31-Aug-18	31-Aug-18	30-Aug-18	30-Aug-18	29-Aug-18	30-Aug-18	30-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	1A	5A	5	5A	5	5	5AB	5A		
% Stones >10mm	-	8.8	<0.1	-	<0.1	<0.1	-	11.1	% w/w	A/T-044
Asbestos in soil (+concrete, ballast, rocks and aggregates)	Appended	Appended	-	Appended	Appended	Appended	Appended	Appended		Subcom DETS

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/9	18/07150/10	18/07150/11	18/07150/12	18/07150/13	18/07150/14	18/07150/15	18/07150/16	Units	Method ref
Client Sample No	102	107	108	104	106	104	102	103		
Client Sample ID	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14		
Depth to Top	0.90	3.20	3.80	2.40	2.50	1.40	0.40	0.70		
Depth To Bottom										
Date Sampled	31-Aug-18	31-Aug-18	31-Aug-18	30-Aug-18	30-Aug-18	29-Aug-18	30-Aug-18	30-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	1A	5A	5	5A	5	5	5AB	5A		
VOC+TICs										
Dichlorodifluoromethane _A	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Chloromethane _A	-	<10	-	-	-	<10	-	<10	µg/kg	A-T-006a
Vinyl Chloride _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromomethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Chloroethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Trichlorofluoromethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1-Dichloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Carbon Disulphide _A [†]	-	1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Dichloromethane _A	-	<5	-	-	-	<5	-	<5	µg/kg	A-T-006a
trans 1,2-Dichloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1-Dichloroethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
cis 1,2-Dichloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
2,2-Dichloropropane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromochloromethane _A [†]	-	<5	-	-	-	<5	-	<5	µg/kg	A-T-006a
Chloroform _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1,1-Trichloroethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1-Dichloropropene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Carbon Tetrachloride _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2-Dichloroethane _A [†]	-	<2	-	-	-	<2	-	<2	µg/kg	A-T-006a
Benzene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Trichloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2-Dichloropropane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Dibromomethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromodichloromethane _A [†]	-	<10	-	-	-	<10	-	<10	µg/kg	A-T-006a
cis 1,3-Dichloropropene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Toluene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
trans 1,3-Dichloropropene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1,2-Trichloroethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,3-Dichloropropane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Tetrachloroethene _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Dibromochloromethane _A [†]	-	<3	-	-	-	<3	-	<3	µg/kg	A-T-006a
1,2-Dibromoethane _A [†]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/9	18/07150/10	18/07150/11	18/07150/12	18/07150/13	18/07150/14	18/07150/15	18/07150/16	Units	Method ref
Client Sample No	102	107	108	104	106	104	102	103		
Client Sample ID	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14		
Depth to Top	0.90	3.20	3.80	2.40	2.50	1.40	0.40	0.70		
Depth To Bottom										
Date Sampled	31-Aug-18	31-Aug-18	31-Aug-18	30-Aug-18	30-Aug-18	29-Aug-18	30-Aug-18	30-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	1A	5A	5	5A	5	5	5AB	5A		
Chlorobenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1,1,2-Tetrachloroethane _A	-	<1	-	-	-	1	-	<1	µg/kg	A-T-006a
Ethylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
m & p Xylene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
o-Xylene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Styrene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromoform _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Isopropylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,1,2,2-Tetrachloroethane _A	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2,3-Trichloropropane _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
Bromobenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
n-Propylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
2-Chlorotoluene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,3,5-Trimethylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
4-Chlorotoluene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
tert-Butylbenzene _A [®]	-	<2	-	-	-	<2	-	<2	µg/kg	A-T-006a
1,2,4-Trimethylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
sec-Butylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
4-Isopropyltoluene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,3-Dichlorobenzene _A	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,4-Dichlorobenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
n-Butylbenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2-Dichlorobenzene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2-Dibromo-3-chloropropane _A	-	<2	-	-	-	4	-	<2	µg/kg	A-T-006a
1,2,4-Trichlorobenzene _A	-	<3	-	-	-	<3	-	<3	µg/kg	A-T-006a
Hexachlorobutadiene _A [®]	-	<1	-	-	-	<1	-	<1	µg/kg	A-T-006a
1,2,3-Trichlorobenzene _A	-	<3	-	-	-	<3	-	<3	µg/kg	A-T-006a
VOC TICs _A	-	None detected	-	-	-	None detected	-	None detected		A-T-006a

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/9	18/07150/10	18/07150/11	18/07150/12	18/07150/13	18/07150/14	18/07150/15	18/07150/16	Units	Method ref
Client Sample No	102	107	108	104	106	104	102	103		
Client Sample ID	TP8	TP9	TP9	TP10	TP11	TP12	TP13	TP14		
Depth to Top	0.90	3.20	3.80	2.40	2.50	1.40	0.40	0.70		
Depth To Bottom										
Date Sampled	31-Aug-18	31-Aug-18	31-Aug-18	30-Aug-18	30-Aug-18	29-Aug-18	30-Aug-18	30-Aug-18		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	1A	5A	5	5A	5	5	5AB	5A		
TPH CWG										
Ali >C5-C6 _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
Ali >C6-C8 _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
Ali >C8-C10 _A ^{MS}	-	2	5	-	<1	<1	-	<1	mg/kg	A-T-655a
Ali >C10-C12 _A ^{MS}	-	14	20	-	<1	<1	-	<1	mg/kg	A-T-655a
Ali >C12-C16 _A ^{MS}	-	89	72	-	<1	<1	-	<1	mg/kg	A-T-655a
Ali >C16-C21 _A ^{MS}	-	167	132	-	<1	<1	-	<1	mg/kg	A-T-655a
Ali >C21-C35 _A	-	33	25	-	<1	<1	-	3	mg/kg	A-T-655a
Total Aliphatics >C5-C35 _A	-	306	255	-	<1	<1	-	3	mg/kg	A-T-655a
Aro >C5-C7 _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
Aro >C7-C8 _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
Aro >C8-C10 _A ^{MS}	-	2	2	-	<1	<1	-	1	mg/kg	A-T-655a
Aro >C10-C12 _A ^{MS}	-	4	14	-	<1	<1	-	<1	mg/kg	A-T-655a
Aro >C12-C16 _A	-	49	93	-	<1	<1	-	<1	mg/kg	A-T-655a
Aro >C16-C21 _A ^{MS}	-	114	94	-	<1	<1	-	1	mg/kg	A-T-655a
Aro >C21-C35 _A ^{MS}	-	51	40	-	<1	<1	-	6	mg/kg	A-T-655a
Total Aromatics >C5-C35 _A	-	220	244	-	<1	<1	-	8	mg/kg	A-T-655a
TPH (Ali & Aro >C5-C35) _A	-	525	499	-	<1	<1	-	11	mg/kg	A-T-655a
BTEX - Benzene _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
BTEX - Toluene _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
BTEX - Ethyl Benzene _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
BTEX - m & p Xylene _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
BTEX - o Xylene _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a
MTBE _A ^g	-	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-622a

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/17	18/07150/18	18/08070/1						Units	Method ref
Client Sample No	101	104	102							
Client Sample ID	TP15	TP16	TP11							
Depth to Top	0.10	1.20	0.40							
Depth To Bottom										
Date Sampled	31-Aug-18	29-Aug-18	30-Aug-18							
Sample Type	Soil - ES	Soil - ES	Solid - Fragment / Tile							
Sample Matrix Code	4AE	4	8							
% Stones >10mm _A	-	<0.1	-						% w/w	A-T-044
Asbestos in soil (*concrete, ballast, rocks and aggregates) _A *	Appended	-	-							Subcon DETS

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/17	18/07150/18	18/08070/1						Units	Method ref
Client Sample No	101	104	102							
Client Sample ID	TP15	TP16	TP11							
Depth to Top	0.10	1.20	0.40							
Depth To Bottom										
Date Sampled	31-Aug-18	29-Aug-18	30-Aug-18							
Sample Type	Soil - ES	Soil - ES	Solid - Fragment / Tile							
Sample Matrix Code	4AE	4	8							
Bulk Fibre ID (inc. matrix)										
Bulk Fibre Identification ²	-	-	Chrysotile							A-T-045
Bulk Fibre Identification Matrix (visual) _A	-	-	Cement							A-T-045
Bulk Fibre Identification - Suitable for Water Absorption Test? _D	-	-	Yes							Gravimetry

Envirolab Job Number: 18/08070 and 18/07150

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07150/17	18/07150/18	18/08070/1						Units	Method ref
Client Sample No	101	104	102							
Client Sample ID	TP15	TP16	TP11							
Depth to Top	0.10	1.20	0.40							
Depth To Bottom										
Date Sampled	31-Aug-18	29-Aug-18	30-Aug-18							
Sample Type	Soil - ES	Soil - ES	Solid - Fragment / Tile							
Sample Matrix Code	4AE	4	8							
TPH CWG										
Ali >C5-C6 _A ^g	-	<0.01	-						mg/kg	A-T-622a
Ali >C6-C8 _A ^g	-	<0.01	-						mg/kg	A-T-622a
Ali >C8-C10 _A ^{MS}	-	<1	-						mg/kg	A-T-655a
Ali >C10-C12 _A ^{MS}	-	<1	-						mg/kg	A-T-655a
Ali >C12-C16 _A ^{MS}	-	<1	-						mg/kg	A-T-655a
Ali >C16-C21 _A ^{MS}	-	<1	-						mg/kg	A-T-655a
Ali >C21-C35 _A	-	<1	-						mg/kg	A-T-655a
Total Aliphatics >C5-C35 _A	-	<1	-						mg/kg	A-T-655a
Aro >C5-C7 _A ^g	-	<0.01	-						mg/kg	A-T-622a
Aro >C7-C8 _A ^g	-	<0.01	-						mg/kg	A-T-622a
Aro >C8-C10 _A ^{MS}	-	<1	-						mg/kg	A-T-655a
Aro >C10-C12 _A ^{MS}	-	<1	-						mg/kg	A-T-655a
Aro >C12-C16 _A	-	<1	-						mg/kg	A-T-655a
Aro >C16-C21 _A ^{MS}	-	<1	-						mg/kg	A-T-655a
Aro >C21-C35 _A ^{MS}	-	<1	-						mg/kg	A-T-655a
Total Aromatics >C5-C35 _A	-	<1	-						mg/kg	A-T-655a
TPH (Ali & Aro >C5-C35) _A	-	<1	-						mg/kg	A-T-655a
BTEX - Benzene _A ^g	-	<0.01	-						mg/kg	A-T-622a
BTEX - Toluene _A ^g	-	<0.01	-						mg/kg	A-T-622a
BTEX - Ethyl Benzene _A ^g	-	<0.01	-						mg/kg	A-T-622a
BTEX - m & p Xylene _A ^g	-	<0.01	-						mg/kg	A-T-622a
BTEX - o Xylene _A ^g	-	<0.01	-						mg/kg	A-T-622a
MTBE _A ^g	-	<0.01	-						mg/kg	A-T-622a

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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.

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.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/07896
Issue Number: 1
Date: 10 October, 2018

Client: Structural Soils Limited (Bristol)
The Old School
Stillhouse Lane
Bedminster
Bristol
UK
BS3 4EB

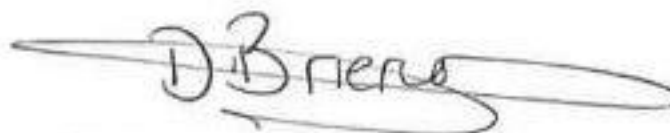
Project Manager: Adam Watts/enviro@soils.co.uk
Project Name: Fulflood Road, Havant
Project Ref: 733845
Order No: N/A
Date Samples Received: 27/09/18
Date Instructions Received: 28/09/18
Date Analysis Completed: 10/10/18

Prepared by:

A handwritten signature in black ink, appearing to read "G. King".

Georgia King
Admin & Client Services Supervisor

Approved by:

A handwritten signature in black ink, appearing to read "D. Brierley".

Danielle Brierley
Client Manager

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/1	18/07896/2	18/07896/3	18/07896/4	18/07896/5	18/07896/6	18/07896/7	18/07896/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
pH (w) _A [®]	6.29	6.87	6.86	7.48	7.16	7.25	7.58	8.00	pH	A-T-031w
Dissolved oxygen _A	<0.5	<0.5	1.6	1.7	2.2	1.1	2.9	7.1	mg/l	A-T-045
Alkalinity (total) (w) Colorimetry _A [®]	359	398	394	148	236	301	115	209	mg/l Ca CO ₃	A-T-028w
Hardness Total _A [®]	700	601	1110	183	588	382	531	232	mg/l Ca CO ₃	A-T-049w
Nitrite (w) _A [®]	<0.10	0.10	<0.10	0.17	0.29	<0.10	<0.10	<0.10	mg/l	A-T-029w
Nitrate (w) _A [®]	1.15	0.25	<0.10	3.84	15.28	<0.10	<0.10	11.19	mg/l	A-T-028w
Sulphate (w) _A [®]	354	189	562	58	418	232	568	30	mg/l	A-T-029w
DIC (w) _A	33.3	29.9	20.5	2.8	6.0	9.0	7.0	6.1	mg/l	A-T-032w
Arsenic (dissolved) _A [®]	13	43	1	<1	<1	<1	1	1	µg/l	A-T-025w
Cadmium (dissolved) _A [®]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	µg/l	A-T-025w
Copper (dissolved) _A [®]	2	<1	2	9	6	10	5	10	µg/l	A-T-025w
Chromium (dissolved) _A [®]	<1	<1	<1	<1	11	9	10	15	µg/l	A-T-025w
Ferrous iron Fell (w) _A	3.8	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/l	Test kit
Lead (dissolved) _A [®]	<1	<1	<1	<1	<1	<1	<1	2	µg/l	A-T-025w
Mercury (dissolved) _A [®]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	µg/l	A-T-025w
Nickel (dissolved) _A [®]	6	2	7	5	2	3	5	2	µg/l	A-T-025w
Selenium (dissolved) _A [®]	<1	<1	<1	<1	2	11	3	<1	µg/l	A-T-025w
Zinc (dissolved) _A [®]	15	9	30	28	8	2	2	14	µg/l	A-T-025w

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/1	18/07896/2	18/07896/3	18/07896/4	18/07896/5	18/07896/6	18/07896/7	18/07896/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
PAH 16MS (w)										
Acenaphthene (w) _A ^g	0.44	0.01	0.02	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Acenaphthylene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Anthracene (w) _A ^g	<0.01	<0.01	0.02	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Benzo(a)anthracene (w) _A ^g	<0.01	<0.01	0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Benzo(a)pyrene (w) _A ^g	<0.01	<0.01	0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Benzo(b)fluoranthene (w) _A ^g	<0.01	<0.01	0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Benzo(ghi)perylene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Benzo(k)fluoranthene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Chrysene (w) _A ^g	<0.01	<0.01	0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Dibenzo(ah)anthracene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Fluoranthene (w) _A ^g	<0.01	<0.01	0.04	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Fluorene (w) _A ^g	0.29	<0.01	0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Indeno(123-cd)pyrene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Naphthalene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Phenanthrene (w) _A ^g	0.01	0.01	0.03	<0.01	<0.01	<0.10	<0.01	0.01	µg/l	A-T-019w
Pyrene (w) _A ^g	<0.01	<0.01	0.03	<0.01	0.01	<0.10	<0.01	<0.01	µg/l	A-T-019w
Total PAH 16MS (w) _A ^g	0.74	0.02	0.19	<0.01	0.01	<0.10	<0.01	0.01	µg/l	A-T-019w

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/1	18/07896/2	18/07896/3	18/07896/4	18/07896/5	18/07896/6	18/07896/7	18/07896/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
VOC+TICs (w)										
Dichlorodifluoromethane _A	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Chloromethane _A	<10	<10	<10	<10	<10	<10	<10	<10	µg/l	A-T-036w
Vinyl Chloride _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Bromomethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Chloroethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Trichlorofluoromethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
trans 1,2-Dichloroethene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Dichloromethane _A	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-036w
Carbon Disulphide _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,1-Dichloroethene _A ^g	<1	<1	<1	<1	<1	<1	2	<1	µg/l	A-T-036w
1,1-Dichloroethane _A ^g	<1	<1	<1	<1	<1	<1	1	<1	µg/l	A-T-036w
cis 1,2-Dichloroethene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Bromochloromethane _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-036w
Chloroform _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
2,2-Dichloropropane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,2-Dichloroethane _A ^g	<2	<2	<2	<2	<2	<2	<2	<2	µg/l	A-T-036w
1,1,1-Trichloroethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,1-Dichloropropene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Benzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Carbon Tetrachloride _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Dibromomethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,2-Dichloropropane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Bromodichloromethane _A ^g	<10	<10	<10	<10	<10	<10	<10	<10	µg/l	A-T-036w
Trichloroethene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
cis 1,3-Dichloropropene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
trans 1,3-Dichloropropene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,1,2-Trichloroethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Toluene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,3-Dichloropropane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Dibromochloromethane _A ^g	<3	<3	<3	<3	<3	<3	<3	<3	µg/l	A-T-036w
1,2-Dibromoethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Tetrachloroethene _A	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/1	18/07896/2	18/07896/3	18/07896/4	18/07896/5	18/07896/6	18/07896/7	18/07896/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
1,1,1,2-Tetrachloroethane _A	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
Chlorobenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
Ethylbenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
m & p Xylene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
Bromoform _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
Styrene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
1,1,1,2,2-Tetrachloroethane _A	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
o-Xylene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
1,2,3-Trichloropropane _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
Isopropylbenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
Bromobenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
2-Chlorotoluene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
n-propylbenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
4-Chlorotoluene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
1,2,4-Trimethylbenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
4-Isopropyltoluene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
1,3,5-Trimethylbenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
1,2-Dichlorobenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
1,4-Dichlorobenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
sec-Butylbenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
tert-Butylbenzene _A [†]	<2	<2	<2	<2	<2	<2	<2	<2	µg/l	A-T-000w
1,3-Dichlorobenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
n-butylbenzene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
1,2-Dibromo-3-chloropropane _A [†]	<2	<2	<2	<2	<2	<2	<2	<2	µg/l	A-T-000w
1,2,4-Trichlorobenzene _A [†]	<3	<3	<3	<3	<3	<3	<3	<3	µg/l	A-T-000w
1,2,3-Trichlorobenzene _A [†]	<3	<3	<3	<3	<3	<3	<3	<3	µg/l	A-T-000w
Hexachlorobutadiene _A [†]	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000w
VOC TICs (Tentatively Identified Compounds) (w) _A	None detected	None detected	None detected	None detected	None detected	None detected	None detected	None detected		A-T-000w

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/1	18/07896/2	18/07896/3	18/07896/4	18/07896/5	18/07896/6	18/07896/7	18/07896/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18	25-Sep-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
TPH CWG (w)										
Ali >C5-C6 (w) _A ^g	<1	1	1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Ali >C6-C8 (w) _A ^g	2	3	1	3	3	3	2	1	µg/l	A-T-022w
Ali >C8-C10 (w) _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Ali >C10-C12 (w) _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Ali >C12-C16 (w) _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Ali >C16-C21 (w) _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Ali >C21-C35 (w) _A ^g	17	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Total Aliphatics >C5-C35 (w) _A ^g	19	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Aro >C5-C7 (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Aro >C7-C8 (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Aro >C8-C10 (w) _A	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Aro >C10-C12 (w) _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Aro >C12-C16 (w) _A ^g	18	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Aro >C16-C21 (w) _A ^g	9	8	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Aro >C21-C35 (w) _A ^g	<10	<10	<10	<10	<10	<10	<10	<10	µg/l	A-T-055w
Total Aromatics >C5-C35 (w) _A	27	<10	<10	<10	<10	<10	<10	<10	µg/l	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	46	12	<10	<10	<10	<10	<10	<10	µg/l	A-T-055w
BTEX - Benzene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - Toluene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - Ethyl Benzene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - m & p Xylene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - o Xylene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
MTBE (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/9								Units	Method ref
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	25-Sep-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
pH (w) _A [®]	7.86								pH	A-T-031w
Dissolved oxygen _A	5.8								mg/l	A-T-045
Alkalinity (total) (w) Colorimetry _A [®]	198								mg/l Ca CO ₃	A-T-038w
Hardness Total _A [®]	217								mg/l Ca CO ₃	A-T-049w
Nitrite (w) _A [®]	0.12								mg/l	A-T-026w
Nitrate (w) _A [®]	14.15								mg/l	A-T-026w
Sulphate (w) _A [®]	42								mg/l	A-T-026w
DIC (w) _A	6.1								mg/l	A-T-032w
Arsenic (dissolved) _A [®]	<1								µg/l	A-T-025w
Cadmium (dissolved) _A [®]	<0.2								µg/l	A-T-025w
Copper (dissolved) _A [®]	9								µg/l	A-T-025w
Chromium (dissolved) _A [®]	2								µg/l	A-T-025w
Ferrous iron Fell (w) _A	<0.1								mg/l	Test kit
Lead (dissolved) _A [®]	<1								µg/l	A-T-025w
Mercury (dissolved) _A [®]	<0.1								µg/l	A-T-025w
Nickel (dissolved) _A [®]	2								µg/l	A-T-025w
Selenium (dissolved) _A [®]	<1								µg/l	A-T-025w
Zinc (dissolved) _A [®]	7								µg/l	A-T-025w

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/9								Units	Method ref
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	25-Sep-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
PAH 16MS (w)										
Acenaphthene (w) _A ^g	<0.10								µg/l	A-T-019w
Acenaphthylene (w) _A ^g	<0.10								µg/l	A-T-019w
Anthracene (w) _A ^g	<0.10								µg/l	A-T-019w
Benzo(a)anthracene (w) _A ^g	<0.10								µg/l	A-T-019w
Benzo(a)pyrene (w) _A ^g	<0.10								µg/l	A-T-019w
Benzo(b)fluoranthene (w) _A ^g	<0.10								µg/l	A-T-019w
Benzo(ghi)perylene (w) _A ^g	<0.10								µg/l	A-T-019w
Benzo(k)fluoranthene (w) _A ^g	<0.10								µg/l	A-T-019w
Chrysene (w) _A ^g	<0.10								µg/l	A-T-019w
Dibenzo(ah)anthracene (w) _A ^g	<0.10								µg/l	A-T-019w
Fluoranthene (w) _A ^g	<0.10								µg/l	A-T-019w
Fluorene (w) _A ^g	<0.10								µg/l	A-T-019w
Indeno(123-cd)pyrene (w) _A ^g	<0.10								µg/l	A-T-019w
Naphthalene (w) _A ^g	<0.10								µg/l	A-T-019w
Phenanthrene (w) _A ^g	<0.10								µg/l	A-T-019w
Pyrene (w) _A ^g	<0.10								µg/l	A-T-019w
Total PAH 16MS (w) _A ^g	<0.10								µg/l	A-T-019w

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/9									
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	25-Sep-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
VOC+TICs (w)										
Dichlorodifluoromethane _A	<1								µg/l	A-T-036w
Chloromethane _A	<10								µg/l	A-T-036w
Vinyl Chloride _A ^g	<1								µg/l	A-T-036w
Bromomethane _A ^g	<1								µg/l	A-T-036w
Chloroethane _A ^g	<1								µg/l	A-T-036w
Trichlorofluoromethane _A ^g	<1								µg/l	A-T-036w
trans 1,2-Dichloroethene _A ^g	<1								µg/l	A-T-036w
Dichloromethane _A	<5								µg/l	A-T-036w
Carbon Disulphide _A ^g	<1								µg/l	A-T-036w
1,1-Dichloroethene _A ^g	<1								µg/l	A-T-036w
1,1-Dichloroethane _A ^g	<1								µg/l	A-T-036w
cis 1,2-Dichloroethene _A ^g	<1								µg/l	A-T-036w
Bromochloromethane _A ^g	<5								µg/l	A-T-036w
Chloroform _A ^g	<1								µg/l	A-T-036w
2,2-Dichloropropane _A ^g	<1								µg/l	A-T-036w
1,2-Dichloroethane _A ^g	<2								µg/l	A-T-036w
1,1,1-Trichloroethane _A ^g	<1								µg/l	A-T-036w
1,1-Dichloropropene _A ^g	<1								µg/l	A-T-036w
Benzene _A ^g	<1								µg/l	A-T-036w
Carbon Tetrachloride _A ^g	<1								µg/l	A-T-036w
Dibromomethane _A ^g	<1								µg/l	A-T-036w
1,2-Dichloropropane _A ^g	<1								µg/l	A-T-036w
Bromodichloromethane _A ^g	<10								µg/l	A-T-036w
Trichloroethene _A ^g	<1								µg/l	A-T-036w
cis 1,3-Dichloropropene _A ^g	<1								µg/l	A-T-036w
trans 1,3-Dichloropropene _A ^g	<1								µg/l	A-T-036w
1,1,2-Trichloroethane _A ^g	<1								µg/l	A-T-036w
Toluene _A ^g	<1								µg/l	A-T-036w
1,3-Dichloropropane _A ^g	<1								µg/l	A-T-036w
Dibromochloromethane _A ^g	<3								µg/l	A-T-036w
1,2-Dibromoethane _A ^g	<1								µg/l	A-T-036w
Tetrachloroethene _A	<1								µg/l	A-T-036w

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/9								Units	Method ref
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	25-Sep-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
1,1,1,2-Tetrachloroethane _A	<1								µg/l	A-T-000e
Chlorobenzene _A ^g	<1								µg/l	A-T-000e
Ethylbenzene _A ^g	<1								µg/l	A-T-000e
m & p Xylene _A ^g	<1								µg/l	A-T-000e
Bromoform _A ^g	<1								µg/l	A-T-000e
Styrene _A ^g	<1								µg/l	A-T-000e
1,1,2,2-Tetrachloroethane _A	<1								µg/l	A-T-000e
o-Xylene _A ^g	<1								µg/l	A-T-000e
1,2,3-Trichloropropane _A ^g	<1								µg/l	A-T-000e
Isopropylbenzene _A ^g	<1								µg/l	A-T-000e
Bromobenzene _A ^g	<1								µg/l	A-T-000e
2-Chlorotoluene _A ^g	<1								µg/l	A-T-000e
n-propylbenzene _A ^g	<1								µg/l	A-T-000e
4-Chlorotoluene _A ^g	<1								µg/l	A-T-000e
1,2,4-Trimethylbenzene _A ^g	<1								µg/l	A-T-000e
4-Isopropyltoluene _A ^g	<1								µg/l	A-T-000e
1,3,5-Trimethylbenzene _A ^g	<1								µg/l	A-T-000e
1,2-Dichlorobenzene _A ^g	<1								µg/l	A-T-000e
1,4-Dichlorobenzene _A ^g	<1								µg/l	A-T-000e
sec-Butylbenzene _A ^g	<1								µg/l	A-T-000e
tert-Butylbenzene _A ^g	<2								µg/l	A-T-000e
1,3-Dichlorobenzene _A ^g	<1								µg/l	A-T-000e
n-butylbenzene _A ^g	<1								µg/l	A-T-000e
1,2-Dibromo-3-chloropropane _A ^g	<2								µg/l	A-T-000e
1,2,4-Trichlorobenzene _A ^g	<3								µg/l	A-T-000e
1,2,3-Trichlorobenzene _A ^g	<3								µg/l	A-T-000e
Hexachlorobutadiene _A ^g	<1								µg/l	A-T-000e
VOC TICs (Tentatively Identified Compounds) (w) _A	None detected									A-T-000e

Envirolab Job Number: 18/07896

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/07896/9								Units	Method ref
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	25-Sep-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
TPH CWG (w)										
Ali >C5-C6 (w) _A ^g	1								µg/l	A-T-022w
Ali >C6-C8 (w) _A ^g	2								µg/l	A-T-022w
Ali >C8-C10 (w) _A ^g	<5								µg/l	A-T-055w
Ali >C10-C12 (w) _A ^g	<5								µg/l	A-T-055w
Ali >C12-C16 (w) _A ^g	<5								µg/l	A-T-055w
Ali >C16-C21 (w) _A ^g	<5								µg/l	A-T-055w
Ali >C21-C35 (w) _A ^g	<5								µg/l	A-T-055w
Total Aliphatics >C5-C35 (w) _A ^g	<5								µg/l	A-T-055w
Aro >C5-C7 (w) _A ^g	<1								µg/l	A-T-022w
Aro >C7-C8 (w) _A ^g	<1								µg/l	A-T-022w
Aro >C8-C10 (w) _A	<5								µg/l	A-T-055w
Aro >C10-C12 (w) _A ^g	<5								µg/l	A-T-055w
Aro >C12-C16 (w) _A ^g	<5								µg/l	A-T-055w
Aro >C16-C21 (w) _A ^g	<5								µg/l	A-T-055w
Aro >C21-C35 (w) _A ^g	<10								µg/l	A-T-055w
Total Aromatics >C5-C35 (w) _A	<10								µg/l	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	<10								µg/l	A-T-055w
BTEX - Benzene (w) _A ^g	<1								µg/l	A-T-022w
BTEX - Toluene (w) _A ^g	<1								µg/l	A-T-022w
BTEX - Ethyl Benzene (w) _A ^g	<1								µg/l	A-T-022w
BTEX - m & p Xylene (w) _A ^g	<1								µg/l	A-T-022w
BTEX - o Xylene (w) _A ^g	<1								µg/l	A-T-022w
MTBE (w) _A ^g	<1								µg/l	A-T-022w

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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.

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.

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/08563
Issue Number: 1
Date: 29 October, 2018

Client: Structural Soils Limited (Bristol)
The Old School
Stillhouse Lane
Bedminster
Bristol
UK
BS3 4EB

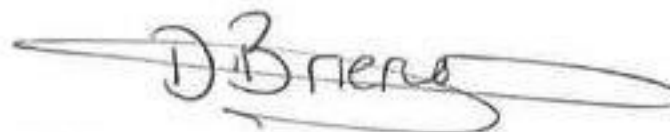
Project Manager: Adam Watts/enviro@soils.co.uk
Project Name: Fulflood Road, Havant
Project Ref: 733845
Order No: N/A
Date Samples Received: 17/10/18
Date Instructions Received: 17/10/18
Date Analysis Completed: 29/10/18

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Danielle Brierley
Client Manager

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/1	18/08563/2	18/08563/3	18/08563/4	18/08563/5	18/08563/6	18/08563/7	18/08563/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
pH (w) _A [®]	6.49	7.29	6.70	7.58	7.81	7.67	7.61	7.36	pH	A-T-031w
Dissolved oxygen _A	<0.5	<0.5	2.3	1.3	7.1	6.0	6.7	6.8	mg/l	A-T-045
Alkalinity (total) (w) Colorimetry _A [®]	393	355	398	117	146	253	31	51	mg/l Ca CO ₃	A-T-028w
Hardness Total _A [®]	881	837	1051	225	637	320	267	154	mg/l Ca CO ₃	A-T-049w
Nitrite (w) _A [®]	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	mg/l	A-T-029w
Nitrate (w) _A [®]	11.11	8.83	<0.10	16.33	15.15	<0.10	0.35	8.02	mg/l	A-T-028w
Sulphate (w) _A [®]	338	442	556	62	501	185	281	81	mg/l	A-T-029w
DIC (w) _A	4.3	<0.2	5.7	<0.2	<0.2	<0.2	<0.2	<0.2	mg/l	A-T-032w
Arsenic (dissolved) _A [®]	3	3	2	<1	4	1	<1	<1	µg/l	A-T-025w
Cadmium (dissolved) _A [®]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	µg/l	A-T-025w
Copper (dissolved) _A [®]	4	10	<1	6	11	13	6	10	µg/l	A-T-025w
Chromium (dissolved) _A [®]	1	2	<1	<1	10	7	17	9	µg/l	A-T-025w
Ferrous iron Fell (w) _A	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/l	Test kit
Lead (dissolved) _A [®]	<1	<1	<1	2	<1	<1	<1	<1	µg/l	A-T-025w
Mercury (dissolved) _A [®]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	µg/l	A-T-025w
Nickel (dissolved) _A [®]	7	3	8	3	2	3	1	3	µg/l	A-T-025w
Selenium (dissolved) _A [®]	<1	2	<1	<1	2	6	<1	<1	µg/l	A-T-025w
Zinc (dissolved) _A [®]	21	22	14	12	7	<1	<1	12	µg/l	A-T-025w

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/1	18/08563/2	18/08563/3	18/08563/4	18/08563/5	18/08563/6	18/08563/7	18/08563/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
PAH 16MS (w)										
Acenaphthene (w) _A ^g	0.16	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Acenaphthylene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Anthracene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Benzo(a)anthracene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Benzo(a)pyrene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Benzo(b)fluoranthene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Benzo(ghi)perylene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Benzo(k)fluoranthene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Chrysene (w) _A ^g	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Dibenzo(ah)anthracene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Fluoranthene (w) _A ^g	0.01	0.03	0.03	<0.01	0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Fluorene (w) _A ^g	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Indeno(123-cd)pyrene (w) _A ^g	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Naphthalene (w) _A ^g	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Phenanthrene (w) _A ^g	0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Pyrene (w) _A ^g	0.01	0.02	0.03	0.01	0.01	<0.01	<0.01	<0.01	µg/l	A-T-019w
Total PAH 16MS (w) _A ^g	0.30	0.07	0.11	0.01	0.02	<0.01	<0.01	<0.01	µg/l	A-T-019w

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/1	18/08563/2	18/08563/3	18/08563/4	18/08563/5	18/08563/6	18/08563/7	18/08563/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
VOC+TICs (w)										
Dichlorodifluoromethane _A	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Chloromethane _A	<10	<10	<10	<10	<10	<10	<10	<10	µg/l	A-T-036w
Vinyl Chloride _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Bromomethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Chloroethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Trichlorofluoromethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
trans 1,2-Dichloroethene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Dichloromethane _A	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-036w
Carbon Disulphide _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,1-Dichloroethene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,1-Dichloroethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
cis 1,2-Dichloroethene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Bromochloromethane _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-036w
Chloroform _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
2,2-Dichloropropane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,2-Dichloroethane _A ^g	<2	<2	<2	<2	<2	<2	<2	<2	µg/l	A-T-036w
1,1,1-Trichloroethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,1-Dichloropropene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Benzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Carbon Tetrachloride _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Dibromomethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,2-Dichloropropane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Bromodichloromethane _A ^g	<10	<10	<10	<10	<10	<10	<10	<10	µg/l	A-T-036w
Trichloroethene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
cis 1,3-Dichloropropene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
trans 1,3-Dichloropropene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,1,2-Trichloroethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Toluene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
1,3-Dichloropropane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Dibromochloromethane _A ^g	<3	<3	<3	<3	<3	<3	<3	<3	µg/l	A-T-036w
1,2-Dibromoethane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w
Tetrachloroethene _A	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-036w

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/1	18/08563/2	18/08563/3	18/08563/4	18/08563/5	18/08563/6	18/08563/7	18/08563/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
1,1,1,2-Tetrachloroethane _A	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
Chlorobenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
Ethylbenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
m & p Xylene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
Bromoform _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
Styrene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
1,1,2,2-Tetrachloroethane _A	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
o-Xylene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
1,2,3-Trichloropropane _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
Isopropylbenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
Bromobenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
2-Chlorotoluene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
n-propylbenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
4-Chlorotoluene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
1,2,4-Trimethylbenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
4-Isopropyltoluene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
1,3,5-Trimethylbenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
1,2-Dichlorobenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
1,4-Dichlorobenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
sec-Butylbenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
tert-Butylbenzene _A ^g	<2	<2	<2	<2	<2	<2	<2	<2	µg/l	A-T-000e
1,3-Dichlorobenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
n-butylbenzene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
1,2-Dibromo-3-chloropropane _A ^g	<2	<2	<2	<2	<2	<2	<2	<2	µg/l	A-T-000e
1,2,4-Trichlorobenzene _A ^g	<3	<3	<3	<3	<3	<3	<3	<3	µg/l	A-T-000e
1,2,3-Trichlorobenzene _A ^g	<3	<3	<3	<3	<3	<3	<3	<3	µg/l	A-T-000e
Hexachlorobutadiene _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-000e
VOC TICs (Tentatively Identified Compounds) (w) _A	None detected	None detected	None detected	None detected	None detected	None detected	None detected	None detected		A-T-000e

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/1	18/08563/2	18/08563/3	18/08563/4	18/08563/5	18/08563/6	18/08563/7	18/08563/8	Units	Method ref
Client Sample No	1	1	1	1	1	1	1	1		
Client Sample ID	WS1	WS2A	WS3	WS4	WS5	WS6	WS7	SW1		
Depth to Top	3.40	3.55	4.00	3.30	3.50	3.00	3.35			
Depth To Bottom										
Date Sampled	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18	15-Oct-18		
Sample Type	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW	Water - EW		
Sample Matrix Code	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
TPH CWG (w)										
Ali >C5-C6 (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Ali >C6-C8 (w) _A ^g	<1	1	<1	<1	<1	1	<1	<1	µg/l	A-T-022w
Ali >C8-C10 (w) _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Ali >C10-C12 (w) _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Ali >C12-C16 (w) _A ^g	<5	<5	<5	<5	<5	<5	<5	<5	µg/l	A-T-055w
Ali >C16-C21 (w) _A ^g	<5	<5	<5	55	<5	<5	<5	<5	µg/l	A-T-055w
Ali >C21-C35 (w) _A ^g	15	<5	<5	329	<5	<5	12	6	µg/l	A-T-055w
Total Aliphatics >C5-C35 (w) _A ^g	15	<5	<5	384	<5	<5	12	6	µg/l	A-T-055w
Aro >C5-C7 (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Aro >C7-C8 (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
Aro >C8-C10 (w) _A	5	<5	<5	11	<5	<5	<5	<5	µg/l	A-T-055w
Aro >C10-C12 (w) _A ^g	<5	<5	<5	7	<5	<5	<5	<5	µg/l	A-T-055w
Aro >C12-C16 (w) _A ^g	13	<5	<5	19	<5	<5	<5	<5	µg/l	A-T-055w
Aro >C16-C21 (w) _A ^g	11	<5	<5	127	<5	<5	7	<5	µg/l	A-T-055w
Aro >C21-C35 (w) _A ^g	12	<10	<10	326	<10	<10	12	13	µg/l	A-T-055w
Total Aromatics >C5-C35 (w) _A	41	<10	<10	490	<10	<10	19	13	µg/l	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	56	<10	<10	874	<10	<10	30	19	µg/l	A-T-055w
BTEX - Benzene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - Toluene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - Ethyl Benzene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - m & p Xylene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
BTEX - o Xylene (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w
MTBE (w) _A ^g	<1	<1	<1	<1	<1	<1	<1	<1	µg/l	A-T-022w

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/9								Units	Method ref
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	15-Oct-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
pH (w) _A [®]	7.40								pH	A-T-031w
Dissolved oxygen _A	7.0								mg/l	A-T-045
Alkalinity (total) (w) Colorimetry _A [®]	54								mg/l Ca CO ₃	A-T-028w
Hardness Total _A [®]	165								mg/l Ca CO ₃	A-T-049w
Nitrite (w) _A [®]	<0.10								mg/l	A-T-026w
Nitrate (w) _A [®]	8.07								mg/l	A-T-026w
Sulphate (w) _A [®]	88								mg/l	A-T-026w
DIC (w) _A	<0.2								mg/l	A-T-032w
Arsenic (dissolved) _A [®]	<1								µg/l	A-T-025w
Cadmium (dissolved) _A [®]	<0.2								µg/l	A-T-025w
Copper (dissolved) _A [®]	12								µg/l	A-T-025w
Chromium (dissolved) _A [®]	10								µg/l	A-T-025w
Ferrous iron Fell (w) _A	<0.1								mg/l	Test kit
Lead (dissolved) _A [®]	<1								µg/l	A-T-025w
Mercury (dissolved) _A [®]	<0.1								µg/l	A-T-025w
Nickel (dissolved) _A [®]	3								µg/l	A-T-025w
Selenium (dissolved) _A [®]	<1								µg/l	A-T-025w
Zinc (dissolved) _A [®]	11								µg/l	A-T-025w

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/9								Units	Method ref
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	15-Oct-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
PAH 16MS (w)										
Acenaphthene (w) _A ^g	<0.01								µg/l	A-T-019w
Acenaphthylene (w) _A ^g	<0.01								µg/l	A-T-019w
Anthracene (w) _A ^g	<0.01								µg/l	A-T-019w
Benzo(a)anthracene (w) _A ^g	<0.01								µg/l	A-T-019w
Benzo(a)pyrene (w) _A ^g	<0.01								µg/l	A-T-019w
Benzo(b)fluoranthene (w) _A ^g	<0.01								µg/l	A-T-019w
Benzo(ghi)perylene (w) _A ^g	<0.01								µg/l	A-T-019w
Benzo(k)fluoranthene (w) _A ^g	<0.01								µg/l	A-T-019w
Chrysene (w) _A ^g	<0.01								µg/l	A-T-019w
Dibenzo(ah)anthracene (w) _A ^g	<0.01								µg/l	A-T-019w
Fluoranthene (w) _A ^g	<0.01								µg/l	A-T-019w
Fluorene (w) _A ^g	<0.01								µg/l	A-T-019w
Indeno(123-cd)pyrene (w) _A ^g	<0.01								µg/l	A-T-019w
Naphthalene (w) _A ^g	0.03								µg/l	A-T-019w
Phenanthrene (w) _A ^g	<0.01								µg/l	A-T-019w
Pyrene (w) _A ^g	<0.01								µg/l	A-T-019w
Total PAH 16MS (w) _A ^g	0.03								µg/l	A-T-019w

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/9									
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	15-Oct-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
VOC+TICs (w)										
Dichlorodifluoromethane _A	<1								µg/l	A-T-036w
Chloromethane _A	<10								µg/l	A-T-036w
Vinyl Chloride _A ^g	<1								µg/l	A-T-036w
Bromomethane _A ^g	<1								µg/l	A-T-036w
Chloroethane _A ^g	<1								µg/l	A-T-036w
Trichlorofluoromethane _A ^g	<1								µg/l	A-T-036w
trans 1,2-Dichloroethene _A ^g	<1								µg/l	A-T-036w
Dichloromethane _A	<5								µg/l	A-T-036w
Carbon Disulphide _A ^g	<1								µg/l	A-T-036w
1,1-Dichloroethene _A ^g	<1								µg/l	A-T-036w
1,1-Dichloroethane _A ^g	<1								µg/l	A-T-036w
cis 1,2-Dichloroethene _A ^g	<1								µg/l	A-T-036w
Bromochloromethane _A ^g	<5								µg/l	A-T-036w
Chloroform _A ^g	<1								µg/l	A-T-036w
2,2-Dichloropropane _A ^g	<1								µg/l	A-T-036w
1,2-Dichloroethane _A ^g	<2								µg/l	A-T-036w
1,1,1-Trichloroethane _A ^g	<1								µg/l	A-T-036w
1,1-Dichloropropene _A ^g	<1								µg/l	A-T-036w
Benzene _A ^g	<1								µg/l	A-T-036w
Carbon Tetrachloride _A ^g	<1								µg/l	A-T-036w
Dibromomethane _A ^g	<1								µg/l	A-T-036w
1,2-Dichloropropane _A ^g	<1								µg/l	A-T-036w
Bromodichloromethane _A ^g	<10								µg/l	A-T-036w
Trichloroethene _A ^g	<1								µg/l	A-T-036w
cis 1,3-Dichloropropene _A ^g	<1								µg/l	A-T-036w
trans 1,3-Dichloropropene _A ^g	<1								µg/l	A-T-036w
1,1,2-Trichloroethane _A ^g	<1								µg/l	A-T-036w
Toluene _A ^g	<1								µg/l	A-T-036w
1,3-Dichloropropane _A ^g	<1								µg/l	A-T-036w
Dibromochloromethane _A ^g	<3								µg/l	A-T-036w
1,2-Dibromoethane _A ^g	<1								µg/l	A-T-036w
Tetrachloroethene _A	<1								µg/l	A-T-036w

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/9								Units	Method ref
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	15-Oct-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
1,1,1,2-Tetrachloroethane _A	<1								µg/l	A-T-000e
Chlorobenzene _A ^g	<1								µg/l	A-T-000e
Ethylbenzene _A ^g	<1								µg/l	A-T-000e
m & p Xylene _A ^g	<1								µg/l	A-T-000e
Bromoform _A ^g	<1								µg/l	A-T-000e
Styrene _A ^g	<1								µg/l	A-T-000e
1,1,2,2-Tetrachloroethane _A	<1								µg/l	A-T-000e
o-Xylene _A ^g	<1								µg/l	A-T-000e
1,2,3-Trichloropropane _A ^g	<1								µg/l	A-T-000e
Isopropylbenzene _A ^g	<1								µg/l	A-T-000e
Bromobenzene _A ^g	<1								µg/l	A-T-000e
2-Chlorotoluene _A ^g	<1								µg/l	A-T-000e
n-propylbenzene _A ^g	<1								µg/l	A-T-000e
4-Chlorotoluene _A ^g	<1								µg/l	A-T-000e
1,2,4-Trimethylbenzene _A ^g	<1								µg/l	A-T-000e
4-Isopropyltoluene _A ^g	<1								µg/l	A-T-000e
1,3,5-Trimethylbenzene _A ^g	<1								µg/l	A-T-000e
1,2-Dichlorobenzene _A ^g	<1								µg/l	A-T-000e
1,4-Dichlorobenzene _A ^g	<1								µg/l	A-T-000e
sec-Butylbenzene _A ^g	<1								µg/l	A-T-000e
tert-Butylbenzene _A ^g	<2								µg/l	A-T-000e
1,3-Dichlorobenzene _A ^g	<1								µg/l	A-T-000e
n-butylbenzene _A ^g	<1								µg/l	A-T-000e
1,2-Dibromo-3-chloropropane _A ^g	<2								µg/l	A-T-000e
1,2,4-Trichlorobenzene _A ^g	<3								µg/l	A-T-000e
1,2,3-Trichlorobenzene _A ^g	<3								µg/l	A-T-000e
Hexachlorobutadiene _A ^g	<1								µg/l	A-T-000e
VOC TICs (Tentatively Identified Compounds) (w) _A	None detected									A-T-000e

Envirolab Job Number: 18/08563

Client Project Name: Fulflood Road, Havant

Client Project Ref: 733845

Lab Sample ID	18/08563/9								Units	Method ref
Client Sample No	1									
Client Sample ID	SW2									
Depth to Top										
Depth To Bottom										
Date Sampled	15-Oct-18									
Sample Type	Water - EW									
Sample Matrix Code	N/A									
TPH CWG (w)										
Ali >C5-C6 (w) _A ^g	<1								µg/l	A-T-022w
Ali >C6-C8 (w) _A ^g	<1								µg/l	A-T-022w
Ali >C8-C10 (w) _A ^g	<5								µg/l	A-T-055w
Ali >C10-C12 (w) _A ^g	<5								µg/l	A-T-055w
Ali >C12-C16 (w) _A ^g	<5								µg/l	A-T-055w
Ali >C16-C21 (w) _A ^g	<5								µg/l	A-T-055w
Ali >C21-C35 (w) _A ^g	<5								µg/l	A-T-055w
Total Aliphatics >C5-C35 (w) _A ^g	<5								µg/l	A-T-055w
Aro >C5-C7 (w) _A ^g	<1								µg/l	A-T-022w
Aro >C7-C8 (w) _A ^g	<1								µg/l	A-T-022w
Aro >C8-C10 (w) _A	<5								µg/l	A-T-055w
Aro >C10-C12 (w) _A ^g	<5								µg/l	A-T-055w
Aro >C12-C16 (w) _A ^g	<5								µg/l	A-T-055w
Aro >C16-C21 (w) _A ^g	<5								µg/l	A-T-055w
Aro >C21-C35 (w) _A ^g	<10								µg/l	A-T-055w
Total Aromatics >C5-C35 (w) _A	<10								µg/l	A-T-055w
TPH (Ali & Aro >C5-C35) (w) _A	<10								µg/l	A-T-055w
BTEX - Benzene (w) _A ^g	<1								µg/l	A-T-022w
BTEX - Toluene (w) _A ^g	<1								µg/l	A-T-022w
BTEX - Ethyl Benzene (w) _A ^g	<1								µg/l	A-T-022w
BTEX - m & p Xylene (w) _A ^g	<1								µg/l	A-T-022w
BTEX - o Xylene (w) _A ^g	<1								µg/l	A-T-022w
MTBE (w) _A ^g	<1								µg/l	A-T-022w

REPORT NOTES

General:

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

All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.

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.

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.

United Kingdom Accreditation Service

ACCREDITATION CERTIFICATE



TESTING LABORATORY
No. 1247

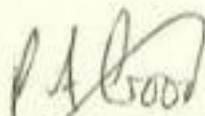
Envirolab

is accredited in accordance with the recognised International Standard ISO/IEC 17025:2005
General Requirements for the competence of testing and calibration laboratories.

This accreditation demonstrates technical competence for a defined scope as detailed in and at the locations specified in the schedule to this certificate, and the operation of a laboratory quality management system (refer joint ISO-ILAC-IAF Communiqué dated January 2009).

The schedule to this certificate is an essential accreditation document and from time to time may be revised and reissued by the United Kingdom Accreditation Service. The most recent issue of the schedule of accreditation, which bears the same accreditation number as this certificate, is available from the UKAS website www.ukas.com.

This accreditation is subject to continuing conformity with United Kingdom Accreditation Service requirements. The absence of a schedule on the UKAS website indicates that the accreditation is no longer in force.



Accreditation Manager, United Kingdom Accreditation Service

Initial Accreditation date
2 December 1992

This certificate issued on
12 November 2012

UKAS is appointed as the sole national accreditation body for the UK by The Accreditation Regulations 2009 (SI No 3155/2009) and operates under a Memorandum of Understanding (MoU) with the Department for Business, Innovation and Skills (BIS).

APPENDIX D - BACKGROUND TO GEOENVIRONMENTAL ASSESSMENT

- (i) RSK Group Generic Assessment Criteria (GAC)
- (ii) Risk Assessment Methodology

Generic assessment criteria for human health: commercial scenario

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 only C4SL exposure modification relevant to a commercial end use are daily inhalation rates.

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.

Pathway selection

In accordance with SR3⁽⁵⁾ the commercial scenario considers risks to a female worker who works from the age of 16 to 65 years. It should be noted that this end use is not suitable for a workplace nursery but may be appropriate for a sports centre or shopping centre where children are present. In accordance with Box 3.5, SR3⁽⁵⁾ the pathways considered for production of the SAC in the commercial scenario are

- direct soil and dust ingestion
- dermal contact with soil both indoors and outdoors
- indoor air inhalation from soil and vapour and outdoor inhalation of soil and vapour.

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, methyl tertiary-butyl ether (MTBE), 1,1,2-trichloroethane, 1,1-dichloroethene, 1,2-dichloropropane, 2-chloronaphthalene, chloroethane, chloromethane, cis 1,2-dichloroethene, dichloromethane, hexachloroethane and trans 1,2-dichloroethene 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 commercial end use, the CLEA default pre-1970s three-storey office building was used. SR3⁽⁵⁾ notes this commercial building type to be the most conservative in terms of protection from vapour intrusion. The default input building parameters presented in Table 3.10 of SR3⁽⁵⁾ have been used.

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 this 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 a commercial land use

In summary, the RSK commercial 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 Table 2 below. The sole modification to the default commercial input parameters is the updated inhalation rate.

The final selected GAC are presented by pathway in Table 3 with the combined GAC in Table 4.

Figure 1: Conceptual model for CLEA commercial scenario

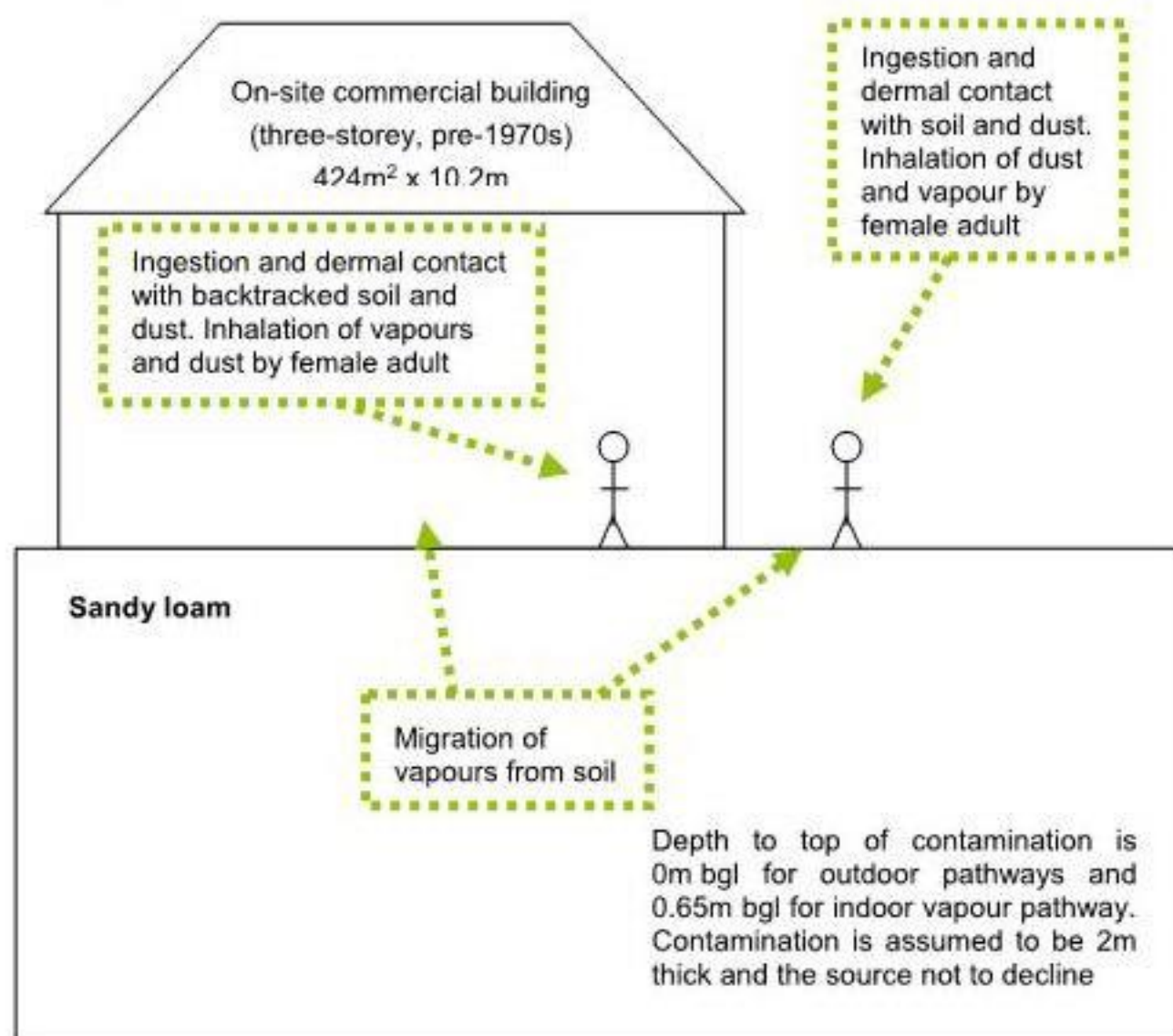


Table 1: Exposure assessment parameters for commercial scenario – inputs for CLEA model

Parameter	Value	Justification
Land use	Commercial	Chosen land use
Receptor	Female worker	Taken as female adult exposed over 49 years from age 16 to 65 years, Box 3.5, SR3 ⁽⁵⁾
Building	Office (pre-1970)	Key generic assumption given in Box 3.5, SR3 ⁽⁵⁾ . Pre-1970s three-storey office building chosen as it is the most conservative in terms of protection from vapour intrusion (Section 3.4.6, SR3 ⁽⁵⁾)
Soil type	Sandy loam	Most common UK soil type (Section 4.3.1, Table 4.4, SR3 ⁽⁵⁾)
Start age class (AC)	17	AC corresponding to key generic assumption that the critical receptor is a working female adult exposed over a 49-year period from age 16 to 65 years. Assumption given in Box 3.5, SR3 ⁽⁵⁾
End AC	17	
SOM (%)	6	Representative of sandy loam 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: Commercial – modified receptor inputs

Parameter	Unit	Value	Justification
Inhalation rate (AC17)	m ³ day ⁻¹	15.7	Mean value USEPA, 2011 ⁽¹²⁾ ; Table 3.2, SP1010 ⁽³⁾

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14. USEPA (2010). Hydrogen cyanide and cyanide salts. Integrated Risk Information Systems (IRIS) Chemical Assessment Summary. September 2010. <https://www.epa.gov/iris> (accessed 9 December 2015)

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL



Table 2

Human health generic assessment criteria by pathway for commercial 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)	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR	6.35E+02	1.25E+03	NR	NR
Cadmium	(a)	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR	7.73E+02	8.57E+02	4.10E+02	NR
Chromium (III) - hexavalent	(c)	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR	3.31E+05	8.57E+03	NR	NR
Chromium (VI) - hexavalent	(a,d)	8.62E+02	4.91E+01	NR	NR	8.62E+02	4.91E+01	NR	NR	8.62E+02	4.91E+01	NR	NR
Copper		1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR	1.89E+05	8.96E+04	6.83E+04	NR
Lead	(a)	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR	2.32E+03	NR	NR	NR
Elemental Mercury (Hg ⁰)	(d)	NR	NR	NR	4.31E+00	NR	NR	NR	1.07E+01	NR	NR	NR	2.58E+01
Inorganic Mercury (Hg ²⁺)		1.18E+03	1.87E+04	1.12E+03	NR	1.18E+03	1.87E+04	1.12E+03	NR	1.18E+03	1.87E+04	1.12E+03	NR
Methyl Mercury (Hg ⁺)		NR	NR	NR	7.33E+01	3.38E+02	3.87E+03	3.11E+02	1.43E+02	3.38E+02	7.33E+03	3.23E+02	3.04E+02
Nickel	(d)	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR	3.06E+03	9.83E+02	NR	NR
Selenium	(b)	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR	1.23E+04	NR	NR	NR
Zinc	(b)	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR	7.35E+05	1.97E+08	NR	NR
Cyanide (free)		6.58E+02	7.51E+04	6.53E+02	NR	6.58E+02	7.51E+04	6.53E+02	NR	6.58E+02	7.51E+04	6.53E+02	NR
Volatile Organic Compounds													
Benzene	(a)	1.09E+03	2.79E+01	2.72E+01	1.22E+03	1.09E+03	5.19E+01	4.96E+01	2.28E+03	1.09E+03	1.08E+02	8.80E+01	4.71E+03
Toluene		NR	NR	NR	8.89E+02	NR	NR	NR	1.92E+03	NR	NR	NR	4.36E+03
Ethylbenzene		NR	NR	NR	5.18E+02	NR	NR	NR	1.22E+03	NR	NR	NR	2.84E+03
Xylene - m		NR	NR	NR	6.25E+02	NR	NR	NR	1.47E+03	NR	NR	NR	3.46E+03
Xylene - o		NR	NR	NR	4.78E+02	NR	NR	NR	1.12E+03	NR	NR	NR	2.82E+03
Xylene - p		NR	NR	NR	5.76E+02	NR	NR	NR	1.35E+03	NR	NR	NR	3.17E+03
Total xylene		NR	NR	NR	6.25E+02	NR	NR	NR	1.47E+03	NR	NR	NR	3.46E+03
Methyl tertiary-butyl ether (MTBE)		NR	7.58E+03	7.48E+03	2.04E+04	NR	1.23E+04	1.21E+04	3.31E+04	NR	2.34E+04	2.24E+04	6.27E+04
1,1,1,2-Tetrachloroethane		NR	1.09E+02	1.08E+02	2.80E+03	NR	2.55E+02	2.47E+02	6.02E+03	1.10E+04	5.88E+02	5.59E+02	1.40E+04
1,1,2,2-Tetrachloroethane		NR	2.81E+02	2.74E+02	2.67E+03	NR	6.75E+02	5.46E+02	5.46E+03	1.10E+04	1.26E+03	1.13E+03	1.20E+04
1,1,1-Trichloroethane		NR	6.60E+02	6.60E+02	1.43E+03	NR	1.35E+03	1.35E+03	2.92E+03	NR	2.96E+03	2.96E+03	6.39E+03
1,1,2-Trichloroethane		NR	9.02E+01	8.91E+01	4.03E+03	NR	1.84E+02	1.80E+02	8.21E+03	NR	4.02E+02	3.82E+02	1.80E+04
1,1-Dichloroethane		NR	2.43E+01	2.43E+01	2.23E+03	NR	4.30E+01	4.30E+01	3.94E+03	NR	8.68E+01	8.67E+01	7.94E+03
1,2-Dichloroethane		NR	6.73E+01	6.71E+01	3.41E+03	2.29E+02	9.71E+01	9.67E+01	4.61E+03	2.29E+02	1.67E+02	1.65E+02	8.43E+03
1,2,4-Trimethylbenzene		NR	3.29E+02	NR	4.74E+02	NR	6.41E+02	NR	1.14E+03	NR	1.04E+03	NR	2.76E+03
1,3,5-Trimethylbenzene	(a)	NR	NR	NR	2.30E+02	NR	NR	NR	5.52E+02	NR	NR	NR	1.30E+03
1,2-Dichloropropane		NR	3.14E+00	3.13E+00	1.19E+03	NR	5.54E+00	5.54E+00	2.11E+03	NR	1.11E+01	1.11E+01	4.24E+03
Carbon Tetrachloride (tetrachloromethane)		NR	2.87E+00	2.87E+00	1.52E+03	NR	6.28E+00	6.28E+00	3.32E+03	NR	1.43E+01	1.42E+01	7.54E+03
Chloroethane		NR	8.01E+02	NR	2.61E+03	NR	1.22E+03	NR	3.54E+03	NR	1.97E+03	NR	5.71E+03
Chloromethane		NR	9.54E+01	NR	1.91E+03	NR	1.11E+00	NR	2.24E+03	NR	1.49E+00	NR	2.99E+03
Cis 1,2 Dichloroethane		1.36E+01	NR	NR	3.94E+03	2.29E+01	NR	NR	6.61E+03	4.44E+01	NR	NR	1.29E+04
Dichloromethane		NR	2.63E+02	2.57E+02	7.27E+03	9.04E+03	3.50E+02	3.29E+02	9.63E+03	9.04E+03	5.53E+02	5.26E+02	1.53E+04
Tetrachloroethene		NR	1.88E+01	1.86E+01	4.24E+02	NR	4.17E+01	4.16E+01	9.51E+02	NR	9.57E+01	9.49E+01	2.18E+03
Trans 1,2 Dichloroethane		NR	2.07E+01	NR	3.42E+03	NR	3.74E+01	NR	6.17E+03	NR	7.63E+01	NR	1.26E+04
Trichloroethene		8.53E+02	1.23E+00	1.23E+00	1.54E+03	9.53E+02	2.58E+00	2.57E+00	3.22E+03	9.53E+02	5.72E+00	5.69E+00	7.14E+03
Vinyl Chloride (chloroethene)		2.67E+01	5.96E+02	5.94E+02	1.36E+03	2.67E+01	7.70E+02	7.67E+02	1.78E+03	2.67E+01	1.18E+01	1.17E+01	2.69E+03
Semi-Volatile Organic Compounds													
2-Chloronaphthalene		NR	NR	NR	1.14E+02	NR	NR	NR	2.80E+02	NR	NR	NR	6.69E+02
Acenaphthene		1.10E+05	2.75E+06	1.06E+06	5.70E+01	1.10E+05	5.36E+06	1.06E+06	1.41E+02	1.10E+05	8.83E+06	1.06E+06	3.36E+02
Acenaphthylene		1.10E+05	2.68E+06	1.06E+06	8.61E+01	1.10E+05	5.23E+06	1.07E+06	2.12E+02	1.10E+05	8.65E+06	1.06E+06	5.06E+02
Anthracene		5.48E+05	1.13E+07	5.23E+05	1.17E+00	5.48E+05	2.35E+07	5.36E+05	2.91E+00	5.48E+05	4.13E+07	5.42E+05	6.96E+00
Benzo(a)anthracene		2.84E+02	4.08E+02	1.67E+02	1.71E+00	2.84E+02	4.47E+02	1.74E+02	4.23E+00	2.84E+02	4.67E+02	1.76E+02	1.03E+01
Benzo(a)pyrene	(a)	7.68E+01	2.04E+02	5.58E+01	8.11E+01	7.68E+01	2.09E+02	5.61E+01	2.28E+00	7.68E+01	2.11E+02	5.63E+01	5.46E+00
Benzo(b)fluoranthene		7.13E+01	1.17E+02	4.43E+01	1.22E+00	7.13E+01	1.20E+02	4.47E+01	3.04E+00	7.13E+01	1.21E+02	4.49E+01	7.29E+00

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH - COMMERCIAL



Table 3

Human health generic assessment criteria by pathway for commercial scenario

Compound	Notes	SAC appropriate to pathway SOM 1% (mg/kg)				SAC appropriate to pathway SOM 2.5% (mg/kg)				SAC appropriate to pathway SOM 6% (mg/kg)			
		Oral	Inhalation	Combined	Soil saturation limit (mg/kg)	Oral	Inhalation	Combined	Soil saturation limit (mg/kg)	Oral	Inhalation	Combined	Soil saturation limit (mg/kg)
Benzo(a)anthracene		6.29E+03	1.05E+04	3.91E+03	1.54E+02	6.29E+03	1.05E+04	3.95E+03	3.85E+02	6.29E+03	1.07E+04	3.96E+03	9.25E+02
Benzo(k)fluoranthene		1.88E+03	3.11E+03	1.17E+03	6.87E+01	1.88E+03	3.17E+03	1.18E+03	1.72E+00	1.88E+03	3.21E+03	1.18E+03	4.12E+00
Chrysene		5.67E+02	8.89E+02	3.46E+02	4.40E+01	5.67E+02	9.25E+02	3.52E+02	1.10E+00	5.67E+02	9.47E+02	3.55E+02	2.64E+00
Dibenz(a,h)anthracene		5.87E+00	9.32E+00	3.53E+00	3.93E+03	5.87E+00	9.52E+00	3.55E+00	9.82E+03	5.87E+00	9.84E+00	3.57E+00	2.36E+02
Fluoranthene		2.29E+04	1.89E+05	2.26E+04	1.89E+01	2.29E+04	2.72E+05	2.27E+04	4.73E+01	2.29E+04	3.32E+05	2.27E+04	1.13E+02
Fluorene					3.09E+01	7.31E+04	1.06E+05	6.84E+04	7.65E+01	7.31E+04	3.24E+05	7.08E+04	1.83E+02
Hexachlorobenzene			NR	NR	8.17E+00		NR	NR	2.01E+01		NR	NR	4.81E+01
Indeno(1,2,3-cd)pyrene		8.10E+02	1.31E+03	5.01E+02	6.13E+02	8.10E+02	1.35E+03	5.06E+02	1.53E+01	8.10E+02	1.37E+03	5.05E+02	3.88E+01
Naphthalene					7.64E+01				1.83E+02				4.32E+02
Phenanthrene		2.28E+04	5.35E+05	2.15E+04	3.60E+01	2.28E+04	1.09E+06	2.24E+04	8.96E+01	2.28E+04	1.86E+06	2.25E+04	2.14E+02
Pyrene		5.49E+04	4.47E+05	5.42E+04	2.20E+00	5.49E+04	8.46E+05	5.44E+04	5.49E+00	5.49E+04	7.91E+05	5.45E+04	1.32E+01
Phenol					2.42E+04	1.10E+06	3.04E+04	2.96E+04	3.81E+04	1.10E+06	3.46E+04	3.35E+04	7.03E+04
Total petroleum hydrocarbons													
Aliphatic hydrocarbons EC5-EC8					3.04E+02				5.58E+02				1.15E+03
Aliphatic hydrocarbons >EC8-EC10					1.44E+02				3.22E+02				7.36E+02
Aliphatic hydrocarbons >EC10-EC12					7.77E+01				1.90E+02				4.51E+02
Aliphatic hydrocarbons >EC12-EC16					4.75E+01				1.18E+02				2.83E+02
Aliphatic hydrocarbons >EC16-EC35	(b)	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aliphatic hydrocarbons >EC35-EC44	(b)	1.58E+06	NR	NR	8.48E+00	1.75E+06	NR	NR	2.12E+01	1.83E+06	NR	NR	5.09E+01
Aromatic hydrocarbons >EC8-EC10					6.13E+02				1.50E+03				3.58E+03
Aromatic hydrocarbons >EC10-EC12					3.64E+02				8.96E+02				2.15E+03
Aromatic hydrocarbons >EC12-EC16					1.89E+02	3.61E+04	4.78E+05	3.73E+04	4.19E+02	3.61E+04	1.03E+06	3.78E+04	1.00E+03
Aromatic hydrocarbons >EC16-EC21	(b)	2.82E+04	NR	NR	5.37E+01	2.83E+04	NR	NR	1.34E+02	2.84E+04	NR	NR	3.21E+02
Aromatic hydrocarbons >EC21-EC35	(b)	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01
Aromatic hydrocarbons >EC35-EC44	(b)	2.84E+04	NR	NR	4.83E+00	2.84E+04	NR	NR	1.21E+01	2.84E+04	NR	NR	2.90E+01

Notes:

EC - equivalent carbon; GsAC - groundwater screening value; SAC - soil screening value

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 dependent 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. Longman, 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 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/CIH 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.

Table 4
Human Health Generic Assessment Criteria for Commercial Scenario

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	640	640	640
Cadmium	410	410	410
Chromium (III) - trivalent	8,600	8,600	8,600
Chromium (VI) - hexavalent	49	49	49
Copper	68,000	68,000	68,000
Lead	2,300	2,300	2,300
Elemental Mercury (Hg ⁰)			
Inorganic Mercury (Hg ²⁺)	1,120	1,120	1,120
Methyl Mercury (Hg ^{CH3})			320
Nickel	980	980	980
Selenium	12,000	12,000	12,000
Zinc	740,000	740,000	740,000
Cyanide (free)	650	650	650
Volatile Organic Compounds			
Benzene	27	50	98
Toluene	500,000 (1,000)	100,000 (1,000)	100,000 (1,000)
Ethylbenzene	500,000 (1,000)	100,000 (1,000)	27,000 (1,000)
Xylene - m	500,000 (1,000)	100,000 (1,000)	1,000 (1,000)
Xylene - o	500,000 (1,000)	100,000 (1,000)	33,000 (1,000)
Xylene - p	500,000 (1,000)	100,000 (1,000)	30,000 (1,000)
Total xylene	5,000 (1,000)	10,000 (1,000)	30,000 (1,000)
Methyl tertiary-Butyl ether (MTBE)	7,500	12,100	22,400
1,1,1,2-Tetrachloroethane	110	250	560
1,1,2,2-Tetrachloroethane	270	550	1,130
1,1,1-Trichloroethane	700	1,300	3,000
1,1,2-Trichloroethane	89	180	382
1,1-Dichloroethane	24	43	87
1,2-Dichloroethane	0.67	0.97	1.65
1,2,4-Trimethylbenzene	330	640	1,040
1,3,5-Trimethylbenzene	NR	NR	NR
1,2-Dichloropropane	3	6	11
Carbon Tetrachloride (tetrachloromethane)	2.9	6.3	14.2
Chloroethane	901	1,223	1,972
Chloromethane	1.0	1.1	1.5
Cis-1,2-Dichloroethene	14	23	44
Dichloromethane	257	339	526
Tetrachloroethene	20	40	90
Trichloroethene	1	3	6
Trans-1,2-Dichloroethene	21	37	76
Trichloroethene	1	3	6
Vinyl Chloride (chloroethene)	0.06	0.08	0.12
Semi-Volatile Organic Compounds			
2-Chloronaphthalene		90,000	7,300
Acenaphthene	110,000	110,000	110,000
Acenaphthylene	110,000	110,000	110,000
Anthracene	520,000	540,000	540,000
Benzo[a]anthracene	170	170	180
Benzo[a]pyrene	77	77	77
Benzo[b]fluoranthene	44	45	45
Benzo[g,h,i]perylene	3,900	3,900	4,000
Benzo[k]fluoranthene	1,200	1,200	1,200
Chrysene	350	350	350
Dibenzo[a,h]anthracene	3.5	3.6	3.6
Fluoranthene	23,000	23,000	23,000
Fluorene		68,000	71,000
Hexachloroethane			
Indeno[1,2,3-cd]pyrene	500	510	510
Naphthalene	1,000 (1,000)	1,000 (1,000)	2,000 (1,000)
Phenanthrene	22,000	22,000	23,000
Pyrene	54,000	54,000	54,000
Phenol	440*	690*	1,300*
Total Petroleum Hydrocarbons			
Aliphatic hydrocarbons EC ₄ -EC ₈	3,200 (144)	1,300 (144)	12,000 (1,160)
Aliphatic hydrocarbons >EC ₈ -EC ₁₂	7,800 (144)	17,400 (122)	35,000 (710)
Aliphatic hydrocarbons >EC ₁₂ -EC ₁₈	2,000 (70)	4,800 (190)	11,000 (100)
Aliphatic hydrocarbons >EC ₁₈ -EC ₂₂	4,700 (46)	22,400 (150)	47,000 (160)
Aliphatic hydrocarbons >EC ₂₂ -EC ₂₆	10,000 (20)	22,000 (20)	20,000 (140)
Aliphatic hydrocarbons >EC ₂₆ -EC ₃₀	1,000,000**	1,000,000**	1,000,000**
Aliphatic hydrocarbons >EC ₃₀ -EC ₃₄	1,000,000**	1,000,000**	1,000,000**
Aliphatic hydrocarbons >EC ₃₄ -EC ₃₈	1,000,000**	1,000,000**	1,000,000**
Aromatic hydrocarbons >EC ₄ -EC ₁₀	3,500 (110)	4,100 (110)	17,000 (1,160)
Aromatic hydrocarbons >EC ₁₀ -EC ₁₂	16,000 (160)	24,000 (160)	24,000 (1,160)
Aromatic hydrocarbons >EC ₁₂ -EC ₁₈	34,000 (160)	37,000	38,000
Aromatic hydrocarbons >EC ₁₈ -EC ₂₂	28,000	28,000	28,000
Aromatic hydrocarbons >EC ₂₂ -EC ₂₆	28,000	28,000	28,000
Aromatic hydrocarbons >EC ₂₆ -EC ₃₀	28,000	28,000	28,000
Aromatic hydrocarbons >EC ₃₀ -EC ₃₄	28,000	28,000	28,000
Minerals			
Asbestos	No asbestos detected with ID or <0.001% dry weight†		

Notes:

† 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. GrAC - groundwater assessment criteria. SAC - soil assessment criteria.

* The GAC for Phenol is based on a threshold which is protective of direct contact (SC050021/Phenol SGV report).

** Denoted SAC calculated exceeds 100% contaminant, hence 100% (1,000,000mg/kg) has been taken as SAC.

The SAC for organic compounds are dependent on Soil Organic Matter (SOM) (%) content. To obtain SOM from total organic carbon (TOC) (%) divide by 1.58.

1% SOM is 0.5% TOC. DL, Rowell Soil Science: Methods and Applications, Longman, 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.

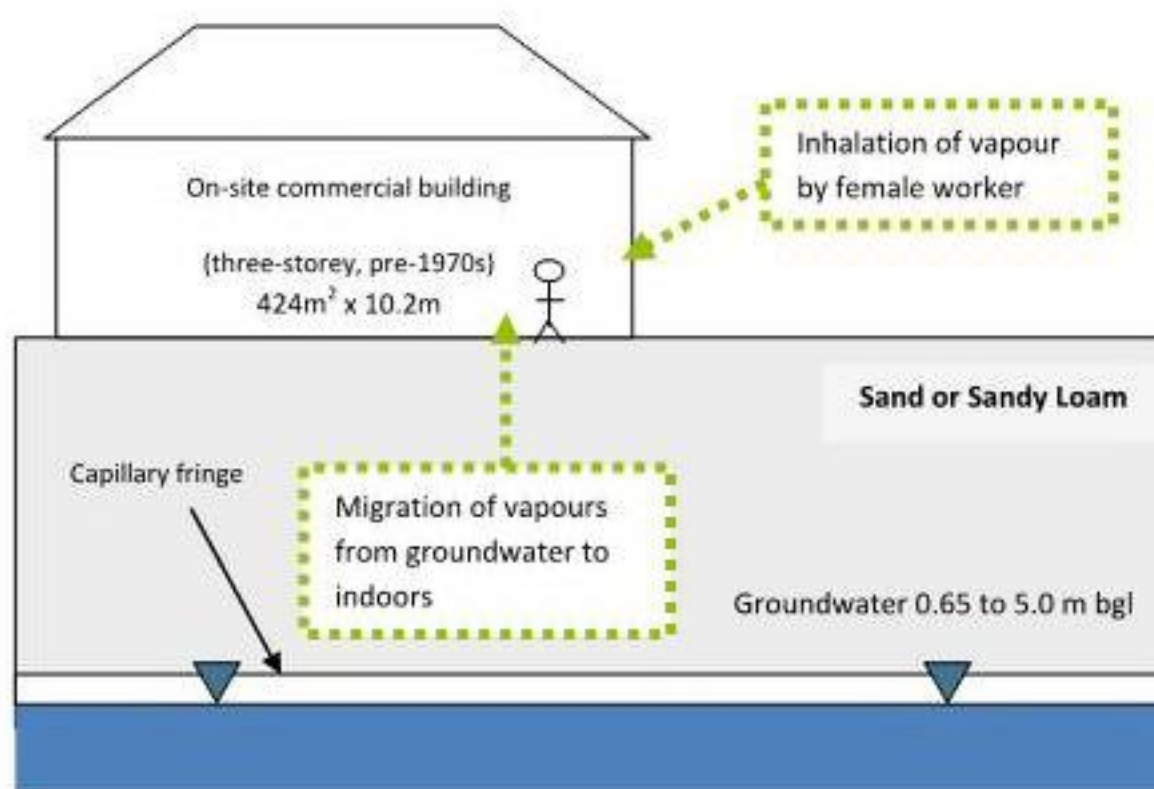
RSK has adopted an approach for petroleum hydrocarbons in accordance with LQM/CDH whereby the concentration modelled for each petroleum hydrocarbon fraction has been tabulated as the SAC with the corresponding solubility or vapour saturation limits given in brackets.

Generic groundwater assessment criteria (GrAC) for human health: commercial scenario (adult receptor)

Background

Volatile organic compounds (VOC) in groundwater have the potential to pose risks to residential site end users via indoor and outdoor inhalation exposure. Due to significant dilution effects in outdoor air, inhalation risk is dominated by indoor exposure. The GrAC conceptual site model (CSM) is shown in Figure 1 (not to scale).

Figure 1: GrAC conceptual model for a generic commercial scenario



RSK GrAC derivation

Model selection

The Society for Brownfield Risk Assessment (SoBRA) published a set of generic assessment criteria for assessing vapour risk to human health from volatile contaminants in groundwater in February 2017⁽¹⁾. The criteria were developed for a list of common VOC using the Environment Agency Contaminated Land Exposure Assessment (CLEA) tool⁽²⁾ based on a sand soil type and a groundwater depth of 0.65 m below foundation base level. The CLEA tool is not designed to directly model VOC in groundwater and the SoBRA generic criteria are recognised as being conservative since calculations in CLEA are based on three-phase partitioning in the unsaturated zone between soil, soil vapour and soil moisture, with the latter taken by SoBRA as a groundwater equivalent. This method does not take account of the presence of a semi-saturated capillary fringe above the water table, which will serve to provide some mitigation to vertical soil vapour migration.

RSK GrAC are calculated using the RBCA Toolkit for Chemical Releases (version 2.6) with the Johnson and Ettinger model, based on the CSM in Figure 1 for a pre-1970 three storey office

building (as defined in SR3⁽³⁾, Table 4.21) and which allows consideration of a capillary fringe. The capillary fringe is the subsurface layer in which groundwater seeps up from a water table by capillary action to partially fill soil pores.

The RBCA model was used in preference to the Environment Agency Contaminated Land Exposure Assessment (CLEA) tool⁽²⁾, as the CLEA tool is not designed to directly model VOC in groundwater and does not take account of the presence of a semi-saturated capillary zone.

Conceptual model

In accordance with SR3⁽³⁾, the commercial scenario considers risks to an adult female worker who works from the age of 16 to 65 years. It should be noted that this end use is not suitable for a workplace nursery (where children will be present for an extended period of time) but may be appropriate for a sports centre or shopping centre where children are present but for limited periods of time.

The pollutant linkage considered in production of the GrAC is the volatilisation of compounds from groundwater and subsequent vapour inhalation by the identified receptor while indoors. Figure 1 illustrates this linkage. Although the outdoor air inhalation pathway is also valid, this contributes little to the overall risks owing to the dilution in outdoor air. RBCA does not take account of the presence of non-aqueous phase chemicals but highlights when the assessment criterion exceeds the solubility limit of the pure compound.

Input selection – chemical and toxicological parameters

Key parameters used in the RBCA model are listed and justified in Table 1. The most up-to-date published chemical and toxicological data was obtained from EA Report SC050021/SR7⁽²⁾, the EA TOX⁽⁵⁾ reports, and published by Nathaniel et al.,⁽⁶⁾ as appropriate. Toxicological and specific chemical parameters for 1,2,4-trimethylbenzene and methyl tertiary-butyl ether (MTBE) were obtained from the CL:AIRE Soil Generic Assessment Criteria report⁽⁷⁾.

The toxicological input parameters are associated with minimal risk, rather than low risk.

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

For the Commercial GrAC, the Health Criteria Values (HCV) used in the modelling were derived using the toxicological data discussed above, amended as follows:

- An adult weighing 70kg and breathing 15.7m³ air per day in accordance with the revised exposure parameters used in the SP1010 final project report for the Category 4 Screening Levels (C4SL) (Table 3.2⁽⁸⁾) and USEPA data⁽⁹⁾
- Background inhalation (mean daily intake(MDI)) for an adult (Age Class 17).

The amended HCV used in the derivation of the RSK GrAC are presented in Table 1.

Table 1: Amended Health Criteria Values

	Modified HCV (mg/m ³)
VOC / SVOC	Adult (Commercial)
MTBE	3.2064
Benzene	0.0062
Toluene	6.2362
Ethylbenzene	0.3301
Xylenes	0.2609
Trimethylbenzenes	0.0085
TPH_Aliph EC5-EC6	11.1465
TPH_Aliph >EC6-EC8	11.1465
TPH_Aliph >EC8-EC10	0.6465
TPH_Aliph >EC10-EC12	0.6465
TPH_Aliph >EC12-EC16	0.6465
TPH_Arom >EC8-EC10	0.1338
TPH_Arom >EC10-EC12	0.1338
TPH_Arom >EC12-EC16	0.1338
Acenaphthene	0.2675
Acenaphthylene	0.2675
Naphthalene	0.0037
Vinyl chloride	0.0013
Dichloroethane-1,2	0.0005
Tetrachloroethene	0.0363
Carbon tetrachloride	0.0114
Trichloroethane-1,1,1	2.6752
Trichloroethene	0.0025
Tetrachloroethane 1,1,2,2 & 1,1,1,2	0.0257
1,1,2-Trichloroethane	0.0216
1,1-dichloroethene	0.2541
Chloroethane	12.7374
Chloromethane	0.0115
Dichloromethane	0.5765

Note on Trimethylbenzenes

For trimethylbenzenes the CL:AIRE report⁽⁷⁾ based background inhalation from non-soil sources (MDI) on a Dutch study from 1985, which is reported to have identified an average daily dose of 1,2,4-trimethylbenzene of 86 ug d⁻¹ (1,3,5-trimethylbenzene was 20.5 ug d⁻¹). This dose value was based on the upper end of the identified concentration range of 1,2,4-trimethylbenzene (2.46 – 5.66 ug m⁻³) and was used to calculate an a MDI of 1.23 ug kg⁻¹ bw d⁻¹ for a 70 kg adult breathing 20 m³ of air daily.

The approach recommended in SR2⁽¹⁰⁾, and also adopted for the C4SLs⁽⁸⁾, for non-carcinogenic (threshold) compounds such as trimethylbenzenes is to subtract the MDI from the tolerable daily intake (TDI) to obtain a tolerable daily intake from soil (TDSI) in units of ug kg⁻¹ bw d⁻¹. For 1,2,4-trimethylbenzene, the adult MDI from the Dutch study used in the CL:AIRE report⁽⁷⁾ (1.23 ug kg⁻¹ bw d⁻¹) is a significant proportion of the TDI (2.0 ug kg⁻¹ bw d⁻¹), resulting in a low TDSI (1.0 ug kg⁻¹ bw d⁻¹) when the 50% rule is applied (i.e. TDSI = TDI * 0.5 when MDI is high relative to TDI).

This TDSI equates to an Inhalation Reference Concentration (or modified Health Criteria Value) for adults of 3.4 ug m^{-3} (70 kg adult breathing $15.7 \text{ m}^3 \text{ d}^{-1}$).

By comparison the adult inhalation modified HCV for benzene is 6.2 ug m^{-3} , which is proven human carcinogen (non-threshold compound).

The MDI for 1,2,4-trimethylbenzene is considered by RSK to be overly conservative for the following reasons:

- The Dutch 1985 study is dated and air quality has improved since this time
- The maximum value in the range (5.66 ug m^{-3}) was used in calculating the MDI
- Experience has shown that trimethylbenzenes often appear to drive inhalation risks to a greater extent than benzene, even though the latter is carcinogenic and more volatile.

As an alternative to the 1985 Dutch study, RSK have obtained automated roadside air quality monitoring data for the UK from www.uk-air.defra.gov.uk/. The average concentration of 1,2,4-trimethylbenzene measured during 2015 at Eltham, south-east London (urban) was 0.309 ug m^{-3} , significantly lower than that identified in the Dutch study and used by CL:AIRE⁽⁷⁾ for calculation of a MDI. Whilst an average concentration of 1,2,4-trimethylbenzene in UK urban and rural areas is likely to be significantly below 0.309 ug m^{-3} , this value is considered to be suitably conservative for the calculation of a modified HCV for trimethylbenzenes in the UK.

On this basis, the HCV for 1,2,4-trimethylbenzene for adults and children was calculated as 8.5 ug m^{-3} (0.0085 mg m^{-3}) and 2.6 ug m^{-3} (0.0026 mg m^{-3}), respectively (see Table 3). Due to the paucity of toxicological data for 1,2,3-trimethylbenzene and 1,3,5-trimethylbenzene the modified HCV for 1,2,4-trimethylbenzene is considered suitable for assessing total trimethylbenzenes.

Note on aqueous solubility and the RSK GrAC

Where the modelled assessment criteria, or the modelled assessment criteria with the correction factor applied to those contaminants specified below, exceeds the aqueous solubility limit the assessment criteria defaults to this concentration and consequently the GrAC is set at the limit of solubility. These assessment criteria are shaded in red in Table 3 at the end of this document.

The theoretical aqueous solubility is the maximum amount of a single chemical that will dissolve in pure water at a specified temperature. Above this concentration, the chemical will exist in the non-aqueous phase (i.e. in its natural physical form as a solid, liquid (NAPL) or gas). If the contaminant, based on its toxicity, is not considered to pose a risk to human health at the aqueous solubility concentration then the contaminant can be considered not to pose a risk to human health. Where the GrAC is set at the aqueous solubility limit (shaded in red on Table 3), this is not a risk based assessment criteria but is indicative of the maximum amount of chemical that would be found dissolved in the water. Therefore an exceedance of the RSK GrAC set at the aqueous solubility limit is not indicative that there may be potential risks to human health. It should be noted that for certain contaminants (e.g. the lighter petroleum hydrocarbon fractions) the aqueous solubility is very low and may be at, or below, the laboratory method detection limit. It should also be noted that non-aqueous phase may exist where concentrations of individual compounds are well below their solubility limits where they are part of a mixture, in accordance with Raoult's Law.

Input selection - physical parameters

For the commercial scenario, the CLEA default pre-1970s three-storey office building was used. SR3⁽³⁾ notes this commercial building type to be the most conservative in terms of risk from vapour intrusion. The building parameters used in the production of the RSK GrACs are the default CLEA v1.06 inputs presented in Table 3.3 of SR3⁽³⁾.

The RSK GrAC have been calculated for both Sand and Sandy Loam soils. The soil parameters used in the derivation of the RSK GrAC are those presented in Table 3.1 of SR3⁽³⁾.

The RSK GrAC have been derived for groundwater depths of 0.65 m, 1.5 m, 2.5 m and 5.0 m below ground level, incorporating a capillary fringe (see Table 2).

Input selection - attenuation factors

In line with recommendations provided in Environment Agency SR3⁽³⁾ a sub-surface to indoor attenuation factor of 10 has been applied to certain RBCA derived 'site-specific target levels'. SR3⁽³⁾ states that, as a general rule of thumb, it is recognised that estimating vapour phase concentrations from dissolved and sorbed phase petroleum hydrocarbons by using partition coefficients are at least a factor of ten higher than those likely to be measured on-site. This difference is likely to be due to a number of factors, however aerobic biodegradation in the unsaturated zone is believed to be largely responsible. RSK has therefore applied this attenuation factor to all volatile petroleum hydrocarbon fractions (including BTEX, trimethylbenzenes and the polycyclic aromatic hydrocarbons (PAH) naphthalene, acenaphthene and acenaphthylene). No such attenuation factors have been applied to other non-hydrocarbon chemical species, including chlorinated hydrocarbons or fuel oxygenates such as MtBE.

Convective (volumetric) air flow through foundation cracks (Q_{soil}) is a sensitive parameter in the calculation of GrAC and has been calculated within RBCA on a soil-specific basis for Sand and Sandy Loam in a residential exposure scenario (see Table 2). This approach is less conservative than using the default Q_{soil} value recommended in SR3⁽³⁾ for a Sandy Loam ($150 \text{ cm}^3 \text{ s}^{-1}$) and used in the CLEA model (version 1.071) for Sandy Loam (and Sand) soils ($150 \text{ cm}^3 \text{ s}^{-1}$) in a commercial scenario.

Table 2: Commercial scenario – RBCA inputs

Parameter	Unit	Value	Justification
Receptor – female child			
Averaging time	Years	49	From Box 3.5, SR3 ⁽³⁾
Receptor weight	kg	70	Female adult, Table 4.6, SR3 ⁽³⁾
Exposure duration	Years	49	From Box 3.5, SR3 ⁽³⁾
Exposure frequency	Days yr ⁻¹	86.25	Weighted using occupancy period of 9 hours per day for 230 days of the year ((9hours x 230 days)/24 hours)
Soil type – sand			
Total porosity	-	0.54	CLEA value for sand. Parameters for sand from Table 4.4, SR3 ⁽³⁾ . Volumetric water content in the vadose zone is a highly sensitive parameter within the model and potentially highly variable in the field.
Volumetric water content – unsaturated (vadose) zone	-	0.24	
Volumetric air content - unsaturated (vadose) zone	-	0.30	
Dry bulk density	g cm ⁻³ or kg L ⁻¹	1.18	
Volumetric water content – capillary zone	-	0.35	Calculated using SR3 Equation 4.1. Value taken as the average moisture content calculated for suction heads (cm H ₂ O); 0 (i.e. saturated), 10, 20, 30, 40, 50 (i.e. unsaturated soil at field capacity). This is a highly sensitive parameter within the model.
Volumetric air content - capillary zone	-	0.19	Calculated from total porosity and volumetric water content of capillary zone. This is a highly sensitive parameter within the model.
Vertical hydraulic conductivity	cm d ⁻¹	636	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3 ⁽³⁾ equivalent to 7.36 E-03 cm s ⁻¹
Vapour permeability	m ²	7.54 E-12	Calculated for sand using equations in Appendix 1, SR3 ⁽³⁾
Capillary zone thickness	m	0.25	Taken from C W Fetter, Applied Hydrogeology 4 th Ed, 1994 ⁽¹¹⁾ and R Heath, Basic groundwater hydrology 1992 ⁽¹²⁾ for a medium sand
Fraction organic carbon	%	0.0058	Equivalent to SOM = 1%. Note that GrAC are independent on FOC/SOM content since partitioning is assumed to be between aqueous and vapour phases only
Soil type – sandy loam			
Total porosity	-	0.53	CLEA value for sandy loam. Parameters for sandy loam from Table 4.4, SR3 ⁽³⁾ . Volumetric water content in the vadose zone is a highly sensitive parameter within the model and potentially highly variable in the field.
Volumetric water content – unsaturated (vadose) zone	-	0.33	
Volumetric air content - unsaturated (vadose) zone	-	0.20	
Dry bulk density	g cm ⁻³ or kg/L	1.21	
Volumetric water content – capillary zone	-	0.42	Calculated using SR3 Equation 4.1 ⁽³⁾ . Value taken as the average moisture content calculated for suction heads (cm H ₂ O); 0 (i.e. saturated), 10, 20, 30, 40, 50 (i.e. unsaturated soil at field capacity). This is a highly sensitive parameter within the model.
Volumetric air content - capillary zone	-	0.11	Calculated from total porosity and volumetric water content of capillary zone. This is a highly sensitive parameter within the model.

Parameter	Unit	Value	Justification
Vertical hydraulic conductivity	cm d ⁻¹	308	CLEA value for saturated conductivity of sandy loam, Table 4.4, SR3 ⁽³⁾ equivalent to 3.56E-3 cm s ⁻¹
Vapour permeability	m ²	3.05 E-12	Calculated for sandy loam using equations in Appendix 1, SR3 ⁽³⁾
Capillary zone thickness	m	0.4	Taken from R Heath, Basic Groundwater Hydrology 1992 ⁽¹²⁾ for a fine sand. Note: C W Fetter, Applied Hydrogeology 4 th Ed, 1994 ⁽¹¹⁾ value for fine sand is 0.5 m
Fraction organic carbon	%	0.0058	Equivalent to SOM = 1%. Note that GrAC are independent on FOC/SOM content since partitioning is assumed to be between aqueous and vapour phases only
Building – pre-1970 three storey office			
Building volume/area ratio	m	9.6	Table 3.10, SR3 ⁽³⁾
Foundation area	m ²	424	
Foundation perimeter	m	82.40	Based on square root of building area being 20.59m
Building air exchange rate	d ⁻¹	24	Table 3.10, SR3 ⁽³⁾ Building air exchange rate equivalent to 2.8 E-04 s ⁻¹
Depth to bottom of foundation slab	m	0.15	
Foundation thickness	m	0.15	
Foundation crack fraction	-	3.89E-04	Calculated from floor crack area of 0.165m ² and building footprint of 424m ² in Table 4.21, SR3 ⁽³⁾
Volumetric water content of cracks	-	0.24 / 0.33	For sand / sandy loam, assumed equal to underlying soil type in assumption that cracks become filled with unsaturated zone soil over time. Parameters for sand and sandy loam from Table 4.4, SR3 ⁽³⁾
Volumetric air content of cracks	-	0.30 / 0.20	
Indoor/outdoor differential pressure	Pa	4.4	From Table 3.3, SR3 ⁽³⁾ Equivalent to 44g/cm/s ²
Convective air flow through cracks (Q _{soil}) - Sand	m ³ s ⁻¹	1.95 E-04	Soil-specific calculated parameter in RBCA equivalent (and cross checked) with equations A1, A2, A3, A8, A9 in SR3 ⁽³⁾ . Equivalent to 195 cm ³ s ⁻¹
Convective air flow through cracks (Q _{soil}) – Sandy Loam	m ³ s ⁻¹	7.7 E-05	Soil-specific calculated parameter in RBCA equivalent (and cross checked) with equations A1, A2, A3, A8, A9 in SR3 ⁽³⁾ . Equivalent to 77 cm ³ s ⁻¹

RSK GrAC derivation outputs

The RSK GrACs are presented in Table 3.

Within the RSK GrAC the following should be noted:

- GrAC do not take account of outdoor inhalation exposure to VOC, which is considered to contribute minimally to overall inhalation exposure
- GrAC do not take account of other exposure routes potentially relevant to VOC in shallow groundwater such as direct contact or root uptake
- No biodegradation is assumed to occur in the unsaturated zone. Where aerobic conditions on site are known to exist the GrAC for hydrocarbons may therefore be conservative
- GrAC do not take account of preferential flow into buildings such as through unsealed service entries. In such circumstances GrAC may not be appropriate for use
- GrAC are based on a soil vapour intrusion CSM and are not appropriate for use when the foundation is in direct contact with contaminated groundwater

- GrAC assume that the capillary fringe is un-contaminated with VOC, which is unlikely, particularly where groundwater levels are variable
- GrAC set at the theoretical aqueous solubility limit are not considered to pose a risk to human health
- GrAC do not take into account the interaction between contaminants and the influence this may have on the theoretical aqueous solubility
- GrACs are only applicable to dissolved phase contaminants where the modelled assessment criteria is below the aqueous solubility limits

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GW Depth (m)		Table 3: RSK GrAC (ug/l)							
		COMMERCIAL							
		SAND				SANDY LOAM			
		0.65	1.5	2.5	5	0.65	1.5	2.5	5
Metals									
Elemental mercury		56	56	56	56	56	56	56	56
Methyl mercury		100000	100000	100000	100000	100000	100000	100000	100000
Volatile Organic Compounds									
Benzene		30740	40200	51330	79160	158660	193720	234960	338070
Toluene		590000	590000	590000	590000	590000	590000	590000	590000
Ethylbenzene		180000	180000	180000	180000	180000	180000	180000	180000
Xylene - m		200000	200000	200000	200000	200000	200000	200000	200000
Xylene - o		173000	173000	173000	173000	173000	173000	173000	173000
Xylene - p		200000	200000	200000	200000	200000	200000	200000	200000
Total xylene		173000	173000	173000	173000	173000	173000	173000	173000
Methyl tertiary-Butyl ether (MTBE)		12068580	16013210	20653950	32255810	48000000	48000000	48000000	48000000
Trichloroethene		820	1090	1400	2180	4410	5400	6550	9440
Tetrachloroethene		7430	9930	12870	20210	41190	50460	61360	88610
1,1,1-Trichloroethane		456280	604180	778170	1213140	1300000	1300000	1300000	1300000
1,1,1,2-Tetrachloroethane		35130	47100	61190	96410	180890	225050	277000	406880
1,1,2,2-Tetrachloroethane		231900	313430	409350	649150	844250	1131800	1470100	2315840
Carbon Tetrachloride		1200	1590	2050	3210	6600	8050	9760	14030
1,2-Dichloroethane		1290	1690	2160	3350	5860	7330	9060	13390
Vinyl Chloride		90	120	140	220	460	550	660	930
1,2,4-Trimethylbenzene		55900	55900	55900	55900	55900	55900	55900	55900
Semi-Volatile Organic Compounds									
Acenaphthene		4100	4100	4100	4100	4100	4100	4100	4100
Acenaphthylene		7950	7950	7950	7950	7950	7950	7950	7950
Naphthalene		19000	19000	19000	19000	19000	19000	19000	19000
Petroleum Hydrocarbons									
Aliphatic hydrocarbons EC5-EC6		35900	35900	35900	35900	35900	35900	35900	35900
Aliphatic hydrocarbons >EC6-EC8		5370	5370	5370	5370	5370	5370	5370	5370
Aliphatic hydrocarbons >EC8-EC10		427	427	427	427	427	427	427	427
Aliphatic hydrocarbons >EC10-EC12		33.9	33.9	33.9	33.9	33.9	33.9	33.9	33.9
Aliphatic hydrocarbons >EC12-EC16		0.759	0.759	0.759	0.759	0.759	0.759	0.759	0.759
Aromatic hydrocarbons >EC8-EC10		64600	64600	64600	64600	64600	64600	64600	64600
Aromatic hydrocarbons >EC10-EC12		24500	24500	24500	24500	24500	24500	24500	24500
Aromatic hydrocarbons >EC12-EC16		5750	5750	5750	5750	5750	5750	5750	5750
Notes:									
Values less than 100 have not been rounded up or down; values greater than 100 have been rounded to the nearest 10.									
Highlighted values exceed solubility limit for the pure compound in water (aqueous solubility); GrAC defaults to the limit of solubility.									
No vadose zone biodegradation considered									
Sub-surface to indoor air correction factor of 10 applied to all petroleum (non-chlorinated) hydrocarbons									
All GrAC are for 1% SOM (0.0058 FOC)									

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⁾	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 ammonia ^s (ammonium (as NH ₄ ⁺) plus ammonia (NH ₃))	-	500 ⁽²⁾ (0.5 mg/l)	300 ^(6f) (0.3 mg/l)	-
Non-hazardous pollutant	Specific pollutant	Ammonia un-ionised (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)	-	-
(Not determined)	-	Nitrite (as NO ₂)	-	500 ⁽²⁾ (0.5 mg/l)	10 ⁽⁹⁾ (0.01 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
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)	-	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)
(Not determined)	-	Trihalomethanes	-	100 ^(2a)	-	-

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⁾	(see "Trihalomethanes" above)	2.5 ^(6a)	2.5 ^(6a)
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	0.005 ⁽⁷⁾	0.6 ⁽⁴⁾	0.6 ^(6c)	0.6 ^(6c)
Semi-volatile organic compounds (SVOC)						
(Not determined)	-	Acenaphthylene (C12-C16)	-	-	5.8 ⁽¹⁰⁾	
Hazardous substance	Priority hazardous substance	Anthracene (C16-C21)	-	-	0.1 ^(6a)	0.1 ^(6a)
Non-hazardous pollutant	Priority substance	Naphthalene (C10-C12)	-	-	2 ^(6a)	2 ^(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	Fluoranthene (C21-C35)	-	-	0.0063 ^(6a)	0.0063 ^(6a)
Hazardous substance(s)	Priority hazardous substance(s)	Benzo(a)pyrene (C21-C35)	-	0.01 ⁽²⁾	0.00017 ^(6a)	0.00017 ^(6a)
		Benzo(b)fluoranthene (C21-C35)	-	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 (C21-C35)	-			
		Benzo(g,h,i)perylene (C21-C35)	-			
		Indeno(1,2,3-cd)pyrene (C21-C35)	-			
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)
Hazardous substance	Priority substance	Pentachloro-phenol (PCP)	0.1 ⁽⁷⁾	9 ⁽⁴⁾	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
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 (C5-C7)	1 ⁽⁷⁾	1 ⁽²⁾	10 ^(6a)	8 ^(6a)
Hazardous substance	Specific pollutant	Toluene (C7-C8)	4 ⁽⁷⁾	700 ⁽⁴⁾	74 ^(6a)	74 ^(6a)
Hazardous substance	-	Ethylbenzene (C8-C9)	-	300 ⁽⁴⁾	-	-
(Not determined)	-	Xylenes (C8-C10)	3 ⁽⁷⁾	500 ⁽⁴⁾	30 ⁽¹¹⁾	-
Non-hazardous pollutant	-	Methyl tertiary butyl ether (MTBE)	-	15 ⁽¹²⁾	-	-
Pesticides, fungicides, insecticides and herbicides						
Hazardous substance(s)	Other pollutant (Cyclodiene)	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⁾		

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)	Endrin	0.003 ⁽⁷⁾	0.1 ^(2b)		
		Isodrin ^{*2}	0.003 ⁽⁷⁾	0.1 ^(2b)		
Hazardous substance	Other pollutant	DDT (total)	0.002 ⁽⁷⁾	1 ⁽⁴⁾	0.025 ^(6a)	0.025 ^(6a)
(Not determined) – assume to be Hazardous Substance	-	Total pesticides	-	0.5 ⁽²⁾	-	-
(Not determined) - assume to be Hazardous Substance	-	Other individual pesticides	-	0.1 ⁽²⁾		
Hazardous substance	Specific pollutant	Carbendazim	-	-	0.15 ^(6a)	-
Hazardous substance	Specific pollutant	Chlorothalonil	-	-	0.035 ^(6a)	-
Hazardous substance	Specific pollutant (until 22/12/18, after which it becomes a Priority substance)	Cypermethrin	-	-	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⁾	-	0.48 ^(6a)	0.48 ^(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	Glyphosate	-	-	196 ^(6a)	196 ^(6a)
Hazardous substance	Specific pollutant	Linuron		-	0.5 ^(6a)	0.5 ^(6a)
Non-hazardous pollutant	Specific pollutant	Mecoprop	0.04 ⁽⁷⁾	-	18 ^(6a)	18 ^(6a)
Non-hazardous pollutant	Specific pollutant	Methiocarb	-	-	0.01 ^(6a)	-
Non-hazardous pollutant	Specific pollutant	Pendimethalin	-	20 ⁽⁴⁾	0.3 ^(6a)	-
Hazardous substance	Specific pollutant	Permethrin	0.001 ⁽⁷⁾	-	0.001 ^(6a)	0.0002 ^(6a)
Hazardous substance	Priority substance	Alachlor	-	20 ⁽⁴⁾	0.3 ^(6a)	0.3 ^(6a)
Hazardous substance	Priority substance	Atrazine	0.03 ⁽⁷⁾	100 ⁽⁴⁾	0.6 ^(6a)	0.6 ^(6a)
Hazardous substance	Priority substance	Diuron	-	-	0.2 ^(6a)	0.2 ^(6a)
Hazardous substance	Priority hazardous substance	Endosulphan	0.005 ⁽⁷⁾	-	0.005 ^(6a)	0.0005 ^(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	Isoproturon	-	9 ⁽⁴⁾	0.3 ^(6a)	0.3 ^(6a)
Hazardous substance	Priority substance	Simazine	0.03 ⁽⁷⁾	2 ⁽⁴⁾	1 ^(6a)	1 ^(6a)
Hazardous substance	Priority hazardous substance	Trifluralin	0.01 ⁽⁷⁾	20 ⁽⁴⁾	0.03 ^(6a)	0.03 ^(6a)
(Not determined)	From 22/12/18: Priority substance	Dichlorovos	-	-	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:

¹ A target concentration is not available.

³Please 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⁾ .	

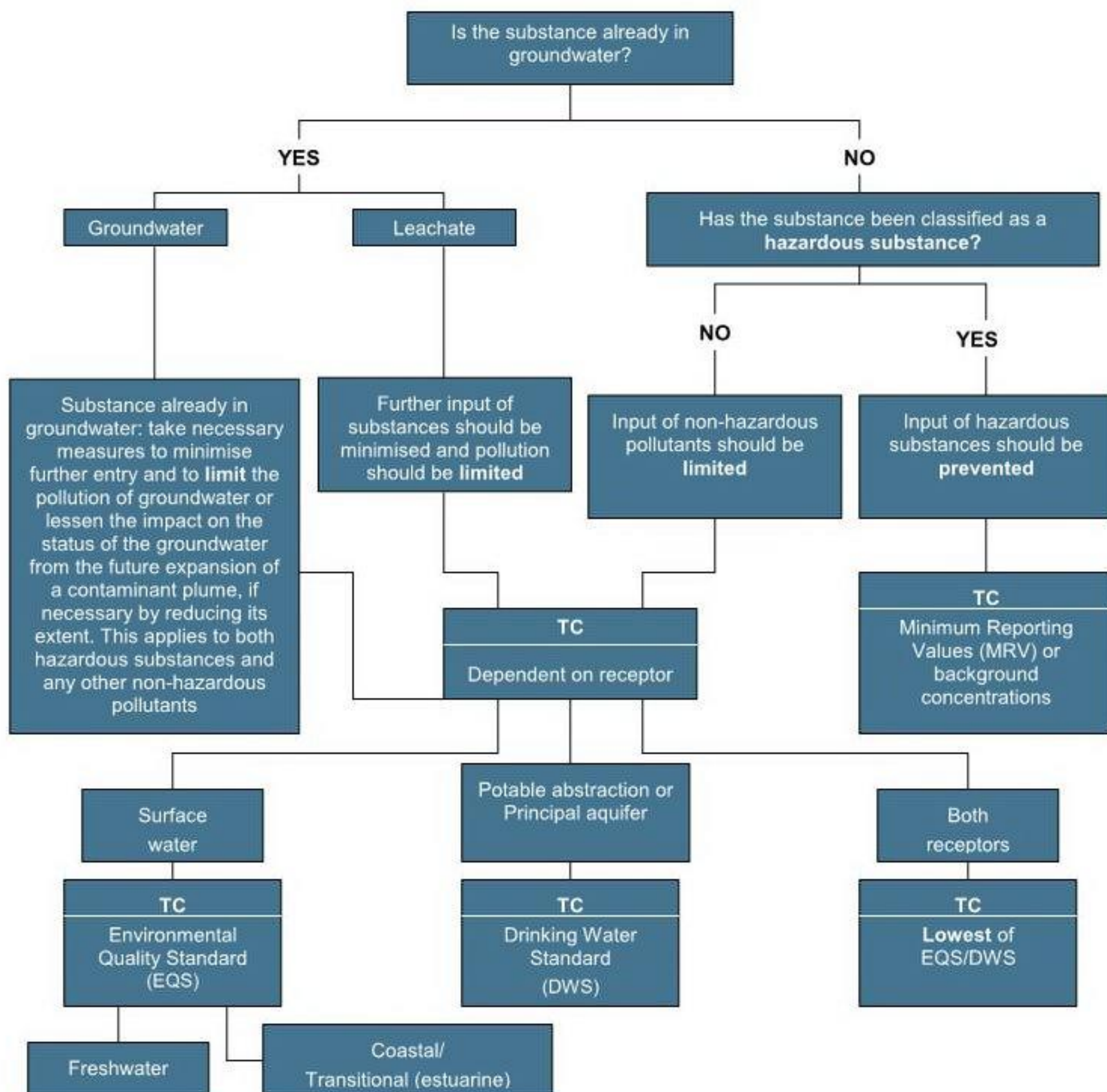
References

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

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.

Risk Assessment Methodology

Risk is a combination of the 'likelihood' of an event occurring and the magnitude of its 'consequences'. Therefore, in order to assess risk, both the likelihood and the consequences of an event must be taken into account. RSK Group Plc has adopted guidance provided in CIRIA C552 for use in the production of risk assessments.

The likelihood of an event can be classified on a four point system using the following terms and definitions based on CIRIA C552:

Highly likely: The event appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution;

Likely: It is probable that an event will occur, or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;

Low likelihood: Circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely in the short term;

Unlikely: Circumstances are such that it is improbable the event would occur even in the long term.

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

Severe: Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);

Medium: Chronic damage to human health ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land', DETR 2000);

Mild: Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment; and

Minor: Harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the likelihood of an event occurring and its severity have been classified, a risk category can be assigned the table below.

RISK CLASSIFICATION SYSTEM (CIRIA 552)					
		Consequence			
		Severe	Medium	Mild	Minor
Probability	Highly likely	Very high	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

APPENDIX E - MONITORING RECORDS

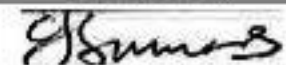
(i) Groundwater Monitoring Results

IN-SITU WATER MONITORING RESULTS

	<u>Weather</u>	<u>Ground Conditions</u>	<u>Wind Conditions</u>	<u>Air Temperature (°C)</u>	<u>Equipment Used & Remarks</u>
Round 1	Dry and bright	Dry	Light	15	Dipmeter
Round 2	Clear	Damp	Light	7	Dipmeter
Round 3	Cloud	Damp	Light	12	Dipmeter

Exploratory Position ID	Pipe Ref	Pipe Diameter	Monitoring Round / Test Number	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring	Water Depth (mbgl)	pH	Redox (mV)	Conductivity (uS/cm)	Temperature (°C)	Dissolved Oxygen (mg/l)	Remarks
BH01	1	50	1 / 1	9.00	7.21	6.00 to 9.00	18/09/2018 11:34	1.86	---	---	---	---	---	
BH01	1	50	2 / 1	9.00	7.18	6.00 to 9.00	25/09/2018 08:57	1.73	---	---	---	---	---	
BH01	1	50	3 / 1	9.00	7.17	6.00 to 9.00	15/10/2018 09:29	1.54	---	---	---	---	---	
DTS06	1	50	1 / 1	2.00	2.06	1.00 to 2.00	18/09/2018 09:35	DRY	---	---	---	---	---	
DTS06	1	50	2 / 1	2.00	2.10	1.00 to 2.00	25/09/2018 10:55	DRY	---	---	---	---	---	
DTS06	1	50	3 / 1	2.00	2.08	1.00 to 2.00	15/10/2018 10:07	1.57	---	---	---	---	---	
EWS3	1	19	1 / 1	4.07	4.07	1.00 to 4.00	18/09/2018 12:09	2.53	---	---	---	---	---	
EWS3	1	19	2 / 1	4.07	4.10	1.00 to 4.00	25/09/2018 14:53	2.38	---	---	---	---	---	
EWS3	1	19	3 / 1	4.07	4.10	1.00 to 4.00	15/10/2018 04:45	2.23	---	---	---	---	---	
SW1	1	NDA	2 / 1	NDA	NDA	NDA to NDA	25/09/2018 15:15	---	7.83	319	409	11.5	6.2	
SW2	1	NDA	2 / 1	NDA	NDA	NDA to NDA	25/09/2018 15:46	---	7.65	326	406	11.4	5.4	
WS1	1	40	1 / 1	4.00	4.00	1.00 to 4.00	18/09/2018 07:19	3.00	---	---	---	---	---	
WS1	1	40	2 / 1	4.00	4.01	1.00 to 4.00	25/09/2018 07:14	2.88	---	---	---	---	---	

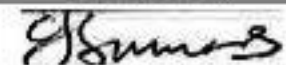
Key: NDA denotes 'no data available'.

 STRUCTURAL SOILS The Old School Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By	Date	Checked By	Date	Contract Ref:
		28/11/18		28/11/18	733845
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IN-SITU WATER MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe Diameter	Monitoring Round / Test Number	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring	Water Depth (mbgl)	pH	Redox (mV)	Conductivity (uS/cm)	Temperature (°C)	Dissolved Oxygen (mg/l)	Remarks
WS1	1	40	2 / 1				25/09/2018 07:27	---	7.12	320	1195	9.7	3.3	
WS1	1	40	2 / 1				25/09/2018 07:30	---	6.73	254	1253	11.1	0.7	
WS1	1	40	3 / 1	4.00	4.02	1.00 to 4.00	15/10/2018 08:26	2.20	---	---	---	---	---	
WS2A	1	40	1 / 1	4.00	3.99	1.00 to 4.00	18/09/2018 07:56	3.07	---	---	---	---	---	
WS2A	1	40	2 / 1	4.00	4.03	1.00 to 4.00	25/09/2018 13:59	2.99	---	---	---	---	---	
WS2A	1	40	2 / 1				25/09/2018 14:09	---	6.92	250	1257	18.8	2.6	
WS2A	1	40	2 / 1				25/09/2018 14:11	---	6.88	196	1246	17.0	0.8	
WS2A	1	40	3 / 1	4.00	4.02	1.00 to 4.00	15/10/2018 09:18	1.99	---	---	---	---	---	
WS3	1	40	1 / 1	5.00	4.95	1.00 to 5.00	18/09/2018 08:25	3.26	---	---	---	---	---	
WS3	1	40	2 / 1	5.00	4.98	1.00 to 5.00	25/09/2018 11:28	3.10	---	---	---	---	---	
WS3	1	40	2 / 1				25/09/2018 11:41	---	6.84	398	1611	20.5	2.7	
WS3	1	40	2 / 1				25/09/2018 11:44	---	6.77	405	1592	17.3	0.5	
WS3	1	40	3 / 1	5.00	4.98	1.00 to 5.00	15/10/2018 12:02	2.88	---	---	---	---	---	
WS4	1	40	1 / 1	3.70	3.70	1.00 to 3.70	18/09/2018 08:59	3.26	---	---	---	---	---	
WS4	1	40	2 / 1	3.70	3.69	1.00 to 3.70	25/09/2018 10:32	2.94	---	---	---	---	---	
WS4	1	40	2 / 1				25/09/2018 10:45	---	7.61	426	389	17.9	1.2	
WS4	1	40	2 / 1				25/09/2018 10:48	---	7.46	437	389	16.9	0.4	
WS4	1	40	2 / 1				25/09/2018 10:51	---	7.37	435	387	16.6	0.3	
WS4	1	40	2 / 1				25/09/2018 10:54	---	7.31	432	387	16.5	0.3	
WS4	1	40	2 / 1				25/09/2018 10:57	---	7.26	430	386	16.4	0.2	
WS4	1	40	3 / 1	3.70	3.69	1.00 to 3.70	15/10/2018 13:03	2.93	---	---	---	---	---	

Key: NDA denotes 'no data available'.

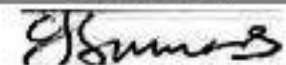
 STRUCTURAL SOILS The Old School Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By	Date	Checked By	Date	Contract Ref:
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IN-SITU WATER MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe Diameter	Monitoring Round / Test Number	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring	Water Depth (mbgl)	pH	Redox (mV)	Conductivity (uS/cm)	Temperature (°C)	Dissolved Oxygen (mg/l)	Remarks
WS5	1	40	1 / 1	5.00	4.91	1.00 to 5.00	18/09/2018 09:43	2.83	---	---	---	---	---	
WS5	1	40	2 / 1	5.00	4.95	1.00 to 5.00	25/09/2018 12:42	2.08	---	---	---	---	---	
WS5	1	40	2 / 1				25/09/2018 12:53	---	7.15	508	1179	22.3	3.2	
WS5	1	40	2 / 1				25/09/2018 12:56	---	7.04	578	1159	19.1	2.0	
WS5	1	40	2 / 1				25/09/2018 12:59	---	6.98	641	1163	18.9	1.8	
WS5	1	40	2 / 1				25/09/2018 13:02	---	6.94	668	1150	18.6	1.5	
WS5	1	40	2 / 1				25/09/2018 13:35	---	7.02	337	1124	18.1	2.2	
WS5	1	40	2 / 1				25/09/2018 13:38	---	6.98	326	1125	18.2	1.8	
WS5	1	40	2 / 1				25/09/2018 13:41	---	6.95	322	1120	17.7	2.1	
WS5	1	40	2 / 1				25/09/2018 13:47	---	6.95	322	1126	17.5	4.6	
WS5	1	40	2 / 1				25/09/2018 13:50	---	6.97	321	1122	17.4	4.4	
WS5	1	40	3 / 1	5.00	4.94	1.00 to 5.00	15/10/2018 11:23	0.94	---	---	---	---	---	
WS6	1	40	1 / 1	4.00	3.92	1.00 to 4.00	18/09/2018 10:14	2.28	---	---	---	---	---	
WS6	1	40	2 / 1	4.00	3.94	1.00 to 4.00	25/09/2018 09:20	2.04	---	---	---	---	---	
WS6	1	40	2 / 1				25/09/2018 09:34	---	7.11	365	874	17.0	1.7	
WS6	1	40	2 / 1				25/09/2018 09:37	---	7.06	382	875	17.6	0.6	
WS6	1	40	2 / 1				25/09/2018 09:40	---	7.03	388	880	17.9	0.5	
WS6	1	40	2 / 1				25/09/2018 09:43	---	7.01	387	884	18.0	0.4	
WS6	1	40	2 / 1				25/09/2018 09:46	---	6.99	388	889	18.1	0.3	
WS6	1	40	3 / 1	4.00	3.82	1.00 to 4.00	15/10/2018 10:32	1.72	---	---	---	---	---	
WS7	1	40	1 / 1	5.00	4.97	1.00 to 5.00	18/09/2018 10:51	1.94	---	---	---	---	---	
WS7	1	40	2 / 1	5.00	5.00	1.00 to 5.00	25/09/2018 08:27	1.69	---	---	---	---	---	
WS7	1	40	2 / 1				25/09/2018 08:37	---	6.13	260	1029	11.4	6.9	

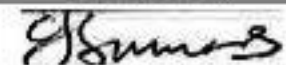
Key: NDA denotes 'no data available'.

 STRUCTURAL SOILS The Old School Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By	Date	Checked By	Date	Contract Ref:
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IN-SITU WATER MONITORING RESULTS

Exploratory Position ID	Pipe ref	Pipe Diameter	Monitoring Round / Test Number	Reported Installation Depth (m)	Measured Installation Depth (mbgl)	Response Zone	Date & Time of Monitoring	Water Depth (mbgl)	pH	Redox (mV)	Conductivity (uS/cm)	Temperature (°C)	Dissolved Oxygen (mg/l)	Remarks
WS7	1	40	2 / 1				25/09/2018 08:40	---	6.77	255	1091	13.9	2.5	
WS7	1	40	2 / 1				25/09/2018 08:43	---	6.84	260	1130	15.0	2.3	
WS7	1	40	2 / 1				25/09/2018 08:46	---	6.89	268	1136	15.7	2.4	
WS7	1	40	3 / 1	5.00	5.00	1.00 to 5.00	15/10/2018 10:04	0.17	---	---	---	---	---	

Key: NDA denotes 'no data available'.

 STRUCTURAL SOILS The Old School Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By	Date	Checked By	Date	Contract Ref:
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APPENDIX F - CALIBRATION CERTIFICATES

- (i) Photo ionisation Detector (PID) Calibration Records

CALIBRATION CERTIFICATE



Date of Calibration: - 15th June 2018

Certificate Number: - 242812

Calibrated by: - J Boyce

Signed 

Customer: - Structural Soils

Description: - Tiger

Manufacturer: - ION Science Ltd

Type Number: - N/A

Serial Number: - T-107655

Service Due date: - June 2019

This instrument has been factory calibrated to fully documented procedures in accordance with our ISO 9001:2008 Quality Management System.

Measurement standards are derived from volumetric and time sources which have been calibrated at an accredited laboratory traceable to National or International standards. The following list indicates the serial numbers of equipment used during the calibration procedure.

BARD2	C9081/A11352				
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¹ Gas mixtures prepared using equipment traceable to N.P.L. standards against Suppliers Certificate No

The instrument has been calibrated at a temperature of $19.9^{\circ}\text{C} \pm 0.25^{\circ}\text{C}$ and a barometric pressure of $1013.1 \text{ mbar} \pm 2 \text{ mbar}$.

ION Science hereby certify that on the day of calibration the instrument was working according to the manufacturer's original sales specification as checked by the calibration procedure, unless otherwise stated.

Copies of this certificate may only be reproduced in full.

Calibrations are valid as certified only on date of Calibration. For correct instrument operation please see the User Manual.

RESULTS ON RECEIPT

Applied Concentration	Instrument Indication
102.0 ppm Isobutylene	105.7 ppm Isobutylene

RESULTS AFTER ADJUSTMENT

Applied Concentration	Instrument Indication
102.0 ppm Isobutylene	102.3 ppm Isobutylene

The estimated applied gas uncertainty is $\pm 2.0\%$

Comments: - Main PCB replaced prior to calibration.

PD-FM-086-07

Unrivalled Gas Detection.

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