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Dandara Ltd

Windroos, Littlehampton

Ground Investigation Report

February 2019

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Executive Summary

The Site	The site forms part of a former haulage depot, comprising a central depot area with a two-bay storage unit in the centre of the site. This is surrounded by a concrete and tarmac forecourt, with two empty residential buildings to the south. The entrance to the site is from the south east, via the A259, Worthing Road. A partially concrete and tarmac covered vehicle track runs through the centre to the northern portion of the site. The surrounding areas of the site area are predominantly open ground, appearing to have been reworked by vehicle movements. Several material stockpiles and bunds are located around the site, with evidence of stockpiled material having been moved around the site. A stockpile and bund are located in the north-eastern corner, with two smaller stockpiles and bunds located adjacent to each other in the north-western corner of the site. There is a further stockpile in the west of the site adjacent to the site boundary and a large bund located along the southern boundary of the site. A partially intact greenhouse is located within the central eastern portion. Five tanks were formerly located on the site in the north-eastern and north-western corners, in the west and along the southern boundary.
Geology, Hydrogeology, Hydrology and Radon	BGS records indicate the site is underlain by River Terrace Deposits comprising sand, silt or clay, which is underlain by Raised Beach Deposits comprising sand and gravel. The Raised Beach Deposits are underlain by the New Pit Chalk Formation. Records provided by the Environment Agency indicate the River Terrace Deposits and Raised Beach Deposits are classified as a Secondary 'A' Aquifer, while the underlying New Pit Chalk Formation is classified as a Principal Aquifer.
Fieldwork	A ground investigation was undertaken by WYG to augment the findings of a previous ground investigation undertaken by Eastwood and Partners in 2013. The site investigation included: • 4no. windowless sample boreholes to depths of 4m and 5m with in situ testing at locations of former tanks. • 7no. machine-excavated trial pits to a maximum depth of 3.5m and excavated by means of a JCB; one of the trial pits was targeted at a former tank location. • 8no. hand excavated trial pits to a maximum depth of 0.67m at stockpile locations and in areas where overhead power cables prevented access by the JCB. • In situ TRL Probe testing adjacent to the borehole locations to provide CBRs. • Collection of disturbed and undisturbed soil samples. • Geotechnical and chemical laboratory testing of soil samples.
Ground Conditions Encountered	The soils beneath the site are largely characterised by up to 0.6m thickness of made ground; these are predominantly present in the central and southern parts of the site. There are also two areas of locally deep made ground, to depths of 1.45m and 3.40m at a known former tank location and within an area of potential former structures or infrastructure respectively. The made ground was underlain by the River Terrace Deposits which generally comprised soft and firm brown sandy clay and gravelly clay and extended to depths of between 1.70m and 3.60m. The Raised Beach Deposits comprising very loose and loose orange-brown slightly clayey fine and medium sand and soft brown sandy clay, were encountered below the River Terrace Deposits in the southwest of the site only. These extended to depths of between 1.70m and 3.80m. Below this, the New Pit Chalk Formation was encountered to the maximum depth investigated (5.0m bgl). Groundwater was not encountered in any of the exploratory positions.

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Geotechnical Assessment	Based on the characteristic soil parameters, traditional shallow foundations (pad or strip) constructed within the River Terrace Deposits will need to be limited to an allowable bearing capacity of 60kN/m^2, or for a higher allowable bearing pressure, foundation excavations would need to be extended in to the Structureless Dc chalk, where 125 kN/m^2 could be achieved. However, the depth to the New Pit Chalk Formation is prohibitive even for trench fill foundations and further investigation would be required in this respect. A raft foundation may also be a viable alternative solution. Given the presence of variable low strength soils at shallow depth, ground bearing floor slabs are not recommended. Suspended floor slabs should be utilised, but this can be reviewed again once the proposed development plans have been finalised.
Ground contamination assessment	Intrusive ground investigation has not identified the presence of gross soil contamination in the vicinity of former storage tanks or elsewhere on site, however, the made ground is of variable composition. Several contaminants were detected which could represent a theoretical risk to human health assuming long-term exposure in a sensitive residential development context. This includes elevated concentrations of aromatic hydrocarbons >EC12-EC16 and >EC16-21, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, lead, naphthalene, phenanthrene and asbestos. Chemical analysis of soil derived leachate samples indicated marginally elevated concentrations of several constituents of concern including copper and polycyclic aromatic hydrocarbons. Given the relatively low concentration of contaminants identified in leachate samples it is not considered that there is a significant risk to the wider environment (groundwater and surface water).
Key ground contamination recommendations	A remediation strategy should be developed and agreed with Arun District Council to address the risks posed to future receptors. This should consider the requirement for selective excavation and disposal of contaminated source materials (Made Ground and soil stockpile), in combination with the use of cover systems. The final strategy will need to take account of the proposed finished levels for the site in order to accommodate an adequate depth of clean cover in garden and soft landscape areas. The risk to site construction workers during development can be managed through the use of appropriate PPE and good working practices on site. If material is to be reused on site, this should be undertaken under the auspices of a Materials Management Plan. The presence of asbestos within soils should be controlled and managed within an Asbestos Management Plan which sets out procedures to both manage the risk to construction workers and limit the potential for release of airborne asbestos fibres during ground disturbance. The appointed construction contractor should adopt a reactive strategy to identify, manage and deal with any previously unidentified areas of contamination which may be encountered during future site works. Assessment of ground gas was outside the remit of this phase of ground investigation. Consultation should be held with Arun District Council and the NHBC to agree the requirements for any gas protection measures within buildings at the site. Based on the characteristic soil parameters, traditional shallow foundations (pad or strip) constructed within the River Terrace Deposits will need to be limited to an allowable bearing capacity of 60kN/m^2, or for a higher allowable bearing pressure, foundation excavations would need to be extended in to the Structureless Dc chalk, where 125 kN/m^2 could be achieved. However, the depth to the New Pit Chalk Formation is prohibitive even for trench fill foundations and further investigation would be required in this respect.

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1 Introduction

1.1 Instruction

WYG Environment Planning Transport Ltd (WYG) was commissioned by Dandara Ltd to undertake an intrusive ground investigation at the Windroos development site, Littlehampton, as part of a proposed residential development. The development is subject to planning conditions set by Arun District Council. A ground investigation has previously been carried out by Eastwood & Partners in 2013[1]. The purpose of this additional investigation is to provide further information on the ground conditions, with particular focus on the extent and nature of contamination on the site, in order to assist with the discharge of Planning Condition 5 related to ground contamination (LU/229/10).

1.2 Brief

Planning consent is in place for the development of 84 dwellings, with areas of private and communal soft landscaping, subject to the discharge of a number of conditions under reserved matters. Condition 5, relating to risks associated with ground contamination, requires completion of a number of components which must be submitted for the approval of the planning authority. These include:

1) A preliminary risk assessment;
2) Site investigation;
3) Risk assessment, remediation options appraisal and remediation strategy;
4) A verification plan to demonstrate that remedial works are complete.

It is understood that Arun District Council have confirmed that the site investigation undertaken by Eastwood & Partners meets the requirements of points 1 and 2 above, however, further ground investigation was required by the Council following removal of fuel storage tanks in order that points 3 and 4 could be completed. The additional ground investigation undertaken by WYG is intended to fulfil these criteria with regard to investigation of ground conditions in the vicinity of tank locations and verification of the findings of the previous ground investigation. It is anticipated that points 3) and 4) will be carried out following the completion of this additional site investigation report.

1.3 Report Scope

This report summarises the work undertaken and includes the following key elements;

[1] Eastwood & Partners, 20123. Geotechnical and Geo-environmental Site Investigation. Windroos Nursery, Worthing Road, Toddington for Taylor Wimpey Southern Counties. Report No. 3574-001R(I2). Fleet.

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- Full factual records of the site works carried out;
- Ground conditions encountered;
- In-situ testing results;
- Geotechnical and environmental laboratory testing results; and
- Interpretation of all in-situ, geotechnical and chemical testing results.

1.4 Limitations

This report has been prepared in accordance with the requirements of Dandara Ltd. It is subject to the report conditions contained in Appendix A. The information contained in this report is intended for the use of Dandara Ltd. WYG can take no responsibility for the use of this information by any third party or for uses other than that described in this report.

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2 Site Information

2.1 Location

The site is located to the north of Littlehampton, a civil parish within West Sussex. The site address is Worthing Road, Wick, Littlehampton, West Sussex BN17 6LY. The National Grid Reference to the centre of the site is TQ 03605 03465. A site location plan is presented as Figure 1.

2.2 Site description

The site forms part of the former Stuart Lyons Haulage Depot, comprising a central depot area with a two-bay storage unit in the centre of the site. This is surrounded by a concrete and tarmac forecourt, with two empty residential buildings to the south. The entrance to the site is from the south east, via the A259, Worthing Road. A partial concrete and partial tarmac covered vehicle track runs through the centre to the northern portion of the site. The surrounding areas of the site area are predominantly open ground, appearing to have been reworked by vehicle movements.

Several material stockpiles and bunds are located around the site, with evidence of stockpiled material having been moved around the site. A stockpile and bund are located in the north-eastern corner of the site which measures roughly 430m^2, with two smaller stockpiles and bunds located adjacent to each other in the north-western corner of the site, measuring roughly 40m^2 and 80m^2. These stockpiles are approximately 1.0m to 1.5m high. There is a further stockpile of approximately 200m^2 and bund in the west of the site adjacent to the site boundary and a large bund located along the southern boundary of the site that measured approximately 800m^2, both of which are around 2.0m to 2.5m in height. Although these stockpiles were the subject of a previous investigation on the site in 2013, from the shape and vegetation growing on the stockpiles, it appears that they have remained unchanged until the date of the recent investigation, with the exception of the stockpile along the southern boundary which appears to have been reduced towards the site boundary. A partially intact greenhouse is located within the central eastern portion. A ground investigation previously carried by Eastwood & Partners for Taylor Wimpey in 2013 (ref 35747-001R(I2)) has been made available and the findings of the site history are discussed in Section 2.5.

Five tanks were formerly located on the site and a number of these were present at the time of the investigation carried out in 2013 but have since been removed.

An above ground steel tank was located adjacent to the cottage in the southeast. At the time of the investigation in 2013, the tank was disused and was assessed to have likely contained heating oil.

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A concrete base was located to the northeast of the haulage yard building, in the centre of the site, and this was present during the recent investigation. This base carried a large fuel tank, although the capacity and contents of the tank is not known, it is likely this was previously used to refuel haulage vehicles. At the time of the 2013 investigation, a plastic, above ground internally bunded tank with integral pump dispenser containing diesel fuel was present, and no signs of spillage or leakage were noted. This tank had subsequently been removed prior to the recent investigation.

The previous investigation noted that the Upton McGougan Consulting Engineers' Siteline Survey drawing number 022.1832-S1 Rev A shows a tank to have been present adjacent to the southern elevation of the haulage yard building. No indication of a tank was noted during the 2013 investigation, although there was a 1.0m deep concrete pit which appeared to be associated with a drainage system, and this was also present during the recent investigation.

The Eastwood & Partners investigation also noted that the West Sussex Trading Standards Petroleum Licensing Officer data held by Arun District Council contains no details of the tanks on site.

During a walkover of the site prior to the recent intrusive investigation, discussions with Dandara indicated that there had also been tanks located adjacent to the north-western corner of the haulage yard building and adjacent to the western elevation of the building in the south, which have since been removed. Although these tanks are understood to have been relatively small and located above-ground, the nature of the contents is unknown and is thought likely to have been heating oil.

The locations of all five former tanks is shown on the Site Investigation Layout Plan in Figure 2.

2.3 Geology

Information has been gathered using BGS geology mapping (1:50,000 scale, sheet 332 Bognor). These indicate that the site is underlain by superficial River Terrace Deposits over Raised Beach Deposits and bedrock deposits of the New Pit Chalk Formation. Immediately south of the site the BGS record bedrock of Undifferentiated Chalk Formations. Due to the existing site development, Made Ground deposits are anticipated across the site, and have been identified within previous ground investigation reports.

The New Pit Chalk Formation is described by the BGS as *"Principally blocky, white firm to moderately hard chalk with numerous marls or paired marl seams."*

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2.4 Planning History

A search of the Arun District Council planning portal has been carried out and the relevant planning applications for the site are listed in Table 2-1.

Table 2-1 - Summary of Planning History

Planning Application Reference	Date	Issued by	Details	Key Documents	Comment
LU/229/10/	26/07/10	Savills Planning & Regeneration	Demolition of existing structures on the site and construction of 91 dwellings.	Preliminary Contamination Risk Assessment *Upton McGougan Ltd dated July 2010, ref 022.1832/RW/92 139A*	The recommendation of a full ground investigation made within the Preliminary Contamination Risk assessment was acceptable to the council and a full ground investigation including asbestos sampling was required.
LU/229/10/	28/09/11	Arun District Council	Planning permission was granted subject to conditions, including Condition 5 (detailed below)	Decision Notice.	See Condition 5 below.
LU/110/14/DOC	17/04/14	Paul Basham Associates	Issue of geotechnical and geoenvironmental report	Geotechnical & Geo-Environmental Site Investigation *Eastwood & Partners Consulting Engineers June 2013 (ref 35747-001R(I2))*	See Section 2.5.
LU/110/14/DOC	15/05/14	Arun District Council	Planning permission refused on the basis that Condition 5 could not be passed.	Decision Notice.	'Only section 1 and 2 of Condition 5 have been met. Contamination has been discovered onsite that requires further investigation.'
LU/342/18/DOC	26/11/18	Dandara Ltd	Demolition of existing structures on the site and construction of 91 dwellings.	Planning Application.	None. No further update to Condition 5 has been made and application reference LU/110/14/DOC Condition 5 remains current.

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Letter from Arun District Council to Paul Basham Associates, dated 15th May 2014, Ref LU/110/14/DOC (current condition):

Article 21 of the Town and Country Planning (General Development Procedure) Order 1995 Application for approval of details reserved by condition 5 of previously approved planning application LU/229/10 - relating to risks associated with contamination of site.

Condition 5: 'Prior to the commencement of development approved by this planning permission (or such other date or stage in development as may be agreed in writing with the Local Planning Authority), the following components of a scheme to deal with the risks associated with contamination of the site shall each be submitted to an approved, in writing, by the local planning authority:

1) A preliminary risk assessment which has identified: - all previous uses; - potential contaminants associated with those uses; - a conceptual model of the site indicating sources, pathways and receptors; - potentially unacceptable risks arising from contamination at the site.

2) A site investigation scheme based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.

3) The site investigation results and the detailed risk assessment (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.

4) A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in (3) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance and arrangements for contingency action.

Any changes to these components require the express consent of the local planning authority. The scheme shall be implemented as approved. Reason: To ensure that any contamination related to the historic and recent site uses does not cause pollution to controlled waters due to the development in accordance with PPS23 and Policy GEN26 of the Arun District Local Plan.'

2.5 Previous Investigations

This section provides a summary of ground conditions encountered during previous phases of geoenvironmental assessment on the site.

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The following table summarises the relevant reports made available to WYG.

Table 2-2 - Summary of Previous Reports

Report	Author	Reference / Date	Title	Client
1	Upton McGougan Ltd	022.1832/RW/92139A, July 2010	Geotechnical & Geo-Environmental Site Investigation	Stuart Lyons Haulage Ltd
2	Eastwood & Partners	35747-001R(I2)), June 2013	Geotechnical and Geo-Environmental Site Investigation	Taylor Wimpey Southern Counties
3	Ground & Water geotechnical and environmental consultants	GWPR1624, No date	Soakaway testing results	Stuart Lyons Haulage Ltd

WYG understand that Dandara Ltd have reliance on the Eastwood & Partners report outlined above, as such the findings and recommendations are summarised below and the contamination data within the report is utilised within the contamination assessment in Section 8.0.

2.5.1 Report 1 Summary

Upton McGougan Ltd carried out a Preliminary Contamination Assessment at the site (report ref 022.1832/RW/92139A, dated July 2010).

The assessment identified the following potential sources of contamination:

- The use of the site may have involved the use of chemical fertilisers, weed killers and other substances.
- The existing buildings were erected at a time when asbestos was a commonly used building material.
- The use of the site as a haulage yard may have involved the use of fuel and lubricants on site.

The report concluded that as the site will be used for residential purposes, a full detailed site investigation will be required.

2.5.2 Report 2 Summary

Eastwood & Partners carried out a geotechnical and geo-environmental site investigation (report ref 35747-001R(I2), dated June 2013). As part of the investigation, a desk study was carried out and the findings are summarised below.

- Historical maps indicate that prior to 1969, the site was undeveloped and formed open fields. After that time, the site appears to have been used as a nursery with glasshouses in the early 1970s, which were demolished over time. At the time of the investigation, the site was in use as a haulage facility.

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Planning history indicates a boiler house and refrigeration unit may have existing on the site after 1964.

- BGS records indicate the site is underlain by River Terrace Deposits comprising sand, silt or clay, which is underlain by Raised Beach Deposits comprising sand and gravel. The Raised Beach Deposits are underlain by the New Pit Chalk Formation.
- Records provided by the Environment Agency indicate the River Terrace Deposits and Raised Beach Deposits are classified as a Secondary 'A' Aquifer, while the underlying New Pit Chalk Formation is classified as a Principal Aquifer.
- The site is not within a groundwater source protection zone. The nearest surface water feature is a pond with an associated unnamed stream/drain which is located approximately 250m northeast of the site and forms part of a network of streams and drains across the surrounding area.
- Records indicate an historical landfill was located 100m southwest of the site which received inert and household waste between 1960 and 1970 and at the time of the report, the former landfill site was in use as a caravan park.
- No radon protective measures are required.
- The site does not lie within a floodplain.

The subsequent ground investigation comprised the following elements.

- 10no. machine excavated trial pits using a JCB 3CX excavator and advanced to depths of between 2.5m and 3.6m;
- 6no. window sample boreholes and advanced to depths of between 1.1m and 4.0m depth;
- 1no borehole excavated by means of a hand auger;
- 15no. hand excavated pits to sample stockpiles of soil and to enable sampling within the glasshouses on site;
- 4no. soakaway tests; and
- Installation of 4no. soil gas and ground monitoring standpipes to 4m depth. Three subsequent

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ground gas and groundwater monitoring visits were carried out following the fieldwork.

The ground investigation findings are summarised below.

- Ground conditions were found to comprise topsoil or granular made ground over sand, silt and clay, with weathered chalk encountered at depths of between 2.0m and 3.8m. Topsoil was encountered in the northern third of the site and to the west of the glass houses, in the centre of the site. The topsoil comprised dark brown silty sand with occasional concrete, glass fragments, aluminium frame and roof tiles, which were thought to have originated from the demolition of the glass house in that area. Topsoil was also located in the garden areas of the cottage and building in the south. Made Ground was encountered predominantly in the southern half of the site to depths of between 0.2m and 0.7m, with the deepest made ground encountered in the centre of the site at the location of the former glasshouse. The WYG ground investigation identified Made Ground across a wider site area; this Made Ground is shown on the Site investigation Layout Plan in Figure 2.
- Groundwater was not encountered during the investigation.
- Infiltration rates of 0.48 to 12 $\times$ 10^{-6} m/sec were recorded.
- The highest recorded sulphate class was within a made ground stockpile and was assessed as DS-3 AC-3.
- Window sample holes and trial pits were located to provide general coverage of the site. Several stockpiles and bunds were targeted for investigation using hand pits (designated as TS, except for TS7 which was "taken through the centre of the gravel covered yard in the west of the site".) Seven stockpiles are identified on the plan within the Eastwood & Partners report; TS1 and TS2 targeted the stockpile in the far north eastern corner, TS3 targeted a small stockpile along the western boundary, with TS4 and TS5 targeting a stockpile just to the south of this. TS8-11 targeted the stockpile in the south western corner of the site. It is unclear from the plan whether WS1-2 also targeted this stockpile. There was one small stockpile in the north-western corner of the site which was not the target of any exploratory locations.
- A number of trial pits were located adjacent to the edges of stockpiles as identified on the plan within the Eastwood & Partners report. These were TP6 (a small stockpile in the north-eastern corner of the site), TP8 (between two stockpiles along the north-western boundary), and TP10 (adjacent to the edge of the stockpile targeted by TS1-TS2).
- The stockpiles are identified on the plan as being of topsoil (5no. stockpiles), with two being identified as being composed of "rubbish with small amounts of soil". The stockpile along the southern and

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western boundary is identified as being composed of "gravel, similar to made ground within the ground".

- The glasshouses on site were to be targeted with two window sample locations. These were not drilled due to access therefore GH1 S1, GH1 S2, GH2 S1, and GH2 S2 were sampled instead. It is not explicitly stated, but it is assumed that these samples are from hand-dug pits in place of the abandoned window sample locations. Photographs of the glasshouses are included within Appendix 4, which show areas of overgrown vegetation, empty plant pots and what is interpreted as irrigation infrastructure.

- Elevated concentrations of several contaminants in relation to the relevant screening values were identified in GH1 (lead), WS2 at 0.2m bgl (benzo[a]anthracene, benzo[a]pyrene, benz[b]fluoranthene, chrysene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, naphthalene, and phenanthrene), WS3 at 0.2m bgl (lead and naphthalene), WS7 at 0.3m bgl (lead), TP2 at 0.2m bgl (aromatic hydrocarbons >EC12-EC16 and >EC16-21), TP11 (no depth provided, the exceedance was of benzo[b]fluoranthene), and TS7 at 0.1m bgl (benzo[a]anthracene, benzo[a]pyrene, benz[b]fluoranthene, chrysene, dibenz[a,h]anthracene, lead, and naphthalene). The presence of asbestos was tested for from four locations (TP5 at 0.1m bgl, TP9 at 0.1m bgl, WS7 at 0.3m bgl, and TP8 at 0.2m bgl) and was not identified.

- None of these exceedances were located within any of the "stockpiles" identified on the site plan. GH1 is assumed to be located within what is identified as Glasshouse 1 on the plan within the Eastwood & Partners report. TP2 is located adjacent to a structure in the south eastern corner of the site. TP11 is located along the north western boundary of the site. TS7 is located adjacent to the northern end of the stockpile along the southern and western boundary. WS2 is located adjacent to the stockpile along the south and western boundaries of the site. WS3 is located in the southern central part of the site and was located adjacent to a "tank" identified on that plan. WS7 is located in the central south western portion of the site to the west of what is labelled a "Maintenance Garage" on the Eastwood & Partners plan.

- The report concluded that material which recorded elevated concentrations of PAHs and TPHs will need to be removed or capped with a minimum thickness of 600mm (including 150mm of topsoil). The report goes onto recommend that localised elevated concentrations of petroleum hydrocarbons and naphthalene will require installation of a ventilated void beneath the ground floor if the material is retained.

- The report goes onto recommend removing or capping other areas of ground where elevated PAHs

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were identified across the site.

- Soil gas monitoring indicated a maximum carbon dioxide concentration of 6.4 % and a maximum flow rate of 1.9l/hr. The maximum concentration of carbon dioxide exceeded the typical maximum concentration for classification as Green, with all other results falling below this. The report concluded that the "typical maximum concentrations" can be exceeded in certain circumstances should the conceptual model indicate it safe to do so, and it was considered that provided a ventilated void is installed beneath the ground floor slab, significant risks would not be posed.

- The report recommended conventional strip footings should extend into the natural strata to a minimum depth of 750mm and also recommended an allowable bearing capacity of 75kPa within the clay/sand soils at that depth. The report then went on to recommend an allowable bearing pressure of 125kPa (indicated on the adjacent site) and to allow for some extra dig to achieve the required bearing pressure, although the report did not stipulate the depth or bearing stratum for foundations designed to this allowable bearing pressure.

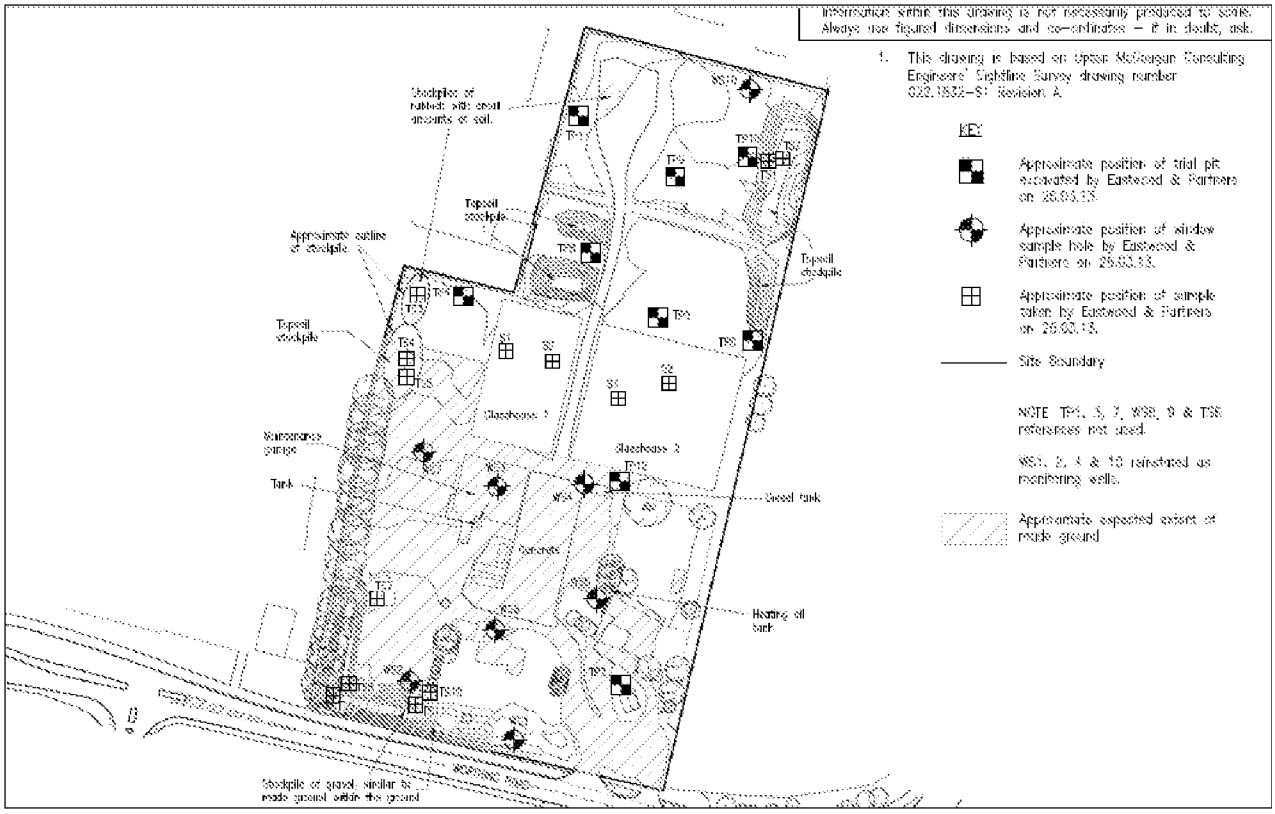
- A sulphate class of DS-2 AC-2 was recommended for concrete placed within the made ground, DS-3 AC-3 within the made ground stockpile and DS-1 AC-2z within the natural ground

- The report recommended an infiltration rate of 0.48 × 10-6 m/sec within the very silty slightly clayey

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slightly gravelly sand.

An extract of the stockpile locations and extent of made ground is shown in the plan extract below, provided as part of the ground investigation findings.



Since the date of the aforementioned ground investigation, the guidance and standards for both contamination assessment and soil gas monitoring have been updated; specifically, C4SLs were published in 2014 and S4ULs were published in 2015. The results of soil contamination testing during the previous investigation in 2013 have subsequently been reassessed within this report in line with current guidelines.

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3 Site Investigation

The WYG site investigation was undertaken between 13th and 15th November 2018. Details of the fieldwork methods are given in the notes section at the end of this report.

3.1 Scope

The scope of the site investigation included the following:

- 4no. windowless sample boreholes to depths of 4m and 5m with in situ testing. Window sample references WS01 to WS04 were positioned to investigate the likelihood of contaminated soils at the former tank locations, which are shown in the Site Investigation Location Plan in Figure 2.
- 7no. machine-excavated trial pits to a maximum depth of 3.5m and excavated by means of a JCB. Due to the depth of the concrete casing at the former tank location adjacent to the southern elevation of the haulage yard building, this location was investigated by means of a machine-excavated trial pit, reference TP07, also shown on the Site Investigation Location Plan in Figure 2.
- 8no. hand excavated trial pits to a maximum depth of 0.67m at stockpile locations (references HP05, HP16 to HP18) and in areas where overhead power cables prevented access by the JCB (references HP01, HP04, HP13 and HP15).
- In situ TRL Probe testing adjacent to the borehole locations to provide CBRs.
- Collection of disturbed and undisturbed soil samples including sampling of stockpiles of topsoil and made ground.
- Geotechnical and chemical laboratory testing of soil samples. Logging of exploratory positions by a suitably qualified geo-environmental engineer to BS5930:1999+A2:2010 (partly superseded by BS EN 1997 Eurocode 7).
- Laboratory geotechnical classification tests undertaken on selected samples.
- Testing of soil samples collected from the trial pits and stockpiles for a general suite of expected contaminants including screening for herbicides/pesticides.

Figure 2 shows the layout of the exploratory holes advanced during the site investigation. Exploratory hole logs including photographic plates are presented in Appendix B. Laboratory test results are presented in Appendix D (Geotechnical) and Appendix E (Ground Contamination).

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4 Ground Conditions Encountered

4.1 Strata encountered

The sequence of strata encountered beneath the site was;

- Concrete
- Asphalt
- Made Ground
- River Terrace Deposits
- Raised Beach Deposits
- New Pit Chalk Formation

A summary of depth of each stratum is provided in Table 4-1 - Summary of strata depths (m bgl) for all exploratory holes and descriptions of each stratum are detailed in the subsequent sections. Exploratory hole logs including photographic plates can also be seen in Appendix B.

Table 4-1 - Summary of strata depths (m bgl) for all exploratory holes

Location	Concrete/Asphalt	Made Ground	River Terrace Deposits/ Raised Beach Deposits	New Pit Chalk Formation
HP04	Ne	0.00 – 0.15	0.15 – 0.67*	Ne
HP05 (Stockpile)	Ne	0.00 – 0.50	0.50 – 0.66*	Ne
HP13	Ne	0.00 – 0.05	0.05 – 0.30*	Ne
HP15	Ne	0.00 – 0.40	0.40 – 0.62*	Ne
HP16 (Stockpile)	Ne	0.00 – 0.50*	Ne	Ne
HP17 (Stockpile)	Ne	0.00 – 0.50*	Ne	Ne
HP18 (Stockpile)	Ne	0.00 – 0.45*	Ne	Ne
TP07	Ne±	1.40 – 1.45*	Ne	Ne
TP08	0.00 – 0.15	0.15 – 3.40	Ne	Ne
TP09	Ne	0.00 – 0.20	0.20 – 3.00*	Ne
TP10	0.00 – 0.10	0.10 – 0.35	0.35 – 2.50*	Ne
TP11	Ne	0.00 – 0.60	0.60 – 3.10	Ne
TP12	Ne	0.00 – 0.10	0.10 – 3.20	Ne
TP14	Ne	0.00 – 0.10	0.10 – 3.50*	Ne
WS01	0.00 – 0.30	0.30 – 0.40	0.40 – 3.80	3.80 – 5.00*
WS02	Ne	0.00 – 0.40	0.40 – 3.50	3.50 – 5.00*
WS03	Ne	0.00 – 0.40	0.40 – 2.90	2.90 – 4.00*

Location	Concrete/Asphalt	Made Ground	River Terrace Deposits/ Raised Beach Deposits	New Pit Chalk Formation
WS04	Ne	Ne	0.00 – 3.80	3.80 – 5.00*

*Base of stratum not proven
±Void encountered

4.1.1 Made Ground

Made Ground encountered generally comprised brown to dark brown slightly gravelly fine to coarse sand and sandy gravelly clay with brick concrete and tile fragments and extended to depths of between 0.05m and 0.60m. Local deepening of the made ground to 1.45m were encountered at TP07 due to the presence of a former tank concrete encasement that extended to a depth of 1.40m bgl, and at TP08 the made ground extended to a depth of 3.40m and may be associated with historic structures or infrastructure that may have since been removed. At both locations the depth of the made ground was not proven as well as at HP16, HP17 and HP18.

At the former tank location, TP07, underlying the existing concrete encasement, a strong hydrocarbon odour and surface hydrocarbon sheen was noted. No other visual or olfactory evidence was noted during the fieldwork. A sample of soil at this location was collected from a depth of 1.45m for the purpose of contamination testing and the results are discussed in Section 8.0.

The site plan shown in Figure 2 shows a revised indication of the likely extent of made ground on the site, including made ground encountered during the previous investigation.

4.1.2 River Terrace Deposits

The River Terrace Deposits were proved within the window sampler boreholes to depths of between 1.70m and 3.60m depth. Where the River Terrace Deposits were encountered within the trial pits, the depth of this stratum was not proved, although it was found to extend to depths of between 0.30m and 3.50m. At the majority of sampling locations, the River Terrace Deposits were found to comprise soft and firm brown sandy clay and gravelly clay.

The River Terrace Deposits comprised brown clayey slightly gravelly fine to coarse sand within TP10 and TP11.

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4.1.3 Raised Beach Deposits

The Raised Beach Deposits were encountered within the window sampler boreholes to depths of between 1.70m and 3.80m depth. These deposits were encountered in the southwestern area of the site only, thickening towards the southwest. Where the River Terrace Deposits were encountered, Raised Beach Deposits were found to comprise very loose and loose orange-brown slightly clayey fine and medium sand and soft brown sandy clay.

4.1.4 New Pit Chalk Formation

The New Pit Chalk Formation was found to comprise structureless chalk composed of a cream, slightly sandy silt (grade Dm) which was proved to depths of 3.40m and 4.50m. This overlaid a cream to white low density structureless chalk composed of slightly sandy subangular to angular gravel, with very weak to weak clasts(Grade Dc). The New Pit Chalk Formation was encountered within the window sampler boreholes only and which were advanced to depths of 4.0m and 5.0m. The base of the chalk was not proven at these locations.

4.2 Groundwater

Groundwater was not encountered in any of the exploratory positions.

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5 Laboratory Testing

5.1 Geotechnical Testing

Geotechnical testing was scheduled by WYG and undertaken by GSTL Ltd, an approved supplier in accordance with the requirements of WYG quality system and are UKAS accredited for a range of geotechnical tests. The test procedures used in each case are given in Table 2 and full results are presented in Appendix D.

Table 5-1 - Summary of scheduled geotechnical tests

Test	Standard (BS1377:1990)	No.
Moisture Content	BS1377:1990 2/3.2	4
4 Point Liquid & Plastic Limit	BS1377:1990 2/4.3&5.3	4
PSD Wet Sieve	BS1377:1990 2/9.2	2
BRE Suite SD1 and pH for soil	BRE	3

5.2 Environmental Testing

The environmental chemistry was investigated by specialist chemical analysis of selected soil and groundwater samples carried out by ALS Life Sciences Ltd, which is an approved supplier in accordance with the requirements of WYG quality system and is UKAS and MCERTS accredited for a range of chemical analyses. The test suites are detailed in Appendix F. The test results for the soil sample testing are included in Appendix E.

Table 5-2 - Summary of scheduled environmental testing

Test suite	No.
WYG Suite B (consisting of pH, asbestos identification, fraction of organic carbon, easily liberatable cyanide, phenol, metals and metalloids (arsenic, beryllium, water soluble boron, cadmium, chromium III and VI, copper, lead, mercury, nickel, selenium, vanadium, zinc), PAHs (acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene), Petrol Range Organics (>C5 to C10), Diesel Range Organics (>C10 to C40), BTEX (benzene, toluene, ethylbenzene, and mixed isomers of xylenes).	12
WYG Suite C (consisting of pH, asbestos identification, fraction of organic carbon, easily liberatable cyanide, phenol, Sulphate, metals and metalloids (arsenic, beryllium, water soluble boron, cadmium, chromium III and VI, copper, lead, mercury, nickel, selenium, vanadium, zinc), PAHs (acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene), Speciated Aliphatic and Aromatic compounds (Aliphatic >EC5-EC6, >EC6-EC8, >EC8-EC10, >EC10-EC12, >EC12-EC16, >EC16-EC35, >EC35-EC44, Aromatic >EC5-EC7, >EC7-EC8, >EC8-EC10, >EC10-EC12, >EC12-EC16, >EC16-EC21, >EC21-EC35, >EC35-EC44). BTEX (benzene, toluene, ethylbenzene, and mixed isomers of xylenes).	12

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Test suite	No.
WYG Leachate Suite B (consisting of pH, sulphate, ammonium (NH_4), alkalinity as $CaCO_3$, total phenol, metals and metalloids (antimony, arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc) PAHs (acenaphthene, acenaphthylene, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene), Petrol Range Organics (>C5 to C10), Diesel Range Organics (>C10 to C40).	3
Combined Pesticides (aldrin, α-hexachlorocyclohexane, Azinphos-methyl, β-hexachlorocyclohexane, δ-hexachlorocyclohexane, diazinon, dichlorvos, dieldrin, Endosulphan I, Endosulphan II, Endosulphan sulphate, endrin, ethion, fenitrothion, γ-hexachlorocyclohexane (lindane), heptachlor, heptachlor epoxide, malathion, methyl parathion, mevinphos, o,p'-DDD (TDE), o,p-methoxychlor, p,p-DDE, p,p-DDT, p,p-methoxychlor, p,p-TDE (DDD), parathion)	3

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6 Geotechnical Assessment

6.1 Ground Conditions

The soils beneath the site typically comprise made ground over a substantial thickness of superficial deposits (River Terrace Deposits and Raised Beach Deposits) overlying the New Pit Chalk Formation. The mantle of made ground is typically thin at less than 0.6m in thickness. However, there are two areas of locally deep made ground; depths of up to 3.4m have been identified, one of which is associated with a former tank location and the other may be associated with potential former site structures / infrastructure since removed. The made ground was underlain by the River Terrace Deposits which generally comprised soft and firm brown sandy clay and gravelly clay and extended to depths of between 1.70m and 3.60m. Where present the Raised Beach Deposits comprised very loose and loose orange-brown slightly clayey fine and medium sand and soft brown sandy clay. The New Pit Chalk Formation was encountered at depths ranging between 2.9 and 3.9m bgl and was present to the maximum depth investigated (5m bgl). The New Pit Chalk Formation was described as a structureless chalk composed of cream, slight sandy silt (Grade Dm) and slightly sandy sub-angular to angular gravel with very weak to weak clasts (Grade Dc). No groundwater was encountered during the investigation.

6.2 Soil and Rock Properties

The ranges of the various soil and rock properties measured are discussed below, to aid in the selection of design values. However, the appropriate choice of characteristic and design values will depend on the particular analysis and design philosophy used and should be selected by the designer.

Where characteristic values are given, these are reasonably conservative estimates of a measured or assessed property that may be used to represent the overall behaviour of the material. Design values also take into account the ground-structure interaction for a given structure so need to be selected by the designer.

6.2.1 Made ground

Given the limited thickness and variability of the made ground soils, they are not considered suitable to support structural loads unless they are engineered.

6.2.2 River Terrace Deposits

The River Terrace Deposits were generally identified as fine grained (cohesive) deposits, although more granular layers were also identified. Plasticity indices tests were undertaken on four representative samples. Moisture contents ranged between 21 to 35%, liquid limits ranged between 32 to 53%, plastic limits ranged between 14 to 27% and plasticity indices ranged between 18 to 31%. These results indicate that the clay

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soils are of low to high plasticity. The modified plasticity index I'P is defined as I'P = (IP x % less than 425µm)/100%. Based on the test results modified plasticity indices ranged between 15 and 27% indicating that the clay soils are of low to medium volume change potential as a result of moisture content fluctuations. Undrained shear strength was measured directly during the fieldworks by hand vane, and the results combined with the hand vane results collected during the Eastwood & Partners investigation are appended. Standard penetration tests were also undertaken, from which undrained shear strength can be correlated. A plot of SPT N values against depth is presented as Figure 3. The results are presented in table 4 below.

Table 6-1 - Summary of test results

		No. of results	Range (min–max)	Average	Lower quartile	Upper quartile	Characteristic value
SPT N values		8	3 – 8	5	4	6	5
Angle of shearing resistance ϕ^2		8	27.5 – 29.5	n/a	n/a	n/a	28
Undrained shear strength:							
from SPT N values [2]	c (kN/m^2)	8	13.5 – 36	22	17	27	22
From hand vanes	c (kN/m^2)	17	17 – 95	45	32	48	45

Notes:

\+ suggested characteristic values are appropriate for most normal applications but designers should satisfy themselves that they are suitable for the specific application and design method they are using;

1 Estimated from Peck, Hansen and Thornburn, Foundation Engineering, Wiley, 2nd ed., (1974)[5]

2 Estimated from a correlation by Stroud and Butler (1975)[4]

Based on the results given in the table above, the clay soils of the River Terrace Deposits are generally soft and soft to firm. The undrained shear strength recorded by hand vanes tests vary greatly. It is noted from the previous ground investigation undertaken at the site that a similar variance of hand vane results was determined. This is probably a function of the granular content of the soils. Based on the characteristic values of undrained shear determined by both hand vanes (direct measurement) and SPT N values (correlation) a design/characteristic value of $30kN/m^2$ is recommended.

6.2.3 Raised Beach Deposits

Raised beach deposits were encountered in some but not all exploratory holes underlying the Rover Terrace Deposits. Typically, they comprised loose yellow and orange-brown gravelly slightly clayey fine to coarse grained sand but also in some instances sandy clay. Differentiating between River Terrace Deposits and Raised Beach Deposits is relatively subjective in some instances. Given variation in occurrence and thickness only limited geotechnical information was collected, specifically 6 (six) standard penetration results with N

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values varying between 0 and 15, with an average of 6. This indicates the raised beach deposits are of loose density. A plot of SPT N values against depth is presented as Figure 3.

6.2.4 New Pit Chalk Formation

The New Pit Chalk Formation was encountered at the base of the windowless sample boreholes only and as such only limited geotechnical information was collected on the unit. The chalk has been described a as structureless chalk, typically grade Dm but becoming Dc with depth. 9 (nine) standard penetration tests undertaken in the New Pit Chalk Formation recorded value ranging from 0 to 50 with an average of 27. A plot of SPT N values against depth is presented as Figure 3.

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7 Geotechnical Design Considerations

7.1 Proposed Development

The proposals for the site are understood to comprise the demolition of the existing warehouse, greenhouses, cottage and other ancillary buildings, followed by the construction of 84 new housing units, with areas of private and communal soft landscaping.

This assessment is considered to provide a general assessment of ground conditions on the site and to inform foundation design. Finished ground levels were not known at the time of writing the report; the depths stated in the following sections are to existing ground levels.

7.2 Foundations

The ground investigation has shown made ground, River Terrace Deposits and Beach Deposits to be present across the site with variable thicknesses, composition (cohesive and granular soils) and strength (soft and soft to firm where cohesive, and loose where granular).

Based on the characteristic soil parameters given in Section 6, traditional shallow foundations (pad or strip) constructed within the River Terrace Deposits will need to be limited to an allowable bearing capacity of 60kN/m^2. This should generally limit predicted settlements to less that 25mm. Assuming the soils to be of a worst-case moderate susceptibility to volume change, foundations will need to be placed a minimum of 0.9m bgl. Foundation depths will need to be deeper if foundations are being placed near to existing or proposed tress. NHBC guidance should be consulted in this respect. Where localised areas of deeper made ground exist, foundations excavations will need to be deepened or the made ground soils engineered to support the foundation. All foundation excavations should be inspected by an experienced and suitably qualified geotechnical engineer.

There is no notable increase in soil strength with depth in both the River Terrace Deposits and Raised Beach Deposits. Moreover, a decrease in soil density was noted at depth within the Raised Beach Deposits. To obtain a higher allowable bearing pressure, foundation excavations would need to be extended in to the Structureless Dc chalk, where 125 kN/m^2 could be achieved. However, the depth to the New Pit Chalk Formation is prohibitive even for trench fill foundations.

Raft foundations may represent a viable alternative to traditional foundations and would help mitigate differential settlements due to the variation is soil composition and strength. To assess the viability of a raft foundation, details of the proposed finished development level need to be considered. Furthermore, it will be necessary to collect further data on the shallow soils, given their variability. Alternatively, the use of pile

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foundations placed into the New Pit Chalk Formation could be considered. Again, if this option is chosen further ground investigation will be required to obtain deeper information on the New Pit Chalk Formation. It is recommended that boreholes are drilled to circa 3m to 5m below the basis of any proposed pile. A specialist piling contractor should be consulted for preliminary advice on pile type and depth to ensure sufficient ground data is collected for full design.

7.3 Floor Slabs

Given the presence of variable low strength soils at shallow depth, ground bearing floor slabs are not recommended. Suspended floor slabs should be utilised, but this can be reviewed again once the proposed development plans have been finalised.

7.4 Pavements

CBR values for the Made Ground deposits are typically in the range 9% to 18%. For pavement design, a value of 10% is recommended. Due to the nature of the deposits, the subgrade should be inspected during construction to identify any loose, soft or other unsuitable material, which should be removed and replaced with suitable compacted backfill. CBR values for the underlying natural soils, tested up to a depth of 1.2m are typically in the range 5% to 19%. For pavement design, a value of 8% is recommended.

7.5 Chemical Attack on Buried Concrete

Chemical tests show low levels of water-soluble sulphates and generally near-neutral conditions. Based on these conditions, it is recommended that for foundations the Design Sulphate Class for the site, as defined in BRE Special Digest 1, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1, based on mobile water conditions. These results should be reviewed in conjunction with the results of the findings of the Eastwood and Partners report.

7.6 Temporary Works

Given loose and soft materials were encountered, some collapse of shallow excavations is expected. Shallow groundwater was not encountered during the investigation. It is therefore unlikely that groundwater will be encountered within shallow excavations, although groundwater levels can vary seasonally.

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8 Ground Contamination Assessment

8.1 Introduction

The English Contaminated Land Regime allows for a tiered approach to the assessment of ground contamination which is designed to allow increasingly site-specific assessment, with each tier providing decreasing levels of conservatism if required. The first tier of assessment has been undertaken and is presented in this section; it comprises a comparison of site chemical data with accepted generic assessment criteria/screening values in order to identify potential constituents of concern (CoCs) that may require further consideration by means of subsequent, more site-specific tiers of assessment.

It should be noted that the assessment criteria for human health and controlled waters are intended to indicate to an assessor that concentrations above this level might present an unacceptable risk to the receptor and that further assessment, site investigation or remediation/risk management may be required. They are not intended to be used as categorical indicators of significant contamination.

8.2 Ground Contamination Assessment

Generic assessment criteria/screening values are derived by means of computer modelling using input parameters reflective of typical ground conditions, chemical fate and transport properties and typical receptors and exposure scenarios. In March 2014, the Department of Environment, Food and Rural Affairs (DEFRA) with Contaminated Land: In Real Environments (CL:AIRE) published Category 4 Screening Levels (C4SLs) for a limited number of contaminants for soil with 6% Soil Organic Matter (SOM) using the Contaminated Land Exposure Assessment (CLEA) Model. Contaminant concentrations below C4SLs are considered to pose an acceptably low risk. Where C4SLs have been published, these values have been used

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as Generic Assessment Criteria (GAC). Where no published screening values are available WYG have derived their own values.

The following screening values for soils have been used which are the most up to date at the time of reporting:

- CL:AIRE published C4SLs;
- Published CIEH/LQM Tier One generic assessment criteria;
- WYG internal Tier 1 Screening Criteria (issue 15) derived using the derivation tool CLEA version 1.06(9), in line with the current UK Contaminated Land Regime, and;
- Published CLEA Soil Guideline Values published by DEFRA/EA(8) (where available).

The Soil Screening Values used in the assessment of risks to human health from soil are based on generic land-use scenarios modelled over the operational life of the site. Consequently, short term (acute) exposure risks arising from activities which deviate from the assumed land-use scenario (i.e. risk to construction workers) are not considered by this assessment process. Similarly, issues of waste classification and management are not addressed by this framework.

GACs used as part of this assessment process (gQRA) have been developed specifically for a generic residential with plant uptake land use scenario. This is the most suitable screening criteria in light of the sensitivity of the proposed end use as residential development. The screening values adopted assume 1% Soil Organic Matter.

8.2.1 Tier 1 – Soil Screening

Twenty-four soil samples from the near surface materials and stockpiles on site were submitted for chemical laboratory analysis. Full copies of laboratory certificates for all soil analysis are included as Appendix E and these results have been screened against the screening values detailed above.

The screening exercise that has been undertaken has allowed for the identification of potential constituents of concern (CoC). Table 8-1 - Potential Constituents of Concern Following Tier 1 Screening – Natural Strata and Table 8-2 - Potential Constituents of Concern Following Tier 1 Screening – Made Ground (Stockpiles) provides a summary of the potential CoC for natural strata and made ground deposits, respectively.

Table 8-1 - Potential Constituents of Concern Following Tier 1 Screening – Natural Strata

Determinant	Units	Screening Criteria	Maximum	Minimum	Exceedances
Benzo[b]fluoranthene	mg/kg	2.6	2.83	<0.015	HP05 – 0.6m (Stockpile in south)
Dibenz[a,h]anthracene	mg/kg	0.24	0.316	<0.023	HP05 – 0.6m (Stockpile in south)

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Table 8-2 - Potential Constituents of Concern Following Tier 1 Screening – Made Ground (Stockpiles)

Determinant	Units	Screening Criteria	Maximum	Minimum	Exceedances
Lead	mg/kg	200	372	12.9	HP16 – 0.2m HP17 – 0.3m HP18 – 0.3m
Dibenz[a,h]anthracene	mg/kg	0.24	0.316	<0.023	HP17 – 0.3m

8.2.2 Asbestos Screening

Of the twenty-four samples scheduled for analysis, three samples returned positive for the presence of asbestos, all within Made Ground. Table 8-3 provides a summary of the asbestos identified within Made Ground deposits.

Table 8-3 - Presence of asbestos, asbestos type and quantification (where undertaken)

Determinant	Units	Screening Criteria	Quantification or Description	Exceedances
Asbestos (Amosite)	% Total	Presence	0.0455 "Loose fibres in soil"	TP08 – 0.5m WS03 – 0.3m
Asbestos (Chrysotile)	% Total	Presence	"Soil containing material typical of bitumen"	TP10 – 0.3m

8.2.3 Eastwood & Partners Report

The contamination results from the previous ground investigation carried out by Eastwood and Partners have been screened using the most recent screening criteria and the results are as follows.

Table 8-4 - Potential Constituents of Concern Following Tier 1 Screening – Eastwood & Partners Report

Determinant	Units	Screening Criteria	Maximum	Minimum	Exceedances
Lead	mg/kg	200	640	13	TS7 – 0.1m GH1 – no depth WS3 – 0.2m WS7 – 0.3m
Naphthalene	mg/kg	2.3	52.0	<0.1	TS2 – no depth TS7 – 0.1m WS2 – 0.2m WS3 – 0.2m
Phenanthrene	mg/kg	95	150	<0.1	WS2 – 0.2m
Benzo(a)anthracene	mg/kg	7.2	61	<0.1	TS7 – 0.1m WS2 – 0.2m
Chrysene	mg/kg	15	53	<0.1	TS7 – 0.1m WS2 – 0.2m

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Benzo(b)fluoranthene	mg/kg	2.6	80	<0.1	TS4 – no depth TS7 – 0.1m WS2 – 0.2m TP11 – Stockpile in northwest of site
Benzo(a)pyrene	mg/kg	5.0	65	<0.1	TS7 – 0.1m WS2 – 0.2m
Dibenzo(a,h)anthracene	mg/kg	0.24	9.8	<0.1	TS7 – 0.1m WS2 – 0.2m
Indeno(1,2,3-cd)pyrene	mg/kg	27	34	<0.1	WS2 – 0.2m
Aromatic >EC12-EC16	mg/kg	140	140	140	WS2 – 0.2m
Aromatic >EC16-EC12	mg/kg	260	900	N/A	WS2 - 0.2m

As noted in Section 2.5.2, the previous ground investigation identified a number of contaminants at elevated concentrations when compared to more recent screening values. These were lead, naphthalene, phenanthrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene, indeno(1,2,3-c,d]pyrene, aromatic >EC12-EC16, and aromatic >EC16-EC21. Exceedances of PAHs were identified in made ground samples from GH1, WS2, WS3, WS7, TP2, TP11 and TS7. The most heavily impacted soils are those from WS2 at a depth of 0.2m bgl. However, an evaluation of the PAH ratios would indicate that the source of the PAHs is from coal-tar. The most reasonable explanation for this is that coal-tar derived asphalt is present within the soils. This would generally render the PAHs immobile and so of a limited risk unless particulate sized pieces (2-10μm diameter) are inhaled, which is considered unlikely.

8.2.4 Summary

Based on the findings above, localised exceedances of lead and dibenz[a,h]anthracene have been identified from the WYG investigation in stockpiles of Made Ground deposits on the site at concentrations in exceedance of their respective screening criteria. One exceedance of benzo[b]fluoranthene and dibenz[a,h]anthracene was detected within natural strata. It is considered that these two elevations are the result of cross contamination, with soils from the Made Ground being driven into the natural strata during the development of the hand pit. Asbestos was identified in shallow made ground samples at three locations. As such, lead, benzo[b]fluoranthene, dibenz[a,h]anthracene and asbestos are considered potential constituents of concern, whereby they should be assessed in further detail in the form of a site conceptual model and ground contamination risk assessment.

A number of exceedances are identified from the Eastwood & Partners report. Aromatic >EC12-EC16 and >EC16-EC21, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene,

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dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, lead, naphthalene and phenanthrene were identified as being elevated within Made Ground when compared to more recent screening criteria published after the Eastwood & Partners report. Locations TS7 and WS2 are shown on the plan to be adjacent to stockpiles. The remaining locations (GH1, WS3, WS7, TP2 and TP11) are all within the central and southern portions of the site. As such, the contaminants present at these locations would be considered to be constituents of concern.

8.3 Ground Contamination Assessment – Wider Environment

Exploratory positions were excavated to a maximum depth of 5.0m bgl. Groundwater was not encountered on site, therefore sampling and analysis of groundwater samples was not possible. However, leachate testing was carried out on samples to assess potential contaminant impact on the groundwater environment or other receptors.

The screening criteria used to assess potential risks to the wider environment, including groundwater and surface water, are based on various water quality standards which are intended to be protective of aquatic ecosystems and/or potable supply. These screening criteria values are also conservatively used to assess the results of soil derived leachate testing.

Soil derived leachate testing is used to assess the potential for constituents within soil to be leached into water and subsequently impact upon sensitive water resources or other receptors in the wider environment. Accepted published screening values, protective of controlled waters, have been used in this assessment and comprise the following (in order of preference):

- EC Water Framework Directive (WFD)
- Environmental Quality Standards (EQS) including marine EQS values.
- UK Drinking Water Standards (DWS)

UK Drinking Water Standards (DWS) have been used in the absence of alternative screening values from the WFD and EQS.

Certain screening values are below the laboratory method detection limit for particular constituents. In these instances the limit of detection is considered sufficient in highlighting potential significant contamination and so has been defaulted to as the screening tool.

8.3.1 Tier 1 screening of soil derived leachate

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Table 8-5 - Summary of Contaminants of Concern in Leachate below presents the range of contaminants that were recorded in leachate samples at concentrations above relevant Tier 1 screening criteria (described above).

Table 8-5 - Summary of Contaminants of Concern in Leachate

Determinant	Number of Samples	Tier-1 Screening Criteria (µg/l)	Minimum (µg/l)	Maximum (µg/l)	Number of Exceedances
Dissolved Copper	4	0.001	<0.0003	0.00141	1 (WS02 – 0.2m)
Fluoranthene	4	0.0000063	0.0000229	0.000195	4 (TP09 – 0.4m, WS01 – 1.2m, WS02 – 0.2m, WS04 – 1.2m)
Benzo[b]fluoranthene	4	0.000017	0.0000127	0.0000373	1 (WS02 – 0.2m)
Benzo[a]pyrene	4	0.00000017	<0.000002	0.0000243	3 (TP09 – 0.4m, WS02 – 0.2m, WS04 – 1.2m)
Benzo[g,h,i]perylene	4	0.0000082	<0.000005	0.000017	1 (WS02 – 0.2m)

Inorganics

A marginally elevated leachable concentration of copper was detected in one location, WS02 at a depth of 0.2m BGL. This exceedance was only marginally elevated above the screening criteria used.

Organics

Marginally elevated leachable concentrations of a number of PAHs (fluoranthene, benzo[b]fluoranthene, benzo[a]pyrene and benzo[g,h,i]perylene) were detected within a number of locations; TP09 at 0.4m BGL, WS01 at 1.2m BGL, WS02 at 0.2m BGL, and WS04 at 1.2m BGL. As with the dissolved copper, these exceedances were marginal.

8.4 Discussion

8.4.1 Tier 1 – Human Health

As noted above, benzo[b]fluoranthene, dibenz[a,h]anthracene and asbestos were identified at marginally elevated concentrations within natural strata and made ground soils on site from the WYG ground investigation, and lead was identified at elevated concentrations within stockpiled soils. It is thought that the elevated concentrations of benzo[b]fluoranthene and dibenz[a,h]anthracene within natural strata are the result of cross contamination from contaminated soils being driven into the natural strata. All exceedances were detected at relatively shallow depths (a maximum depth of 0.6m BGL). It is considered that the main risk from lead, benzo[b]fluoranthene and dibenzo[a,h]anthracene would be associated with the risk from ingestion and inhalation of soil opposed to the inhalation of vapours. The risk from asbestos is associated with the inhalation of airborne fibres into the lungs. An analysis of the Eastwood & Partners Report indicates that elevated lead, naphthalene, phenanthrene, benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene, indeno(1,2,3-c,d]pyrene, aromatic >EC12-EC16, and aromatic >EC16-EC21 were identified. All exceedances were detected at relatively shallow depths (a maximum of 0.3m bgl, where depth is identified).

As with the contaminants identified within the WYG ground investigation, the main risk from the majority of these contaminants is associated with the risk from ingestion and inhalation of soil opposed to the inhalation of vapours. Naphthalene presents a potential risk associated with vapour inhalation.

It should be noted that a void was identified within TP07 where visual evidence of hydrocarbon contamination was noted. A silty sandy sediment was identified at the base of this void, and a sample was taken. Although aliphatic and aromatic hydrocarbons were identified within this sediment, none were at concentrations above the relevant screening value.

Higher concentrations of PAHs were identified in the Eastwood & Partners ground investigation when compared to the findings of the WYG investigation. An evaluation of the PAH ratios in the Eastwood & Partners data would indicate that the source of the PAHs is from coal-tar. The most reasonable explanation for this is that coal-tar derived asphalt is present within the soils. This would generally render the PAHs immobile and so of a limited risk unless particulate sized pieces (2-10μm diameter) are inhaled, which is considered unlikely.

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Pesticides were tested for on three samples across the site, and none were found above the limit of detection of the analytical test.

8.4.2 Tier 1 – Controlled Waters

As noted above, copper, fluoranthene, benzo[b]fluoranthene, benzo[a]pyrene and benzo[g,h,i]perylene were all detected in soil derived leachate at concentrations slightly elevated in comparison to the relevant screening targets. The leachate test used is an aggressive test which utilises a strong acid to mimic the effect of rainwater percolating through soils. Thus, it tends to over-estimate the likely quantities of soluble contaminants which are likely to be leached from soil. Given that the screening targets utilised are extremely low and related to conservative Environmental Quality and Drinking Water Standards, it is considered unlikely that the low concentrations of contamination identified within leachate samples would have a deleterious impact upon the superficial Secondary A aquifer, and by extension the Principal chalk aquifer.

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9 Site Conceptual Model and Ground Contamination Risk Assessment

9.1 Introduction

In general, ground contamination can occur through several causes, particularly from historical operations and activities. Contamination can result from either on-site sources or from on-site migration from off-site sources, leading to long term liabilities under recent legislation for any site owner.

The Environmental Protection Act 1990 (Part 2A) makes provisions for a risk-based framework for the identification, assessment, management and redevelopment of contaminated land within England. The provisions of the Act came into effect in England in April 2000 and are aimed at ensuring that actions taken with respect to contaminated land are directed by a technically well-founded assessment of risk.

The process of risk assessment is an evaluation of the probability of harm, and comprises the identification of sources of contamination, receptors that may be affected by the contamination and pathways by which the receptors may be harmed forming a pollution linkage. The site conceptual model (presented below) forms the basis for the qualitative assessment of ground contamination risks associated with the site.

9.2 Site conceptual model

The conceptual model for the site reflects the findings and observations made during the site investigation and subsequent laboratory testing of samples obtained from the site.

The key source, pathway, receptor model is outlined below within the context of the proposed development of the site for residential use.

9.2.1 Sources

The following sources of contamination have been identified on site;

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- Made ground identified across the site acting as a potential source of lead, PAHs, and aromatic hydrocarbons in relation to human health which have been identified in both the WYG and Eastwood & Partners ground investigation, and;
- Made ground identified across the site acting as a potential source of asbestos in relation to human health which have been identified in the WYG ground investigation.

9.2.2 Pathways

The primary pathways by which sensitive receptors may come into contact with ground contamination are considered to be the following:

- Direct dermal contact or ingestion of soils, or inhalation of dust (i.e. human interaction with surface and sub-surface materials),
- Inhalation of asbestos fibres, and;
- Leaching and horizontal or vertical migration through the unsaturated ground, whether through permeable sub-surface materials and/or preferential pathways.

9.2.3 Potential receptors

The following are considered to be sensitive receptors:

- Current and Future Site Users (members of the public either accessing the site, or living within the planned accommodation);
- Construction workers during the development;
- Controlled Waters in the form of the Superficial Secondary A Aquifer and the underlying Principal Aquifer of the New Pit Chalk Formation;

9.3 Ground contamination risk assessment table

The pollution linkages and a qualitative risk assessment are presented in Table 10-1 below. The risk assessment considers the site within an area context and assesses potential risks to identified receptors in relation to the existing site setting and the proposed development. CIRIA C552 has been used to define the risk rating presented in the Qualitative Risk Assessment matrix, methodology for which is presented in Appendix F.

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Table 9-1 - CIRIA C552 Qualitative Risk Assessment

Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
Made Ground and Natural Strata (elevated lead, aromatic hydrocarbons and PAHs)	Direct dermal contact or ingestion of soils, or inhalation of dust and vapours.	Current site users	Medium	Unlikely	Low Risk	Only limited, marginal exceedances of lead and dibenz[a,h]anthracene have been encountered during the WYG ground investigation, although higher concentrations of PAHs were identified during the Eastwood & Partners ground investigation. The site is not currently being used and public access is currently limited and as such the current risk of human exposure is low. As such, no remedial measures would be required if the site were to remain in its current form and use.
		Site construction workers		Unlikely	Moderate Risk	The concentrations of lead, PAHs, and aromatic hydrocarbons are unlikely to present an acute toxicological risk. However, construction workers should be informed of the presence of these contaminants, and appropriate PPE, good hygiene and working practices should be adopted on site whilst construction work is underway.
		Future site users		Low likelihood	Moderate Risk	Elevated concentrations of a number of contaminants are present within shallow soils and stockpiles of Made Ground at the site. Remedial action will be required in the form of either removal of the source of contamination or limitation of the potential exposure of future site users through the use of cover systems. The exact requirements for remediation will depend upon whether site levels will be raised, cut or maintained as they are. Please see Section 10 for further discussion.
Made ground (asbestos)	Inhalation of fibres	Current site users	Medium	Unlikely	Low Risk	The site is not currently being used and public access is currently limited and as such the current risk of human exposure is low

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Source	Pathway	Receptor	Consequence of risk being realised	Probability of risk being realised	Risk Classification	Potential risk management requirements
		Site construction workers		Low likelihood	Moderate/Low Risk	The relatively low concentrations of asbestos are unlikely to present an acute toxicological risk. However, workers should be informed of the presence of these contaminants during construction, appropriate practices should be adopted to limit the potential release of airborne fibres as a result of the disturbance of the ground during construction
		Future site users		Low likelihood		Remedial action will be required in the form of either removal of the source of contamination or limitation of the potential exposure of future site users through the use of cover systems. The exact requirements for remediation will depend upon whether site levels will be raised, cut or maintained as they are. Please see Section 10 for further discussion.
Made Ground (copper and PAHs)	Leaching and horizontal or vertical migration through the unsaturated ground, whether through permeable sub-surface materials and/or preferential pathways.	Future site users	Mild	Unlikely	Very Low Risk	Given the aggressive nature of the leachate test, the generally low concentrations of leachable contaminants and the general insoluble nature of the contaminants identified within leachate samples, it is considered that the leaching of contaminants through the Made Ground is likely to have little impact upon the Superficial and Primary Aquifers. As such remedial action to protect the wider environment will not be required. The development of the site with provision of surface water drainage will limit rainfall infiltration and the potential for mobilisation of contaminants, and any potential barrier would reduce infiltration and having a likewise effect.
		Superficial and Primary Aquifer				

10 Remedial Options

The ground investigations undertaken at the site have identified the presence of Made Ground of variable depth predominantly in the central and southern half of the site. Ground investigation has not identified the presence of gross soil contamination within subsurface soils in the vicinity of former tanks or elsewhere on site, however, the Made Ground is of variable composition and contains a number of contaminants which could represent a theoretical risk to human health assuming long-term exposure in a sensitive residential development context. These include elevated concentrations of aromatic hydrocarbons >EC12-EC16 and >EC16-21, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, lead, naphthalene, phenanthrene and asbestos. A number of stockpiles containing elevated concentrations of contaminants are also present.

An assessment of remediation options is required in accordance with point number 3 of Condition 5 of the planning permission. Consideration has been given to the following:

- Do nothing;
- Design the layout of the development so that areas of contamination are overlain by hardstanding/roads/building foundations which will effectively break the exposure pathway between future site users and underlying contamination;
- Excavate and remove areas of identified contamination and backfill excavated areas with clean fill;
- Import clean soils to create a barrier reducing the risk of exposure to underlying contamination.

Each option is discussed below.

10.1 Do Nothing

The identified soil contamination is not considered to represent a significant risk to environmental receptors in the vicinity of the site. If the site were to remain undeveloped 'do nothing' could be a viable approach, however, given that development plans include residential properties with gardens and soft landscaping areas where there is a risk of exposure of future occupants to underlying soil contamination, remedial action will be required.

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10.2 Site Layout Design

Amendment of the site layout so that the location of gardens and soft landscape areas take account of the presence of soil contamination and hardstanding and buildings are placed over known areas of contamination can be a viable option and can help to reduce remedial requirements. Given the widespread presence of made ground in the central and southern part of the site, the variable nature of the material, and current development plan which includes for houses with gardens throughout the site, it is not considered that amendment of the site layout would be sufficient to negate the need for remedial action in garden or soft landscape areas.

10.3 Excavate and Disposal

Excavation and disposal has the advantage that contaminated material is permanently removed from site, there are no ongoing liability or maintenance issues and it can be implemented relatively quickly and reliably. It is likely to be the most expensive option, however, and is not considered to be a sustainable solution as it would result in significant vehicle movements associated with disposal of soils and import of clean material, with associated noise and traffic impacts.

The selective excavation and disposal of localised areas of soil contamination or 'hotspots' of contamination is a viable remedial strategy where the vertical and lateral extent of soil contamination can be identified and subsequently validated. However, given the variable nature of the Made Ground and identified presence of elevated concentrations of a number of contaminants in approximately a third of exploratory locations in the central/southern part of the site it is not considered that the extent of contaminated soil below ground level could be reliably delineated without extensive further sampling and analysis.

The lack of gross contamination, and presence of slightly elevated contaminants within Made Ground soils does not warrant the widespread excavation of made ground on the basis of cost or sustainability. Selective excavation and disposal of made ground may be required dependent on proposed finished levels. Soil stockpiles which are not suitable for re-use on site should be removed from site to a suitable waste disposal facility.

10.4 Cover System

The use of a cover system using site won or imported material is well suited to sites such as Windroos which contain predominantly inorganic and non-volatile contamination. It can be a highly sustainable approach and can be incorporated into site earthworks or regrading requirements. It is less suited to sites where volatile

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contamination or vapours are present, there can be a risk of the exposure of underlying soils as a result of changes to future site use and it requires robust validation testing to prove the suitability and depth of cover materials.

It is not considered that there is suitable material at the site to establish a cover layer using site won material. However, there is an apparent lack of sufficient topsoil on site and this will need to be imported as a growing medium in gardens and soft landscaping areas. The use of an adequate depth of clean imported topsoil and subsoil to create a cover layer in these areas is considered to be the most appropriate remediation approach provided the design provides mitigation against excavation activities by future residents and the requirements for site level changes arising from placement of cover materials can be accommodated. The presence of buildings, roads and parking in other areas of the site will effectively break the exposure pathway in these areas.

10.5 Environmental and Engineering Implications

At the time of preparation of this report an earthworks balance and final finished levels have not yet been established for the site and the final remediation strategy will need to take account of these factors. The remediation and verification strategy will need to be discussed and agreed with Arun District Council before development proceeds.

Where site levels are to be raised then the import of a suitable depth of topsoil and subsoil as a cover system to cap underlying made ground in gardens and soft landscaping areas, and placement of engineering fill beneath buildings and paved areas, will break exposure pathways.

Where site levels are to be reduced or remain at existing levels, surplus made ground will need to be excavated and either re-used elsewhere if suitable as backfill or removed off site. Levels would then need to be made up with imported soil and engineered fill. Where reduced level excavations result in made ground remaining beneath areas of gardens and soft landscaping an adequate depth of topsoil and subsoil will be required to cap any underlying contaminated soils. Validation of the chemical content and depth of imported soils will be required as part of a verification plan to demonstrate that remedial works are complete.

Given that the presence of asbestos fibres has been identified in a number of samples of made ground at the site it is recommended that a site specific asbestos management plan is established setting out the measures required to control the risk of release of asbestos fibres and exposure to asbestos during the construction phase.

If it is intended to re-use made ground soils within the development, it is recommended that a Material Management Plan (MMP) is adopted in accordance with the CL:AIRE Code of Practice (CoP)[3]2

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11 Conclusions and Recommendations

11.1 Ground Contamination

The findings of the ground investigation undertaken by WYG are broadly similar to the findings of the previous investigation. The site is covered with concrete or asphalt at surface, underlain in the southern and central part of the site by Made Ground – which generally comprised gravelly sandy clays or gravelly sands with brick and concrete fragments and roots. This material was underlain by superficial River Terrace Deposits and Raised Beach Deposits over the New Pit Chalk Formation. A number of above ground stockpiles of soil are also present across the site, located in the north-western and north-eastern corners of the site and along the western and southern boundaries.

Intrusive ground investigation has not identified the presence of gross soil contamination in the vicinity of former storage tanks or elsewhere on site, however, the made ground is of variable composition and contains a number of contaminants which could represent a theoretical risk to human health assuming long-term exposure in a sensitive residential development context. This includes elevated concentrations of aromatic hydrocarbons >EC12-EC16 and >EC16-21, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, chrysene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, lead, naphthalene, phenanthrene and asbestos.

The potential risk to current site users is low due to the inaccessible nature of the site and limited potential for exposure of current site users to the underlying ground.
The presence of elevated concentrations of contaminants presents a risk to site construction workers during development, however, this can be managed through the use of appropriate PPE and good hygiene practices on site.
Chemical analysis of soil derived leachate samples indicated slight elevation of a number of constituents of concern including copper and polycyclic aromatic hydrocarbons. However, given the relatively low concentration of contaminants identified in leachate samples it is not considered that there is a significant risk to the wider environment (groundwater and surface water).

Asbestos has been identified within the made ground in a number of locations on the site. No concentrations have been identified above the hazardous waste threshold of 0.1%. The risks to future site users can be mitigated through the adoption of appropriate remedial measures. The risks to construction workers during the development phase will need to be managed through an Asbestos Management plan for the site (see details below).

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Adequate risk management methods and/or remediation works will be required to mitigate the risks from contamination. This is particularly relevant to works exposing contaminated Made Ground on site and to the design considerations for the residential gardens and open space areas.

Waste Disposal

In the event of materials being removed from site, they should be assessed prior to disposal so that the materials can be suitably characterised. This is particularly important for those soils in the stockpile along the southern and western boundary of the site, given the characterisation of the PAH contamination being likely derived from coal-tar. Further characterisation would aid in determining the classification of waste. Dependent upon these results, further testing in the form of waste acceptance criteria testing should be undertaken. If the material is classified as hazardous waste, then this WAC testing should be undertaken post any treatment that is undertaken.

11.2 Geotechnical Assessment

Based on the characteristic soil parameters given in Section 6, traditional shallow foundations (pad or strip) constructed within the River Terrace Deposits will need to be limited to an allowable bearing capacity of 60kN/m^2. This should generally limit predicted settlements to less that 25mm. Assuming the soils to be of a worst-case to moderate susceptibility to volume change, foundations will need to be placed a minimum of 0.9m bgl. Foundation depths will need to be deeper if foundations are being placed near to existing or proposed tress. NHBC guidance should be consulted in this respect. Where localised areas of deeper made ground exist, foundations excavations will need to be deepened or the made ground soils engineered to support the foundation. All foundation excavations should be inspected by an experienced and suitably qualified geotechnical engineer.

There is no notable increase in soil strength with depth in both the River Terrace Deposits and Raised Beach Deposits. Moreover, a decrease in soil density was noted at depth within the Raised Beach Deposits. To obtain a higher allowable bearing pressure, foundation excavations would need to be extended in to the Structureless Dc chalk, where 125 kN/m^2 could be achieved. However, the depth to the New Pit Chalk Formation is prohibitive even for trench fill foundations.

Raft foundations may represent a viable alternative to traditional foundations and would help mitigate differential settlements due to the variation is soil composition and strength. To assess the viability of a raft foundation, details of the proposed finished development level need to be considered. Furthermore, it will be necessary to collect further data on the shallow soils, given their variability. Alternatively, the use of pile foundations placed into the New Pit Chalk Formation could be considered. Again, if this option is chosen

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further ground investigation will be required to obtain deeper information on the New Pit Chalk Formation. It is recommended that boreholes are drilled to circa 3m to 5m below the basis of any proposed pile. A specialist piling contractor should be consulted for preliminary advice on pile type and depth to ensure sufficient ground data is collected for full design.

11.3 Recommendations

The following recommendations are presented in the context of the proposed development on the site in order to manage the ground contamination issues.

- A remediation strategy should be developed and agreed with Arun District Council to address the risks posed to future receptors. This should consider the requirement for selective excavation and disposal of contaminated source materials (Made Ground and soil stockpiles) materials, in combination with the use of cover systems. The final strategy will need to take account of the proposed finished levels for the site in order to accommodate an adequate depth of clean cover.
- If it is intended to re-use made ground soils within the development, it is recommended that a Material Management Plan (MMP) is adopted in accordance with the CL:AIRE Code of Practice (CoP)[3]. This provides a clear process which enables the legitimate re-use of materials on-site, or their movement between sites. It is necessarily the responsibility of the 'waste producer' to formally classify waste materials.
- The use of cover systems will reduce the risk to future site users associated with localised asbestos contamination. However, the presence of asbestos within soils should be controlled and managed within an Asbestos Management Plan which sets out procedures to both manage the risk to construction workers, and limit the potential for release of airborne asbestos fibres during ground disturbance:

- The appointed construction contractor should adopt a reactive strategy to identify, manage and deal with any previously unidentified areas of contamination which may be encountered during future site works.
- Assessment of ground gas was outside the remit of this phase of ground investigation. Consultation should be held with Arun District Council and NHBC to agree the requirements for gas protection measures within buildings at the site.

[3] Contaminated Land: Applications in the Real Environment (CLA:IRE) 2011. The Definition of Waste: Development Industry Code of Practice. Version 2. Available at https://www.claire.co.uk/component/phocadownload/category/8-initiatives?download=212:definition-of-waste-development-industry-code-of-practice

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Notes

1. Standards

All boring operations, sampling of soils, *in situ* testing and geotechnical laboratory testing have been carried out in accordance with the recommendations of the British Standards BS 5930[4] , BS 1377[5] and BS10175[6] .
Soil and rock descriptions follow the recommendations of BS 5930[4]. Where descriptions or classifications are based on other documents (e.g. BS 8004[7] or CIRIA C574[8]), this is stated in the report text.

2. Site methods

Unless specifically stated otherwise, the following methods are used for exploratory holes.

- Holes described as cable percussive are bored using a light cable percussive rig. Standard penetration tests are carried out where appropriate, as shown in the logs. Disturbed and undisturbed samples are taken from the exploratory holes at the depths on the records.
- Window sampling generally uses the windowless sampling method, using a tracked Geotool.
- Dynamic probes are usually heavy dynamic probes, using the same tracked Geotool used for window sampling.

3. Definitions and abbreviations

The following terms are used in the exploratory hole logs

Samples

U	Undisturbed 102mm dia. sample
TW	Thin Walled undisturbed 102mm dia. sample
B	Bulk sample
D	Small disturbed sample
W	Water sample
CBR	California Bearing Ratio test or CBR value obtained from Mexiprobe test
LB	Large bulk disturbed sample
ES	Environmental soil sample

In situ tests

S	Standard penetration test (SPT)
N	SPT N value (blows/300mm)
HP	Hand penetrometer – shear strength
SV	Hand shear vane – shear strength
VOC	Volatile organic compounds (ppm)
PID	Photo-ionisation detector – used to detect the presence of VOCs.

Core recovery and rock quality

TCR	Total core recovery (%)
SCR	Solid core recovery (%)
RQD	Rock quality designation (%)
FI	Fracture index
NR	No recovery
NI	Not intact

Rotary drilling sizes

	Nominal diameter (mm)	
Index letter	**Borehole**	**Core**
N	75	54
H	99	76
P	120	92
S	146	113

Water strikes

▽	Level of water strike
▼	Water level rose to this level (see Remarks at foot of log for details)

Depth means depth below existing ground level unless otherwise specified. Values specified in soil descriptions given in the exploratory hole logs are depths unless otherwise specified.

[4] British Standards Institute (2015) Code of Practice for Ground Investigations. BS5930:2015. London
[5] British Standards Institute (1990) Methods of Test for Soils for Civil Engineering Purposes. BS1377-2:1990. London
[6] British Standards Institute (2017) Investigation of Potentially Contaminated Site. Code of Practice. BS 10175:2011+A2:2017. London
[7] British Standards Institute (2015) Code of Practice for Foundations. BS 8004:2015. London
[8] Construction Industry Research and Information Association (2002) Engineering in Chalk. CIRIA C574. London

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Figures

Figure 1 – Site Location Plan

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS



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REV	DESCRIPTION	BY	CHK	APP	DATE

5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2092 9200
FAX: +44 (0)29 2076 5321
e-mail: cardiff@wyg.com

DANDARA LTD (SOUTHERN)

Project: WINDROOS, LITTLEHAMPTON

Drawing Title: SITE LOCATION PLAN

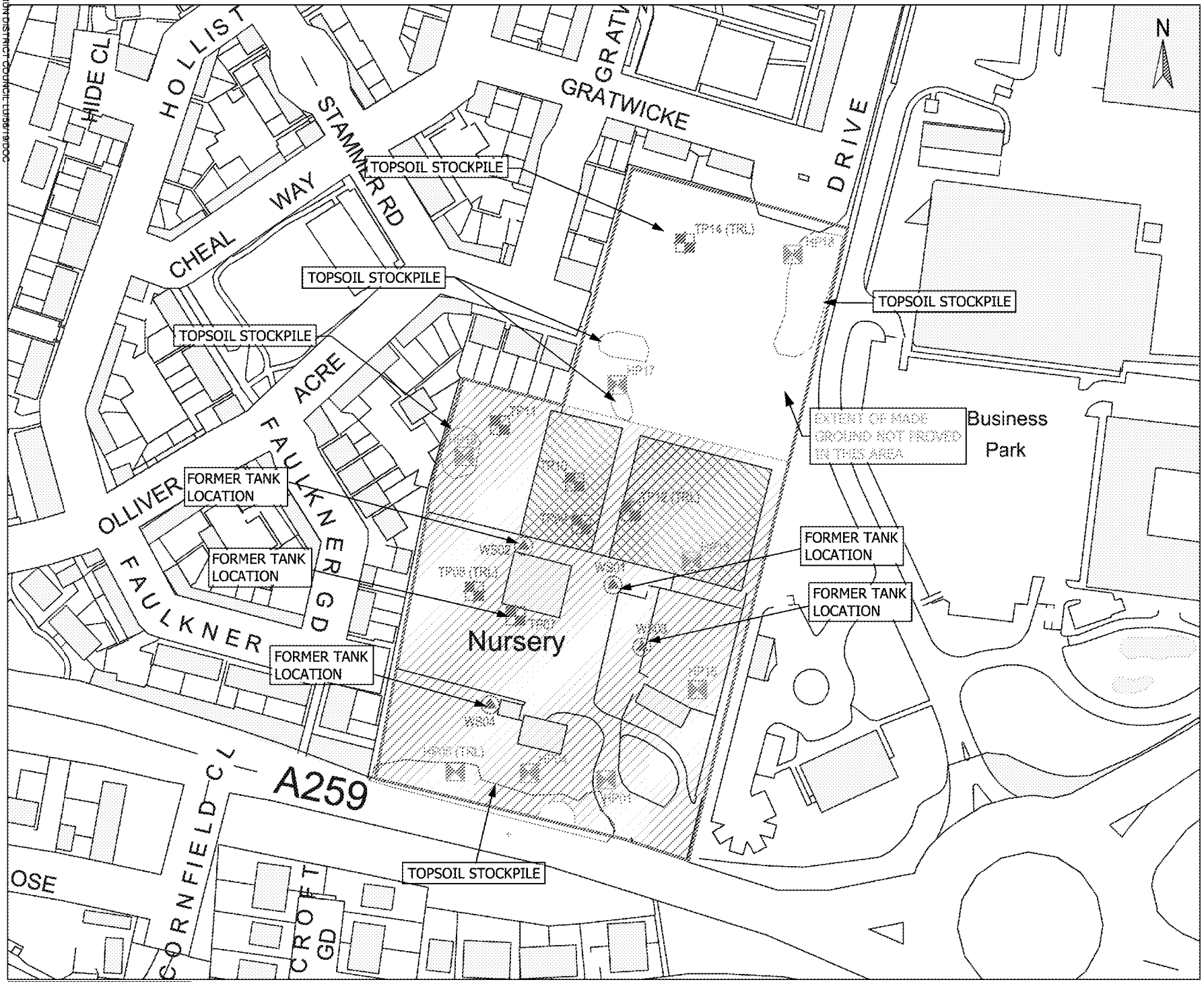
Scale @ A4	Drawn	Date	Checked	Date	Approved	Date
	PP	08.01.19	JH		CA	

Project No.	Office	Type	Drawing No.	Revision
A111089	CDF	N	1	00

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ARUN DISTRICT COUNCIL LU/56/19/DOC

Figure 2 – Site Investigation Layout Plan, highlighted to show areas of Made Ground



DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

LEGEND:

- INDICATIVE TRIAL PIT LOCATIONS
- INDICATIVE HAND PIT LOCATIONS
- INDICATIVE WINDOW SAMPLE LOCATIONS
- APPROXIMATE EXPECTED EXTENT OF MADE GROUND BASED ON EASTWOOD AND PARTNERS AND WYG GROUND INVESTIGATION FINDINGS.

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:
DANDARA LTD (SOUTHERN)

5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2082 9200
FAX: +44 (0)29 2045 5321
e-mail: cardiff@wyg.com

Project:
WINDROOS, LITTLEHAMPTON

Drawing Title:
INDICATIVE SITE INVESTIGATION LAYOUT PLAN

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
	PP	08.01.19	CA	16.01.19	IV	16.01.19

Project No.	Office	Type	Drawing No.	Revision
A111089	CDF	N	2	00

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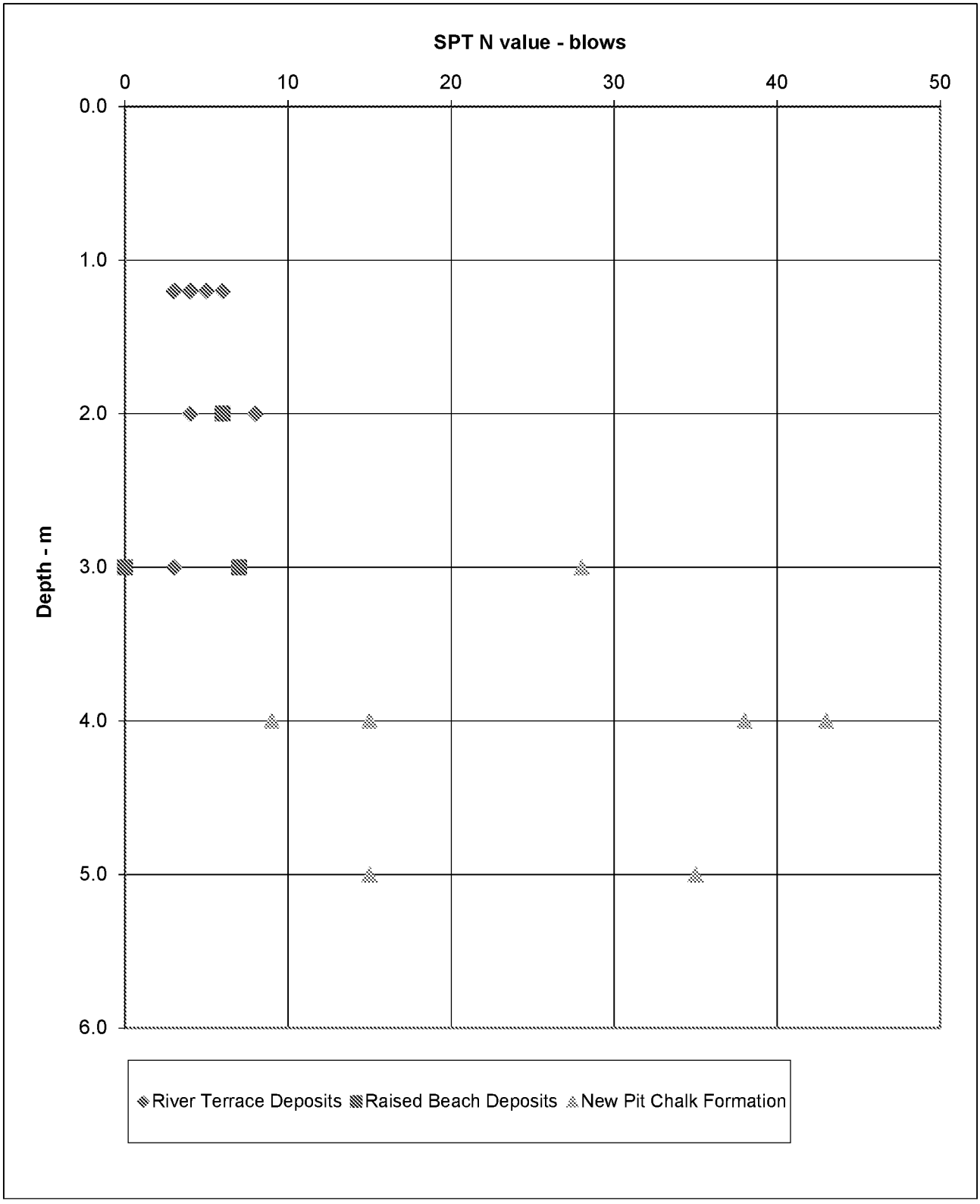
© Crown copyright and database rights 2019 Ordnance Survey 0100031673

0 12.5 25 37.5 50 62.5 m

SCALE 1:1250

ARUN DISTRICT COUNCIL LD/SB/19/DOC

Figure 3 – SPT N Plot



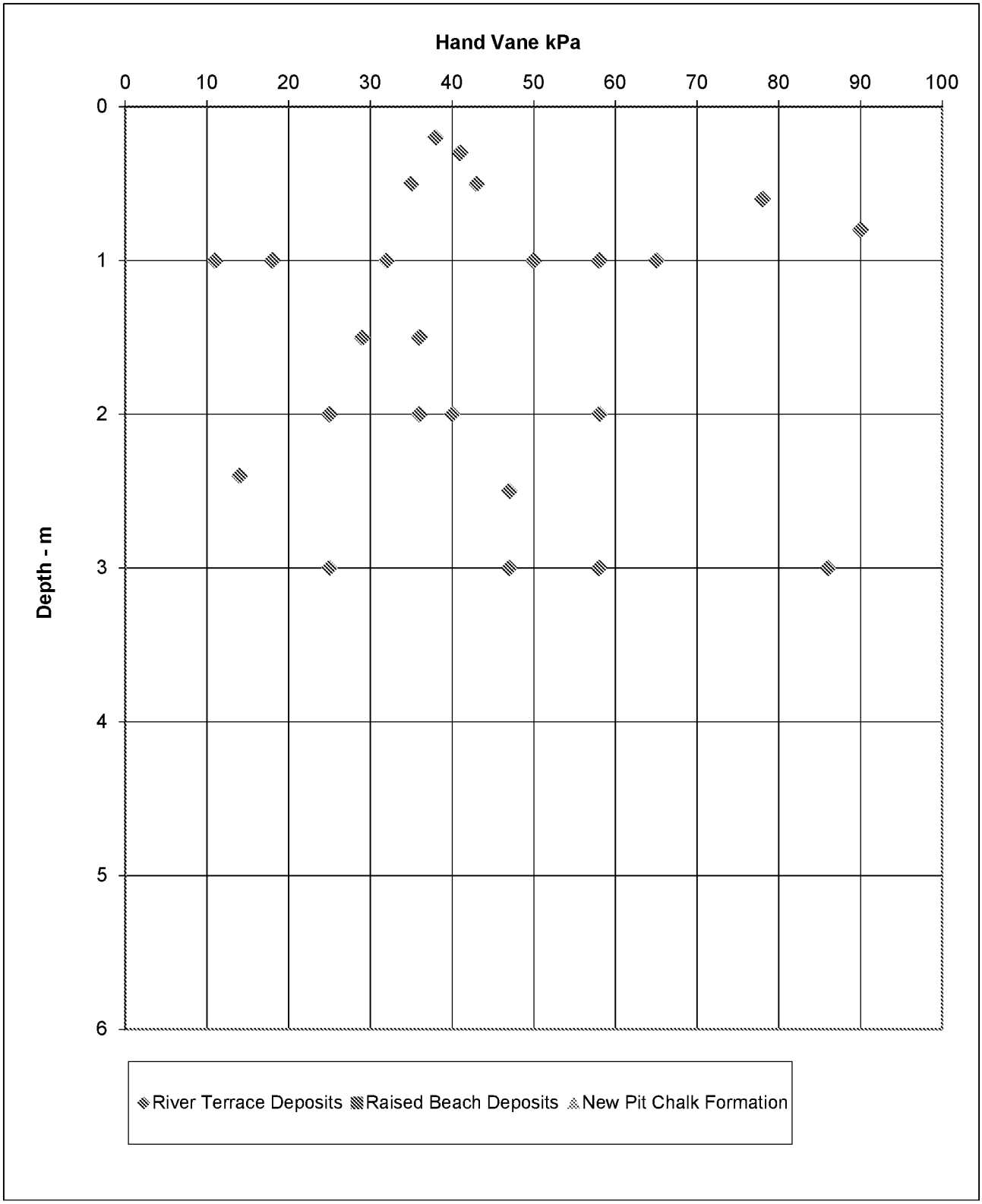
WYG Environment Ltd
Longcross Court, Newport Rd, Cardiff, CF24 0AD
Tel: 02920 892200
Fax: 02920 455321

Environmental Consultancy

Project: **Windroos**	Drawing Title: **SPT vs Depth Plot WS01 to WS04**
Client: **Dandara Ltd**	Drawing No.: **FIGURE 3**

ARUN DISTRICT COUNCIL LU/56/19/DOC

Figure 4 – Hand Vane Plot



WYG Environment Ltd
Longcross Court, Newport Rd, Cardiff, CF24 0AD
Tel: 02920 892200
Fax: 02920 455321

Environmental Consultancy

Project	Drawing Title
Windroos	**Hand Vane kPa Depth Plot**
Client	Drawing No.
Dandara Ltd	**FIGURE 4**

Appendices

Appendix A – Report Conditions

APPENDIX A - REPORT CONDITIONS
GROUND INVESTIGATION

This report is produced solely for the benefit of Dandara and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYG. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.

Appendix B – Exploratory Hole Logs

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 0.67m Logger: SB Type: IP	Status FINAL	Pit Number **HP04** Sheet 1 of 1

Hole Information		Groundwater				
Pit Dimensions	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Scale: 1:10
m	Shoring: None					Checked By: CA
m	Stability: Stable					Approved By: PV
	Plant: Hand excavated pit					Start Date: 14/11/2018
						Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over brown to dark brown slightly gravelly fine to coarse SAND. (MADE GROUND)								
		0.15						
Soft brown sandy CLAY. Sand is fine. (RIVER TERRACE DEPOSITS)						0.40	ES1	HV 0.50m, (p)=32 kPa (r)=14 kPa HV 0.50m, (p)=35 kPa (r)=15 kPa HV 0.50m, (p)=39 kPa (r)=19 kPa
		0.67						
EOH at 0.67m - Target depth achieved.								

1

2

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Hand dug inspection pit terminated at 0.67m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 0.66m Logger: JM Type: IP	Status FINAL	Pit Number **HP05** Sheet 1 of 1

Hole Information		Groundwater				
Pit Dimensions	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Scale: 1:10
m	Shoring: None					Checked By: CA
m	Stability: Stable					Approved By: PV
	Plant: Hand excavated pit					Start Date: 14/11/2018
						Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Soft brown to dark grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine and medium flint brick concrete and tile fragments. (MADE GROUND)						0.30	ES1	
Soft to firm brown sandy CLAY. (RIVER TERRACE DEPOSITS)		0.50				0.60	ES2	
EOH at 0.66m - Target depth achieved.		0.66						

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Hand dug inspection pit terminated at 0.66m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 0.30m Logger: JM Type: IP	Status FINAL	Pit Number **HP13** Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:10
Pit Dimensions	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: CA
m	Shoring: None					Approved By: PV
m	Stability: Stable					Start Date: 15/11/2018
	Plant: Hand excavated pit					Finish Date: 15/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over clayey slightly gravelly medium and coarse SAND. Gravel is angular coarse brick and concrete fragments. (MADE GROUND)		0.05				0.20 0.20 - 0.30	ES1 B1	
Soft brown slightly gravelly CLAY. Gravel is rounded fine and medium flint. (RIVER TERRACE DEPOSITS)								
EOH at 0.30m - Target depth achieved.		0.30						

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Hand dug inspection pit terminated at 0.3m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 0.62m Logger: SB Type: IP	Status FINAL	Pit Number **HP15** Sheet 1 of 1

Hole Information		Groundwater				
Pit Dimensions	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Scale: 1:10
m	Shoring: None					Checked By: CA
m	Stability: Stable					Approved By: PV
	Plant: Hand excavated pit					Start Date: 14/11/2018
						Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Brown to dark brown slightly gravelly fine to coarse SAND. (MADE GROUND)								
		0.40						
Soft brown very sandy CLAY. Sand is fine. (RIVER TERRACE DEPOSITS)						0.50	ES1	
		0.62						
EOH at 0.62m - Target depth achieved.								

1

2

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Hand dug inspection pit terminated at 0.62m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 0.50m Logger: JM Type: IP	Status FINAL	Pit Number **HP16** Sheet 1 of 1

Hole Information		Groundwater				
Pit Dimensions m m	Orientation: ° Shoring: None Stability: Stable Plant: Hand excavated pit	Strike (m)	Rose To (m)	After (mins)	Remarks	Scale: 1:10 Checked By: CA Approved By: PV Start Date: 13/11/2018 Finish Date: 13/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
(Soft) brown gravelly slightly sandy CLAY. Sand is fine. Gravel is subrounded to angular fine to coarse flint brick concrete and tile fragments and other mixed general materials. (MADE GROUND)						0.20	ES1	
EOH at 0.50m - Target depth achieved.		0.50						

1

2

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Hand dug inspection pit terminated at 0.50m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 0.50m Logger: JM Type: IP	Status FINAL	Pit Number **HP17** Sheet 1 of 1

Hole Information		Groundwater				
Pit Dimensions m m	Orientation: ° Shoring: None Stability: Stable Plant: Hand excavated pit	Strike (m)	Rose To (m)	After (mins)	Remarks	Scale: 1:10 Checked By: CA Approved By: PV Start Date: 13/11/2018 Finish Date: 13/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
(Soft) brown mottled grey gravelly slightly sandy CLAY. Sand is fine. Gravel is subangular to angular fine to coarse glass brick tile and concrete fragments with other mixed general materials. (MADE GROUND)						0.30	ES1	
EOH at 0.50m - Target depth achieved.		0.50						

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Hand dug inspection pit terminated at 0.50m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 0.45m Logger: JM Type: IP	Status FINAL	Pit Number **HP18** Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:10
Pit Dimensions	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: CA
m	Shoring: None					Approved By: PV
m	Stability: Stable					Start Date: 13/11/2018
	Plant: Hand excavated pit					Finish Date: 13/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown very gravelly slightly sandy CLAY with cobbles of broken concrete blocks. Sand is fine to coarse. Gravel is subangular to angular fine to coarse broken tile and plastic piping brick and concrete fragments with other mixed general materials. (MADE GROUND)						0.30	ES1	
EOH at 0.45m - Target depth achieved.		0.45						

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Hand dug inspection pit terminated at 0.45m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 1.45m Logger: JM Type: TP	Status FINAL	Pit Number **TP07** Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions	Orientation: °	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: CA
0.45m / 2.30m	Shoring: None					Approved By: PV
	Stability: Stable					Start Date: 15/11/2018
	Plant: 8 tonne tracked excavator					Finish Date: 15/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Void at former tank locations								
Soft dark grey sandy SILT with cobbles of broken angular concrete fragment and degraded wooden boards. Sand is fine to coarse. (MADE GROUND)		1.40				1.45	ES1	
EOH at 1.45m - Target depth achieved.		1.45						

Observations / Remarks

1. Groundwater not observed. 2. Exploratory position within former tank/ concrete holder, strong hydrocarbon odour and surface hydrocarbon sheen in retained water. 3. Trial pit terminated at 1.45m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 3.40m Logger: SB Type: TP	Status FINAL	Pit Number **TP08** Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions	Orientation: 170°	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: CA
0.55m / 2.40m	Shoring: None					Approved By: PV
	Stability: Stable					Start Date: 14/11/2018
	Plant: Hand excavated pit					Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
ASPHALT (ASPHALT)		0.15						
(Soft) brown sandy gravelly CLAY. Sand is medium and coarse. Gravel is subrounded to angular fine to medium flint and brick fragments. Four pockets of Made Ground recorded in eastern pit face. Made Ground pockets are dark grey very sandy GRAVEL of angular medium and coarse glass tarmac concrete and brick fragments. Sand is fine to coarse. (MADE GROUND)						0.30 0.50 0.50 - 1.00	ES1 ES2 B1	HV 0.60m, (p)= kPa (r)= kPa Coarse material content too high.
(Firm) brown mottled grey sandy silty CLAY with low cobble content of brick fragments and broken plastic piping. Sand is fine to coarse. (MADE GROUND)		1.05				1.00 1.50 - 2.00	ES3 B2	
EOH at 3.40m - Target depth achieved.		3.40						

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Trial pit terminated at 3.40m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 3.00m Logger: JM Type: TP	Status FINAL	Pit Number **TP09** Sheet 1 of 1

Hole Information		Groundwater				
Pit Dimensions 0.50m 2.10m	Orientation: 170° Shoring: None Stability: Stable Plant: 8 tonne tracked excavator	Strike (m)	Rose To (m)	After (mins)	Remarks	Scale: 1:25 Checked By: CA Approved By: PV Start Date: 14/11/2018 Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Dark brown gravelly silty fine to coarse SAND. Gravel of subangular to angular fine to coarse glass tarmac and concrete fragments. (MADE GROUND)						0.15	ES1	
		0.20						
Soft to firm brown slightly sandy CLAY. Sand is fine and medium. (RIVER TERRACE DEPOSITS)						0.40	ES2	
						0.50 - 1.00	B1	HV 0.50m, (p)=27 kPa (r)=14 kPa HV 0.50m, (p)=48 kPa (r)=20 kPa HV 0.50m, (p)=55 kPa (r)=20 kPa
		1.15						
Soft to firm brown CLAY. (RIVER TERRACE DEPOSITS)						1.20	ES3	
						1.50 - 2.00	B2	
		3.00						
EOH at 3.00m - Target depth achieved.								

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Trial pit terminated at 3.0m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 2.50m Logger: JM Type: TP	Status FINAL	Pit Number **TP10** Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions	Orientation: 160°	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: CA
2.10m / 2.15m	Shoring: None					Approved By: PV
	Stability: Stable					Start Date: 14/11/2018
	Plant: 8 tonne tracked excavator					Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Fragmented CONCRETE. (CONCRETE)		0.10						
Dark brown gravelly clayey medium and coarse SAND. Gravel is subangular to angular fine to coarse brick concrete tarmac and glass. (MADE GROUND)		0.35				0.30	ES1	
Brown clayey slightly gravelly fine to coarse SAND. Gravel is rounded coarse flint. (RIVER TERRACE DEPOSITS)						0.50 - 1.00	B1	
						0.80	ES2	
						1.50 1.50 - 2.00	ES3 B2	
EOH at 2.50m - Target depth achieved.		2.50						

1
2
3
4
5

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Trial pit terminated at 2.50m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 3.10m Logger: JM Type: TP	Status FINAL	Pit Number **TP11** Sheet 1 of 1

Hole Information		Groundwater				
Pit Dimensions 0.45m 2.35m	Orientation: 80° Shoring: None Stability: Stable Plant: 8 tonne tracked excavator	Strike (m)	Rose To (m)	After (mins)	Remarks	Scale: 1:25 Checked By: CA Approved By: PV Start Date: 14/11/2018 Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Dark greyish brown gravelly very silty fine to coarse SAND. Gravel of subangular to angular fine to coarse glass tarmac and concrete fragments. (MADE GROUND)						0.20 - 0.40 0.30	B1 ES1	HV 0.20m, (p)=14 kPa (r)=5 kPa HV 0.20m, (p)=19 kPa (r)=9 kPa HV 0.20m, (p)=21 kPa (r)=10 kPa
Brown very clayey fine and medium SAND. (RIVER TERRACE DEPOSITS)		0.60				0.60 - 1.00 1.00 1.50 - 2.00 2.00	B2 ES2 B3 ES3	HV 0.50m, (p)= kPa (r)= kPa Coarse material content too high.
EOH at 3.10m - Target depth achieved.		3.10						

1 2 3 4 5

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Trial pit terminated at 3.10m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 3.20m Logger: JM Type: TP	Status FINAL	Pit Number **TP12** Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions	Orientation: 100°	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: CA
0.45m / 2.20m	Shoring: None					Approved By: PV
	Stability: Stable					Start Date: 14/11/2018
	Plant: 8 tonne tracked excavator					Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Dark greyish brown gravelly clayey fine to coarse SAND with frequent rootlets. Gravel is fine and medium plastic sheeting, tarmac, brick and concrete fragments. (MADE GROUND)		0.10				0.15	ES1	HV 0.20m, (p)=17 kPa (r)=8 kPa HV 0.20m, (p)=19 kPa (r)=11 kPa HV 0.20m, (p)=22 kPa (r)=10 kPa
Soft to firm brown slightly sandy CLAY. (RIVER TERRACE DEPOSITS)						0.50 0.50 - 1.00	ES2 B1	HV 0.50m, (p)= kPa (r)= kPa Clay too firm for hand vane to enter pit wall for accurate testing.
						1.50 1.50 - 2.00	ES3 B2	
EOH at 3.20m - Target depth achieved.		3.20						

1 2 3 4 5

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Trial pit terminated at 3.20m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton** Location: **Worthing Road, Littlehampton BN17 6LY** Client: **Dandara Ltd**	Location Details Easting: Northing: Level: Depth: 3.50m Logger: JM Type: TP	Status FINAL	Pit Number **TP14** Sheet 1 of 1

Hole Information		Groundwater				
Pit Dimensions 0.50m 2.20m	Orientation: 40° Shoring: None Stability: Stable Plant: 8 tonne tracked excavator	Strike (m)	Rose To (m)	After (mins)	Remarks	Scale: 1:25 Checked By: CA Approved By: PV Start Date: 14/11/2018 Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
(Soft) dark brown sandy SILT with frequent rootlets. Sand is fine. (TOPSOIL)		0.10						
Soft to firm brown slightly sandy CLAY. Sand is fine. (RIVER TERRACE DEPOSITS)						0.20	ES1	HV 0.20m, (p)=32 kPa (r)=15 kPa HV 0.20m, (p)=38 kPa (r)=18 kPa HV 0.20m, (p)=40 kPa (r)=18 kPa HV 0.30m, (p)=35 kPa (r)=14 kPa HV 0.30m, (p)=48 kPa (r)=30 kPa
						0.50 0.50 - 0.80	ES2 B1	
		0.90						HV 0.80m, (p)=87 kPa (r)=43 kPa HV 0.80m, (p)=88 kPa (r)=41 kPa HV 0.80m, (p)=95 kPa (r)=50 kPa
Firm brown sandy CLAY. Sand is fine and medium. (RIVER TERRACE DEPOSITS)						1.20	ES3	
						1.50 - 2.00	B2	
						3.00	B3	
EOH at 3.50m - Target depth achieved.		3.50						

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Trial pit terminated at 3.50m bgl. 4. Upon completion exploratory position backfilled with arisings.

Project Number

A111089

Project: **Windroos, Littlehampton**	Location Details		Status	Borehole Number
Location: **Worthing Road, Littlehampton BN17 6LY**	Easting:	Northing:	FINAL	**WS01**
Client: **Dandara Ltd**	Level:	Depth: 5.00m		Sheet 1 of 1
	Logger: SB	Type: WLS		
		Inclination: °		

Method, Plant and Crew					Diameter		Casing		Groundwater						Scale: 1:25
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: CA
0.00	1.20	Inspection Pit	Hand excavated pit		2.00	101									Approved By: PV
1.20	5.00	Dynamic Windowless Sampling	Premier tracked windowless sample rig		3.00	98									Start Date: 14/11/2018
					4.00	88									Finish Date: 14/11/2018
					5.00	78									

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing			
						Depth (m)	Ref	Tests / Results	
CONCRETE with 20mm thick rebar in grid pattern approximately with 300mm pitch. (CONCRETE)		0.30							
Dark reddish brown sandy GRAVEL of crushed brick fragments and grey concrete. (MADE GROUND)		0.40				0.40	ES1		
Soft brown slightly sandy silty CLAY. Sand is fine. (RIVER TERRACE DEPOSITS)						1.20	ES3	SPT(S) 1.20m, N=4 (1,1/1,1,1,1)	1
						2.00	ES2	SPT(S) 2.00m, N=4 (0,1/1,1,1,1)	2
Soft to firm sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is rounded fine and medium flint. (RIVER TERRACE DEPOSITS)		2.70				3.00	ES4	SPT(S) 3.00m, N=8 (2,1/1,2,2,3)	3
						3.50	ES5		
Loose yellow gravelly slightly clayey fine to coarse SAND. Gravel is rounded to subangular fine to coarse flint and chalk. (RAISED BEACH DEPOSITS)		3.60							
Structureless CHALK composed of cream, slightly sandy SILT. (Grade Dm) (NEW PIT CHALK FORMATION)		3.80						SPT(S) 4.00m, N=43 (2,7/9,12,12,10)	4
EOH at 5.00m - Target depth achieved.		5.00						SPT(S) 5.00m, N=39 (4,12/8,9,10,12)	5

Observations / Remarks	Sampling Runs					Hammer Information	
	From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Exploratory hole terminated at 5.00m bgl. 4. Upon completion exploratory position backfilled with arisings.							

Project Number

A111089

Project: **Windroos, Littlehampton**	Location Details		Status	Borehole Number
Location: **Worthing Road, Littlehampton BN17 6LY**	Easting:	Northing:	FINAL	**WS02**
Client: **Dandara Ltd**	Level:	Depth: 5.00m		Sheet 1 of 1
	Logger: SB	Type: WLS		
		Inclination: °		

Method, Plant and Crew					Diameter		Casing		Groundwater						Scale: 1:25
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: CA
0.00	1.20	Inspection Pit	Hand excavated pit		2.00	101									Approved By: PV
1.20	5.00	Dynamic Windowless Sampling	Premier tracked windowless sample rig		3.00	98									Start Date: 14/11/2018
					4.00	88									Finish Date: 14/11/2018
					5.00	78									

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing			
						Depth (m)	Ref	Tests / Results	
Dark brown gravelly fine to coarse SAND. Gravel is subangular to angular chalk and concrete. (MADE GROUND)									
Light brown very gravelly coarse SAND. Gravel is subrounded to angular fine to coarse chalk flint and brick fragments. (MADE GROUND)		0.20				0.20	ES1		
Soft to firm brown slightly sandy silty CLAY. Sand is fine. (RIVER TERRACE DEPOSITS)		0.40				1.00	ES2		1
								SPT(S) 1.20m, N=5 (1,1/1,2,1,1)	
						1.70	ES3		
Loose orange-brown slightly clayey fine SAND. (RIVER TERRACE DEPOSITS)		1.80							
Soft brown sandy CLAY. Sand is fine. (RIVER TERRACE DEPOSITS)		2.00						SPT(S) 2.00m, N=8 (1,3/3,2,1,2)	2
Soft orange-brown slightly sandy CLAY. Sand is fine. (RAISED BEACH DEPOSITS)		2.70				2.80	ES4		
Very loose orange-brown slightly clayey fine SAND. (RAISED BEACH DEPOSITS)		2.85							
Soft orangish brown slightly sandy CLAY. Sand is fine. (RAISED BEACH DEPOSITS)		3.00						SPT(S) 3.00m, N=0 (0,0/0,0,0,0)	3
Structureless CHALK composed of cream, slightly sandy SILT. (Grade Dm) (NEW PIT CHALK FORMATION)		3.50						SPT(S) 4.00m, N=15 (3,2/4,3,4,4)	4
EOH at 5.00m - Target depth achieved.		5.00						SPT(S) 5.00m, N=15 (4,2/3,4,3,5)	5

Observations / Remarks	Sampling Runs					Hammer Information	
	From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Exploratory hole terminated at 5.00m bgl. 4. Upon completion exploratory position backfilled with arisings.							

Project Number

A111089

Project: **Windroos, Littlehampton**

Location: **Worthing Road, Littlehampton BN17 6LY**

Client: **Dandara Ltd**

Location Details			
Easting:		Northing:	
Level:		Depth:	4.00m
Logger:	SB	Type:	WLS
		Inclination:	°

Status: FINAL

Borehole Number: **WS03**

Sheet 1 of 1

Method, Plant and Crew					Diameter		Casing		Groundwater						Scale: 1:25
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: CA
0.00	1.20	Inspection Pit	Hand excavated pit		2.00	101									Approved By: PV
1.20	4.00	Dynamic Windowless Sampling	Premier tracked windowless sample rig		3.00	98									Start Date: 14/11/2018
					4.00	88									Finish Date: 14/11/2018

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results	
Dark brown gravelly fine to coarse SAND. Gravel is subangular to angular brick and concrete fragments. (MADE GROUND)									
		0.20							
Brown clayey gravelly fine to coarse SAND. Gravel is subrounded to angular fine to coarse chalk ,flint, glass and brick fragments. (MADE GROUND)						0.30	ES1		
		0.40							
Firm brown sandy CLAY with rare coarse rounded flint gravel. Sand is fine and medium. (RIVER TERRACE DEPOSITS)						1.00	ES2		1
								SPT(S) 1.20m, N=3 (2,1/1,0,1,1)	
						2.00	ES3	SPT(S) 2.00m, N=6 (1,2/2,1,2,1)	2
Soft to firm brown sandy CLAY with rare coarse rounded flint gravel. Sand is fine and medium. (RIVER TERRACE DEPOSITS)		2.50							
						2.80	ES4		
Structureless CHALK composed of cream, slightly sandy SILT. (Grade Dm) (NEW PIT CHALK FORMATION)		2.90						SPT(S) 3.00m, N=28 (6,4/5,7,9,7)	3
Structureless CHALK composed of slightly sandy subangular to angular GRAVEL. Clasts are very weak and weak, low density cream to white. Matrix is cream. (Grade Dc) (NEW PIT CHALK FORMATION)		3.40							
EOH at 4.00m - Target depth achieved.		4.00						SPT(S) 4.00m, N=38 (3,7/10,10,8,10)	4
									5

Observations / Remarks

1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Exploratory hole terminated at 4.00m bgl. 4. Upon completion exploratory position backfilled with arisings.

Sampling Runs					Hammer Information	
From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %

Project Number: **A111089**

Project: **Windroos, Littlehampton**	Location Details		Status	Borehole Number
Location: **Worthing Road, Littlehampton BN17 6LY**	Easting:	Northing:	FINAL	**WS04**
Client: **Dandara Ltd**	Level:	Depth: 5.00m		Sheet 1 of 1
	Logger: SB	Type: WLS		
		Inclination: °		

Method, Plant and Crew					Diameter		Casing		Groundwater						Scale: 1:25
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: CA
0.00	1.20	Inspection Pit	Hand excavated pit		2.00	101									Approved By: PV
1.20	5.00	Dynamic Windowless Sampling	Premier tracked windowless sample rig		3.00	98									Start Date: 14/11/2018
					4.00	88									Finish Date: 14/11/2018
					5.00	78									

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing			
						Depth (m)	Ref	Tests / Results	
Soft brown sandy CLAY. Sand is fine. Rare rounded coarse flint gravel. (RIVER TERRACE DEPOSITS)						0.20	ES2	HV 0.30m, (p)=38 kPa (r)=20 kPa HV 0.30m, (p)=42 kPa (r)=28 kPa HV 0.30m, (p)=45 kPa (r)=28 kPa	
						0.50	ES1	HV 0.60m, (p)=75 kPa (r)=34 kPa HV 0.60m, (p)=79 kPa (r)=38 kPa HV 0.60m, (p)=82 kPa (r)=40 kPa	1
						1.20	ES3	SPT(S) 1.20m, N=6 (1,0/2,1,1,2)	
Loose orange-brown slightly clayey fine and medium SAND. (RAISED BEACH DEPOSITS)		1.70							
Soft brown sandy CLAY. Sand is fine. (RAISED BEACH DEPOSITS)		2.00						SPT(S) 2.00m, N=6 (1,1/1,1,2,2)	2
Loose orange-brown slightly clayey fine SAND. (RAISED BEACH DEPOSITS)		2.80						SPT(S) 3.00m, N=7 (1,3/2,2,2,1)	3
Structureless CHALK composed of cream, sandy SILT. (Grade Dm) (NEW PIT CHALK FORMATION)		3.80						SPT(S) 4.00m, N=9 (3,3/2,2,3,2)	4
Structureless CHALK composed of slightly sandy subangular to angular GRAVEL. Clasts are very weak and weak, low density cream to white. Matrix is cream. (Grade Dc) (NEW PIT CHALK FORMATION)		4.50							
EOH at 5.00m - Target depth achieved.		5.00						SPT(S) 5.00m, N=35 (3,8/8,8,7,12)	5

Observations / Remarks	Sampling Runs					Hammer Information	
	From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
1. Groundwater not observed. 2. No visible or olfactory evidence of significant contamination. 3. Exploratory hole terminated at 5.00m bgl. 4. Upon completion exploratory position backfilled with arisings.							

Project Number

A111089

Appendix C – Photographic Plates

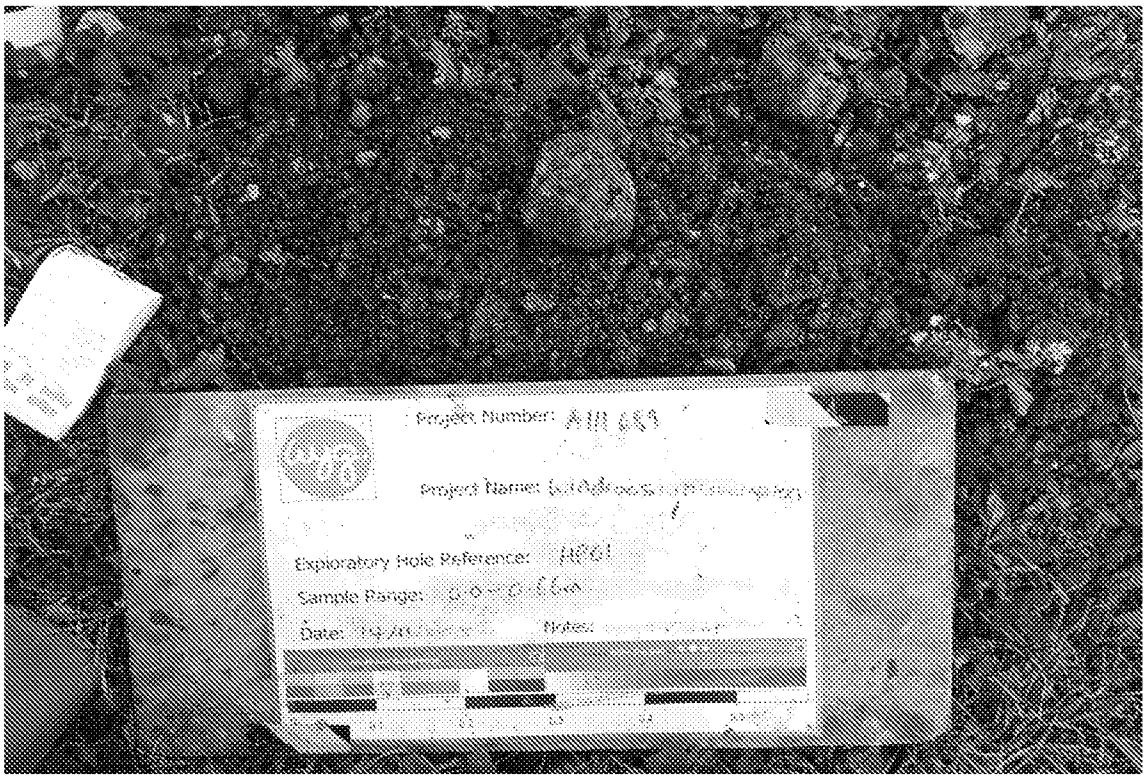


Plate 1 HP01: Hand pit spoil



Plate 2 HP02: Hand dug pit and spoil

WYG Environment
5th Floor, Longcross Court
47 Newport Road
Cardiff
CF24 0AD

[redacted]

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Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018



Plate 3 HP03: Hand dug pit



Plate 4 HP03: Hand pit spoil

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47 Newport Road
Cardiff
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[redacted]

Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089

Date : 14/11/2018

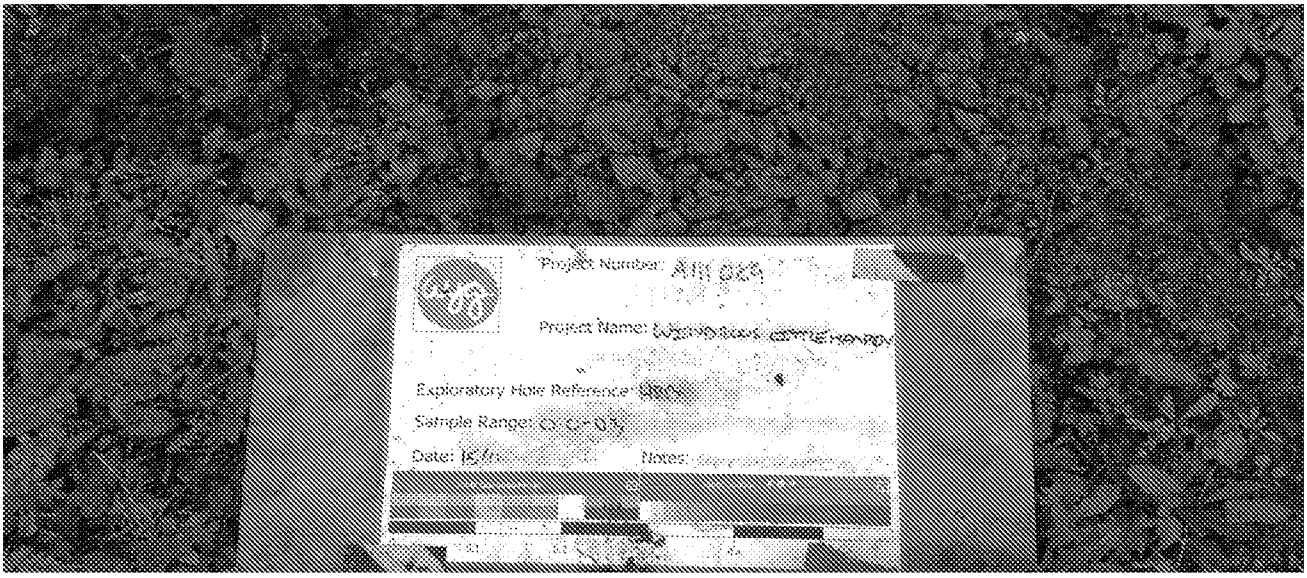


Plate 5 HP13: Hand pit spoil

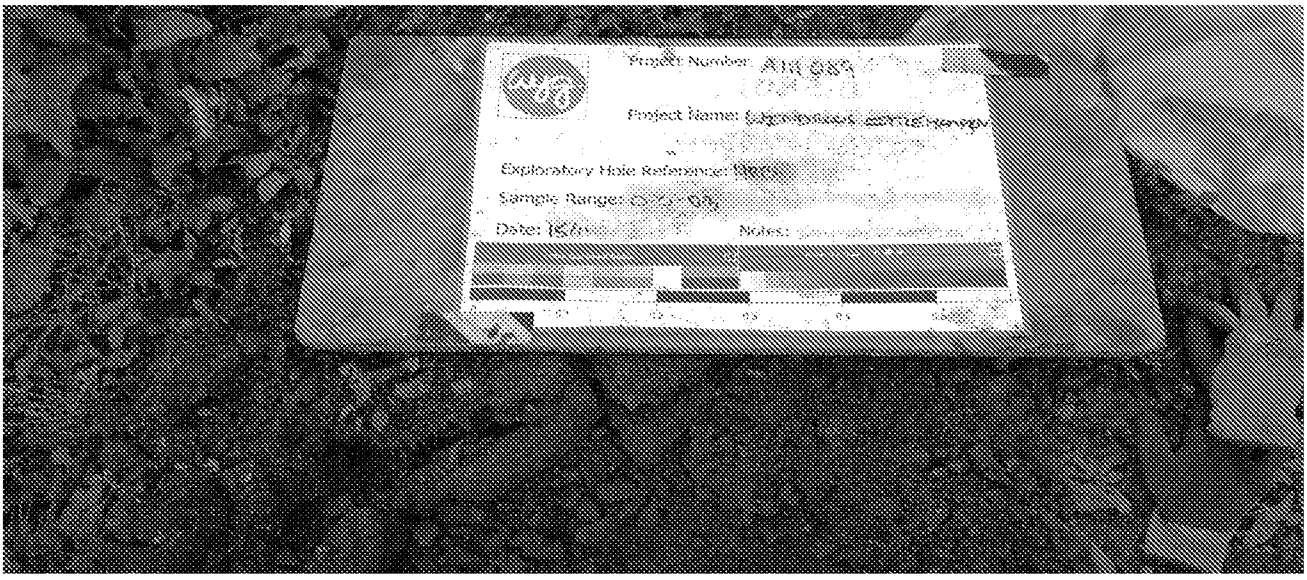


Plate 6 HP13: Hand dug pit

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Cardiff
CF24 0AD

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Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018

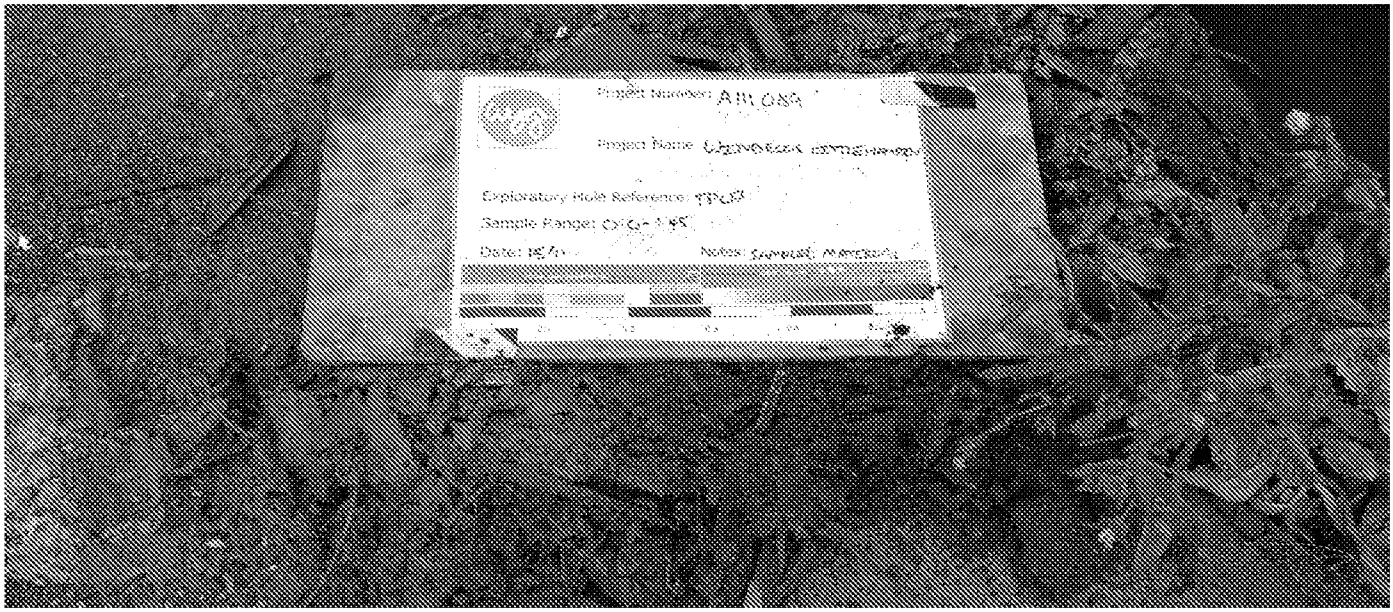


Plate 1 TP07 Sampled material

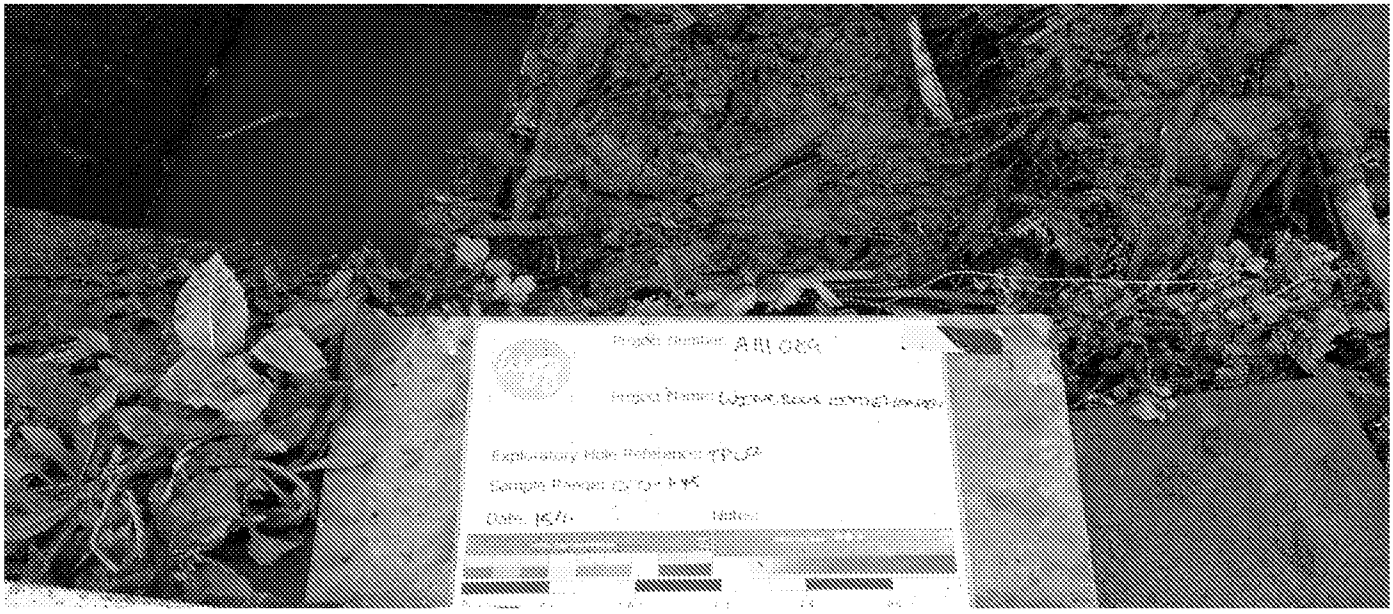


Plate 2 TP07 Tank sample

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Cardiff
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Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089

Date : 15/11/2018

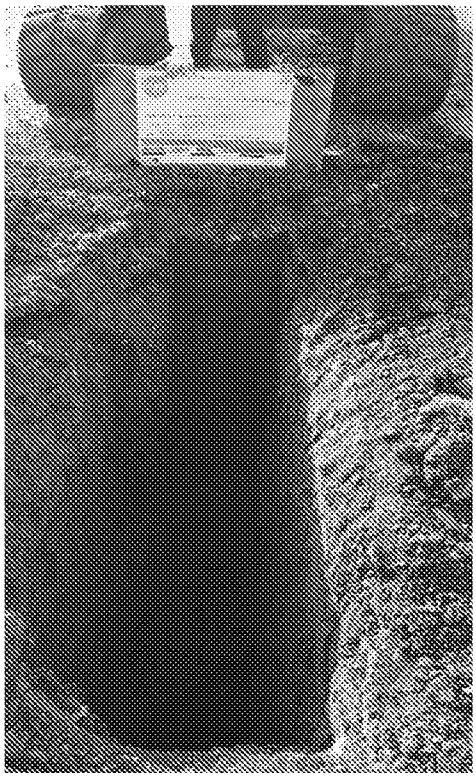


Plate 3 TP08 Pit



Plate 4 TP08 Spoil

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[redacted]

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Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089

Date : 14/11/2018

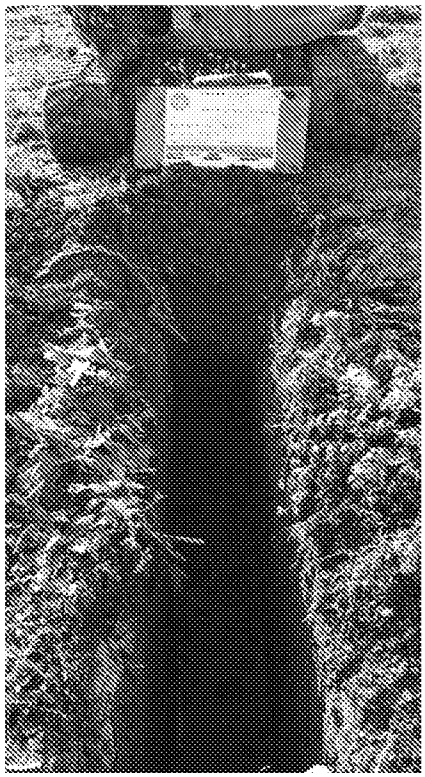


Plate 5 TP09 Pit



Plate 6 TP09 Spoil

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Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089

Date : 14/11/2018

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Plate 7 TP10 Pit



Plate 8 TP10 Spoil

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47 Newport Road
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[redacted]

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Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089

Date : 14/11/2018

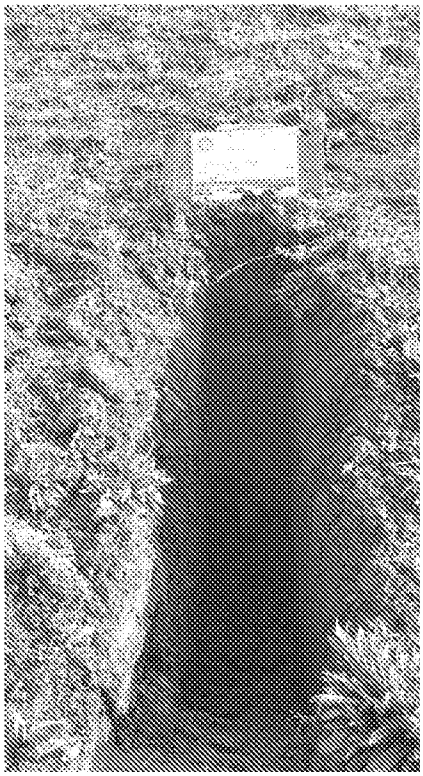


Plate 9 TP11 Pit



Plate 10 TP11 Spoil

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47 Newport Road
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[redacted]

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Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089

Date : 14/11/2018

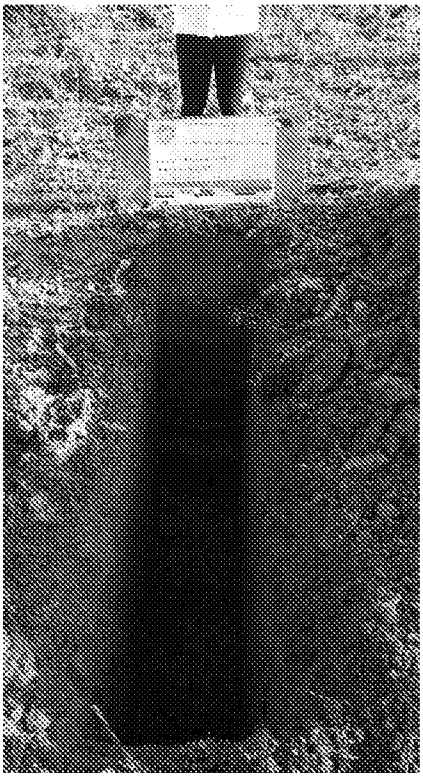


Plate 11 TP12 Pit



Plate 12 TP12 Spoil

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[redacted]

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Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089

Date : 14/11/2018

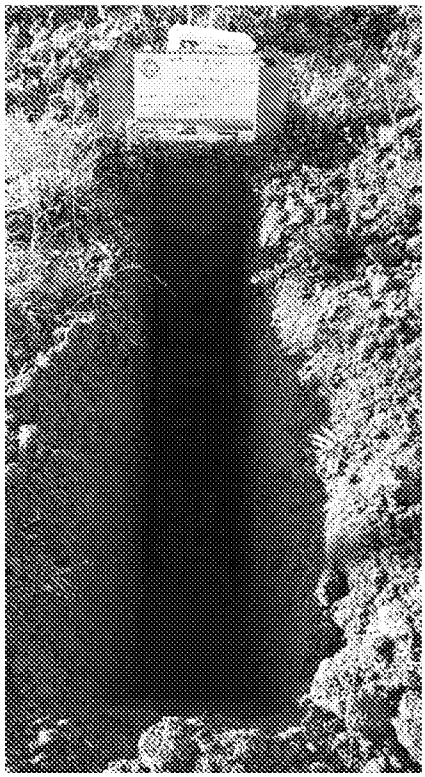


Plate 13 TP14 Pit



Plate 14 TP14 Spoil

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47 Newport Road
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Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089

Date : 14/11/2018

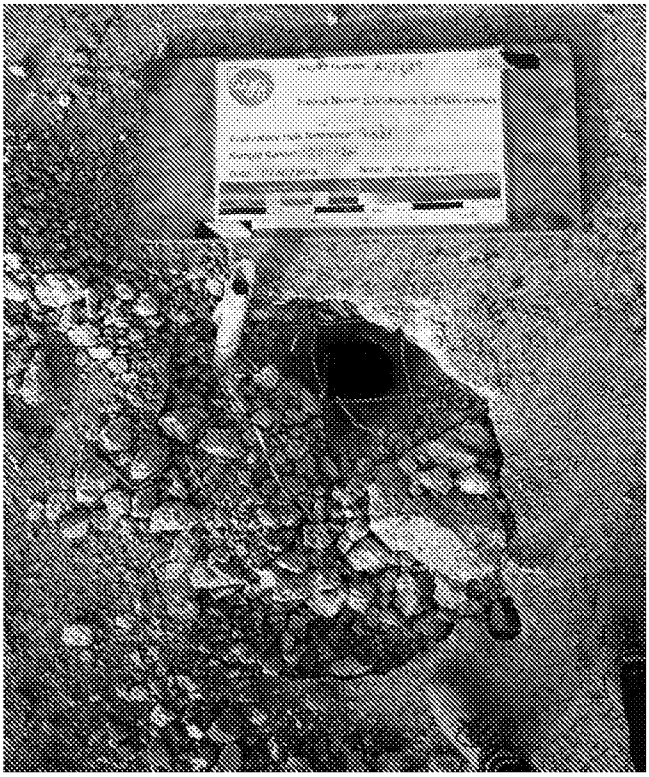


Plate 1 WS01: Hand dug pit



Plate 2 WS01: Pit spoil

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47 Newport Road
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[redacted]

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Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018

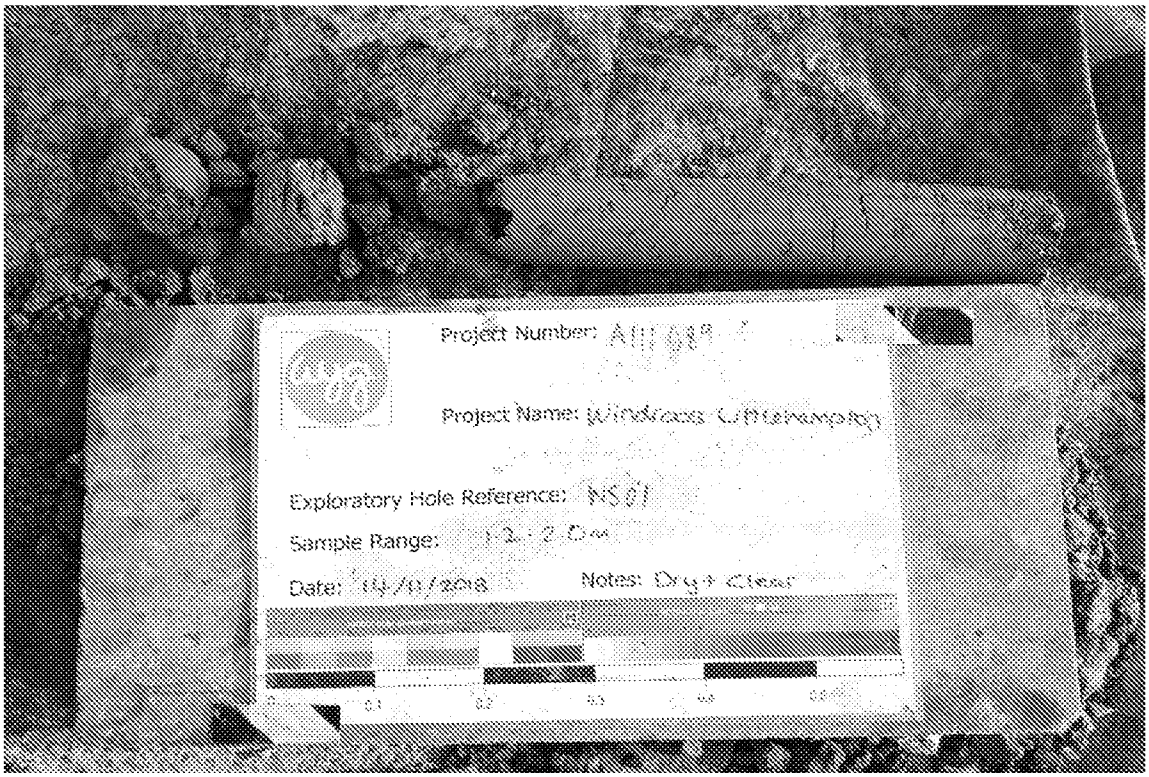


Plate 3 WS01: 1.20 - 2.00 m bgl



Plate 4 WS01: 2.00 - 3.00 m bgl

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47 Newport Road
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Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018

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Plate 5 WS01: 3.00 - 4.00 m bgl

Plate 6 BLANK

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Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018

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Plate 7 WS02: Hand dug pit



Plate 8 WS02: Hand dug pit spoil

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Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018

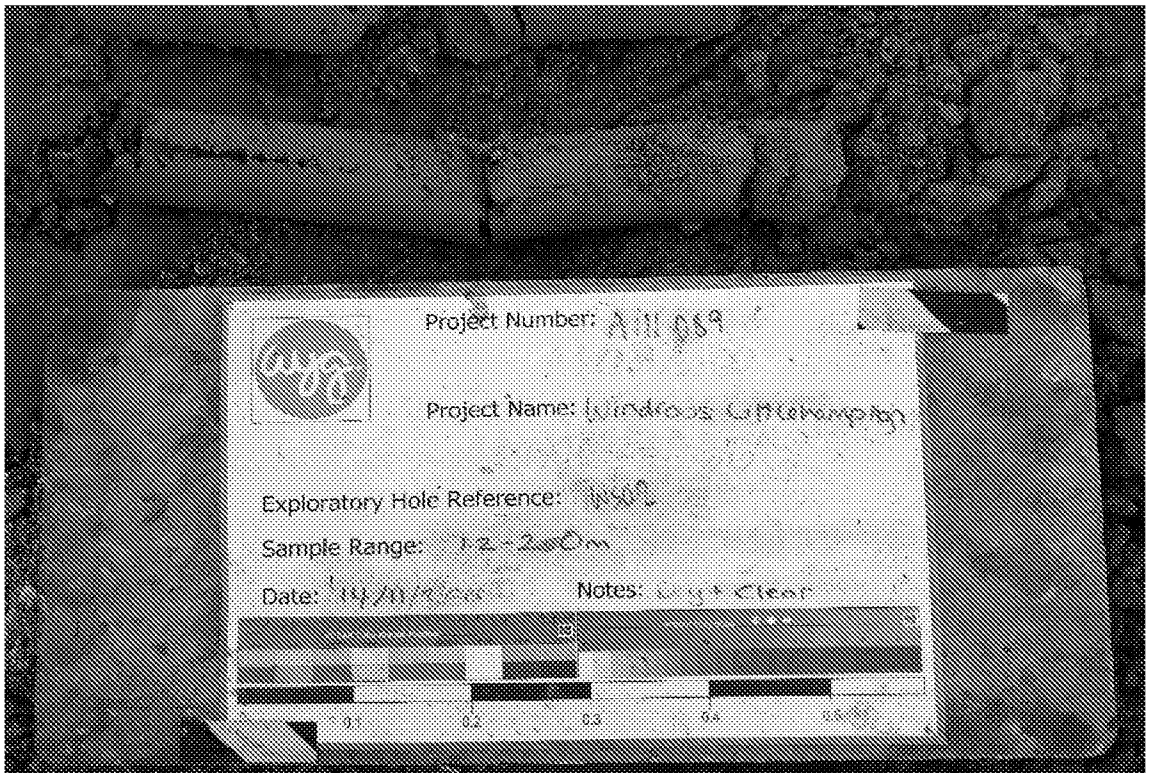


Plate 9 WS02: 1.20 - 2.00 m bgl

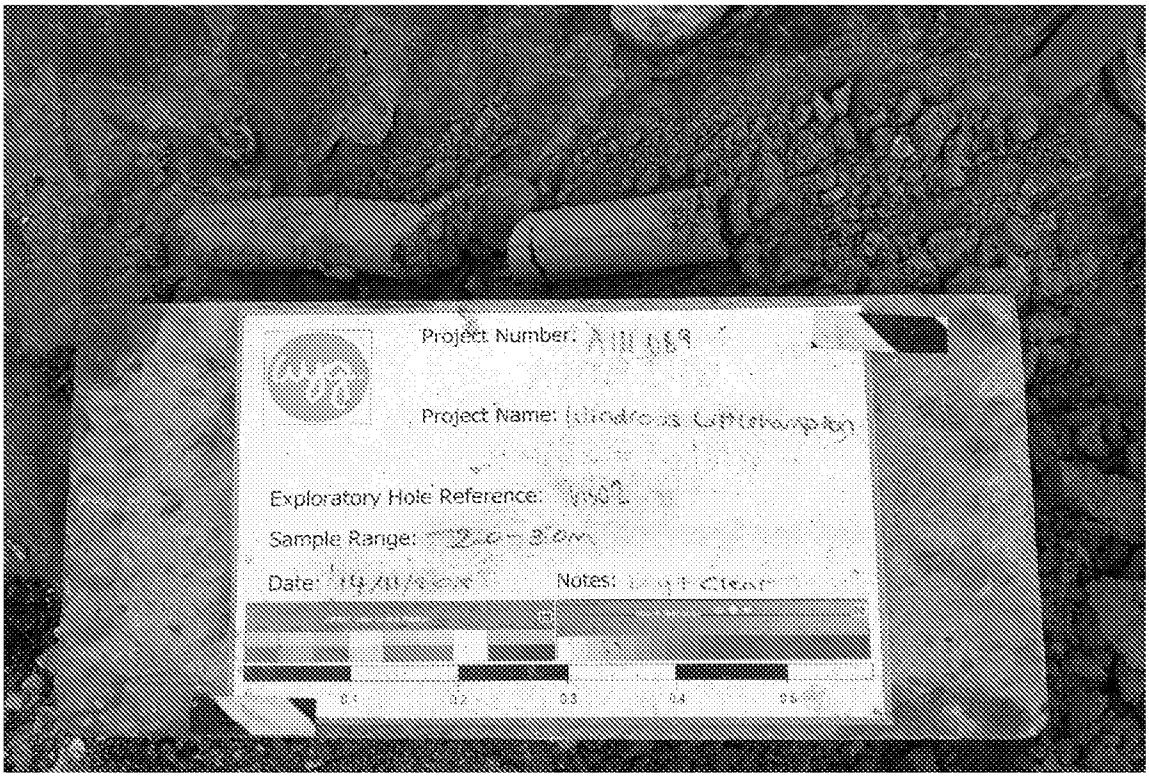


Plate 10 WS02: 2.00 - 3.00 m bgl

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Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018



Plate 11 WS02: 3.00 - 4.00 m bgl



Plate 12 WS02: 4.00 - 5.00 m bgl

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[redacted]

Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018



Plate 13 WS03: Hand dug pit



Plate 14 WS03: Hand dug spoil

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Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018



Plate 15 WS03: 1.20 - 2.00 m bgl



Plate 16 WS03: 2.00 - 3.00 m bgl

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47 Newport Road
Cardiff
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[redacted]

Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018



Plate 17 WS04: Hand dug pit spoil



Plate 18 WS04: 1.20 - 2.00 m bgl

WYG Environment
5th Floor, Longcross Court
47 Newport Road
Cardiff
CF24 0AD

[redacted]

Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018



Plate 19 WS04: 2.00 - 3.00m bgl



Plate 20 WS04: 3.00 - 4.00 m bgl

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47 Newport Road
Cardiff
CF24 0AD

[redacted]

Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018



Plate 21 WS04: 4.00 - 5.00 m bgl

Plate 22 BLANK

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47 Newport Road
Cardiff
CF24 0AD

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Environmental Consultancy
Ground Technologies & Investigation

Project :-
Windroos, Littlehampton

Client: Dandara

Project No.: A111089 | Date : 14/11/2018

Appendix D – Geotechnical Laboratory Testing Results

UKAS TESTING
2788

Laboratory Report

GSTL
GEO Site & Testing Services Ltd

Contract Number: 42006

Client Ref: **A111089**
Client PO: **C18/675**

Report Date: **17-12-2018**

Client **WYG Group**
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Contract Title: **Windroos, Littlehampton**
For the attention of: **caroline.anderson**

Date Received: **06-12-2018**
Date Commenced: **06-12-2018**
Date Completed: **17-12-2018**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	4
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	4
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	2
pH value of soil BS 1377:1990 - Part 3 : 9.5 - @ Non Accredited Test	3
Sulphate Content of Groundwater BS 1377:1990 - Part 3 : 5.4 - @ Non Accredited Test	3
Disposal of samples for job	1

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
- denotes test carried out by approved contractor
@ - denotes non accredited tests

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 Signatories:
Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Accounts Assistant)
Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gsti.co.uk gsti.co.uk

ARUN DISTRICT COUNCIL-LU/66/19/DOC

GSTL	LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5) DESCRIPTIONS	
Contract Number	42006	
Site Name	Windroos, Littlehampton	

TP Trialpit	Sample Number	Sample Type	Depth (m)			Descriptions
TP09	1	B	0.50	-	1.00	Brown fine to medium gravelly sandy silty CLAY
TP09	2	B	1.50	-	2.00	Brown fine to coarse gravelly sandy silty CLAY
TP12	1	B	0.50	-	1.00	Brown silty CLAY
TP14	2	B	1.50	-	2.00	Brown fine to medium gravelly sandy silty CLAY
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
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				-		
				-		
				-		
				-		

Operators	Checked	16/12/2018	Sean Penn	[redacted]
RO/MH	Approved	17/12/2018	Ben Sharp	[redacted]

UKAS TESTING 2788

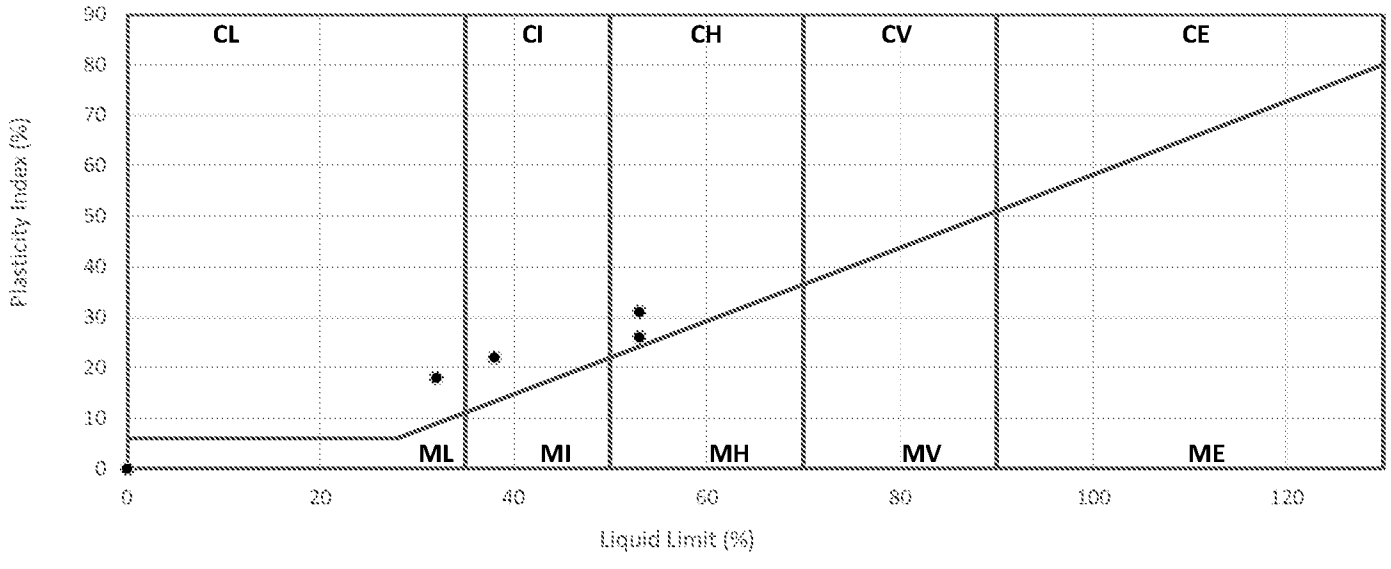
LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX
(BS 1377 : Part 2 : 1990 Method 5)

Contract Number	42006
Site Name	Windroos, Littlehampton

TP Trialpit	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing .425mm %	Remarks
TP09	1	B	0.50	-	1.00	27	53	22	31	90	CH High Plasticity
TP09	2	B	1.50	-	2.00	35	53	27	26	83	CH High Plasticity
TP12	1	B	0.50	-	1.00	23	38	16	22	100	CI Intermediate Plasticity
TP14	2	B	1.50	-	2.00	21	32	14	18	86	CL Low Plasticity
				-							
				-							
				-							
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				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

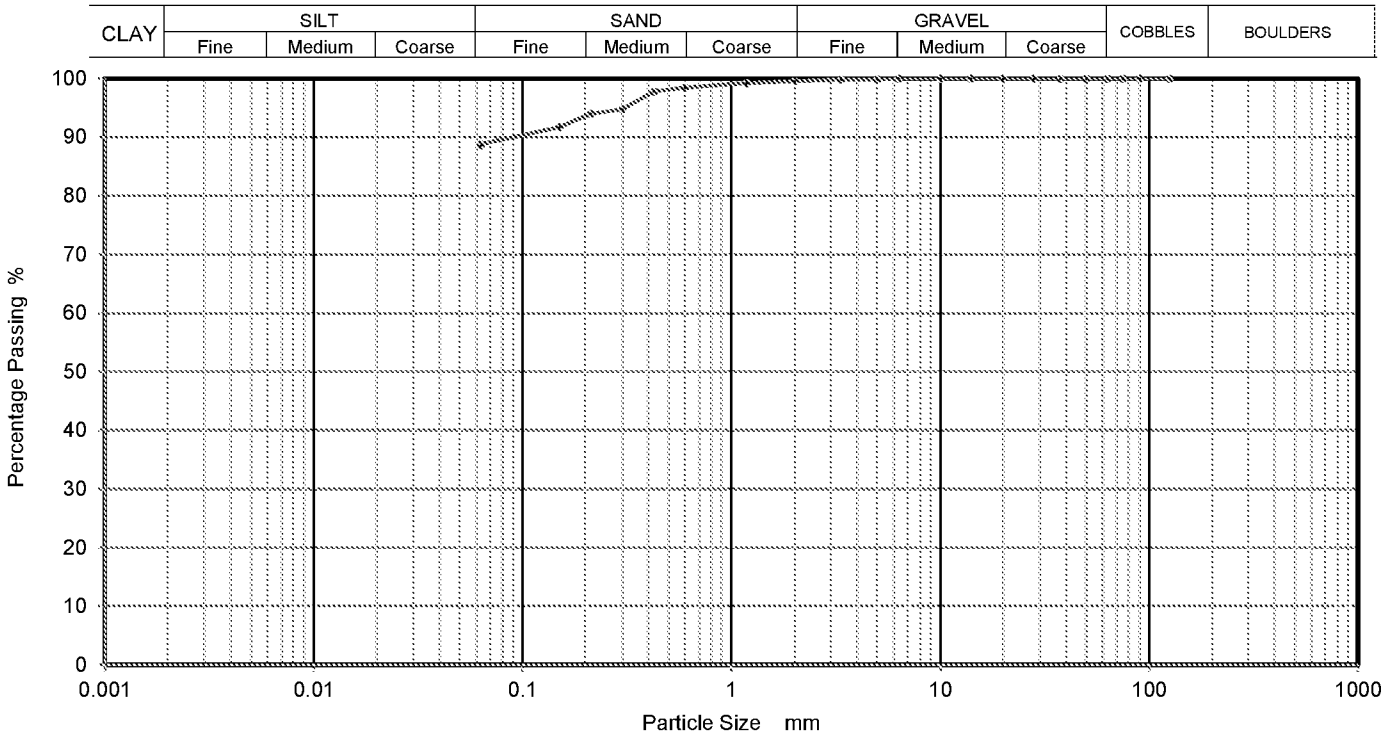
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Operators	Checked	16/12/2018	Sean Penn	[redacted]
DB	Approved	17/12/2018	Ben Sharp	

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	42006
		Borehole/Pit No.	TP10
Site Name	Windroos, Littlehampton	Sample No.	2
Soil Description	Brown fine to coarse sandy SILT/CLAY	Depth Top	1.50
		Depth Base	2.00
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	98		
0.425	98		
0.3	95		
0.212	94		
0.15	92		
0.063	89		

Sample Proportions	% dry mass
Cobbles	0
Gravel	0
Sand	11
Silt and Clay	89

Grading Analysis	
Uniformity Coefficient	

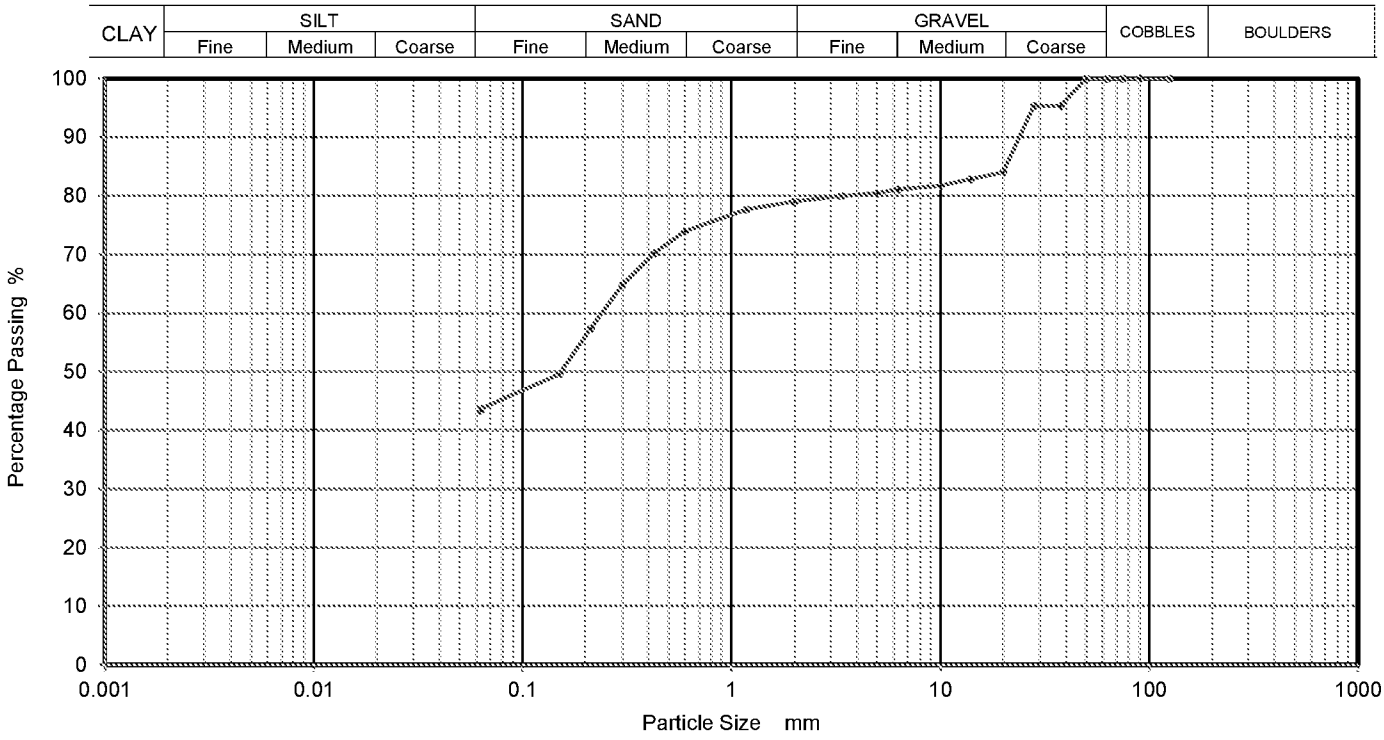
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16/12/2018	Sean Penn	[redacted]
RO/MH	Approved	17/12/2018	Ben Sharp	[redacted]

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	42006
		Borehole/Pit No.	TP11
Site Name	Windroos, Littlehampton	Sample No.	3
Soil Description	Brown fine to coarse gravelly fine to coarse sandy SILT/CLAY	Depth Top	1.50
		Depth Base	2.00
		Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	100	0.0060	
75	100	0.0019	
63	100		
50	100		
37.5	95		
28	95		
20	84		
14	83		
10	82		
6.3	81		
5	80		
3.35	80		
2	79		
1.18	78		
0.6	74		
0.425	70		
0.3	65		
0.212	57		
0.15	50		
0.063	44		

Sample Proportions	% dry mass
Cobbles	0
Gravel	21
Sand	35
Silt and Clay	44

Grading Analysis	
Uniformity Coefficient	

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	16/12/2018	Sean Penn	[redacted]
RO/MH	Approved	17/12/2018	Ben Sharp	[redacted]

UKAS TESTING 2788

GSTL	Certificate of Chemical Analysis BS1377 Part 3 1990	Contract Number	42006
		Client Reference	A111089
Client	WYG	**Date Received**	
Site Name	Windroos, Littlehampton	**Date Started**	12/12/2018
		Date Completed	17/12/2018
		No. of Samples	3

Hole Number	Sample Number	Sample Type	Depth (m)			Acid Soluble Sulphate	Aqueous Extract Sulphate	Water Soluble Chloride	PH Value	Organic Matter Content	Acid Soluble Chloride	Loss On Ignition
TP09	1	B	0.50	-	1.00		0.02		7.21			
TP12	1	B	0.50	-	1.00		0.03		7.49			
TP14	2	B	1.50	-	2.00		0.03		7.70			
				-								
				-								
				-								
				-								
				-								
				-								
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Key	**Reported As**	**Clause**
Acid Soluble Sulphate	% SO_3	Clause 5.2 & 5.5
Aqueous Extract Sulphate	g/l SO_3	Clause 5.3 & 5.5
Water Soluble Chloride	%	Clause 7.2
PH Value	@ 25°	Clause 9.5
Organic	%	Clause 3
Acid Soluble Chloride	%	Clause 7.3
LOI	%	Clause 4

Remarks

NCP = No Chloride Present

Test Operator	Checked and Authorised by		Ben Sharp	[redacted]
Darren Bourne	Date	17/12/2018		

ARUN DISTRICT COUNCIL LU/56/19/DOC

Appendix E – Environmental Laboratory Testing Results

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
[redacted]
[redacted]

WYG Geo-Environment
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Attention: Sophie Brookes

CERTIFICATE OF ANALYSIS

Date:	02 December 2018
Customer:	H_WYG_CDF
Sample Delivery Group (SDG):	181121-121
Your Reference:	A111089
Location:	Windroos, Littlehampton
Report No:	483494

We received 25 samples on Wednesday November 21, 2018 and 25 of these samples were scheduled for analysis which was completed on Sunday December 02, 2018. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

Approved By:

[redacted]

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18790217	HP04	ES1	0.15 - 0.15	14/11/2018
18790166	HP05	ES1	0.30 - 0.30	14/11/2018
18790224	HP05	ES2	0.60 - 0.60	14/11/2018
18790228	HP13	ES1	0.20 - 0.20	14/11/2018
18790235	HP15	ES1	0.50 - 0.50	14/11/2018
18790244	HP16	ES1	0.20 - 0.20	14/11/2018
18790250	HP17	ES1	0.30 - 0.30	14/11/2018
18790257	HP18	ES1	0.30 - 0.30	14/11/2018
18790266	TP07	ES1	1.45 - 1.45	14/11/2018
18790103	TP08	ES1	0.50 - 0.50	14/11/2018
18790109	TP09	ES1	0.15 - 0.15	14/11/2018
18790123	TP09	ES2	0.40 - 0.40	14/11/2018
18790128	TP09	ES3	1.20 - 1.20	14/11/2018
18790135	TP10	ES1	0.30 - 0.30	14/11/2018
18790142	TP11	ES1	0.30 - 0.30	14/11/2018
18790148	TP12	ES1	0.50 - 0.50	14/11/2018
18790154	TP14	ES1	0.50 - 0.50	14/11/2018
18790094	WS01	ES1	0.40 - 0.40	14/11/2018
18790116	WS01	ES2	1.20 - 1.20	14/11/2018
18790159	WS02	ES1	0.20 - 0.20	14/11/2018
18790174	WS02	ES2	1.00 - 1.00	14/11/2018
18790180	WS02	ES3	2.80 - 2.80	14/11/2018
18790186	WS03	ES1	0.30 - 0.30	14/11/2018
18790194	WS04	ES1	0.20 - 0.20	14/11/2018
18790208	WS04	ES2	1.20 - 1.20	14/11/2018

Maximum Sample/Coolbox Temperature (°C) : **6.4**

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with **4** frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to **24**hrs.

Only received samples which have had analysis scheduled will be shown on the following pages.

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			18790217		18790166		18790224		18790228		18790235		18790244		18790250						
Customer Sample Reference			HP04		HP05		HP05		HP13		HP15		HP16		HP17						
AGS Reference			ES1		ES1		ES2		ES1		ES1		ES1		ES1						
Depth (m)			0.15 - 0.15		0.30 - 0.30		0.60 - 0.60		0.20 - 0.20		0.50 - 0.50		0.20 - 0.20		0.30 - 0.30						
Container			1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB				
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Alkalinity Filtered as CaCO3	All	NDPs: 0 Tests: 4																			
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 4																			
Anions by Kone (soil)	All	NDPs: 0 Tests: 12					X									X					
Anions by Kone (w)	All	NDPs: 0 Tests: 4																			
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 24	X			X			X			X			X			X			X
Asbestos Quantification - Full	All	NDPs: 0 Tests: 2																			
Boron Water Soluble	All	NDPs: 0 Tests: 24		X			X			X			X			X					
CEN Readings	All	NDPs: 0 Tests: 4																			
Chromium III	All	NDPs: 0 Tests: 24		X			X			X			X			X					
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 24		X			X			X			X			X					
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 4																			
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 4																			
EPH by FID	All	NDPs: 0 Tests: 12		X			X			X			X								
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 12														X					
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 12														X					

18790135	TP10	ES1	0.30 - 0.30	250g Amber Jar (ALE210)	S							X		X	X			X		
				1kg TUB	S					X	X									
18790128	TP09	ES3	1.20 - 1.20	60g VOC (ALE215)	S															
				250g Amber Jar (ALE210)	S							X		X	X			X		
				1kg TUB	S					X										
18790123	TP09	ES2	0.40 - 0.40	250g Amber Jar (ALE210)	S															
				1kg TUB	S	X	X		X				X			X	X			
18790109	TP09	ES1	0.15 - 0.15	60g VOC (ALE215)	S															
				250g Amber Jar (ALE210)	S							X		X	X			X		
				1kg TUB	S					X										
18790103	TP08	ES1	0.50 - 0.50	60g VOC (ALE215)	S															
				250g Amber Jar (ALE210)	S							X		X	X			X		
				1kg TUB	S					X	X									
18790266	TP07	ES1	1.45 - 1.45	60g VOC (ALE215)	S															
				250g Amber Jar (ALE210)	S			X				X		X	X				X	X
				1kg TUB	S					X										
18790257	HP18	ES1	0.30 - 0.30	60g VOC (ALE215)	S															
				250g Amber Jar (ALE210)	S			X				X		X	X				X	X
				1kg TUB	S					X										
18790250	HP17	ES1	0.30 - 0.30	60g VOC (ALE215)	S															
				250g Amber Jar (ALE210)	S							X		X	X			X		

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend

[X] Test

[N] No Determination Possible

Sample Types -
- S - Soil/Solid
- UNS - Unspecified Solid
- GW - Ground Water
- SW - Surface Water
- LE - Land Leachate
- PL - Prepared Leachate
- PR - Process Water
- SA - Saline Water
- TE - Trade Effluent
- TS - Treated Sewage
- US - Untreated Sewage
- RE - Recreational Water
- DW - Drinking Water Non-regulatory
- UNL - Unspecified Liquid
- SL - Sludge
- G - Gas
- OTH - Other

Lab Sample No(s)					18790217			18790166			18790224			18790228			18790235			18790244	18790250
Customer Sample Reference					HP04			HP05			HP05			HP13			HP15			HP16	HP17
AGS Reference					ES1			ES1			ES2			ES1			ES1			ES1	ES1
Depth (m)					0.15 - 0.15			0.30 - 0.30			0.60 - 0.60			0.20 - 0.20			0.50 - 0.50			0.20 - 0.20	0.30 - 0.30
Container			1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
GRO by GC-FID (S)	All	NDPs: 0 Tests: 24			X			X			X			X			X			X	
GRO by GC-FID (W)	All	NDPs: 0 Tests: 4																			
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 24		X			X			X			X			X			X		
Mercury Dissolved	All	NDPs: 0 Tests: 4																			
Metals in solid samples by OES	All	NDPs: 0 Tests: 24		X			X			X			X			X			X		
OC, OP Pesticides and Triazine Herb	All	NDPs: 0 Tests: 3					X												X		
PAH by GCMS	All	NDPs: 0 Tests: 24		X			X			X			X			X			X		
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 4																			
pH	All	NDPs: 0 Tests: 24		X			X			X			X			X			X		
pH Value of Filtered Water	All	NDPs: 0 Tests: 4																			
Phenols by HPLC (S)	All	NDPs: 0 Tests: 24		X			X			X			X			X			X		
Phenols by HPLC (W)	All	NDPs: 0 Tests: 4																			
Sample description	All	NDPs: 0 Tests: 25		X			X			X			X			X			X		
Total EPH (aq)	All	NDPs: 0 Tests: 4																			
Total Organic Carbon	All	NDPs: 0 Tests: 24		X			X			X			X			X			X		

18790135	TP10	ES1	0.30 - 0.30	250g Amber Jar (ALE210)	S					X				X				X				X				X				X				X
				1kg TUB	S																														
18790128	TP09	ES3	1.20 - 1.20	60g VOC (ALE215)	S		X																												
				250g Amber Jar (ALE210)	S					X				X				X				X				X				X				X
				1kg TUB	S																														
18790123	TP09	ES2	0.40 - 0.40	250g Amber Jar (ALE210)	S																									X					
				1kg TUB	S				X				X								X				X				X				X		
18790109	TP09	ES1	0.15 - 0.15	60g VOC (ALE215)	S		X																												
				250g Amber Jar (ALE210)	S					X				X				X				X				X				X				X
				1kg TUB	S																														
18790103	TP08	ES1	0.50 - 0.50	60g VOC (ALE215)	S		X																												
				250g Amber Jar (ALE210)	S					X				X				X				X				X				X				X
				1kg TUB	S																														
18790266	TP07	ES1	1.45 - 1.45	60g VOC (ALE215)	S		X																												
				250g Amber Jar (ALE210)	S					X				X				X				X				X				X				X
				1kg TUB	S																														
18790257	HP18	ES1	0.30 - 0.30	60g VOC (ALE215)	S		X																												
				250g Amber Jar (ALE210)	S					X				X				X				X				X				X				X
				1kg TUB	S																														
18790250	HP17	ES1	0.30 - 0.30	60g VOC (ALE215)	S		X																												
				250g Amber Jar (ALE210)	S					X				X				X				X				X				X				X

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
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US - Untreated Sewage
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DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			18790217		18790166		18790224		18790228		18790235		18790244		18790250				
Customer Sample Reference			HP04		HP05		HP05		HP13		HP15		HP16		HP17				
AGS Reference			ES1		ES1		ES2		ES1		ES1		ES1		ES1				
Depth (m)			0.15 - 0.15		0.30 - 0.30		0.60 - 0.60		0.20 - 0.20		0.50 - 0.50		0.20 - 0.20		0.30 - 0.30				
Container			1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
TPH CWG GC (S)	All	NDPs: 0 Tests: 12																	X		
VOC MS (S)	All	NDPs: 0 Tests: 24			X			X			X			X			X			X	

18790135	TP10	ES1	0.30 - 0.30	250g Amber Jar (ALE210)	S					
				1kg TUB	S					
18790128	TP09	ES3	1.20 - 1.20	60g VOC (ALE215)	S				X	
				250g Amber Jar (ALE210)	S					
				1kg TUB	S					
18790123	TP09	ES2	0.40 - 0.40	250g Amber Jar (ALE210)	S					
				1kg TUB	S					
18790109	TP09	ES1	0.15 - 0.15	60g VOC (ALE215)	S				X	
				250g Amber Jar (ALE210)	S					
				1kg TUB	S					
18790103	TP08	ES1	0.50 - 0.50	60g VOC (ALE215)	S				X	
				250g Amber Jar (ALE210)	S					
				1kg TUB	S					
18790266	TP07	ES1	1.45 - 1.45	60g VOC (ALE215)	S				X	
				250g Amber Jar (ALE210)	S		X			
				1kg TUB	S					
18790257	HP18	ES1	0.30 - 0.30	60g VOC (ALE215)	S				X	
				250g Amber Jar (ALE210)	S		X			
				1kg TUB	S					
18790250	HP17	ES1	0.30 - 0.30	60g VOC (ALE215)	S				X	
				250g Amber Jar (ALE210)	S					

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			18790135			18790142			18790148			18790154			18790094			18790116			18790159	
Customer Sample Reference			TP10			TP11			TP12			TP14			WS01			WS01			WS02	
AGS Reference			ES1			ES1			ES1			ES1			ES1			ES2			ES1	
Depth (m)			0.30 - 0.30			0.30 - 0.30			0.50 - 0.50			0.50 - 0.50			0.40 - 0.40			1.20 - 1.20			0.20 - 0.20	
Container			60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Alkalinity Filtered as CaCO3	All	NDPs: 0 Tests: 4														X			X				
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 4														X			X				
Anions by Kone (soil)	All	NDPs: 0 Tests: 12												X			X					X	
Anions by Kone (w)	All	NDPs: 0 Tests: 4														X			X				
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 24		X			X			X			X			X			X				
Boron Water Soluble	All	NDPs: 0 Tests: 24			X			X			X			X			X			X			X	
CEN Readings	All	NDPs: 0 Tests: 4														X			X				
Chromium III	All	NDPs: 0 Tests: 24			X			X			X			X			X			X			X	
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 24			X			X			X			X			X			X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 4														X			X				
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 4														X			X				
EPH by FID	All	NDPs: 0 Tests: 12			X			X			X												
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 12												X			X					X	
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 12												X			X					X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 24	X			X			X			X			X			X					X

18790208	WS04	ES2	1.20 - 1.20	60g VOC (ALE215)	S															X
				250g Amber Jar (ALE210)	S			X			X		X	X				X	X	
				1kg TUB	S	X	X		X	X		X			X	X				
18790194	WS04	ES1	0.20 - 0.20	60g VOC (ALE215)	S															X
				250g Amber Jar (ALE210)	S			X			X		X	X				X	X	
				1kg TUB	S					X										
18790186	WS03	ES1	0.30 - 0.30	60g VOC (ALE215)	S															X
				250g Amber Jar (ALE210)	S			X			X		X	X				X	X	
				1kg TUB	S					X										
18790180	WS02	ES3	2.80 - 2.80	60g VOC (ALE215)	S															X
				250g Amber Jar (ALE210)	S			X			X		X	X				X	X	
				1kg TUB	S					X										
18790174	WS02	ES2	1.00 - 1.00	60g VOC (ALE215)	S															X
				250g Amber Jar (ALE210)	S			X			X		X	X				X	X	
				1kg TUB	S					X										

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			18790135		18790142			18790148			18790154			18790094		18790116		18790159			
Customer Sample Reference			TP10		TP11			TP12			TP14			WS01		WS01		WS02			
AGS Reference			ES1		ES1			ES1			ES1			ES1		ES2		ES1			
Depth (m)			0.30 - 0.30		0.30 - 0.30			0.50 - 0.50			0.50 - 0.50			0.40 - 0.40		1.20 - 1.20		0.20 - 0.20			
Container			60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
GRO by GC-FID (W)	All	NDPs: 0 Tests: 4														X		X			
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 24			X			X			X			X			X			X	
Mercury Dissolved	All	NDPs: 0 Tests: 4														X		X			
Metals in solid samples by OES	All	NDPs: 0 Tests: 24			X			X			X			X			X			X	
OC, OP Pesticides and Triazine Herb	All	NDPs: 0 Tests: 3																			
PAH by GCMS	All	NDPs: 0 Tests: 24			X			X			X			X			X			X	
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 4														X		X			
pH	All	NDPs: 0 Tests: 24			X			X			X			X			X			X	
pH Value of Filtered Water	All	NDPs: 0 Tests: 4														X		X			
Phenols by HPLC (S)	All	NDPs: 0 Tests: 24			X			X			X			X			X			X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 4														X		X			
Sample description	All	NDPs: 0 Tests: 25			X			X			X			X			X			X	
Total EPH (aq)	All	NDPs: 0 Tests: 4														X		X			
Total Organic Carbon	All	NDPs: 0 Tests: 24			X			X			X			X			X			X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 12												X			X			X	

18790208	WS04	ES2	1.20 - 1.20	60g VOC (ALE215)	S	
				250g Amber Jar (ALE210) 1kg TUB	S	X
				60g VOC (ALE215)	S	
18790194	WS04	ES1	0.20 - 0.20	250g Amber Jar (ALE210) 1kg TUB	S	X
				60g VOC (ALE215)	S	
18790186	WS03	ES1	0.30 - 0.30	250g Amber Jar (ALE210) 1kg TUB	S	X
				60g VOC (ALE215)	S	
18790180	WS02	ES3	2.80 - 2.80	250g Amber Jar (ALE210) 1kg TUB	S	X
				60g VOC (ALE215)	S	
18790174	WS02	ES2	1.00 - 1.00	250g Amber Jar (ALE210) 1kg TUB	S	X
				60g VOC (ALE215)	S	

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
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UNL - Unspecified Liquid
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G - Gas
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Lab Sample No(s)	18790135		18790142		18790148		18790154		18790094		18790116		18790159						
Customer Sample Reference	TP10		TP11		TP12		TP14		WS01		WS01		WS02						
AGS Reference	ES1		ES1		ES1		ES1		ES1		ES2		ES1						
Depth (m)	0.30 - 0.30		0.30 - 0.30		0.50 - 0.50		0.50 - 0.50		0.40 - 0.40		1.20 - 1.20		0.20 - 0.20						
Container	60g VOC (ALE215)	250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215)	250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215)	250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215)	250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215)	250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215)	250g Amber Jar (ALE210) 1kg TUB	60g VOC (ALE215)	250g Amber Jar (ALE210) 1kg TUB					
Sample Type	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
VOC MS (S) / All / NDPs: 0 Tests: 24	X			X			X			X			X			X			X

18790208			1.20 - 1.20	60g VOC (ALE215)	S	X
	WS04	ES2		250g Amber Jar (ALE210)	S	
				1kg TUB	S	
18790194			0.20 - 0.20	60g VOC (ALE215)	S	X
	WS04	ES1		250g Amber Jar (ALE210)	S	
				1kg TUB	S	
18790186			0.30 - 0.30	60g VOC (ALE215)	S	X
	WS03	ES1		250g Amber Jar (ALE210)	S	
				1kg TUB	S	
18790180			2.80 - 2.80	60g VOC (ALE215)	S	X
	WS02	ES3		250g Amber Jar (ALE210)	S	
				1kg TUB	S	
18790174			1.00 - 1.00	60g VOC (ALE215)	S	X
	WS02	ES2		250g Amber Jar (ALE210)	S	
				1kg TUB	S	

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
18790217	HP04	0.15 - 0.15	Dark Brown	Sandy Silt Loam	Vegetation	None
18790166	HP05	0.30 - 0.30	Dark Brown	Sandy Loam	Stones	Vegetation
18790224	HP05	0.60 - 0.60	Dark Brown	Silt Loam	Stones	None
18790228	HP13	0.20 - 0.20	Dark Brown	Loamy Sand	Vegetation	Stones
18790235	HP15	0.50 - 0.50	Light Brown	Sand	Vegetation	Stones
18790244	HP16	0.20 - 0.20	Dark Brown	Sandy Loam	Vegetation	Stones
18790250	HP17	0.30 - 0.30	Dark Brown	Sandy Loam	Stones	Vegetation
18790257	HP18	0.30 - 0.30	Dark Brown	Sandy Loam	Vegetation	Stones
18790266	TP07	1.45 - 1.45	Dark Brown	Sandy Loam	Vegetation	Stones
18790103	TP08	0.50 - 0.50	Dark Brown	Sand	Vegetation	Stones
18790109	TP09	0.15 - 0.15	Dark Brown	Sandy Loam	Stones	Vegetation
18790123	TP09	0.40 - 0.40	Dark Brown	Silty Clay Loam	None	None
18790128	TP09	1.20 - 1.20	Dark Brown	Silty Clay Loam	None	None
18790135	TP10	0.30 - 0.30	Dark Brown	Sandy Loam	Glass & Stones	Vegetation
18790142	TP11	0.30 - 0.30	Dark Brown	Silt Loam	Stones	None
18790148	TP12	0.50 - 0.50	Light Brown	Loamy Sand	Vegetation	Stones
18790154	TP14	0.50 - 0.50	Dark Brown	Silty Clay Loam	None	None
18790094	WS01	0.40 - 0.40	Dark Brown	Silt Loam	None	None
18790116	WS01	1.20 - 1.20	Dark Brown	Silty Clay Loam	None	None
18790159	WS02	0.20 - 0.20	Dark Brown	Sand	Vegetation	Stones
18790174	WS02	1.00 - 1.00	Light Brown	Sand	Vegetation	Stones
18790180	WS02	2.80 - 2.80	Light Brown	Sand	Vegetation	Stones
18790186	WS03	0.30 - 0.30	Dark Brown	Sandy Loam	Brick	Stones
18790194	WS04	0.20 - 0.20	Dark Brown	Sandy Loam	Stones	Vegetation
18790208	WS04	1.20 - 1.20	Light Brown	Loamy Sand	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	HP04	HP05	HP05	HP13	HP15	HP15
			Depth (m)	0.15 - 0.15	0.30 - 0.30	0.60 - 0.60	0.20 - 0.20	0.50 - 0.50	0.20 - 0.20
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
			Sample Time						
			Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
			SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
			Lab Sample No.(s)	18790217	18790166	18790224	18790228	18790235	18790244
			AGS Reference	ES1	ES1	ES2	ES1	ES1	ES1
Moisture Content Ratio (% of as received sample)	%	PM024		16	5.9	15	15	14	16
EPH Surrogate % recovery**	%	TM061		82.3 M		83.6 M	76.8 M	93.5 M	
EPH Range >C10 - C40	<35 mg/kg	TM061		<35 M		597 M	54.1 M	<35 M	
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	0.0238 M
Fraction Organic Carbon (FOC)	<0.002	TM132		0.00454 #	0.0334 #	0.00561 #	0.0106 #	0.00528 #	0.0205 #
pH	1 pH Units	TM133		7.08 M	8.45 M	7.64 M	7.15 M	7.58 M	8.1 M
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #
Cyanide, Easily liberatable (low level)	<0.5 mg/kg	TM153		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium, Trivalent	<0.9 mg/kg	TM181		16.6	4.12	14.9	16.6	13.2	18
Arsenic	<0.6 mg/kg	TM181		10.5 M	5.42 M	11 M	10.8 M	7.99 M	11.6 M
Beryllium	<0.01 mg/kg	TM181		0.654 M	0.152 M	0.556 M	0.574 M	0.475 M	0.788 M
Cadmium	<0.02 mg/kg	TM181		0.261 M	0.193 M	0.287 M	0.45 M	0.322 M	0.438 M
Chromium	<0.9 mg/kg	TM181		16.6 M	4.12 M	14.9 M	16.6 M	13.2 M	18 M
Copper	<1.4 mg/kg	TM181		12.1 M	11.6 M	11.9 M	17.9 M	11.5 M	24.1 M
Lead	<0.7 mg/kg	TM181		16.8 M	28.6 M	23.1 M	149 M	18.2 M	273 M
Mercury	<0.14 mg/kg	TM181		<0.14 M	0.488 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M
Nickel	<0.2 mg/kg	TM181		19.8 M	5.15 M	17.2 M	17.5 M	14.9 M	17.5 M
Selenium	<1 mg/kg	TM181		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Vanadium	<0.2 mg/kg	TM181		33.5 #	12.4 #	31 #	30 #	26.6 #	33 #
Zinc	<1.9 mg/kg	TM181		49.3 M	39 M	47.1 M	124 M	49.9 M	140 M
Boron, water soluble	<1 mg/kg	TM222		<1 M	<1 M	<1 M	<1 M	<1 M	<1 M
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243			0.0254 M				0.0082 M

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	HP17	HP18	TP07	TP08	TP09	TP09
			Depth (m)	0.30 - 0.30	0.30 - 0.30	1.45 - 1.45	0.50 - 0.50	0.15 - 0.15	0.40 - 0.40
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
			Sample Time						
			Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
			SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
			Lab Sample No.(s)	18790250	18790257	18790266	18790103	18790109	18790123
			AGS Reference	ES1	ES1	ES1	ES1	ES1	ES2
Moisture Content Ratio (% of as received sample)	%	PM024		16	15	19	12	6.7	17
EPH Surrogate % recovery**	%	TM061		79.2 M			79.3 M	81.7 M	
EPH Range >C10 - C40	<35 mg/kg	TM061		94.9 M			1230 M	37.9 M	
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M	0.0861 M	<0.01 M	<0.01 M	
Fraction Organic Carbon (FOC)	<0.002	TM132		0.0131 #	0.013 #	0.0391 #	0.0161 #	0.0108 #	
pH	1 pH Units	TM133		8.1 M	8.02 M	7.6 M	8.14 M	8.01 M	
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #	
Cyanide, Easily liberatable (low level)	<0.5 mg/kg	TM153		<0.5	<0.5	<0.5	<0.5	<0.5	
Chromium, Trivalent	<0.9 mg/kg	TM181		16.6	17.8	37.5	29.7	4.4	
Arsenic	<0.6 mg/kg	TM181		10.8 M	9.88 M	7.6 M	9.08 M	8.51 M	
Beryllium	<0.01 mg/kg	TM181		0.593 M	0.478 M	0.398 M	0.593 M	0.147 M	
Cadmium	<0.02 mg/kg	TM181		0.613 M	0.434 M	0.419 M	0.279 M	0.0434 M	
Chromium	<0.9 mg/kg	TM181		16.6 M	17.8 M	37.5 M	29.7 M	4.4 M	
Copper	<1.4 mg/kg	TM181		22.7 M	22.3 M	133 M	14.5 M	3.54 M	
Lead	<0.7 mg/kg	TM181		259 M	372 M	43.9 M	76.5 M	30.5 M	
Mercury	<0.14 mg/kg	TM181		<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M	
Nickel	<0.2 mg/kg	TM181		18.4 M	15.3 M	18.2 M	15.7 M	6 M	
Selenium	<1 mg/kg	TM181		<1 #	<1 #	<1 #	<1 #	<1 #	
Vanadium	<0.2 mg/kg	TM181		31.9 #	26 #	23.6 #	31.8 #	11.4 #	
Zinc	<1.9 mg/kg	TM181		134 M	239 M	420 M	81.9 M	26.1 M	
Boron, water soluble	<1 mg/kg	TM222		<1 M	<1 M	1.46 M	1.41 M	<1 M	
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243			<0.004 M	0.101 M			
Asbestos Quantification - Gravimetric - %	<0.001 %	TM304					0.0443 #		
Asbestos Quantification - PCOM Evaluation - %	<0.001 %	TM304					0.0012 #		
Additional Asbestos Components (Using TM048)		TM304					None #		
Analysts Comments		TM304					Asbestos Insulation B		
Asbestos Quantification - Total - %	<0.001 %	TM304					0.0455 #		

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Testing Symbols	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	TP09	TP10	TP11	TP12	TP14	WS01
			Depth (m)	1.20 - 1.20	0.30 - 0.30	0.30 - 0.30	0.50 - 0.50	0.50 - 0.50	0.40 - 0.40
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
			Sample Time						
			Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
			SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
			Lab Sample No.(s)	18790128	18790135	18790142	18790148	18790154	18790094
			AGS Reference	ES3	ES1	ES1	ES1	ES1	ES1
Moisture Content Ratio (% of as received sample)	%	PM024		12	20	16	15	15	16
EPH Surrogate % recovery**	%	TM061		81.9 M	72.3 M	81.7 M	80.6 M	89.3 M	
EPH Range >C10 - C40	<35 mg/kg	TM061		<35 M	112 M	<35 M	<35 M	<35 M	
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	0.0125 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Fraction Organic Carbon (FOC)	<0.002	TM132		<0.002 #	0.0179 #	0.00387 #	<0.002 #	<0.002 #	0.00369 #
pH	1 pH Units	TM133		8.11 M	7.69 M	8.17 M	8.29 M	8.22 M	8.44 M
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #
Cyanide, Easily liberatable (low level)	<0.5 mg/kg	TM153		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium, Trivalent	<0.9 mg/kg	TM181		21.5	14.5	17.2	24.2	16.8	19.8
Arsenic	<0.6 mg/kg	TM181		11.2 M	9.29 M	8.76 M	13.1 M	10.3 M	10.3 M
Beryllium	<0.01 mg/kg	TM181		0.81 M	0.525 M	0.586 M	0.986 M	0.75 M	0.714 M
Cadmium	<0.02 mg/kg	TM181		0.172 M	0.362 M	0.199 M	0.213 M	0.183 M	0.169 M
Chromium	<0.9 mg/kg	TM181		21.5 M	14.5 M	17.2 M	24.2 M	16.8 M	19.8 M
Copper	<1.4 mg/kg	TM181		8.8 M	24.4 M	11.1 M	17 M	12.7 M	13.1 M
Lead	<0.7 mg/kg	TM181		14.7 M	103 M	17.6 M	17.1 M	12.4 M	19.3 M
Mercury	<0.14 mg/kg	TM181		<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M
Nickel	<0.2 mg/kg	TM181		21.9 M	15.3 M	16.6 M	31 M	26.2 M	21.9 M
Selenium	<1 mg/kg	TM181		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Vanadium	<0.2 mg/kg	TM181		51.1 #	27.9 #	31.9 #	46 #	38.3 #	37.2 #
Zinc	<1.9 mg/kg	TM181		45.1 M	73.2 M	49.3 M	57.9 M	44.6 M	53.9 M
Boron, water soluble	<1 mg/kg	TM222		<1 M	<1 M	<1 M	<1 M	<1 M	<1 M
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243							0.0871 M
Asbestos Quantification - Gravimetric - %	<0.001 %	TM304			<0.001 #				
Asbestos Quantification - PCOM Evaluation - %	<0.001 %	TM304			<0.001 #				
Additional Asbestos Components (Using TM048)		TM304			None #				
Analysts Comments		TM304			N/C				
Asbestos Quantification - Total - %	<0.001 %	TM304			<0.001 #				

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS01	WS02	WS02	WS02	WS03	WS04
			Depth (m)	1.20 - 1.20	0.20 - 0.20	1.00 - 1.00	2.80 - 2.80	0.30 - 0.30	0.20 - 0.20
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
			Sample Time						
			Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
			SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
			Lab Sample No.(s)	18790116	18790159	18790174	18790180	18790186	18790194
			AGS Reference	ES2	ES1	ES2	ES3	ES1	ES1
Moisture Content Ratio (% of as received sample)	%	PM024		16	8.7	16	14	6.9	14
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Fraction Organic Carbon (FOC)	<0.002	TM132		0.00226 #	0.00974 #	0.00332 #	<0.002 #	0.00672 #	0.0147 #
pH	1 pH Units	TM133		8.07 M	8.66 M	7.49 M	7.91 M	9.03 M	7 M
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #
Cyanide, Easily liberatable (low level)	<0.5 mg/kg	TM153		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium, Trivalent	<0.9 mg/kg	TM181		22	11.9	22.4	15	6.97	25.3
Arsenic	<0.6 mg/kg	TM181		12.3 M	4.39 M	11.9 M	8.52 M	3.71 M	13 M
Beryllium	<0.01 mg/kg	TM181		0.935 M	0.51 M	0.889 M	0.695 M	0.207 M	0.536 M
Cadmium	<0.02 mg/kg	TM181		0.216 M	0.281 M	0.202 M	0.147 M	0.287 M	0.502 M
Chromium	<0.9 mg/kg	TM181		22 M	11.9 M	22.4 M	15 M	6.97 M	25.3 M
Copper	<1.4 mg/kg	TM181		17.3 M	8.12 M	14.5 M	6.6 M	5.61 M	20.8 M
Lead	<0.7 mg/kg	TM181		19.3 M	37.9 M	16.7 M	12.9 M	30.4 M	118 M
Mercury	<0.14 mg/kg	TM181		<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M
Nickel	<0.2 mg/kg	TM181		26.6 M	9.21 M	24.6 M	19 M	4.17 M	23 M
Selenium	<1 mg/kg	TM181		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Vanadium	<0.2 mg/kg	TM181		42.3 #	59.7 #	42.5 #	31.9 #	8.97 #	33.7 #
Zinc	<1.9 mg/kg	TM181		65.8 M	40.9 M	57.8 M	36.1 M	50.5 M	121 M
Boron, water soluble	<1 mg/kg	TM222		<1 M	<1 M	<1 M	<1 M	<1 M	<1 M
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243		0.0532 M	0.0333 M	0.0631 M	0.0243 M	0.0197 M	0.0683 M

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS04
			Depth (m)	1.20 - 1.20
			Sample Type	Soil/Solid (S)
			Date Sampled	14/11/2018
			Sample Time	
			Date Received	21/11/2018
			SDG Ref	181121-121
			Lab Sample No.(s)	18790208
			AGS Reference	ES2
Moisture Content Ratio (% of as received sample)	%	PM024		16
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M
Fraction Organic Carbon (FOC)	<0.002	TM132		0.00335 #
pH	1 pH Units	TM133		7.39 M
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #
Cyanide, Easily liberatable (low level)	<0.5 mg/kg	TM153		<0.5
Chromium, Trivalent	<0.9 mg/kg	TM181		21.3
Arsenic	<0.6 mg/kg	TM181		11.6 M
Beryllium	<0.01 mg/kg	TM181		0.86 M
Cadmium	<0.02 mg/kg	TM181		0.231 M
Chromium	<0.9 mg/kg	TM181		21.3 M
Copper	<1.4 mg/kg	TM181		15.7 M
Lead	<0.7 mg/kg	TM181		21 M
Mercury	<0.14 mg/kg	TM181		<0.14 M
Nickel	<0.2 mg/kg	TM181		23.5 M
Selenium	<1 mg/kg	TM181		<1 #
Vanadium	<0.2 mg/kg	TM181		40.5 #
Zinc	<1.9 mg/kg	TM181		54.3 M
Boron, water soluble	<1 mg/kg	TM222		<1 M
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243		0.0222 M

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

GRO by GC-FID (S)

Results Legend		Customer Sample Ref.	HP04	HP05	HP13	HP15	HP17	TP08
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.	Depth (m)	0.15 - 0.15	0.60 - 0.60	0.20 - 0.20	0.50 - 0.50	0.30 - 0.30	0.50 - 0.50
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
*	Subcontracted test.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sample Time						
		Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790217	18790224	18790228	18790235	18790250	18790103
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES2	ES1	ES1	ES1	ES1

Component	LOD/Units	Method						
GRO TOT (Moisture Corrected)	<0.1 mg/kg	TM089	<0.1 #	<0.1 #	<0.1 #	<0.1 M	<0.1 M	<0.1 M

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

GRO by GC-FID (S)

Results Legend		Customer Sample Ref.	TP09	TP09	TP10	TP11	TP12	TP14
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.	Depth (m)	0.15 - 0.15	1.20 - 1.20	0.30 - 0.30	0.30 - 0.30	0.50 - 0.50	0.50 - 0.50
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
tot.unfilt	Total / unfiltered sample.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
*	Subcontracted test.	Sample Time						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790109	18790128	18790135	18790142	18790148	18790154
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES3	ES1	ES1	ES1	ES1

Component	LOD/Units	Method						
GRO TOT (Moisture Corrected)	<0.1 mg/kg	TM089	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 #	<0.1 M

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

OC, OP Pesticides and Triazine Herb

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	HP05	HP16	WS04			
			Depth (m)	0.30 - 0.30	0.20 - 0.20	1.20 - 1.20			
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)			
			Date Sampled	14/11/2018	14/11/2018	14/11/2018			
			Sample Time						
			Date Received	21/11/2018	21/11/2018	21/11/2018			
			SDG Ref	181121-121	181121-121	181121-121			
			Lab Sample No.(s)	18790166	18790244	18790208			
			AGS Reference	ES1	ES1	ES2			
Dichlorvos	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Mevinphos	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
alpha-Hexachlorocyclohexane (HCH)	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Diazinon	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
gamma-Hexachlorocyclohexane (HCH / Lindane)	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Heptachlor	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Aldrin	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
beta-Hexachlorocyclohexane (HCH)	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Methyl parathion	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
delta-Hexachlorocyclohexane (HCH)	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Malathion	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Fenitrothion	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Heptachlor epoxide	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Parathion	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Endosulphan I	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
p,p-DDE	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Dieldrin	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
o,p'-DDD (TDE)	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Endrin	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
p,p-TDE (DDD)	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Ethion	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Endosulphan II	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
p,p-DDT	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
o,p-Methoxychlor	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
p,p-Methoxychlor	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Endosulphan sulphate	<0.05 mg/kg	TM073		<2	<0.5	<0.05			
Azinphos-methyl	<0.05 mg/kg	TM073		<2	<0.5	<0.05			

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

PAH by GCMS

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	HP04	HP05	HP05	HP13	HP15	HP15
			Depth (m)	0.15 - 0.15	0.30 - 0.30	0.60 - 0.60	0.20 - 0.20	0.50 - 0.50	0.20 - 0.20
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
			Sample Time						
			Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
			SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
			Lab Sample No.(s)	18790217	18790166	18790224	18790228	18790235	18790244
			AGS Reference	ES1	ES1	ES2	ES1	ES1	ES1
Naphthalene-d8 % recovery**	%	TM218		88.9	87.7	84.9	85.4	86.2	86.3
Acenaphthene-d10 % recovery**	%	TM218		88.9	89.2	85	85.4	86.2	87.3
Phenanthrene-d10 % recovery**	%	TM218		89.5	87.1	86.7	86.5	86.6	88.5
Chrysene-d12 % recovery**	%	TM218		86.5	83.9	96.5	84.7	84.4	91.1
Perylene-d12 % recovery**	%	TM218		78.4	87.1	95.4	82.2	78.1	86.1
Naphthalene	<0.009 mg/kg	TM218		<0.009 M	<0.09 M	0.673 M	<0.009 M	<0.009 M	<0.009 M
Acenaphthylene	<0.012 mg/kg	TM218		<0.012 M	<0.12 M	<0.06 M	0.0376 M	<0.012 M	0.036 M
Acenaphthene	<0.008 mg/kg	TM218		<0.008 M	<0.08 M	0.965 M	<0.008 M	<0.008 M	0.0171 M
Fluorene	<0.01 mg/kg	TM218		<0.01 M	<0.1 M	0.801 M	<0.01 M	<0.01 M	0.0162 M
Phenanthrene	<0.015 mg/kg	TM218		<0.015 M	<0.15 M	6.7 M	0.0596 M	<0.015 M	0.258 M
Anthracene	<0.016 mg/kg	TM218		<0.016 M	<0.16 M	1.06 M	0.0203 M	<0.016 M	0.0719 M
Fluoranthene	<0.017 mg/kg	TM218		<0.017 M	<0.17 M	5.99 M	0.265 M	<0.017 M	0.966 M
Pyrene	<0.015 mg/kg	TM218		<0.015 M	<0.15 M	4.65 M	0.232 M	<0.015 M	0.884 M
Benz(a)anthracene	<0.014 mg/kg	TM218		<0.014 M	<0.14 M	2.39 M	0.198 M	<0.014 M	0.555 M
Chrysene	<0.01 mg/kg	TM218		<0.01 M	<0.1 M	2.2 M	0.229 M	<0.01 M	0.569 M
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		<0.015 M	<0.15 M	2.83 M	0.443 M	<0.015 M	0.997 M
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		<0.014 M	<0.14 M	0.915 M	0.158 M	<0.014 M	0.352 M
Benzo(a)pyrene	<0.015 mg/kg	TM218		<0.015 M	<0.15 M	2.1 M	0.301 M	<0.015 M	0.677 M
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		<0.018 M	<0.18 M	1.56 M	0.253 M	<0.018 M	0.708 M
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		<0.023 M	<0.23 M	0.316 M	0.0567 M	<0.023 M	0.115 M
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		<0.024 M	<0.24 M	1.23 M	0.257 M	<0.024 M	0.588 M
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		<0.118	<1.18	34.4	2.51	<0.118	6.81

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

PAH by GCMS

Testing Symbols	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	HP17	HP18	TP07	TP08	TP09	TP09
			Depth (m)	0.30 - 0.30	0.30 - 0.30	1.45 - 1.45	0.50 - 0.50	0.15 - 0.15	1.20 - 1.20
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
			Sample Time						
			Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
			SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
			Lab Sample No.(s)	18790250	18790257	18790266	18790103	18790109	18790128
			AGS Reference	ES1	ES1	ES1	ES1	ES1	ES3
Naphthalene-d8 % recovery**	%	TM218		87.8	87.3	83.6	85.1	85.4	86.4
Acenaphthene-d10 % recovery**	%	TM218		87.6	86.8	85.1	105	83.9	86.1
Phenanthrene-d10 % recovery**	%	TM218		89.1	87.6	82.8	84.4	85.6	87.3
Chrysene-d12 % recovery**	%	TM218		91.7	86.6	79.6	77.6	83.1	86.3
Perylene-d12 % recovery**	%	TM218		91.7	79.3	76.7	73.8	81.2	83.6
Naphthalene	<0.009 mg/kg	TM218		0.0189 M	<0.009 M	<0.045 M	<0.09 M	<0.009 M	<0.009 M
Acenaphthylene	<0.012 mg/kg	TM218		<0.012 M	0.0203 M	<0.06 M	<0.12 M	<0.012 M	<0.012 M
Acenaphthene	<0.008 mg/kg	TM218		0.147 M	0.0228 M	<0.04 M	<0.08 M	<0.008 M	<0.008 M
Fluorene	<0.01 mg/kg	TM218		0.152 M	0.0216 M	<0.05 M	<0.1 M	<0.01 M	<0.01 M
Phenanthrene	<0.015 mg/kg	TM218		1.81 M	0.526 M	0.172 M	<0.15 M	<0.015 M	<0.015 M
Anthracene	<0.016 mg/kg	TM218		0.503 M	0.13 M	<0.08 M	<0.16 M	<0.016 M	<0.016 M
Fluoranthene	<0.017 mg/kg	TM218		3.28 M	1.81 M	0.335 M	<0.17 M	0.0739 M	<0.017 M
Pyrene	<0.015 mg/kg	TM218		2.35 M	1.58 M	0.325 M	<0.15 M	0.0734 M	<0.015 M
Benz(a)anthracene	<0.014 mg/kg	TM218		1.58 M	0.82 M	0.142 M	<0.14 M	0.0539 M	<0.014 M
Chrysene	<0.01 mg/kg	TM218		1.65 M	0.708 M	0.139 M	<0.1 M	0.0687 M	<0.01 M
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		2.21 M	0.905 M	0.201 M	<0.15 M	0.141 M	<0.015 M
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		0.76 M	0.323 M	0.0909 M	<0.14 M	0.0526 M	<0.014 M
Benzo(a)pyrene	<0.015 mg/kg	TM218		1.51 M	0.836 M	0.179 M	<0.15 M	0.0951 M	<0.015 M
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		1.38 M	0.476 M	0.119 M	<0.18 M	0.108 M	<0.018 M
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		0.265 M	0.118 M	<0.115 M	<0.23 M	<0.023 M	<0.023 M
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		1.07 M	0.69 M	0.168 M	<0.24 M	0.0888 M	<0.024 M
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		18.7	8.98	1.87	<1.18	0.756	<0.118

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

PAH by GCMS

Results Legend		Customer Sample Ref.	TP10	TP11	TP12	TP14	WS01	WS01
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.	Depth (m)	0.30 - 0.30	0.30 - 0.30	0.50 - 0.50	0.50 - 0.50	0.40 - 0.40	1.20 - 1.20
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
*	Subcontracted test.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sample Time						
		Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790135	18790142	18790148	18790154	18790094	18790116
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES1	ES1	ES1	ES1	ES2

Component	LOD/Units	Method						
Naphthalene-d8 % recovery**	%	TM218	83.7	86	84.9	85.3	91.3	89.2
Acenaphthene-d10 % recovery**	%	TM218	85	85.2	84.3	86.1	91.1	87.9
Phenanthrene-d10 % recovery**	%	TM218	86.4	86.6	86.1	87.6	88	85.6
Chrysene-d12 % recovery**	%	TM218	86.7	84	85.4	85.5	83.4	81.5
Perylene-d12 % recovery**	%	TM218	86.5	83.1	84.7	86.3	81.5	80
Naphthalene	<0.009 mg/kg	TM218	<0.009 M	<0.009 M	<0.009 M	<0.009 M	<0.009 M	<0.009 M
Acenaphthylene	<0.012 mg/kg	TM218	0.0193 M	<0.012 M	<0.012 M	<0.012 M	<0.012 M	<0.012 M
Acenaphthene	<0.008 mg/kg	TM218	0.0124 M	<0.008 M	<0.008 M	<0.008 M	<0.008 M	<0.008 M
Fluorene	<0.01 mg/kg	TM218	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Phenanthrene	<0.015 mg/kg	TM218	0.199 M	<0.015 M	<0.015 M	<0.015 M	<0.015 M	<0.015 M
Anthracene	<0.016 mg/kg	TM218	0.0729 M	<0.016 M	<0.016 M	<0.016 M	<0.016 M	<0.016 M
Fluoranthene	<0.017 mg/kg	TM218	1.09 M	<0.017 M	<0.017 M	<0.017 M	0.0349 M	<0.017 M
Pyrene	<0.015 mg/kg	TM218	0.959 M	<0.015 M	<0.015 M	<0.015 M	0.0294 M	<0.015 M
Benz(a)anthracene	<0.014 mg/kg	TM218	0.7 M	<0.014 M	<0.014 M	<0.014 M	0.0182 M	<0.014 M
Chrysene	<0.01 mg/kg	TM218	0.715 M	<0.01 M	<0.01 M	<0.01 M	0.0158 M	<0.01 M
Benzo(b)fluoranthene	<0.015 mg/kg	TM218	1.29 M	<0.015 M	<0.015 M	<0.015 M	0.02 M	<0.015 M
Benzo(k)fluoranthene	<0.014 mg/kg	TM218	0.473 M	<0.014 M	<0.014 M	<0.014 M	<0.014 M	<0.014 M
Benzo(a)pyrene	<0.015 mg/kg	TM218	0.867 M	<0.015 M	<0.015 M	<0.015 M	<0.015 M	<0.015 M
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218	0.921 M	<0.018 M	<0.018 M	<0.018 M	<0.018 M	<0.018 M
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218	0.155 M	<0.023 M	<0.023 M	<0.023 M	<0.023 M	<0.023 M
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218	0.785 M	<0.024 M	<0.024 M	<0.024 M	<0.024 M	<0.024 M
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218	8.26	<0.118	<0.118	<0.118	0.118	<0.118

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

PAH by GCMS

Testing Site		Customer Sample Ref.	WS02	WS02	WS02	WS03	WS04	WS04
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.	Depth (m)	0.20 - 0.20	1.00 - 1.00	2.80 - 2.80	0.30 - 0.30	0.20 - 0.20	1.20 - 1.20
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
*	Subcontracted test.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sample Time						
		Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790159	18790174	18790180	18790186	18790194	18790208
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES2	ES3	ES1	ES1	ES2

Component	LOD/Units	Method						
Naphthalene-d8 % recovery**	%	TM218	85.8	87.9	90.3	86	91.1	84.2
Acenaphthene-d10 % recovery**	%	TM218	80.2	87.2	88.9	79.2	88.7	96.5
Phenanthrene-d10 % recovery**	%	TM218	79.5	84.4	86.1	83.5	88.2	89
Chrysene-d12 % recovery**	%	TM218	79.4	79.5	89.1	75.5	86.7	94.2
Perylene-d12 % recovery**	%	TM218	74.3	72.6	87.8	77.1	84.5	85.2
Naphthalene	<0.009 mg/kg	TM218	<0.045 M	<0.009 M	<0.009 M	<0.09 M	<0.009 M	<0.09 M
Acenaphthylene	<0.012 mg/kg	TM218	<0.06 M	<0.012 M	<0.012 M	<0.12 M	<0.012 M	<0.12 M
Acenaphthene	<0.008 mg/kg	TM218	<0.04 M	<0.008 M	<0.008 M	<0.08 M	<0.008 M	<0.08 M
Fluorene	<0.01 mg/kg	TM218	<0.05 M	<0.01 M	<0.01 M	<0.1 M	<0.01 M	<0.1 M
Phenanthrene	<0.015 mg/kg	TM218	0.196 M	<0.015 M	<0.015 M	<0.15 M	0.0618 M	<0.15 M
Anthracene	<0.016 mg/kg	TM218	<0.08 M	<0.016 M	<0.016 M	<0.16 M	<0.016 M	<0.16 M
Fluoranthene	<0.017 mg/kg	TM218	0.831 M	<0.017 M	<0.017 M	<0.17 M	0.318 M	<0.17 M
Pyrene	<0.015 mg/kg	TM218	0.699 M	<0.015 M	<0.015 M	<0.15 M	0.283 M	<0.15 M
Benz(a)anthracene	<0.014 mg/kg	TM218	0.471 M	<0.014 M	<0.014 M	<0.14 M	0.169 M	<0.14 M
Chrysene	<0.01 mg/kg	TM218	0.417 M	<0.01 M	<0.01 M	<0.1 M	0.168 M	<0.1 M
Benzo(b)fluoranthene	<0.015 mg/kg	TM218	0.53 M	<0.015 M	<0.015 M	<0.15 M	0.236 M	<0.15 M
Benzo(k)fluoranthene	<0.014 mg/kg	TM218	0.251 M	<0.014 M	<0.014 M	<0.14 M	0.0944 M	<0.14 M
Benzo(a)pyrene	<0.015 mg/kg	TM218	0.577 M	<0.015 M	<0.015 M	<0.15 M	0.21 M	<0.15 M
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218	0.392 M	<0.018 M	<0.018 M	<0.18 M	0.141 M	<0.18 M
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218	<0.115 M	<0.023 M	<0.023 M	<0.23 M	0.031 M	<0.23 M
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218	0.489 M	<0.024 M	<0.024 M	<0.24 M	0.185 M	<0.24 M
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218	4.85	<0.118	<0.118	<1.18	1.9	<1.18

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

TPH CWG (S)

Results Legend		Customer Sample Ref.	HP05	HP16	HP18	TP07	WS01	WS01
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.	Depth (m)	0.30 - 0.30	0.20 - 0.20	0.30 - 0.30	1.45 - 1.45	0.40 - 0.40	1.20 - 1.20
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
tot.unfilt	Total / unfiltered sample.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
*	Subcontracted test.	Sample Time						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790166	18790244	18790257	18790266	18790094	18790116
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES1	ES1	ES1	ES1	ES2

Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	108	106	100	117	118	105
GRO TOT (Moisture Corrected)	<0.1 mg/kg	TM089	<0.1 M	<0.1 M	<0.1 M	19.2 M	<0.1 M	<0.1 M
Aliphatics >C5-C6	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	0.0209	<0.01	<0.01
Aliphatics >C6-C8	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	1.51	<0.01	<0.01
Aliphatics >C8-C10	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	2.06	<0.01	<0.01
Aliphatics >C10-C12	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	8.52	<0.01	<0.01
Aliphatics >C12-C16	<0.1 mg/kg	TM173	3.94	<0.1	<0.1	232	0.443	<0.1
Aliphatics >C16-C21	<0.1 mg/kg	TM173	21.7	<0.1	1.12	694	5.1	0.883
Aliphatics >C21-C35	<0.1 mg/kg	TM173	230	5.22	11.6	2020	3.04	0.334
Aliphatics >C35-C44	<0.1 mg/kg	TM173	229	0.978	4.38	493	<0.1	<0.1
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173	485	6.2	17.1	3440	8.58	1.22
Aromatics >EC5-EC7	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC7-EC8	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	1.38	<0.01	<0.01
Aromatics >EC10-EC12	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	5.68	<0.01	<0.01
Aromatics >EC12-EC16	<0.1 mg/kg	TM173	<0.1	0.226	0.55	60.5	0.149	<0.1
Aromatics >EC16-EC21	<0.1 mg/kg	TM173	35.4	5.3	6.38	202	1.3	<0.1
Aromatics >EC21-EC35	<0.1 mg/kg	TM173	523	28.1	40.3	729	1.21	<0.1
Aromatics >EC35-EC44	<0.1 mg/kg	TM173	580	13.4	19.9	341	2.3	<0.1
Aromatics >EC40-EC44	<0.1 mg/kg	TM173	280	5.13	7.53	144	1.4	<0.1
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173	1140	47	67.2	1330	4.96	<0.1
Total Aliphatics & Aromatics >C5-C44	<0.1 mg/kg	TM173	1620	53.2	84.2	4790	13.5	1.22

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

TPH CWG (S)

Results Legend		Customer Sample Ref.	WS02	WS02	WS02	WS03	WS04	WS04
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.	Depth (m)	0.20 - 0.20	1.00 - 1.00	2.80 - 2.80	0.30 - 0.30	0.20 - 0.20	1.20 - 1.20
diss.filt	Dissolved / filtered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
tot.unfilt	Total / unfiltered sample.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
*	Subcontracted test.	Sample Time						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790159	18790174	18790180	18790186	18790194	18790208
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES2	ES3	ES1	ES1	ES2

Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	95.4	102	109	97.2	153	129
GRO TOT (Moisture Corrected)	<0.1 mg/kg	TM089	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 #	<0.1 M
Aliphatics >C5-C6	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	<0.1 mg/kg	TM173	1.34	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C16-C21	<0.1 mg/kg	TM173	7.39	<0.1	<0.1	2.46	<0.1	<0.1
Aliphatics >C21-C35	<0.1 mg/kg	TM173	64.4	<0.1	<0.1	29.5	25	0.595
Aliphatics >C35-C44	<0.1 mg/kg	TM173	47.7	0.306	<0.1	12.9	3.37	<0.1
Total Aliphatics >C12-C44	<0.1 mg/kg	TM173	121	0.306	<0.1	44.8	28.4	0.595
Aromatics >EC5-EC7	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC7-EC8	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	<0.01 mg/kg	TM089	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	<0.1 mg/kg	TM173	0.872	<0.1	<0.1	0.738	<0.1	<0.1
Aromatics >EC16-EC21	<0.1 mg/kg	TM173	14.9	<0.1	<0.1	7.75	1.12	<0.1
Aromatics >EC21-EC35	<0.1 mg/kg	TM173	148	<0.1	<0.1	52.5	20	<0.1
Aromatics >EC35-EC44	<0.1 mg/kg	TM173	149	1.1	3.84	38.6	8.74	<0.1
Aromatics >EC40-EC44	<0.1 mg/kg	TM173	62.9	<0.1	2.52	15	3.58	<0.1
Total Aromatics >EC12-EC44	<0.1 mg/kg	TM173	314	1.1	3.84	99.6	29.9	<0.1
Total Aliphatics & Aromatics >C5-C44	<0.1 mg/kg	TM173	434	1.41	3.84	144	58.2	0.595

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

VOC MS (S)

Results Legend		Customer Sample Ref.	HP04	HP05	HP05	HP13	HP15	HP15
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.	Depth (m)	0.15 - 0.15	0.30 - 0.30	0.60 - 0.60	0.20 - 0.20	0.50 - 0.50	0.20 - 0.20
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
*	Subcontracted test.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sample Time						
		Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790217	18790166	18790224	18790228	18790235	18790244
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES1	ES2	ES1	ES1	ES1

Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	100	104	104	101	97.2	110
Toluene-d8**	%	TM116	99.9	95.5	97.7	96.1	93.4	96.1
4-Bromofluorobenzene**	%	TM116	103	88.8	83.7	76.6	86.4	76.1
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116	<0.01 M	<0.2 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Benzene	<0.009 mg/kg	TM116	<0.009 M	<0.18 M	<0.009 M	<0.009 M	<0.009 M	<0.009 M
Toluene	<0.007 mg/kg	TM116	<0.007 M	<0.14 M	<0.007 M	<0.007 M	<0.007 M	<0.007 M
Ethylbenzene	<0.004 mg/kg	TM116	<0.004 M	<0.08 M	<0.004 M	<0.004 M	<0.004 M	<0.004 M
p/m-Xylene	<0.01 mg/kg	TM116	<0.01 #	<0.2 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #
o-Xylene	<0.01 mg/kg	TM116	<0.01 M	<0.2 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

VOC MS (S)

Results Legend		Customer Sample Ref.	HP17	HP18	TP07	TP08	TP09	TP09
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.	Depth (m)	0.30 - 0.30	0.30 - 0.30	1.45 - 1.45	0.50 - 0.50	0.15 - 0.15	1.20 - 1.20
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
*	Subcontracted test.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sample Time						
		Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790250	18790257	18790266	18790103	18790109	18790128
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES1	ES1	ES1	ES1	ES3

Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	106	100	106	125	113	104
Toluene-d8**	%	TM116	97	99.5	93	69.2	99.1	101
4-Bromofluorobenzene**	%	TM116	78.6	91.3	78.9	72.9	95.4	97.1
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116	<0.01 M	<0.1 M	<0.2 M	<0.01 M	<0.1 M	<0.01 M
Benzene	<0.009 mg/kg	TM116	<0.009 M	<0.09 M	<0.18 M	<0.009 M	<0.09 M	<0.009 M
Toluene	<0.007 mg/kg	TM116	<0.007 M	<0.07 M	5.43 M	<0.007 M	<0.07 M	<0.007 M
Ethylbenzene	<0.004 mg/kg	TM116	<0.004 M	<0.04 M	<0.08 M	<0.004 M	<0.04 M	<0.004 M
p/m-Xylene	<0.01 mg/kg	TM116	<0.01 #	<0.1 #	<0.2 #	<0.01 #	<0.1 #	<0.01 #
o-Xylene	<0.01 mg/kg	TM116	<0.01 M	<0.1 M	<0.2 M	<0.01 M	<0.1 M	<0.01 M

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

VOC MS (S)

Results Legend		Customer Sample Ref.	TP10	TP11	TP12	TP14	WS01	WS01
#	ISO17025 accredited.							
M	*m*CERTS accredited.							
aq	Aqueous / settled sample.							
diss.filt	Dissolved / filtered sample.	Depth (m)	0.30 - 0.30	0.30 - 0.30	0.50 - 0.50	0.50 - 0.50	0.40 - 0.40	1.20 - 1.20
tot.unfilt	Total / unfiltered sample.	Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
*	Subcontracted test.	Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery	Sample Time						
		Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
		SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
(F)	Trigger breach confirmed	Lab Sample No.(s)	18790135	18790142	18790148	18790154	18790094	18790116
1-5&+§@	Sample deviation (see appendix)	AGS Reference	ES1	ES1	ES1	ES1	ES1	ES2

Component	LOD/Units	Method						
Dibromofluoromethane**	%	TM116	99.6	99.3	98.4	103	95.9	98.9
Toluene-d8**	%	TM116	92.6	96.3	97.3	98.1	97.5	97.2
4-Bromofluorobenzene**	%	TM116	83.2	97.1	103	98.8	102	103
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Benzene	<0.009 mg/kg	TM116	<0.009 M	<0.009 M	<0.009 M	<0.009 M	<0.009 M	<0.009 M
Toluene	<0.007 mg/kg	TM116	<0.007 M	<0.007 M	<0.007 M	<0.007 M	<0.007 M	<0.007 M
Ethylbenzene	<0.004 mg/kg	TM116	<0.004 M	<0.004 M	<0.004 M	<0.004 M	<0.004 M	<0.004 M
p/m-Xylene	<0.01 mg/kg	TM116	<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #
o-Xylene	<0.01 mg/kg	TM116	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

VOC MS (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	WS02	WS02	WS02	WS03	WS04	WS04
			Depth (m)	0.20 - 0.20	1.00 - 1.00	2.80 - 2.80	0.30 - 0.30	0.20 - 0.20	1.20 - 1.20
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
			Date Sampled	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018	14/11/2018
			Sample Time						
			Date Received	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018	21/11/2018
			SDG Ref	181121-121	181121-121	181121-121	181121-121	181121-121	181121-121
			Lab Sample No.(s)	18790159	18790174	18790180	18790186	18790194	18790208
			AGS Reference	ES1	ES2	ES3	ES1	ES1	ES2
Dibromofluoromethane**	%	TM116		113	105	111	104	132	99.1
Toluene-d8**	%	TM116		87	100	101	93.3	102	97.1
4-Bromofluorobenzene**	%	TM116		72.9	93	95.8	75.6	103	102
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116		<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M
Benzene	<0.009 mg/kg	TM116		<0.009 M	<0.009 M	<0.009 M	<0.009 M	<0.009 M	<0.009 M
Toluene	<0.007 mg/kg	TM116		<0.007 M	<0.007 M	<0.007 M	<0.007 M	<0.007 M	<0.007 M
Ethylbenzene	<0.004 mg/kg	TM116		<0.004 M	<0.004 M	<0.004 M	<0.004 M	<0.004 M	<0.004 M
p/m-Xylene	<0.01 mg/kg	TM116		<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #
o-Xylene	<0.01 mg/kg	TM116		<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M	<0.01 M

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Extractable Petroleum Hydrocarbons (EPH) By GC-FID

EPH (DRO) (C10-C40)

Sample No	Customer Sample Ref.	Depth	Matrix (mg/kg)	EPH	Interpretation
18792947	HP13 ES1	0.20 - 0.20	SOLID	54.1	No interpretation possible
18793013	TP12 ES1	0.50 - 0.50	SOLID	<35.0	No interpretation possible
18793055	TP08 ES1	0.50 - 0.50	SOLID	1230	Possible biodegraded diesel/heavy oil
18793089	TP14 ES1	0.50 - 0.50	SOLID	<35.0	No interpretation possible
18793370	TP10 ES1	0.30 - 0.30	SOLID	112	No interpretation possible
18794381	TP09 ES1	0.15 - 0.15	SOLID	37.9	No interpretation possible
18794457	TP09 ES3	1.20 - 1.20	SOLID	<35.0	No interpretation possible
18795423	HP15 ES1	0.50 - 0.50	SOLID	<35.0	No interpretation possible
18796805	HP17 ES1	0.30 - 0.30	SOLID	94.9	No interpretation possible
18796837	HP04 ES1	0.15 - 0.15	SOLID	<35.0	No interpretation possible
18797041	HP05 ES2	0.60 - 0.60	SOLID	597	PAHs
18797176	TP11 ES1	0.30 - 0.30	SOLID	<35.0	No interpretation possible

Extractable Petroleum Hydrocarbons (formally Diesel Range Organics) :- Any compound extractable in n-hexane within the carbon range C10-C40, includes Aliphatic (Min Oil), Aromatic (PAHs) and naturally occurring compounds.

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Asbestos Identification - Solid Samples

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	HP04 ES 1 0.15 - 0.15 SOLID 14/11/2018 00:00:00 22/11/2018 11:31:23 181121-121 18790217 TM048	26/11/2018	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	HP05 ES 1 0.30 - 0.30 SOLID 14/11/2018 00:00:00 22/11/2018 11:29:25 181121-121 18790166 TM048	26/11/2018	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	HP05 ES 2 0.60 - 0.60 SOLID 14/11/2018 00:00:00 22/11/2018 11:37:40 181121-121 18790224 TM048	26/11/2018	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	HP13 ES 1 0.20 - 0.20 SOLID 14/11/2018 00:00:00 22/11/2018 13:40:13 181121-121 18790228 TM048	26/11/2018	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	HP15 ES 1 0.50 - 0.50 SOLID 14/11/2018 00:00:00 22/11/2018 10:36:45 181121-121 18790235 TM048	26/11/2018	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	HP16 ES 1 0.20 - 0.20 SOLID 14/11/2018 00:00:00 22/11/2018 13:47:17 181121-121 18790244 TM048	26/11/2018	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

Validated

CERTIFICATE OF ANALYSIS

SDG: 181121-121 **Client Reference:** A111089 **Report Number:** 483494
Location: Windroos, Littlehampton **Order Number:** C18/640 **Superseded Report:**

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	HP17 ES 1 0.30 - 0.30 SOLID 14/11/2018 00:00:00 22/11/2018 13:21:33 181121-121 18790250 TM048	26/11/2018	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	HP18 ES 1 0.30 - 0.30 SOLID 14/11/2018 00:00:00 22/11/2018 13:48:13 181121-121 18790257 TM048	26/11/2018	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP07 ES 1 1.45 - 1.45 SOLID 14/11/2018 00:00:00 22/11/2018 08:49:36 181121-121 18790266 TM048	26/11/2018	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP08 ES 1 0.50 - 0.50 SOLID 14/11/2018 00:00:00 22/11/2018 11:45:23 181121-121 18790103 TM048	26/11/2018	Andrzej Ferfecki	soil containing material typical of asbestos cement	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP09 ES 1 0.15 - 0.15 SOLID 14/11/2018 00:00:00 22/11/2018 10:31:58 181121-121 18790109 TM048	27/11/2018	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP09 ES 3 1.20 - 1.20 SOLID 14/11/2018 00:00:00 22/11/2018 10:34:07 181121-121 18790128 TM048	26/11/2018	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

Validated

CERTIFICATE OF ANALYSIS

SDG: 181121-121 **Client Reference:** A111089 **Report Number:** 483494
Location: Windroos, Littlehampton **Order Number:** C18/640 **Superseded Report:**

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP10 ES 1 0.30 - 0.30 SOLID 14/11/2018 00:00:00 22/11/2018 09:22:17 181121-121 18790135 TM048	26/11/2018	Barbara Urbanek-Walsh	Soil containing material typical of bitumen.	Not Detected (#)	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP11 ES 1 0.30 - 0.30 SOLID 14/11/2018 00:00:00 22/11/2018 09:24:44 181121-121 18790142 TM048	26/11/2018	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP12 ES 1 0.50 - 0.50 SOLID 14/11/2018 00:00:00 22/11/2018 13:43:43 181121-121 18790148 TM048	26/11/2018	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP14 ES 1 0.50 - 0.50 SOLID 14/11/2018 00:00:00 22/11/2018 09:20:23 181121-121 18790154 TM048	26/11/2018	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS01 ES 1 0.40 - 0.40 SOLID 14/11/2018 00:00:00 22/11/2018 10:43:04 181121-121 18790094 TM048	23/11/2018	Renata Bozhkov	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS01 ES 2 1.20 - 1.20 SOLID 14/11/2018 00:00:00 22/11/2018 08:58:54 181121-121 18790116 TM048	26/11/2018	Lucy Caroe	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

Validated

CERTIFICATE OF ANALYSIS

SDG: 181121-121 **Client Reference:** A111089 **Report Number:** 483494
Location: Windroos, Littlehampton **Order Number:** C18/640 **Superseded Report:**

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS02 ES 1 0.20 - 0.20 SOLID 14/11/2018 00:00:00 22/11/2018 08:48:20 181121-121 18790159 TM048	26/11/2018	Andrzej Ferfecki	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS02 ES 2 1.00 - 1.00 SOLID 14/11/2018 00:00:00 22/11/2018 10:41:11 181121-121 18790174 TM048	26/11/2018	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS02 ES 3 2.80 - 2.80 SOLID 14/11/2018 00:00:00 22/11/2018 08:47:04 181121-121 18790180 TM048	23/11/2018	Renata Bozhkov	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS03 ES 1 0.30 - 0.30 SOLID 14/11/2018 00:00:00 22/11/2018 10:42:00 181121-121 18790186 TM048	26/11/2018	James Richards	Loose fibres in soil	Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS04 ES 1 0.20 - 0.20 SOLID 14/11/2018 00:00:00 22/11/2018 09:21:45 181121-121 18790194 TM048	26/11/2018	Barbara Urbanek-Walsh	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	WS04 ES 2 1.20 - 1.20 SOLID 14/11/2018 00:00:00 22/11/2018 09:00:54 181121-121 18790208 TM048	26/11/2018	James Richards	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Asbestos Quantification - Full

		Additional Asbestos Components (Using TM048)	Analysts Comments	Asbestos Quantification - Gravimetric - %	Asbestos Quantification - PCOM Evaluation - %	Asbestos Quantification - Total - %
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP08 ES 1 0.50 - 0.50 SOLID 14/11/2018 00:00:00 22/11/2018 11:46:50 181121-121 18790103 TM304	None (#)	Asbestos Insulation Board also discovered in sample.	0.0443 (#)	0.0012 (#)	0.0455 (#)
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Receieved SDG Original Sample Method Number	TP10 ES 1 0.30 - 0.30 SOLID 14/11/2018 00:00:00 22/11/2018 09:23:39 181121-121 18790135 TM304	None (#)	N/C	<0.001 (#)	<0.001 (#)	<0.001 (#)

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Windroos, Littlehampton
Mass Sample taken (kg)	0.107	**Natural Moisture Content (%)**	19
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	84
Particle Size <4mm	>95%		

Case	
SDG	181121-121
Lab Sample Number(s)	18790116
Sampled Date	14-Nov-2018
Customer Sample Ref.	WS01 ES2
Depth (m)	1.20 - 1.20

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Sulphate (soluble)	6	<2	60	<20	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<1	<1	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total EPH (C6-C40)	<0.1	<0.1	<1	<1	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.000591	<0.0005	0.00591	<0.005	-	-	-
Total Ammonium as NH4	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.0587	<0.0002	0.587	<0.002	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Fluoranthene (diss.filt)	0.0000293	<0.000005	0.000293	<0.00005	-	-	-
Anthracene (diss.filt)	0.00000528	<0.000005	0.0000528	<0.00005	-	-	-
Boron	0.0529	<0.01	0.529	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000272	<0.000005	0.000272	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO3	28.5	<2	285	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Pyrene (diss.filt)	0.0000201	<0.000005	0.000201	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.0000127	<0.000005	0.000127	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.00000745	<0.000005	0.0000745	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	<0.0003	<0.0003	<0.003	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000102	<0.000082	0.00102	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00116	<0.001	0.0116	<0.01	-	-	-

Leach Test Information

Date Prepared	23-Nov-2018
pH (pH Units)	7.54
Conductivity (µS/cm)	67.60
Temperature (°C)	16.20
Volume Leachant (Litres)	0.883

Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Windroos, Littlehampton
Mass Sample taken (kg)	0.107	**Natural Moisture Content (%)**	19
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	84
Particle Size <4mm	>95%		

Case	
SDG	181121-121
Lab Sample Number(s)	18790116
Sampled Date	14-Nov-2018
Customer Sample Ref.	WS01 ES2
Depth (m)	1.20 - 1.20

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
TPH CWG (W)							
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-
GRO TOT (C5-C10)	<0.01	<0.01	<0.1	<0.1	-	-	-
EPH (C6-C10)	<0.1	<0.1	<1	<1	-	-	-

Leach Test Information

Date Prepared	23-Nov-2018
pH (pH Units)	7.54
Conductivity (µS/cm)	67.60
Temperature (°C)	16.20
Volume Leachant (Litres)	0.883

Mcerts Certification does not apply to leachates

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Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Windroos, Littlehampton
Mass Sample taken (kg)	0.108	**Natural Moisture Content (%)**	20.5
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	83
Particle Size <4mm	>95%		

Case	
SDG	181121-121
Lab Sample Number(s)	18790123
Sampled Date	14-Nov-2018
Customer Sample Ref.	TP09 ES2
Depth (m)	0.40 - 0.40

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<1	<1	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total EPH (C6-C40)	<0.1	<0.1	<1	<1	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	<0.0005	<0.0005	<0.005	<0.005	-	-	-
Total Ammonium as NH4	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.0355	<0.0002	0.355	<0.002	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Fluoranthene (diss.filt)	0.0000264	<0.000005	0.000264	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0662	<0.01	0.662	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000319	<0.000005	0.000319	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO3	22	<2	220	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.00000651	<0.000005	0.0000651	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Pyrene (diss.filt)	0.000018	<0.000005	0.00018	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.0000155	<0.000005	0.000155	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.00000821	<0.000005	0.0000821	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	0.00000533	<0.000002	0.0000533	<0.00002	-	-	-
Copper	0.000759	<0.0003	0.00759	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.00035	<0.0002	0.0035	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000112	<0.000082	0.00112	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.0032	<0.001	0.032	<0.01	-	-	-

Leach Test Information

Date Prepared	23-Nov-2018
pH (pH Units)	6.51
Conductivity (µS/cm)	42.70
Temperature (°C)	14.30
Volume Leachant (Litres)	0.882

Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Windroos, Littlehampton
Mass Sample taken (kg)	0.108	**Natural Moisture Content (%)**	20.5
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	83
Particle Size <4mm	>95%		

Case	
SDG	181121-121
Lab Sample Number(s)	18790123
Sampled Date	14-Nov-2018
Customer Sample Ref.	TP09 ES2
Depth (m)	0.40 - 0.40

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
TPH CWG (W)							
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-
GRO TOT (C5-C10)	<0.01	<0.01	<0.1	<0.1	-	-	-
EPH (C6-C10)	<0.1	<0.1	<1	<1	-	-	-

Leach Test Information

Date Prepared	23-Nov-2018
pH (pH Units)	6.51
Conductivity (µS/cm)	42.70
Temperature (°C)	14.30
Volume Leachant (Litres)	0.882

Mcerts Certification does not apply to leachates

02/12/2018 15:33:08

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CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Windroos, Littlehampton
Mass Sample taken (kg)	0.099	**Natural Moisture Content (%)**	9.53
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	91.3
Particle Size <4mm	>95%		

Case	
SDG	181121-121
Lab Sample Number(s)	18790159
Sampled Date	14-Nov-2018
Customer Sample Ref.	WS02 ES1
Depth (m)	0.20 - 0.20

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
EPH (DRO) (C10-C40)	<0.1	<0.1	<1	<1	-	-	-
Naphthalene (diss.filt)	0.0000384	<0.00001	0.000384	<0.0001	-	-	-
Total EPH (C6-C40)	<0.1	<0.1	<1	<1	-	-	-
Acenaphthene (diss.filt)	0.000118	<0.000005	0.00118	<0.00005	-	-	-
Arsenic	0.00226	<0.0005	0.0226	<0.005	-	-	-
Total Ammonium as NH4	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.00986	<0.0002	0.0986	<0.002	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Fluoranthene (diss.filt)	0.000195	<0.000005	0.00195	<0.00005	-	-	-
Anthracene (diss.filt)	0.0000611	<0.000005	0.000611	<0.00005	-	-	-
Boron	0.0191	<0.01	0.191	<0.1	-	-	-
Phenanthrene (diss.filt)	0.000236	<0.000005	0.00236	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO3	33.5	<2	335	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	0.0000675	<0.000005	0.000675	<0.00005	-	-	-
Chrysene (diss.filt)	0.0000216	<0.000005	0.000216	<0.00005	-	-	-
Pyrene (diss.filt)	0.000112	<0.000005	0.00112	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.0000185	<0.000005	0.000185	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.0000373	<0.000005	0.000373	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.0000175	<0.000005	0.000175	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	0.0000243	<0.000002	0.000243	<0.00002	-	-	-
Copper	0.00141	<0.0003	0.0141	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	0.00000884	<0.000005	0.0000884	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	0.000017	<0.000005	0.00017	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	0.0000206	<0.000005	0.000206	<0.00005	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000993	<0.000082	0.00993	<0.00082	-	-	-
Nickel	0.000479	<0.0004	0.00479	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	<0.001	<0.001	<0.01	<0.01	-	-	-

Leach Test Information

Date Prepared	23-Nov-2018
pH (pH Units)	8.32
Conductivity (µS/cm)	67.20
Temperature (°C)	14.70
Volume Leachant (Litres)	0.891

Mcerts Certification does not apply to leachates

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Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Windroos, Littlehampton
Mass Sample taken (kg)	0.099	**Natural Moisture Content (%)**	9.53
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	91.3
Particle Size <4mm	>95%		

Case	
SDG	181121-121
Lab Sample Number(s)	18790159
Sampled Date	14-Nov-2018
Customer Sample Ref.	WS02 ES1
Depth (m)	0.20 - 0.20

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
TPH CWG (W)							
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-
GRO TOT (C5-C10)	<0.01	<0.01	<0.1	<0.1	-	-	-
EPH (C6-C10)	<0.1	<0.1	<1	<1	-	-	-

Leach Test Information

Date Prepared	23-Nov-2018
pH (pH Units)	8.32
Conductivity (µS/cm)	67.20
Temperature (°C)	14.70
Volume Leachant (Litres)	0.891

Mcerts Certification does not apply to leachates

02/12/2018 15:33:08

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Windroos, Littlehampton
Mass Sample taken (kg)	0.107	**Natural Moisture Content (%)**	19
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	84
Particle Size <4mm	>95%		

Case	
SDG	181121-121
Lab Sample Number(s)	18790208
Sampled Date	14-Nov-2018
Customer Sample Ref.	WS04 ES2
Depth (m)	1.20 - 1.20

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	Limit of Detection	Result	Limit of Detection			
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
EPH (DRO) (C10-C40)	<0.2	<0.2	<2	<2	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total EPH (C6-C40)	<0.1	<0.1	<1	<1	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.000651	<0.0005	0.00651	<0.005	-	-	-
Total Ammonium as NH4	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.0739	<0.0002	0.739	<0.002	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Fluoranthene (diss.filt)	0.0000229	<0.000005	0.000229	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0843	<0.01	0.843	<0.1	-	-	-
Phenanthrene (diss.filt)	0.0000223	<0.000005	0.000223	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO3	13.5	<2	135	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Pyrene (diss.filt)	0.0000179	<0.000005	0.000179	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.0000149	<0.000005	0.000149	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.00000674	<0.000005	0.0000674	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	0.00000586	<0.000002	0.0000586	<0.00002	-	-	-
Copper	0.000515	<0.0003	0.00515	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.0000906	<0.000082	0.000906	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00163	<0.001	0.0163	<0.01	-	-	-

Leach Test Information

Date Prepared	23-Nov-2018
pH (pH Units)	7.43
Conductivity (µS/cm)	117.00
Temperature (°C)	13.00
Volume Leachant (Litres)	0.883

Mcerts Certification does not apply to leachates

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Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Windroos, Littlehampton
Mass Sample taken (kg)	0.107	**Natural Moisture Content (%)**	19
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	84
Particle Size <4mm	>95%		

Case	
SDG	181121-121
Lab Sample Number(s)	18790208
Sampled Date	14-Nov-2018
Customer Sample Ref.	WS04 ES2
Depth (m)	1.20 - 1.20

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
TPH CWG (W)							
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-
GRO TOT (C5-C10)	<0.01	<0.01	<0.1	<0.1	-	-	-
EPH (C6-C10)	<0.1	<0.1	<1	<1	-	-	-

Leach Test Information

Date Prepared	23-Nov-2018
pH (pH Units)	7.43
Conductivity (µS/cm)	117.00
Temperature (°C)	13.00
Volume Leachant (Litres)	0.883

Mcerts Certification does not apply to leachates

02/12/2018 15:33:08

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description
ASB_PREP		
PM001		Preparation of Samples for Metals Analysis
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM061	Method for the Determination of EPH,Massachusetts Dept.of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM073	MEWAM BOOK 60 1980,95 1985, HMSO / Modified: US EPA Method 8081A & 8141A	Determination of organochlorine and organophosphorous pesticides by GCMS
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM243		Mixed Anions In Soils By Kone
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM304	HSE Contract research Report no 83/1996	Asbestos Quantification in Soil: Fibres identified by morphology only

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	18790217	18790166	18790224	18790228	18790235	18790244	18790250	18790257	18790266	18790103
Customer Sample Ref.	HP04	HP05	HP05	HP13	HP15	HP16	HP17	HP18	TP07	TP08
AGS Ref.	ES1	ES1	ES2	ES1	ES1	ES1	ES1	ES1	ES1	ES1
Depth	0.15 - 0.15	0.30 - 0.30	0.60 - 0.60	0.20 - 0.20	0.50 - 0.50	0.20 - 0.20	0.30 - 0.30	0.30 - 0.30	1.45 - 1.45	0.50 - 0.50
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (soil)		29-Nov-2018				29-Nov-2018		29-Nov-2018	29-Nov-2018	
Asbestos ID in Solid Samples	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018
Asbestos Quantification - Full										28-Nov-2018
Boron Water Soluble	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
Chromium III	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018
Cyanide Comp/Free/Total/Thiocyanate	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018
EPH by FID	26-Nov-2018		26-Nov-2018	26-Nov-2018	26-Nov-2018		27-Nov-2018			27-Nov-2018
EPH CWG (Aliphatic) GC (S)		26-Nov-2018				27-Nov-2018		27-Nov-2018	27-Nov-2018	
EPH CWG (Aromatic) GC (S)		26-Nov-2018				27-Nov-2018		27-Nov-2018	27-Nov-2018	
GRO by GC-FID (S)	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	28-Nov-2018	28-Nov-2018	29-Nov-2018	29-Nov-2018	28-Nov-2018
Hexavalent Chromium (s)	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018
Metals in solid samples by OES	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
OC, OP Pesticides and Triazine Herb		28-Nov-2018				28-Nov-2018				
PAH by GCMS	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	27-Nov-2018	26-Nov-2018
pH	26-Nov-2018	26-Nov-2018	26-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	26-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018
Phenols by HPLC (S)	27-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018
Sample description	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018
Total Organic Carbon	28-Nov-2018	26-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
TPH CWG GC (S)		29-Nov-2018				28-Nov-2018		29-Nov-2018	29-Nov-2018	
VOC MS (S)	28-Nov-2018	29-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	29-Nov-2018	28-Nov-2018

Lab Sample No(s)	18790109	18790123	18790128	18790135	18790142	18790148	18790154	18790094	18790116	18790159
Customer Sample Ref.	TP09	TP09	TP09	TP10	TP11	TP12	TP14	WS01	WS01	WS02
AGS Ref.	ES1	ES2	ES3	ES1	ES1	ES1	ES1	ES1	ES2	ES1
Depth	0.15 - 0.15	0.40 - 0.40	1.20 - 1.20	0.30 - 0.30	0.30 - 0.30	0.50 - 0.50	0.50 - 0.50	0.40 - 0.40	1.20 - 1.20	0.20 - 0.20
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO3		27-Nov-2018							28-Nov-2018	28-Nov-2018
Ammoniacal Nitrogen		26-Nov-2018							27-Nov-2018	27-Nov-2018
Anions by Kone (soil)								27-Nov-2018	29-Nov-2018	29-Nov-2018
Anions by Kone (w)		02-Dec-2018							02-Dec-2018	02-Dec-2018
Asbestos ID in Solid Samples	27-Nov-2018		26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	23-Nov-2018	26-Nov-2018	26-Nov-2018
Asbestos Quantification - Full				28-Nov-2018						
Boron Water Soluble	28-Nov-2018		28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
CEN 10:1 Leachate (1 Stage)		23-Nov-2018							23-Nov-2018	23-Nov-2018
CEN Readings		24-Nov-2018							24-Nov-2018	24-Nov-2018
Chromium III	29-Nov-2018		29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018
Cyanide Comp/Free/Total/Thiocyanate	27-Nov-2018		27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018
Dissolved Metals by ICP-MS		27-Nov-2018							27-Nov-2018	27-Nov-2018
EPH (DRO) (C10-C40) Aqueous (W)		26-Nov-2018							26-Nov-2018	26-Nov-2018
EPH by FID	27-Nov-2018		26-Nov-2018	26-Nov-2018	26-Nov-2018	27-Nov-2018	26-Nov-2018			
EPH CWG (Aliphatic) GC (S)								27-Nov-2018	27-Nov-2018	27-Nov-2018
EPH CWG (Aromatic) GC (S)								27-Nov-2018	27-Nov-2018	27-Nov-2018
GRO by GC-FID (S)	28-Nov-2018		29-Nov-2018	28-Nov-2018	29-Nov-2018	29-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
GRO by GC-FID (W)		27-Nov-2018							27-Nov-2018	27-Nov-2018
Hexavalent Chromium (s)	29-Nov-2018		29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018
Mercury Dissolved		28-Nov-2018							28-Nov-2018	28-Nov-2018
Metals in solid samples by OES	28-Nov-2018		28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
PAH by GCMS	26-Nov-2018		26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018
PAH in waters by GC-MS (diss.filt)		27-Nov-2018							27-Nov-2018	27-Nov-2018
pH	27-Nov-2018		27-Nov-2018	27-Nov-2018	27-Nov-2018	26-Nov-2018	27-Nov-2018	27-Nov-2018	26-Nov-2018	27-Nov-2018
pH Value of Filtered Water		27-Nov-2018							27-Nov-2018	27-Nov-2018
Phenols by HPLC (S)	26-Nov-2018		26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018
Phenols by HPLC (W)		27-Nov-2018							27-Nov-2018	27-Nov-2018
Sample description	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018
Total EPH (aq)		27-Nov-2018							27-Nov-2018	27-Nov-2018
Total Organic Carbon	26-Nov-2018		27-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	26-Nov-2018	27-Nov-2018
TPH CWG GC (S)								28-Nov-2018	28-Nov-2018	28-Nov-2018
VOC MS (S)	28-Nov-2018		28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Lab Sample No(s)	18790174	18790180	18790186	18790194	18790208
Customer Sample Ref.	WS02	WS02	WS03	WS04	WS04
AGS Ref.	ES2	ES3	ES1	ES1	ES2
Depth	1.00 - 1.00	2.80 - 2.80	0.30 - 0.30	0.20 - 0.20	1.20 - 1.20
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO3					28-Nov-2018
Ammoniacal Nitrogen					27-Nov-2018
Anions by Kone (soil)	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018
Anions by Kone (w)					02-Dec-2018
Asbestos ID in Solid Samples	26-Nov-2018	23-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018
Boron Water Soluble	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
CEN 10:1 Leachate (1 Stage)					23-Nov-2018
CEN Readings					24-Nov-2018
Chromium III	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018
Cyanide Comp/Free/Total/Thiocyanate	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018
Dissolved Metals by ICP-MS					27-Nov-2018
EPH (DRO) (C10-C40) Aqueous (W)					26-Nov-2018
EPH CWG (Aliphatic) GC (S)	26-Nov-2018	26-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018
EPH CWG (Aromatic) GC (S)	26-Nov-2018	26-Nov-2018	27-Nov-2018	27-Nov-2018	27-Nov-2018
GRO by GC-FID (S)	28-Nov-2018	28-Nov-2018	28-Nov-2018	29-Nov-2018	28-Nov-2018
GRO by GC-FID (W)					27-Nov-2018
Hexavalent Chromium (s)	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018	29-Nov-2018
Mercury Dissolved					28-Nov-2018
Metals in solid samples by OES	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
OC, OP Pesticides and Triazine Herb					28-Nov-2018
PAH by GCMS	26-Nov-2018	26-Nov-2018	27-Nov-2018	27-Nov-2018	26-Nov-2018
PAH in waters by GC-MS (diss.filt)					27-Nov-2018
pH	26-Nov-2018	27-Nov-2018	27-Nov-2018	26-Nov-2018	27-Nov-2018
pH Value of Filtered Water					27-Nov-2018
Phenols by HPLC (S)	27-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018	26-Nov-2018
Phenols by HPLC (W)					27-Nov-2018
Sample description	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018	22-Nov-2018
Total EPH (aq)					27-Nov-2018
Total Organic Carbon	28-Nov-2018	27-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018
TPH CWG GC (S)	28-Nov-2018	28-Nov-2018	28-Nov-2018	29-Nov-2018	28-Nov-2018
VOC MS (S)	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018	28-Nov-2018

ASSOCIATED AQC DATA

Alkalinity Filtered as CaCO3

Component	Method Code	QC 1814	QC 1869
Total Alkalinity Filtered as CaCO3	TM043	**105.0** 100.35 : 114.15	**110.0** 100.35 : 114.15

Ammoniacal Nitrogen

Component	Method Code	QC 1857	QC 1897
Ammoniacal Nitrogen as N	TM099	**100.4** 95.98 : 104.95	**104.0** 95.98 : 104.95

Anions by Kone (soil)

Component	Method Code	QC 1806	QC 1800	QC 1806
Chloride (soluble)	TM243	89.71 : 106.08	89.71 : 106.08	89.71 : 106.08
Water Soluble Sulphate as SO4 2:1 Extract	TM243	93.35 : 113.08	93.35 : 113.08	93.35 : 113.08

Anions by Kone (w)

Component	Method Code	QC 1819
Chloride	TM184	92.93 : 115.43
Phosphate (Ortho as PO4)	TM184	96.40 : 108.40
Sulphate (soluble)	TM184	**99.6** 90.53 : 113.03
TON as NO3	TM184	96.26 : 111.21

Boron Water Soluble

Component	Method Code	QC 1801	QC 1851	QC 1895
Water Soluble Boron	TM222	**97.0** 86.05 : 109.75	**96.5** 86.05 : 109.75	**93.0** 86.05 : 109.75

Cyanide Comp/Free/Total/Thiocyanate

Validated

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 1873	QC 1879	QC 1800
Free Cyanide	TM153	**98.1** 93.39 : 106.36	**98.0** 93.39 : 106.36	**97.6** 93.39 : 106.36
Thiocyanate	TM153	**92.81** 88.89 : 99.03	**94.01** 88.89 : 99.03	**92.22** 88.89 : 99.03
Total Cyanide	TM153	**102.14** 86.13 : 100.93	**102.86** 86.13 : 100.93	**100.0** 86.13 : 100.93

Dissolved Metals by ICP-MS

Component	Method Code	QC 1880	QC 1842
Aluminium	TM152	**101.0** 94.19 : 114.31	**101.33** 94.19 : 114.31
Antimony	TM152	**101.33** 79.80 : 122.00	**102.83** 79.80 : 122.00
Arsenic	TM152	**100.83** 90.42 : 111.32	**102.83** 90.42 : 111.32
Barium	TM152	**100.17** 90.79 : 113.16	**101.5** 90.79 : 113.16
Beryllium	TM152	**105.0** 93.25 : 120.04	**103.0** 93.25 : 120.04
Bismuth	TM152	**101.0** 94.65 : 117.05	**101.33** 94.65 : 117.05
Borate	TM152	**103.7** 88.00 : 112.00	**106.79** 88.00 : 112.00
Boron	TM152	**103.67** 86.68 : 117.67	**107.0** 86.68 : 117.67
Cadmium	TM152	**103.33** 94.60 : 112.40	**103.83** 94.60 : 112.40
Calcium	TM152	**104.67** 83.40 : 121.11	**103.33** 83.40 : 121.11
Chromium	TM152	**100.17** 93.28 : 110.91	**98.83** 93.28 : 110.91
Cobalt	TM152	**98.17** 84.39 : 114.26	**95.33** 84.39 : 114.26
Copper	TM152	**101.67** 88.86 : 118.72	**99.17** 88.86 : 118.72
Iron	TM152	**102.0** 92.00 : 113.00	**99.33** 92.00 : 113.00
Lead	TM152	**101.5** 89.25 : 115.12	**101.0** 89.25 : 115.12
Lithium	TM152	**99.67** 89.26 : 119.04	**102.17** 89.26 : 119.04
Magnesium	TM152	**102.67** 86.35 : 113.36	**102.67** 86.35 : 113.36
Manganese	TM152	**101.33** 94.24 : 112.74	**99.67** 94.24 : 112.74
Molybdenum	TM152	**99.33** 87.00 : 108.89	**95.17** 87.00 : 108.89
Nickel	TM152	**101.5** 92.11 : 110.56	**99.0** 92.11 : 110.56
Phosphorus	TM152	**100.5** 90.52 : 115.47	**101.83** 90.52 : 115.47
Potassium	TM152	**103.33** 90.23 : 109.87	**102.67** 90.23 : 109.87

Dissolved Metals by ICP-MS

		QC 1880	QC 1842
Selenium	TM152	**103.0** 88.44 : 113.86	**105.17** 88.44 : 113.86
Silver	TM152	**100.83** 87.04 : 107.38	**101.17** 87.04 : 107.38
Sodium	TM152	**103.33** 92.68 : 108.68	**102.0** 92.68 : 108.68
Strontium	TM152	**102.0** 90.72 : 114.82	**103.0** 90.72 : 114.82
Tellurium	TM152	**100.33** 90.72 : 112.62	**100.33** 90.72 : 112.62
Thallium	TM152	**99.0** 86.08 : 122.48	**96.83** 86.08 : 122.48
Tin	TM152	**99.5** 91.00 : 109.00	**100.17** 91.00 : 109.00
Titanium	TM152	**95.17** 91.87 : 102.47	**95.0** 91.87 : 102.47
Tungsten	TM152	**100.33** 78.12 : 132.82	**99.33** 78.12 : 132.82
Uranium	TM152	**100.0** 90.58 : 113.28	**99.67** 90.58 : 113.28
Vanadium	TM152	**99.33** 88.43 : 114.30	**99.83** 88.43 : 114.30
Zinc	TM152	**103.0** 86.52 : 115.27	**102.0** 86.52 : 115.27

EPH (DRO) (C10-C40) Aqueous (W)

Component	Method Code	QC 1821
EPH (DRO) (C10-C40)	TM172	**113.0** 66.75 : 120.64

EPH by FID

Component	Method Code	QC 1844
EPH (DRO) (C10-C40)	TM061	**88.67** 82.83 : 102.54

EPH CWG (Aliphatic) GC (S)

Component	Method Code	QC 1862	QC 1850	QC 1869
Total Aliphatics >C12-C35	TM173	**87.08** 66.17 : 105.28	**91.25** 70.61 : 106.16	**92.5** 66.17 : 105.28

EPH CWG (Aromatic) GC (S)

CERTIFICATE OF ANALYSIS

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EPH CWG (Aromatic) GC (S)

Component	Method Code	QC 1862	QC 1850	QC 1869
Total Aromatics >EC12-EC35	TM173	**92.67** 65.78 : 102.90	**80.67** 67.75 : 104.04	**94.67** 65.78 : 102.90

GRO by GC-FID (S)

Component	Method Code	QC 1851	QC 1884	QC 1888
QC	TM089	**99.2** 70.01 : 104.45	**95.88** 70.01 : 104.45	**89.98** 70.01 : 104.45

GRO by GC-FID (W)

Component	Method Code	QC 1810
Benzene by GC	TM245	**104.0** 78.79 : 124.61
Ethylbenzene by GC	TM245	**104.0** 76.66 : 126.56
m & p Xylene by GC	TM245	**104.5** 76.61 : 126.24
MTBE GC-FID	TM245	**103.5** 79.77 : 125.56
o Xylene by GC	TM245	**103.0** 77.23 : 124.70
QC	TM245	**124.33** 60.71 : 137.65
Toluene by GC	TM245	**104.5** 77.29 : 127.45

Hexavalent Chromium (S)

Component	Method Code	QC 1876	QC 1884
Hexavalent Chromium	TM151	**100.0** 90.20 : 107.00	**98.0** 90.20 : 107.00

Mercury Dissolved

Component	Method Code	QC 1857	QC 1879
Mercury Dissolved (CVAF)	TM183	**107.0** 75.00 : 111.00	**95.6** 75.00 : 111.00

Metals in solid samples by OES

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

Metals in solid samples by OES

Component	Method Code	QC 1842	QC 1851	QC 1806	QC 1890
Aluminium	TM181	**107.08** 78.33 : 113.38	**91.15** 78.33 : 113.38	**92.92** 77.84 : 119.01	**102.65** 77.84 : 119.01
Antimony	TM181	**100.41** 88.24 : 108.30	**95.53** 88.24 : 108.30	**90.65** 88.24 : 108.30	**104.07** 88.24 : 108.30
Arsenic	TM181	**102.62** 89.58 : 111.37	**96.8** 89.58 : 111.37	**92.73** 91.21 : 109.74	**104.36** 91.21 : 109.74
Barium	TM181	**102.75** 79.27 : 109.37	**95.41** 79.27 : 109.37	**100.0** 82.49 : 109.34	**102.75** 82.49 : 109.34
Beryllium	TM181	**105.22** 85.71 : 109.58	**100.37** 85.71 : 109.58	**98.13** 90.00 : 109.18	**102.61** 90.00 : 109.18
Boron	TM181	**99.14** 76.57 : 104.15	**87.97** 76.57 : 104.15	**88.25** 76.57 : 104.15	**91.98** 76.57 : 104.15
Cadmium	TM181	**96.71** 82.95 : 110.25	**94.24** 82.95 : 110.25	**90.95** 82.95 : 110.25	**100.82** 82.95 : 110.25
Chromium	TM181	**96.35** 74.64 : 112.05	**91.08** 74.64 : 112.05	**85.19** 81.67 : 106.07	**93.71** 81.67 : 106.07
Cobalt	TM181	**96.54** 83.03 : 100.18	**93.08** 83.03 : 100.18	**89.62** 83.02 : 100.17	**95.28** 83.02 : 100.17
Copper	TM181	**101.58** 85.25 : 108.00	**96.83** 85.25 : 108.00	**93.84** 85.25 : 108.00	**100.18** 85.25 : 108.00
Iron	TM181	**105.56** 80.89 : 112.64	**99.21** 80.89 : 112.64	**91.27** 82.95 : 110.58	**100.79** 82.95 : 110.58
Lead	TM181	**97.52** 81.07 : 104.72	**95.27** 81.07 : 104.72	**91.89** 81.63 : 104.17	**97.3** 81.63 : 104.17
Manganese	TM181	**113.06** 97.73 : 122.27	**106.39** 97.73 : 122.27	**105.56** 99.46 : 120.54	**115.28** 99.46 : 120.54
Mercury	TM181	**97.34** 84.33 : 107.55	**90.58** 84.33 : 107.55	**91.55** 86.53 : 105.35	**100.72** 86.53 : 105.35
Molybdenum	TM181	**102.06** 83.22 : 106.44	**97.53** 83.22 : 106.44	**96.3** 89.41 : 107.75	**103.7** 89.41 : 107.75
Nickel	TM181	**99.27** 83.87 : 104.87	**94.13** 83.87 : 104.87	**91.2** 85.63 : 103.11	**97.56** 85.63 : 103.11
Phosphorus	TM181	**110.71** 92.65 : 125.47	**107.47** 92.65 : 125.47	**107.88** 94.56 : 124.28	**110.1** 94.56 : 124.28
Selenium	TM181	**105.1** 88.36 : 111.25	**101.18** 88.36 : 111.25	**92.55** 89.98 : 109.62	**105.49** 89.98 : 109.62
Strontium	TM181	**102.23** 81.61 : 106.65	**93.54** 81.61 : 106.65	**95.77** 84.00 : 104.25	**98.22** 84.00 : 104.25
Thallium	TM181	**109.73** 85.30 : 112.69	**106.64** 85.30 : 112.69	**95.58** 86.84 : 111.14	**100.44** 86.84 : 111.14
Tin	TM181	**107.98** 86.11 : 113.01	**98.1** 86.11 : 113.01	**94.68** 90.25 : 108.86	**114.07** 90.25 : 108.86
Titanium	TM181	**87.02** 68.52 : 104.35	**72.44** 68.52 : 104.35	**77.1** 66.23 : 102.06	**82.44** 66.23 : 102.06
Vanadium	TM181	**101.83** 84.26 : 110.04	**92.31** 84.26 : 110.04	**90.11** 86.37 : 107.94	**102.93** 86.37 : 107.94
Zinc	TM181	**104.93** 92.42 : 115.61	**99.59** 92.42 : 115.61	**96.51** 84.21 : 122.14	**104.11** 84.21 : 122.14

OC, OP Pesticides and Triazine Herb

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

QC, OP Pesticides and Triazine Herb

Component	Method Code	QC 1811
Atrazine (Raw)	TM073	**90.14** 78.55 : 119.92
Azinphos methyl (Raw)	TM073	**90.04** 58.68 : 154.71
cis-Chlordane (Raw)	TM073	**91.28** 71.90 : 129.99
Diazinon (Raw)	TM073	**92.84** 70.00 : 130.00
Dichlorvos (Raw)	TM073	**90.27** 70.00 : 130.00
Dieldrin (Raw)	TM073	**92.53** 70.00 : 130.00
gamma-HCH (Lindane) (Raw)	TM073	**85.1** 71.48 : 129.99
Heptachlor (Raw)	TM073	**91.29** 66.39 : 134.63
Hexachlorobenzene (Raw)	TM073	**75.61** 47.15 : 124.32
Malathion (Raw)	TM073	**92.32** 70.00 : 130.00
p,p-DDT (Raw)	TM073	**94.1** 70.00 : 130.00
Parathion (Raw)	TM073	**94.18** 64.13 : 127.88

PAH by GCMS

Component	Method Code	QC 1805	QC 1844	QC 1829	QC 1822	QC 1879
Acenaphthene	TM218	**86.5** 82.09 : 110.18	**88.5** 82.09 : 110.18	**88.5** 80.84 : 118.08	**94.5** 84.53 : 114.86	**88.0** 82.09 : 110.18
Acenaphthylene	TM218	**84.5** 73.63 : 112.10	**86.5** 73.63 : 112.10	**88.0** 72.34 : 104.83	**90.0** 80.13 : 113.99	**87.0** 73.63 : 112.10
Anthracene	TM218	**88.0** 76.15 : 110.07	**94.5** 76.15 : 110.07	**89.5** 79.32 : 108.94	**96.5** 71.15 : 111.65	**90.5** 76.15 : 110.07
Benz(a)anthracene	TM218	**91.0** 73.77 : 119.26	**107.5** 73.77 : 119.26	**94.5** 79.56 : 127.05	**92.5** 74.78 : 122.48	**92.5** 73.77 : 119.26
Benzo(a)pyrene	TM218	**91.0** 73.20 : 114.18	**98.5** 73.20 : 114.18	**92.5** 83.39 : 123.49	**89.5** 70.68 : 115.92	**93.0** 73.20 : 114.18
Benzo(b)fluoranthene	TM218	**91.5** 75.36 : 117.58	**99.0** 75.36 : 117.58	**91.5** 80.60 : 126.56	**85.0** 73.56 : 121.32	**90.5** 75.36 : 117.58
Benzo(ghi)perylene	TM218	**90.0** 70.73 : 116.12	**93.5** 70.73 : 116.12	**92.5** 76.59 : 116.42	**90.5** 71.68 : 115.27	**92.5** 70.73 : 116.12
Benzo(k)fluoranthene	TM218	**91.0** 75.98 : 116.59	**97.5** 75.98 : 116.59	**96.5** 87.91 : 119.03	**91.0** 73.30 : 120.87	**92.0** 75.98 : 116.59
Chrysene	TM218	**88.5** 74.82 : 114.18	**101.0** 74.82 : 114.18	**90.5** 85.34 : 115.46	**92.0** 77.24 : 120.84	**89.0** 74.82 : 114.18
Dibenzo(ah)anthracene	TM218	**86.0** 69.17 : 115.30	**89.5** 69.17 : 115.30	**95.0** 82.98 : 121.47	**89.5** 72.03 : 116.78	**89.0** 69.17 : 115.30
Fluoranthene	TM218	**90.5** 75.88 : 112.84	**97.5** 75.88 : 112.84	**88.0** 79.07 : 112.75	**94.0** 78.65 : 113.45	**87.0** 75.88 : 112.84
Fluorene	TM218	**88.0** 78.50 : 114.02	**94.0** 78.50 : 114.02	**90.5** 80.52 : 110.90	**98.0** 76.95 : 117.18	**91.0** 78.50 : 114.02
Indeno(123cd)pyrene	TM218	**83.5** 80.09 : 117.12	**87.5** 80.09 : 117.12	**91.5** 84.02 : 120.55	**89.5** 68.53 : 118.42	**90.5** 80.09 : 117.12

CERTIFICATE OF ANALYSIS

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PAH by GCMS

		QC 1805	QC 1844	QC 1829	QC 1822	QC 1879
Naphthalene	TM218	**89.5** 75.24 : 111.26	**85.5** 75.24 : 111.26	**90.0** 80.21 : 118.71	**96.0** 78.80 : 115.10	**87.5** 75.24 : 111.26
Phenanthrene	TM218	**87.5** 83.12 : 115.78	**94.5** 83.12 : 115.78	**90.0** 79.34 : 111.91	**100.0** 76.49 : 119.30	**89.0** 83.12 : 115.78
Pyrene	TM218	**92.5** 78.74 : 112.56	**100.0** 78.74 : 112.56	**90.0** 78.80 : 115.76	**96.5** 76.20 : 119.96	**89.5** 78.74 : 112.56

PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC 1825
Acenaphthene (diss.filt)	TM178	**100.0** 73.80 : 125.40
Acenaphthylene (diss.filt)	TM178	**100.0** 82.88 : 117.68
Anthracene (diss.filt)	TM178	**98.8** 72.88 : 125.44
Benzo(a)anthracene (diss.filt)	TM178	**101.6** 70.96 : 124.96
Benzo(a)pyrene (diss.filt)	TM178	**106.4** 78.60 : 123.96
Benzo(b)fluoranthene (diss.filt)	TM178	**103.6** 81.20 : 125.84
Benzo(g,h,i)perylene (diss.filt)	TM178	**101.6** 73.68 : 119.04
Benzo(k)fluoranthene (diss.filt)	TM178	**103.6** 93.96 : 136.92
Chrysene (diss.filt)	TM178	**106.0** 75.88 : 127.96
Dibenzo(a,h)anthracene (diss.filt)	TM178	**98.4** 69.44 : 116.72
Fluoranthene (diss.filt)	TM178	**102.8** 77.08 : 123.88
Fluorene (diss.filt)	TM178	**102.8** 85.08 : 112.68
Indeno(1,2,3-cd)pyrene (diss.filt)	TM178	**106.4** 65.84 : 116.72
Naphthalene (diss.filt)	TM178	**100.4** 81.00 : 124.68
Phenanthrene (diss.filt)	TM178	**99.6** 78.92 : 121.16
Pyrene (diss.filt)	TM178	**105.6** 76.20 : 128.28

pH

Component	Method Code	QC 1849	QC 1845	QC 1881	QC 1804	QC 1827
pH	TM133	**99.08** 97.60 : 101.72	**99.43** 97.41 : 101.91	**100.8** 97.41 : 101.91	**99.77** 97.60 : 101.72	**98.86** 97.60 : 101.72

pH Value of Filtered Water

CERTIFICATE OF ANALYSIS

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Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

pH Value of Filtered Water

Component	Method Code	QC 1805
pH Value of Filtered Water	TM256	**100.27** 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 1872	QC 1827
2.3.5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	**97.4** 83.23 : 109.71	**101.95** 83.23 : 109.71
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	**87.13** 76.34 : 104.11	**91.81** 76.34 : 104.11
Catechol by HPLC (S)	TM062 (S)	**121.9** 43.44 : 146.72	**123.81** 43.44 : 146.72
Cresols by HPLC (S)	TM062 (S)	**94.57** 78.30 : 110.88	**98.12** 78.30 : 110.88
Napthol by HPLC (S)	TM062 (S)	**123.57** 75.62 : 124.38	**126.43** 75.62 : 124.38
Phenol by HPLC (S)	TM062 (S)	**101.99** 79.53 : 120.47	**106.62** 79.53 : 120.47
Resorcinol HPLC (S)	TM062 (S)	**123.27** 82.00 : 115.00	**126.42** 82.00 : 115.00
Xylenols by HPLC (S)	TM062 (S)	**98.75** 89.90 : 107.23	**102.08** 89.90 : 107.23

Phenols by HPLC (W)

Component	Method Code	QC 1840	QC 1866
2.3.5 Trimethyl-Phenol by HPLC (W)	TM259	**101.0** 92.00 : 110.00	**100.0** 92.00 : 110.00
2-Isopropyl Phenol by HPLC (W)	TM259	**101.0** 84.00 : 138.00	**101.0** 84.00 : 138.00
Cresols by HPLC (W)	TM259	**94.67** 88.33 : 106.33	**94.67** 88.33 : 106.33
Napthol by HPLC (W)	TM259	**106.0** 84.00 : 108.00	**107.0** 84.00 : 108.00
Phenol by HPLC (W)	TM259	**98.0** 93.00 : 111.00	**99.0** 93.00 : 111.00
Xylenols by HPLC (W)	TM259	**103.17** 90.50 : 113.50	**103.33** 90.50 : 113.50

Total Organic Carbon

Component	Method Code	QC 1891
Total Organic Carbon	TM132	**107.42** 70.49 : 130.92

VOC MS (S)

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VOC MS (S)

Component	Method Code	QC 1816	QC 1839	QC 1833	QC 1897	QC 1852	QC 1813
1,1,1,2-tetrachloroethane	TM116	**96.0** 77.56 : 115.55	**98.8** 77.56 : 115.55	**103.0** 77.56 : 115.55	**108.6** 79.10 : 119.66	**96.4** 77.56 : 115.55	**100.8** 77.56 : 115.55
1,1,1-Trichloroethane	TM116	**93.0** 73.73 : 118.05	**94.2** 73.73 : 118.05	**99.2** 73.73 : 118.05	**96.6** 88.88 : 119.66	**91.8** 73.73 : 118.05	**95.0** 73.73 : 118.05
1,1,2-Trichloroethane	TM116	**91.2** 77.12 : 116.04	**90.4** 77.12 : 116.04	**94.6** 77.12 : 116.04	**100.6** 75.16 : 112.70	**94.4** 77.12 : 116.04	**91.6** 77.12 : 116.04
1,1-Dichloroethane	TM116	**100.2** 74.46 : 129.15	**102.6** 74.46 : 129.15	**104.4** 74.46 : 129.15	**88.2** 77.84 : 124.12	**96.8** 74.46 : 129.15	**101.0** 74.46 : 129.15
1,2-Dichloroethane	TM116	**103.4** 87.98 : 127.86	**103.4** 87.98 : 127.86	**106.2** 87.98 : 127.86	**115.2** 86.58 : 129.62	**102.0** 87.98 : 127.86	**102.0** 87.98 : 127.86
1,4-Dichlorobenzene	TM116	**99.8** 72.76 : 126.34	**101.0** 72.76 : 126.34	**108.8** 72.76 : 126.34	**90.6** 71.61 : 124.63	**102.4** 72.76 : 126.34	**100.8** 72.76 : 126.34
2-Chlorotoluene	TM116	**99.8** 69.73 : 114.13	**98.6** 69.73 : 114.13	**103.6** 69.73 : 114.13	**82.8** 66.81 : 118.43	**97.0** 69.73 : 114.13	**101.6** 69.73 : 114.13
4-Chlorotoluene	TM116	**98.8** 66.90 : 112.46	**95.8** 66.90 : 112.46	**97.0** 66.90 : 112.46	**79.6** 65.88 : 114.76	**94.4** 66.90 : 112.46	**100.8** 66.90 : 112.46
Benzene	TM116	**96.6** 81.05 : 117.28	**98.4** 81.05 : 117.28	**100.4** 81.05 : 117.28	**93.6** 93.16 : 123.63	**94.6** 81.05 : 117.28	**99.8** 81.05 : 117.28
Carbon Disulphide	TM116	**97.2** 74.91 : 122.14	**98.2** 74.91 : 122.14	**99.8** 74.91 : 122.14	**73.4** 75.11 : 124.81	**92.6** 74.91 : 122.14	**99.6** 74.91 : 122.14
Carbontetrachloride	TM116	**94.6** 80.31 : 124.50	**96.8** 80.31 : 124.50	**100.0** 80.31 : 124.50	**106.8** 82.35 : 126.46	**92.0** 80.31 : 124.50	**96.8** 80.31 : 124.50
Chlorobenzene	TM116	**100.4** 75.00 : 115.53	**100.6** 75.00 : 115.53	**104.4** 75.00 : 115.53	**96.0** 82.88 : 122.42	**97.0** 75.00 : 115.53	**102.6** 75.00 : 115.53
Chloroform	TM116	**101.6** 87.40 : 122.49	**103.0** 87.40 : 122.49	**105.8** 87.40 : 122.49	**94.2** 82.52 : 123.25	**101.6** 87.40 : 122.49	**102.0** 87.40 : 122.49
Chloromethane	TM116	**93.8** 58.11 : 136.20	**76.6** 58.11 : 136.20	**97.6** 58.11 : 136.20	**77.0** 52.88 : 131.36	**89.6** 58.11 : 136.20	**91.0** 58.11 : 136.20
Cis-1,2-Dichloroethene	TM116	**99.0** 80.67 : 126.72	**101.8** 80.67 : 126.72	**104.0** 80.67 : 126.72	**93.8** 78.27 : 128.90	**99.0** 80.67 : 126.72	**101.6** 80.67 : 126.72
Dibromomethane	TM116	**91.0** 67.80 : 121.75	**92.2** 67.80 : 121.75	**94.6** 67.80 : 121.75	**114.4** 71.69 : 119.43	**94.6** 67.80 : 121.75	**91.4** 67.80 : 121.75
Dichloromethane	TM116	**108.8** 81.11 : 133.25	**108.4** 81.11 : 133.25	**114.8** 81.11 : 133.25	**98.6** 81.68 : 125.21	**108.2** 81.11 : 133.25	**106.4** 81.11 : 133.25
Ethylbenzene	TM116	**91.6** 75.92 : 110.41	**91.8** 75.92 : 110.41	**97.8** 75.92 : 110.41	**87.0** 83.56 : 122.99	**89.8** 75.92 : 110.41	**95.6** 75.92 : 110.41
Hexachlorobutadiene	TM116	**76.4** 12.82 : 152.73	**78.6** 12.82 : 152.73	**100.0** 12.82 : 152.73	**51.6** 7.32 : 139.00	**96.8** 12.82 : 152.73	**86.2** 12.82 : 152.73
Isopropylbenzene	TM116	**86.6** 54.21 : 117.17	**86.8** 54.21 : 117.17	**94.2** 54.21 : 117.17	**66.6** 52.15 : 132.52	**87.6** 54.21 : 117.17	**94.6** 54.21 : 117.17
Naphthalene	TM116	**114.2** 80.86 : 128.81	**113.4** 80.86 : 128.81	**120.8** 80.86 : 128.81	**87.6** 76.79 : 127.18	**114.0** 80.86 : 128.81	**113.2** 80.86 : 128.81
o-Xylene	TM116	**86.4** 67.52 : 107.60	**85.2** 67.52 : 107.60	**89.8** 67.52 : 107.60	**78.6** 68.16 : 107.61	**85.2** 67.52 : 107.60	**89.0** 67.52 : 107.60
p/m-Xylene	TM116	**87.9** 68.32 : 108.91	**88.0** 68.32 : 108.91	**92.2** 68.32 : 108.91	**85.6** 77.41 : 112.71	**85.9** 68.32 : 108.91	**90.1** 68.32 : 108.91
Sec-Butylbenzene	TM116	**79.6** 44.91 : 118.40	**78.4** 44.91 : 118.40	**96.2** 44.91 : 118.40	**59.2** 44.71 : 117.87	**89.8** 44.91 : 118.40	**89.4** 44.91 : 118.40
Tetrachloroethene	TM116	**97.6** 76.95 : 121.02	**100.4** 76.95 : 121.02	**102.8** 76.95 : 121.02	**105.4** 81.43 : 126.65	**94.2** 76.95 : 121.02	**104.0** 76.95 : 121.02
Toluene	TM116	**88.2** 74.24 : 107.42	**88.8** 74.24 : 107.42	**92.6** 74.24 : 107.42	**87.8** 87.82 : 116.21	**88.4** 74.24 : 107.42	**89.4** 74.24 : 107.42
Trichloroethene	TM116	**91.0** 77.61 : 111.54	**93.4** 77.61 : 111.54	**96.2** 77.61 : 111.54	**95.0** 79.80 : 112.33	**90.4** 77.61 : 111.54	**94.2** 77.61 : 111.54

CERTIFICATE OF ANALYSIS

SDG:	181121-121	**Client Reference:**	A111089	**Report Number:**	483494
Location:	Windroos, Littlehampton	**Order Number:**	C18/640	**Superseded Report:**	

VOC MS (S)

		QC 1816	QC 1839	QC 1833	QC 1897	QC 1852	QC 1813
Trichlorofluoromethane	TM116	**89.8** 71.31 : 128.41	**91.6** 71.31 : 128.41	**92.4** 71.31 : 128.41	**105.6** 72.76 : 118.80	**85.4** 71.31 : 128.41	**90.6** 71.31 : 128.41
Vinyl Chloride	TM116	**89.2** 68.26 : 133.45	**92.8** 68.26 : 133.45	**91.8** 68.26 : 133.45	**85.0** 64.90 : 133.10	**85.0** 68.26 : 133.45	**89.8** 68.26 : 133.45

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.
The figure detailed is the percentage recovery result for the AQC.
The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

Appendix General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

21. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
S	**Sampled on date not provided**
*	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix F- CIRIA C552 Risk Methodology

The following tables are derived from CIRIA C552 and have been used to define the risk rating presented in the Qualitative Risk Assessment matrix in Section **Error! Reference source not found.**.

Classification of consequence

Classification	Definition
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 (note; Water Resources Act contains no scope for considering significant pollution) of sensitive water resource. Catastrophic damage to building/property. A short term risk to a particular ecosystem, or organism forming part of such ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Medium	Chronic damage to human health ('significant harm', as defined In DETR, 2000). Pollution of sensitive water resources (note; Water Resources Act contains no scope for considering significant pollution). A significant change in a particular ecosystem, or an organism forming part of such an ecosystem. (Note the definitions of ecological systems within the 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 DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor	Harm, although not necessarily significant harm, which may results in a financial loss, or expenditure to resolve. Non-permanent heath effects to human health (easily prevented by means such as persona protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

Classification of probability

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

Matrix of consequence against probability to gain a risk classification

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk