Horsham District Council

Mr Nikolas Antoniou
NJA Town Planning Ltd
The Beehive
City Place
Gatwick
RH6 0PA

Our ref:	DISC/23/0092
Your ref:	DOC 11 an 14 - Angells Sandpi...
Email:	planning@horsham.gov.uk
Direct Line:	01403 215238
If Calling Please ask for:	Nicola Pettifer
Date:	31st May 2023

Dear Sir/Madam,

Town and Country Planning Act 1990 (as amended)
Town and Country Planning (Development Management Procedure England) Order 2015

Approval of details reserved by conditions 11 and 14 to approved application DC/21/0057

Angell Sand Pit Washington Road Storrington West Sussex

The Authority has considered your application, and I can confirm that the submitted information is acceptable pursuant to the following condition(s):

11. **Pre-Commencement Condition:** No development shall commence until a drainage strategy detailing the proposed means of foul and surface water disposal has been submitted to and approved in writing by the Local Planning Authority. As part of the details, no drainage systems for the infiltration of surface water to the ground are permitted other than with the written consent of the local planning authority. Any proposals for such systems must be supported by an assessment of the risks to controlled waters. The development shall be carried out in accordance with the approved details.

    Reason: Given the previous use of the land as a landfill this condition is required to ensure that the development does not contribute to, is not put at unacceptable risk from, or adversely affected by, unacceptable levels of water pollution caused by mobilised contaminants, and to ensure that the development is properly drained and to comply with Policy 38 of the Horsham District Planning Framework (2015) and paragraph 170 of the National Planning Policy Framework.

Date of approval - 31st May 2023

14. **Pre-Commencement (Slab Level) Condition:** No development above ground floor slab level of any plot of the development hereby permitted shall take place until a schedule of materials and finishes and colours to be used for external walls, roofs and skylights of the approved building has been submitted to and approved by the Local Planning Authority in writing and all materials used in the construction of the development hereby permitted shall conform to those approved.

    Reason: As this matter is fundamental to enable the Local Planning Authority to control the development in detail in the interests of amenity by endeavouring to achieve a building of

visual quality in accordance with Policy 33 of the Horsham District Planning Framework (2015).

Date of approval - 31st May 2023

The development shall be implemented in accordance with the approved plans and details listed in the schedule below.

Schedule of plans/documents:

Plan Type	Description	Drawing Number	Received Date
Materials			19.04.2023
Supporting Docs	Flood Risk Assessment and Drainage Strategy	020.5383/FRA/4 4	19.04.2023
Supporting Statement	Remediation Strategy	J20-002-R04 1.0	11.05.2023

This letter constitutes a legal document which should be regarded as an addendum to the original planning application.

If you have any queries or require further information, please do not hesitate to contact the Case Officer.

Yours faithfully



Emma Parkes
Head of Development and Building Control



LAND AT ANGEL SANDPIT STORRINGTON

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

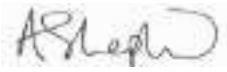
May 2020

MIBri Ltd.

RESIDENTIAL DEVELOPEMENT
LAND AT ANGEL SANDPIT STORRINGTON

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

CONTROLLED DOCUMENT

Document No:		020.5383/FRA/4	
Status:	Original	*Copy No:*	
	Name	*Signature*	*Date*
Prepared by:	Adam Shephard		29/06/18
Checked by:	Rob Wilson		29/06/18
Approved by:	Rob Wilson		29/06/18

Revision Record					
Rev.	*Date*	*By*	*Summary of Changes*	*Chkd*	*Aprvd*
2	26.07.18	RW		AS	RW
3	27.05.2020	RW	Updated with latest layout	COH	RW
4	07.07.2020	CLP	Updated to suit client comment	COH	RW

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RESIDENTIAL DEVELOPMENT
LAND AT ANGEL SANDPIT, WATER LANE, STORRINGTON

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

CONTENTS

1. INTRODUCTION 2
2. SITE DETAILS 2
3. EXISTING DRAINAGE 5
4. FLOOD RISK 6
5. DRAINAGE STRATEGY 12
6. SUMMARY AND RECOMMENDATIONS 14

Figures

Figure 1: Site Location Plan
Figure 2: Aerial view of the site
Figure 3: British Geological Society bedrock deposits mapping
Figure 4: EA Map for surface water flooding
Figure 5: EA flood map from artificial sources
Figure 6: EA long-term flood risk map

Appendices

Appendix A – Site Layout Plan (6545_100_Rev P3)
Appendix B – Topographical Survey of the Site
Appendix C – Pre-filling Topo Survey
Appendix D – UK SuDS Greenfield Runoff Estimate
Appendix E – Southern Water Sewer Records
Appendix F – Site Investigation Reports
Appendix G – Soakaway Calculations
Appendix H – Indicative Drainage Strategy Drawings (020.5383.003 & 004)

1. INTRODUCTION

1.1 This Flood Risk Assessment and Drainage Strategy has been prepared by Paul Basham Associates to support a planning application for MiBri Ltd's proposed residential development of the land at Angel Sandpit Storrington

2. SITE DETAILS

2.1 The site is approximately 1.16ha total area and is currently open scrub land located on the northern side of the A283, approximately 1.1km to the east of Storrington Town centre. The development proposals involve the erection of six no. residential dwellings consisting of one no. five bedroom house; three no. four bedroom house and two no. two bedroom houses with associated landscaping and access improvements to Heather Way at Angell Sandpit, Storrington. Vehicle access would be provided from Washington Road. The proposed site layout is shown on drawing *6545_100_Site Plan Rev P3* included in **Appendix A**. The red line boundary is shown in **Figure 1** below, and an aerial view of the site is shown in **Figure 2**.

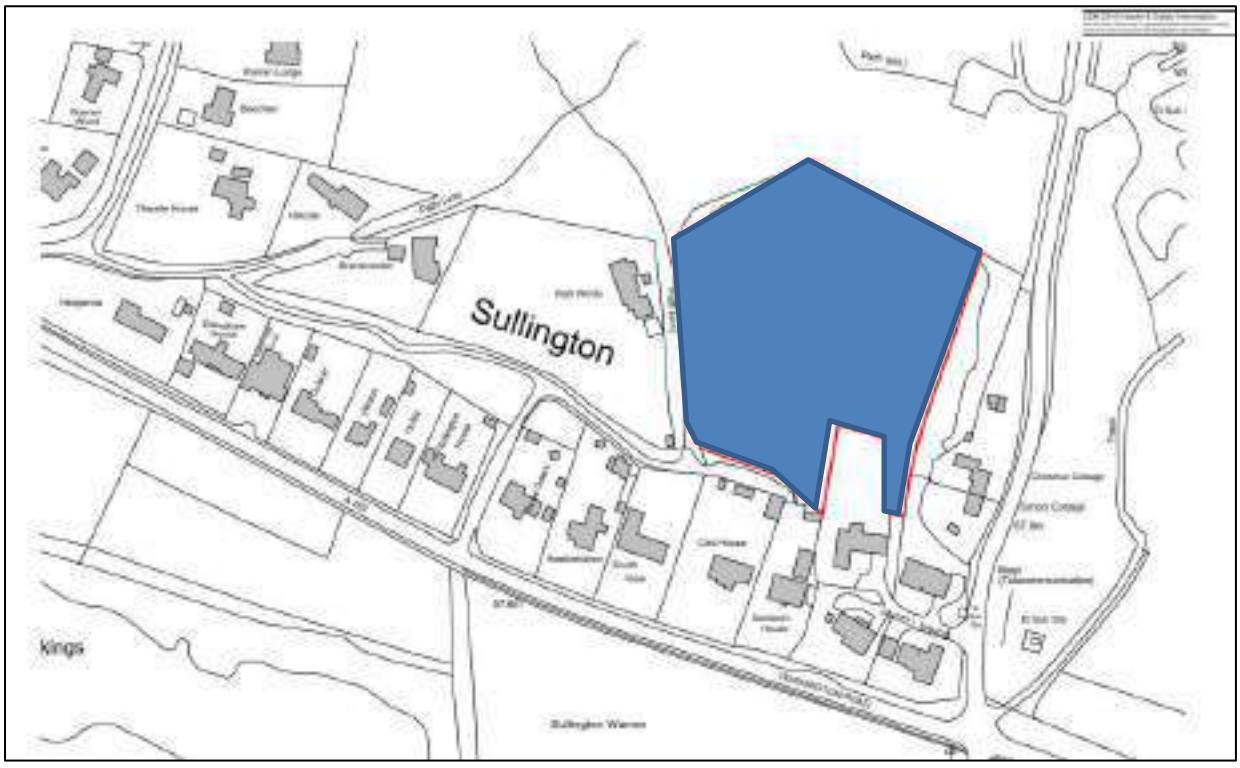

Figure 1: Site Location Plan



Figure 2: Aerial view of the site

2.2 A topographical survey has been undertaken by Geodime Ltd in 2015 across the site and is included in Appendix B. The survey shows that the site is generally falls in a north-west to east direction. The high point of the site is at the north Western Boundary where the levels are in the order of 79.6mAOD. The site steadily slopes down towards the east with a low point of approximately 65.4mAOD.

2.3 In addition to the above, we have also included the pre-filling topographic survey which was carried out in 1998. This survey indicated the lowest level of the excavation was in the region of 33.15 mAOD.

Site Geology

2.4 A review of the British Geological Survey mapping indicates that the bedrock geology beneath the site is the Folkestone Formation - Sandstone. Sedimentary Bedrock formed approximately 101 to 126 million years ago in the Cretaceous Period. Local environment previously dominated by shallow seas. These sedimentary rocks are shallow-marine in origin. They are detrital, ranging from coarse- to fine-grained (locally with some carbonate content) forming interbedded sequences.

2.5 The mapping also shows that there are no superficial deposits recorded; however, we are aware that the site was extensively quarried and copies of the pre-filling surveys are included in **Appendix C.**

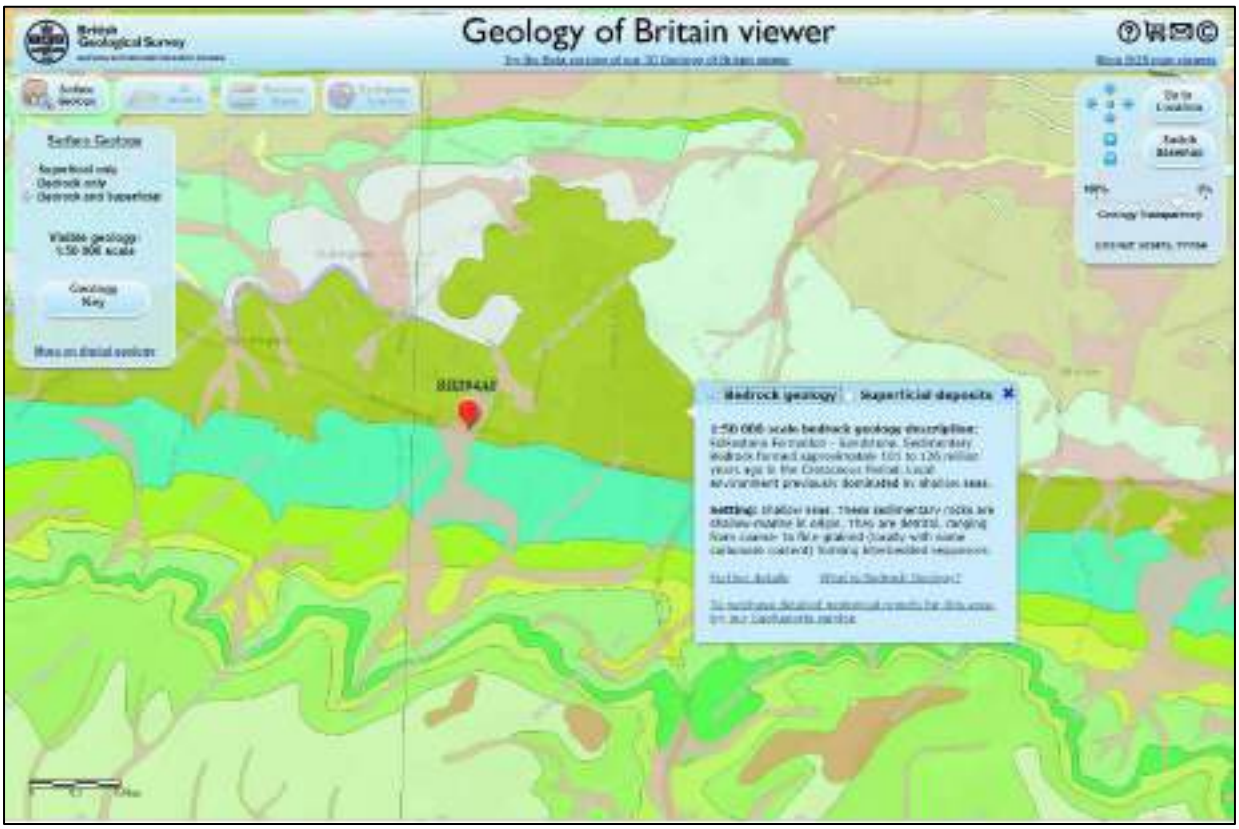

Figure 3: British Geological Survey bedrock deposits mapping

3. EXISTING DRAINAGE

Existing Surface Water Drainage

The topographic survey included in **Appendix B** shows that the site generally falls in a north west to east direction. Both the topographic survey and OS mapping do not identify any watercourse either within the site boundary or the general area, however, there is a drainage trench noted on the topographic survey which we understand relates to the filling operations.

3.1 As mentioned in Paragraph 2.3, the geology underlying the site is Sandstone which is generally permeable. However, due to the filing operation it is anticipated that a reasonable greenfield run-off would currently be generated by the existing site, especially during high return period short duration rainfall events.

3.2 The greenfield run-off rates for the existing site have been estimated using the HR Wallingford online calculator on the UK SUDS website. A copy of these calculations is included in **Appendix D** which shows very low greenfield run-off rates. The existing Q Bar rate has been noted as 0.26l/s. The 1 in 1 year run off rate for the 1.16ha site is 0.22 l/s and the 1 in 100-year run-off rate is 0.84 l/s. For all practical purposes, it is assumed that the site would not currently generate any surface water run-off.

3.3 A review of the Southern Water sewer records (a copy is included in **Appendix E**) shows that there are no public surface water sewers in the area surrounding the site.

Existing Foul Water Drainage

3.4 The development site is greenfield and does not currently generate a foul water discharge. A review of the Southern Water sewer records shows that the closest public foul water sewer to the site is in Washington Road, approximately 150 m to the south-west of the site.

3.5 All on-site drainage would be designed and constructed to adoptable standards and would also comply with building regulations. It is therefore considered that with appropriate design, the flood risk associated with the on-site drainage system would be low.

4. FLOOD RISK

Fluvial/Tidal Flooding

4.1 The Environment Agency (EA) flood mapping has identified that the site falls entirely within Flood Zone 1, an area with a low risk of flooding (less than 0.1% probability- 1 in 1000) from rivers and tidal sources in any given year. The extract of the EA's Flood Map overlaid with the site boundary is provided in **Figure 2.**



Figure 2: Environment Agency Flood Map for Rivers and Seas

National Planning Policy Framework (NPPF)

4.2 This FRA has been prepared considering the National Planning Policy Framework (NPPF) Technical Guidance and the EA Flood Risk Standing Advice. This report will seek to quantify the flood risk posed to the site and the proposed development and to identify potential mitigation measures. The drainage of surface water run-off generated by the site is also considered to ensure that the re-development proposals would not pose an adverse effect on the flood risk to the surrounding area.

4.3 Table 3 from the NPPF Technical Guidance has been included as Table 1 below. This gives the classes of development (based on flood risk vulnerability) that are permitted within each of the flood zones.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Table 1: NPPF Planning Practice Guidance Table 3 – Flood Risk Vulnerability and Flood Zone Compatibility

4.4 Table 2 from the NPPF Technical Guidance sets out the flood risk vulnerability classifications for various types of development. The proposed development of the site is for 6 residential dwellings which would be classed as "More Vulnerable" and would therefore be acceptable within its Flood Zone classification (Zone 1). Because the site is located within Flood Zone 1, the Sequential Test and Exception Test is not required.

4.5 Whilst the site is in Flood Zone 1, it is greater than 1 ha (1.16ha), therefore an FRA is required. In-line with NPPF Technical Guidance, this report identifies the risks of flooding from all sources, possible mitigation measures, assesses the development impacts on flood risk to the surrounding areas, and provides recommendations to ensure flood risk is not increased off site.

Surface Water Flooding

4.6 Surface water or 'pluvial' flooding results from rainfall running over ground before entering a watercourse or sewer. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is already saturated, frozen, developed (for example in an urban setting), or otherwise has low permeability.

4.7 The EA Flooding from Surface Water Map is included as **Figure 4** and indicates that the site is at a very low risk of flooding from surface water.

4.8 It is therefore considered that the flood risk posed to the proposed development by surface water would be low. However, it is still recommended that careful consideration should be given throughout the design stages to the use of appropriate drainage slopes of hardstanding areas on the site to ensure that any surface water run-off is directed away from buildings and other critical infrastructure. An adequate on-site drainage system in conjunction with appropriate threshold levels (approximately 200mm) for buildings above the adjacent ground would also help to mitigate any risk associated with surface water run-off.

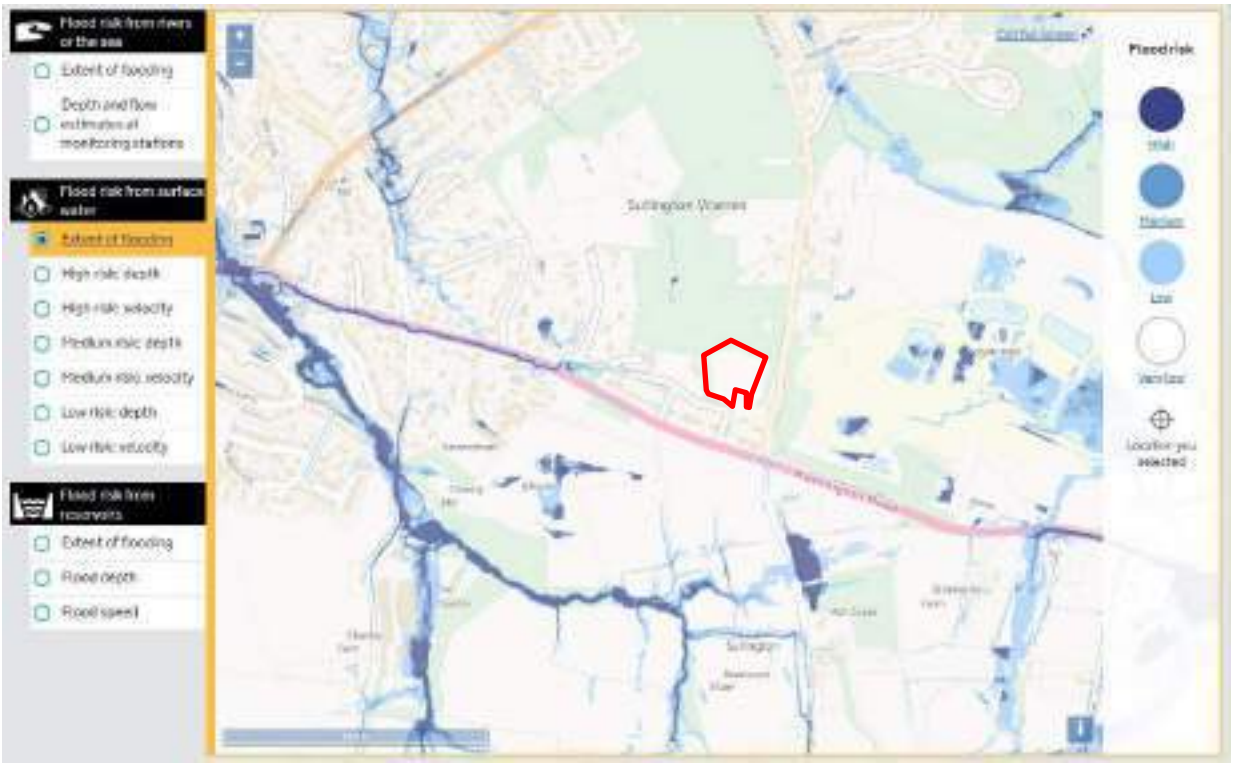

Figure 4: EA Map for surface water flooding

Groundwater Flooding

4.9 Groundwater flooding occurs when groundwater levels increase sufficiently for the water table to intersect the ground surface. Groundwater flooding can occur in a variety of geological settings including valleys, in areas underlain by chalk, and in river valleys with thick deposits of alluvium and river gravels.

4.10 A borehole investigation and soakage testing site assessment was carried out by GESL in November 2017. The on-site testing gave infiltration rates of 3.95 $x10^{-3}$ at 9m bgl, $3.32x10^{-5}$ at 20 m bgl and $1.59x10^{-4}$m/s at 25 m bgl. (this equates to rates of14.256 m/Hr, 0.1195 m/Hr and 0.572 m/hr as used in the microdrainage calculations). A copy of the report is shown in **Appendix F**.

4.11 As part of the site investigation works several window samples were carried out to a depth of 25m below ground level. It is noted that the window sample logs confirmed the presence of sandstone with a varying depth of fill above.

4.12 A further Ground Investigation was carried out by Ground Condition Consultants (Ref: J20-002-R02, dated April 2020) which notes that ground water was encountered in the wells dug by Ground Condition Consultants and at location BH1. It is noted that there is considerable fluctuation in the recorded ground level at BH1 (3.59mbgl in round 1 to 6.73mbgl in round 2).

4.13 The fill material encountered on site was of a clay matrix with pockets of sand. Groundwater is likely to be encountered in these pockets of granular material at varying depths across the site.

Artificial Sources of Flooding

4.14 There are no artificial water sources (canals, reservoirs, etc.) within vicinity of the site that could potentially be the source of flood risk to the site. The EA's flooding from reservoirs map is shown in Figure 5 and confirms that there is no risk to the site associated with flooding from artificial sources.



Figure 5: EA flood map from artificial sources

Long Term Flood Risk

4.15 The EA's long-term flood risk mapping shows that there is no long-term flood risk for the site. An extract of this map is shown in **Figure 6**.

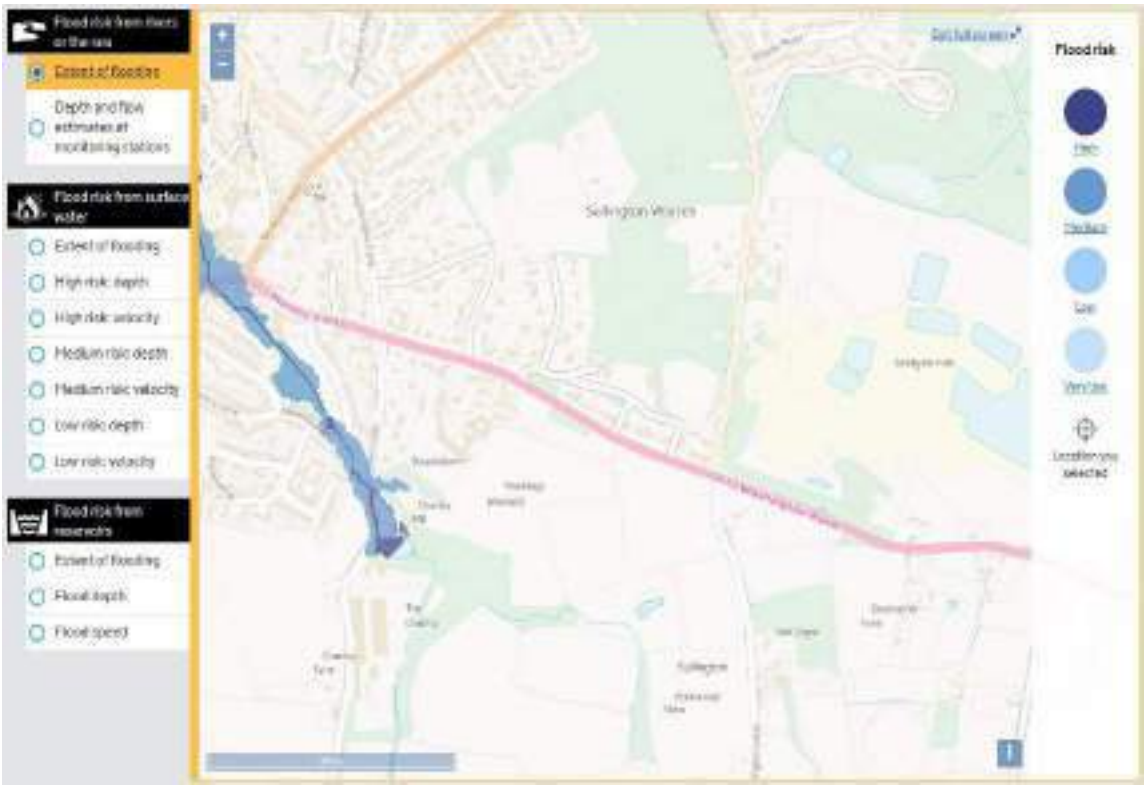

Figure 6: EA long-term flood risk map

Sewer Flooding

4.16 The Southern Water sewer records in **Appendix E** show that there are no public surface water sewers near the site, however, a foul water sewer is located approximately 150m south-west of the site in Washington Road.

4.17 All on-site drainage would be designed and constructed to adoptable standards and would also comply with building regulations. It is therefore considered that with appropriate design, the flood risk associated with the on-site drainage system would be low.

Historical Flooding

4.18 We are not aware of any flooding incidents at the site.

Flood Risk Summary

4.19 It is concluded that the overall flood risk to the site and the proposed development is very low.

4.20 Any potential risk from surface water flooding could be mitigated against by ensuring an adequate on-site drainage system in conjunction with appropriate threshold levels for buildings above the adjacent ground. A threshold level of 200mm is likely to be adequate. It will also be important to ensure that hardstanding areas slope away from buildings.

4.21 As the site is located within Flood Zone 1, safe access and egress to/from the site does not require any further consideration, nor does it require compensatory floodplain storage.

5. DRAINAGE STRATEGY

Proposed Surface Water Drainage

5.1 In line with the Building Regulations Part H3, surface water shall discharge to one of the following, listed in order of priority:

- An adequate infiltration system: or, where not reasonably practicable,
- A watercourse; or, where not reasonably practicable,
- A sewer.

5.2 The initial site investigation has indicated that the underlying geology is likely to be conducive to infiltration techniques, therefore the preferred discharge method outlined in the Building Regulations can be utilised for discharging the surface water run-off generated by the developed site.

5.3 Initial infiltration testing has provided a rate that has been used in the calculations, however, it is accepted that further Infiltration testing will need to be undertaken at various locations around the site. These tests will be carried out in accordance with BRE Digest 365, prior to the detailed design stage.

5.4 The impermeable area (roofs and hardstanding) created by the new development has been estimated using the proposed site layout in **Appendix B** to be 0.36ha which equates to 31% of the total site (1.16ha), including for roads, patios and paths, and 10% urban creep. It has been assumed that a combination of permeable pavements and borehole soakaways will be used in the rear gardens and borehole soakaways in the roads will dispose of the surface water. The borehole soakaways would generally be based on a 1.8 dia x 2.0m deep head chamber with a sleeved bore down to the natural sandstone at the base of the former quarry, the permeable pavements would be Lined To form a tanked subbase which would then discharge into a borehole in a similar manner to the house soakaways

5.5 Preliminary soakaway calculations have been carried out using for the 1 in 100-year storm event with a 40% increase due to climate change (in line with the current Environment Agency guidance) for the houses. The calculation outputs are included in **Appendix G**.

5.6 The proposed indicative surface water drainage strategy is shown on Drawings 020.5383-003 A & 004 A in **Appendix H**. The strategy shown on the drawing includes permeable paving for the small courtyards access road and private drives. It is considered that these areas of permeable paving would mimic the existing natural drainage of the site. Where the permeable paving is in areas of fill, the paving will be tanked with an outfall to a deep bore soakaway.

5.7 It is proposed that the access road from the A283 Washington Road (currently referred to as "Heather Way") will be improved in certain areas, it is anticipated that the new road areas will be constructed as permeable pavement to mimic the existing natural drainage of the site

5.8 When the final surface water network layout has been derived during the detailed design stage, it would be modelled using Microdrainage to ensure that the site would not flood for storm events with a return period of 1 in 1 and 1 in 100 years (including climate change).

5.9 It is important to note that the surface water strategy outlined above and on drawings 020.5383-003 & 004 is an indicative scheme that has been derived to demonstrate that technically viable options would be available to manage the surface water run-off generated by the proposed development, based on the information available at present. It is noted that the infiltration rate adopted for this assessment is based on a single soakage test location, however, full scale BRE 365 soakage tests will be carried out for this site prior to the commencement of the building regulations submission.

Proposed Foul Water Drainage

5.10 The proposed foul water drainage strategy is shown on Drawings 020.5383-003 & 004 in Appendix H and is a traditional gravity fed pipe and manhole system, which outfalls to the existing foul sewer in Washington Road.

5.11 As has been previously noted in Paragraph 3.4, the nearest public foul water sewer is shown on the sewer records to be approximately 150 m to the south-west of the site. The development proposals involve the construction of 6 residential dwellings, and based on the Sewers for Adoption design criteria of 4,000 litres per dwelling per day, the design discharge would be 0.27 l/s.

5.12 Southern Water have not been approached to carry out a capacity check, however, it is generally acknowledged that capacity checks are not required for developments of less than 10 units. Under the new charging rules for foul sewerage, the infrasturcuture charges are deemed to cover any necessary upgrades

6. SUMMARY AND RECOMMENDATIONS

6.1 This Flood Risk Assessment has been prepared by Paul Basham Associates to support a planning application for MiBri Ltd's proposed residential development of the land at Angel Sandpit Storrington. The site is approximately 1.16 ha in total area and is currently open scrubland.

6.2 The development proposals involve the erection of six no. residential dwellings consisting of one no. five bedroom house; three no. four bedroom house and two no. two bedroom houses with associated landscaping and access improvements to Heather Way at Angell Sandpit, Storrington

6.3 It has been identified that the site falls wholly within Flood Zone 1, an area with a low risk of flooding due to rivers or tidal waters. Because of this, no Sequential of Exception Testing is required.

6.4 The site has been assessed for all sources of flood risk such as rivers, groundwater, canals, reservoirs, surface water (pluvial flooding), and sewers. It was concluded that flood risk to the site and the proposed development is generally low. Any potential risk from surface water (pluvial) flooding could be mitigated against by ensuring an adequate on-site drainage system, in conjunction with appropriate threshold levels for buildings above the adjacent ground. It will also be important to ensure that hardstanding areas slope away from buildings.

6.5 The existing site is greenfield, and it is assumed that any direct rain fall would infiltrate into the soil due to the permeable nature of the underlying sand geology. The proposed surface water drainage strategy would drain towards the south of the site and would utilise soakaways and areas of permeable paving around the site to discharge the surface water run-off created by the impermeable areas into the underlying ground. The most important design factor will be the infiltration rates around the site, which will need to be confirmed through further on-site testing prior to the building regulations submission.

6.6 The development site is greenfield and does not currently generate a foul water discharge. The proposed foul water drainage strategy is a traditional gravity fed pipe and manhole system, which outfalls to the existing public Sewer in Washington Road

6.7 Southern Water have not been approached to carry out a capacity check, however, it is generally acknowledged that capacity checks are not required for developments of less than 10 units. Under the new charging rules for foul sewerage, the infrasturcuture charges are deemed to cover any necessary upgrades

6.8 It is important to note that the surface and foul water strategies outlined in this report may not necessarily form the final design. It is simply a demonstration of the most suitable and technically feasible designs for the proposed development, based on the information available at present. Site constraints and economic appraisals undertaken as part of the design stage may result in suitable amendments to the current strategies.

6.9 This FRA has been prepared taking into account the National Planning Policy Framework Technical Guidance and the EA Flood Risk Standing Advice. This report has quantified the flood risk posed to the proposed development as being low. The drainage of surface water run-off generated by the site has also been considered to ensure that it is managed in a sustainable manner and would not pose an adverse effect on the flood risk to the site or the surrounding area.

6.10 It is therefore concluded that the proposed development of the site would be acceptable in the context of flood risk and drainage.

Appendix A

CDM 2015 Health & Safety Information

This information relates only to 'Significant Hazards' identified on this drawing and is to be read in conjunction with the Designer's Hazard Register.

KEY:-

1. SSSI 15m BUFFER ZONE
2. 45m DISTANCE FROM GRADE 2 LISTED BUILDING - CHESTNUT COTTAGE
3. INSECT AND BUTTERFLY LANDSCAPE BUND
4. EXISTING BOUNDARY FENCING - CHESTNUT PALING RETAINED AND OR REINSTATED
5. EXISTING POST AND RAIL FENCE
6. TREES TO BE REMOVED - SEE AGRICULTURALIST DWGS
7. TIMBER SLEEPER RETAINING PLANTERS
8. POST AND RAIL FENCING WITH NEW HEDGE AND TREES TO MAINTAIN PRIVACY BETWEEN PLOTS
9. FEATURE STEPS BETWEEN SMALL WOODLAND
10. NEW SMALL COMMUNITY WOODLAND
11. NEW SITE ENTRANCE TO HIGHWAY ENGINEERS DESIGN
12. PAVED PATIO AREA
13. REFUSE TURNING AREA
14. BIN COLLECTION POINT

+77.00 - *existing levels*
+78.20 - **proposed levels**



SITE PLAN

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Rev	Date	Revision Details	Dr	Ch
P3	11.05.20	PLOT 6 REPOSITIONED	JT	MN
P2	11.05.20	PLOT 4,5,6 REPOSITIONED	JT	MN
P1	26.07.18	ISSUED FOR PLANNING	JT	MN

London: 76 Great Suffolk Street, London, SE1 0BL, T 0207 928 2773 E london@ecearchitecture.com
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ECE Architecture
www.ecearchitecture.com

Client's Name
MIBRI

Job Title
Angel Sandpit

Drawing Title
Proposed Site Plan

Scale
1:250 @ A0 / 1:500 @ A2
metres 5 10 15 20 25

Drawn	Checked	Date
JT	MG	18.07.18

Job No	Drawing No	Rev
6545	100	P3

Status
APPROVAL

CAD Plot date: 11/05/2020 - 15:33:54 — 6545 - site plan.dwg

Appendix B

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LEGEND:

SITE BOUNDARY.

Rev	Description	Date	By	Chkd
-	-	--.--.--	--	--

paul basham associates

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Client: MiBri Limited

Project Name: ANGELS SANDPIT, WASHINGTON ROAD STORRINGTON, WEST SUSSEX

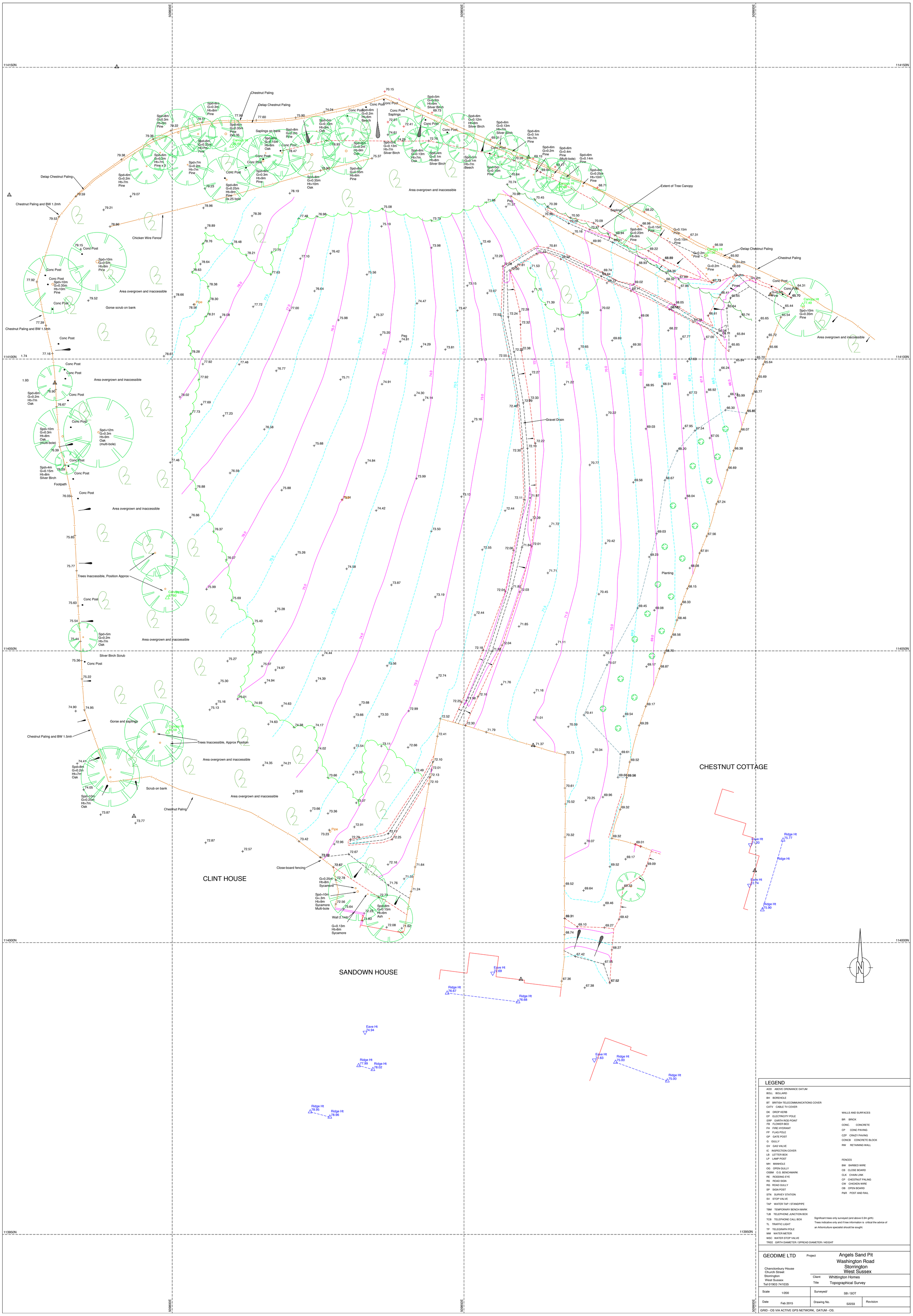
Title: SITE SURVEY: PRE-FILL

Project Phase: PRELIMINARY

Checked By	Checked Date	Drawn By	Drawn Date
RW	26.07.18	RL	26.07.18

Client Drawing No.	Scale	
-	1:500	(ATA1 SIZE)

PBA Drawing No.	Revision
020.5383.001	-



LEGEND

AOD ABOVE ORDNANCE DATUM
BOLL BOLLARD
BH BOREHOLE
BT BRITISH TELECOMMUNICATIONS COVER
CATV CABLE TV COVER
DK DROP KERB
EP ELECTRICITY POLE
ERP EARTH ROD POINT
FB FLOWER BED
FH FIRE HYDRANT
FP FLAG POLE
GP GATE POST
G GULLY
GV GAS VALVE
IC INSPECTION COVER
LB LETTER BOX
LP LAMP POST
MH MANHOLE
OG OPEN GULLY
OSBM O.S. BENCHMARK
RE RODDING EYE
RS ROAD SIGN
RG ROAD GULLY
SP SIGN POST
STN SURVEY STATION
SV STOP VALVE
TAP WATER TAP / STANDPIPE
TBM TEMPORARY BENCH MARK
TJB TELEPHONE JUNCTION BOX
TCB TELEPHONE CALL BOX
TL TRAFFIC LIGHT
TP TELEGRAPH POLE
WM WATER METER
WSC WATER STOP VALVE
TREE GIRTH DIAMETER / SPREAD DIAMETER / HEIGHT

WALLS AND SURFACES
BR BRICK
CONC. CONCRETE
CP CONC PAVING
CZP CRAZY PAVING
CONCB CONCRETE BLOCK
RW RETAINING WALL

FENCES
BW BARBED WIRE
CB CLOSE BOARD
CLK CHAIN LINK
CP CHESTNUT PALING
CW CHICKEN WIRE
OB OPEN BOARD
P&R POST AND RAIL

Significant trees only surveyed (and above 0.3m girth)
Trees indicative only and if tree information is critical the advice of an Arboriculture specialist should be sought.

GEODIME LTD
Chanctonbury House
Church Street
Storrington
West Sussex
Tel 01903 741035

Project: Angels Sand Pit
Washington Road
Storrington
West Sussex

Client: Whittington Homes
Title: Topographical Survey
Scale: 1/200
Surveyed/: SB / SOT
Date: Feb 2015
Drawing No.: S2233
Revision:

GRID - OS VIA ACTIVE GPS NETWORK, DATUM - OS.

Appendix C



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LEGEND:

SITE BOUNDARY.

Rev	Description	Date	By	Chkd
-	-	--.--.--	--	--

paulbasham associates

Paul Basham Associates Ltd
Lancaster Court, 8 Barnes Wallis Road, Fareham, PO15 5TU
01489 668134
info@paulbashamassociates.com www.paulbashamassociates.com

Client

MiBri Limited

Project Name
ANGELS SANDPIT, WASHINGTON ROAD
STORRINGTON, WEST SUSSEX

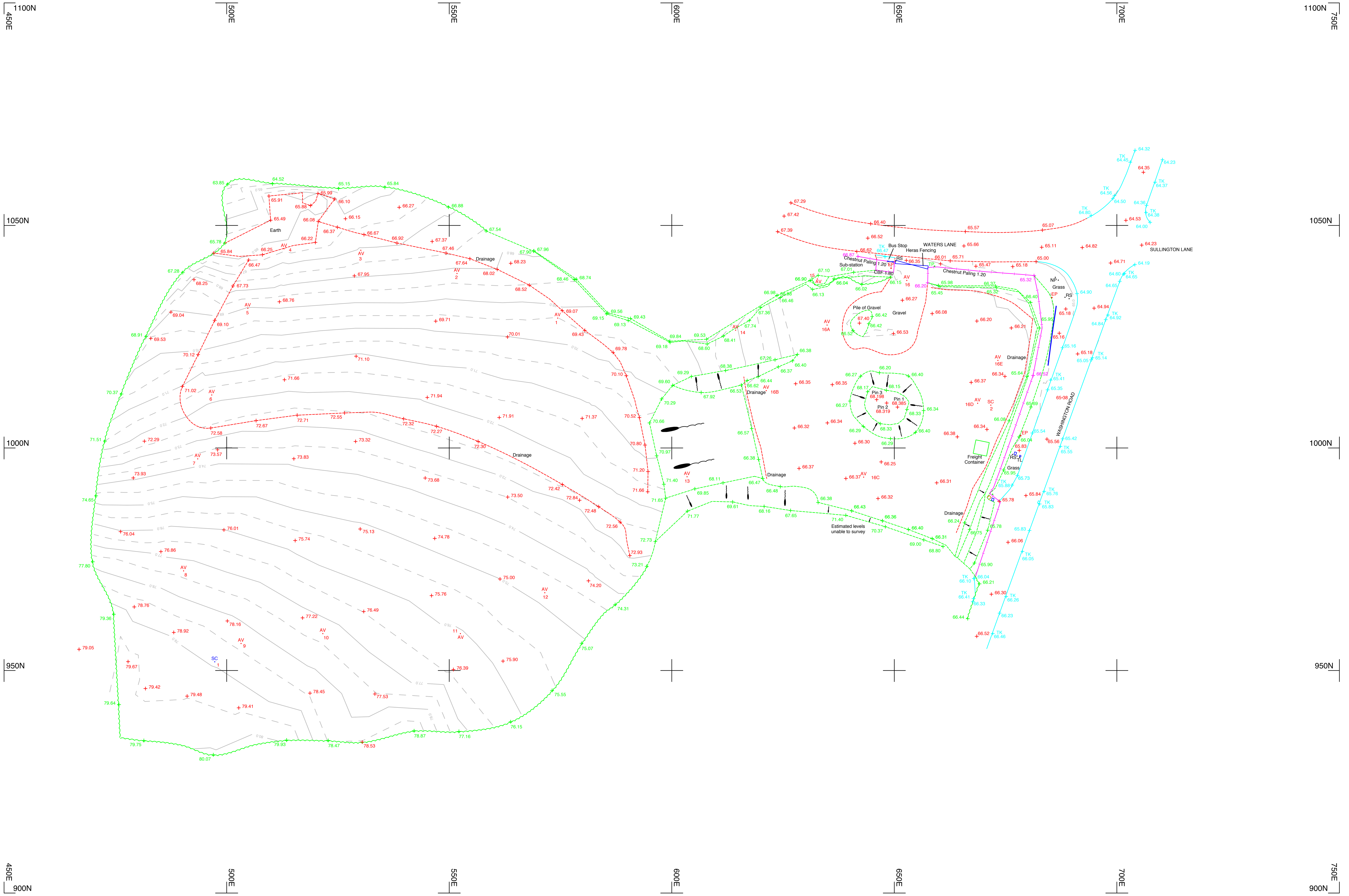
Title
SITE SURVEY: POST-FILL

Project Phase
PRELIMINARY

Checked By	Checked Date	Drawn By	Drawn Date
RW	26.07.18	RL	26.07.18

Client Drawing No.	Scale
-	1:500 (ATTA1 SIZE)

PBA Drawing No.	Revision
020.5383.002	-



1100N
450E
500E
550E
600E
650E
700E
750E
1050N
1000N
950N
900N
Earth
Drainage
Bus Stop
WATERS LANE
Heras Fencing
Chestnut Paling 1.20
Sub-station
CBF 1.80
Chestnut Paling 1.20
SULLINGTON LANE
NP
Grass
RS
EP
TP
Pile of Gravel
Gravel
Pin 1
Pin 2
Pin 3
Freight Container
WASHINGTON ROAD
Estimated levels unable to survey

Appendix D

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Rob Wilson
Site name:	Angel Sandpit North
Site location:	Storrington

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude:	50.91798° N
Longitude:	0.43815° W

Reference:	6396433
Date:	2018-07-03T16:31:57

Methodology	IH124

Site characteristics

Total site area (ha)	1.16

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	1	1
HOST class	---	---
SPR/SPRHOST	0.1	0.1

Hydrological characteristics

	Default	Edited
SAAR (mm)	902	902
Hydrological region	7	7
Growth curve factor: 1 year	0.85	0.85
Growth curve factor: 30 year	2.3	2.3
Growth curve factor: 100 year	3.19	3.19

Notes:

(1) Is Q_{BAR} < 2.0 l/s/ha?

Normally limiting discharge rates which are less than 2.0 l/s/ha are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consents are usually set at 5.0l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite may be a requirement for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	0.26	0.26
1 in 1 year (l/s)	0.22	0.22
1 in 30 years (l/s)	0.6	0.6
1 in 100 years (l/s)	0.84	0.84

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for use of this data in the design or operational characteristics of any drainage scheme.

Appendix E

Premier Energy
Premier House
Daux Road
Billingshurst
West Sussex
RH14 9SJ

Your ref	Angel Pit, Storrington
Our ref	275958
Date	11 January 2018
Contact	searches@southernwater.co.uk Tel 0845 272 0845 0330 303 0276 Fax 01634 844514

Attention: Hannah Stalley

Dear Customer

Re: Provision of public sewer and water main record extract

Location: Angel Pit, Water Lane, Storrington, RH20 4DE

Thank you for your order regarding the provision of extracts of our sewer and/or water main records. Please find enclosed the extracts from Southern Water's records for the above location.

We confirm payment of your fee in the sum of £49.92 and enclose a VAT receipt for your records.

Customers should be aware that there are areas within our region in which there are neither sewers nor water mains. Similarly, whilst the enclosed extract may indicate the approximate location of our apparatus in the area of interest, it should not be relied upon as showing that further infrastructure does not exist and may subsequently be found following site investigation. Actual positions of the disclosed (and any undisclosed) infrastructure should therefore be determined on site, because Southern Water does not accept any responsibility for inaccuracy or omission regarding the enclosed plan. Accordingly it should not be considered to be a definitive document.

Should you require any further assistance regarding this matter, please contact the LandSearch team.

Yours faithfully

LandSearch

VAT receipt

Ordered by:

Premier Energy
Daux Road
Billingshurst
West Sussex
RH14 9SJ

VAT registration number: 813 0378 56
Order reference: 275958
Your reference: Angel Pit, Storrington

Receipt for provision of an extract from the public sewer and/or water main records.

Location	Costs
Angel Pit Water Lane Storrington RH20 4DE	£41.60
Net total	£41.60
VAT	£8.32
Total	£49.92
Paid	**Paid in full**

Thank you for your payment:

Received on: 10 January 2018

For enquiries regarding the information provided in this receipt, please contact the LandSearch team:

Tel: 0845 270 0212
0330 303 0276 (individual consumers)

Email: searches@southernwater.co.uk

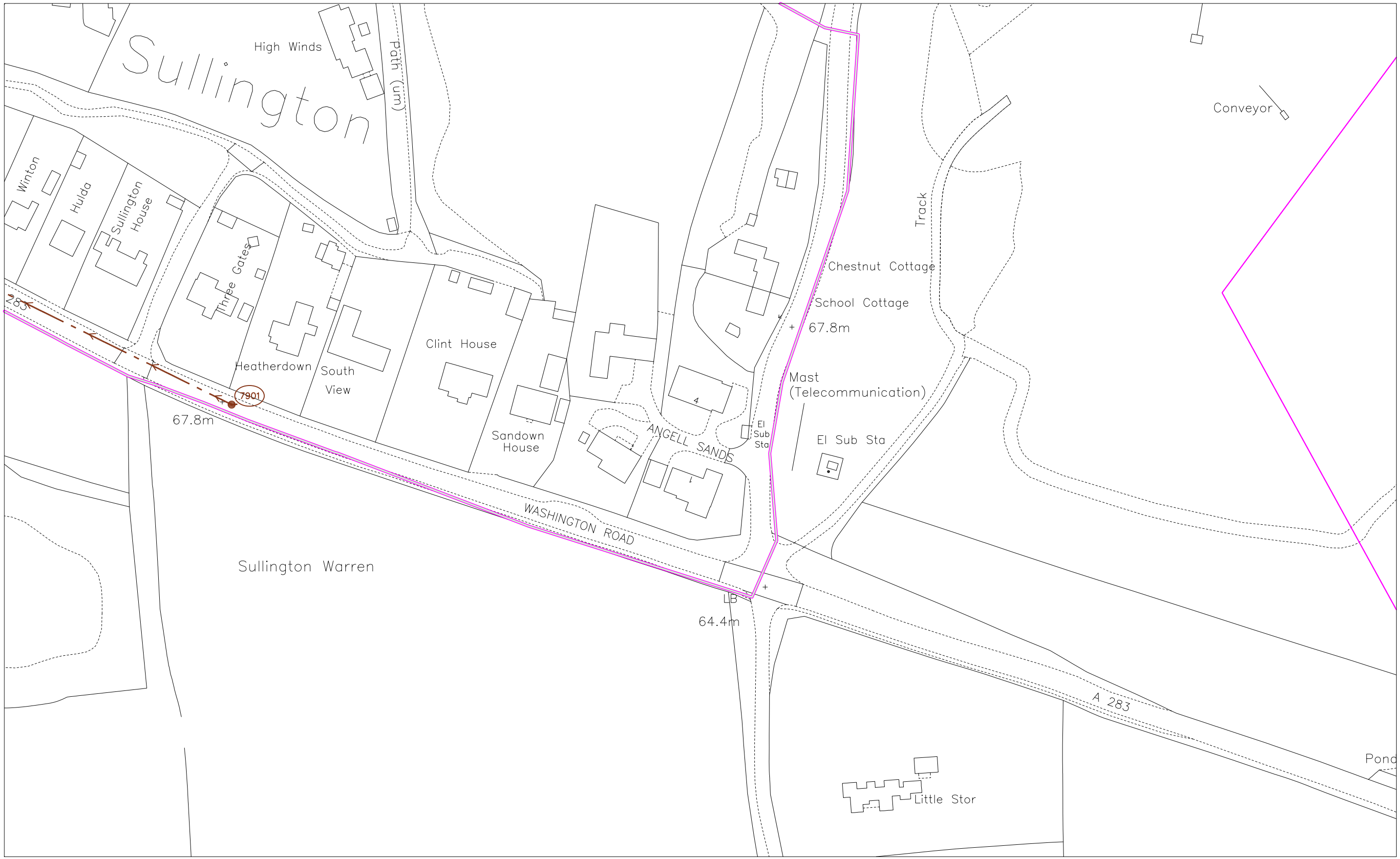
Web: www.southernwater.co.uk

LandSearch
Southern Water Services
Southern House
Capstone Road
Chatham
Kent
ME5 7QA

Southern Water

SEWER RECORDS PAGE 1 OF 2

114106



113818

509645

510118

O.S. REF. TQ0913NE	Drawn by: yadavsa	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determnined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may Include Bonded Asbestos Cement
	Scale: 1:1250	
Title: 275958_Angel Pit, Water Lane,	Date: 11/01/2018	Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.

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Southern Water

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
7901X	67.89	66.23	150	CP	CIRC																		

LINE STYLES / COLOURS

Brown	Foul
	Foul Syphon Sewer
	Foul Vacuum Main
	Foul Rising Main
Red	Combined
	Combined Syphon Sewer
	Combined Rising Main
	Lateral Drain
Orange	Building Over Agreement Area
Dark Blue	Treated Effluent
Purple	Sludge
	Sewer Catchment
	Section 104 Area
Light Blue	Surface Water
	Surface Water Rising Main
Yellow	Private
Green	Access Shaft
	Decommissioned

MATERIALS

AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
XXX	Other
ZZZ	Unknown

LEGEND - SEWERS

Manhole (SW)	Washout (SW)	Other (s)	Wastewater treatment works
Manhole (F&C)	Washout (F&C)	Other	Martne treatment works
Lamp hole (SW)	Rodding Eye (SW)	Change in sewer (s)	Outfall headworks
Lamp hole (F&C)	Rodding Eye (F&C)	Change in sewer	Vent
Pumping Station (SW)	Gauging point (SW)	Reflux valve	Vent column
Pumping Station (F&C)	Gauging point (F&C)	Flap valve	Tidal storage tank
Side entry manhole (SW)	Intercept chamber (SW)	Cascade	Blank end
Side entry Manhole (F&C)	Intercept chamber (F&C)	Anode	Head of Public Sewer
Blind shaft (SW)	Storm Tank (SW)	Valve	Micro Pumping Station
Blind shaft (F&C)	Storm Tank (F&C)	Closed Valve	
Ejector station (SW)	Vortex chamber (SW)	Air Valve	
Ejector station (F&C)	Vortex chamber (F&C)	Hatch box (SW)	
Watertight door (SW)	Label ellipse	Hatch box (F&C)	
Watertight door (F&C)	Dummy/S24 manhole	Direction arrow	
Flushing ch. Mn-e (SW)	Outfall	Emptying valve	
Flushing ch. Mn-e (F&C)	Penstock chamber	Catchpit	
Flushing ch. No-e (SW)	Damboards	Soakaway	
Flushing ch. No-e (F&C)	Storm Overflow	Inlet	
Demarcation Chamber	Backdrop manhole	Balancing Pond	

SHAPES (S)

A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

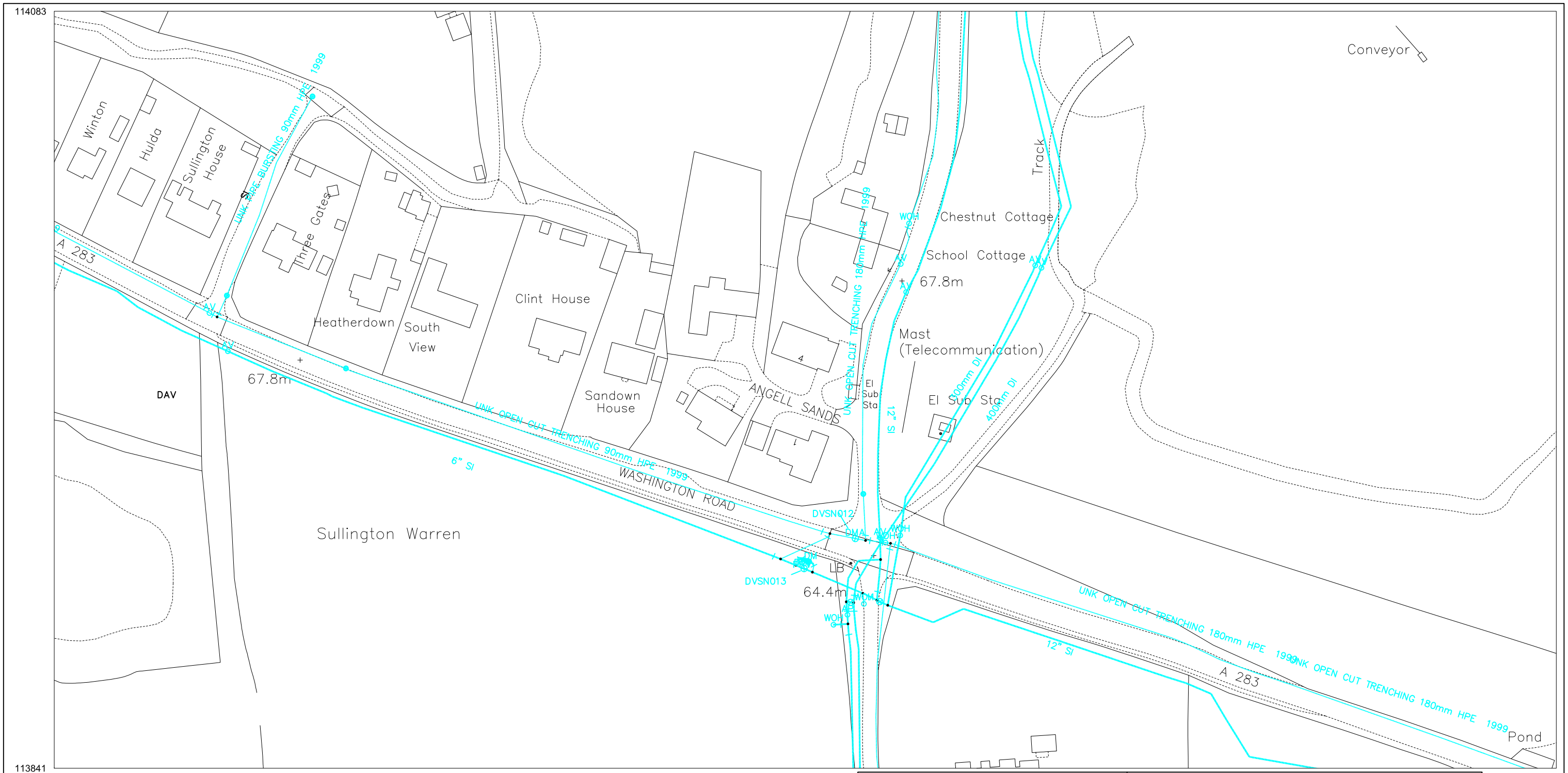
NODE REFERENCING SYSTEM

1st digit: hundred metre easting identifier
2nd digit: hundred metre northing identifier
sewer type identifier
3rd digit: 0-4 = Foul/Combined
5-9 = Surface Water
4th digit: next sequential node

Drawn by:	yadavsa
Title:	275958_Angel Pit, Water Lane,
Date:	11/01/2018

Southern Water

114083



113841 509640 510123

LEGEND - MAINS

- Distribution Main / Communication pipe
- Trunk Main
- Raw water main (RAW)
- Non potable (NP)
- Abandoned main
- Proposed Main (P P)
- Fire main (FM)
- Non SWS
- Sluice valve
- Closed valve
- Air valve (AV)
- Butterfly valve
- Pressure reducing valve
- Reflux valve
- Motorised valve (mv)
- Clockwise closing valve
- Fire Hydrant
- Washout (WO)
- Washout hydrant (WOH)
- Meter (M)
- Capped end
- Emptying plug (EP)
- Stopcock
- Leak Noise Correlator Survey Point (SP)
- Anode (AN)
- Telemetry cable (TC)
- Access point / hatchbox (AP)
- Dialysis machine (D)
- Break pressure tank (BPT)
- Change node
- Pumping station
- Booster station
- Insertion Flow Meter Point
- Water tower
- Service reservoir
- Water Supply Works
- Bore hole / Well
- Intake
- Customer site
- Swab insertion point

MATERIALS

Alkathene	AK
Cast iron	CI
Spun (grey) iron	SI
Concrete	CO
Ductile iron	DI
Bonded Asbestos Cement	BAC
Glass reinforced plastic	GRP
Glass reinforced epoxy	GRE
(Unplasticised) Polyvinyl chloride	PVC
Polyethylene	PE
Steel	ST
Concrete segments bolted	CSB
Concrete segments unbolted	CSU
Galvanised iron	GI
Ductile sleeve	DS
Concrete pre-stressed	CPS
High performance polyethelene	HPE
Unknown	??

WARNING: BAC pipes are constructed of Bonded Asbestos Cement

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

Drawn by:	yadavsa
Scale:	1:1250
Date:	11/01/2018

O.S.Ref: TQ0913NE

TITLE: 275958_Angel Pit, Water Lane,

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd. accept no responsibility in the event of inaccuracy. The actual positions of pipes should be determined on site.

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Southern Water

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Appendix F

4th December 2017

Our ref: GE16049/FG01/171204

Marcel Hoad
Fowlers Estate Agents
c/o ECE Planning
Brooklyn Chambers
11 Goring Road
Worthing
West Sussex
BN12 4AP

Dear Marcel,

RE: Angel's Sandpit, Storrington

Geo-Environmental Services Limited (Geo-Environmental) was instructed by Fowlers Estate Agents to undertake the construction of a borehole extending into natural ground beneath the site and to undertake falling head permeability testing within the natural ground at the above named site.

The purpose of this investigation was to ascertain the infiltration values of the underlying strata and thus to inform the emerging drainage strategy for the proposed and existing development.

Scope of Works

The following scope of works was agreed with the Client:

- Construction of 1No. cable percussive borehole to depths of up to 40m bgl, depending on drilling conditions and the depth at which natural ground was encountered, using a cable percussive drilling rig.
- Borehole falling head permeability testing at intervals within Made Ground and underlying natural ground.

The intrusive investigation was undertaken between 21st and 24th November 2017 with the works supervised by a Geo-Environmental Engineer.

Ground Conditions

The ground conditions encountered during the investigation were broadly consistent with the anticipated published sequence of strata. In summary, ground conditions typically comprised a mantle of Made Ground overlying the Folkestone Formation.

Made Ground was encountered to a depth of 8.7m bgl and typically consisted of dark brown/ black greyish sandy clay with frequent f/m comprising brick, flint, concrete and wood, which was noted to be consistent with previous investigations undertaken in relation to the wider site.

Soils inferred to be the Folkestone Formation were encountered from beneath the Made Ground to the base of the investigation borehole 25m bgl. The deposits were of a mixed composition and comprised clayey fine to coarse sand and fine to coarse sand.

Figure 2 presents the borehole investigation location undertaken. For more a detailed descriptions of the ground conditions, reference should be made to the exploratory hole log enclosed in Appendix A.

Obstructions

No obstructions were encountered during the investigation works, but drilling conditions became difficult and the borehole was terminated at 25m bgl, due to the dense nature of the sands encountered.

Groundwater

Slight groundwater seepages where inferred during the drilling however resting groundwater was not encountered during the investigation works. The borehole was cased for stability and as such this may have hindered to identification of groundwater seepages. Areas of instability were identified within the underlying natural soils on the site which may be linked to the presence of groundwater.

Variable Head Permeability Testing

Variable Head permeability testing was undertaken at 4No. depths within the borehole. The following preliminary infiltration rates were calculated for the tests undertaken:

- 9m bgl - calculated as 3.96 x 10^{-3}m/s.
- 20m bgl - calculated as 3.32 x 10^{-5}m/s, and
- 25m bgl - calculated as 1.59 x 10^{-4}m/s.

There was an insufficient fall in head to calculate an infiltration rate for the test undertaken at 15m bgl as water levels increased during the testing period. Therefore this test is considered unsuccessfully potentially due to instabilities within the borehole during the testing period. The permeability testing results are present in Appendix B.

The results from the variable head permeability testing to date do indicate that discharge of storm water to the ground could be achievable on this site. However, initial assessment of the permeability test results indicates that a conventional soakaways would be unlikely to achieve 50% volume discharge in a 24 hour period and thus an allowance for some form of storage and attenuation during periods of peak flow may be required.

Closure

We trust we have interpreted your request correctly and provided sufficient information for your current requirements. If you have any questions or queries in relation the information provided at this stage please let us know.

Yours sincerely
For and on Behalf of Geo-Environmental

FIONA GOODE BSc (Hons), MSc, FGS, MIEnvSc, RSoBRA
Senior Consultant Engineer
fiona.goode@gesl.net

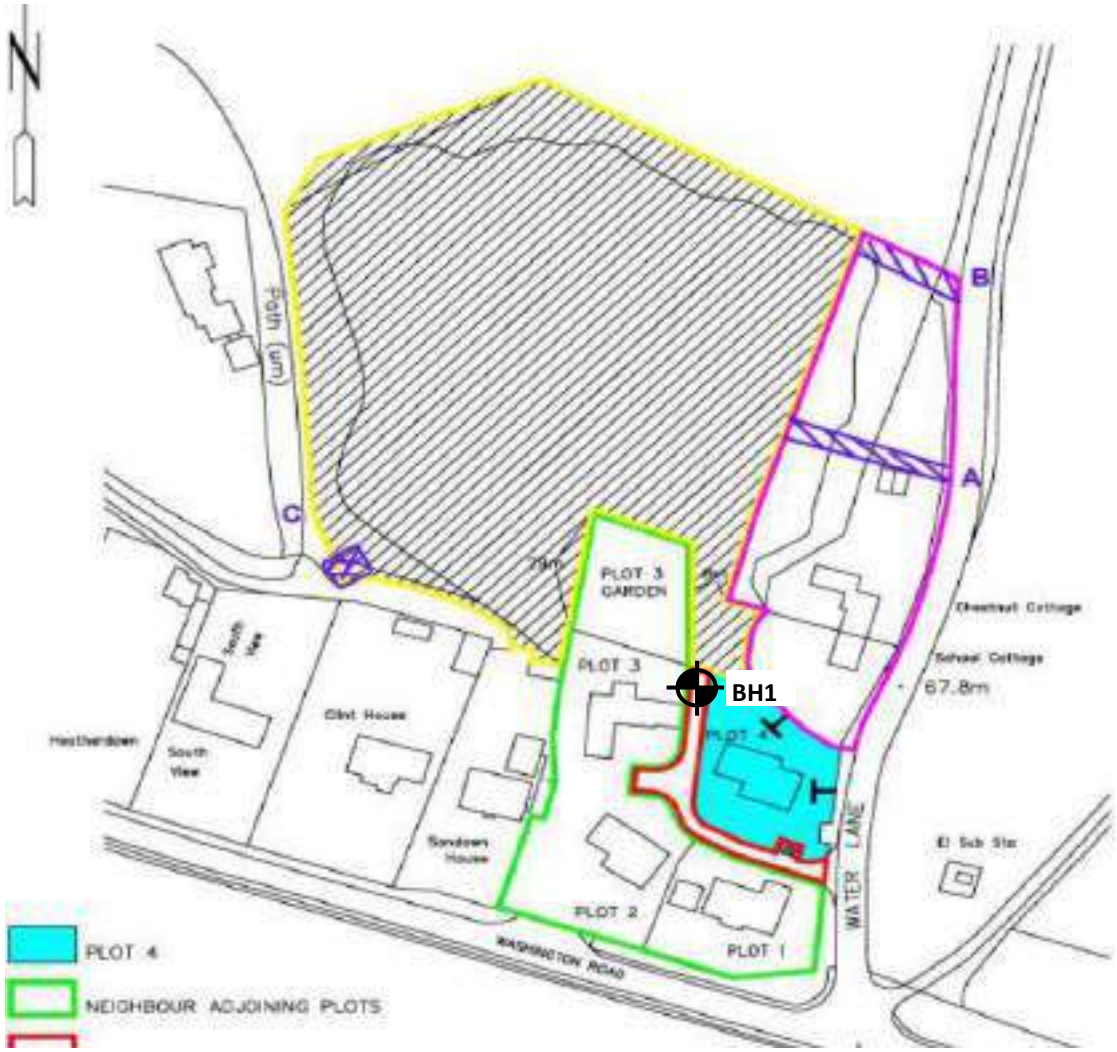
Enc. Figure 1 - Site Location Plan
Figure 2 - Borehole Investigation Location
Appendix A - Exploratory Hole Logs
Appendix B - Falling Head Permeability Results

FIGURES





Project:	Angels Sandpit, Storrington			**Title**	Borehole Location Plan
Client:	Fowlers Estate Agents			**Geo-Environmental Services Ltd** **Unit 7 Danworth Farm, Cuckfield Road** **Hurstpierpoint, West Sussex BN6 9GL** **+44(0)1273 832972 www.gesl.net**	Geo-Environmental
Ref No:	GE16049	**Revision:**	0		
Drawn:	FG	**Date:**	15/11/2017		
Figure:	1	**Scale:**	Not To Scale		



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BH1 to be located in the gravel driveway area between Plot 3 and Plot 4. To be site to the north of any possible services assocaited with Plot 3. Site engineer to advise on final location

Project:	Angels Sandpit, Storrington			**Title**	Borehole Location Plan
Client:	Fowlers Estate Agents			**Geo-Environmental Services Ltd**	
Ref No:	GE16049	**Revision:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	FG	**Date:**	15/11/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:	2	**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	Geo-Environmental

Geo-Environmental

APPENDIX A

Exploratory Hole Logs



Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Borehole Log	Borehole No. **BH1** Sheet 1 of 3

Project Name:	Angels Sandpit, Storrington	Project No. GE16049	Co-ords: 509872E - 114002N	Hole Type CP
Location:	Storrington		Level:	Scale 1:50
Client:	Fowlers Estate Agents		Dates: 21/11/2017	Logged By FG

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	B					Dark brown/ black greyish sandy CLAY with frequent f/ m brick, flint, concrete and wood MADE GROUND	
		1.00	B						1
		1.50	D						
		2.00 2.00	B S	N=5 (1,1/1,1,1,2)					2
		3.00 3.00 3.00	B D S	N=5 (1,1/1,1,2,1)					3
		4.00 4.00	B S	N=6 (1,2/1,2,1,2)					4
		4.50	D						
		5.00 5.00	B S	N=6 (1,1/2,2,1,1)					5
		6.00 6.00	B D						6
		6.50	S	N=7 (1,2/2,1,2,2)					
		7.00	B						7
					7.20			Dark brown/ black greyish slightly sandy CLAY with frequent f/m brick, flint, concrete and wood MADE GROUND	
		7.50	D						
		8.00 8.00	B S	N=10 (2,2/2,2,3,3)					8
					8.70			Dark orangish red very clayey fine to coarse SAND FOLKESTONE FORMATION	
		9.00 9.00 9.00	B D S	N=10 (1,2/3,2,3,2)					9
		10.00	B						
								Continued on Next Sheet	10

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	**Borehole Log**	Borehole No. **BH1** Sheet 2 of 3

Project Name:	Angels Sandpit, Storrington	Project No. GE16049	Co-ords: 509872E - 114002N	Hole Type CP
Location:	Storrington		Level:	Scale 1:50
Client:	Fowlers Estate Agents		Dates: 21/11/2017	Logged By FG

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		10.50	D		10.50				
		10.50	S	N=28 (2,3/4,6,6,12)				Brownish orange fine to coarse SAND FOLKESTONE FORMATION	
		11.00	B						11
		12.00	B						12
		12.00	D						
		12.00	S	100 (2,3/100 for 225mm)					
		13.00	B						13
		13.50	D						
		13.50	S	50 (3,4/50 for 75mm)					
		14.00	B						14
		15.00	B						15
		15.00	D						
		15.00	S	50 (8,25/50 for 75mm)					
		16.00	B						16
		16.50	D						
		16.50	S	50 (12,25/50 for 75mm)					
		17.00	B						17
					17.20			Pale yellowish brown fine to coarse SAND FOLKESTONE FORMATION	
		18.00	B						18
		18.00	D						
		18.00	S	50 (4,25/50 for 75mm)					
		19.00	B						19
		19.50	D						
		19.50	S	50 (3,18/50 for 75mm)					
		20.00	B						20
								Continued on Next Sheet	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Borehole Log	Borehole No. **BH1** Sheet 3 of 3

Project Name:	Angels Sandpit, Storrington	Project No. GE16049	Co-ords: 509872E - 114002N	Hole Type CP
Location:	Storrington		Level:	Scale 1:50
Client:	Fowlers Estate Agents		Dates: 21/11/2017	Logged By FG

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		21.00	B						21
		21.00	D						
		21.00	S	50 (6,25/50 for 75mm)					
		22.00	B						22
		22.50	D						
		22.50	S	57 (3,4/57 for 150mm)					
		23.00	B						23
		24.00	B						24
		24.00	D						
		24.50	S	59 (2,4/59 for 225mm)					
		25.00	B		25.00			End of Borehole at 25.00m	25
									26
									27
									28
									29
									30

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	

Geo-Environmental

APPENDIX B

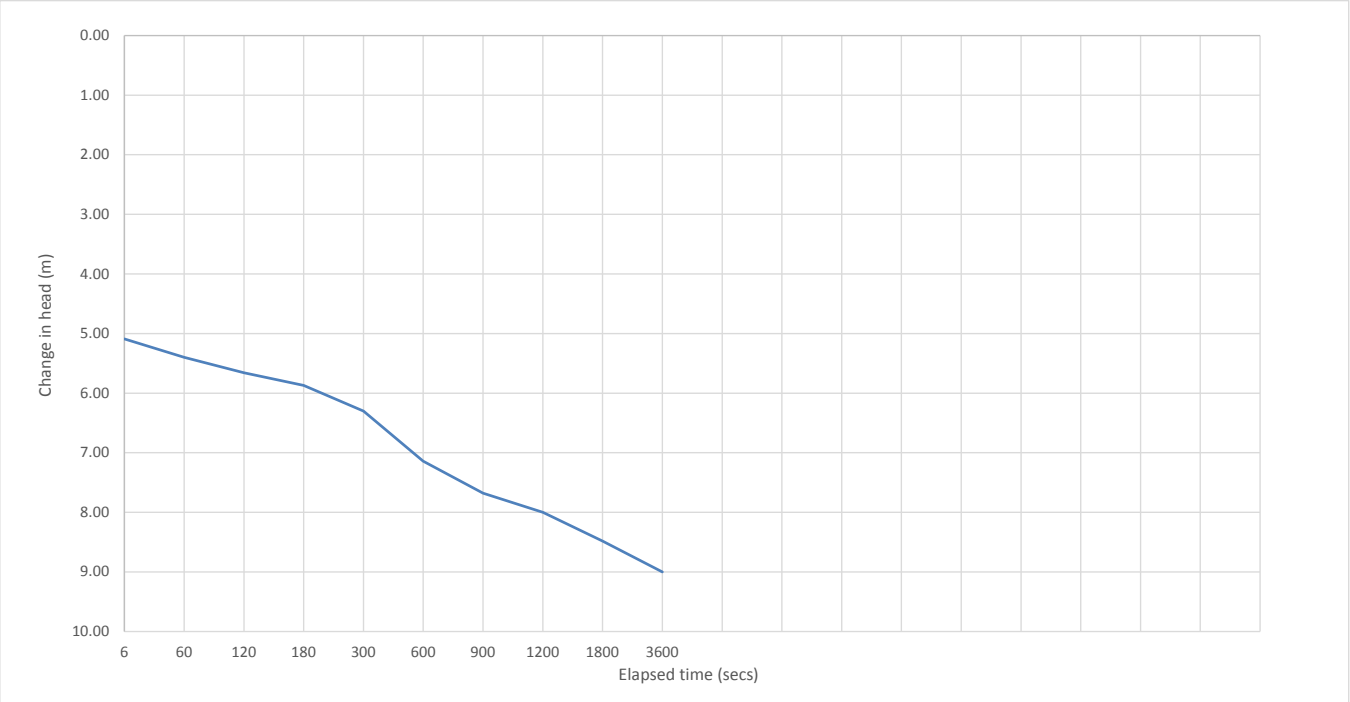
Variable Head Permeability Testing



Variable Head Permeabillity Test (after BS5930:2015 and BS EN ISO 22282:2012)

Location	Angels Sandpit	**Position**	BH1	**Date:**	30/11/2017
Borehole depth (m bgl)	9	**Standing water level (m bgl)**		-	
Casing height above ground level (m)	-	**Depth of casing below ground level (m bgl)**	3	**Casing diameter (m)**	200

Time elapsed				Depth (m)					
mins	**secs**	**total time (secs)**	**t-t0 (secs)**		**h_0**	**h_0/ht**	**ln (h_0/ht)**	**dh/dt (m/s)**	
0.1	-	6	0.00	5.09	5.09	1.00	0.00	0.00	
1	-	60	54.00	5.40	5.09	0.94	0.06	0.31	
2	-	120	114.00	5.66	5.09	0.90	0.11	0.26	
3	-	180	174.00	5.87	5.09	0.87	0.14	0.21	
5	-	300	294.00	6.30	5.09	0.81	0.21	0.43	
10	-	600	594.00	7.14	5.09	0.71	0.34	0.84	
15	-	900	894.00	7.68	5.09	0.66	0.41	0.54	
20	-	1200	1194.00	8.00	5.09	0.64	0.45	0.32	
30	-	1800	1794.00	8.48	5.09	0.60	0.51	0.48	
60	-	3600	3594.00	9.00	5.09	0.57	0.57	0.52	



Shape Factor F (from BS EN ISO 22282-1

L =	3.91
D =	200.00
L/D =	0.02
F=	**1256.72**

Permeability (from BS EN ISO 22282-2)

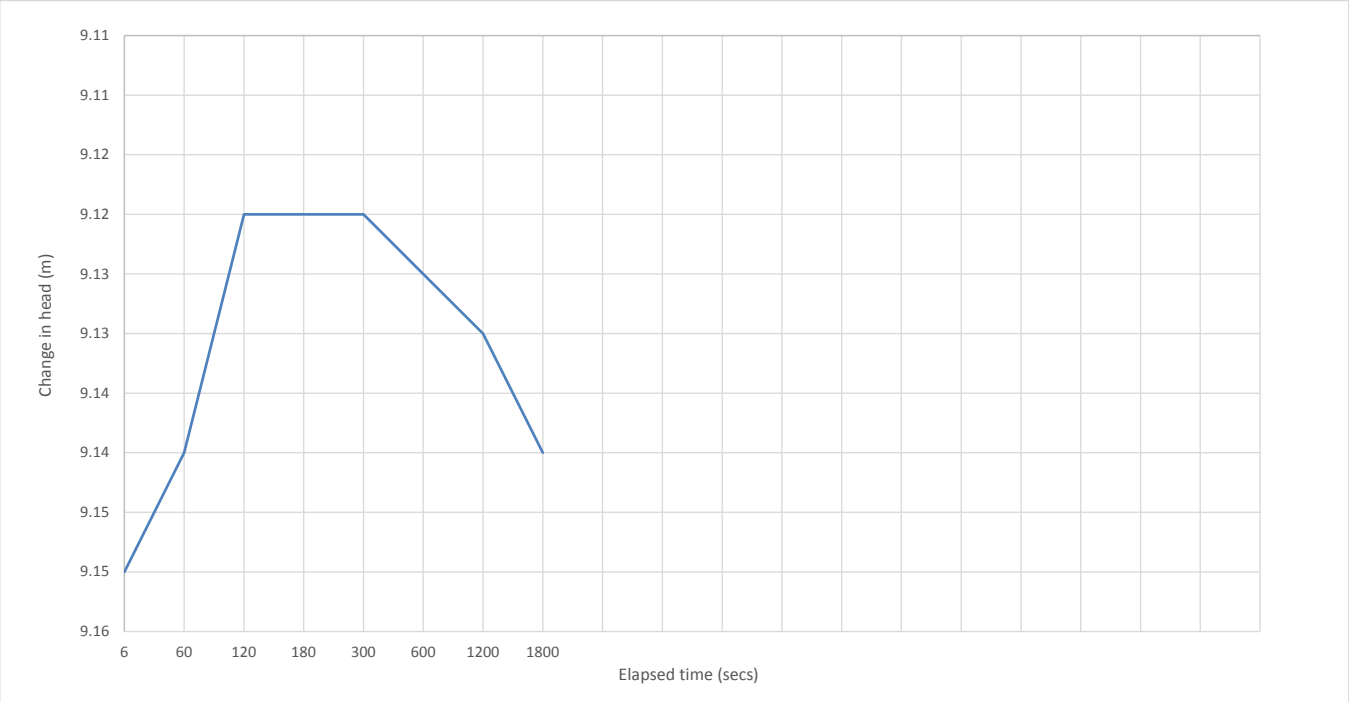
t0	6.00		
t	3600.00		
h0	5.09		
h	9.00		
S =	31415.9265		
k =	**-3.96E-03**	m/s	(negative value means falling head of water)

Project:	Angels Sandpit, Storrington			**Title**	BH1 Variable Head Permeability Test (9m)
Client:	Fowlers Estate Agents			**Geo-Environmental Services Ltd**	
Ref No:	GE16049	**Rev:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	FG	**Date:**	30/11/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:	N/A	**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	

Variable Head Permeabillity Test (after BS5930:2015 and BS EN ISO 22282:2012)

Location	Angels Sandpit	**Position**	BH1	**Date:**	30/11/2017
Borehole depth (m bgl)	15m	**Standing water level (m bgl)**		13.2	
Casing height above ground level (m)	-	**Depth of casing below ground level (m bgl)**	15	**Casing diameter (m)**	150

Time elapsed				Depth (m)	h_0	h_0/ht	ln (h_0/ht)	dh/dt (m/s)	
mins	secs	total time (secs)	t-t0 (secs)						
0.1	-	6	0.00	9.15	9.15	1.00	0.00	0.00	
1	-	60	54.00	9.14	9.15	1.00	0.00	-0.01	
2	-	120	114.00	9.12	9.15	1.00	0.00	-0.02	
3	-	180	174.00	9.12	9.15	1.00	0.00	0.00	
5	-	300	294.00	9.12	9.15	1.00	0.00	0.00	
10	-	600	594.00	9.13	9.15	1.00	0.00	0.01	
20	-	1200	1194.00	9.13	9.15	1.00	0.00	0.01	
30	-	1800	1794.00	9.14	9.15	1.00	0.00	0.01	



Shape Factor F (from BS EN ISO 22282-1

L =	0.03
D =	150.00
L/D =	0.00
F=	**942.48**

Permeability (from BS EN ISO 22282-2)

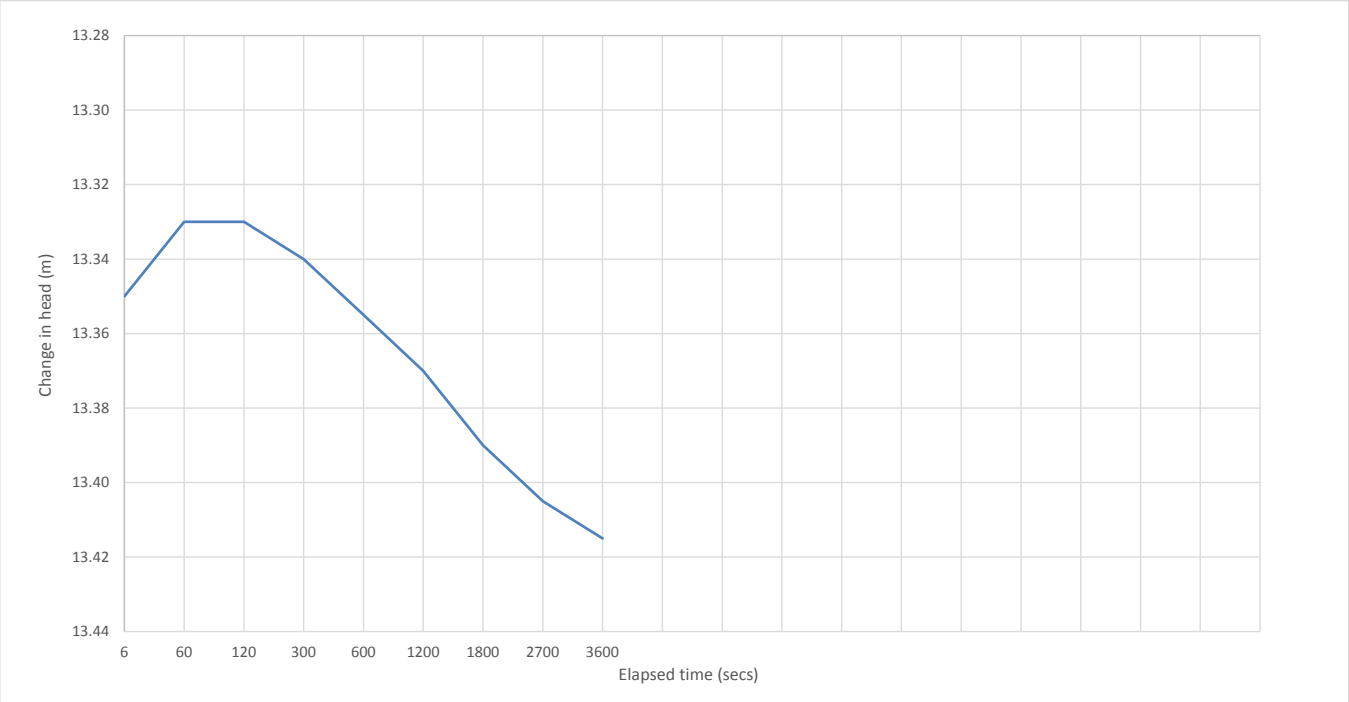
t0	6.00		
t	1800.00		
h0	9.12		
h	9.15		
S =	17671.4587		
k =	**-3.43E-05**	m/s	(negative value means falling head of water)

Project:	Angels Sandpit, Storrington			**Title**	BH1 Variable Head Permeability Test (15m)
Client:	Fowlers Estate Agents			**Geo-Environmental Services Ltd**	
Ref No:	GE16049	**Rev:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	FG	**Date:**	30/11/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:	N/A	**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	

Variable Head Permeabillity Test (after BS5930:2015 and BS EN ISO 22282:2012)

Location	Angels Sandpit	**Position**	BH1	**Date:**	30/11/2017
Borehole depth (m bgl)	20	**Standing water level (m bgl)**		17.5	
Casing height above ground level (m)	-	**Depth of casing below ground level (m bgl)**	20	**Casing diameter (m)**	150

Time elapsed				Depth (m)					
mins	secs	total time (secs)	t-t0 (secs)		h_0	h_0/ht	ln (h_0/ht)	dh/dt (m/s)	
0.1	-	6	0.00	13.35	13.35	1.00	0.00	0.00	
1	-	60	54.00	13.33	13.35	1.00	0.00	-0.02	
2	-	120	114.00	13.33	13.35	1.00	0.00	0.00	
5	-	300	294.00	13.34	13.35	1.00	0.00	0.01	
10	-	600	594.00	13.36	13.35	1.00	0.00	0.02	
20	-	1200	1194.00	13.37	13.35	1.00	0.00	0.01	
30	-	1800	1794.00	13.39	13.35	1.00	0.00	0.02	
45	-	2700	2694.00	13.41	13.35	1.00	0.00	0.01	
60	-	3600	3594.00	13.42	13.35	1.00	0.00	0.01	



Shape Factor F (from BS EN ISO 22282-1

L =	0.08
D =	150.00
L/D =	0.00
F=	**942.48**

Permeability (from BS EN ISO 22282-2)

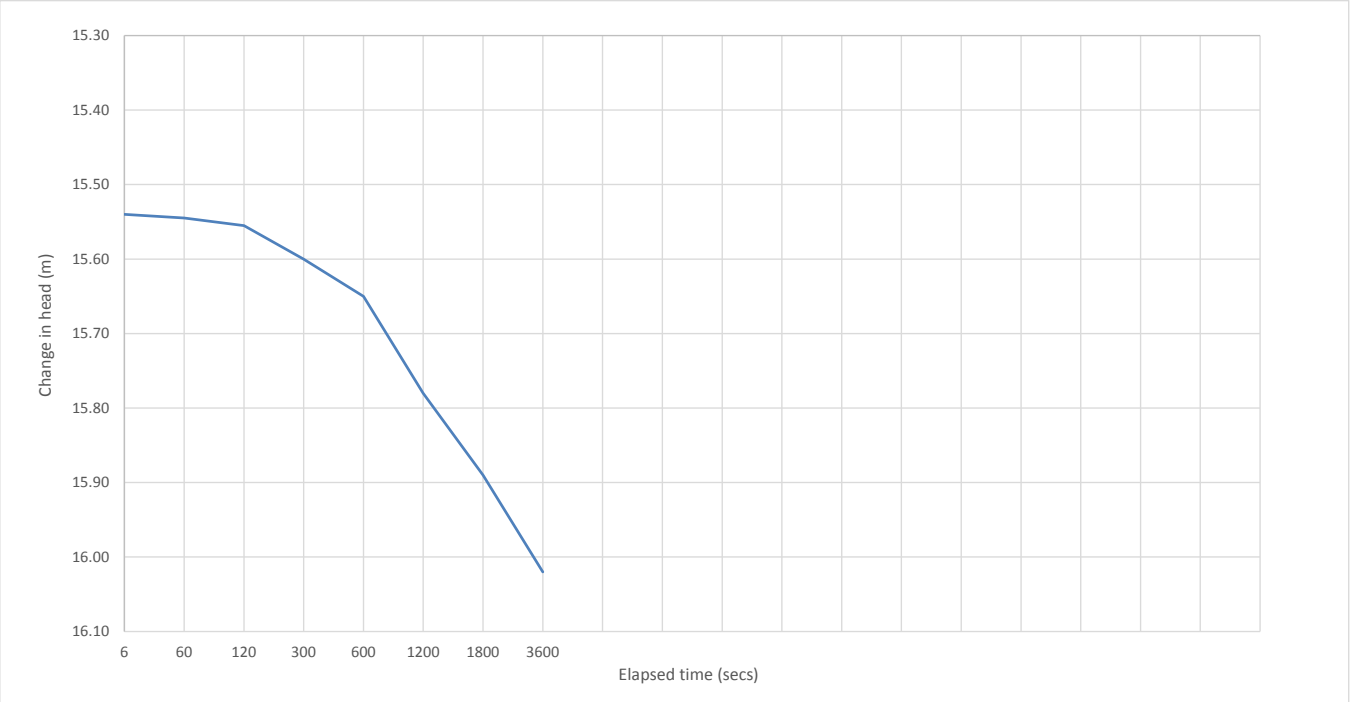
t0	6.00		
t	3600.00		
h0	13.33		
h	13.42		
S =	17671.4587		
k =	**-3.32E-05**	m/s	(negative value means falling head of water)

Project:	Angels Sandpit, Storrington			**Title**	BH1 Variable Head Permeability Test (20m)
Client:	Fowlers Estate Agents			**Geo-Environmental Services Ltd**	
Ref No:	GE16049	**Rev:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	FG	**Date:**	30/11/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:	N/A	**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	

Variable Head Permeabillity Test (after BS5930:2015 and BS EN ISO 22282:2012)

Location	Angels Sandpit	**Position**	BH1	**Date:**	30/11/2017
Borehole depth (m bgl)	25	**Standing water level (m bgl)**		22.3	
Casing height above ground level (m)	-	**Depth of casing below ground level (m bgl)**	25	**Casing diameter (m)**	150

Time elapsed				Depth (m)	h_0	h_0/ht	ln (h_0/ht)	dh/dt (m/s)	
mins	**secs**	**total time (secs)**	**t-t0 (secs)**						
0.1	-	6	0.00	15.54	15.54	1.00	0.00	0.00	
1	-	60	54.00	15.55	15.54	1.00	0.00	0.01	
2	-	120	114.00	15.56	15.54	1.00	0.00	0.01	
5	-	300	294.00	15.60	15.54	1.00	0.00	0.04	
10	-	600	594.00	15.65	15.54	0.99	0.01	0.05	
20	-	1200	1194.00	15.78	15.54	0.98	0.02	0.13	
30	-	1800	1794.00	15.89	15.54	0.98	0.02	0.11	
60	-	3600	3594.00	16.02	15.54	0.97	0.03	0.13	



Shape Factor F (from BS EN ISO 22282-1

L =	0.48
D =	150.00
L/D =	0.00
F=	**942.48**

Permeability (from BS EN ISO 22282-2)

t0	6.00		
t	3600.00		
h0	15.54		
h	16.02		
S =	17671.4587		
k =	**-1.59E-04**	m/s	(negative value means falling head of water)

Project:	Angels Sandpit, Storrington			**Title**	BH1 Variable Head Permeability Test (25m)
Client:	Fowlers Estate Agents			**Geo-Environmental Services Ltd**	
Ref No:	GE16049	**Rev:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	FG	**Date:**	30/11/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:	N/A	**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	



ANGELS SANDPIT, STORRINGTON, WEST SUSSEX

GROUND CONDITION ASSESSMENT

APRIL 2020

Prepared for
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Storrington
West Sussex
RH20 4FL

Prepared by
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VERSION CONTROL

Project Name	Angels Sandpit, Storrington – GCA
Project No.	J20-002
Report No.	J20-002-R02

Desk Study Assessment	
Prepared by: Antony Platt - Director	Reviewed by: Rasmus Palmgren - Director
Site Investigation Factual Report	
Prepared by: Antony Platt - Director	Reviewed by: Rasmus Palmgren - Director
Generic Quantitative Risk Assessment	
Prepared by: Antony Platt - Director	Reviewed by: Rasmus Palmgren - Director
Geotechnical Design Report	
Prepared by: David Fall – Geotechnical and Environmental Consulting Ltd	Reviewed by: Rasmus Palmgren - Director

Version	Date	Description
1.0	08.04.20	Final
2.0	04.05.20	Additional ground gas monitoring data added

Contents

0. EXECUTIVE SUMMARY 6
1. INTRODUCTION 8
   1.1 INSTRUCTION 8
   1.2 LEGAL CONTEXT 8
   1.3 METHODOLOGY 9
   1.4 PROPOSED USE 10
   1.5 PREVIOUS REPORTS 11
   1.6 REPORT SCOPE AND LIMITATIONS 11
2. PRELIMINARY RISK ASSESSMENT 13
   2.1 SITE LOCATION AND DESCRIPTON 13
   2.2 SITE HISTORY 13
   2.3 DOCUMENTATED GROUND CONDITIONS 14
   2.4 ENVIRONMENTAL DATA SEARCH 15
   2.5 MINING AND NATURAL GROUND HAZARDS 15
   2.6 DEPARTMENT OF ENVIRONMENT – INDUSTRY PROFILES 16
   2.7 PREVIOUS REPORTS REVIEWED 16
   2.8 ASSESSMENT OF AVAILABLE DATA AND DATA GAPS 19
   2.9 REGULATOR CONSULTATION 21
3. FIELDWORK SUMMARY OF SCOPE AND RATIONALE 23
   3.1 RATIONALE AND SUMMARY OF SCOPE 23
   3.2 SAMPLING 23
   3.3 SITE INVESTIGATION STANDARDS 23
4. GROUND CONDITIONS ENCOUNTERED 24
   4.1 SOIL CONDITIONS 24
   4.2 MADE GROUND 24
   4.3 OBSTRUCTIONS 24

4.4 GROUNDWATER CONDITIONS 24
4.5 VISUAL/OLFACTORY EVIDENCE OF CONTAMINATION 25
5. GENERIC RISK ASSESSMENT 26
5.1 CONTAMINATION ASSESSMENT METHODOLOGY 26
5.2 SOIL ASSESSMENT 28
5.3 STATISTICAL ANALYSIS 31
5.4 LEACHATE ASSESSMENT 32
5.5 GROUND GAS ASSESSMENT 34
6. CONCEPTUAL SITE MODEL 38
6.1 SOURCES 38
6.2 PATHWAYS 38
6.3 RECEPTORS 38
7. RISK ASSESSMENT 40
7.1 RISK ASSESSMENT PROCEDURE 40
7.2 POLLUTANT LINKAGE ASSESSMENT 42
8. PRELIMINARY GEOTECHNICAL ASSESSMENT 44
8.2 MATERIAL PROPERTIES 44
8.3 AGGRESSIVE SOIL CHEMISTRY 48
8.4 PRELIMINARY FOUNDATION ASSESSMENT 49
9. CONCLUSIONS AND RECOMMENDATIONS 53
9.1 CONTAMINATION 53
9.2 GEOTECHNICAL 53

List of Tables

Table 2.1. Data search results 15
Table 3.1. Exploratory hole location rationale 23
Table 5.1. 95% UCL 32
Table 7.1. Sensitivity of receptor 40
Table 7.2. Magnitude of impact 40
Table 7.3. Level of severity for potential hazard 41
Table 7.4. Probability of risk definition 41
Table 7.5. Level of risk for potential hazard definition 41
Table 7.6. Pollutant Linkage Assessment 42
Table 8.1. Geotechnical Testing Undertaken on the Inert Landfill Material 44
Table 8.2. Results of the Standard Penetration Testing 45
Table 8.3. Results of the Atterberg Limits Testing 46
Table 8.4. Results of the Particle Size Distribution Analyses 47
Table 8.5. Summary of the Results of Chemical Testing for Concrete Classification 48
Table 8.6. Results of the BRE SD1 Testing 48
Table 8.7. Minimum Depth of Foundations for Low Volume Change Soil (after NHBC 2017) 49
Table 8.8. Ground Model used in the Bearing Resistance Calculations 50
Table 8.9. Partial Factors Applied to the Bearing Resistance Analysis 50
Table 8.10. Summary of ULS Bearing Capacity Checks 51
Table 8.11. Estimated Time for 90% Consolidation 52

List of Figures and Appendices

FIGURE 1: SITE LOCATION PLAN

FIGURE 2: INVESTIGATION LOCATION PLAN

FIGURE 3: CONCEPTUAL SITE MODEL

FIGURE 4: SPT V DEPTH

APPENDIX 1: REPORT CONDITIONS

APPENDIX 2: ENGINEERING LOGS

APPENDIX 3: GENERIC ASSESSMENT CRITERIA

APPENDIX 4: SOIL AND LEACHATE SCREENING SUMMARIES

APPENDIX 5: CHEMICAL LABORATORY TEST CERTIFICATES

APPENDIX 6: GROUND GAS AND GROUNDWATER MONITORING RESULTS

APPENDIX 7: GEOTECHNICAL LABORATORY CERTIFICATES

APPENDIX 8: ULS BEARING RESISTANCE

0. EXECUTIVE SUMMARY

Brief	The brief was to undertake a site investigation and assessment to identify any ground contamination issues and geotechnical conditions that may affect the proposed development. The geotechnical conditions and foundation design will be presented under separate cover.
Current Site Status	The site is an irregularly shaped parcel of land of approximately 1.27Ha located to the north of Washington Road and the west of Water Lane in Storrington, West Sussex at NGR 509850, 114050. The land was noted to be sloping from northwest to the east and southeast and was noted to be heavily vegetated with bramble and clusters of semi mature trees, shrubs and bushes to the north, west and southwest margins at the time of the site walkover such that it was not possible to access the northern of western portion of the site.
Site History	Historic mapping from 1875 has shown that the site remained generally undeveloped as open field with trees and furze until 1947-48 where an aerial photo indicated that a sand pit had been developed on site. A works building was shown to have been built in the entrance path to the south of the site in 1971-73. In 1993 it was indicated that the sides of the quarry were quite steep as they were mapped as a cliff edge. The centre of the sand pit was shown to have been covered in grass in 1999 (aerial photo). It is understood that the sand pit was infilled as an inert waste landfill between 2000 and 2006 with restoration works continuing into 2008. In 2017 the sand/sand pit were no longer labelled.
Geology	Reference to the British Geological Survey (BGS) Maps indicates the site to overlie Infilled Ground over the bedrock Folkestone Formation (sandstone). Substantial quantities of Made Ground, up to approximately 40m, are known to be present due to the infilling of the former sandpit on the site.
Hydrogeology	The Environment Agency Groundwater Vulnerability Map (Sheet 45, West Sussex and Surrey, Scale 1:100,000) indicates the site to overly a Principal Aquifer, interpreted as the Folkestone Formation (sandstone).
Hydrology	The nearest surface water course to the site is a pond located approximately 192m to the east of the site.
Investigation Scope	The site investigation works were undertaken by GCC between the 24th and 25th February 2020 and comprised: • 11no. windowless sample boreholes (WS101 to WS111) to a maximum depth of 5.0mbgl in the areas of the proposed development.
Conclusions and Recommendations (Contamination)	The conceptual model, based on information obtained as part of the Preliminary Risk Assessment and confirmed by the Generic Quantitative Risk Assessment, has identified the following potential sources of contamination in relation to the proposed development of the site for residential use. • Asbestos debris in Made Ground across the site. • Ground gas from Made Ground. Limited leachable polycyclic aromatic hydrocarbon (PAH) contamination has been identified in soils samples across the near surface soils investigated to data. While these limited concentrations, attributable to ash in the Made Ground, are not considered to constitute a significant source of contamination, it is acknowledged that additional data from deeper deposits within the former landfill may be required to further assess the risks closer to the groundwater table. The risks of impact to the proposed development from asbestos contamination and ground gas have been assessed to be **low/moderate** and are considered to require mitigation measures for the proposed use. Mitigation to address the asbestos containing materials and fibres in the Made Ground across the site will be required in soft landscaped areas only and are likely to take the form of an engineered cover system, comprising imported topsoil placed over a geotextile membrane.

	Ground gas protection measures will be required for all buildings on the site. However, further ground gas monitoring of the wells installed on site is on-going to confirm the current ground gas regime and suitable ground gas protection measures.
Conclusions and Recommendations (Geotechnical)	The preliminary ground investigation has shown the upper 5.00m of Inert Waste to comprise a mixture of fine- and coarse-grained soils with no voids or geotechnically deleterious material being recognised at the eleven WS borehole locations If this were a greenfield site a shallow foundation would be the most appropriate foundation solution and to demonstrate this the ULS bearing resistance of the IWM has been calculated and returned a ULS bearing resistance of 130kN/m2. Although widespread variation within the top 5.00m of the IWM was not identified the use of raft foundations may be the preferred option to allow any weaker material (if present) to be spanned. Settlement due to structural loading is unlikely to preclude the use of shallow foundations based on the results of this ground investigation, although it would be worthwhile to carry further investigation focussed on the actual development plots. The largest barrier to the safe development of this site is the ongoing consolidation settlement of the Inert Waste Material as a result of its placement. A simple assessment of the time for 90% of the consolidation settlement predicts several years will be required due largely to the length of the drainage paths. At this stage, this can only be considered as a rough guide as no details of the materials at lower level in the waste body are available. In conclusion this preliminary report has not dismissed the use of shallow foundations although further ground investigation would be required to facilitate their design. It is also recommended that survey markers are set out and monthly monitoring of the waste surface is undertaken to determine whether or not the inert waste is still undergoing long-term consolidation settlement. If this proves to be the case consideration may need to be given to accelerating the process by the installation of vertical wick drains.
This sheet is intended to provide a summary only of the initial indicative assessment study of the site in relation to ground contamination. It does not provide a definitive engineering analysis for the purposes of costing or construction, and is subject to the limitation of the agreed brief.	

1. INTRODUCTION

1.1 INSTRUCTION

Ground Condition Consultants Ltd. (GCC) was commissioned by Mibri Limited in January 2020 to undertake a Ground Condition Assessment of a site located at Angels Sandpit, Storrington, West Sussex RH20 4FL.

The brief was to undertake a desk top study, site investigation and assessment to identify any ground contamination issues and geotechnical conditions that may affect the proposed development. This report provides an assessment of the identified and potential ground conditions of the site, with regard to the proposed works in accordance with the Model Procedures for the Management of Land Contamination (CLR 11), published by the Environment Agency. In addition, the geotechnical sections of this report provide a detailed assessment of the materials present beneath the site and present characteristic parameters that should be used in design of all geotechnical facets of the proposed development.

This report is prepared in line with the agreed brief and is subject to the report conditions shown in Appendix 1.

1.2 LEGAL CONTEXT

Part IIA of the Environmental Protection Act 1990 (inserted by Section 57 of the Environment Act 1995) provides a regime for the control of specific threats to health or the environment from land contamination. In accordance with the Act and the statutory guidance document 'The Contaminated Land (England) Regulations 2000', the definition of contaminated land is intended to embody the concept of risk assessment. Within the meaning of the Act, land is only "contaminated land" where it appears to the Regulatory Authority, by reason of substances within or under the land, that:

- Significant harm is being caused, or there is a significant possibility of such harm being caused; or
- Pollution of controlled waters is being, or is likely to be, caused."

Inherent in this definition is the requirement for contamination risk assessment to be undertaken on a site-specific basis, as the potential for harm is determined by the site's end use and its specific environmental setting.

The guidance defines "risk" as the combination of:

- The probability, or frequency, of occurrence of a defined hazard (for example, exposure of a property to a substance with the potential to cause harm); and

- The magnitude (including the seriousness) of the consequences.

While Part IIA of the Environmental Protection Act provides a risk based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment, the regime does not take into account future uses. New developments are therefore controlled by the planning regime, with reference to the National Planning Policy Framework (NPPF), rather than directly by Part IIA of the Environmental Protection Act.

The NPPF is based on the principal that the site should be suitable for its new use, taking account of ground conditions, including from natural hazards or former activities and states that "Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner". The NPPF also links the planning and Part IIA regimes by stating that "after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990". Key components of the Part IIA regime, such as the definition of Contaminated Land and the associated risk-based assessment approach, are therefore considered to also be applicable to the planning regime.

1.3 METHODOLOGY

This report has been prepared in accordance with published Environment Agency guidance ('Model Procedures for the Management of Land Contamination – Contaminated Land Report (CLR) 11'). CLR 11 provides the technical framework for structured decision making about land contamination and builds on previous work carried out under the Contaminated Land Research Programme (of the former Department of the Environment). CLR 11 has adopted and refined the well recognised methodology and terminology that has been used in contaminated land risk assessment for a number of years.

1.3.1. Pollutant linkage concept

In the context of land contamination, there are three essential elements to any risk:

- A **contaminant source** – a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters.
- A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property, or a water body.

- A **pathway** – a route or means by which a receptor can be exposed to, or affected by, a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of contaminant–pathway–receptor is described as a pollutant linkage.

1.3.2. Conceptual model

An important thread throughout the overall process of risk assessment is the need to formulate and develop a **conceptual model** for the site, which supports the identification and assessment of pollutant linkages. A conceptual model represents the characteristics of the site in diagrammatic or written form that shows the possible relationships between contaminants, pathways and receptors (pollutant linkages).

1.3.3. Risk assessment

CLR 11 advocates a phased approach to risk assessment comprising the following in order, as necessary:

Preliminary Risk Assessment – a desk study consisting of a review of documentary, anecdotal and site walk over evidence.

Generic Quantitative Risk Assessment (GQRA) - comparison of contaminant concentrations obtained from site investigation with generic assessment criteria.

Detailed Quantitative Risk Assessment (DQRA) - comparison of contaminant concentrations obtained from site investigation with site-specific assessment criteria.

This document constitutes a Preliminary and Generic Quantitative Risk Assessment. This report also comprises a Ground Investigation Report and Geotechnical Design Report in accordance with Eurocodes.

1.4 PROPOSED USE

It is currently understood that the site is to be redeveloped for residential housing with gardens. A change in the site use from that currently proposed may result in the need for reassessment of risk criteria and the conclusions and recommendations resulting from the risk assessment could therefore significantly change.

1.5 PREVIOUS REPORTS

The site has been the subject of various investigations and assessments and the following document have been provided by the Client and the Local Authority:

- Hemsley Consulting (Oct 2008 Draft & Dec 2008 Final), *Angell's Sand Pit, Storrington , West Sussex, Residential Area* (Ref: HC3815)
- WYG Environment (Nov 2009), *Sampling to support Closure of Angells Sandpit* (Ref: A057957/SJS/pg-1)
- WYG Environment (Nov 2010), *Ground Condition Assessment Report* (Ref: A064537 V2)
- WYG Environment (Jun 2011), *Angell's Sandpit Closure Report Update* (Ref: A059751)
- Geo-Environmental Services Limited (Dec 2017), *Desk Study Report* (Ref: GE16049-DSR-DEC17)

1.6 REPORT SCOPE AND LIMITATIONS

This report is based upon a review of readily available historical and current information and the recent site investigation data detailed herein. The report presents an interpretation of the borehole and laboratory data provided by the GCC site investigation undertaken between the 24th and 25rd February 2020 and previous investigations undertaken on the site by others. In addition, this report outlines the basic ground conditions encountered in the exploratory holes and the results of any monitoring of ground installations.

This information has been collated, processed and used to provide an interpretation of the ground conditions, with recommendations on potential ground contamination risks and foundation design for the proposed development.

The recommendations and opinions expressed in this report are based on the strata observed in the exploratory holes, the results of the site and laboratory tests, and information obtained as part of the desk study or provided by others. GCC takes no responsibility for conditions that have not been revealed by the exploratory holes, or which occur between them.

Whilst every effort has been made to interpret the conditions between investigation locations, such information is only indicative and liability cannot be accepted for its accuracy. Information provided from other sources is taken in good faith and GCC cannot guarantee its accuracy.

The information contained in this report is intended for the use of Mibri Limited and GCC can take no responsibility for the use of this information by any other party or for uses other than that described in this report.

2. PRELIMINARY RISK ASSESSMENT

2.1 SITE LOCATION AND DESCRIPTON

The site is an irregularly shaped parcel of land of approximately 1.27Ha located to the north of Washington Road and the west of Water Lane in Storrington, West Sussex at NGR 509850, 114050. The land was noted to be sloping from northwest to the east and southeast and was noted to be heavily vegetated with bramble and clusters of semi mature trees, shrubs and bushes to the north, west and southwest margins at the time of the site walkover such that it was not possible to access the northern of western portion of the site.

The access path to the site was located to the south of the site comprising a gravel driveway through a recent residential development, comprising a number of detached residential properties with private gardens, with access through gates off Water Lane. The embankment from the gravel driveway up to the site was noted to be laid to grass. Residential properties were also present to the east, southeast, west and southwest of the site.

The surrounding land uses were noted to comprise a mix of residential land, open space and woodland associated with Sullington Warren to the north of the site and an operational sandpit to the east of the site on the eastern side of Water Lane.

2.2 SITE HISTORY

Ordnance Survey maps provided in the WYG Ground Condition Assessment and the GES Desk Top Study from 1875 to 2017 (scales 1:2,500, 1:10.000, 1:1,250 and 1:10,560) were reviewed to establish the development history of the site. Historic mapping from 1875 has shown that the site remained generally undeveloped as open field with trees and furze until 1947-48 where an aerial photo indicated that a sand pit had been developed on site. A works building was shown to have been built in the entrance path to the south of the site in 1971-73. In 1993 it was indicated that the sides of the quarry were quite steep as they were mapped as a cliff edge. The centre of the sand pit was shown to have been covered in grass in 1999 (aerial photo). It is understood that the sand pit was infilled as an inert waste landfill between 2000 and 2006 with restoration works continuing into 2008. In 2017 the sand/sand pit were no longer labelled.

The land in the vicinity of the site appears to comprise primarily open fields and forestry, farm land and corn mills. An old gas works site in the built up area of Storrington was labelled in the earliest map and was no longer labelled in 1937. The land extending to the north and west of the site was shown to have been subject to development comprising a residential land use and then development of the built up area of Storrington on the 1937 map and continued to grow throughout the mapping period. Over the mapping period, a number of gravel and clays pits were indicated within the surrounding 1km from the site, the majority of which were subsequently developed over the mapping period. The adjacent Sandgate Park sand pit was shown to begin as a relatively small pit c. 80m NE of the site (on the 1947-48 aerial photo) and grew to extend eastward across Sandgate Park to c. 900m E of the site with a number of its pits gradually becoming disused in 1982.

2.3 DOCUMENTATED GROUND CONDITIONS

Ground conditions recorded in readily available sources are summarised below.

2.3.1. Geology

Reference to the British Geological Survey (BGS) Maps indicates the site to overlie Infilled Ground over the bedrock Folkestone Formation (sandstone). Substantial quantities of Made Ground, up to approximately 40m, are known to be present due to the infilling of the former sandpit on the site.

2.3.2. Hydrogeology

The Environment Agency Groundwater Vulnerability Map (Sheet 45, West Sussex and Surrey, Scale 1:100,000) indicates the site to overly a Principal Aquifer, interpreted as the Folkestone Formation (sandstone).

Principal Aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

The site is not located within a Groundwater Source Protection Zone.

2.3.3. Hydrology

The nearest surface water course to the site is a pond located approximately 192m to the east of the site.

2.3.4. Radon

Radon is a naturally occurring radioactive gas which may be harmful to human health. Radon is generally released into the atmosphere in areas underlain by granite and limestone. Harmful concentrations of radon may build up if it becomes trapped in an enclosed space such as a building.

BGS/Public Health England data presented within the Groundsure Report indicates that the percentage of houses exceeding the Action Levels for Radon in this area is less than 1%. Therefore the property is not in a Radon Affected Area, as defined by the Health Protection Agency (HPA), and radon protection measures are not necessary in new dwellings or extensions.

2.4 ENVIRONMENTAL DATA SEARCH

A search of an environmental database was undertaken together with information from various other organisations as part of the desk study and is summarised in the following sections. The following summary is generally limited to locations within 250m of the site boundaries unless it is considered that installations or activities beyond that range could potentially have an impact on the site or be affected by the redevelopment of the site.

Table 2.1. Data search results

Discharge consents	There is 3no. current discharge consents located within 250m of the site, all relate to the discharge of domestic final treated sewage effluent to land.
Pollution incidents	There are no recorded pollution incidents within 250m of the site.
Water abstractions	There are 5no. recorded groundwater abstractions located within 500m of the site. They all relate to mineral washing for the sand pits some 350m to the northeast and 380m to the west.
Fuel Stations	There are no recorded fuel stations within 250m of the site.
Landfill Sites	The site itself and the area adjacent to the south, now developed for housing, was operated as in inert waste landfill between 2000 and 2005 with restoration continuing into 2008. The depth of the landfill varies across the site due to battered sides and an access ramp to the former sand pit but is understood to be approximately 42m deep at its deepest point.

2.5 MINING AND NATURAL GROUND HAZARDS

2.5.1. Mining

The site is located in an area which may not be affected by coal mining. However, the site is known to have been mined from surface for sand.

2.5.2. Natural Ground Hazards

The following ground hazards were identified in relation the natural geology but these hazards are likely to be generally superseded by the substantial depth of inert waste fill material on the site:

Compressible ground stability hazards – No hazard

Collapsible ground stability hazards – Very Low hazard

Ground dissolution stability hazards – No hazard

Landslide ground stability hazard – Low hazard

Shrinking or swelling clay ground stability hazard – Very Low hazard

Running sand ground stability hazards – Low hazard

2.6 DEPARTMENT OF ENVIRONMENT – INDUSTRY PROFILES

The Department of the Environment Industry Profile for Waste Recycling, Treatment and Disposal Sites: Landfills and other waste disposal sites has been reviewed in relation to the former use of the site.

As a result of this use, the following potential contaminants have a significant potential to be present:

- Metals
- Asbestos
- Inorganic chemicals
- Organic chemicals including oil and fuel hydrocarbons

2.7 PREVIOUS REPORTS REVIEWED

2.7.1. Hemsley Consulting (Oct 2008 Draft & Dec 2008 Final), Angell's Sand Pit, Storrington , West Sussex, Residential Area (Ref: HC3815)

Hemsley Consulting undertook a site investigation of the former landfill area to the southern of the current study site, where a recent housing development has been constructed. The investigation involved the progressing of 5no super heavy dynamic probe holes, which were installed with 19mm dia ground gas monitoring standpipes on completion, large scale load tests, limited chemical testing (metals and PAH) and limited ground gas monitoring was undertaken on two occasions (no flows recorded).

The report concluded that the inert fill proved not to be contaminated with metals and to contain low concentrations of benzo(a)pyrene and the risk to human health was therefore assessed to be low and no remediation of the area was proposed.

Methane concentrations were recorded to be between 11.6% v/v and 71.2% v/v with carbon dioxide concentrations of less than 0.5% v/v.

The report also contains some useful information regarding the filling of the former landfill. It is reported that the fill comprised a wide range of soils arising from construction projects including clays, sands, chalk, gravel with some brick, concrete and stone. The material was selected insofar as to exclude wet material and large blocks of concrete and brickwork. The specification for the filling and the monitoring of the compaction was undertaken by Hemsley Consulting and involved the fill material being spread and compacted with a sheepsfoot roller in layers of approximately 300mm compacted thickness. All rejected material was disposed of in the main area of the landfill site, indicating that the infilling of the main landfill was not engineered in the same way as the landfill area to the south. The landfill was reported not lined.

Two versions of the report have been reviewed with plans contained in the daft version (Oct 2008), which are not present in the final version (Dec 2008), and load test results present in the final version, which were not present in the draft version.

2.7.2. WYG Environment (Nov 2009), Sampling to support Closure of Angells Sandpit (Ref: A057957/SJS/pg-1)

WYG Environment was commissioned in 2009 to undertaken in investigation, sampling and ground gas monitoring to support the closure of the Angells Sandpit landfill. The investigation involved the drilling of three hollow stem auger boreholes (BH1 to 31.0mbgl and BH2 & BH3 to 6.0mbgl) within the main landfill (current study site) and the excavation of three trial pits in the southern area of the landfill (recently developed for residential use. All three boreholes were installed with ground gas monitoring wells.

Six soil samples were taken from the waste material encountered in the boreholes and were submitted for Waste Acceptance Criteria testing. It is reported that all parameters were compliant with inert waste criteria except for slightly elevated concentrations of sulphate and fluoride.

The borehole logs provided in the letter report contain limited descriptions of the material encountered and it is generally not clear which material are fill material and which are natural soils.

2.7.3. WYG Environment (Nov 2010), Ground Condition Assessment Report (Ref: A064537 V2)

WYG Environment was commissioned in 2010 to undertake a site investigation and geo-environmental assessment of the southern area of the former landfill (recent residential development) to address planning condition for the residential development.

The investigation comprised the drilling of three cable percussive boreholes to a maximum depth of 14.5mbgl and the excavation of four trial pits to a maximum depth of 3.1mbgl.

Chemical analyses were carried out on 17 soil samples, 7 soil derived leachate samples and 7 groundwater samples for a broad range of potential contaminants including metals, inorganics, PAH, TPH and asbestos. The report concluded that the risks to human health and controlled waters were of low order but recommended a clean cap and topsoil with a minimum 600mm thickness.

Ground gas monitoring was also commenced by WYGE in October 2009 to support the landfill closure and the data from 13no rounds of monthly monitoring were assessed in relation to the proposed residential development. The report concluded that an appropriate classification for ground gas regime would be Characteristic Situation 3/NHBC Amber 2.

2.7.4. WYG Environment (Jun 2011), Angell's Sandpit Closure Report Update (Ref: A059751)

WYGE was commissioned to prepare a closure report for the landfill in 2009. This report provides an assessment of the ground gas monitoring data obtained as a result of the requirement of the Environment Agency permit as part of the process to surrender the permit.

The report discusses data gathered on a monthly basis between October 2009 and January 2011 from three wells within the current study site (BH1-BH3) and nine wells within the adjacent southern area of the landfill (recently developed residential area).

The report notes that the only monitoring results to show a correlation between ground gas concentrations and atmospheric pressure are from BH1 in the centre of the main landfill area. The results from this well indicate the highest monitored methane concentration (45.5% v/v) corresponds with the lowest monitored atmospheric pressure (985 mb).

The report concluded that after 15 months of monitoring the vast majority of the in-waste wells were showing minimal landfill gas concentrations. These wells were also showing that any methane that was being produced at the start of the monitoring exercise had decreased over time. This indicates that most of the methanogenesis (presumably from small quantities of vegetation) in those areas of the landfill has occurred.

BH 1 (current study site) and E (adjacent residential site) showed average methane concentrations of over 30% but there was little or no gas flow (0.0 to 0.2 litres per hour) associated with these boreholes and therefore these concentrations were of no environmental concern.

2.7.5. Geo-Environmental Services Limited (Dec 2017), Desk Study Report (Ref: GE16049-DSR-DEC17)

GESL was commissioned in December 2017 to undertake a Desk Tops Study for the current study site and included a review of the WYGE Ground Condition Assessment (November 2010) and a letter from WYGE dated 4th February 2011, which is reported to have comprised a response to queries raised about the WYGE Ground Condition Assessment.

The report concluded that there is a potential for contamination to exist at the site due to its recent and historic uses and that this could influence the proposed development. Whilst the individual risk ratings for the potential pollutant linkages identified ranged from moderate to very low, it is considered that further assessment is required to better characterise contamination on site as a result of current and historic land uses and the associated risk to identified receptors. The report went on to make general recommendations for the investigation of the site.

Foundation within areas of deeper Made Ground/infilled ground are likely to require a deeper or piled foundation solution, although this is subject to confirmation following intrusive investigation.

2.8 ASSESSMENT OF AVAILABLE DATA AND DATA GAPS

2.8.1. Chemical Contamination risks to Human Health and Controlled Waters

While substantial chemical testing data of the soil on the residential development plot to the south is available from the previous reports, chemical testing data of the soil on the study site from previous investigations is very limited, comprising only WAC testing from the WYGE landfill closure works.

Re-screening of the chemical analysis results from the WYGE investigation of the adjacent residential area against current generic assessment criteria indicates no exceedances of the criteria and therefore no significant sources of chemical contamination with regard to human health.

2.8.2. Asbestos in Fill Material

The greatest potential risk from contaminants within the fill material is likely to be from asbestos containing materials and fibres. Although no asbestos was identified in the investigation of the southern landfill area and it should not have been included in the inert waste deposited on site, the chance exists for stray asbestos containing materials to have been deposited with other demolition materials.

2.8.3. Ground Gas

The ground gas monitoring data from the WYGE closure monitoring programme provide a substantial data set with the data from BH1 being particularly relevant to the assessment of the study site.

The ground gas monitoring data from BH1 indicate variable concentrations of methane (0.0-45.6% v/v), which appear to broadly fluctuate with rising and falling atmospheric pressure. However, very low flow rates (max. 0.4l/hr) and low carbon dioxide concentrations (max. 2.1% v/v) were recorded. These data indicate a Gas Screening Value (GSV) of 0.18l/hr (based on the maximum recorded methane concentration and flow rate) and a small quantity of methane actually being generated.

If the proposed houses in the site are to be constructed in line with the assumptions of the NHBC assessment approach for low rise housing with a ventilated underfloor void, the maximum methane concentrations would indicate a Red classification on the traffic light system, whereas the GSV would indicate a classification on the boundary of Green and Amber 1. Due to the small quantity of methane being generated and in line with the ground gas assessment in the WYGE Ground Condition Assessment for the residential development to the south, an Amber 2 classification is considered to be a conservative but reasonable classification for the proposed development.

However, due to the large quantities of heterogeneous landfill beneath the site, traditional foundations are not likely to be appropriate for the proposed development and some form of raft foundation will potentially be required. This may mean that the standard building assumptions for the NHBC low rise housing with a ventilated underfloor void may not be valid, in which case an assessment based on the Modified Wilson and Card classification system in CIRIA C665 and BS 8485 may be more appropriate for the proposed development.

The GSV calculated from the BH1 data and the methane concentrations exceeding the typical additional factor concentration of 1% v/v would indicate a classification of Characteristic Situation 2 for the site, although inert waste is given as an example of a typical source of gas generation for a Characteristic Situation 3 gas regime.

If the assumptions of the NHBC systems are not applicable to the proposed building on site and the Characteristic Situation classification system is used, the ground gas protection measures should be designed in accordance with BS 8485: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. This code of practice uses a points based system for building elements with gas protection properties to achieve a minimum score for a specified building category and Characteristic Situation gas regime.

2.8.4. Data Gaps

A data gap is considered to be present with regard to the potential chemical and asbestos contaminants present in the fill material on site and their risks to the health of future residents in particular. However, on the assumption that the main landfill was filled with material of similar character to the southern area of the landfill, the chances of gross chemical contamination being present on the study site are considered to be limited.

Further ground gas monitoring is considered to be appropriate as a means of attempting to determine if the ground gas regime at the site has reduced since the monitoring data obtained between 2009 and 2011.

2.9 REGULATOR CONSULTATION

2.9.1. Horsham District Council

Prior to the GCC investigation being undertaken, the Environmental Health Officer at Horsham District Council was contacted to determine of the Council held any additional documentation about the site, to determine what specific concerns the Council had regarding development of the site and to present an initial strategy for the investigation and ground gas monitoring for the site.

GCC's enquiry to the Council noted that ground gas data obtained by extensive monitoring on BH1 on the study site was indicative of a NHBC Amber 2 gas regime. As such, GCC proposed to install and begin monitoring wells within the upper 4.0-5.0m of the site (in windowless sample boreholes) as well as monitoring any of the former WYG wells that can be located and are still serviceable. The objective of this monitoring was to determine if the conditions remained indicative of an Amber 2 gas regime or if the ground gas concentrations and flow rates have significantly diminished since the previous monitoring was undertaken to allow less stringent gas protection measures to be incorporated into the proposed development. While GCC appreciated that ground gas monitoring on a fortnightly basis for 6 months may be necessary to demonstrate if less stringent gas protection measures can be adopted, if the early data from the monitoring was in line with the previous data obtained, GCC proposed to terminate the monitoring programme early and adopt gas protection measures suitable to an Amber 2 gas regime.

The EHO noted that he would not be prepared to endorse a shortened gas measurement procedure at the time of the enquiry. He was also keen to ensure any construction activities should not facilitate re-activation of the landfill and therefore piling into the body of the landfill will not be acceptable as a construction technique.

2.9.2. Environment Agency

On the recommendation of the Horsham District Council EHO, GCC contacted the Environment Agency to ascertain the concerns they had regarding the site.

The EA noted that the permit holder for the former landfill died following the closure of the landfill but prior to the surrender of the permit. Therefore, in this instance, as the permit holder has died, the permit no longer exists and the responsibility for the future management of the landfill passed to the Local Authority, Horsham DC in this case, and the EA no longer regulate the site. The permit surrender process for the former landfill was therefore not followed to demonstrate the long term management of potential risk form the landfill material.

The EA therefore have concerns about the risks of contamination from this landfill. In particular, their concerns relate to ground gas and potential leachable metals and PAH contamination within the fill material. They specifically required an assessment of the risks to groundwater when the dewatering of the quarry to the east ceases and the groundwater returns to natural levels.

3. FIELDWORK SUMMARY OF SCOPE AND RATIONALE

3.1 RATIONALE AND SUMMARY OF SCOPE

The site investigation works were undertaken by GCC between the 24th and 25th February 2020. The scope and rationale of the site investigation are presented below.

- 11no. windowless sample boreholes (WS101 to WS111) to a maximum depth of 5.0mbgl.

Table 3.1. Exploratory hole location rationale

Location	Rationale	Max depth (mbgl)
WS101 to WS111	11no windowless sample boreholes positioned to provide sitewide coverage and investigate the distribution of contamination across the site.	5.00

The layout of the exploratory hole positions is presented in Figure 2.

3.2 SAMPLING

Soil sampling of the near surface materials was undertaken to assess the contamination risks to human health and at varying depths to assess the risks to controlled waters. Soil samples were also taken from various depths in the boreholes for geotechnical testing purposes.

3.3 SITE INVESTIGATION STANDARDS

Methods employed during the site investigation were generally undertaken in accordance with BS10175, BS EN 1997-2 and BS5930.

4. GROUND CONDITIONS ENCOUNTERED

4.1 SOIL CONDITIONS

Ground conditions encountered during the site investigation were broadly in agreement with those presented in the previous investigation reports and comprised Made Ground with no natural strata encountered. Engineering logs are presented in Appendix 2.

4.2 MADE GROUND

Made Ground was encountered from surface to the base of all of the investigation locations across the site and comprised reworked natural soils of clay and sand with variable gravel content and anthropogenic inclusions in the form of demolition waste such as brick, ash and concrete.

4.3 OBSTRUCTIONS

WS102, WS103, WS106 and WS111 were all terminated before the target depth due to encountering solid obstructions within the fill material. It was noted from the Hemsley Consulting report for the residential development area to the south of the study site that the fill material used on that site was processed to removed large blocks of brick and concrete, which were deposited within the study site. It is therefore anticipated that the windowless sample boreholes terminated at shallow depth encountered similar brick or concrete obstructions and such blocks should be anticipated throughout the fill material beneath the site.

4.4 GROUNDWATER CONDITIONS

Groundwater was not noted during the drilling of any of the windowless sample boreholes. However, groundwater was monitored during the initial monitoring rounds in the GCC wells and BH1 at between 0.6mbgl and 6.73mbgl with some wells dry to up to 4.87mbgl and considerable fluctuation in the recorded groundwater level in BH1 (3.59mbgl in round 1 to 6.73mbgl in round 2).

As the majority of the fill material encountered was of a clay matrix with pockets of sand, groundwater is considered likely to be present in discrete pockets of granular fill at various depths throughout the former landfill material and a consistent groundwater body with in the fill material that correlates with groundwater levels in the surrounding natural soils is considered unlikely.

While the current groundwater level in the surrounding natural soils has not been determined by this or previous investigations at the site, it is understood that de-watering operations are on-going as part of the mineral extraction works to the east of the site, which are likely to be supressing groundwater levels in the natural soil in the vicinity of the site. It is anticipated that when these operations cease, locally supressed groundwater levels will recover to their natural levels.

However, as the investigations to date have identified that the vast majority of the former inert waste landfill material on the site comprises a clay matrix with only small pockets of granular fill, it is not likely that the recovered natural groundwater table will readily extend through the landfill material beneath the site and if it does, groundwater migration rates through the fill material are likely to be very low, much lower than through the natural surrounding soil, with preferential groundwater migration pathways likely to be around the low permeability fill material. The primary interaction between the groundwater in the natural material and the landfill material is likely to be around the perimeter and based of the landfill material.

4.5 VISUAL/OLFACTORY EVIDENCE OF CONTAMINATION

Ash was noted within the fill material in various locations and at various depth during the investigation but was not consistently present throughout the fill material. No other evidence of contamination was noted.

5. GENERIC RISK ASSESSMENT

5.1 CONTAMINATION ASSESSMENT METHODOLOGY

In order to assess the human health and environmental risks posed by potential contaminants within the underlying soils and groundwater, GCC undertook an initial screen of the laboratory results from the recent investigation using generic assessment criteria. Generic assessment criteria (GAC) are conservative contaminant concentration values used for comparison purposes to assess the risk associated with contaminant concentrations found on site and are derived using non-site-specific information

5.1.1. Soils

In order to assess the soil analyses results with regard to potential human health risks, GCC has adopted the LQM/CIEH Suitable 4 Use Levels (S4ULs), generic assessment criteria (GACs) derived in accordance with the UK framework set out in the most recent CLR (Contaminated Land Report) documents using the Contaminated Land Exposure Assessment (CLEA) Model.

S4ULs have been published for an extensive suite of contaminants, with assessment criteria derived for each contaminant for four different land use scenarios namely:

- Residential with homegrown produce;
- Residential without homegrown produce
- Allotments; and
- Commercial and industrial.

A full list of the GACs together with an indication of the method used for their derivation is provided in Appendix 3. GACs applicable to residential with homegrown produce end use have been used for the assessment of the site. Contaminant concentrations below the GACs are considered not to warrant further risk assessment. However, concentrations of contaminants above the GACs may require further consideration through statistical analysis, if appropriate, or further detailed assessment using site specific data.

This document does not constitute a Site Assessment Report (SAR) as outlined in the UKWIR Guidance for the Selection of Water Supply Pipes to be Used in Brownfield Sites (Ref: 10/WM/03/21, 2010). As such, the full generic suite of testing recommended in the UKWIR guidance may not have been undertaken for this site and may be required by some water companies. However, consideration has been given to the 'threshold' concentrations presented in Table 3.1 of the UKWIR guidance, where they are applicable to the analysis undertaken, to provide an indication of the potential risks to buried water supply pipes.

5.1.2. Assessment framework

In regards to human health, the CLEA model states that, 'the contamination is assumed to be at or within 1m of the surface' (CLR10 pg10). It is considered that at depths greater than 1m, the probability of human exposure via the direct contact pathways are significantly reduced, leaving inhalation of volatile compounds as the dominant pathway with regard to human health risks. Typically, volatile compounds only significantly affect the indoor inhalation pathway. Therefore, for the purposes of statistical analysis, data from the top 1.0 to 1.5m is used for assessment of risks to human health via direct contact pathways in accordance with the CLEA model, dependant on proposed future site levels.

5.1.3. Groundwater

Groundwater analyses, where undertaken, shall be assessed by direct comparison with the freshwater Environmental Quality Standards (EQS), or, in the absence of EQSs, UK or WHO Drinking Water Standards or other appropriate guidance values. For certain compounds, the EQS is quoted as a range of values based on the alkalinity of the water, where the measured concentration lies within this range, the results are interpreted qualitatively. The guideline values selected as appropriate GACs for each contaminant are presented in Appendix 3.

5.1.4. Leachate

Leachate analyses, where undertaken, shall be assessed in the same manner as the groundwater samples. The guideline values selected as appropriate GACs for each contaminant are presented in Appendix 3.

5.1.5. Ground Gas

The criteria used to assess the ground gas monitoring results, where monitored, have been taken from the following guidance documents:

- Assessing risks posed by ground gases to buildings, CIRIA Report C665, 2007
- Code of practice for the characterisation and remediation from ground gas in affected developments, British Standard BS 8576, 2013
- A Pragmatic Approach to Ground Gas Risk Assessment, CL:AIRE Research Bulletin RB17, 2012

The frequency and period of monitoring is assessed based on the gas generation potential of the source material and the sensitivity of the development, in accordance with Figure 6 of BS8576 and Table 5.5 of CIRIA C665. As BS8576 promotes a risk based approach to ground gas assessment, it recognises that ground gas monitoring might not be necessary if a viable pollutant linkages is not present, e.g. if a 'credible' source with significant ground gas generation potential and/or a 'credible' migration pathway are not present.

5.2 SOIL ASSESSMENT

5.2.1. General

A total of 21no. soil samples collected during the site investigation of soil that could potentially be reused on site at or near surface during the proposed development works were submitted to a UKAS accredited laboratory for analysis for a suite of heavy metals, phenols, speciated polycyclic aromatic hydrocarbons (PAHs), fractionated total petroleum hydrocarbons (TPH), BTEX compounds and several inorganic parameters. The results of the laboratory analyses are summarised in Appendix 4, in which they are compared to the relevant generic assessment criteria. A full set of all the laboratory test certificates is presented as Appendix 5.

The range of potentially hazardous contaminants present on the site can be wide and varied and the suite has been chosen to reflect both commonly found contaminants and others indicated by research to have a significant risk of being present. It is, however, possible that others may exist for which analyses have not been carried out or which were outside the scope of completed exploratory holes.

The decision to recommend acceptability or a requirement for remediation is based on the evaluation of a number of factors which when combined present a statutory or non-statutory risk that may require remedial action.

5.2.2. Heavy metals

The heavy metals included in the analysis of the 21no samples of Made Ground from the site were generally identified at concentration below the relevant GAC. However, lead was identified at a concentration (214mg/kg) slightly above the relevant residential with homegrown produce GAC (200mg/kg) in only one sample (WS111 at 1.1-1.3mbgl).

Therefore, heavy metals in the Made Ground used to fill the former landfill are generally not considered to present a significant source of contamination with regard to human health but lead is considered further by statistical analysis later in this report.

5.2.3. Petroleum hydrocarbons

Total petroleum hydrocarbon (TPH) concentrations were recorded to be well below GACs in the soil samples across the site and below the laboratory detection limits for the majority of the fractions in many of the samples. Therefore, TPH is not considered to represent a significant source of contamination with regard to human health.

Concentrations of TPH C11-C40 fractions slightly exceeded the UKWIR 'threshold' values for mineral oil for PE pipes. TPH is therefore considered to represent a potentially significant source of contamination to proposed water supply pipes on site. However, the designers of the water supply pipes for this site should review the data in this report to inform their decision-making process.

5.2.4. Polycyclic aromatic hydrocarbons (PAHs)

Polycyclic aromatic hydrocarbon (PAH) compound concentrations were recorded to be well below GACs in the majority of soil samples across the site. However, one sample from WS111 (1.1-1.3mbgl) was identified to contain concentrations of benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene in excess of the relevant GACs. Although no obvious evidence of contamination was noted in the made ground from which this sample was taken, it is considered likely to be attributable to ash within the sample.

Therefore, as ash was locally observed within the Made Ground at various locations and depths across the site during the investigation, PAHs are considered to represent a potentially significant source of contamination with regard to human health and are considered further using statistical analysis later in this report.

5.2.5. BTEX compounds and MTBE

BTEX compounds and MTBE were not identified at concentrations in excess of the laboratory detection limits and were well below the relevant GACs in all of the samples from across the site. Therefore, BTEX compounds and MTBE are not considered to represent a significant source of contamination with regard to human health.

Concentrations of BTEX and MTBE were not recorded to exceed the UKWIR 'threshold' values. BTEX and MTBE are therefore not considered to represent a significant source of contamination to proposed water supply pipes.

5.2.6. Inorganics

The concentrations of free cyanide were not identified to exceed the laboratory detection limits and concentrations fell below the GAC in all of the soil samples analysed.

The pH of the soil samples analysed was generally slightly alkaline with pH values of 7no samples slightly exceeding the typical 6-9 range with values of up to 9.36. These slightly elevated pH levels are not considered to represent a significant source of contamination with regard to human health and are likely to be due to the chalk content of the Made Ground.

5.2.7. Asbestos

Asbestos containing materials, in the form of loose chrysotile and amosite fibres, were identified on 3no of the 21no samples analysed. Loose fibres is a term used to describe fibre bundles and asbestos containing material debris where the original material cannot be identified. Quantification of the asbestos content of these samples identified that all 3no asbestos positive samples contained <0.001% w/w asbestos. It is considered likely that this small amount of asbestos found in the soil, below the limit of quantification, was associated with small quantities of ACM mixed in with the demolition material fragments encountered within the predominantly soil landfill material.

Although only very small quantities of asbestos have been identified on the site, as there is currently no recognised acceptable quantity of asbestos in soil with regard to human health risk, asbestos is therefore considered to present a significant source of contamination with regard to future site users where it is present in areas of proposed soft landscaping.

5.3 STATISTICAL ANALYSIS

5.3.1. Assessment Approach

The CL:AIRE and CIEH Guidance on Comparing Soil Contamination Data with a Critical Concentration guidelines state that for each contaminant, the upper 95th percentile confidence limit on the mean measured concentration (95%UCL) should be calculated and this value should be compared to the GAC. Statistical testing should also be undertaken to decide whether the maximum concentration observed should be treated as an outlier or whether it can reasonably be considered to come from the same underlying population as the other samples.

In order to calculate what are considered to be representative 95%UCL values, the contaminant concentrations have first been assessed to determine if each contaminant distribution is closer to a normal or another distribution. If a dataset was found to be normally distributed, the arithmetic mean was used to calculate the 95%UCL using the 'One sample t-test'. If the distribution was determined to be significantly removed from normal, the one-sided Chebychev Theorem was used to calculate the 95%UCL. Constituent non-detects were assigned a value equal to the reported analytical laboratory limit of detection, considered reasonably conservative in accordance with CLR principles.

Any identified outliers were considered in the context of the conceptual site model and possible sources of error and were only removed from the dataset if they were obviously and demonstrably the result of an error that can be identified and explained or they clearly indicate that more than one soil population exists within the dataset.

5.3.2. Assessment Results

The purpose of this statistical assessment is to provide an indication of the overall average concentrations of lead, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene in the fill that underlies the site. The sample population has therefore been taken to comprise all of the Made Ground samples tested as part of the GCC investigation (21no samples). While the sample locations were not strictly systematic, they are considered to be sufficiently unbiased for the objectives of this assessment.

The outlier test on this dataset did identify the concentration of dibenzo(a,h)anthracene from 1.1-1.3mbgl in WS11 as a statistical outlier. However, this concentration is considered to be associated with ash, which was identified within the heterogenous Made Ground at other locations across the site so it is considered appropriate to retain this statistical outlier within the sample population as it is reasonable to expect similar concentrations elsewhere on site. The 95% upper confidence limit (UCL) on the mean lead, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene concentrations were therefore calculated on the 21no. sample dataset.

Table 5.1. 95% UCL

Contaminant	95% UCL	GAC
Lead	65.7mg/kg	200mg/kg
Benzo(b)fluoranthene	0.64mg/kg	2.6mg/kg
Benzo(a)pyrene	0.59mg/kg	2.2mg/kg
Dibenzo(a,h)anthracene	0.10mg/kg	0.24mg/kg

These results indicate that the mean lead, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene concentrations in the Made Ground are not likely to constitute a significant source of contamination with regard to human health, even if placed in a residential garden use environment.

5.4 LEACHATE ASSESSMENT

5.4.1. General

A total of 11no. Made Ground samples collected during the site investigation were submitted to a UKAS accredited laboratory for analysis for a suite of heavy metals, phenols, speciated polycyclic aromatic hydrocarbons (PAHs), fractionated total petroleum hydrocarbons (TPH), BTEX compounds and several inorganic parameters. The results of the laboratory analyses are summarised in Appendix 4, in which they are compared to the relevant generic assessment criteria. A full set of all the laboratory test certificates is presented as Appendix 5.

The range of potentially hazardous contaminants present on the site can be wide and varied and the suite has been chosen to reflect both commonly found contaminants and others indicated by research to have a significant risk of being present. It is, however, possible that others may exist for which analyses have not been carried out or which were outside the scope of completed exploratory holes.

The decision to recommend acceptability or a requirement for remediation is based on the evaluation of a number of factors which when combined present a statutory or non-statutory risk that may require remedial action.

5.4.2. Heavy metals

The heavy metals included in the analysis of the samples from the site were generally identified at concentrations below the adopted GACs in the samples across the site. The exceptions to this were slightly elevated copper concentrations in 3no of the 11no samples tested and elevated lead concentration in 9no of the 11no samples tested. The slightly elevated copper concentrations are not considered to constitute a significant source of contamination over the site as a whole. However, the lead in the Made Ground is considered to have potential to leach out at concentrations that could potentially represent a significant source of contamination with regard to environmental receptors.

5.4.3. Petroleum hydrocarbons

Total petroleum hydrocarbon (TPH) concentrations were recorded to be well below GACs and generally below the laboratory detection limits in the soil samples tested. The exception to this was the sample from WS110 at 4.0-4.5mbgl where the leachable aromatic C16-C35 range TPH fractionally exceeded the WHO drinking water standard. These TPH fractions are considered to be associated with ash and of low mobility. Therefore, leachable TPH is not considered to represent a significant source of contamination with regard to environmental receptors.

5.4.4. Polycyclic aromatic hydrocarbons (PAHs)

Polycyclic aromatic hydrocarbon (PAH) compound concentrations were recorded to be generally elevated across the site, likely to be attributable to the ash content observed in the Made Ground.

Fluoranthene concentrations exceeded the very conservative Environmental Quality Standard (EQS) GAC in all of the samples from across the site. 4no of these samples also contained slightly elevated concentrations of anthracene and 6no contained PAH (sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(123-cd)pyrene and benzo(ghi)perylene) above the drinking water standard. Naphthalene was also noted to exceed the EQS GAC in 1no sample, WS110 at 4.0-4.5mbgl, which also contained the highest recorded concentrations of the other PAHs identified.

The elevated PAH concentrations recorded were within the same order of magnitude as the GACs in all of the samples except the sample from WS110, which contained concentrations of anthracene and PAH (sum 5) an order of magnitude higher than the GACs.

As the measured concentrations generally only slightly exceed the GACs, the leachate testing procedure at the laboratory is considered to be more effective at leaching contaminants than natural processes in the ground on this site and the identified contaminants are in a low mobility form (ash) in a predominantly low permeability clay matrix, PAHs in the Made Ground are not considered likely to the have the potential to leach out PAH concentrations that could potentially represent a significant source of contamination with regard to environmental receptors.

However, it is acknowledge that the PAH concentrations discussed in this section are related to the upper 5.0m of Made Ground investigated as part of the GCC investigation and investigation and testing of deeper soils, closer to the natural water table, may be required.

5.4.5. BTEX compounds and MTBE

BTEX compounds and MTBE were not identified at concentrations in excess of the laboratory detection limits and were well below the relevant GACs in all of the samples tested. Therefore, BTEX compounds and MTBE are not considered to represent a significant source of contamination with regard to environmental receptors.

5.4.6. Inorganics

The concentrations of cyanide and phenols were not identified to exceed the laboratory detection limits and concentrations fell below the GAC in all of the soil samples analysed. Chloride and sulphate concentrations also fell below the relevant GACs.

The pH of the soil samples analysed was generally within the 5-9 range, although three samples of Made Ground had pH values of between 9.07 and 10.19, indicating slightly alkaline soils. This slightly elevated pH level is not considered to represent a significant source of contamination with regard to environmental receptors and are likely to be attributable to chalk and similar alkaline materials in the Made Ground.

5.5 GROUND GAS ASSESSMENT

The Desk Top Study element of this assessment identified up to 42m of Made Ground to be present beneath the site from the infilling of the former sand pit as an inert waste landfill. The GCC intrusive investigation confirmed the presence of Made Ground in all boreholes to the full depth of the investigation. The character of the Made Ground encountered was reworked natural soils of clay and sand with variable gravel content and anthropogenic inclusions in the form of demolition waste such as brick, ash and concrete. No notable putrescible was observed in the soil during the investigation.

The Made Ground was noted to contain little to no visually identifiable degradable organic matter but has Total Organic Carbon contents of between 0.17% w/w and 3.75% w/w. The 95% upper confidence limit on the mean measured TOC content of the material testing from across the site was 1.38% w/w, which is considered to be relatively low and due in part to the non-putrescible ash content of the Made Ground.

As discussed in Section 2 of this report, 15no rounds of ground gas monitoring were undertaken by WYG in association with the closure of the former landfill on site and included the monitoring of BH1 in the centre of the study site, which was installed to 28.5mbgl in the main body of the landfill.

The previous ground gas monitoring data from BH1 indicated variable concentrations of methane (0.0-45.6% v/v), which appear to broadly fluctuate with rising and falling atmospheric pressure. However, very low flow rates (max. 0.4l/hr) and low carbon dioxide concentrations (max. 2.1% v/v) were recorded. These data indicate a Gas Screening Value (GSV) of 0.18l/hr (based on the maximum recorded methane concentration and flow rate) and a small quantity of methane actually being generated.

In order to provide an indication of ground gas concentrations across a wider area of the site, in the vicinity of the proposed houses, GCC has commenced a ground gas monitoring programme of the of 6no monitoring wells installed across the site as part of the GCC intrusive investigation works and BH1 from the previous WYG investigation. At the time of issue of this report, 5no of the proposed monitoring rounds had been undertaken and the preliminary results are discussed below.

The first round of GCC ground gas monitoring, undertaken on the 4th March 2020, identified elevated methane concentrations in 2no of the 7no monitored wells, WS101 at 12.3% v/v and BH1 at 0.8% v/v. Concentrations of methane above the detection limit of 0.1% v/v were not recorded in any of the other wells and elevated carbon dioxide concentrations were not recorded in any of the monitoring wells. Atmospheric pressure was moderately low at 1004 mb during a period of generally slowly increasing pressure. Ground gas flow rates within the monitoring wells were generally recorded to be negative, indicating ground gas generally being drawn into the ground but could also be attributable to the conditions in the wells reaching equilibrium following the installations of the wells and perched groundwater level fluctuations. The notable exception to the negative flow rates was BH1, where flows of up to 4.1l/hr were recorded.

The second round of ground gas monitoring, undertaken on the 19th March 2020, was generally consistent with the first round with the majority of wells not showing any elevated methane or carbon dioxide concentrations above the detection limits. BH1 was again noted to have a maximum recorded methane concentration of 0.8% v/v. However, WS101 was found to have had the gas tap removed so the tap was replaced and the well was left to stand for an hour before it was monitored.

No elevated methane or carbon dioxide concentration were recorded in WS101 when it was monitored despite up to 12.3% v/v methane being recorded in this well during the first round. While the concentrations recorded in the second round may not be an accurate representation of the accumulated ground gas concentrations in the well, they appear to support the understanding that ground gas generation rates are low as measurable methane concentrations did not recover in the well within an hour.

Ground gas flow rates during the second monitoring round were generally recorded to be below the detection limit of 0.01l/hr with the exception of WS111 where a negative flow rate of up to 1.26l/hr was recorded.

The third ground gas monitoring round in the 31st March 2020 experienced some technical difficulties and has therefore been excluded from the dataset.

The fourth and fifth monitoring rounds (16th April 2020 and 30th April 2020) showed substantially higher methane and carbon dioxide concentrations and flow rates than the previous rounds. A peak methane concentration of 66.0% v/v was recorded during the fifth monitoring round with the highest steady state methane concentrations recorded at 49.1% v/v. Carbon dioxide concentrations were identified at up to 13.7% but were typically less the 2.0% across the site. The ground gas flow rates from the fourth round were generally negative, but the highest methane and carbon dioxide concentrations recorded from the fifth round correlate with a positive flow rate of 2.3l/hr. This gives a worst case gas screening value of 1.52l/hr, based on 66.0% peak methane and 2.3l/hr flow rate.

The results form the fourth and fifth rounds were more consistent with the WYG monitoring data for BH1 from 2010/11. As with the assessment of the BH1 data discussed in Section 2.8.3 of this document, if the proposed houses in the site are to be constructed in line with the assumptions of the NHBC assessment approach for low rise housing with a ventilated underfloor void, the maximum methane concentrations would indicate a Red classification on the traffic light system, and the GSV would indicate a classification on the boundary of Amber 2 and Red.

Due to the small quantity of methane being generated and in line with the ground gas assessment in the WYGE Ground Condition Assessment for the residential development to the south, an Amber 2 classification is considered to be a reasonable classification for the proposed development.

However, due to the large quantities of heterogeneous landfill beneath the site, traditional foundations are not likely to be appropriate for the proposed development and some form of raft foundation is likely to be required. This would mean that the standard building assumptions for the NHBC low rise housing with a ventilated underfloor void may not be valid, in which case an assessment based on the Modified Wilson and Card classification system in CIRIA C665 and BS 8485 may be more appropriate for the proposed development.

The GSV calculated from the worst case data from the fifth monitoring round and the methane concentrations exceeding the typical additional factor concentration of 1% v/v would indicate a classification of Characteristic Situation 3 for the site, which is consistent with inert waste being given as an example of a typical source of gas generation for a Characteristic Situation 3 gas regime in CIRIA C665.

If the assumptions of the NHBC systems are not applicable to the proposed building on site and the Characteristic Situation classification system is used, the ground gas protection measures should be designed in accordance with BS 8485: Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings. This code of practice uses a points based system for building elements with gas protection properties to achieve a minimum score for a specified building category and Characteristic Situation gas regime.

6. CONCEPTUAL SITE MODEL

6.1 SOURCES

The conceptual model, based on information obtained as part of the preliminary risk assessment and intrusive ground investigation, identified the following potential contaminant sources:

6.1.1. On-Site – Historic and Current

- Asbestos debris in Made Ground across the site.
- Ground gas from Made Ground.

Limited leachable polycyclic aromatic hydrocarbon (PAH) contamination has been identified in soils samples across the near surface soils investigated to data. While these limited concentrations, attributable to ash in the Made Ground, are not considered to constitute a significant source of contamination, it is acknowledged that additional data from deeper deposits within the former landfill may be required to further assess the risks closer to the groundwater table.

It should be noted that additional sources of contamination may become apparent during any future investigation and development of the site.

6.1.2. Off-Site – Historic and Current

- None.

6.2 PATHWAYS

The key environmental pathways and exposure routes by which potentially toxic substances can reach the identified receptors are considered to be:

Indirect

- Vertical migration leading to accumulation in confined spaces

Direct

- Inhalation of dust,
- Inhalation of gas

6.3 RECEPTORS

Receptors that may be affected by the potential contamination are:

- Future users
- Adjacent site users

Construction workers have been excluded from this assessment on the basis that the assessment procedure in this report is for long term rather than short term exposure. They are also subject to health and safety at work regulations and are expected to use appropriate personal protective equipment (PPE).

7. RISK ASSESSMENT

7.1 RISK ASSESSMENT PROCEDURE

By considering the sources, pathways and receptors (pollutant linkages), an assessment of the human health/ environmental risks is made with reference to the significance and degree of the risk. This assessment is based on consideration of whether the source contamination can reach a receptor and hence whether it is of major or minor significance.

The risk assessment has been undertaken with reference to BS10175 and CIRIA Document C552: Contaminated Land Risk assessment 'A Guide to Good Practice'. The risk assessment has been carried out by assessing the severity of the potential consequence, taking into account both the potential magnitude of the hazard and the sensitivity of the target, based on the categories given overleaf.

Table 7.1. Sensitivity of receptor

Category	Examples
High	Residential with gardens/Groundwater Source Protection Zone
Medium	Residential without gardens/Principal (Major) Aquifer/sensitive watercourse
Low	Commercial and industrial use/Secondary (Minor) Aquifer
Very Low	Construction and maintenance workers/non-sensitive watercourse

Table 7.2. Magnitude of impact

Category	Examples
Gross Impact	Heavily contaminated gasworks or industrial site, hazardous waste landfill
Moderate Impact	Major leaks and spills from fuel infrastructure (e.g. petrol stations), domestic waste landfill
Slight Impact	Minor leaks and spills from fuel infrastructure, 'inert' waste landfills
No Impact	No identified or suspected contamination

Table 7.3. Level of severity for potential hazard

	Sensitivity of receptor			
Magnitude of Impact	**High**	**Medium**	**Low**	**Very Low**
Gross Impact	Severe	Medium	Mild	Minor
Moderate Impact	Medium	Mild	Minor	Minor
Slight Impact	Mild	Minor	Minor	Minor
No Impact	Minor	Minor	Minor	Minor

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given below.

Table 7.4. Probability of risk definition

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

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix in order to give a level of risk for each potential hazard.

Table 7.5. Level of risk for potential hazard definition

Probability of risk	Potential severity			
	Severe	**Medium**	**Mild**	**Minor**
High Likelihood	Very high	High	Moderate	Low/ Moderate
Likely	High	Moderate	Low/ Moderate	Low
Low likelihood	Moderate	Low/ Moderate	Low	Very low
Unlikely	Low/ Moderate	Low	Very low	Very low

The assessment is discussed below in terms of plausible pollutant linkages. A complete assessment of the pollutant linkages is presented in Table 7.6 overleaf.

A description of these risk classifications and likely action required are given in CIRIA 552 as:

Very high risk – High probability that severe harm could arise to a designated receptor from an identified hazard OR there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in substantial liability. Urgent investigation and remediation are likely to be required.

High risk – Harm is likely to arise to a designated receptor from an identified hazard. This risk, if realised, is likely to result in substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the long term.

Moderate risk – It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation is normally required to clarify risks and to determine potential liability. Some remedial works may be required in the long term.

Low risk – It is possible that harm could arise to a designated receptor from an identified hazard but it is likely that this harm, if realised, would at worst normally be mild.

Very low risk – It is a low possibility that harm could arise to a designated receptor. In the event of such harm being realised it is not likely to be severe.

7.2 POLLUTANT LINKAGE ASSESSMENT

Table 7.6. Pollutant Linkage Assessment

Source	Pathway	Receptor	Severity	Likelihood	Risk Level
Asbestos debris in Made Ground.	Inhalation of dust	Future users	Medium	Low Likelihood	Low/ Moderate
		Adjacent site users	Medium	Unlikely	Low
Ground gas from former on-site inert waste landfill	Vertical migration leading to accumulation in confined spaces and inhalation or explosion	Future users	Medium	Likely	Moderate

7.2.1. Asbestos in Soil

Asbestos debris was encountered in samples of Made Ground across the site during the investigation. The asbestos was encountered in the form of loose chrysotile and amosite fibres. Therefore, the potential exists for ACM and loose fibres to be present in Made Ground across the site.

This assessment is based on the worse case scenario that the impacted Made Ground would be at or near surface in private domestic gardens. While the actual amount of asbestos identified by the investigation is very small, there is currently no recognised acceptable concentration of asbestos in soil.

Vigilance by the groundworks contractor for asbestos containing material is recommended throughout the development and mitigation measures will be required in areas of the proposed development where soft landscaping will be present.

7.2.2. Ground Gas

A monitoring programme of BH1 and 6no new wells installed at shallow depth across the site by GCC is on-going at the time of issue of this report but the initial five monitoring rounds indicate a gas regime to be similar to or slightly more onerous than that identified by the previous BH1 data. The data gathered from the first five rounds indicates a borderline Amber 2/Red classification under the NHBC approach or a Characteristic Situation 3 classification under the CIRIA C665 and BS 8485 approach, which is more likely to be applicable to the proposed development. Inert waste landfills are given in CIRIA C665 as an example of a typical Characteristic Situation 3 gas generation source.

8. PRELIMINARY GEOTECHNICAL ASSESSMENT

8.1 GEOTECHNICAL TESTING

During the ground investigation a limited number of samples were collected to allow preliminary classification of landfill material to be undertaken. Table 8.1 indicates the classification and chemical testing undertaken; whilst the laboratory test certificates are in Appendix 7.

Table 8.1. Geotechnical Testing Undertaken on the Inert Landfill Material

Test	Standard (BS1377:1990) unless otherwise indicated	No.
Classification Tests		
Atterberg Limits	Part 2, Clauses 4.5 & 5.0	9
Particle Size Distribution - Wet Sieve	Part 2, Clause 9.2	1
Chemical Tests		
Sulphate Content 2:1 soil water extract	Part 3, Clause 5.3	4
pH value	Part 3, Clause 9.0	4
BRE SD1	Various	4

8.2 MATERIAL PROPERTIES

This section presents a preliminary assessment of the geotechnical characteristics of the inert waste as determined from field observations, in-situ and laboratory geotechnical testing.

8.2.1. Inert Waste Material

The backfill to Angels Pit will henceforth be termed Inert Waste Material (IWM). Although the term waste does anecdotally have certain connotations these should be largely ignored as, from a geotechnical perspective, no deleterious material was identified.

The maximum depth of the ground investigation was 5.00m so there remains a significant amount of material which may differ from that investigated. However, the characterisation of the top 5.00m will be useful and could help to identify potential problems that will require consideration at later phases of the design.

The IWM generally comprises a discontinuous layer of silty fine to coarse sand up to 2.10m thick (WS107) but more usually between 0.25 to 0.50m thick. Beneath the sand, the fine-grained IWM comprises a variety of silty sandy clays and silty gravelly clays, much of which is still identifiable as being of London Clay Formation or Reading Formation in origin. Some anthropogenic inclusions were present in much of it, believed to be a result of post excavation contamination rather than it being primary Made Ground.

In-Situ Testing

Standard penetration testing was undertaken throughout the IWM the recorded N-values are presented in Table 8.2.

Table 8.2. Results of the Standard Penetration Testing

BH No.	Depth (mbgl)	SPT N Value	Fine/Coarse	BH No.	Depth (mbgl)	SPT N Value	Fine/Coarse
WS101	1.00	19	Fine	WS107	4.00	13	Fine
	2.00	9			5.00	19	
	3.00	16		WS108	1.00	17	Fine
	4.00	27			2.00	23	
	5.00	16			3.00	10	
WS102	1.00	50	Fine		4.00	17	
WS103	1.00	21	Fine		5.00	50	
	1.50	50		WS109	1.00	17	Fine
WS104	1.00	20	Fine		2.00	7	
	2.00	26	Coarse		3.00	3	
WS105	1.00	32	Fine		4.00	17	
	1.40	37			5.00	18	
	2.00	17		WS110	1.00	13	Fine
	3.00	15			2.00	14	
	4.00	7			3.00	10	
	5.00	12			4.00	16	
WS106	1.00	20	Fine		5.00	16	
	1.90	50	Coarse	WS111	1.00	17	Fine
WS107	1.00	50	Sand		2.00	10	
	2.00	10			3.00	50	
	3.00	10	Clay				

The standard penetration testing returned a range of N-values, of 3 to >50. All the N-values have been plotted against depth (Figure 4) and there is no easily identifiable trend in N-value with depth. Discounting the N values of 50 as being associated with obstructions, a characteristic N-value of 15 is considered appropriate for the IWM.

Classification Testing

Consistency Limits

9No. representative samples of the fine-grained IWM underwent Atterberg limits testing to determine its consistency limits. The results of this analyses are presented in Table 8.3 and the laboratory test certificates are in Appendix 7.

Table 8.3. Results of the Atterberg Limits Testing

Location	Depth (mbgl)	Natural Water Content, w (%)	Liquid Limit w_L (%)	Plastic Limit w_P (%)	Plasticity Index I_P (%)	Corrected Plasticity Index (%)
WS101	1.10-1.40	15	43	22	21	13
WS102	0.30-0.70	17	42	22	20	14
WS104	1.50-2.00	17	37	23	14	7
WS105	2.50-3.00	26	38	22	16	11
WS107	3.00-3.50	22	38	23	15	12
WS108	2.50-3.00	36	51	27	24	15
WS109	1.00-2.00	20	40	20	20	14
WS110	1.30-1.70	18	41	17	24	14
WS111	1.00-1.80	17	83	32	51	41

The results of the Atterberg limits tests give plasticity indices (I_p) of between 14 and 51%. After correction to account for the percentage of sample that passed the 425μm sieve, a corrected range of plasticity indices of 7 to 41% was achieved which is consistent with a low to high volume change potential.

The highest I_p of 51% was associated with a material described as grey black suggesting a significant organic content.

For preliminary design purposes the highest value will be ignored as unrepresentative giving a characteristic plasticity index of 13% for the IWM.

Particle Size Distribution

1No. representative sample of the IWM underwent particle size distribution analyses using the wet sieve method. The result of the particle size distribution analysis is presented in Table 8.4 whilst the grading envelopes are located in Appendix 7.

Table 8.4. Results of the Particle Size Distribution Analyses

Location	Depth (mbgl)	Laboratory Description	Granulometric Composition (%)					Cu	Cc
			Clay	Silt	Sand	Gravel	V Coarse		
WS107	1.10-1.50	Reddish brow sand	5.10		94.5	0.5	0	2.1	1.1

The sample tested from WS107 at 1.10-1.50m was shown to be silty fine to coarse sand. The coefficient of curvature or the uniformity coefficient could be determined and indicate the material to be uniformly graded.

Shear Strength

If the IWM is treated as a natural stratum the shear strength can be determined using widely accepted empirical relationships. Although not appropriate for the level of information currently available concerning the IWM, by determining these parameters an initial assessment of bearing resistance can be made.

Undrained Shear Strength

The undrained shear strength c_{uk} value has been determined using the widely accepted empirical relationship:

$$c_u = f_1 \times SPTN$$

Where f_1 is a correlation factor based on the I_P

Using a correlation factor of 5, a characteristic undrained shear strength of 75kN/m^2 is appropriate for the IWM.

Drained (Effective) Shear Strength

The widely accepted relationship between drained shear strength and plasticity index for remoulded clays has been used to determine the effective shear strength parameters. In terms of effective stress, the shear strength of a fine-grained soil can be considered as frictional, such that c'_k = 0kN/m^2.

Taking the characteristic plasticity index of 13% will give a characteristic effective angle of shearing resistance (ϕ'_k) of 27°.

8.3 AGGRESSIVE SOIL CHEMISTRY

Chemical testing was carried out on eight representative samples of the materials encountered beneath the site in accordance with Box C10, BRE Special Digest 1. The results are summarised in Tables 8.5 and 8.6.

Table 8.5. Summary of the Results of Chemical Testing for Concrete Classification

Determinand	WS101 1.10-1.40	WS104 1.50-2.00	WS106 1.50-2.00	WS107 1.10-1.70
	IWM	IWM	IWM	IWM
pH	8.1	10.0	8.4	8.9
Soluble Sulphate (g/l)	0.085	0.20	0.24	0.12

Table 8.6. Results of the BRE SD1 Testing

BH	Depth (mbgl)	Stratum	pH	Total Sulphate AS (% SO4)	Total Sulphur TS (%)	Total Potential Sulphate TPS (%)	Oxidisable (Sulphate) (%)
WS101	3.50-4.00	IWM	8.7	0.113	0.069	0.207	0.094
WS103	1.00-1.50	IWM	8.0	0.02	0.023	0.069	0.049
WS108	1.10-1.50	IWM	8.0	0.038	0.024	0.072	0.034
WS111	1.00-1.80	IWM	9.0	0.135	0.103	0.309	0.174

The amounts of oxidisable sulphides have been determined following the procedure documented in Paragraph C5.1.2 of BRE SD1. The results indicate that pyrite is unlikely to be present in significant amounts within the IWM. Based on the maximum determined total potential sulphate content Table C2 of BRE SD1 gives a Design Sulphate Classification of DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) Class of AC-1s assuming static groundwater conditions in the largely fine-grained IWM.

8.4 PRELIMINARY FOUNDATION ASSESSMENT

Initially considering the IWM as a natural stratum will establish whether a shallow foundation is worth considering in the later stages of the project.

8.4.1. Foundation Depth

Atterberg limits testing has shown the fine-grained IWM to be of low volume change potential. NHBC guidance offers two foundation depth scenarios dependant on future planting regimes (Table 8.7).

Table 8.7. Minimum Depth of Foundations for Low Volume Change Soil (after NHBC 2017)

Depth of Foundation	Description	No Tree Planting Zone (m)		
		High Water Demand	Moderate Water Demand	Low Water Demand
0.75m	No tree planting within Zone of Influence	1.25 x mature height	0.75 x mature height	0.50 x mature height
1.00m	Restricted tree planting within zone of influence	1.00 x mature height	0.50 x mature height	0.20 x mature height

NHBC guidance indicates a minimum foundation depth of 0.75mbgl with no tree planting within a zone which is dependent on the tree species but may be up to 1.25 x mature tree height.

8.4.2. Allowable Bearing Resistance

Bearing resistance analysis has been carried out in order to check the Ultimate Limit State bearing resistance of the IWM. ULS bearing resistance calculations have been carried out in accordance with Eurocode 7.

For the preliminary bearing resistance analysis, a foundation depth of 0.75m has been used, representing the worst case as deeper foundations will offer higher bearing resistances.

Table 8.8. Ground Model used in the Bearing Resistance Calculations

Ground Model	Stratum	Foundation Depth	Shear Strength Parameters			
			Total		Effective	
			c_{uk}	ϕ_{uk}	c'k	ϕ'k
GM1	IWM	0.75mbgl	75	0	0	27

The UK has implemented Design Approach 1 (DA1) of BS EN1997-1:2004 (Eurocode 7: Geotechnical Design), which requires two design combinations to be satisfied:

Combination 1 (C1): A1 "+" M1 "+" R1

Combination 2 (C2): A2 "+" M2 "+" R1

Where A, M and R refer to groups of partial factors relating to actions, materials and resistance respectively.

Table 8.9. Partial Factors Applied to the Bearing Resistance Analysis

	Combination 1			Combination 2		
	A1	M1	R1	A2	M2	R1
Tangent of the Angle of Shearing Resistance (tan ϕ)		1.00			1.25	
Cohesion Intercept (c')		1.00			1.25	
Undrained Cohesion c_u		1.00			1.40	
Permanent Action	1.35			1.00		
Variable Action	1.50			1.30		
Resistance						1.00

The summary of the bearing checks is presented in Table 8.10 and the geotechnical calculation sheets are located in Appendix 8.

Table 8.10. Summary of ULS Bearing Capacity Checks

EC7 Calculation Method	Foundation Material	Design Approach 1	Bearing Resistance (kN/m²)	
			Undrained	Drained
Bearing Resistance (kN/m²)	Inert Waste Material	C1	612	222
		C2	441	129

These calculations indicate that combination 2 presents the most critical case with the lowest values associated with the long-term drained condition. Based on these results an ULS bearing resistance of 130kN/m² is appropriate for the IWM meaning that a shallow foundation solution may be an option for the proposed development.

It should be noted that the bearing resistances presented in Table 8.10 are Ultimate Limit State, representing the maximum load that can be supported by the soil without internal failure of the soil mass occurring.

8.4.3. Settlement

A full settlement analysis will be required at a later stage when structural loads are finalised; however, given the undrained shear strength it is unlikely that the load imposed by the structure will cause large total settlements. Potentially more problematic is the ongoing settlement associated with the consolidation of the waste mass, which could continue for several years.

A rough estimate of the time required to achieve 90% consolidation can be determined by using the equation:

$$T_{90} = \frac{c_v t_{90}}{H_{dr}^2}$$

Where c_v is the coefficient of consolidation – typically 5m²/year

H_{dr} is the drainage path – half the thickness of the material for two-way drainage

T_{90} is the time factor = 0.848

From the above the time for 90% consolidation of varying thicknesses of the IWM can be calculated (Table 8.11)

Table 8.11. Estimated Time for 90% Consolidation

Thickness of IWM (m)	Time to 90% Consolidation
30	38years
20	33years
10	17years

The values presented in Table 8.11 should be used as a guide and are likely to be conservative. i.e. overestimating the actual time to full consolidation. However, they do demonstrate that it is liable to be years until full consolidation of the Inert Waste Material is achieved. The rate of consolidation can be increased by the installation of vertical wick drains which would act to provide radial drainage shortening the drainage path and increasing the rate of consolidation. However, this would require a more detailed understanding of the waste mass at depth.

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 CONTAMINATION

The conceptual model, based on information obtained as part of the Preliminary Risk Assessment and confirmed by the Generic Quantitative Risk Assessment, has identified the following potential sources of contamination in relation to the proposed development of the site for residential use.

- Asbestos debris in Made Ground across the site.
- Ground gas from Made Ground.

Limited leachable polycyclic aromatic hydrocarbon (PAH) contamination has been identified in soil samples across the near surface soils investigated to data. While these limited concentrations, attributable to ash in the Made Ground, are not considered to constitute a significant source of contamination, it is acknowledged that additional data from deeper deposits within the former landfill may be required to further assess the risks closer to the groundwater table.

The risks of impact to the proposed development from asbestos contamination and ground gas have been assessed to be **low/moderate** and are considered to require mitigation measures for the proposed use.

Mitigation to address the asbestos containing materials and fibres in the Made Ground across the site will be required in soft landscaped areas only and are likely to take the form of an engineered cover system, comprising imported topsoil placed over a geotextile membrane.

Ground gas protection measures will be required for all buildings on the site. However, further ground gas monitoring of the wells installed on site is on-going to confirm the current ground gas regime and suitable ground gas protection measures.

A discovery strategy and appropriate PPE are recommended during any redevelopment of the site to address any as yet unidentified contamination that may be identified during the works.

9.2 GEOTECHNICAL

The preliminary ground investigation has shown the upper 5.00m of Inert Waste to comprise a mixture of fine- and coarse-grained soils with no voids or geotechnically deleterious material being recognised at the eleven WS borehole locations. Standard penetration testing indicates that the Inert Waste Material has been well compacted with a mean N-value of 15 being returned.

If this were a greenfield site a shallow foundation would be the most appropriate foundation solution and to demonstrate this the ULS bearing resistance of the IWM has been calculated and returned a ULS bearing resistance of 130kN/m^2.

Although widespread variation within the top 5.00m of the IWM was not identified the use of raft foundations may be the preferred option to allow any weaker material (if present) to be spanned.

Settlement due to structural loading is unlikely to preclude the use of shallow foundations based on the results of this ground investigation, although it would be worthwhile to carry further investigation focussed on the actual development plots.

The largest barrier to the safe development of this site is the ongoing consolidation settlement of the Inert Waste Material as a result of its placement. A simple assessment of the time for 90% of the consolidation settlement predicts several years will be required due largely to the length of the drainage paths. At this stage, this can only be considered as a rough guide as no details of the materials at lower level in the waste body are available.

In conclusion this preliminary report has not dismissed the use of shallow foundations although further ground investigation would be required to facilitate their design. It is also recommended that survey markers are set out and monthly monitoring of the waste surface is undertaken to determine whether or not the inert waste is still undergoing long-term consolidation settlement. If this proves to be the case consideration may need to be given to accelerating the process by the installation of vertical wick drains.

FIGURE 1: SITE LOCATION PLAN



Ground Condition Consultants Ltd
10 Waldegrave Close Southampton SO19 9RY
Telephone 07971 450113
ask@groundcc.co.uk www.groundcc.co.uk

client: MIBRI LTD

site: ANGELS SANDPIT, STORRINGTON

title: LOCATION PLAN

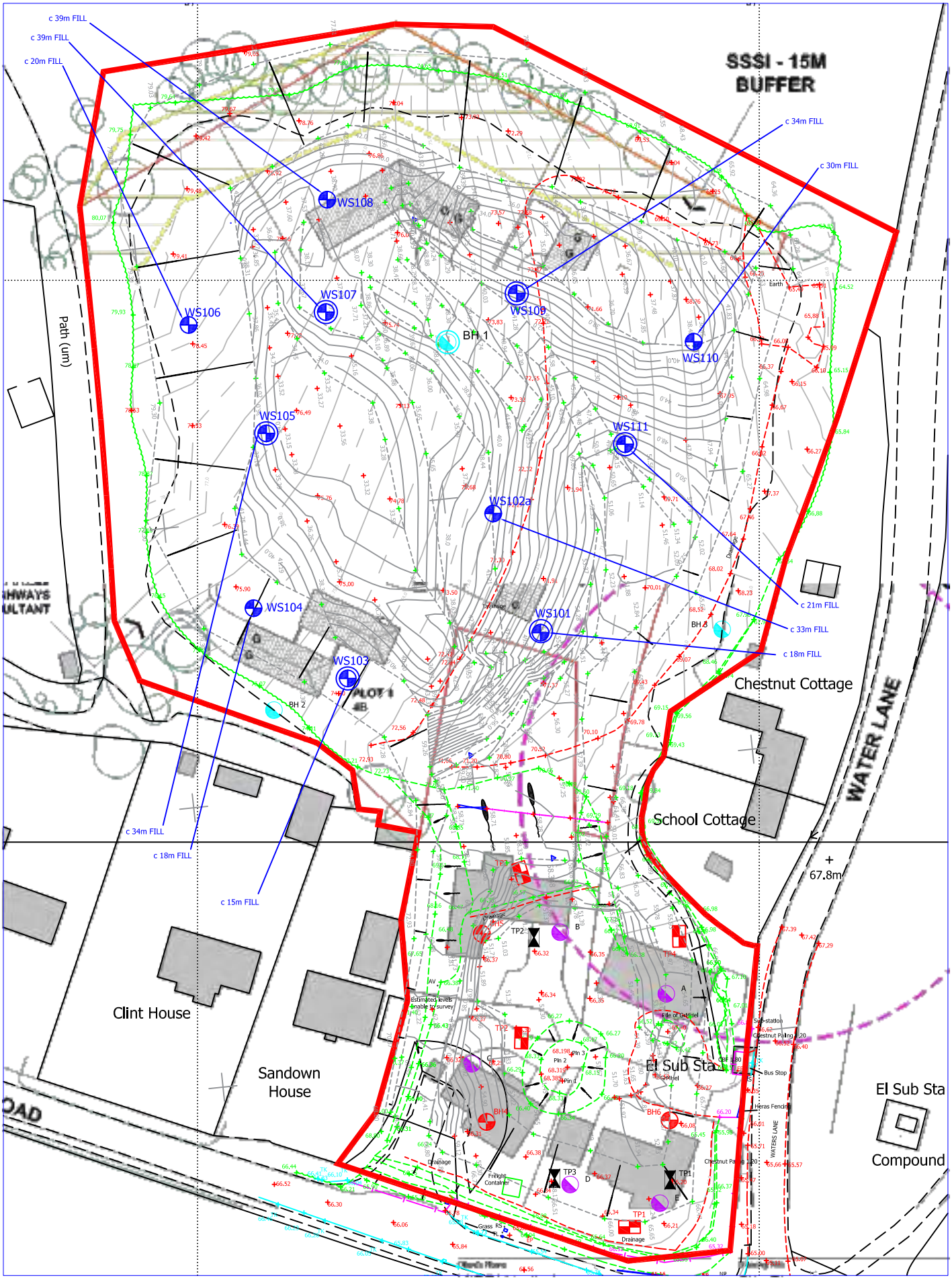
scale	drawn by	checked by
NTS	AP	RP

date	job no
18 MAR 2020	J20-002

drawing number: FIGURE 1

rev.: -

FIGURE 2: INVESTIGATION LOCATION PLAN

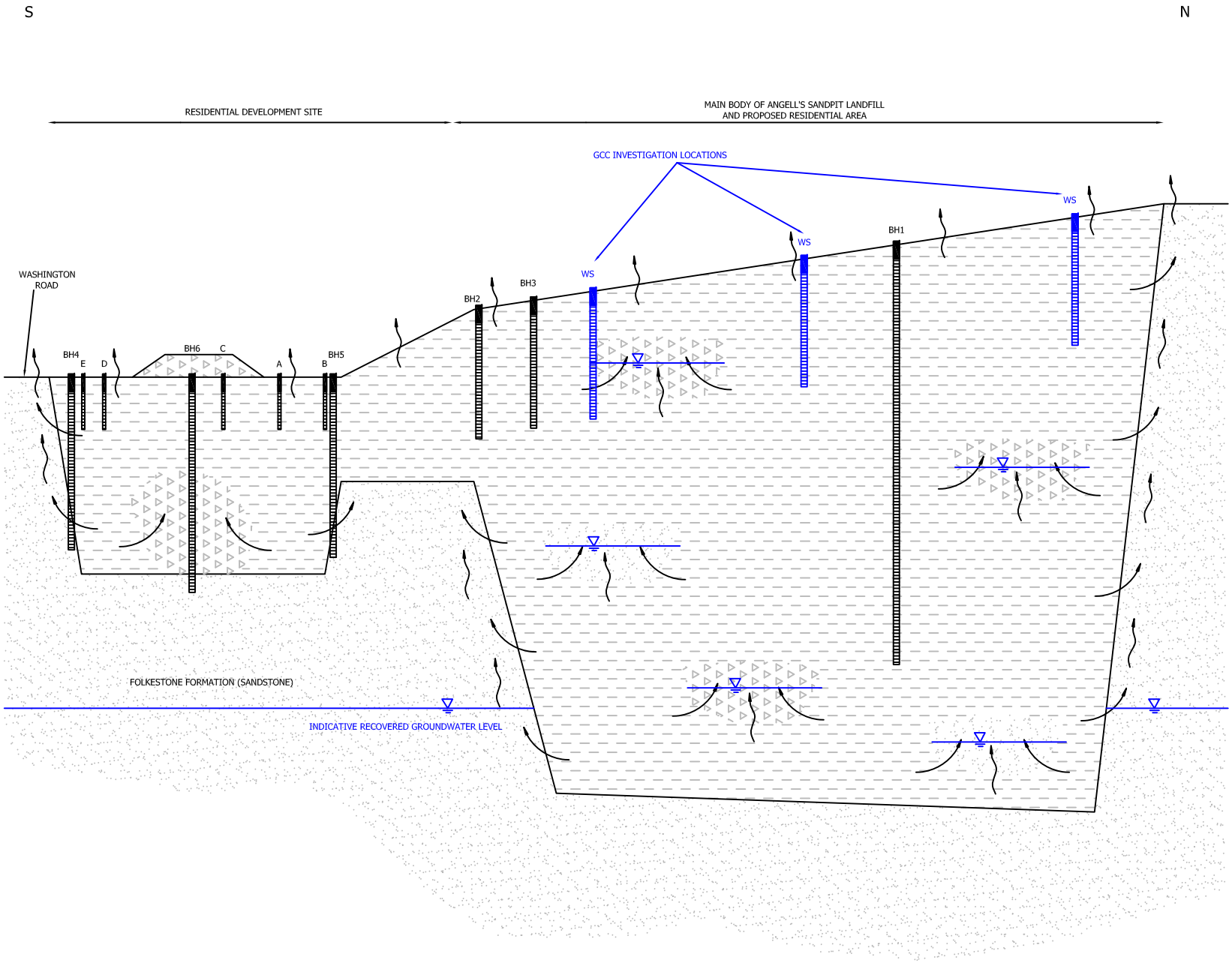


GCC

Ground Condition Consultants Ltd
10 Waldegrave Close Southampton SO19 9RY
Telephone 07971 450113
ask@groundcc.co.uk www.groundcc.co.uk

client	MIBRI LTD
site	ANGELS SANDPIT, STORRINGTON
title	INVESTIGATION PLAN
scale	NTS
drawn by	AP
checked by	RP
date	26 FEB 2020
job no	J20-002
drawing number	FIGURE 1
rev.	0

FIGURE 3: CONCEPTUAL SITE MODEL



KEY:

GROUND GAS FLOW DIRECTION

POCKETS OF PREDOMINANTLY GRAVEL FILL MATERIAL

POCKETS OF PREDOMINANTLY SAND FILL MATERIAL

PREDOMINANTLY CLAY FILL MATERIAL

Ground Condition Consultants Ltd
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client
MIBRI LTD

project
ANGELS SANDPIT, STORRINGTON

title
CONCEPTUAL SITE MODEL WITH INVESTIGATION LOCATIONS

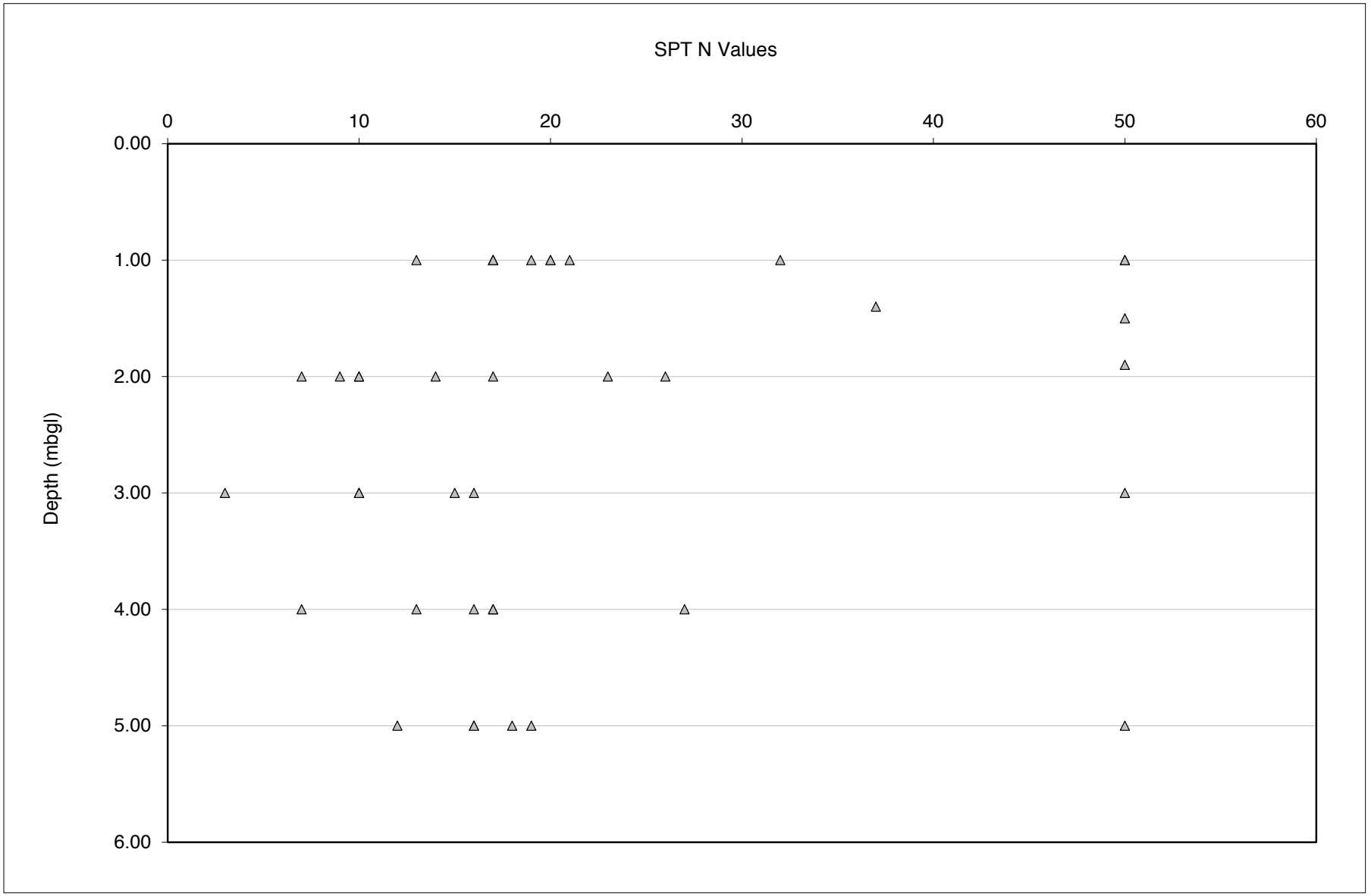
scale	drawn by	checked by
NTS	AP	RP

date	cad file
18 MAR 2020	J20-002

drawing number
FIGURE 3

rev.
1

FIGURE 4: SPT V DEPTH


SPT N Values
0
10
20
30
40
50
60
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Depth (mbgl)

APPENDIX 1: REPORT CONDITIONS

This report is produced solely for the benefit of **Mibri Limited** 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, study of readily accessible referenced historical records, information supplied by those parties noted 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 in good faith without exhaustive clarification. 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 detailed 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, not revealed by this research 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 may have unpublished, often 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 Ground Condition Consultants Ltd. In time improved practices or amended legislation may necessitate a re-assessment.

The report is necessarily limited to those aspects of land contamination specifically reported on and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents that may occur. The opinions expressed cannot be absolute due to the limitations of time and resources within the context of 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 this can only practically be better assessed following extensive on and off Site intrusive investigations and monitoring.

APPENDIX 2: ENGINEERING LOGS

BOREHOLE LOG WS101

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 24/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.4	N = 19		0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.4, 2.6, 2.8, 3, 3.2, 3.4, 3.6, 3.8, 4, 4.2, 4.4, 4.6, 4.8, 5		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground) Brown silty slightly gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded flint. (Made Ground) Firm to stiff brown grey slightly silty slightly sandy gravelly CLAY with frequent brick and occasional concrete and chalk fragments. (Made Ground)	
B - 1.1-1.4						
ES - 1.2-1.3						
	N = 9					
B - 2.3-2.7						
	N = 16					
B - 3.5-4.0						
ES - 3.8-4.0	N = 27					
	N = 16					
			5, 5.2, 5.4		Termination Depth: 5.0m	

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BOREHOLE LOG WS102

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 24/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS Refusal at 1.0m on solid obstruction

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.5 B - 0.3-0.7	N = 50		0.2 0.4 0.6 0.8 1		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground) Firm to stiff brown grey gravelly CLAY with frequent brick, ash and chalk fragments. (Made Ground) Termination Depth: 1.0m	

1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4

produced by ESlog.ESdat.net on 27 Feb 2020

BOREHOLE LOG WS103

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 24/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS Refusal at 1.6m on solid obstruction

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.5	N = 21		0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.4, 1.6		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground) Brown silty slightly gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded flint. (Made Ground) Firm to stiff grey black silty slightly sandy gravelly CLAY with frequent brick, concrete, wood and chalk fragments. (Made Ground)	
B - 1.0-1.5						
ES - 1.1-1.3	N = 50					
			1.8, 2, 2.2, 2.4, 2.6, 2.8, 3, 3.2, 3.4, 3.6, 3.8, 4, 4.2, 4.4, 4.6, 4.8, 5, 5.2, 5.4		Termination Depth: 1.6m	

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BOREHOLE LOG WS104

PROJECT NUMBER J20-002	**DRILLING COMPANY** South Coast Drilling
PROJECT NAME Angells Sandpit	**DRILLING METHOD** Windowless Sampling
CLIENT MiBri	**DRILLING RIG** Trerrier Mk2
ADDRESSStorrington	**LOGGED BY** RP
DATE 24/02/20	

CASING

COMMENTS Collapse to 1.9m

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.4			0.2		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
			0.4		Brown red silty fine to coarse SAND	
ES - 0.6-0.8			0.6		Firm to stiff brown grey gravelly CLAY with frequent brick, concrete and chalk fragments. (Made Ground)	
	N = 20		0.8			
			1			
			1.2		Brown red silty slightly gravelly fine to coarse SAND. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
			1.4			
B - 1.5-2.0			1.6			
			1.8			
	N = 28		2			
ES - 2.0-2.2			2.2			
			2.4			
			2.6		Termination Depth: 2.5m	
			2.8			
			3			
			3.2			
			3.4			
			3.6			
			3.8			
			4			
			4.2			
			4.4			
			4.6			
			4.8			
			5			
			5.2			
			5.4			

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BOREHOLE LOG WS105a

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 24/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS WS105 resused at 0.7m on solid obstruction and was moved

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.4	N = 32		0.2, 0.4, 0.6, 0.8, 1		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
ES - 1.1-1.3			1.2		Brown silty slightly gravelly fine to coarse SAND with frequent brick and chalk fragments. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
B - 1.1-1.5	N = 37		1.4, 1.6, 1.8		Firm to stiff brown grey silty slightly sandy gravelly CLAY with frequent brick and chalk fragments. (Made Ground)	
	N = 17		2, 2.2, 2.4			
B - 2.5-3.0	N = 15		2.6, 2.8, 3, 3.2, 3.4, 3.6, 3.8			
	N = 7		4			
ES - 4.0-4.5	N = 12		4.2, 4.4, 4.6, 4.8, 5			
			5.2, 5.4		Termination Depth: 5.0m	

produced by ESlog.ESdat.net on 27 Feb 2020

BOREHOLE LOG WS106

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 24/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS Refusal at 1.9m on solid obstruction

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.4	N = 20		0.2		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
ES - 1.0-1.2			0.4		Brown silty fine to coarse SAND (Made Ground)	
B - 1.0-1.5			0.6		Firm to stiff brown grey silty CLAY with frequent brick, ash and chalk fragments. (Made Ground)	
	N = 50		1			
			1.2			
			1.4			
			1.6		Tarmacadam	
			1.8		Brown silty fine to coarse SAND. (Made Ground)	
			2		Termination Depth: 1.9m	
			2.2			
			2.4			
			2.6			
			2.8			
			3			
			3.2			
			3.4			
			3.6			
			3.8			
			4			
			4.2			
			4.4			
			4.6			
			4.8			
			5			
			5.2			
			5.4			

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BOREHOLE LOG WS107

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 25/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.2-0.4	N = 50		0.2		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
ES - 1.0-1.1			0.4		Soft to firm brown grey silty gravelly CLAY with frequent brick fragments. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
B - 1.1-1.5			0.6		Brown silty fine to coarse SAND (Made Ground)	
	N = 10		0.8			
			1			
			1.2			
			1.4			
			1.6			
			1.8			
			2			
			2.2			
			2.4			
			2.6		Soft to firm brown grey silty gravelly CLAY with frequent chalk fragments. (Made Ground)	
	N = 10		2.8			
B - 3.0-3.5			3			
			3.2			
			3.4			
ES - 3.5-4.0			3.6			
			3.8			
	N = 13		4			
			4.2			
			4.4			
			4.6			
			4.8			
	N = 19		5			
			5.2		Termination Depth: 5.0m	
			5.4			

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BOREHOLE LOG WS108

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 25/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.5	N = 17		0.2, 0.4, 0.6, 0.8, 1		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
B - 1.1-1.5			1.2		Soft to stiff brown grey silty sandy gravelly CLAY with frequent brick, ash and chalk fragments. (Made Ground)	
ES - 1.2-1.3			1.4, 1.6, 1.8			
B - 2.5-3.0	N = 23		2, 2.2, 2.4, 2.6, 2.8			
ES - 4.0-4.1	N = 10		3, 3.2, 3.4, 3.6, 3.8			
	N = 17		4, 4.2, 4.4, 4.6, 4.8			
	N = 50		5			
			5.2, 5.4		Termination Depth: 5.0m	

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BOREHOLE LOG WS109

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 25/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.4	N = 17		0.2, 0.4, 0.6, 0.8, 1		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
B - 1.0-2.0			1.2, 1.4, 1.6		Soft to firm brown grey very silty gravelly CLAY with frequent brick ash and chalk fragments. (Made Ground)	
ES - 1.5-1.7	N = 7		1.8, 2, 2.2, 2.4, 2.6, 2.8			
ES - 3.5-3.7	N = 3		3, 3.2, 3.4, 3.6, 3.8			
	N = 17		4, 4.2, 4.4, 4.6, 4.8			
	N = 18		5			
			5.2, 5.4		Termination Depth: 5.0m	

produced by ESlog.ESdat.net on 27 Feb 2020

BOREHOLE LOG WS110

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 25/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.3-0.4	N = 13		0.2, 0.4, 0.6, 0.8, 1, 1.2, 1.4, 1.6, 1.8, 2, 2.2, 2.4, 2.6, 2.8, 3, 3.2, 3.4, 3.6, 3.8, 4, 4.2, 4.4, 4.6, 4.8, 5, 5.2, 5.4		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground) Brown silty fine to coarse SAND (Made Ground) Firm grey black silty sandy gravelly CLAY with frequent brick and chalk fragments and occasional concrete fragments. (Made Ground) Termination Depth: 5.0m	
ES - 1.3-1.4 B - 1.3-1.7	N = 14					
	N = 10					
ES - 4.0-4.5	N = 16					
	N = 16					

produced by ESlog.ESdat.net on 27 Feb 2020

BOREHOLE LOG WS111

PROJECT NUMBER J20-002
PROJECT NAME Angells Sandpit
CLIENT MiBri
ADDRESS Storrington
DATE 25/02/20

DRILLING COMPANY South Coast Drilling
DRILLING METHOD Windowless Sampling
DRILLING RIG Trerrier Mk2
LOGGED BY RP

CASING

COMMENTS Refusal at 3.0m on solid obstruction

Samples	SPT N	Water	Depth (m)	Graphic Log	Material Description	Well Installation
ES - 0.4-0.5	N = 17		0.2		Soft brown silty slightly gravelly CLAY. Gravel is fine to coarse angular to rounded flint. (Made Ground)	
			0.4		Brown grey silty slightly gravelly fine to coarse SAND with occasional brick fragments. (Made Ground)	
			0.6			
			0.8			
			1			
ES - 1.1-1.3			1.2		Soft to firm grey black silty gravelly CLAY with frequent brick and chalk fragments. (Made Ground)	
B - 1.0-1.6			1.4			
			1.6			
	N = 10		1.8			
			2			
			2.2			
			2.4			
			2.6			
ES - 2.7-2.8			2.8			
	N = 50		3			
			3.2		Termination Depth: 3.0m	
			3.4			
			3.6			
			3.8			
			4			
			4.2			
			4.4			
			4.6			
			4.8			
			5			
			5.2			
			5.4			

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APPENDIX 3: GENERIC ASSESSMENT CRITERIA

SOIL - HUMAN HEALTH SCREENING VALUES

Status	End Use	Issue No	Issue Date
ISSUE	Residential with Homegrown Produce	1	June 2015

Determinand	Units	SOIL ORGANIC MATTER 1%	2.5%	6%	SOURCE
pH		<5, >9			
Asbestos	%	Presence			
HEAVY METALS/METALLOIDS					
Arsenic	mg/kg	37			S4UL
Cadmium	mg/kg	11			S4UL
Chromium (III)	mg/kg	910			S4UL
Chromium (VI)	mg/kg	6			S4UL
Lead	mg/kg	200			C4SL
Mercury (Elemental)	mg/kg	1.2			S4UL
Mercury (Inorganic)	mg/kg	40			S4UL
Mercury (Methyl)	mg/kg	11			S4UL
Nickel	mg/kg	130			S4UL
Selenium	mg/kg	250			S4UL
Berylium	mg/kg	1.7			S4UL
Boron	mg/kg	290			S4UL
Vanadium	mg/kg	410			S4UL
Copper	mg/kg	2,400			S4UL
Zinc	mg/kg	3,700			S4UL
GENERAL INORGANICS					
Easily Liberatable Cyanide (free)	mg/kg	36			Acute effects infant 1 dose 3g soil
US EPA PRIORITY PAHs					
Acenaphthene	mg/kg	210	510	1100	S4UL
Acenaphthylene	mg/kg	170	420	920	S4UL
Anthracene	mg/kg	2,400	5,400	11000	S4UL
Benzo(a)Anthracene	mg/kg	72	11	13	S4UL
Benzo(b)fluoranthene	mg/kg	2.6	3.3	3.7	S4UL
Benzo(k)fluoranthene	mg/kg	77	93	100.0	S4UL
Benzo(g,h,i)perylene	mg/kg	320	340	350	S4UL
Benzo(a)Pyrene	mg/kg	2.20	2.7	3	S4UL
Chrysene	mg/kg	15	22	27.0	S4UL
Di-benzo(a,h)anthracene	mg/kg	0.24	0.28	0.30	S4UL
Fluoranthene	mg/kg	280	560	890	S4UL
Fluorene	mg/kg	170	400	860	S4UL
Indeno(1,2,3-cd)pyrene	mg/kg	27.0	36	41.0	S4UL
Naphthalene	mg/kg	2.3	5.6	13.0	S4UL
Phenanthrene	mg/kg	95	220	440	S4UL
Pyrene	mg/kg	620	1200	2000	S4UL
Total PAHs	mg/kg	**No Sum**	**No Sum**	**No Sum**	
Chlorinated Solvents/VOCs					
1,2-Dichloroethane (DCE)	mg/kg	0.0071	0.011	0.019	S4UL
1,1,1-Trichloroethane (111 TCA)	mg/kg	8.8	18	39	S4UL
1,1,1,2-Tetrachloroethane (1112 PCA)	mg/kg	1.2	2.8	6.40	S4UL
1,1,2,2-Tetrachloroethane (1122 PCA)	mg/kg	1.60	3.4	7.5	S4UL
Tetrachloroethene (PCE)	mg/kg	0.18	0.39	0.9	S4UL
Tetrachloromethane (Carbon Tetrachloride)	mg/kg	0.026	0.056	0.13	S4UL
Trichloroethene (TCE)	mg/kg	0.016	0.034	0.075	S4UL
Trichloromethane (Chloroform)	mg/kg	0.91	1.7	3.4	S4UL
Vinyl Chloride	mg/kg	0.00064	0.00087	0.0014	S4UL
Chlorobenzene	mg/kg	0.46	1	2.4	S4UL
1,2-Dichlorobenzene	mg/kg	23	55	130	S4UL
1,3-Dichlorobenzene	mg/kg	0.4	1	2.3	S4UL
1,4-Dichlorobenzene	mg/kg	61	150	350	S4UL
1,2,3-Trichlorobenzene	mg/kg	1.5	3.6	8.6	S4UL
1,2,4-Trichlorobenzene	mg/kg	2.6	6.4	15	S4UL
1,3,5-Trichlorobenzene	mg/kg	0.33	0.81	1.9	S4UL
1,2,3,4-Tetrachlorobenzene	mg/kg	15	36	78	S4UL
1,2,3,5-Tetrachlorobenzene	mg/kg	0.66	1.6	3.7	S4UL
1,2,4,5-Tetrachlorobenzene	mg/kg	0.33	0.77	1.6	S4UL
Pentachlorobenzene	mg/kg	5.8	12	22	S4UL
Hexachlorobenzene	mg/kg	1.8	3.3	4.9	S4UL
Carbon Disulphide	mg/kg	0.14	0.29	0.62	S4UL

Hexachlorobutadiene	mg/kg	0.29	0.7	1.6	S4UL
Phenolics					
Phenol	mg/kg	280	550	1100	S4UL
Chlorophenols	mg/kg	0.87	2.00	4.50	S4UL
Pentachlorophenol	mg/kg	0.22	0.52	1.20	S4UL
Explosives					
2,4,6 Trinitrotoluene (TNT)	mg/kg	1.6	3.7	8.1	S4UL
RDX	mg/kg	120.0	250.0	540.0	S4UL
HMX	mg/kg	5.7	13.0	26.0	S4UL
Insecticides/Herbicides					
Aldrin	mg/kg	5.70	6.60	7.10	S4UL
Dieldrin	mg/kg	0.97	2.00	3.50	S4UL
Atrazine	mg/kg	3.30	7.60	17.40	S4UL
Dichlorvos	mg/kg	0.032	0.066	0.140	S4UL
Alpha-Endosulfan	mg/kg	7.4	18.0	41.0	S4UL
Beta-Endosulfan	mg/kg	7.0	17.0	39.0	S4UL
Alpha-Hexachlorocyclohexane	mg/kg	0.23	0.55	1.20	S4UL
Beta-Hexachlorocyclohexane	mg/kg	0.085	0.200	0.460	S4UL
Gamma-Hexachlorocyclohexanes (Lindane)	mg/kg	0.06	0.14	0.33	S4UL
TPH					
TPH Aliphatic >C5-6	mg/kg	42	78	160	S4UL
TPH Aliphatic >C6-8	mg/kg	100	230	530	S4UL
TPH Aliphatic >C8-10	mg/kg	27	65	150	S4UL
TPH Aliphatic >C10-12	mg/kg	130	330	760	S4UL
TPH Aliphatic >C12-16	mg/kg	1100	2,400	4,300	S4UL
TPH Aliphatic >C16-35	mg/kg	65,000	92,000	110,000	S4UL
TPH Aliphatic >C35-44	mg/kg	65,000	92,000	110,000	S4UL
TPH Aromatic >EC5-7 (Benzene)	mg/kg	70	140.00	300	S4UL
TPH Aromatic >EC7-8	mg/kg	130	290	660	S4UL
TPH Aromatic >EC8-10	mg/kg	34	83	190	S4UL
TPH Aromatic >EC10-12	mg/kg	74	180	380	S4UL
TPH Aromatic >EC12-16	mg/kg	140	330	660	S4UL
TPH Aromatic >EC16-21	mg/kg	260	540	930	S4UL
TPH Aromatic >EC21-35	mg/kg	1100	1,500	1,700	S4UL
TPH Aromatic >EC35-44	mg/kg	1100	1,500	1,700	S4UL
TPH Aliphatic & Aromatic >EC44-70	mg/kg	1,600	1,800	1,900	S4UL
Total TPH	mg/kg	**No Sum**	**No Sum**	**No Sum**	
BTEX					
Benzene	mg/kg	0.087	0.17	0.37	S4UL
Toluene	mg/kg	130	290	660	S4UL
Ethylbenzene	mg/kg	47	110	260	S4UL
m-Xylene	mg/kg	60	140	330	S4UL
o-Xylene	mg/kg	59	140	320	S4UL
p-Xylene	mg/kg	56	130	310	S4UL

NOTES

1) Compare individual samples values against Soil Screening Values (SSV). If exceedences are noted consider further in relation to averaging areas and statistical analysis.

2) These values are for initial screening for potential **risk to human health only**. They are **not remediation thresholds**. **Screening for other receptors to be done separately as appropriate for the site, e.g. for water, ecology, building materials.**

3) Screening criteria denoted with an asterix (*) were capped at the lower vapour/aqueous saturation limits for Tier 1 human health risk assessment purposes and considered conservative. Where concentrations are recorded at levels greater that the SSV, free phase (NAPL) contamination may be present and should be considerwed qualitatively. Further information to support the interpretation of assessment criteria that exceed theoretical soil saturation limits is provided in Section 4.12 of the CLEA Software Handbook (SR4).

4) Screening criteria denoted with hash (#) were capped at 1000000mg/kg. It is noted that aesthetic (e.g. odour) and other site specific factors may also be relevant when providing advice relating to these compounds.

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6) SSVs derived for certain constituents may be low in relation to standard laboratory Limits of Detection (LoD). It is the responsibility of the project engineer to check with the laboratory that appropriate detection limits can be achieved. As a target, an LoD would be no larger than 10% of the SSV, but this is not practicable for some constituents. Clearly an LoD greater than the SSV would prevent use of this SSV screening and/or be interpreted as if all samples exceeded the SSV.

7) Human Health Soil Screening Values (SSV) were calculated using a Soil Organic Matter (SOM) value of 1.0%, 2.5% and 6%. This is equivanet to an Fraction Organic Carbon (FOC) values of approx. 0.6%, 1.45% and 3.5% respectively (For reference FOC = 0.58*SOM). Note that some soils have different SOM/FOC, which may give require more stringent SSVs for organic compounds. It is the responsibility of the project engineer to check the SOM with the site specific conditions.

8) In general, SSVs above 100mg/kg are rounded down to 3 significant figures. Similarly, SSVs below 100mg/kg are rounded down to 2 significant figures

WATER QUALITY STANDARDS

Status	Issue No	Date
ISSUE	3	17/02/2017

Choose water quality standard based on receptors identified at the site.

Eg in groundwater Source Protection Zone or near any drinking water supply, use DWS. If near ecological receptor/river etc, use freshwater EQS, if site is near coast use saline EQS. If more than one applicable use lowest, if in doubt use TSV (defined as lowest of freshwater EQS and UK DWS).

Name of Determinand	TSV freshwater (Tier 1 Screening Value) Defined as most conservative of DWS and freshwater EQS	Origin of TSV	Drinking Water Standards 2000	Fresh water EQS	Marine water EQS
	All units µg/l unless otherwise stated		**All units µg/l unless otherwise stated**		
PH	6-9	EQS	6.5 - 10	6-9	7-8.5
Dissolved O_2	50% >7-9	Freshwater Fish Directive	-	-	-
Suspended solids	25000	Freshwater Fish Directive	-	-	-
BOD	3000 salmonid, 6000 cyprinid	Freshwater Fish Directive	-	-	-
Abamectin	0.01 (AA)	EQS	-	0.01 (AA)	0.003 (AA)
Acrylamide	0.1	UK Drinking Water Standard	0.1	-	-
Aldrin	0.01 (AA)	EQS	0.03	0.01 (AA)	0.01 (AA)
Aluminium	pH <6.5 then 10 (MAC)	EQS		pH <6.5 then 10 (MAC)	15 (AA)
	> 6.5 then 15 (AA) or 25 (MAC)		200	> 6.5 then 15 (AA) or 25 (MAC)	
Ammonium (NH_4)	300	draft EQS	500	300 (draft wfd report dept on alkalinity & altitude)	-
Anthracene	0.1	EQS	-	0.1 (AA)	0.1 (AA)
Antimony	5	UK Drinking Water Standard	5	-	-
Arsenic	10	UK Drinking Water Standard	10	50 (AA)	25 (AA)
Atrazine	0.6 (AA)	EQS	-	0.6 (AA)	2 (AA)
Azamethiphos	0.02 (AA)	EQS	-	0.02 (AA)	0.02 (AA)
Azinphos-methyl	0.01 (AA)	EQS	-	0.01 (AA)	0.01 (AA)
Barium	100	Surface Water Abstraction Directive - DW1 limit	-	-	-
Bentazone	500 (AA)	EQS	-	500 (AA)	500 (AA)
Benzene	1	UK Drinking Water Standard	1	10 (AA)	8 (AA)
Benzo-a-pyrene	0.01	EQS	0.01	See PAH	See PAH
Biphenyl	25 (AA)	EQS	-	25 (AA)	25 (AA)
Boron	1000	UK Drinking Water Standard	1000	2000 (AA)	7000 (AA)
Bromine	2 (AA)	EQS	-	2 (AA)	10 (MAC)
Bromate	10	UK Drinking Water Standard	10	-	-
Bromoxynil	100 (AA)	EQS	-	100 (AA)	100
Bronopol (Pyceze)	70 (MAC)	SEPA EQS for aquaculture	-	70 (MAC)	-
Cadmium		EQS	5		0.2 (AA)
	0-40mg CaCO3/l 0.08			0-40mg CaCO3/l 0.08	
	40-50mg CaCO3/l 0.08			40-50mg CaCO3/l 0.08	
	50-100mg CaCO3/l 0.09			50-100mg CaCO3/l 0.09	
	100-200mg CaCO3/l 0.15			100-200mg CaCO3/l 0.15	
	>200mg CaCO3/l 0.25			>200mg CaCO3/l 0.25	
Carbendazim	0.1 (AA)	EQS	-	0.15 (AA)	-
Carbon tetrachloride (CT)	12 (AA)	EQS	-	12 (AA)	12 (AA)
Chloride (Water Soluble)	250000 (AA)	EQS	250000	250000 (AA)	-
Chlorine	2 (AA)	EQS	-	2 (AA)	10 (MAC)
Chlorfenvinphos	0.1 (AA)	EQS	-	0.1 (AA)	0.1 (AA)
Chloroform	12 (AA)	EQS	-	12 (AA)	12 (AA)
4-chloro-3-methyl phenol	40 (AA)	EQS	-	40 (AA)	40 (AA)
Chloronitrotoluenes (Total - all isomers)	10 (AA)	EQS	-	10 (AA)	10 (AA)
2-chlorophenol	50 (AA)	EQS	-	50 (AA)	50 (AA)
Chlorpropham	10 (AA)	EQS	-	10 (AA)	10 (AA)
Chlorothalonil	0.1 (AA)	EQS	-	0.1 (AA)	-
Chlorotoluron	2 (AA)	EQS	-	2 (AA)	2 (AA)
Chlorpyrifos	0.1 (AA)	EQS	-	0.1 (AA)	0.03 (AA)
Chromium (III) - dissolved	4.7 (AA)	EQS	50	4.7 (AA)	-
Chromium (VI) - dissolved	3.4 (AA)	EQS	50	3.4 (AA)	0.6 (AA)
Copper	1 (bioavailable) (AA)	EQS	2000	1 (bioavailable) (AA)	3.76 (AA)
Cobalt (dissolved)	3 (AA)	EQS	-	3 (AA)	3 (AA)
Coumaphos	0.03 (AA)	EQS	-	0.03 (AA)	0.03 (AA)
Cyanide	1	EQS	50	1 (AA)	1 (AA)
Cyfluthrin (total)	0.001 (AA)	EQS	-	0.001 (AA)	0.001 (MAC)
Cypermethrin	0.0001 (AA)	EQS	-	0.0001 (AA)	0.0001 (AA)
2,4-D (ester) (In Statutory Instrument not stated that as 'total')	1 (AA)	EQS	-	1 (AA)	1 (AA)
2,4-D (non-ester) (In Statutory Instrument not stated that as 'total')	40 (AA)	EQS	-	40 (AA)	40 (AA)
DDT (Total- all 4 isomers)	0.025 (AA)	EQS	-	0.025 (AA)	0.025 (AA0
ppDDT (total)	0.01 (AA)	EQS	-	0.01 (AA)	0.01 (AA)
Demetons	0.05 (AA)	EQS	-	0.05 (AA)	0.5 (AA)
Diazinon (sheep dip)	0.01 (AA)	EQS	-	0.01 (AA)	0.01 (AA)
Dichlorobenzenes (sum of all isomers)	20 (AA)	EQS	-	20 (AA)	20 (AA)
1,2-dichloroethane (total)	3 (AA)	UK Drinking Water Standard	3	10 (AA)	10 (AA)
Dichloromethane	20 (AA)	EQS	-	20 (AA)	20 (AA)
2,4-dichlorophenol	4.2 (AA)	EQS	-	4.2 (AA)	0.42 (AA)
Dichlorvos	0.001 (AA)	EQS	-	0.001 (AA)	0.04 (AA)
Dieldrin (total)	0.01 (AA)	EQS	0.03	0.01 (AA)	0.01 (AA)
Diflubenzuron	0.001 (AA)	EQS	-	0.001 (AA)	0.005 (AA)
Dimethoate	0.48 (AA)	EQS	-	0.48 (AA)	0.48 (AA)
Diuron	0.2 (AA)	EQS	-	0.2 (AA)	0.2 (AA)
Doramectin	0.001 (AA)	EQS	-	0.001 (AA)	0.001 (AA)
EDTA (ethylenediaminetetraacetic acid)	400 (AA)	EQS	-	400 (AA)	400 (AA)
Emamectin benzoate	0.22 (ng/l) (AA)	SEPA EQS for aquaculture	-	0.22 (ng/l) (AA)	0.763 (AA)
Endosulphan	0.005 (AA)	EQS	-	0.005 (AA)	0.0005 (AA)
Endrin (total)	0.005 (AA)	EQS	-	0.005 (AA)	0.005
Epichlorohydrin	0.1	UK Drinking Water Standard	0.1	-	-
17α-Ethinyloestradiol	0.0001 n(AA)	PNEC	-	0.0001 n(AA)	0.0001 (AA)
Ethylbenzene	20 (AA)	EQS	-	20 (AA)	20 (AA)
Fenchlorphos	0.03 (AA)	EQS	-	0.03 (AA)	0.03 (AA)
Fenitrothion	0.01 (AA)	EQS	-	0.01 (AA)	0.01 (AA)
Flucofuron (total)	0.1	UK Drinking Water Standard	-	1	1 (MAC)
Fluoranthene	0.0063 (AA)	EQS	-	0.0063 (AA)	0.0063 (AA)
Fluoride	<50 mg CaCO3/l = 1000	EQS	1500	<50 mg CaCO3/l = 1000	5000
	>50 mg CaCO3/l = 5000	EQS		>50 mg CaCO3/l = 5000	
Formaldehyde	5 (AA)	EQS	-	5 (AA)	-
Heptachlor	0.03	UK Drinking Water Standard	0.03	-	-
Heptachlor epoxide	0.03	UK Drinking Water Standard	0.03	-	-
Hexachlorobenzene (total)	0.03 (AA)	EQS	-	0.05 (MAC)	0.05 (MAC)
Hexachlorobutadiene (total)	0.1 (AA)	EQS	-	0.6 (MAC)	0.6 (MAC)
Hexachlorocyclohexane (total)	0.2 (AA)	EQS	-	0.2 (AA)	0.002 (AA)
Hydrogen sulphide (Undissociated)	0.25 (AA)	EQS	-	0.25 (AA)	10 (MAC)
Ioxynil (total)	10 (AA)	EQS	-	10 (AA)	10 (AA0
Iron (dissolved)	200	EQS	200	1000 (AA)	1000 (AA)
Isodrin (total)	0.005 (AA)	EQS	-	0.005 (AA)	0.005 (AA)
Isoproturon	0.3 (AA)	EQS	-	0.3 (AA)	0.3 (AA)
Ivermectin	0.0001 (AA)	EQS	-	0.0001 (AA)	0.001 (AA)
Lead (Dissolved)	1.2 (bioavailable) (AA)	EQS	10	1.2 (bioavailable) (AA)	1.3 (AA)

Name of Determinand	TSV freshwater (Tier 1 Screening Value) Defined as most conservative of DWS and freshwater EQS	Origin of TSV	Drinking Water Standards 2000	Fresh water EQS	Marine water EQS
All units µg/l unless otherwise stated			**All units µg/l unless otherwise stated**		
Linuron	0.5 (AA)	EQS	-	0.5 (AA)	2 (AA)
Malathion	0.01 (AA)	EQS	-	0.01 (AA)	0.02 (AA)
Malachite Green	0.5 (AA)	EQS	-	0.5 (AA)	0.5 (AA)
Mancozeb	2 (AA)	EQS	-	2 (AA)	2 (AA)
Manganese (Dissolved)	30 (AA)	EQS	50	123 (AA)	-
Maneb	3 (AA)	EQS	-	3 (AA)	3 (AA)
MCPA (S-ethyl (4-chloro-2-methylphenoxy)ethanethioate)	pH<7 = 12	EQS	-	pH<7 = 12	80 (AA)
	pH>7 = 80	EQS	-	pH>7 = 80	
Mecoprop	18 (AA)	EQS	-	18 (AA)	18 (AA)
Mercury	1 (AA)	EQS	1	-	0.07 (MAC)
Methiocarb	0.01 (AA)	EQS	-	0.01 (AA)	-
Methylphenols (0.3 2-MP, 0.2 3-MP, 1 4-MP) (=cresols)	100 (AA)	EQS	-	100 (AA)	100 (AA)
Mevinphos	0.02 (MAC)	EQS	-	0.02 (MAC)	-
Naphthalene	2 (AA)	EQS	-	2 (AA)	2 (AA)
Nickel (Dissolved)	4 (bioavailable) (AA)	EQS	20	4 (bioavailable) (AA)	8.6 (AA)
Nitrates (NO_3)	50000	Surface Water Abstraction Directive - DW1 limit	50000	-	-
Nitrites (NO_2)	50	UK Drinking Water Standard	50	-	-
Nonyl phenol	0.3 (AA)	EQS	-	0.3 (AA)	0.3 (AA)
NTA (Nitrilotriacetic acid)	1000 (AA)	EQS	-	1000 (AA)	3000 (AA)
Octyl phenol	0.1 (AA)	EQS	-	0.1 (AA)	0.01(AA)
17β-Oestradiol	0.001 (AA)	PNEC	-	-	-
Omethoate	0.01 (AA)	EQS	-	0.01 (AA)	-
PAH: (Sum of: Benzo(b) fluoranthene Benzo(k)fluoranthene Benzo(ghi)perylene Indeno(1,2,3-cd)pyrene - Drinking Water + Benzo(a)pyrene - EQS)	0.1	UK Drinking Water Standard	0.1	0.00017 (AA)	0.00017 (AA)
PCSDs (flucofuron and sulcofuron) (total)	0.05	EQS	-	0.05	0.05 (MAC)
Pendimethalin	0.1	UK Drinking Water Standard	-	0.3 (AA)	1.5 (AA)
Pentabromodiphenylether	0.5	EQS	-	0.5	0.5
Pentachlorophenol	0.1	UK Drinking Water Standard	-	0.4 (AA)	0.4 (AA)
Permethrin (total)	0.01	EQS	-	0.01	0.0002 (AA)
Pesticides (sum of Parathion, g-HCH and Dieldrin)	0.5	UK Drinking Water Standard	0.5	-	-
Phenol	7.7	EQS	-	7.7 (AA)	7.7 (AA)
Dimethyl phthalate (DMP)	800 (AA)	EQS	-	800 (AA)	800 (AA)
Diethyl phthalate (DEP)	200 (AA)	EQS	-	200 (AA)	200 (AA)
Di-butyl phthalates (DBPs)	8 (AA)	EQS	-	8 (AA)	8 (AA)
Butylbenzyl phthalate (BBP)	20 (AA)	EQS	-	20 (AA)	20 (AA)
Di-octyl phthalates (DOPs)	20 (AA)	EQS	-	20 (AA)	20 (AA)
di(2ethylhexyl)phthalate	8	WHO DWS	-	-	-
Phthalates	See above, no total, by indivdual phthalate only	WHO DWS	-	-	-
Pirimicarb	1 (AA)	EQS	-	1 (AA)	1 (AA)
Pirimiphos-methyl	0.015 (AA)	EQS	-	0.015 (AA)	0.015 (AA)
Prochloraz	4 (AA)	EQS	-	4 (AA)	4 (AA)
Propetamphos	0.03 (AA)	EQS	-	0.03 (AA)	0.03 (AA)
Propyzamide	100 (AA)	EQS	-	100 (AA)	100 (AA)
Silver (Total dissolved)	0.05 (AA)	EQS	-	0.05 (AA)	0.5 (AA)
Selenium	10 (AA)	Surface Water Abstraction Directive - DW1 limit	10	-	-
Simazine	1 (AA)	EQS	-	1 (AA)	1 (AA)
Sulcofuron (total)	25	EQS	-	25 (MAC)	25 (MAC)
Sulphate	250,000	Surface Water Abstraction Directive	-	400000 (AA)	-
Surfactants	200	Surface Water Abstraction Directive - DW1 limit	-	-	-
Styrene	50 (AA)	EQS	-	50 (AA)	50 (AA)
Tecnazene (Total)	1 (AA)	EQS	-	1 (AA)	1 (AA)
Teflubenzuron (Calicide)	6 (ng/l)	SEPA EQS for aquaculture	-	6 (ng/l)	2
Tetrachloroethylene (PCE)	10 (AA)	EQS	-	10 (AA)	10 (AA)
Tetrachloroethene and Trichloroethene	10	UK Drinking Water Standard	10	-	-
Tetrachloromethane	3	UK Drinking Water Standard	3	-	-
Thiabendazole	5 (AA)	EQS	-	5 (AA)	5 (AA)
Tin	25 (AA)	EQS	-	25 (AA)	10 (AA)
Toluene	74 (AA)	EQS	-	74 (AA)	74 (AA)
TPH:					
Aliphatic EC C5-C6	15000	WHO DWS	15000	-	-
Aliphatic EC>C6-C8	15000	WHO DWS	15000	-	-
Aliphatic EC>C8-C10	300	WHO DWS	300	-	-
Aliphatic EC>C10-C12	300	WHO DWS	300	-	-
Aliphatic EC>C12-C16	300	WHO DWS	300	-	-
Aliphatic EC>C16-C21	-	WHO DWS	-	-	-
Aliphatic EC>C21-C35	-	WHO DWS	-	-	-
Aromatic EC C6-C7	1 (Benzene)	UK Drinking Water Standard	1	10 (AA)	8 (AA)
Aromatic EC>C7-C8	74 (Toluene)	EQS	700	74 (AA)	74 (AA)
Aromatic EC>C8-C10	300 (Ethylbenzene)	WHO DWS	300	-	-
Aromatic EC>C10-C12	90	WHO DWS	90	-	-
Aromatic EC>C12-C16	90	WHO DWS	90	-	-
Aromatic EC>C16-C21	90	WHO DWS	90	-	-
Aromatic EC>C21-C35	90	WHO DWS	90	-	-
Triallate	0.25 (AA)	EQS	-	0.25 (AA)	0.25 (AA)
Triazophos	0.005 (AA)	EQS	-	0.005 (AA)	0.005 (AA)
Tributyltin cmpds	0.0002 (AA)	EQS	-	0.0002 (AA)	0.0002 (AA)
Tributyltin	0.0002 (AA)	EQS	-	0.0002 (AA)	0.0002 (AA)
Tributyl phosphate	50 (AA)	EQS	-	50 (AA)	50 (AA)
Trichlorobenzene	0.4 (AA)	EQS	-	0.4 (AA)	0.4 (AA)
1,1,1-trichloroethane	100 (AA)	EQS	-	100 (AA)	100 (AA)
1,1,2-trichloroethane	400 (AA)	EQS	-	400 (AA)	300 (AA)
Trichloroethene	10 (AA)	EQS	-	10 (AA)	10 (AA)
Trifluralin	0.03 (AA)	EQS	-	0.03 (AA)	0.03 (AA)
Trihalomethanes (sum of chloroform, bromoform, dibromochloromethane and bromodichloromethane)	100	UK Drinking Water Standard	100	2.5 (AA)	2.5 (AA)
Triphenyltin cmpds (Total)	0.02 (MAC)	EQS	-	0.02 (MAC)	0.008 (MAC)
Triphenyltin and its derivatives	0.02 (MAC)	EQS	-	0.02 (MAC)	0.008 (MAC)
Vanadium (Total)			-		100 (AA)
	0 - 200mg CaCO3/l 20	EQS		0 - 200mg CaCO3/l 20	
	>200mg CaCO3 /l 60	EQS		>200mg CaCO3 /l 60	
Vinyl Chloride (VC)	0.5	UK Drinking Water Standard	0.5	-	-
Xylenes	30 (AA)	EQS	-	30 (AA)	30 (AA)
Zinc	10.9 (bioavailable) (AA)	EQS	-	10.9 (bioavailable) (AA)	6.8 (AA)

All units µg/l unless otherwise stated
Use these values for initial assessment of all water and leachate results
AA = Annual Average
MAC = Maximum Concentration
TSVs - Tier 1 Screening Values
TSVs listed above defined as most conservative of DWS and EQS assuming potable water supply and river ecosystems are receptors at site.

References.

EQS (Environmental Quality Standards)
Surface water pollution risk assessment for your environmental permit
https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit#contact

Surface Water Abstraction Directive
UK EA Website
http://www.environment-agency.gov.uk/yourenv/eff/1190084/water/213872/577394/577773/?version=1&lang=_e

Statutory Instruments: 2016 No. 614 Water, England and Wales: The Water Supply (Water Quality) Regulations 2016
http://www.legislation.gov.uk/uksi/2016/614/pdfs/uksi_20160614_en.pdf

Freshwater Fish Directive: UK government webpage
http://www.environment-agency.gov.uk/yourenv/eff/1190084/water/213902/576076/

WHO: World Health Organisation drinking water standards
Petroleum Products in Drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality, WHO (WHO/SDE/WSH/05.08/123)
http://www.who.int/water_sanitation_health/dwq/chemicals/Petroleum%20Productsrev071105.pdf

APPENDIX 4: SOIL AND LEACHATE SCREENING SUMMARIES

Project Name: Angels
Project Ref: J20-002
GAC Comparison: GCC - Residential with Homegrown Produce (1% SOM)

Sample ID	Units	GAC	WS101	WS101	WS102	WS103	WS103	WS104	WS104	WS105	WS105	WS106	WS106	WS107	WS107	WS108	WS108	WS109	WS109
Depth to Top			0.30	1.20	0.30	0.30	1.10	0.30	0.60	0.30	1.10	0.30	1.00	0.20	1.00	0.30	1.20	0.30	1.50
Depth to Bottom			0.40	1.30	0.50	0.50	1.30	0.40	0.80	0.40	1.30	0.40	1.20	0.40	1.10	0.50	1.30	0.40	1.70
Date Sampled			25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20
% Stones >10mm	% w/w		1.6	<0.1	5.6	5.3	9.5	<0.1	6.4	6.9	16	2.7	8.1	<0.1	5.1	17.9	30.2	1.9	12.5
pH	pH	5-9	8.8	8.25	8.46	8.93	8.29	**9.07**	8.44	8.8	**9.36**	**9.35**	**9.2**	**9.33**	**9.12**	8.75	**9.26**	8.69	8.36
Cyanide (free)	mg/kg	36	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Phenols - Total by HPLC	mg/kg	280	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Organic matter	% w/w		0.7	1.8	2.2	0.4	3.3	0.3	2.5	0.6	2	<0.1	2	3.6	0.5	1.7	2.5	0.9	6.5
Total Organic Carbon	% w/w		0.4	1.05	1.28	0.23	1.92	0.17	1.47	0.33	1.18	0.08	1.17	2.08	0.28	1.02	1.44	0.51	3.75
Antimony	mg/kg		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Arsenic	mg/kg	37	5	5	8	<1	10	2	7	12	6	4	5	5	5	5	7	6	8
Cadmium	mg/kg	11	<0.5	0.9	1.1	<0.5	1.3	<0.5	1.2	<0.5	0.8	<0.5	0.8	0.8	<0.5	0.8	0.8	<0.5	1
Copper	mg/kg	2400	5	17	20	<1	36	1	18	3	23	2	17	16	5	22	77	9	60
Chromium	mg/kg		11	17	20	6	17	6	24	7	15	6	17	19	9	17	13	14	15
Chromium (hexavalent)	mg/kg	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Lead	mg/kg	200	13	52	95	5	148	5	92	27	55	5	161	83	21	80	198	42	112
Mercury	mg/kg	40	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	0.71	<0.17	1.21	0.34	<0.17	0.89	1.41	<0.17	0.51
Nickel	mg/kg	130	6	12	15	2	12	2	16	5	13	2	12	13	4	16	14	9	14
Selenium	mg/kg	250	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Zinc	mg/kg	3700	17	56	85	<5	167	<5	83	15	61	12	63	70	18	102	89	49	81
Asbestos in Soil (inc. matrix)^@																			
Asbestos in soil		NAD	NAD	**Amosite**	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	**Chrysotile**	NAD	NAD	NAD	NAD	NAD
Asbestos Matrix (microscope)			-	Loose Fibres	-	-	-	-	-	-	-	-	-	Loose Fibres	-	-	-	-	-
Asbestos in soil % composition (hand picking and weighing)	% w/w			<0.001										<0.001					
PAH-16MS (MSD order)																			
Naphthalene	mg/kg	2.3	<0.03	0.38	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.08	0.56	<0.03	<0.03	<0.03	<0.03	<0.03
Acenaphthylene	mg/kg	170	0.01	0.02	0.03	<0.01	<0.01	<0.01	0.05	<0.01	0.02	<0.01	0.03	0.06	<0.01	0.02	<0.01	0.01	0.01
Acenaphthene	mg/kg	210	<0.01	0.11	0.03	<0.01	0.02	<0.01	0.05	<0.01	0.09	<0.01	0.06	0.77	<0.01	0.03	0.02	0.07	0.02
Fluorene	mg/kg	170	<0.01	0.11	0.02	<0.01	0.02	<0.01	0.05	<0.01	0.07	<0.01	0.06	0.63	<0.01	0.04	0.03	0.03	0.02
Phenanthrene	mg/kg	95	0.15	0.83	0.48	<0.03	0.2	<0.03	0.62	<0.03	0.8	<0.03	0.69	5.41	<0.03	0.41	0.46	0.7	0.2
Anthracene	mg/kg	2400	0.03	0.17	0.13	<0.02	0.03	<0.02	0.16	<0.02	0.25	<0.02	0.17	1.38	<0.02	0.09	0.11	0.18	0.05
Fluoranthene	mg/kg	280	0.4	1.16	1.46	<0.08	0.27	<0.08	1.44	<0.08	1.97	<0.08	1.51	5.55	<0.08	1.01	0.94	1.83	0.62
Pyrene	mg/kg	620	0.39	1.06	1.36	<0.07	0.22	<0.07	1.43	<0.07	1.59	<0.07	1.49	4.53	<0.07	0.88	0.8	1.65	0.55
Benzo(a)anthracene	mg/kg	72	0.28	0.57	0.9	<0.04	0.14	<0.04	0.96	<0.04	1.05	<0.04	0.9	2.14	<0.04	0.54	0.44	0.8	0.32
Chrysene	mg/kg	15	0.31	0.59	0.89	<0.06	0.16	<0.06	0.99	<0.06	1.01	<0.06	0.89	2.06	<0.06	0.58	0.47	0.7	0.34
Benzo(b)fluoranthene	mg/kg	2.6	0.4	0.71	1.07	<0.05	0.18	0.07	1.32	<0.05	1.07	<0.05	1.12	2.03	<0.05	0.69	0.5	0.64	0.36
Benzo(k)fluoranthene	mg/kg	77	0.12	0.21	0.31	<0.07	<0.07	<0.07	0.38	<0.07	0.31	<0.07	0.32	0.61	<0.07	0.2	0.15	0.19	0.1
Benzo(a)pyrene	mg/kg	2.2	0.39	0.66	1.04	<0.04	0.17	0.06	1.25	0.05	1.03	<0.04	1.04	1.81	<0.04	0.56	0.41	0.61	0.32
Indeno(123-cd)pyrene	mg/kg	27.0	0.28	0.44	0.7	<0.03	0.13	0.04	0.92	0.04	0.58	<0.03	0.68	1.04	<0.03	0.39	0.27	0.33	0.22
Dibenzo(ah)anthracene	mg/kg	0.24	0.06	0.07	0.15	<0.04	<0.04	<0.04	0.16	<0.04	0.14	<0.04	0.12	0.24	<0.04	0.09	0.05	0.08	<0.04
Benzo(ghi)perylene	mg/kg	320	0.21	0.35	0.55	<0.05	0.09	<0.05	0.75	<0.05	0.45	<0.05	0.54	0.83	<0.05	0.29	0.2	0.23	0.18
Total PAH-16MS (MSD order)	mg/kg		3.03	7.44	9.12	<0.08	1.63	0.17	10.5	0.09	10.4	<0.08	9.7	29.6	<0.08	5.82	4.85	8.05	3.31
TPH CWG																			
Ali >C5-C6	mg/kg	42	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ali >C6-C8	mg/kg	100	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ali >C8-C10	mg/kg	27	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1
Ali >C10-C12	mg/kg	130	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ali >C12-C16	mg/kg	1100	<1	1	<1	<1	<1	<1	<1	<1	2	<1	1	1	<1	<1	2	<1	1
Ali >C16-C21	mg/kg	65000	<1	1	<1	<1	<1	<1	<1	<1	2	<1	1	3	<1	3	3	1	9
Ali >C21-C35	mg/kg	65000	2	57	8	4	8	2	8	<1	18	<1	22	33	<1	9	40	6	16
Total Aliphatics	mg/kg		2	60	8	4	8	2	8	<1	22	<1	25	37	<1	15	46	7	26
Aro >C5-C7	mg/kg	70	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aro >C7-C8	mg/kg	130	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aro >C8-C10	mg/kg	34	<1	1	1	<1	<1	<1	1	<1	<1	<1	2	1	<1	2	<1	1	<1
Aro >C10-C12	mg/kg	74	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	1	2	<1	<1	<1	<1	<1
Aro >C12-C16	mg/kg	140	<1	5	2	<1	2	<1	2	<1	5	<1	3	8	<1	2	2	1	2
Aro >C16-C21	mg/kg	260	1	10	8	<1	5	1	12	<1	11	<1	10	43	<1	10	7	9	12
Aro >C21-C35	mg/kg	1100	6	87	46	10	14	9	46	1	34	<1	30	141	<1	32	24	28	23
Total Aromatics	mg/kg		8	105	57	10	21	10	62	1	51	<1	46	197	<1	45	34	39	37
TPH (Ali & Aro >C5-C35)	mg/kg		9	165	64	13	29	12	71	1	74	<1	71	234	<1	60	79	45	63
BTEX - Benzene	mg/kg	0.087	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - Toluene	mg/kg	130	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - Ethyl Benzene	mg/kg	47	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - m & p Xylene	mg/kg	56	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BTEX - o Xylene	mg/kg	59	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE	mg/kg		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Project Name: Angels
Project Ref: J20-002
GAC Comparison: GCC - Resid

Sample ID	Units	WS110	WS110	WS111	WS111
Depth to Top		0.30	1.30	0.40	1.10
Depth to Bottom		0.40	1.40	0.50	1.30
Date Sampled		25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20
% Stones >10mm	% w/w	<0.1	<0.1	2.1	15.6
pH	pH	8.71	8.2	8.79	8.76
Cyanide (free)	mg/kg	<1	<1	<1	<1
Phenols - Total by HPLC	mg/kg	<0.2	<0.2	<0.2	<0.2
Organic matter	% w/w	0.9	1.8	0.7	3
Total Organic Carbon	% w/w	0.54	1.05	0.39	1.73
Antimony	mg/kg	<5	<5	<5	<5
Arsenic	mg/kg	6	5	5	8
Cadmium	mg/kg	<0.5	0.5	<0.5	0.9
Copper	mg/kg	8	8	4	31
Chromium	mg/kg	13	16	12	20
Chromium (hexavalent)	mg/kg	<1	<1	<1	<1
Lead	mg/kg	35	28	17	**214**
Mercury	mg/kg	<0.17	<0.17	<0.17	0.58
Nickel	mg/kg	9	9	7	15
Selenium	mg/kg	<1	<1	<1	<1
Zinc	mg/kg	47	41	20	196
Asbestos in Soil (inc. matrix)^ @					
Asbestos in soil		NAD	**Chrysotile**	NAD	NAD
Asbestos Matrix (microscope)		-	Loose Fibres	-	-
Asbestos in soil % composition (hand picking and weighing)	% w/w		<0.001		
PAH-16MS (MSD order)					
Naphthalene	mg/kg	<0.03	<0.03	<0.03	0.33
Acenaphthylene	mg/kg	<0.01	0.04	<0.01	0.21
Acenaphthene	mg/kg	<0.01	0.04	0.04	3.31
Fluorene	mg/kg	<0.01	0.04	0.04	4.71
Phenanthrene	mg/kg	0.05	0.37	0.44	36.8
Anthracene	mg/kg	<0.02	0.08	0.1	7.4
Fluoranthene	mg/kg	0.12	0.97	0.79	27.9
Pyrene	mg/kg	0.11	0.91	0.71	23.3
Benzo(a)anthracene	mg/kg	0.08	0.6	0.37	9.53
Chrysene	mg/kg	0.09	0.61	0.35	9.93
Benzo(b)fluoranthene	mg/kg	0.11	0.78	0.36	**7.67**
Benzo(k)fluoranthene	mg/kg	<0.07	0.22	0.11	2.7
Benzo(a)pyrene	mg/kg	0.11	0.75	0.34	**6.62**
Indeno(123-cd)pyrene	mg/kg	0.09	0.54	0.22	3.57
Dibenzo(ah)anthracene	mg/kg	<0.04	0.11	<0.04	**0.9**
Benzo(ghi)perylene	mg/kg	0.07	0.43	0.16	2.54
Total PAH-16MS (MSD order)	mg/kg	0.83	6.49	4.03	147
TPH CWG					
Ali >C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01
Ali >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01
Ali >C8-C10	mg/kg	<1	<1	<1	<1
Ali >C10-C12	mg/kg	<1	<1	<1	3
Ali >C12-C16	mg/kg	<1	<1	<1	42
Ali >C16-C21	mg/kg	<1	<1	<1	67
Ali >C21-C35	mg/kg	2	11	5	89
Total Aliphatics	mg/kg	2	11	5	201
Aro >C5-C7	mg/kg	<0.01	<0.01	<0.01	<0.01
Aro >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01
Aro >C8-C10	mg/kg	<1	<1	<1	<1
Aro >C10-C12	mg/kg	<1	<1	<1	4
Aro >C12-C16	mg/kg	<1	1	<1	61
Aro >C16-C21	mg/kg	<1	6	2	173
Aro >C21-C35	mg/kg	3	22	10	422
Total Aromatics	mg/kg	3	30	12	661
TPH (Ali & Aro >C5-C35)	mg/kg	6	41	17	862
BTEX - Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01
BTEX - Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01
BTEX - Ethyl Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01
BTEX - m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01
BTEX - o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01

Project Name: Angels
Project Ref: J20-002
GAC Comparison: EQS/DWS

Sample ID	Units	GAC	WS101	WS102	WS103	WS104	WS105	WS106	WS107	WS108	WS109	WS110	WS111
Depth to Top			3.80	0.30	1.10	2.00	4.00	1.00	3.50	4.00	3.50	4.00	2.70
Depth to Bottom			4.00	0.50	1.30	2.20	4.50	1.20	4.00	4.10	3.70	4.50	2.80
Date Sampled			25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20		25-Feb-20	25-Feb-20	25-Feb-20
% Stones >10mm	% w/w		12.1	5.6	9.5	13.5	11.1	8.1	20.1	4.6	1	38.6	12.2
pH (leachable)	pH	6-9	**9.07**	8.21	7.79	8.16	8.84	**10.19**	8.62	8.01	**9.6**	8.7	7.81
Alkalinity (total) (leachable) Colorimetry	mg/l Ca CO3	-	169	145	142	62	43	81	166	155	50	248	184
Ammoniacal nitrogen as N (leachable)	mg/l	0.5	**2.25**	0.03	**5.65**	<0.02	**1.48**	0.62	**1.47**	0.05	0.38	**2.89**	**1.41**
Ammonia / Ammoniacal Nitrogen as NH3 (leachable)	mg/l	-	2.745	0.039	6.887	<0.024	1.809	0.75	1.796	0.06	0.459	3.52	1.715
Chloride (leachable)	mg/l	250	24.87	20.45	9.16	4.97	6.86	5.41	19.8	15.41	7.14	38.6	26.49
Nitrate (leachable)	mg/l	-	<0.1	0.7	<0.1	<0.1	0.1	0.3	<0.1	0.2	1	<0.1	<0.1
Sulphate (leachable)	mg/l	250	21.01	33.4	7.83	13.69	42.1	80.54	37.4	35.84	29.53	111	38.14
Cyanide (total) (leachable)	mg/l	0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Phenols (total by HPLC) (leachable)	mg/l	0.0077	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Antimony (leachable)	µg/l	-	8	1	4	2	9	3	11	<1	<1	5	4
Arsenic (leachable)	µg/l	50	30	3	13	9	16	4	24	4	6	19	9
Boron (leachable)	µg/l	2000	127	80	55	65	102	57	115	91	57	81	108
Barium (leachable)	µg/l	-	164	313	126	113	124	11	178	196	7	578	278
Cadmium (leachable)	µg/l	0.09	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper (leachable)	µg/l	28	**30**	17	17	10	28	**34**	28	9	5	**41**	12
Chromium (leachable)	µg/l	50	3	2	<1	1	<1	3	2	2	4	3	1
Lead (leachable)	µg/l	10	**167**	**91**	**138**	**30**	**37**	4	**126**	**48**	1	**86**	**38**
Mercury (leachable)	µg/l	0.07	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel (leachable)	µg/l	20	7	3	5	2	3	7	7	2	2	13	12
Selenium (leachable)	µg/l	-	2	<1	<1	<1	2	<1	<1	<1	2	1	1
Zinc (leachable)	µg/l	125	48	46	44	16	6	2	59	18	1	69	25
PAH-16MS (leachable)													
Naphthalene (leachable)	µg/l	2	0.18	<0.02	<0.02	<0.02	<0.02	<0.02	1.34	<0.02	<0.02	**6.15**	<0.02
Acenaphthylene (leachable)	µg/l	-	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.13	<0.02	<0.02	0.4	0.02
Acenaphthene (leachable)	µg/l	-	0.37	<0.02	<0.02	0.06	0.09	0.03	0.7	<0.02	<0.02	3.34	1.33
Fluorene (leachable)	µg/l	-	0.19	<0.02	<0.02	0.07	0.05	<0.02	0.67	<0.02	<0.02	3.83	0.7
Phenanthrene (leachable)	µg/l	-	0.56	0.02	0.17	0.2	0.16	0.08	0.94	0.07	0.03	4.47	0.99
Anthracene (leachable)	µg/l	0.1	**0.13**	0.03	0.03	0.04	0.04	0.02	**0.19**	0.03	<0.02	**2.26**	**0.35**
Fluoranthene (leachable)	µg/l	0.0063	**0.77**	**0.2**	**0.26**	**0.11**	**0.19**	**0.11**	**0.53**	**0.35**	**0.04**	**9.98**	**1.72**
Pyrene (leachable)	µg/l	-	0.67	0.2	0.23	0.09	0.18	0.1	0.42	0.33	0.04	7.99	1.36
Benzo(a)anthracene (leachable)	µg/l	-	0.22	0.11	0.08	0.03	0.05	0.03	0.12	0.2	<0.02	2.76	0.42
Chrysene (leachable)	µg/l	-	0.26	0.13	0.13	0.03	0.07	0.04	0.15	0.24	<0.02	2.58	0.45
Benzo(b)fluoranthene (leachable)*	µg/l	-	0.22	0.18	0.14	0.02	0.05	0.03	0.1	0.2	<0.02	1.63	0.29
Benzo(k)fluoranthene (leachable)*	µg/l	-	0.07	0.05	0.04	<0.02	<0.02	<0.02	0.03	0.07	<0.02	0.58	0.1
Benzo(a)pyrene (leachable)*	µg/l	-	0.16	0.13	0.09	<0.02	0.03	0.02	0.07	0.18	<0.02	1.38	0.23
Indeno(123-cd)pyrene (leachable)*	µg/l	-	0.11	0.11	0.08	<0.02	0.03	<0.02	0.05	0.12	<0.02	0.86	0.14
Dibenzo(ah)anthracene (leachable)	µg/l	-	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	0.18	0.03
Benzo(ghi)perylene (leachable)*	µg/l	-	0.11	0.11	0.07	<0.02	0.03	<0.02	0.05	0.13	<0.02	0.81	0.13
PAH (SUM 5*)	µg/l	0.1	**0.67**	**0.58**	**0.42**	<0.1	<0.1	<0.1	**0.3**	**0.7**	<0.1	**5.26**	**0.89**
Total PAH-16MS (leachable)	µg/l	-	4.08	1.29	1.32	0.65	0.97	0.46	5.49	1.95	0.11	49.2	8.26
TPH CWG (leachable)													
Ali >C5-C6 (leachable)	µg/l	15000	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Ali >C6-C8 (leachable)	µg/l	15000	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ali >C8-C10 (leachable)	µg/l	300	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ali >C10-C12 (leachable)	µg/l	300	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ali >C12-C16 (leachable)	µg/l	300	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ali >C16-C21 (leachable)	µg/l	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ali >C21-C35 (leachable)	µg/l	-	<20	<20	<20	<20	<20	<20	<20	<20	<20	22	<20
Total Aliphatics (leachable)	µg/l		<10	<10	<10	<10	<10	<10	15	<10	<10	22	<10
Aro >C5-C7 (leachable)	µg/l	10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Aro >C7-C8 (leachable)	µg/l	74	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Aro >C8-C10 (leachable)	µg/l	300	<10	<10	<10	<10	25	<10	11	<10	<10	27	12
Aro >C10-C12 (leachable)	µg/l	90	<10	<10	<10	<10	<10	<10	<10	<10	<10	27	<10
Aro >C12-C16 (leachable)	µg/l	90	<10	<10	<10	<10	<10	<10	<10	<10	<10	71	<10
Aro >C16-C21 (leachable)	µg/l	90	<10	<10	<10	<10	<10	<10	<10	<10	<10	**92**	14
Aro >C21-C35 (leachable)	µg/l	90	<20	<20	<20	<20	<20	<20	<20	<20	<20	**95**	<20
Total Aromatics (leachable)	µg/l	-	22	<20	<20	<20	25	<20	<20	<20	<20	312	26
TPH (Ali & Aro >C5-C35) (leachable)	µg/l	-	22	<20	<20	<20	25	<20	26	<20	<20	334	26
BTEX - Benzene (leachable)	µg/l	10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BTEX - Toluene (leachable)	µg/l	74	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BTEX - Ethyl Benzene (leachable)	µg/l	300	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BTEX - o Xylene (leachable)	µg/l	30	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BTEX - m & p Xylene (leachable)	µg/l	30	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
MTBE (leachable)	µg/l	15	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Determinand	Units	TSV	Arithmetic Mean	Geometric Mean	No. of Samples	Standard Deviation	Coeff. Variability	Distribution	Applicable 95% UCL	95% UCL LogNormal	95% UCL Normal	Max	Min	Tcalc	Tcrit (5%)	Outlier?
Lead (Total)	mg/kg	200	NA	42.0	21	64.0	NA	LOGNORMAL	65.7	65.7	NA	214.0	5.0	1.37	2.58	No
Benzo(b)fluoranthene	mg/kg	2.6	0.9	0.4	21	1.6	1.78	LOGNORMAL	0.64	0.6	1.5	7.7	0.1	2.13	2.58	No
Benzo(a)pyrene	mg/kg	2.2	0.8	0.3	21	1.4	1.71	LOGNORMAL	0.59	0.6	1.4	6.6	0.0	2.07	2.58	No
Dibenzo(ah)anthracene	mg/kg	0.24	0.1	0.1	21	0.2	1.55	LOGNORMAL	0.10	0.1	0.2	0.9	0.0	3.04	2.58	Yes

95%UCL calculated dependent on type of distribution.
Maximum value test undertaken in accordance with CLR7 methodology. If Tcalc>Tcrit, maximum value in distribution is an outlier.

APPENDIX 5: CHEMICAL LABORATORY TEST CERTIFICATES

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 20/01967
Issue Number: 1 **Date:** 04 March, 2020

Client: Ground Condition Consultants Ltd
10 Waldegrave Close
Southampton
SO19 9RY

Project Manager: Antony Platt
Project Name: Angels
Project Ref: J20-002
Order No: J20-002
Date Samples Received: 27/02/20
Date Instructions Received: 27/02/20
Date Analysis Completed: 04/03/20

Prepared by:

Melanie Marshall
Laboratory Coordinator

Approved by:

Richard Wong
Client Manager

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/1	20/01967/2	20/01967/3	20/01967/4	20/01967/5	20/01967/6	20/01967/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS101	WS102	WS103	WS103	WS104			
Depth to Top	0.30	1.20	3.80	0.30	0.30	1.10	0.30			
Depth To Bottom	0.40	1.30	4.00	0.50	0.50	1.30	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5A	5AB	6ABE	4A	6AE	4A			
% Stones >10mm$_A$	1.6	<0.1	12.1	5.6	5.3	9.5	<0.1	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	8.80	8.25	-	8.46	8.93	8.29	9.07	pH	0.01	A-T-031s
Cyanide (free)$_A$$^{M\#}$	<1	<1	-	<1	<1	<1	<1	mg/kg	1	A-T-042sFCN
Phenols - Total by HPLC$_A$	<0.2	<0.2	-	<0.2	0.3	<0.2	<0.2	mg/kg	0.2	A-T-050s
Organic matter$_D$$^{M\#}$	0.7	1.8	-	2.2	0.4	3.3	0.3	% w/w	0.1	A-T-032 OM
Total Organic Carbon$_D$$^{M\#}$	0.40	1.05	-	1.28	0.23	1.92	0.17	% w/w	0.03	A-T-032s
Antimony$_D$	<5	<5	-	<5	<5	<5	<5	mg/kg	5	A-T-024s
Arsenic$_D$$^{M\#}$	5	5	-	8	<1	10	2	mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	<0.5	0.9	-	1.1	<0.5	1.3	<0.5	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	5	17	-	20	<1	36	1	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	11	17	-	20	6	17	6	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	-	<1	<1	<1	<1	mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	13	52	-	95	5	148	5	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17	-	<0.17	<0.17	<0.17	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	6	12	-	15	2	12	2	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	-	<1	<1	<1	<1	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	17	56	-	85	<5	167	<5	mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-2 (10:1)$_A$	-	-	*	*	-	*	-			A-T-001
pH (leachable)$_A$$^{\#}$	-	-	9.07	8.21	-	7.79	-	pH	0.01	A-T-031w
Alkalinity (total) (leachable) Colorimetry$_A$	-	-	169	145	-	142	-	mg/l Ca CO3	20	A-T-038w
Ammoniacal nitrogen as N (leachable)$_A$	-	-	2.25	0.03	-	5.65	-	mg/l	0.02	A-T-033w
Ammonia / Ammoniacal Nitrogen as NH3 (leachable)$_A$	-	-	2.745	0.039	-	6.887	-	mg/l	0.024	A-T-033w
Chloride (leachable)$_A$$^{\#}$	-	-	24.87	20.45	-	9.16	-	mg/l	1	A-T-026w
Nitrate (leachable)$_A$$^{\#}$	-	-	<0.1	0.7	-	<0.1	-	mg/l	0.1	A-T-026w
Sulphate (leachable)$_A$$^{\#}$	-	-	21.01	33.40	-	7.83	-	mg/l	1	A-T-026w
Cyanide (total) (leachable)$_A$$^{\#}$	-	-	<0.005	<0.005	-	<0.005	-	mg/l	0.005	A-T-042wTCN
Phenols (total by HPLC) (leachable)$_A$	-	-	<0.01	<0.01	-	<0.01	-	mg/l	0.01	A-T-050w
Antimony (leachable)$_A$$^{\#}$	-	-	8	1	-	4	-	µg/l	1	A-T-025w
Arsenic (leachable)$_A$$^{\#}$	-	-	30	3	-	13	-	µg/l	1	A-T-025w
Boron (leachable)$_A$$^{\#}$	-	-	127	80	-	55	-	µg/l	10	A-T-025w
Barium (leachable)$_A$$^{\#}$	-	-	164	313	-	126	-	µg/l	1	A-T-025w
Cadmium (leachable)$_A$$^{\#}$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-025w
Copper (leachable)$_A$$^{\#}$	-	-	30	17	-	17	-	µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/1	20/01967/2	20/01967/3	20/01967/4	20/01967/5	20/01967/6	20/01967/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS101	WS102	WS103	WS103	WS104			
Depth to Top	0.30	1.20	3.80	0.30	0.30	1.10	0.30			
Depth To Bottom	0.40	1.30	4.00	0.50	0.50	1.30	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5A	5AB	6ABE	4A	6AE	4A			
Chromium (leachable)$_{A}^{\#}$	-	-	3	2	-	<1	-	µg/l	1	A-T-025w
Lead (leachable)$_{A}^{\#}$	-	-	167	91	-	138	-	µg/l	1	A-T-025w
Mercury (leachable)$_{A}^{\#}$	-	-	<0.1	<0.1	-	<0.1	-	µg/l	0.1	A-T-025w
Nickel (leachable)$_{A}^{\#}$	-	-	7	3	-	5	-	µg/l	1	A-T-025w
Selenium (leachable)$_{A}^{\#}$	-	-	2	<1	-	<1	-	µg/l	1	A-T-025w
Zinc (leachable)$_{A}^{\#}$	-	-	48	46	-	44	-	µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/1	20/01967/2	20/01967/3	20/01967/4	20/01967/5	20/01967/6	20/01967/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS101	WS102	WS103	WS103	WS104			
Depth to Top	0.30	1.20	3.80	0.30	0.30	1.10	0.30			
Depth To Bottom	0.40	1.30	4.00	0.50	0.50	1.30	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5A	5AB	6ABE	4A	6AE	4A			
Asbestos in Soil (inc. matrix)^ @										
Asbestos in soil$_D^{\#}$	NAD	Amosite	-	NAD	NAD	NAD	NAD			A-T-045
Asbestos Matrix (microscope)$_D$	-	Loose Fibres	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	N/A	-	N/A	N/A	N/A	N/A			A-T-045
Asbestos in Soil Quantification % @ (Hand Picking&Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_D$	-	<0.001	-	-	-	-	-	% w/w	0.001	A-T-054

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/1	20/01967/2	20/01967/3	20/01967/4	20/01967/5	20/01967/6	20/01967/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS101	WS102	WS103	WS103	WS104			
Depth to Top	0.30	1.20	3.80	0.30	0.30	1.10	0.30			
Depth To Bottom	0.40	1.30	4.00	0.50	0.50	1.30	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5A	5AB	6ABE	4A	6AE	4A			
PAH-16MS (leachable)										
Naphthalene (leachable)$_A$	-	-	0.18	<0.02	-	<0.02	-	µg/l	0.02	A-T-019w
Acenaphthylene (leachable)$_A$	-	-	0.03	<0.02	-	<0.02	-	µg/l	0.02	A-T-019w
Acenaphthene (leachable)$_A$	-	-	0.37	<0.02	-	<0.02	-	µg/l	0.02	A-T-019w
Fluorene (leachable)$_A$	-	-	0.19	<0.02	-	<0.02	-	µg/l	0.02	A-T-019w
Phenanthrene (leachable)$_A$	-	-	0.56	0.02	-	0.17	-	µg/l	0.02	A-T-019w
Anthracene (leachable)$_A$	-	-	0.13	0.03	-	0.03	-	µg/l	0.02	A-T-019w
Fluoranthene (leachable)$_A$	-	-	0.77	0.20	-	0.26	-	µg/l	0.02	A-T-019w
Pyrene (leachable)$_A$	-	-	0.67	0.20	-	0.23	-	µg/l	0.02	A-T-019w
Benzo(a)anthracene (leachable)$_A$	-	-	0.22	0.11	-	0.08	-	µg/l	0.02	A-T-019w
Chrysene (leachable)$_A$	-	-	0.26	0.13	-	0.13	-	µg/l	0.02	A-T-019w
Benzo(b)fluoranthene (leachable)$_A$	-	-	0.22	0.18	-	0.14	-	µg/l	0.02	A-T-019w
Benzo(k)fluoranthene (leachable)$_A$	-	-	0.07	0.05	-	0.04	-	µg/l	0.02	A-T-019w
Benzo(a)pyrene (leachable)$_A$	-	-	0.16	0.13	-	0.09	-	µg/l	0.02	A-T-019w
Indeno(123-cd)pyrene (leachable)$_A$	-	-	0.11	0.11	-	0.08	-	µg/l	0.02	A-T-019w
Dibenzo(ah)anthracene (leachable)$_A$	-	-	0.03	0.02	-	<0.02	-	µg/l	0.02	A-T-019w
Benzo(ghi)perylene (leachable)$_A$	-	-	0.11	0.11	-	0.07	-	µg/l	0.02	A-T-019w
Total PAH-16MS (leachable)$_A$	-	-	4.08	1.29	-	1.32	-	µg/l	0.02	A-T-019w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/1	20/01967/2	20/01967/3	20/01967/4	20/01967/5	20/01967/6	20/01967/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS101	WS102	WS103	WS103	WS104			
Depth to Top	0.30	1.20	3.80	0.30	0.30	1.10	0.30			
Depth To Bottom	0.40	1.30	4.00	0.50	0.50	1.30	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5A	5AB	6ABE	4A	6AE	4A			
PAH-16MS (MSD order)										
Naphthalene$_A^{M\#}$	<0.03	0.38	-	<0.03	<0.03	<0.03	<0.03	mg/kg	0.03	A-T-019s
Acenaphthylene$_A^{M\#}$	0.01	0.02	-	0.03	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-019s
Acenaphthene$_A^{M\#}$	<0.01	0.11	-	0.03	<0.01	0.02	<0.01	mg/kg	0.01	A-T-019s
Fluorene$_A^{M\#}$	<0.01	0.11	-	0.02	<0.01	0.02	<0.01	mg/kg	0.01	A-T-019s
Phenanthrene$_A^{M\#}$	0.15	0.83	-	0.48	<0.03	0.20	<0.03	mg/kg	0.03	A-T-019s
Anthracene$_A^{M\#}$	0.03	0.17	-	0.13	<0.02	0.03	<0.02	mg/kg	0.02	A-T-019s
Fluoranthene$_A^{M\#}$	0.40	1.16	-	1.46	<0.08	0.27	<0.08	mg/kg	0.08	A-T-019s
Pyrene$_A^{M\#}$	0.39	1.06	-	1.36	<0.07	0.22	<0.07	mg/kg	0.07	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.28	0.57	-	0.90	<0.04	0.14	<0.04	mg/kg	0.04	A-T-019s
Chrysene$_A^{M\#}$	0.31	0.59	-	0.89	<0.06	0.16	<0.06	mg/kg	0.06	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.40	0.71	-	1.07	<0.05	0.18	0.07	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.12	0.21	-	0.31	<0.07	<0.07	<0.07	mg/kg	0.07	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.39	0.66	-	1.04	<0.04	0.17	0.06	mg/kg	0.04	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.28	0.44	-	0.70	<0.03	0.13	0.04	mg/kg	0.03	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.06	0.07	-	0.15	<0.04	<0.04	<0.04	mg/kg	0.04	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.21	0.35	-	0.55	<0.05	0.09	<0.05	mg/kg	0.05	A-T-019s
Total PAH-16MS (MSD order)$_A^{M\#}$	3.03	7.44	-	9.12	<0.08	1.63	0.17	mg/kg	0.03	A-T-019s

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/1	20/01967/2	20/01967/3	20/01967/4	20/01967/5	20/01967/6	20/01967/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS101	WS102	WS103	WS103	WS104			
Depth to Top	0.30	1.20	3.80	0.30	0.30	1.10	0.30			
Depth To Bottom	0.40	1.30	4.00	0.50	0.50	1.30	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5A	5AB	6ABE	4A	6AE	4A			
TPH CWG (leachable)										
Ali >C5-C6 (leachable)$_A$	-	-	<2	<2	-	<2	-	µg/l	1	A-T-022w
Ali >C6-C8 (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
Ali >C8-C10 (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Ali >C10-C12 (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Ali >C12-C16 (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Ali >C16-C21 (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Ali >C21-C35 (leachable)$_A$	-	-	<20	<20	-	<20	-	µg/l	20	A-T-055w
Total Aliphatics (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Aro >C5-C7 (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
Aro >C7-C8 (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
Aro >C8-C10 (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Aro >C10-C12 (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Aro >C12-C16 (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Aro >C16-C21 (leachable)$_A$	-	-	<10	<10	-	<10	-	µg/l	10	A-T-055w
Total Aromatics (leachable)$_A$	-	-	22	<20	-	<20	-	µg/l	20	A-T-055w
TPH (Ali & Aro >C5-C35) (leachable)$_A$	-	-	22	<20	-	<20	-	µg/l	20	A-T-055w
BTEX - Benzene (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
BTEX - Toluene (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
BTEX - o Xylene (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
BTEX - m & p Xylene (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
MTBE (leachable)$_A$	-	-	<1	<1	-	<1	-	µg/l	1	A-T-022w
Aro >C21-C35 (leachable)$_A$	-	-	<20	<20	-	<20	-	µg/l	20	A-T-055w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/1	20/01967/2	20/01967/3	20/01967/4	20/01967/5	20/01967/6	20/01967/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS101	WS101	WS101	WS102	WS103	WS103	WS104			
Depth to Top	0.30	1.20	3.80	0.30	0.30	1.10	0.30			
Depth To Bottom	0.40	1.30	4.00	0.50	0.50	1.30	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	4AE	5A	5AB	6ABE	4A	6AE	4A			
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	<1	-	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	<1	-	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	1	-	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	1	-	<1	<1	<1	<1	mg/kg	1	A-T-055s
Ali >C21-C35$_A$	2	57	-	8	4	8	2	mg/kg	1	A-T-055s
Total Aliphatics$_A$	2	60	-	8	4	8	2	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<1	1	-	1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12$_A^{M\#}$	<1	2	-	<1	<1	<1	<1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	<1	5	-	2	<1	2	<1	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	1	10	-	8	<1	5	1	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	6	87	-	46	10	14	9	mg/kg	1	A-T-055s
Total Aromatics$_A$	8	105	-	57	10	21	10	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	9	165	-	64	13	29	12	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/8	20/01967/9	20/01967/10	20/01967/11	20/01967/12	20/01967/13	20/01967/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS104	WS104	WS105	WS105	WS105	WS106	WS106			
Depth to Top	0.60	2.00	0.30	1.10	4.00	0.30	1.00			
Depth To Bottom	0.80	2.20	0.40	1.30	4.50	0.40	1.20			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4A	4AB	5AB	5AB	4A	5AB			
% Stones >10mm$_A$	6.4	13.5	6.9	16.0	11.1	2.7	8.1	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	8.44	-	8.80	9.36	-	9.35	9.20	pH	0.01	A-T-031s
Cyanide (free)$_A$$^{M\#}$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-042sFCN
Phenols - Total by HPLC$_A$	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	mg/kg	0.2	A-T-050s
Organic matter$_D$$^{M\#}$	2.5	-	0.6	2.0	-	<0.1	2.0	% w/w	0.1	A-T-032 OM
Total Organic Carbon$_D$$^{M\#}$	1.47	-	0.33	1.18	-	0.08	1.17	% w/w	0.03	A-T-032s
Antimony$_D$	<5	-	<5	<5	-	<5	<5	mg/kg	5	A-T-024s
Arsenic$_D$$^{M\#}$	7	-	12	6	-	4	5	mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	1.2	-	<0.5	0.8	-	<0.5	0.8	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	18	-	3	23	-	2	17	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	24	-	7	15	-	6	17	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	92	-	27	55	-	5	161	mg/kg	1	A-T-024s
Mercury$_D$	<0.17	-	<0.17	0.71	-	<0.17	1.21	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	16	-	5	13	-	2	12	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	83	-	15	61	-	12	63	mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-2 (10:1)$_A$	-	*	-	-	*	-	*			A-T-001
pH (leachable)$_A$$^{\#}$	-	8.16	-	-	8.84	-	10.19	pH	0.01	A-T-031w
Alkalinity (total) (leachable) Colorimetry$_A$	-	62	-	-	43	-	81	mg/l Ca CO3	20	A-T-038w
Ammoniacal nitrogen as N (leachable)$_A$	-	<0.02	-	-	1.48	-	0.62	mg/l	0.02	A-T-033w
Ammonia / Ammoniacal Nitrogen as NH3 (leachable)$_A$	-	<0.024	-	-	1.809	-	0.750	mg/l	0.024	A-T-033w
Chloride (leachable)$_A$$^{\#}$	-	4.97	-	-	6.86	-	5.41	mg/l	1	A-T-026w
Nitrate (leachable)$_A$$^{\#}$	-	<0.1	-	-	0.1	-	0.3	mg/l	0.1	A-T-026w
Sulphate (leachable)$_A$$^{\#}$	-	13.69	-	-	42.10	-	80.54	mg/l	1	A-T-026w
Cyanide (total) (leachable)$_A$$^{\#}$	-	<0.005	-	-	<0.005	-	<0.005	mg/l	0.005	A-T-042wTCN
Phenols (total by HPLC) (leachable)$_A$	-	<0.01	-	-	<0.01	-	<0.01	mg/l	0.01	A-T-050w
Antimony (leachable)$_A$$^{\#}$	-	2	-	-	9	-	3	µg/l	1	A-T-025w
Arsenic (leachable)$_A$$^{\#}$	-	9	-	-	16	-	4	µg/l	1	A-T-025w
Boron (leachable)$_A$$^{\#}$	-	65	-	-	102	-	57	µg/l	10	A-T-025w
Barium (leachable)$_A$$^{\#}$	-	113	-	-	124	-	11	µg/l	1	A-T-025w
Cadmium (leachable)$_A$$^{\#}$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-025w
Copper (leachable)$_A$$^{\#}$	-	10	-	-	28	-	34	µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/8	20/01967/9	20/01967/10	20/01967/11	20/01967/12	20/01967/13	20/01967/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS104	WS104	WS105	WS105	WS105	WS106	WS106			
Depth to Top	0.60	2.00	0.30	1.10	4.00	0.30	1.00			
Depth To Bottom	0.80	2.20	0.40	1.30	4.50	0.40	1.20			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4A	4AB	5AB	5AB	4A	5AB			
Chromium (leachable)$_{A}^{\#}$	-	1	-	-	<1	-	3	µg/l	1	A-T-025w
Lead (leachable)$_{A}^{\#}$	-	30	-	-	37	-	4	µg/l	1	A-T-025w
Mercury (leachable)$_{A}^{\#}$	-	<0.1	-	-	<0.1	-	<0.1	µg/l	0.1	A-T-025w
Nickel (leachable)$_{A}^{\#}$	-	2	-	-	3	-	7	µg/l	1	A-T-025w
Selenium (leachable)$_{A}^{\#}$	-	<1	-	-	2	-	<1	µg/l	1	A-T-025w
Zinc (leachable)$_{A}^{\#}$	-	16	-	-	6	-	2	µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/8	20/01967/9	20/01967/10	20/01967/11	20/01967/12	20/01967/13	20/01967/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS104	WS104	WS105	WS105	WS105	WS106	WS106			
Depth to Top	0.60	2.00	0.30	1.10	4.00	0.30	1.00			
Depth To Bottom	0.80	2.20	0.40	1.30	4.50	0.40	1.20			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4A	4AB	5AB	5AB	4A	5AB			
Asbestos in Soil (inc. matrix)^ @										
Asbestos in soil$_D^{\#}$	NAD	-	NAD	NAD	-	NAD	NAD			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	-	N/A	N/A	-	N/A	N/A			A-T-045

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/8	20/01967/9	20/01967/10	20/01967/11	20/01967/12	20/01967/13	20/01967/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS104	WS104	WS105	WS105	WS105	WS106	WS106			
Depth to Top	0.60	2.00	0.30	1.10	4.00	0.30	1.00			
Depth To Bottom	0.80	2.20	0.40	1.30	4.50	0.40	1.20			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4A	4AB	5AB	5AB	4A	5AB			
PAH-16MS (leachable)										
Naphthalene (leachable)$_A$	-	<0.02	-	-	<0.02	-	<0.02	µg/l	0.02	A-T-019w
Acenaphthylene (leachable)$_A$	-	<0.02	-	-	<0.02	-	<0.02	µg/l	0.02	A-T-019w
Acenaphthene (leachable)$_A$	-	0.06	-	-	0.09	-	0.03	µg/l	0.02	A-T-019w
Fluorene (leachable)$_A$	-	0.07	-	-	0.05	-	<0.02	µg/l	0.02	A-T-019w
Phenanthrene (leachable)$_A$	-	0.20	-	-	0.16	-	0.08	µg/l	0.02	A-T-019w
Anthracene (leachable)$_A$	-	0.04	-	-	0.04	-	0.02	µg/l	0.02	A-T-019w
Fluoranthene (leachable)$_A$	-	0.11	-	-	0.19	-	0.11	µg/l	0.02	A-T-019w
Pyrene (leachable)$_A$	-	0.09	-	-	0.18	-	0.10	µg/l	0.02	A-T-019w
Benzo(a)anthracene (leachable)$_A$	-	0.03	-	-	0.05	-	0.03	µg/l	0.02	A-T-019w
Chrysene (leachable)$_A$	-	0.03	-	-	0.07	-	0.04	µg/l	0.02	A-T-019w
Benzo(b)fluoranthene (leachable)$_A$	-	0.02	-	-	0.05	-	0.03	µg/l	0.02	A-T-019w
Benzo(k)fluoranthene (leachable)$_A$	-	<0.02	-	-	<0.02	-	<0.02	µg/l	0.02	A-T-019w
Benzo(a)pyrene (leachable)$_A$	-	<0.02	-	-	0.03	-	0.02	µg/l	0.02	A-T-019w
Indeno(123-cd)pyrene (leachable)$_A$	-	<0.02	-	-	0.03	-	<0.02	µg/l	0.02	A-T-019w
Dibenzo(ah)anthracene (leachable)$_A$	-	<0.02	-	-	<0.02	-	<0.02	µg/l	0.02	A-T-019w
Benzo(ghi)perylene (leachable)$_A$	-	<0.02	-	-	0.03	-	<0.02	µg/l	0.02	A-T-019w
Total PAH-16MS (leachable)$_A$	-	0.65	-	-	0.97	-	0.46	µg/l	0.02	A-T-019w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/8	20/01967/9	20/01967/10	20/01967/11	20/01967/12	20/01967/13	20/01967/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS104	WS104	WS105	WS105	WS105	WS106	WS106			
Depth to Top	0.60	2.00	0.30	1.10	4.00	0.30	1.00			
Depth To Bottom	0.80	2.20	0.40	1.30	4.50	0.40	1.20			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4A	4AB	5AB	5AB	4A	5AB			
PAH-16MS (MSD order)										
Naphthalene$_A^{M\#}$	<0.03	-	<0.03	<0.03	-	<0.03	0.08	mg/kg	0.03	A-T-019s
Acenaphthylene$_A^{M\#}$	0.05	-	<0.01	0.02	-	<0.01	0.03	mg/kg	0.01	A-T-019s
Acenaphthene$_A^{M\#}$	0.05	-	<0.01	0.09	-	<0.01	0.06	mg/kg	0.01	A-T-019s
Fluorene$_A^{M\#}$	0.05	-	<0.01	0.07	-	<0.01	0.06	mg/kg	0.01	A-T-019s
Phenanthrene$_A^{M\#}$	0.62	-	<0.03	0.80	-	<0.03	0.69	mg/kg	0.03	A-T-019s
Anthracene$_A^{M\#}$	0.16	-	<0.02	0.25	-	<0.02	0.17	mg/kg	0.02	A-T-019s
Fluoranthene$_A^{M\#}$	1.44	-	<0.08	1.97	-	<0.08	1.51	mg/kg	0.08	A-T-019s
Pyrene$_A^{M\#}$	1.43	-	<0.07	1.59	-	<0.07	1.49	mg/kg	0.07	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.96	-	<0.04	1.05	-	<0.04	0.90	mg/kg	0.04	A-T-019s
Chrysene$_A^{M\#}$	0.99	-	<0.06	1.01	-	<0.06	0.89	mg/kg	0.06	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	1.32	-	<0.05	1.07	-	<0.05	1.12	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.38	-	<0.07	0.31	-	<0.07	0.32	mg/kg	0.07	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	1.25	-	0.05	1.03	-	<0.04	1.04	mg/kg	0.04	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.92	-	0.04	0.58	-	<0.03	0.68	mg/kg	0.03	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.16	-	<0.04	0.14	-	<0.04	0.12	mg/kg	0.04	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.75	-	<0.05	0.45	-	<0.05	0.54	mg/kg	0.05	A-T-019s
Total PAH-16MS (MSD order)$_A^{M\#}$	10.5	-	0.09	10.4	-	<0.08	9.70	mg/kg	0.03	A-T-019s

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/8	20/01967/9	20/01967/10	20/01967/11	20/01967/12	20/01967/13	20/01967/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS104	WS104	WS105	WS105	WS105	WS106	WS106			
Depth to Top	0.60	2.00	0.30	1.10	4.00	0.30	1.00			
Depth To Bottom	0.80	2.20	0.40	1.30	4.50	0.40	1.20			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4A	4AB	5AB	5AB	4A	5AB			
TPH CWG (leachable)										
Ali >C5-C6 (leachable)$_A$	-	<2	-	-	<2	-	<2	µg/l	1	A-T-022w
Ali >C6-C8 (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
Ali >C8-C10 (leachable)$_A$	-	<10	-	-	<10	-	<10	µg/l	10	A-T-055w
Ali >C10-C12 (leachable)$_A$	-	<10	-	-	<10	-	<10	µg/l	10	A-T-055w
Ali >C12-C16 (leachable)$_A$	-	<10	-	-	<10	-	<10	µg/l	10	A-T-055w
Ali >C16-C21 (leachable)$_A$	-	<10	-	-	<10	-	<10	µg/l	10	A-T-055w
Ali >C21-C35 (leachable)$_A$	-	<20	-	-	<20	-	<20	µg/l	20	A-T-055w
Total Aliphatics (leachable)$_A$	-	<10	-	-	<10	-	<10	µg/l	10	A-T-055w
Aro >C5-C7 (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
Aro >C7-C8 (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
Aro >C8-C10 (leachable)$_A$	-	<10	-	-	25	-	<10	µg/l	10	A-T-055w
Aro >C10-C12 (leachable)$_A$	-	<10	-	-	<10	-	<10	µg/l	10	A-T-055w
Aro >C12-C16 (leachable)$_A$	-	<10	-	-	<10	-	<10	µg/l	10	A-T-055w
Aro >C16-C21 (leachable)$_A$	-	<10	-	-	<10	-	<10	µg/l	10	A-T-055w
Total Aromatics (leachable)$_A$	-	<20	-	-	25	-	<20	µg/l	20	A-T-055w
TPH (Ali & Aro >C5-C35) (leachable)$_A$	-	<20	-	-	25	-	<20	µg/l	20	A-T-055w
BTEX - Benzene (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
BTEX - Toluene (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
BTEX - o Xylene (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
BTEX - m & p Xylene (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
MTBE (leachable)$_A$	-	<1	-	-	<1	-	<1	µg/l	1	A-T-022w
Aro >C21-C35 (leachable)$_A$	-	<20	-	-	<20	-	<20	µg/l	20	A-T-055w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/8	20/01967/9	20/01967/10	20/01967/11	20/01967/12	20/01967/13	20/01967/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS104	WS104	WS105	WS105	WS105	WS106	WS106			
Depth to Top	0.60	2.00	0.30	1.10	4.00	0.30	1.00			
Depth To Bottom	0.80	2.20	0.40	1.30	4.50	0.40	1.20			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	6AE	4A	4AB	5AB	5AB	4A	5AB			
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	<1	-	<1	2	-	<1	1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	-	<1	2	-	<1	1	mg/kg	1	A-T-055s
Ali >C21-C35$_A$	8	-	<1	18	-	<1	22	mg/kg	1	A-T-055s
Total Aliphatics$_A$	8	-	<1	22	-	<1	25	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	1	-	<1	<1	-	<1	2	mg/kg	1	A-T-055s
Aro >C10-C12$_A^{M\#}$	<1	-	<1	<1	-	<1	1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	2	-	<1	5	-	<1	3	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	12	-	<1	11	-	<1	10	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	46	-	1	34	-	<1	30	mg/kg	1	A-T-055s
Total Aromatics$_A$	62	-	1	51	-	<1	46	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	71	-	1	74	-	<1	71	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/15	20/01967/16	20/01967/17	20/01967/18	20/01967/19	20/01967/20	20/01967/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS107	WS107	WS107	WS108	WS108	WS108	WS109			
Depth to Top	0.20	1.00	3.50	0.30	1.20	4.00	0.30			
Depth To Bottom	0.40	1.10	4.00	0.50	1.30	4.10	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20				25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5A	5AB	5AB	5ABE	6AE	6AE			
% Stones >10mm$_A$	<0.1	5.1	20.1	17.9	30.2	4.6	1.9	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	9.33	9.12	-	8.75	9.26	-	8.69	pH	0.01	A-T-031s
Cyanide (free)$_A$$^{M\#}$	<1	<1	-	<1	<1	-	<1	mg/kg	1	A-T-042sFCN
Phenols - Total by HPLC$_A$	<0.2	<0.2	-	<0.2	<0.2	-	<0.2	mg/kg	0.2	A-T-050s
Organic matter$_D$$^{M\#}$	3.6	0.5	-	1.7	2.5	-	0.9	% w/w	0.1	A-T-032 OM
Total Organic Carbon$_D$$^{M\#}$	2.08	0.28	-	1.02	1.44	-	0.51	% w/w	0.03	A-T-032s
Antimony$_D$	<5	<5	-	<5	<5	-	<5	mg/kg	5	A-T-024s
Arsenic$_D$$^{M\#}$	5	5	-	5	7	-	6	mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	0.8	<0.5	-	0.8	0.8	-	<0.5	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	16	5	-	22	77	-	9	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	19	9	-	17	13	-	14	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	-	<1	<1	-	<1	mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	83	21	-	80	198	-	42	mg/kg	1	A-T-024s
Mercury$_D$	0.34	<0.17	-	0.89	1.41	-	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	13	4	-	16	14	-	9	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	<1	-	<1	<1	-	<1	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	70	18	-	102	89	-	49	mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-2 (10:1)$_A$	-	-	*	-	-	*	-			A-T-001
pH (leachable)$_A$$^{\#}$	-	-	8.62	-	-	8.01	-	pH	0.01	A-T-031w
Alkalinity (total) (leachable) Colorimetry$_A$	-	-	166	-	-	155	-	mg/l Ca CO3	20	A-T-038w
Ammoniacal nitrogen as N (leachable)$_A$	-	-	1.47	-	-	0.05	-	mg/l	0.02	A-T-033w
Ammonia / Ammoniacal Nitrogen as NH3 (leachable)$_A$	-	-	1.796	-	-	0.060	-	mg/l	0.024	A-T-033w
Chloride (leachable)$_A$$^{\#}$	-	-	19.80	-	-	15.41	-	mg/l	1	A-T-026w
Nitrate (leachable)$_A$$^{\#}$	-	-	<0.1	-	-	0.2	-	mg/l	0.1	A-T-026w
Sulphate (leachable)$_A$$^{\#}$	-	-	37.40	-	-	35.84	-	mg/l	1	A-T-026w
Cyanide (total) (leachable)$_A$$^{\#}$	-	-	<0.005	-	-	<0.005	-	mg/l	0.005	A-T-042wTCN
Phenols (total by HPLC) (leachable)$_A$	-	-	<0.01	-	-	<0.01	-	mg/l	0.01	A-T-050w
Antimony (leachable)$_A$$^{\#}$	-	-	11	-	-	<1	-	µg/l	1	A-T-025w
Arsenic (leachable)$_A$$^{\#}$	-	-	24	-	-	4	-	µg/l	1	A-T-025w
Boron (leachable)$_A$$^{\#}$	-	-	115	-	-	91	-	µg/l	10	A-T-025w
Barium (leachable)$_A$$^{\#}$	-	-	178	-	-	196	-	µg/l	1	A-T-025w
Cadmium (leachable)$_A$$^{\#}$	-	-	<1	-	-	<1	-	µg/l	1	A-T-025w
Copper (leachable)$_A$$^{\#}$	-	-	28	-	-	9	-	µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/15	20/01967/16	20/01967/17	20/01967/18	20/01967/19	20/01967/20	20/01967/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS107	WS107	WS107	WS108	WS108	WS108	WS109			
Depth to Top	0.20	1.00	3.50	0.30	1.20	4.00	0.30			
Depth To Bottom	0.40	1.10	4.00	0.50	1.30	4.10	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20				25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5A	5AB	5AB	5ABE	6AE	6AE			
Chromium (leachable)$_{A}^{\#}$	-	-	2	-	-	2	-	µg/l	1	A-T-025w
Lead (leachable)$_{A}^{\#}$	-	-	126	-	-	48	-	µg/l	1	A-T-025w
Mercury (leachable)$_{A}^{\#}$	-	-	<0.1	-	-	<0.1	-	µg/l	0.1	A-T-025w
Nickel (leachable)$_{A}^{\#}$	-	-	7	-	-	2	-	µg/l	1	A-T-025w
Selenium (leachable)$_{A}^{\#}$	-	-	<1	-	-	<1	-	µg/l	1	A-T-025w
Zinc (leachable)$_{A}^{\#}$	-	-	59	-	-	18	-	µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/15	20/01967/16	20/01967/17	20/01967/18	20/01967/19	20/01967/20	20/01967/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS107	WS107	WS107	WS108	WS108	WS108	WS109			
Depth to Top	0.20	1.00	3.50	0.30	1.20	4.00	0.30			
Depth To Bottom	0.40	1.10	4.00	0.50	1.30	4.10	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20				25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5A	5AB	5AB	5ABE	6AE	6AE			
Asbestos in Soil (inc. matrix)^ @										
Asbestos in soil$_D^{\#}$	Chrysotile	NAD	-	NAD	NAD	-	NAD			A-T-045
Asbestos Matrix (microscope)$_D$	Loose Fibres	-	-	-	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	N/A	-	N/A	N/A	-	N/A			A-T-045
Asbestos in Soil Quantification % @ (Hand Picking&Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_D$	<0.001	-	-	-	-	-	-	% w/w	0.001	A-T-054

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/15	20/01967/16	20/01967/17	20/01967/18	20/01967/19	20/01967/20	20/01967/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS107	WS107	WS107	WS108	WS108	WS108	WS109			
Depth to Top	0.20	1.00	3.50	0.30	1.20	4.00	0.30			
Depth To Bottom	0.40	1.10	4.00	0.50	1.30	4.10	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20				25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5A	5AB	5AB	5ABE	6AE	6AE			
PAH-16MS (leachable)										
Naphthalene (leachable)$_A$	-	-	1.34	-	-	<0.02	-	µg/l	0.02	A-T-019w
Acenaphthylene (leachable)$_A$	-	-	0.13	-	-	<0.02	-	µg/l	0.02	A-T-019w
Acenaphthene (leachable)$_A$	-	-	0.70	-	-	<0.02	-	µg/l	0.02	A-T-019w
Fluorene (leachable)$_A$	-	-	0.67	-	-	<0.02	-	µg/l	0.02	A-T-019w
Phenanthrene (leachable)$_A$	-	-	0.94	-	-	0.07	-	µg/l	0.02	A-T-019w
Anthracene (leachable)$_A$	-	-	0.19	-	-	0.03	-	µg/l	0.02	A-T-019w
Fluoranthene (leachable)$_A$	-	-	0.53	-	-	0.35	-	µg/l	0.02	A-T-019w
Pyrene (leachable)$_A$	-	-	0.42	-	-	0.33	-	µg/l	0.02	A-T-019w
Benzo(a)anthracene (leachable)$_A$	-	-	0.12	-	-	0.20	-	µg/l	0.02	A-T-019w
Chrysene (leachable)$_A$	-	-	0.15	-	-	0.24	-	µg/l	0.02	A-T-019w
Benzo(b)fluoranthene (leachable)$_A$	-	-	0.10	-	-	0.20	-	µg/l	0.02	A-T-019w
Benzo(k)fluoranthene (leachable)$_A$	-	-	0.03	-	-	0.07	-	µg/l	0.02	A-T-019w
Benzo(a)pyrene (leachable)$_A$	-	-	0.07	-	-	0.18	-	µg/l	0.02	A-T-019w
Indeno(123-cd)pyrene (leachable)$_A$	-	-	0.05	-	-	0.12	-	µg/l	0.02	A-T-019w
Dibenzo(ah)anthracene (leachable)$_A$	-	-	<0.02	-	-	0.03	-	µg/l	0.02	A-T-019w
Benzo(ghi)perylene (leachable)$_A$	-	-	0.05	-	-	0.13	-	µg/l	0.02	A-T-019w
Total PAH-16MS (leachable)$_A$	-	-	5.49	-	-	1.95	-	µg/l	0.02	A-T-019w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/15	20/01967/16	20/01967/17	20/01967/18	20/01967/19	20/01967/20	20/01967/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS107	WS107	WS107	WS108	WS108	WS108	WS109			
Depth to Top	0.20	1.00	3.50	0.30	1.20	4.00	0.30			
Depth To Bottom	0.40	1.10	4.00	0.50	1.30	4.10	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20				25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5A	5AB	5AB	5ABE	6AE	6AE			
PAH-16MS (MSD order)										
Naphthalene$_A^{M\#}$	0.56	<0.03	-	<0.03	<0.03	-	<0.03	mg/kg	0.03	A-T-019s
Acenaphthylene$_A^{M\#}$	0.06	<0.01	-	0.02	<0.01	-	0.01	mg/kg	0.01	A-T-019s
Acenaphthene$_A^{M\#}$	0.77	<0.01	-	0.03	0.02	-	0.07	mg/kg	0.01	A-T-019s
Fluorene$_A^{M\#}$	0.63	<0.01	-	0.04	0.03	-	0.03	mg/kg	0.01	A-T-019s
Phenanthrene$_A^{M\#}$	5.41	<0.03	-	0.41	0.46	-	0.70	mg/kg	0.03	A-T-019s
Anthracene$_A^{M\#}$	1.38	<0.02	-	0.09	0.11	-	0.18	mg/kg	0.02	A-T-019s
Fluoranthene$_A^{M\#}$	5.55	<0.08	-	1.01	0.94	-	1.83	mg/kg	0.08	A-T-019s
Pyrene$_A^{M\#}$	4.53	<0.07	-	0.88	0.80	-	1.65	mg/kg	0.07	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	2.14	<0.04	-	0.54	0.44	-	0.80	mg/kg	0.04	A-T-019s
Chrysene$_A^{M\#}$	2.06	<0.06	-	0.58	0.47	-	0.70	mg/kg	0.06	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	2.03	<0.05	-	0.69	0.50	-	0.64	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.61	<0.07	-	0.20	0.15	-	0.19	mg/kg	0.07	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	1.81	<0.04	-	0.56	0.41	-	0.61	mg/kg	0.04	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	1.04	<0.03	-	0.39	0.27	-	0.33	mg/kg	0.03	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.24	<0.04	-	0.09	0.05	-	0.08	mg/kg	0.04	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.83	<0.05	-	0.29	0.20	-	0.23	mg/kg	0.05	A-T-019s
Total PAH-16MS (MSD order)$_A^{M\#}$	29.6	<0.08	-	5.82	4.85	-	8.05	mg/kg	0.03	A-T-019s

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/15	20/01967/16	20/01967/17	20/01967/18	20/01967/19	20/01967/20	20/01967/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS107	WS107	WS107	WS108	WS108	WS108	WS109			
Depth to Top	0.20	1.00	3.50	0.30	1.20	4.00	0.30			
Depth To Bottom	0.40	1.10	4.00	0.50	1.30	4.10	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20				25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5A	5AB	5AB	5ABE	6AE	6AE			
TPH CWG (leachable)										
Ali >C5-C6 (leachable)$_A$	-	-	<2	-	-	<2	-	µg/l	1	A-T-022w
Ali >C6-C8 (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
Ali >C8-C10 (leachable)$_A$	-	-	<10	-	-	<10	-	µg/l	10	A-T-055w
Ali >C10-C12 (leachable)$_A$	-	-	<10	-	-	<10	-	µg/l	10	A-T-055w
Ali >C12-C16 (leachable)$_A$	-	-	<10	-	-	<10	-	µg/l	10	A-T-055w
Ali >C16-C21 (leachable)$_A$	-	-	<10	-	-	<10	-	µg/l	10	A-T-055w
Ali >C21-C35 (leachable)$_A$	-	-	<20	-	-	<20	-	µg/l	20	A-T-055w
Total Aliphatics (leachable)$_A$	-	-	15	-	-	<10	-	µg/l	10	A-T-055w
Aro >C5-C7 (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
Aro >C7-C8 (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
Aro >C8-C10 (leachable)$_A$	-	-	11	-	-	<10	-	µg/l	10	A-T-055w
Aro >C10-C12 (leachable)$_A$	-	-	<10	-	-	<10	-	µg/l	10	A-T-055w
Aro >C12-C16 (leachable)$_A$	-	-	<10	-	-	<10	-	µg/l	10	A-T-055w
Aro >C16-C21 (leachable)$_A$	-	-	<10	-	-	<10	-	µg/l	10	A-T-055w
Total Aromatics (leachable)$_A$	-	-	<20	-	-	<20	-	µg/l	20	A-T-055w
TPH (Ali & Aro >C5-C35) (leachable)$_A$	-	-	26	-	-	<20	-	µg/l	20	A-T-055w
BTEX - Benzene (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
BTEX - Toluene (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
BTEX - o Xylene (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
BTEX - m & p Xylene (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
MTBE (leachable)$_A$	-	-	<1	-	-	<1	-	µg/l	1	A-T-022w
Aro >C21-C35 (leachable)$_A$	-	-	<20	-	-	<20	-	µg/l	20	A-T-055w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/15	20/01967/16	20/01967/17	20/01967/18	20/01967/19	20/01967/20	20/01967/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS107	WS107	WS107	WS108	WS108	WS108	WS109			
Depth to Top	0.20	1.00	3.50	0.30	1.20	4.00	0.30			
Depth To Bottom	0.40	1.10	4.00	0.50	1.30	4.10	0.40			
Date Sampled	25-Feb-20	25-Feb-20	25-Feb-20				25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5A	5AB	5AB	5ABE	6AE	6AE			
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	<1	-	2	<1	-	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	<1	-	<1	<1	-	<1	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	1	<1	-	<1	2	-	<1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	3	<1	-	3	3	-	1	mg/kg	1	A-T-055s
Ali >C21-C35$_A$	33	<1	-	9	40	-	6	mg/kg	1	A-T-055s
Total Aliphatics$_A$	37	<1	-	15	46	-	7	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	1	<1	-	2	<1	-	1	mg/kg	1	A-T-055s
Aro >C10-C12$_A^{M\#}$	2	<1	-	<1	<1	-	<1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	8	<1	-	2	2	-	1	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	43	<1	-	10	7	-	9	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	141	<1	-	32	24	-	28	mg/kg	1	A-T-055s
Total Aromatics$_A$	197	<1	-	45	34	-	39	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	234	<1	-	60	79	-	45	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/22	20/01967/23	20/01967/24	20/01967/25	20/01967/26	20/01967/27	20/01967/28	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS109	WS109	WS110	WS110	WS110	WS111	WS111			
Depth to Top	1.50	3.50	0.30	1.30	4.00	0.40	1.10			
Depth To Bottom	1.70	3.70	0.40	1.40	4.50	0.50	1.30			
Date Sampled	25-Feb-20	25-Feb-20			25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5AE	6AE	6AE	6AE	6AE	6AE			
% Stones >10mm$_A$	12.5	1.0	<0.1	<0.1	38.6	2.1	15.6	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	8.36	-	8.71	8.20	-	8.79	8.76	pH	0.01	A-T-031s
Cyanide (free)$_A$$^{M\#}$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-042sFCN
Phenols - Total by HPLC$_A$	<0.2	-	<0.2	<0.2	-	<0.2	<0.2	mg/kg	0.2	A-T-050s
Organic matter$_D$$^{M\#}$	6.5	-	0.9	1.8	-	0.7	3.0	% w/w	0.1	A-T-032 OM
Total Organic Carbon$_D$$^{M\#}$	3.75	-	0.54	1.05	-	0.39	1.73	% w/w	0.03	A-T-032s
Antimony$_D$	<5	-	<5	<5	-	<5	<5	mg/kg	5	A-T-024s
Arsenic$_D$$^{M\#}$	8	-	6	5	-	5	8	mg/kg	1	A-T-024s
Cadmium$_D$$^{M\#}$	1.0	-	<0.5	0.5	-	<0.5	0.9	mg/kg	0.5	A-T-024s
Copper$_D$$^{M\#}$	60	-	8	8	-	4	31	mg/kg	1	A-T-024s
Chromium$_D$$^{M\#}$	15	-	13	16	-	12	20	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-040s
Lead$_D$$^{M\#}$	112	-	35	28	-	17	214	mg/kg	1	A-T-024s
Mercury$_D$	0.51	-	<0.17	<0.17	-	<0.17	0.58	mg/kg	0.17	A-T-024s
Nickel$_D$$^{M\#}$	14	-	9	9	-	7	15	mg/kg	1	A-T-024s
Selenium$_D$$^{M\#}$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-024s
Zinc$_D$$^{M\#}$	81	-	47	41	-	20	196	mg/kg	5	A-T-024s
Leachate Prep BS EN 12457-2 (10:1)$_A$	-	*	-	-	*	-	-			A-T-001
pH (leachable)$_A$$^{\#}$	-	9.60	-	-	8.70	-	-	pH	0.01	A-T-031w
Alkalinity (total) (leachable) Colorimetry$_A$	-	50	-	-	248	-	-	mg/l Ca CO3	20	A-T-038w
Ammoniacal nitrogen as N (leachable)$_A$	-	0.38	-	-	2.89	-	-	mg/l	0.02	A-T-033w
Ammonia / Ammoniacal Nitrogen as NH3 (leachable)$_A$	-	0.459	-	-	3.520	-	-	mg/l	0.024	A-T-033w
Chloride (leachable)$_A$$^{\#}$	-	7.14	-	-	38.60	-	-	mg/l	1	A-T-026w
Nitrate (leachable)$_A$$^{\#}$	-	1.0	-	-	<0.1	-	-	mg/l	0.1	A-T-026w
Sulphate (leachable)$_A$$^{\#}$	-	29.53	-	-	111.00	-	-	mg/l	1	A-T-026w
Cyanide (total) (leachable)$_A$$^{\#}$	-	<0.005	-	-	<0.005	-	-	mg/l	0.005	A-T-042wTCN
Phenols (total by HPLC) (leachable)$_A$	-	<0.01	-	-	<0.01	-	-	mg/l	0.01	A-T-050w
Antimony (leachable)$_A$$^{\#}$	-	<1	-	-	5	-	-	µg/l	1	A-T-025w
Arsenic (leachable)$_A$$^{\#}$	-	6	-	-	19	-	-	µg/l	1	A-T-025w
Boron (leachable)$_A$$^{\#}$	-	57	-	-	81	-	-	µg/l	10	A-T-025w
Barium (leachable)$_A$$^{\#}$	-	7	-	-	578	-	-	µg/l	1	A-T-025w
Cadmium (leachable)$_A$$^{\#}$	-	<1	-	-	<1	-	-	µg/l	1	A-T-025w
Copper (leachable)$_A$$^{\#}$	-	5	-	-	41	-	-	µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/22	20/01967/23	20/01967/24	20/01967/25	20/01967/26	20/01967/27	20/01967/28	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS109	WS109	WS110	WS110	WS110	WS111	WS111			
Depth to Top	1.50	3.50	0.30	1.30	4.00	0.40	1.10			
Depth To Bottom	1.70	3.70	0.40	1.40	4.50	0.50	1.30			
Date Sampled	25-Feb-20	25-Feb-20			25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5AE	6AE	6AE	6AE	6AE	6AE			
Chromium (leachable)$_A^\#$	-	4	-	-	3	-	-	µg/l	1	A-T-025w
Lead (leachable)$_A^\#$	-	1	-	-	86	-	-	µg/l	1	A-T-025w
Mercury (leachable)$_A^\#$	-	<0.1	-	-	<0.1	-	-	µg/l	0.1	A-T-025w
Nickel (leachable)$_A^\#$	-	2	-	-	13	-	-	µg/l	1	A-T-025w
Selenium (leachable)$_A^\#$	-	2	-	-	1	-	-	µg/l	1	A-T-025w
Zinc (leachable)$_A^\#$	-	1	-	-	69	-	-	µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/22	20/01967/23	20/01967/24	20/01967/25	20/01967/26	20/01967/27	20/01967/28	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS109	WS109	WS110	WS110	WS110	WS111	WS111			
Depth to Top	1.50	3.50	0.30	1.30	4.00	0.40	1.10			
Depth To Bottom	1.70	3.70	0.40	1.40	4.50	0.50	1.30			
Date Sampled	25-Feb-20	25-Feb-20			25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5AE	6AE	6AE	6AE	6AE	6AE			
Asbestos in Soil (inc. matrix)^ @										
Asbestos in soil$_D^{\#}$	NAD	-	NAD	Chrysotile	-	NAD	NAD			A-T-045
Asbestos Matrix (microscope)$_D$	-	-	-	Loose Fibres	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	-	N/A	N/A	-	N/A	N/A			A-T-045
Asbestos in Soil Quantification % @ (Hand Picking&Weighing)										
Asbestos in soil % composition (hand picking and weighing)$_D$	-	-	-	<0.001	-	-	-	% w/w	0.001	A-T-054

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/22	20/01967/23	20/01967/24	20/01967/25	20/01967/26	20/01967/27	20/01967/28	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS109	WS109	WS110	WS110	WS110	WS111	WS111			
Depth to Top	1.50	3.50	0.30	1.30	4.00	0.40	1.10			
Depth To Bottom	1.70	3.70	0.40	1.40	4.50	0.50	1.30			
Date Sampled	25-Feb-20	25-Feb-20			25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5AE	6AE	6AE	6AE	6AE	6AE			
PAH-16MS (leachable)										
Naphthalene (leachable)$_A$	-	<0.02	-	-	6.15	-	-	µg/l	0.02	A-T-019w
Acenaphthylene (leachable)$_A$	-	<0.02	-	-	0.40	-	-	µg/l	0.02	A-T-019w
Acenaphthene (leachable)$_A$	-	<0.02	-	-	3.34	-	-	µg/l	0.02	A-T-019w
Fluorene (leachable)$_A$	-	<0.02	-	-	3.83	-	-	µg/l	0.02	A-T-019w
Phenanthrene (leachable)$_A$	-	0.03	-	-	4.47	-	-	µg/l	0.02	A-T-019w
Anthracene (leachable)$_A$	-	<0.02	-	-	2.26	-	-	µg/l	0.02	A-T-019w
Fluoranthene (leachable)$_A$	-	0.04	-	-	9.98	-	-	µg/l	0.02	A-T-019w
Pyrene (leachable)$_A$	-	0.04	-	-	7.99	-	-	µg/l	0.02	A-T-019w
Benzo(a)anthracene (leachable)$_A$	-	<0.02	-	-	2.76	-	-	µg/l	0.02	A-T-019w
Chrysene (leachable)$_A$	-	<0.02	-	-	2.58	-	-	µg/l	0.02	A-T-019w
Benzo(b)fluoranthene (leachable)$_A$	-	<0.02	-	-	1.63	-	-	µg/l	0.02	A-T-019w
Benzo(k)fluoranthene (leachable)$_A$	-	<0.02	-	-	0.58	-	-	µg/l	0.02	A-T-019w
Benzo(a)pyrene (leachable)$_A$	-	<0.02	-	-	1.38	-	-	µg/l	0.02	A-T-019w
Indeno(123-cd)pyrene (leachable)$_A$	-	<0.02	-	-	0.86	-	-	µg/l	0.02	A-T-019w
Dibenzo(ah)anthracene (leachable)$_A$	-	<0.02	-	-	0.18	-	-	µg/l	0.02	A-T-019w
Benzo(ghi)perylene (leachable)$_A$	-	<0.02	-	-	0.81	-	-	µg/l	0.02	A-T-019w
Total PAH-16MS (leachable)$_A$	-	0.11	-	-	49.2	-	-	µg/l	0.02	A-T-019w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/22	20/01967/23	20/01967/24	20/01967/25	20/01967/26	20/01967/27	20/01967/28	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS109	WS109	WS110	WS110	WS110	WS111	WS111			
Depth to Top	1.50	3.50	0.30	1.30	4.00	0.40	1.10			
Depth To Bottom	1.70	3.70	0.40	1.40	4.50	0.50	1.30			
Date Sampled	25-Feb-20	25-Feb-20			25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5AE	6AE	6AE	6AE	6AE	6AE			
PAH-16MS (MSD order)										
Naphthalene$_A^{M\#}$	<0.03	-	<0.03	<0.03	-	<0.03	0.33	mg/kg	0.03	A-T-019s
Acenaphthylene$_A^{M\#}$	0.01	-	<0.01	0.04	-	<0.01	0.21	mg/kg	0.01	A-T-019s
Acenaphthene$_A^{M\#}$	0.02	-	<0.01	0.04	-	0.04	3.31	mg/kg	0.01	A-T-019s
Fluorene$_A^{M\#}$	0.02	-	<0.01	0.04	-	0.04	4.71	mg/kg	0.01	A-T-019s
Phenanthrene$_A^{M\#}$	0.20	-	0.05	0.37	-	0.44	36.8	mg/kg	0.03	A-T-019s
Anthracene$_A^{M\#}$	0.05	-	<0.02	0.08	-	0.10	7.40	mg/kg	0.02	A-T-019s
Fluoranthene$_A^{M\#}$	0.62	-	0.12	0.97	-	0.79	27.9	mg/kg	0.08	A-T-019s
Pyrene$_A^{M\#}$	0.55	-	0.11	0.91	-	0.71	23.3	mg/kg	0.07	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.32	-	0.08	0.60	-	0.37	9.53	mg/kg	0.04	A-T-019s
Chrysene$_A^{M\#}$	0.34	-	0.09	0.61	-	0.35	9.93	mg/kg	0.06	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.36	-	0.11	0.78	-	0.36	7.67	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.10	-	<0.07	0.22	-	0.11	2.70	mg/kg	0.07	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.32	-	0.11	0.75	-	0.34	6.62	mg/kg	0.04	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.22	-	0.09	0.54	-	0.22	3.57	mg/kg	0.03	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	-	<0.04	0.11	-	<0.04	0.90	mg/kg	0.04	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.18	-	0.07	0.43	-	0.16	2.54	mg/kg	0.05	A-T-019s
Total PAH-16MS (MSD order)$_A^{M\#}$	3.31	-	0.83	6.49	-	4.03	147	mg/kg	0.03	A-T-019s

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/22	20/01967/23	20/01967/24	20/01967/25	20/01967/26	20/01967/27	20/01967/28	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS109	WS109	WS110	WS110	WS110	WS111	WS111			
Depth to Top	1.50	3.50	0.30	1.30	4.00	0.40	1.10			
Depth To Bottom	1.70	3.70	0.40	1.40	4.50	0.50	1.30			
Date Sampled	25-Feb-20	25-Feb-20			25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5AE	6AE	6AE	6AE	6AE	6AE			
TPH CWG (leachable)										
Ali >C5-C6 (leachable)$_A$	-	<2	-	-	<2	-	-	µg/l	1	A-T-022w
Ali >C6-C8 (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
Ali >C8-C10 (leachable)$_A$	-	<10	-	-	<10	-	-	µg/l	10	A-T-055w
Ali >C10-C12 (leachable)$_A$	-	<10	-	-	<10	-	-	µg/l	10	A-T-055w
Ali >C12-C16 (leachable)$_A$	-	<10	-	-	<10	-	-	µg/l	10	A-T-055w
Ali >C16-C21 (leachable)$_A$	-	<10	-	-	<10	-	-	µg/l	10	A-T-055w
Ali >C21-C35 (leachable)$_A$	-	<20	-	-	22	-	-	µg/l	20	A-T-055w
Total Aliphatics (leachable)$_A$	-	<10	-	-	22	-	-	µg/l	10	A-T-055w
Aro >C5-C7 (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
Aro >C7-C8 (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
Aro >C8-C10 (leachable)$_A$	-	<10	-	-	27	-	-	µg/l	10	A-T-055w
Aro >C10-C12 (leachable)$_A$	-	<10	-	-	27	-	-	µg/l	10	A-T-055w
Aro >C12-C16 (leachable)$_A$	-	<10	-	-	71	-	-	µg/l	10	A-T-055w
Aro >C16-C21 (leachable)$_A$	-	<10	-	-	92	-	-	µg/l	10	A-T-055w
Total Aromatics (leachable)$_A$	-	<20	-	-	312	-	-	µg/l	20	A-T-055w
TPH (Ali & Aro >C5-C35) (leachable)$_A$	-	<20	-	-	334	-	-	µg/l	20	A-T-055w
BTEX - Benzene (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
BTEX - Toluene (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
BTEX - Ethyl Benzene (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
BTEX - o Xylene (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
BTEX - m & p Xylene (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
MTBE (leachable)$_A$	-	<1	-	-	<1	-	-	µg/l	1	A-T-022w
Aro >C21-C35 (leachable)$_A$	-	<20	-	-	95	-	-	µg/l	20	A-T-055w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/22	20/01967/23	20/01967/24	20/01967/25	20/01967/26	20/01967/27	20/01967/28	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS109	WS109	WS110	WS110	WS110	WS111	WS111			
Depth to Top	1.50	3.50	0.30	1.30	4.00	0.40	1.10			
Depth To Bottom	1.70	3.70	0.40	1.40	4.50	0.50	1.30			
Date Sampled	25-Feb-20	25-Feb-20			25-Feb-20	25-Feb-20	25-Feb-20			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Sample Matrix Code	5ABE	5AE	6AE	6AE	6AE	6AE	6AE			
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	-	<1	<1	-	<1	3	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	1	-	<1	<1	-	<1	42	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	9	-	<1	<1	-	<1	67	mg/kg	1	A-T-055s
Ali >C21-C35$_A$	16	-	2	11	-	5	89	mg/kg	1	A-T-055s
Total Aliphatics$_A$	26	-	2	11	-	5	201	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	<1	-	<1	<1	-	<1	<1	mg/kg	1	A-T-055s
Aro >C10-C12$_A^{M\#}$	<1	-	<1	<1	-	<1	4	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	2	-	<1	1	-	<1	61	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	12	-	<1	6	-	2	173	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	23	-	3	22	-	10	422	mg/kg	1	A-T-055s
Total Aromatics$_A$	37	-	3	30	-	12	661	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	63	-	6	41	-	17	862	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	-	<0.01	<0.01	-	<0.01	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/29							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS111									
Depth to Top	2.70									
Depth To Bottom	2.80									
Date Sampled	25-Feb-20									
Sample Type	Soil									
Sample Matrix Code	6ABE									
% Stones >10mm$_A$	12.2							% w/w	0.1	A-T-044
Leachate Prep BS EN 12457-2 (10:1)$_A$	*									A-T-001
pH (leachable)$_A^{\#}$	7.81							pH	0.01	A-T-031w
Alkalinity (total) (leachable) Colorimetry$_A$	184							mg/l Ca CO3	20	A-T-038w
Ammoniacal nitrogen as N (leachable)$_A$	1.41							mg/l	0.02	A-T-033w
Ammonia / Ammoniacal Nitrogen as NH3 (leachable)$_A$	1.715							mg/l	0.024	A-T-033w
Chloride (leachable)$_A^{\#}$	26.49							mg/l	1	A-T-026w
Nitrate (leachable)$_A^{\#}$	<0.1							mg/l	0.1	A-T-026w
Sulphate (leachable)$_A^{\#}$	38.14							mg/l	1	A-T-026w
Cyanide (total) (leachable)$_A^{\#}$	<0.005							mg/l	0.005	A-T-042wTCN
Phenols (total by HPLC) (leachable)$_A$	<0.01							mg/l	0.01	A-T-050w
Antimony (leachable)$_A^{\#}$	4							µg/l	1	A-T-025w
Arsenic (leachable)$_A^{\#}$	9							µg/l	1	A-T-025w
Boron (leachable)$_A^{\#}$	108							µg/l	10	A-T-025w
Barium (leachable)$_A^{\#}$	278							µg/l	1	A-T-025w
Cadmium (leachable)$_A^{\#}$	<1							µg/l	1	A-T-025w
Copper (leachable)$_A^{\#}$	12							µg/l	1	A-T-025w
Chromium (leachable)$_A^{\#}$	1							µg/l	1	A-T-025w
Lead (leachable)$_A^{\#}$	38							µg/l	1	A-T-025w
Mercury (leachable)$_A^{\#}$	<0.1							µg/l	0.1	A-T-025w
Nickel (leachable)$_A^{\#}$	12							µg/l	1	A-T-025w
Selenium (leachable)$_A^{\#}$	1							µg/l	1	A-T-025w
Zinc (leachable)$_A^{\#}$	25							µg/l	1	A-T-025w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/29							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS111									
Depth to Top	2.70									
Depth To Bottom	2.80									
Date Sampled	25-Feb-20									
Sample Type	Soil									
Sample Matrix Code	6ABE									
PAH-16MS (leachable)										
Naphthalene (leachable)$_A$	<0.02							µg/l	0.02	A-T-019w
Acenaphthylene (leachable)$_A$	0.02							µg/l	0.02	A-T-019w
Acenaphthene (leachable)$_A$	1.33							µg/l	0.02	A-T-019w
Fluorene (leachable)$_A$	0.70							µg/l	0.02	A-T-019w
Phenanthrene (leachable)$_A$	0.99							µg/l	0.02	A-T-019w
Anthracene (leachable)$_A$	0.35							µg/l	0.02	A-T-019w
Fluoranthene (leachable)$_A$	1.72							µg/l	0.02	A-T-019w
Pyrene (leachable)$_A$	1.36							µg/l	0.02	A-T-019w
Benzo(a)anthracene (leachable)$_A$	0.42							µg/l	0.02	A-T-019w
Chrysene (leachable)$_A$	0.45							µg/l	0.02	A-T-019w
Benzo(b)fluoranthene (leachable)$_A$	0.29							µg/l	0.02	A-T-019w
Benzo(k)fluoranthene (leachable)$_A$	0.10							µg/l	0.02	A-T-019w
Benzo(a)pyrene (leachable)$_A$	0.23							µg/l	0.02	A-T-019w
Indeno(123-cd)pyrene (leachable)$_A$	0.14							µg/l	0.02	A-T-019w
Dibenzo(ah)anthracene (leachable)$_A$	0.03							µg/l	0.02	A-T-019w
Benzo(ghi)perylene (leachable)$_A$	0.13							µg/l	0.02	A-T-019w
Total PAH-16MS (leachable)$_A$	8.26							µg/l	0.02	A-T-019w

Envirolab Job Number: 20/01967

Client Project Name: Angels

Client Project Ref: J20-002

Lab Sample ID	20/01967/29							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS111									
Depth to Top	2.70									
Depth To Bottom	2.80									
Date Sampled	25-Feb-20									
Sample Type	Soil									
Sample Matrix Code	6ABE									
TPH CWG (leachable)										
Ali >C5-C6 (leachable)$_A$	<2							µg/l	1	A-T-022w
Ali >C6-C8 (leachable)$_A$	<1							µg/l	1	A-T-022w
Ali >C8-C10 (leachable)$_A$	<10							µg/l	10	A-T-055w
Ali >C10-C12 (leachable)$_A$	<10							µg/l	10	A-T-055w
Ali >C12-C16 (leachable)$_A$	<10							µg/l	10	A-T-055w
Ali >C16-C21 (leachable)$_A$	<10							µg/l	10	A-T-055w
Ali >C21-C35 (leachable)$_A$	<20							µg/l	20	A-T-055w
Total Aliphatics (leachable)$_A$	<10							µg/l	10	A-T-055w
Aro >C5-C7 (leachable)$_A$	<1							µg/l	1	A-T-022w
Aro >C7-C8 (leachable)$_A$	<1							µg/l	1	A-T-022w
Aro >C8-C10 (leachable)$_A$	12							µg/l	10	A-T-055w
Aro >C10-C12 (leachable)$_A$	<10							µg/l	10	A-T-055w
Aro >C12-C16 (leachable)$_A$	<10							µg/l	10	A-T-055w
Aro >C16-C21 (leachable)$_A$	14							µg/l	10	A-T-055w
Total Aromatics (leachable)$_A$	26							µg/l	20	A-T-055w
TPH (Ali & Aro >C5-C35) (leachable)$_A$	26							µg/l	20	A-T-055w
BTEX - Benzene (leachable)$_A$	<1							µg/l	1	A-T-022w
BTEX - Toluene (leachable)$_A$	<1							µg/l	1	A-T-022w
BTEX - Ethyl Benzene (leachable)$_A$	<1							µg/l	1	A-T-022w
BTEX - o Xylene (leachable)$_A$	<1							µg/l	1	A-T-022w
BTEX - m & p Xylene (leachable)$_A$	<1							µg/l	1	A-T-022w
MTBE (leachable)$_A$	<1							µg/l	1	A-T-022w
Aro >C21-C35 (leachable)$_A$	<20							µg/l	20	A-T-055w

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900μS/cm @ 25°C / 11550μS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

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

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

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

Client: Ground Condition Consultants Ltd, 10 Waldegrave Close, Southampton, SO19 9RY

Project: Angels

Clients Project No: J20-002

Project No: 20/01967

Date Received: 27/02/2020 (am)

Cool Box Temperatures (°C): 6.8 & 7.0

Lab Sample ID	20/01967/18	20/01967/19	20/01967/20	20/01967/24	20/01967/25
Client Sample No					
Client Sample ID/Depth	WS108 0.30-0.50m	WS108 1.20-1.30m	WS108 4.00-4.10m	WS110 0.30-0.40m	WS110 1.30-1.40m
Date Sampled					
Deviation Code					
E (no date)	✓	✓	✓	✓	✓

Key
E (no date) *No sampling date provided (all results affected if not provided)*

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

APPENDIX 6: GROUND GAS AND GROUNDWATER MONITORING RESULTS

Site	Water Lane						BH Depth	4.87m		
Date	04/03/2020						Water Lvl	4.87m		
Hole ID	WS101						Weth/°C	Party Cloudy / 9°C		
Tech	RS						Atm Press	1004		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	-1.02	
	10	20	30	60	120	180				
O_2	19.40	13.30	13.20	11.60	7.30	1.90	na	Flow Max (l/hr)	-1.08	
CO_2	0.00	0.00	0.00	0.00	0.10	0.20	na			
CH_4	4.40	4.70	5.20	5.90	8.30	12.30	na	Hole Press (mb)	993	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane						BH Depth	3.02m		
Date	04/03/2020						Water Lvl	None		
Hole ID	WS111						Weth/°C	Party Cloudy / 9°C		
Tech	RS						Atm Press	1004		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	-1.59	
	10	20	30	60	120	180				
O_2	19.20	19.00	19.00	19.00	19.70	20.20	na	Flow Max (l/hr)	-1.44	
CO_2	0.00	0.10	0.10	0.10	0.00	0.00	na			
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	993	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane						BH Depth	4.98m		
Date	04/03/2020						Water Lvl	3.54m		
Hole ID	WS109						Weth/°C	Party Cloudy / 9°C		
Tech	RS						Atm Press	1004		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	0.52	
	10	20	30	60	120	180				
O_2	20.10	19.60	19.00	18.40	19.00	20.30	na	Flow Max (l/hr)	0.79	
CO_2	0.10	0.20	0.20	0.20	0.20	0.00	na			
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	993	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane						BH Depth	4.73m		
Date	04/03/2020						Water Lvl	None		
Hole ID	WS107						Weth/°C	Party Cloudy / 9°C		
Tech	RS						Atm Press	1004		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	-0.79	
	10	20	30	60	120	180				
O_2	20.40	20.50	20.50	20.50	20.50	20.50	na	Flow Max (l/hr)	-0.85	
CO_2	0.00	0.00	0.00	0.00	0.00	0.00	na			
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	991	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane						BH Depth	19m		
Date	04/03/2020						Water Lvl	3.59m		
Hole ID	BH1						Weth/°C	Party Cloudy / 9°C		
Tech	RS						Atm Press	1004		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	409	
	10	20	30	60	120	180				
O_2	20.00	20.10	20.00	20.00	20.10	20.10	na	Flow Max (l/hr)	4.1	
CO_2	0.10	0.10	0.10	0.10	0.10	0.10	na			
CH_4	0.30	0.70	0.80	0.80	0.80	0.80	na	Hole Press (mb)	990	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane						BH Depth	4.81m		
Date	04/03/2020						Water Lvl	3.71m		
Hole ID	WS105						Weth/°C	Party Cloudy / 9°C		
Tech	RS						Atm Press	1004		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	-1.93	
	10	20	30	60	120	180				
O_2	20.00	20.10	20.00	20.00	20.10	20.10	na	Flow Max (l/hr)	-1.96	
CO_2	0.10	0.10	0.10	0.10	0.10	0.10	na			
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	990	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane					BH Depth	1.08m		
Date	04/03/2020					Water Lvl	0.6m		
Hole ID	WS103					Weth/°C	Party Cloudy / 9°C		
Tech	RS					Atm Press	1004		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	-9.33
	10	20	30	60	120	180			
O_2	19.90	2.10	20.10	19.90	20.00	20.00	na	Flow Max (l/hr)	-9.33
CO_2	0.10	0.10	0.10	0.10	0.10	0.10	na		
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	992
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane						BH Depth	4.89m		
Date	19/03/2020						Water Lvl	None		
Hole ID	WS101						Weth/°C	Mostly Cloudy / 9°C		
Tech	RS						Atm Press	1024		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	<0.01
	10	20	30	60	120	180			
O_2	19.90	20.00	20.00	20.00	20.00	20.00	na	Flow Max (l/hr)	<0.01
CO_2	0.00	0.00	0.00	0.00	0.00	0.00	na		
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	113
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane						BH Depth	3.02m		
Date	19/03/2020						Water Lvl	None		
Hole ID	WS111						Weth/°C	Mostly Cloudy / 9°C		
Tech	RS						Atm Press	1024		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	-1.21
	10	20	30	60	120	180			
O_2	19.50	19.60	19.70	19.80	19.80	19.90	na	Flow Max (l/hr)	-1.26
CO_2	0.00	0.00	0.00	0.00	0.00	0.00	na		
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	1014
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane						BH Depth	4.58m		
Date	19/03/2020						Water Lvl	4.55m		
Hole ID	WS109						Weth/°C	Mostly Cloudy / 9°C		
Tech	RS						Atm Press	1024		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	<0.01
	10	20	30	60	120	180			
O_2	20.00	20.00	20.00	20.00	20.00	20.00	na	Flow Max (l/hr)	<0.01
CO_2	0.00	0.00	0.00	0.00	0.00	0.00	na		
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	1014
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane						BH Depth	4.72m		
Date	19/03/2020						Water Lvl	None		
Hole ID	WS107						Weth/°C	Mostly Cloudy / 9°C		
Tech	RS						Atm Press	1024		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	<0.01	
	10	20	30	60	120	180				
O_2	19.80	19.80	19.80	19.80	19.80	19.80	na	Flow Max (l/hr)	<0.01	
CO_2	0.00	0.00	0.00	0.00	0.00	0.00	na			
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	1014	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane						BH Depth	18.94m		
Date	19/03/2020						Water Lvl	6.73m		
Hole ID	BH1						Weth/°C	Mostly Cloudy / 9°C		
Tech	RS						Atm Press	1024		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	<0.01	
	10	20	30	60	120	180				
O_2	19.80	19.80	19.80	19.80	19.80	19.80	na	Flow Max (l/hr)	<0.01	
CO_2	0.00	0.00	0.00	0.00	0.00	0.00	na			
CH_4	0.30	0.70	0.80	0.80	0.80	0.80	na	Hole Press (mb)	1012	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane						BH Depth	4.76m		
Date	19/03/2020						Water Lvl	3.78m		
Hole ID	WS105						Weth/°C	Mostly Cloudy / 9°C		
Tech	RS						Atm Press	1024		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	<0.01	
	10	20	30	60	120	180				
O_2	2.00	20.00	20.00	20.00	20.00	20.00	na	Flow Max (l/hr)	<0.01	
CO_2	0.00	0.00	0.00	0.00	0.00	0.00	na			
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	1012	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane						BH Depth	0.88m		
Date	19/03/2020						Water Lvl	0.68		
Hole ID	WS103						Weth/°C	Mostly Cloudy / 9°C		
Tech	RS						Atm Press	1024		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	<0.01	
	10	20	30	60	120	180				
O_2	19.90	19.90	19.80	19.80	19.90	19.90	na	Flow Max (l/hr)	<0.01	
CO_2	0.00	0.00	0.00	0.00	0.00	0.00	na			
CH_4	0.00	0.00	0.00	0.00	0.00	0.00	na	Hole Press (mb)	1014	
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na			
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na	

Site	Water Lane					BH Depth	3.02		
Date	16/04/2020					Water Lvl	DRY		
Hole ID	WS111					Weth/°C	Partly sunny / 17°C		
Tech	JE					Atm Press	1015		
Gas (%)	Time (seconds)							Flow Min (l/hr)	-1.16
	10	20	30	60	120	180	Atm (%)		
O_2	16.00	4.90	3.10	2.60	1.20	0.20	na	Flow Max (l/hr)	-1.12
CO_2	1.00	1.20	1.20	1.30	1.40	1.70	na		
CH_4	4.00	7.00	7.60	7.80	8.30	9.00	na	Hole Press (mb)	1009
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	4.84		
Date	16/04/2020					Water Lvl	DRY		
Hole ID	WS101					Weth/°C	Partly sunny / 17°C		
Tech	JE					Atm Press	1015		
Gas (%)	Time (seconds)							Flow Min (l/hr)	-1.23
	10	20	30	60	120	180	Atm (%)		
O_2	17.00	3.20	0.80	0.30	0.20	0.20	na	Flow Max (l/hr)	-1.19
CO_2	0.20	0.50	0.50	0.50	0.50	0.50	na		
CH_4	6.30	14.00	15.00	15.50	15.50	15.40	na	Hole Press (mb)	1010
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	1.09		
Date	16/04/2020					Water Lvl	1.08		
Hole ID	WS103					Weth/°C	Partly sunny / 17°C		
Tech	JE					Atm Press	1015		
Gas (%)	Time (seconds)							Flow Min (l/hr)	-4.78
	10	20	30	60	120	180	Atm (%)		
O_2	10.40	2.50	2.30	2.40	3.40	4.30	na	Flow Max (l/hr)	-4.79
CO_2	6.90	11.00	10.90	10.80	9.90	9.50	na		
CH_4	27.00	47.00	49.30	49.00	46.50	44.10	na	Hole Press (mb)	1010
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	4.6		
Date	16/04/2020					Water Lvl	4.35		
Hole ID	WS105					Weth/°C	Partly sunny / 17°C		
Tech	JE					Atm Press	1015		
Gas (%)	Time (seconds)							Flow Min (l/hr)	-0.88
	10	20	30	60	120	180	Atm (%)		
O_2	14.00	2.80	2.10	1.80	0.60	0.20	na	Flow Max (l/hr)	-0.95
CO_2	0.20	0.20	0.20	0.10	0.10	0.00	na		
CH_4	6.60	10.90	11.90	12.10	13.00	13.70	na	Hole Press (mb)	1010
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	4.73		
Date	16/04/2020					Water Lvl	DRY		
Hole ID	WS107					Weth/°C	Partly sunny / 17°C		
Tech	JE					Atm Press	1015		
Gas (%)	Time (seconds)							Flow Min (l/hr)	-0.88
	10	20	30	60	120	180	Atm (%)		
O_2	12.20	4.60	3.30	2.50	1.60	0.80	na	Flow Max (l/hr)	-0.85
CO_2	1.10	1.40	1.40	1.50	1.60	1.70	na		
CH_4	1.40	1.80	2.00	2.10	2.20	2.30	na	Hole Press (mb)	1010
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	4.39		
Date	16/04/2020					Water Lvl	3.65		
Hole ID	WS109					Weth/°C	Partly sunny / 17°C		
Tech	JE					Atm Press	1015		
Gas (%)	Time (seconds)							Flow Min (l/hr)	-1.42
	10	20	30	60	120	180	Atm (%)		
O_2	10.00	2.60	1.60	1.20	1.00	0.60	na	Flow Max (l/hr)	-1.37
CO_2	0.80	2.00	2.10	2.10	2.10	2.20	na		
CH_4	1.80	2.30	2.40	2.50	2.50	2.60	na	Hole Press (mb)	1009
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	18.73		
Date	16/04/2020					Water Lvl	7.44		
Hole ID	BH1					Weth/°C	Partly sunny / 17°C		
Tech	JE					Atm Press	1015		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	-1.49
	10	20	30	60	120	180			
O_2	13.10	2.80	1.60	1.40	1.40	1.40	na	Flow Max (l/hr)	-1.54
CO_2	0.80	0.80	0.80	0.80	0.80	0.80	na		
CH_4	7.10	11.30	11.80	11.80	11.80	11.80	na	Hole Press (mb)	1009
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	3		
Date	30/04/2020					Water Lvl	DRY		
Hole ID	WS111					Weth/°C	Partly sunny, breezy / 10°C		
Tech	JE					Atm Press	995		
Gas (%)	Time (seconds)							Flow Min (l/hr)	1.08
	10	20	30	60	120	180	Atm (%)		
O_2	19.60	7.50	2.40	1.10	0.20	0.00	na	Flow Max (l/hr)	0.5
CO_2	0.50	0.70	0.70	0.70	0.70	0.70	na		
CH_4	8.80	13.80	14.50	15.00	15.50	15.60	na	Hole Press (mb)	987
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	4.81		
Date	30/04/2020					Water Lvl	DRY		
Hole ID	WS101					Weth/°C	Partly sunny, breezy / 10°C		
Tech	JE					Atm Press	995		
Gas (%)	Time (seconds)							Flow Min (l/hr)	2.3
	10	20	30	60	120	180	Atm (%)		
O_2	17.70	2.50	0.80	1.50	3.60	5.20	na	Flow Max (l/hr)	0.8
CO_2	5.50	13.60	13.70	13.10	11.70	10.30	na		
CH_4	44.00	66.00	66.00	62.30	55.10	49.10	na	Hole Press (mb)	987
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	1.09		
Date	30/04/2020					Water Lvl	DRY		
Hole ID	WS103					Weth/°C	Partly sunny, breezy / 10°C		
Tech	JE					Atm Press	995		
Gas (%)	Time (seconds)							Flow Min (l/hr)	0.79
	10	20	30	60	120	180	Atm (%)		
O_2	19.10	5.20	1.40	0.60	0.00	0.00	na	Flow Max (l/hr)	0.07
CO_2	0.10	0.00	0.00	0.00	0.00	0.00	na		
CH_4	17.50	12.60	13.30	13.80	14.30	14.40	na	Hole Press (mb)	987
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Gas tap was open on arrival so readings after10 mins closed

Site	Water Lane					BH Depth	4.59		
Date	30/04/2020					Water Lvl	4.29		
Hole ID	WS105					Weth/°C	Partly sunny, breezy / 10°C		
Tech	JE					Atm Press	995		
Gas (%)	Time (seconds)							Flow Min (l/hr)	-0.12
	10	20	30	60	120	180	Atm (%)		
O_2	18.20	4.30	0.70	0.20	0.10	0.00	na	Flow Max (l/hr)	-1.42
CO_2	0.70	0.90	1.00	1.00	1.00	1.00	na		
CH_4	2.80	4.70	5.00	5.10	5.10	5.20	na	Hole Press (mb)	987
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	4.7		
Date	30/04/2020					Water Lvl	DRY		
Hole ID	WS107					Weth/°C	Partly sunny, breezy / 10°C		
Tech	JE					Atm Press	995		
Gas (%)	Time (seconds)							Flow Min (l/hr)	1.16
	10	20	30	60	120	180	Atm (%)		
O_2	18.10	4.00	0.40	0.00	0.00	0.00	na	Flow Max (l/hr)	1.3
CO_2	1.50	2.30	2.30	2.30	2.30	2.40	na		
CH_4	1.60	2.20	2.30	2.40	2.40	2.50	na	Hole Press (mb)	988
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	4.38		
Date	30/04/2020					Water Lvl	3.6		
Hole ID	WS109					Weth/°C	Partly sunny, breezy / 10°C		
Tech	JE					Atm Press	995		
Gas (%)	Time (seconds)							Flow Min (l/hr)	2.3
	10	20	30	60	120	180	Atm (%)		
O_2	19.10	3.60	0.60	0.10	0.00	0.00	na	Flow Max (l/hr)	2.18
CO_2	0.90	1.70	1.70	1.70	1.80	1.90	na		
CH_4	6.20	9.00	9.50	9.60	9.70	9.70	na	Hole Press (mb)	988
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

Site	Water Lane					BH Depth	18.71		
Date	30/04/2020					Water Lvl	7.38		
Hole ID	BH1					Weth/°C	Partly sunny, breezy / 10°C		
Tech	JE					Atm Press	995		
Gas (%)	Time (seconds)						Atm (%)	Flow Min (l/hr)	0.41
	10	20	30	60	120	180			
O_2	19.20	4.20	0.50	0.10	0.00	0.00	na	Flow Max (l/hr)	1.72
CO_2	0.80	1.10	1.10	1.10	1.10	1.10	na		
CH_4	6.40	12.50	13.00	13.00	13.20	13.10	na	Hole Press (mb)	987
H_2S	0.00	0.00	0.00	0.00	0.00	0.00	na		
LEL	0.00	0.00	0.00	0.00	0.00	0.00	na	VOC	na

APPENDIX 7: GEOTECHNICAL LABORATORY CERTIFICATES

TEST CERTIFICATE

Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

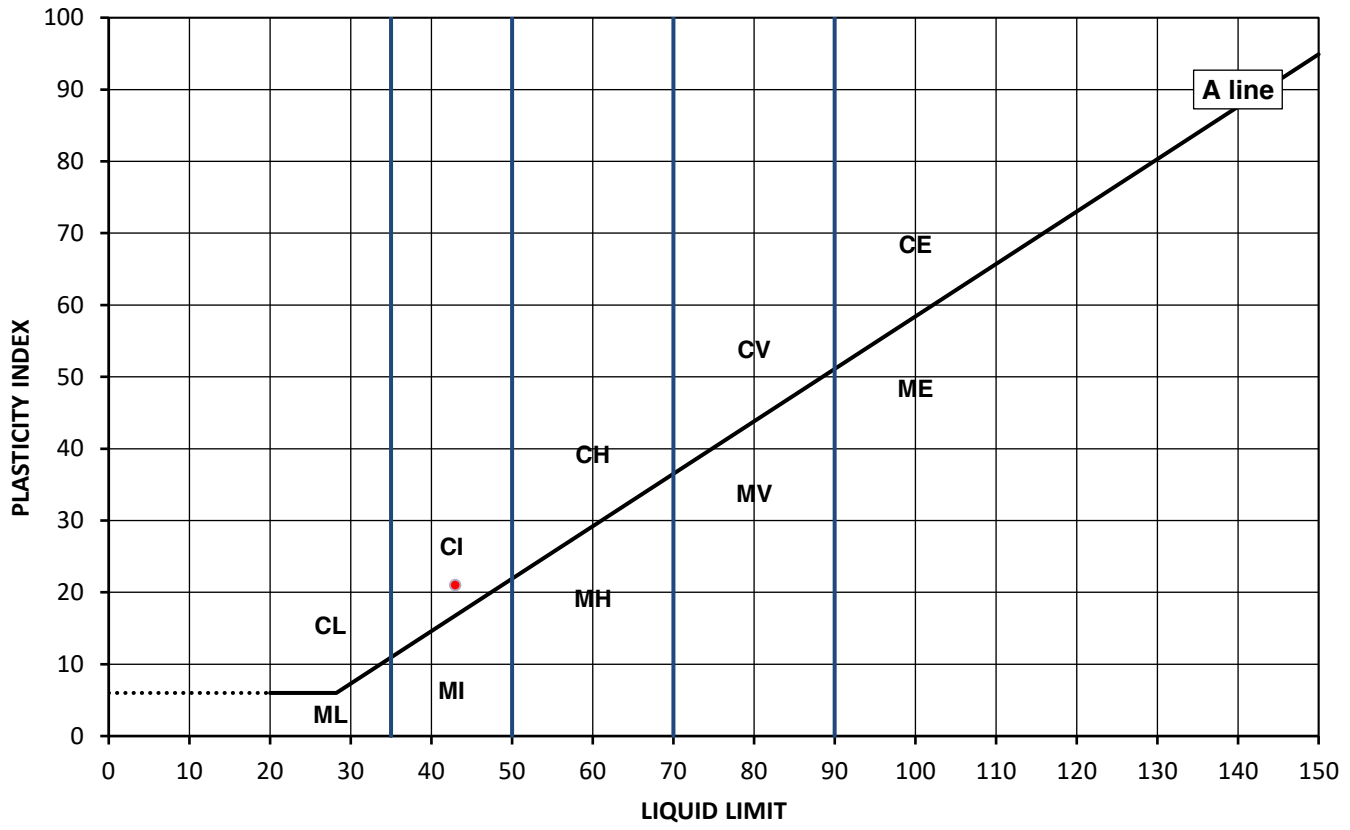
Client:	Ground Condition Consultants	Client Reference:	20-90016
Client Address:	10 Waldegrave Close, Southampton, S019 9RY	Job Number:	20-90016
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	10/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458763	Depth Top [m]:	1.10
Hole No.:	WS101	Depth Base [m]:	1.40
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Multicolour gravelly sandy CLAY with chalk		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
15	43	22	21	63



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 16/03/2020

GF 232.8

TEST CERTIFICATE

Liquid and Plastic Limits

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Brackmills Industrial Estate
Northampton NN4 7EB

4041

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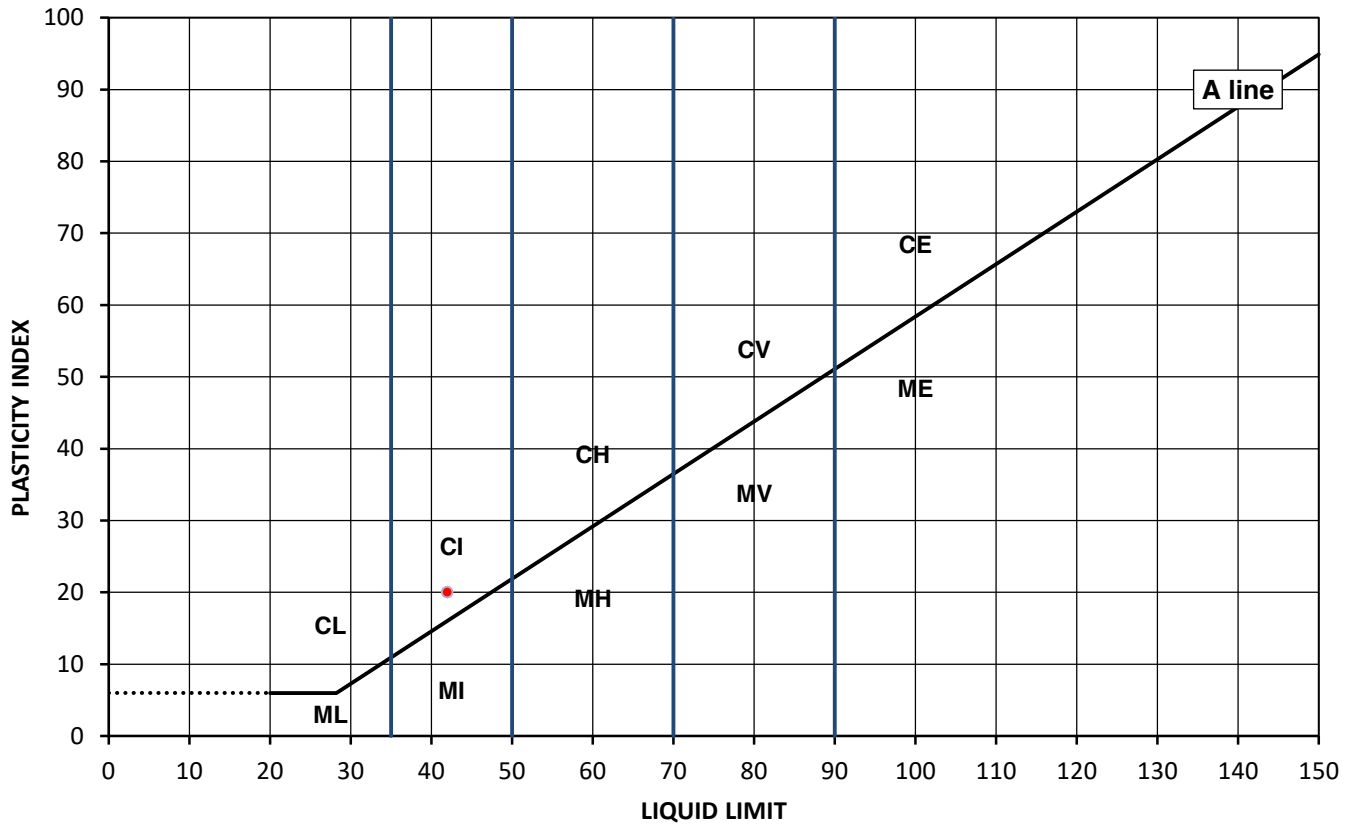
Client:	Ground Condition Consultants	Client Reference:	20-90016
Client Address:	10 Waldegrave Close, Southampton, S019 9RY	Job Number:	20-90016
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	10/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458764	Depth Top [m]:	0.30
Hole No.:	WS102	Depth Base [m]:	0.70
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Dark brown slightly gravelly sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
17	42	22	20	72



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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Client Address:	10 Waldegrave Close, Southampton, S019 9RY	Job Number:	20-90016
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	10/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

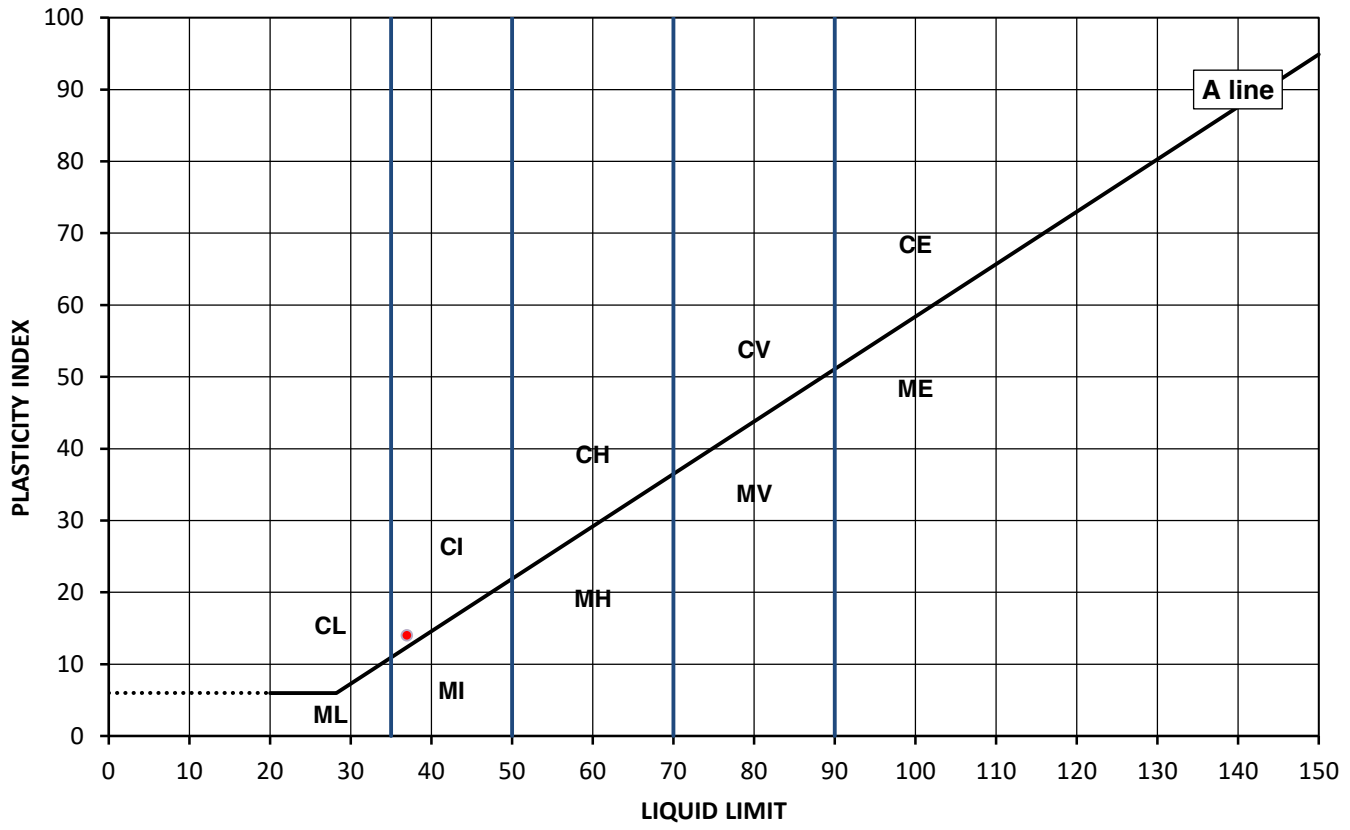
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458765	Depth Top [m]:	1.50
Hole No.:	WS104	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Brown gravelly sandy CLAY		

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
17	37	23	14	52



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

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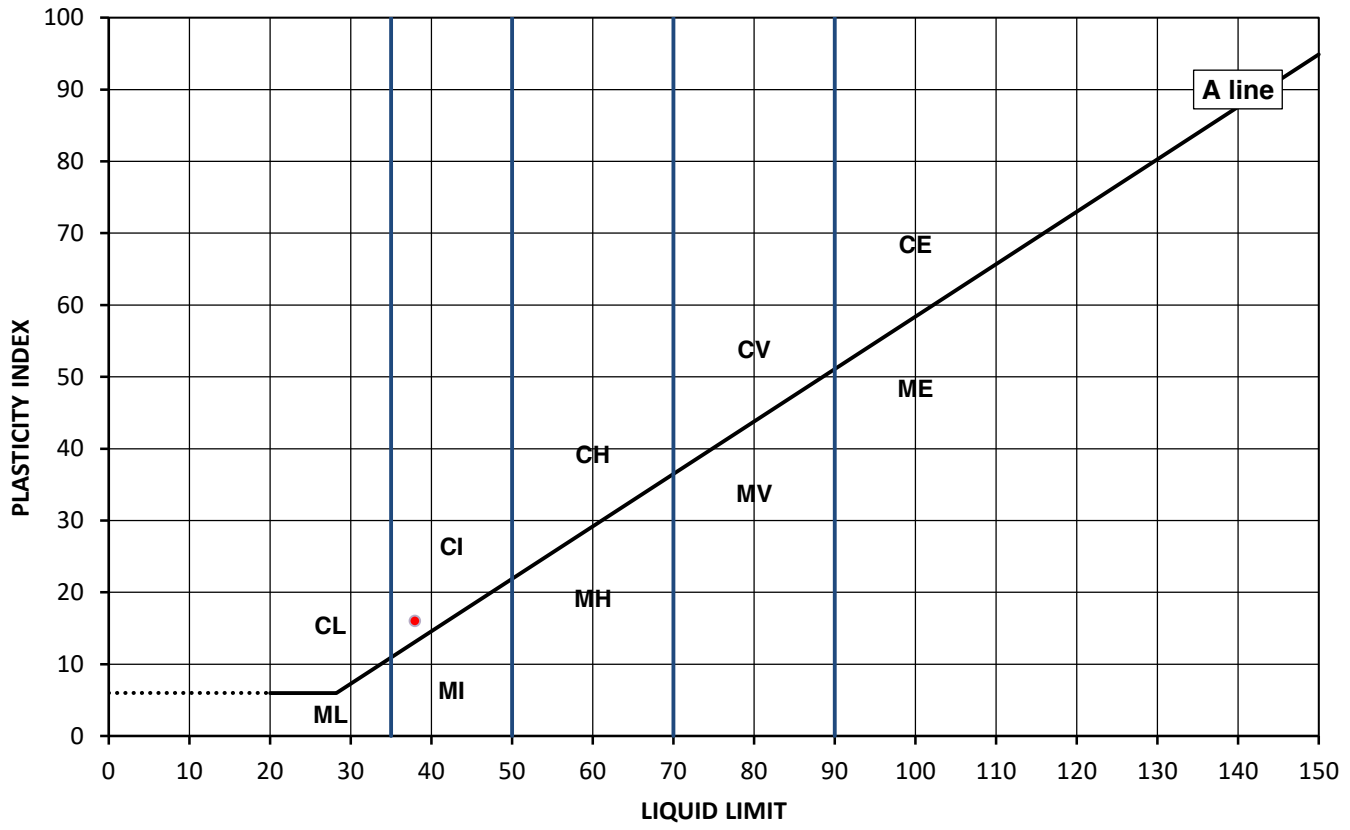
Client:	Ground Condition Consultants	Client Reference:	20-90016
Client Address:	10 Waldegrave Close, Southampton, S019 9RY	Job Number:	20-90016
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	10/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458766	Depth Top [m]:	2.50
Hole No.:	WS105	Depth Base [m]:	3.00
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Brown slightly gravelly sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
26	38	22	16	70



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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Northampton NN4 7EB

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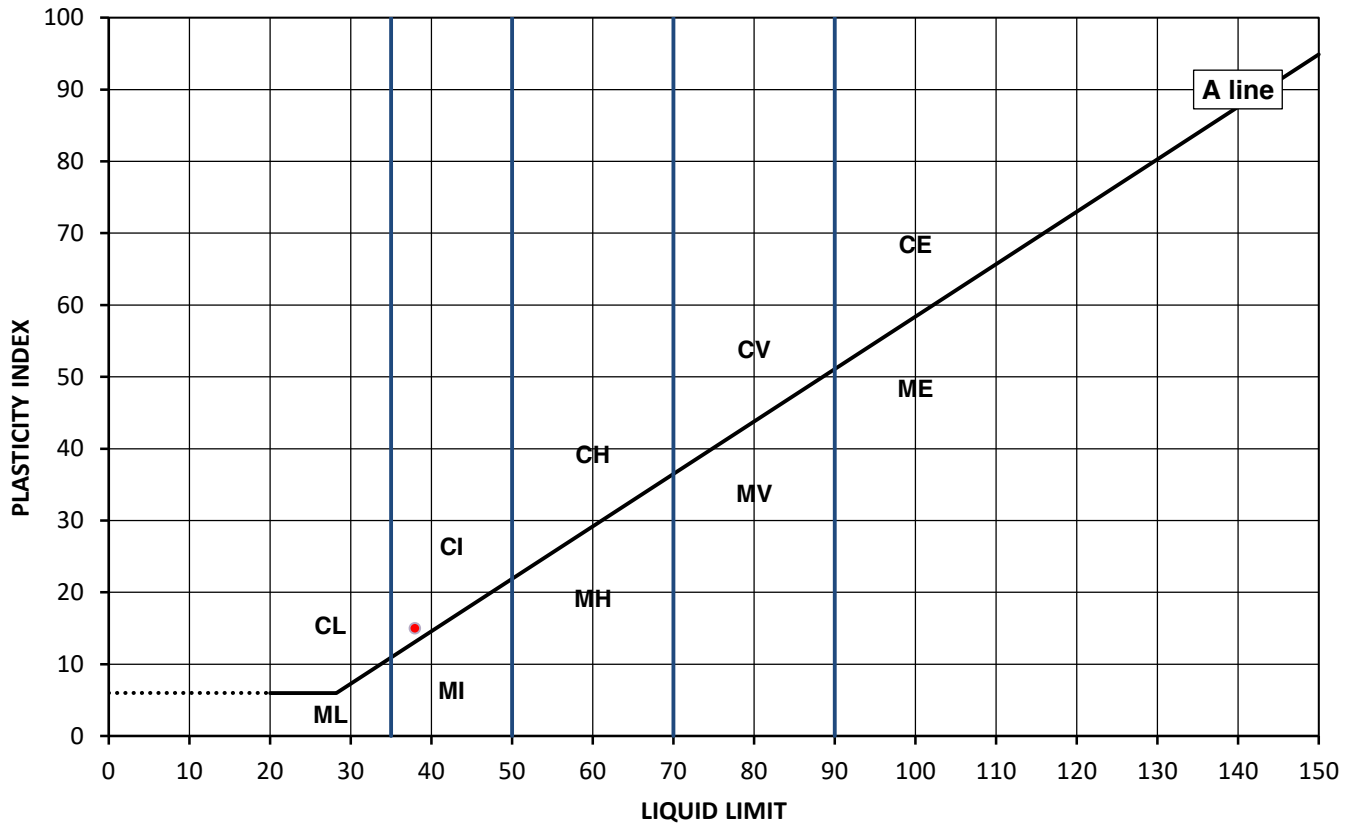
Client:	Ground Condition Consultants	Client Reference:	20-90016
Client Address:	10 Waldegrave Close, Southampton, S019 9RY	Job Number:	20-90016
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	05/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458768	Depth Top [m]:	3.00
Hole No.:	WS107	Depth Base [m]:	3.50
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Dark brown slightly gravelly sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
22	38	23	15	77



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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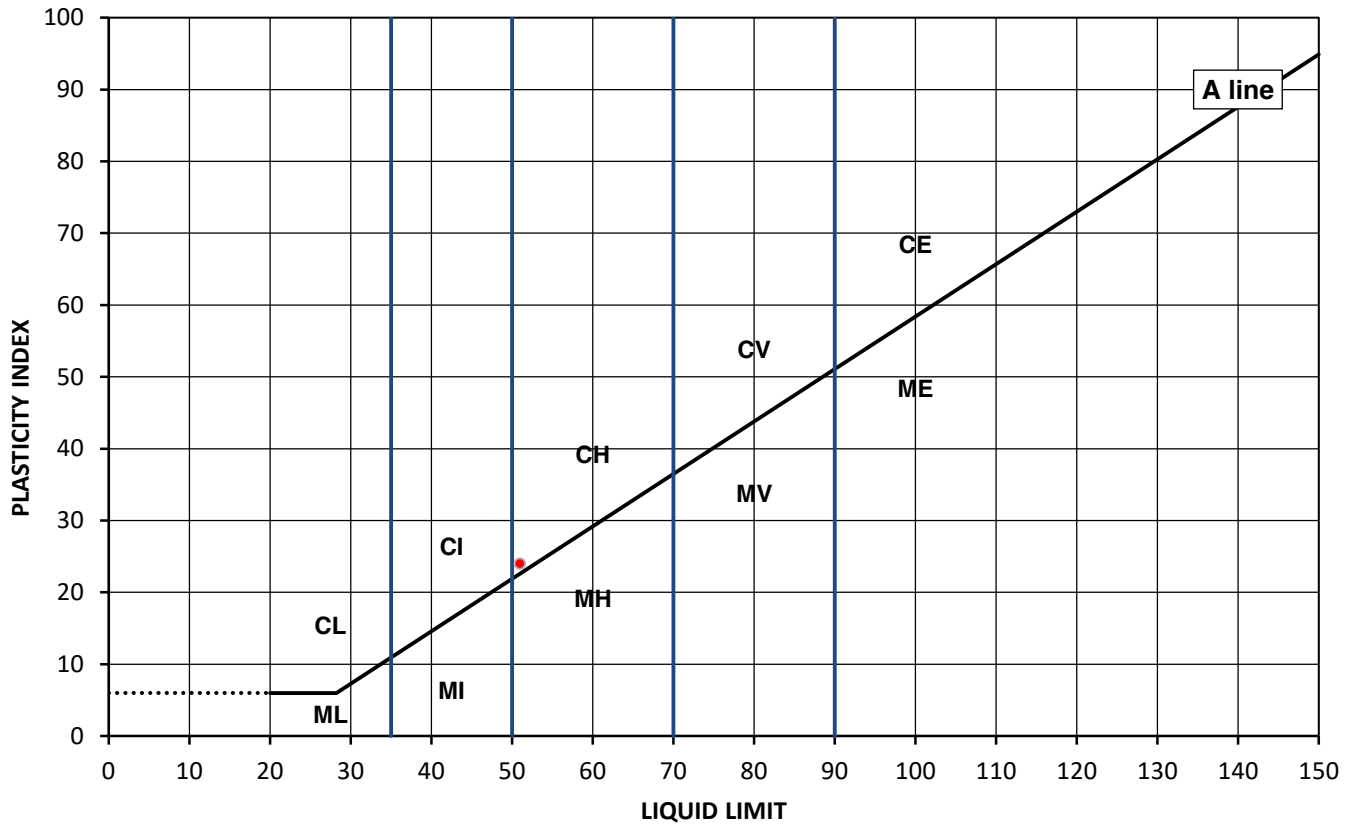
Client Address:	10 Waldegrave Close, Southampton, S019 9RY	Job Number:	20-90016
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	05/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458769	Depth Top [m]:	2.50
Hole No.:	WS108	Depth Base [m]:	3.00
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Brown gravelly slightly sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
36	51	27	24	64



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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Liquid and Plastic Limits

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

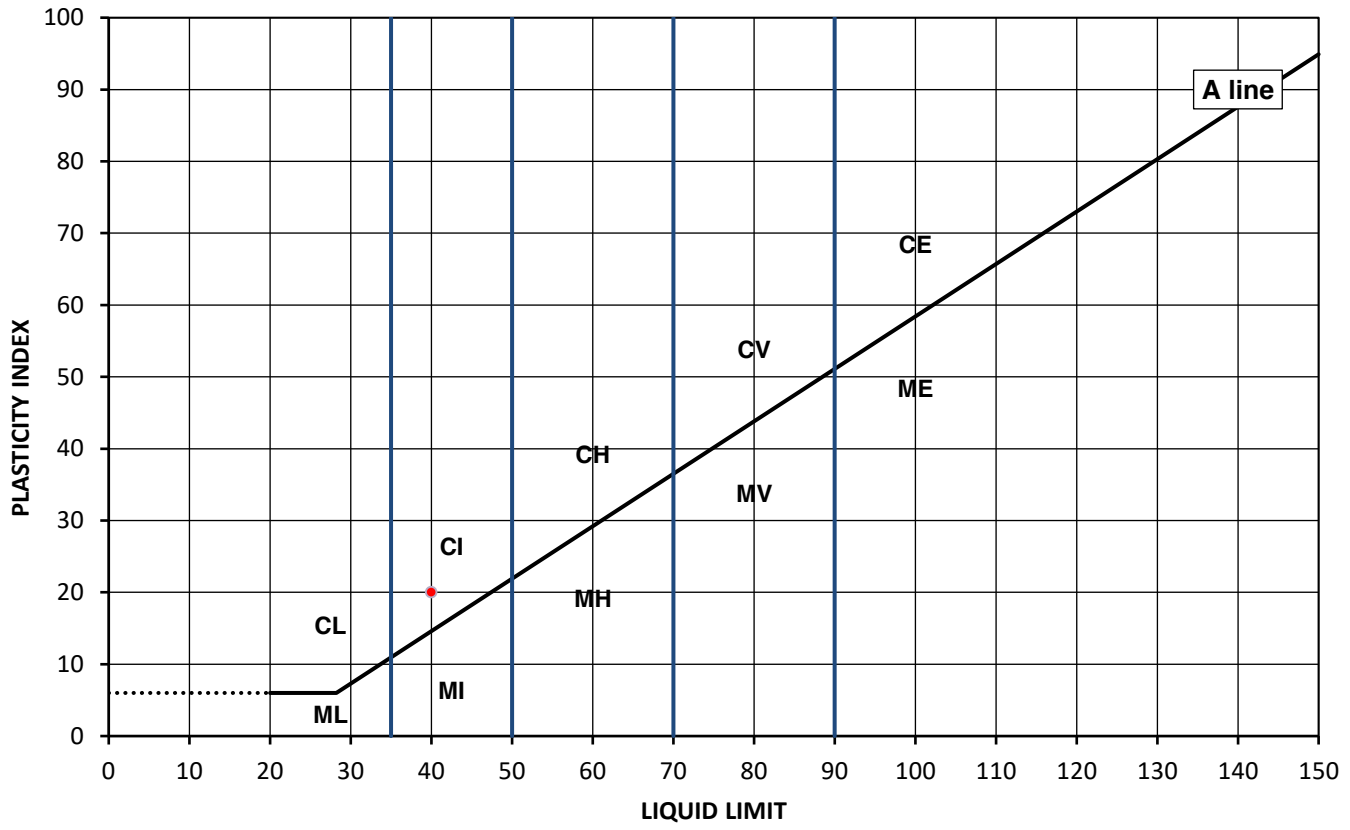
Client:	Ground Condition Consultants	Client Reference:	20-90016
Client Address:	10 Waldegrave Close, Southampton, S019 9RY	Job Number:	20-90016
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	05/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458770	Depth Top [m]:	1.00
Hole No.:	WS109	Depth Base [m]:	2.00
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Brown slightly gravelly sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
20	40	20	20	72



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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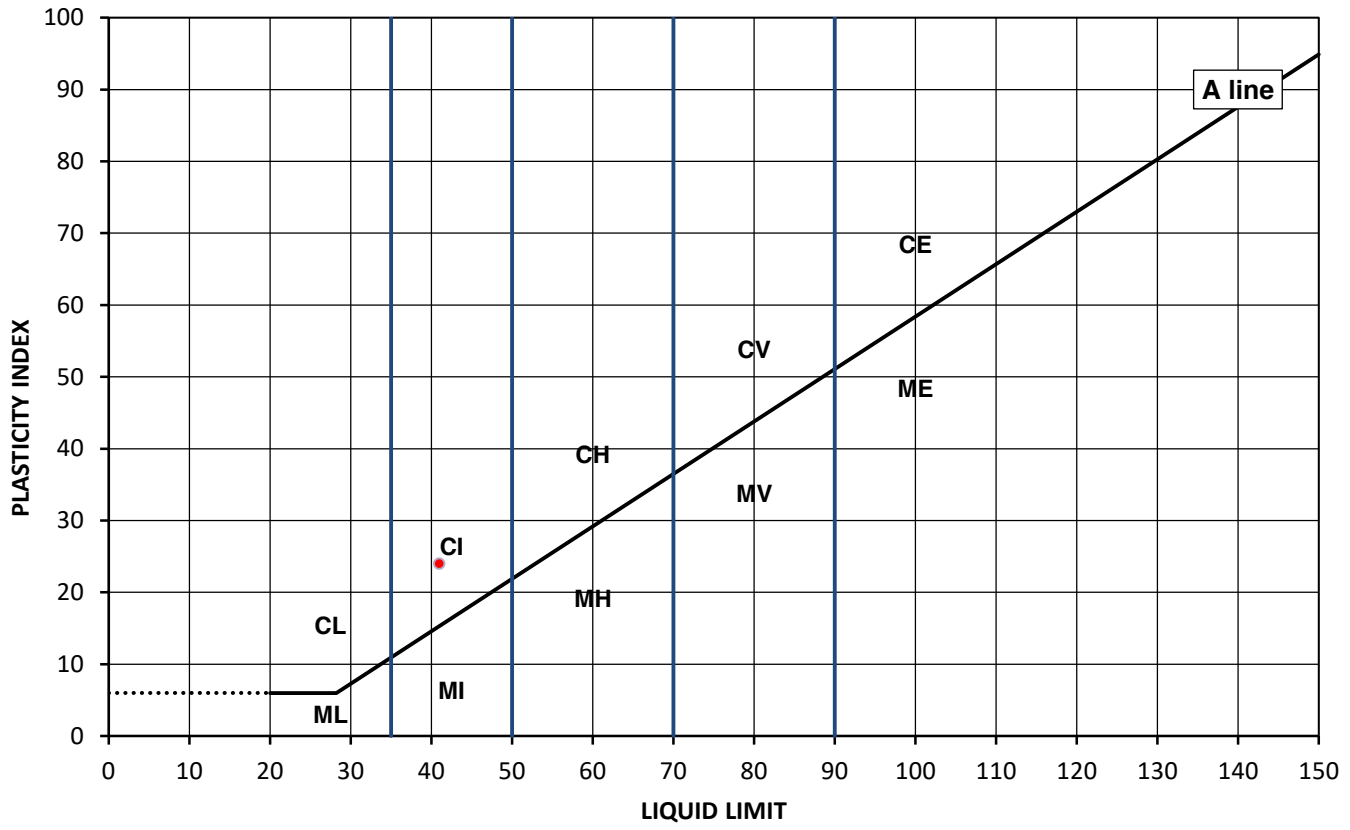
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	05/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458771	Depth Top [m]:	1.30
Hole No.:	WS110	Depth Base [m]:	1.70
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Dark brown gravelly sandy CLAY		
Sample Preparation:	Tested after washing to remove >425um		

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
18	41	17	24	60



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
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		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	05/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

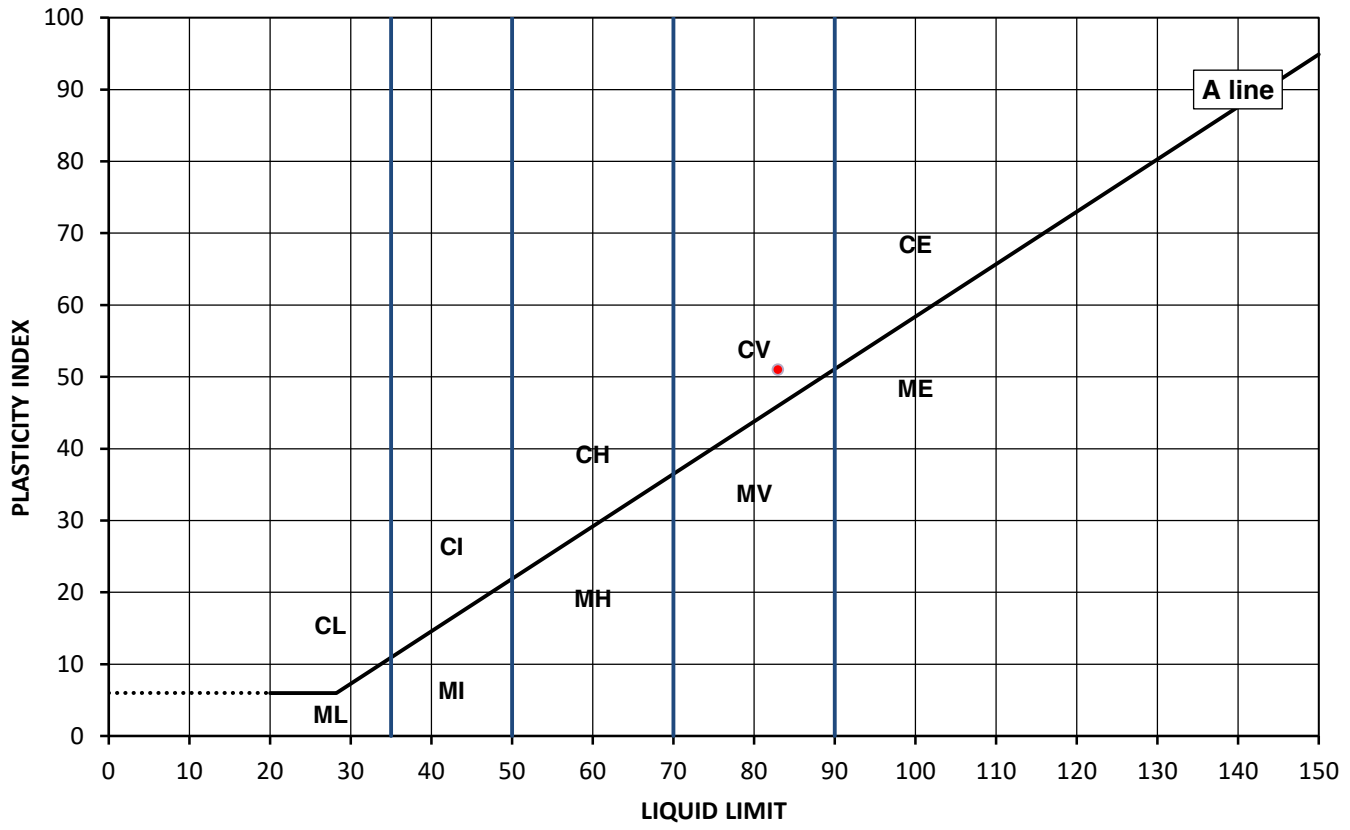
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458772	Depth Top [m]:	1.00
Hole No.:	WS111	Depth Base [m]:	1.80
Sample Reference:	Not Given	Sample Type:	B
Soil Description:	Dark brown slightly gravelly CLAY		

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425μm BS Test Sieve
17	83	32	51	80



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		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
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Date Reported: 16/03/2020

GF 232.8

SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Tested in Accordance with:

MC by BS 1377-2: 1990: Clause 3.2; WC by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3, Clause 4.4 and 5; PD by BS 1377-2: 1990: Clause 8.2

Client: Ground Condition Consultants

Client Address: 10 Waldegrave Close, Southampton, S019 9RY

Contact: Rasmus Palmgren

Site Address: Angells Pit

Client Reference: 20-90016
Job Number: 20-90016
Date Sampled: Not Given
Date Received: 26/02/2020
Date Tested: 05/03 - 10/03/2020
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	MC	WC	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	LL	PL	PI	bulk	dry	PD			
			m	m				%	%	%	%	%	%	Mg/m3	Mg/m3	Mg/m3	%		
1458763	WS101	Not Given	1.10	1.40	B	Multicolour gravelly sandy CLAY with chalk	Atterberg 1 Point	15		63	43	22	21						
1458764	WS102	Not Given	0.30	0.70	B	Dark brown slightly gravelly sandy CLAY	Atterberg 1 Point	17		72	42	22	20						
1458765	WS104	Not Given	1.50	2.00	B	Brown gravelly sandy CLAY	Atterberg 1 Point	17		52	37	23	14						
1458766	WS105	Not Given	2.50	3.00	B	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	26		70	38	22	16						
1458768	WS107	Not Given	3.00	3.50	B	Dark brown slightly gravelly sandy CLAY	Atterberg 1 Point	22		77	38	23	15						
1458769	WS108	Not Given	2.50	3.00	B	Brown gravelly slightly sandy CLAY	Atterberg 1 Point	36		64	51	27	24						
1458770	WS109	Not Given	1.00	2.00	B	Brown slightly gravelly sandy CLAY	Atterberg 1 Point	20		72	40	20	20						
1458771	WS110	Not Given	1.30	1.70	B	Dark brown gravelly sandy CLAY	Atterberg 1 Point	18		60	41	17	24						
1458772	WS111	Not Given	1.00	1.80	B	Dark brown slightly gravelly CLAY	Atterberg 1 Point	17		80	83	32	51						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Date Reported: 16/03/2020

GF 234.10

TEST CERTIFICATE

Particle Size Distribution

Tested in Accordance with: BS 1377-2: 1990

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

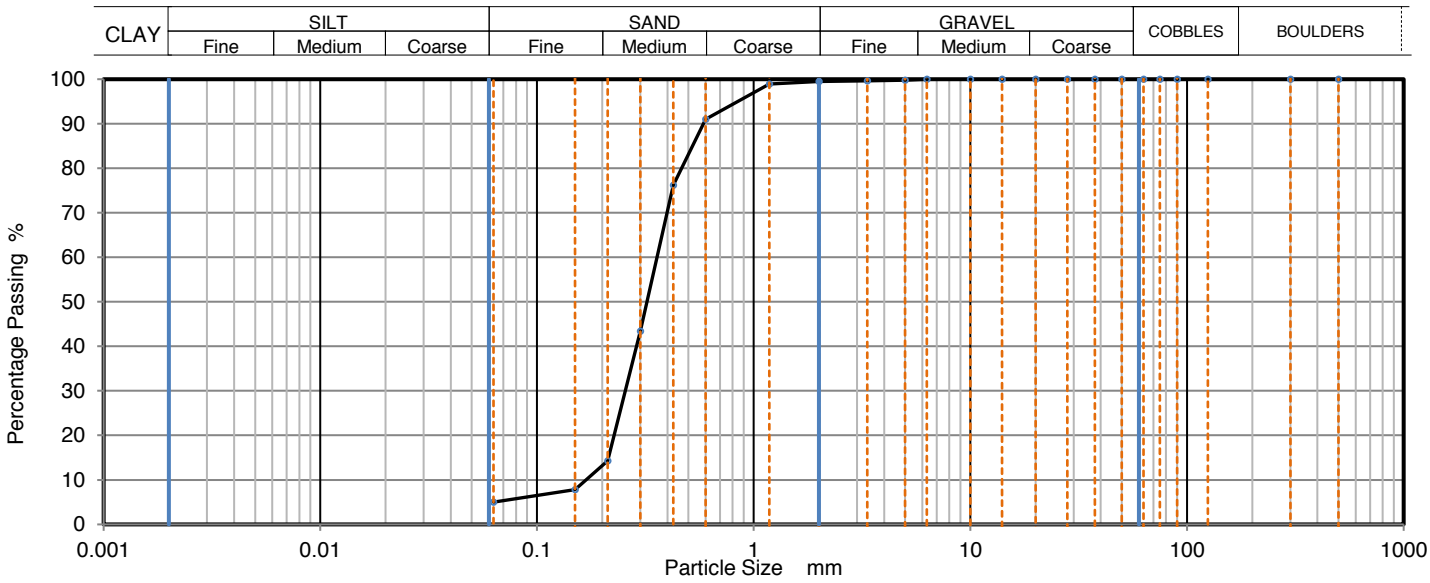
UKAS TESTING 4041

Client:	Ground Condition Consultants	Client Reference:	20-90016
Client Address:	10 Waldegrave Close, Southampton, S019 9RY	Job Number:	20-90016
		Date Sampled:	Not Given
		Date Received:	26/02/2020
Contact:	Rasmus Palmgren	Date Tested:	10/03/2020
Site Address:	Angells Pit	Sampled By:	Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference:	1458767	Depth Top [m]:	1.10
Hole No.:	WS107	Depth Base [m]:	1.50
Sample Reference:	Not Given	Sample Type:	B
Sample Description:	Reddish brown SAND		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100		
300	100		
125	100		
90	100		
75	100		
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	91		
0.425	76		
0.3	43		
0.212	14		
0.15	8		
0.063	5.1		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	0.50
Sand	94.50
Fines <0.063mm	5.10

Grading Analysis		
D100	mm	6.3
D60	mm	0.358
D30	mm	0.256
D10	mm	0.169
Uniformity Coefficient		2.1
Curvature Coefficient		1.1

Note: Tested in Accordance with BS1377:Part 2:1990, clause 9.2

Remarks:

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report are representative of the samples submitted for analysis.

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Date Reported: 16/03/2020

GF 100.16

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Analytical Report Number : 20-90023

Project / Site name:	Angells Pit	**Samples received on:**	26/02/2020
Your job number:		**Samples instructed on:**	02/03/2020
Your order number:		**Analysis completed by:**	12/03/2020
Report Issue Number:	1	**Report issued on:**	12/03/2020
Samples Analysed:	8 soil samples		

Signed:

Karolina Marek
Head of Reporting Section

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 20-90023

Project / Site name: Angells Pit

Lab Sample Number				1458791	1458792	1458793	1458794	1458795
Sample Reference				WS101	WS101	WS103	WS104	WS106
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.10-1.40	3.50-4.00	1.00-1.50	1.50-2.00	1.50-2.00
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	14	18	13	15	16
Total mass of sample received	kg	0.001	NONE	0.45	0.45	0.45	0.45	0.45
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.1	8.7	8.0	10.0	8.4
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.113	0.044	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.085	0.36	0.10	0.20	0.24
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	83	12	-	-
Total Sulphur	%	0.005	MCERTS	-	0.069	0.023	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	< 2.0	< 2.0	-	-
Heavy Metals / Metalloids								
Magnesium (water soluble)	mg/kg	5	NONE	-	10	11	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	5.2	5.4	-	-

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Analytical Report Number: 20-90023

Project / Site name: Angells Pit

Lab Sample Number				1458796	1458797	1458798		
Sample Reference				WS107	WS108	WS111		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				1.10-1.50	1.10-1.50	1.00-1.80		
Date Sampled				Deviating	Deviating	Deviating		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	15	17	14		
Total mass of sample received	kg	0.001	NONE	0.45	0.45	0.45		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.9	8.0	9.0		
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.038	0.135		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.034	0.47		
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	3.2	57		
Total Sulphur	%	0.005	MCERTS	-	0.024	0.103		
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	< 2.0	< 2.0		
Heavy Metals / Metalloids								
Magnesium (water soluble)	mg/kg	5	NONE	-	13	19		
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	6.5	9.5		

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 20-90023

Project / Site name: Angells Pit

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1458791	WS101	None Supplied	1.10-1.40	Brown clay and loam with gravel.
1458792	WS101	None Supplied	3.50-4.00	Brown clay and loam with gravel.
1458793	WS103	None Supplied	1.00-1.50	Brown loam and sand with gravel and brick.
1458794	WS104	None Supplied	1.50-2.00	Brown loam and sand with gravel.
1458795	WS106	None Supplied	1.50-2.00	Brown loam and clay with gravel.
1458796	WS107	None Supplied	1.10-1.50	Brown sand with gravel.
1458797	WS108	None Supplied	1.10-1.50	Brown clay and loam with gravel.
1458798	WS111	None Supplied	1.00-1.80	Brown clay and loam with gravel.

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number : 20-90023

Project / Site name: Angells Pit

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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The results included within the report are representative of the samples submitted for analysis.

Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
WS101		S	20-90023	1458791	a			
WS101		S	20-90023	1458792	a			
WS103		S	20-90023	1458793	a			
WS104		S	20-90023	1458794	a			
WS106		S	20-90023	1458795	a			
WS107		S	20-90023	1458796	a			
WS108		S	20-90023	1458797	a			
WS111		S	20-90023	1458798	a			

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

APPENDIX 8: ULS BEARING RESISTANCE

Project Title:	Angell Pit				
Shallow Foundation	Strip Foundation				
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP

Inert Waste Material

Design Approach 1

Combination 1 A1 + M1 + R1

Material Properties and Resistance

Partial factors set M1: $\gamma_{cu} = 1$ $\gamma_{\phi} = 1$ and $\gamma_c = 1$

Characteristic Geotechnical Parameters

Unit Weight	19
Undrained Cohesion	75
Cohesion	0
Shearing Resistance	27

Foundation Size

depth	0.75
breadth	0.6

$$c_{ud} = \frac{c_{uk}}{\gamma_{cu}} = \quad 75$$

Design shearing resistance is $\phi_d = \tan^{-1}\left(\frac{\tan\phi_K}{\gamma_\phi}\right) = \quad 27$

Design cohesision is $c'_d = \frac{c_k}{\gamma_c} = \quad 0$

Drained Bearing Capacity Factors

For overburden $N_q = \left[e^{(\pi\times\tan(\phi_d))}\times\left(\tan\left(45+\frac{\phi_d}{2}\right)\right)^2\right] = \quad 13.19$

For cohesion $N_c = \left[(N_q - 1)\times\cot(\phi_d)\right] = \quad 23.92$

For self-weight $N_\gamma = \left[2(N_q - 1)\times\tan(\phi_d)\right] = \quad 12.42$

Depth and Shape Factors

Solgado's depth factor for undrained loading: $d_C = 1 + 0.27\sqrt{\frac{d}{B}} = \quad 1.30$

Ignore depth factors for drained loading

Solgado's shape factor for undrained loading: $s_c = 1 + 0.17\sqrt{\frac{d}{B}} = \quad 1.19$

Shape factors are all 1.0 for drained loading and so can be ignored

Undrained Bearing Resitance

Total overburden at foundation base is $\sigma_{vk,b} = \gamma_k \times d = \quad 14.25$

Partial factors set R1: $\gamma_{Rv} = 1$

Ultimate resistance is $q_{ult} = (\pi + 2)\times c_{ud}\times d_c \times s_c + \sigma_{vk,b} = \quad 612$

Design Resistance is $q_{Rd} = \frac{q_{ult}}{\gamma_{Rv}} = \quad 612$

Project Title:	Angell Pit				
Shallow Foundation	Strip Foundation				
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP

Drained Bearing Resistance Depth to Groundwater 0 Groundwater > 2b

Effective overburden at foundation base is $\sigma'_{vk,b} = \sigma_{vk,b} - u_{k,b} = 14.25$

From overburden $q'_{ult_1} = N_q \times \sigma'_{wk,b} =$ 188

From cohesion $q'_{ult_2} = N_C \times c'_d =$ 0

From self-weight $q'_{ult_3} = \left[N_\gamma \times (\gamma_k - \gamma_w) \times \frac{B}{2} \right] =$ 34

Total resistance is $q'_{ult} = \sum_{i=1}^{3}$ $q'_{ult} =$ 222

Design resistance is $q'_{Rd} = \frac{q'_{ult}}{\gamma_{Rv}} =$ 222

Design Approach 1

Combination 2 A2 + M2 + R1

Material Properties and Resistance

Partial factors set M2: $\gamma_{cu} = 1.4$ $\gamma_\phi = 1.25$ and $\gamma_c = 1.25$

Design undrained strength is $c_{ud} = \frac{c_{uk}}{\gamma_{cu}} =$ 54

Design shearing resistance is $\phi_d = \tan^{-1}\left(\frac{\tan \phi_K}{\gamma_\phi} \right) =$ 22

Design cohesision is $c'_d = \frac{c_k}{\gamma_c} =$ 0

Drained Bearing Capacity Factors

For overburden $N_q = \left[e^{(\pi \times \tan(\phi_d))} \times \left(\tan\left(45 + \frac{\phi_d}{2} \right) \right)^2 \right] =$ 7.96

For cohesion $N_c = \lfloor (N_q - 1) \times \cot(\phi_d) \rfloor =$ 17.07

For self-weight $N_\gamma = \lfloor 2(N_q - 1) \times \tan(\phi_d) \rfloor =$ 5.67

Project Title:	Angell Pit				
Shallow Foundation	Strip Foundation				
Determination of Bearing Resistance		Calcs by	DF	Checked by	RP

Depth and Shape Factors

Solgado's depth factor for undrained loading: $d_C = 1 + 0.27\sqrt{\frac{d}{B}} =$ 1.30

Ignore depth factors for drained loading

Solgado's shape factor for undrained loading: $s_c = 1 + 0.17\sqrt{\frac{d}{B}} =$ 1.19

Shape factors are all 1.0 for drained loading and so can be ignored

Undrained Bearing Resitance

Total overburden at foundation base is $\sigma_{vk,b} = \gamma_k \times d =$ 14.25

Partial factors set R1: $\gamma_{Rv} = 1$

Ultimate resistance is $q_{ult} = (\pi + 2) \times c_{ud} \times d_c \times s_c + \sigma_{vk,b} =$ 441

Design Resistance is $q_{Rd} = \frac{q_{ult}}{\gamma_{Rv}} =$ 441

Drained Bearing Resistance

Effective overburden at foundation base is $\sigma'_{vk,b} = \sigma_{vk,b} - u_{k,b} =$ 14.25

From overburden $q'_{ult_1} = N_q \times \sigma'_{wk,b} =$ 113

From cohesion $q'_{ult_2} = N_C \times c'_d =$ 0

From self-weight $q'_{ult_3} = \left[N_\gamma \times (\gamma_k - \gamma_w) \times \frac{B}{2} \right]$ 16

Total resistance is $q'_{ult} = \sum_{i=1}^{3} \quad q'_{ult} =$ 129

Design Resistance is $q'_{Rd} = \frac{q'_{ult}}{\gamma_{Rv}} =$ 129

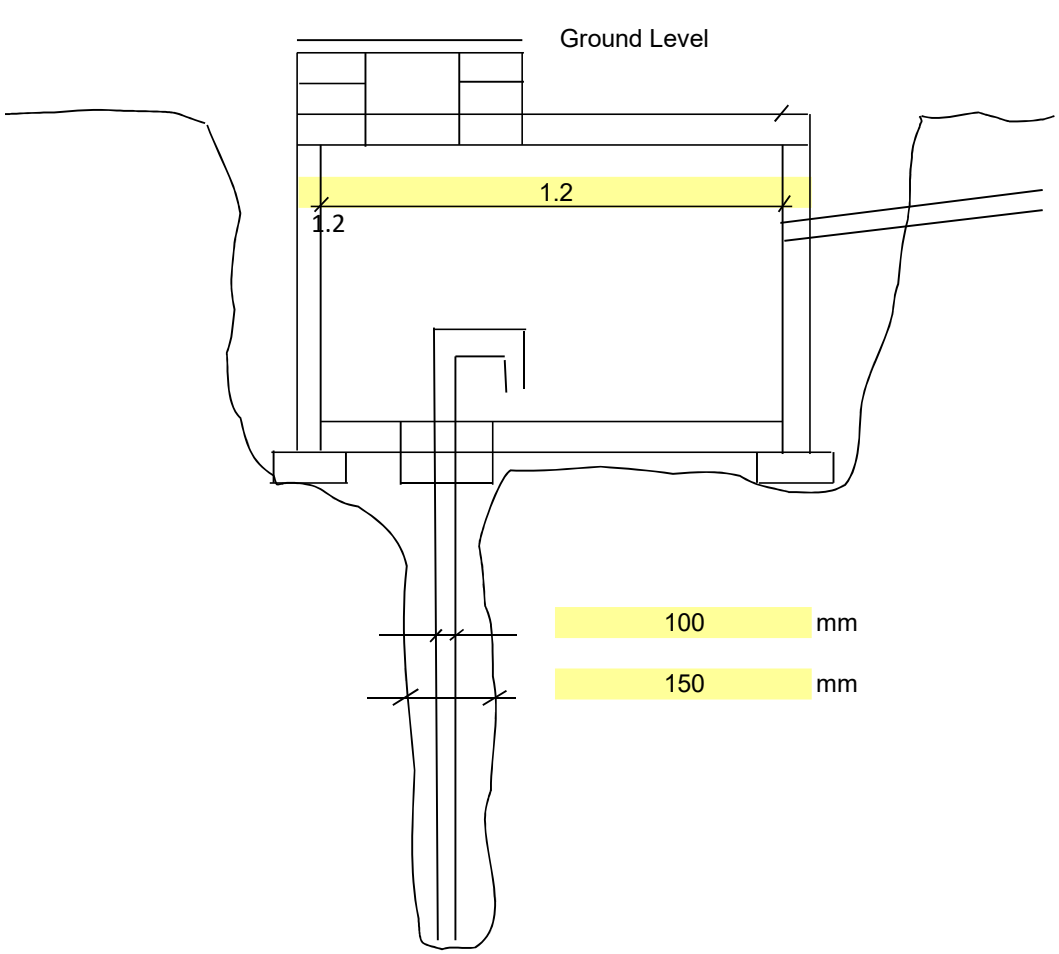
Design Approach	Combination	Design Resistance ULS (kN/m^2)	
		undrained	drained
DA1	Combination 1	612	222
	Combination 2	441	129

Appendix G

Project No. 20.5383 Angel Sandpit Storrington

Soakaway Calculations Page 1

Catchment Area:	545	m2	
Return Period:	100	yrs	134 mm/Hr
Peak Flow = Qp :	20	l/s	



Not included in manhole depth		
Not included in effective depth	1	m
Effective Storage Depth	3	m
Not included in effective depth	1	m
MH Depth = (BGL)	**5**	**m**

Project No. 20.5383 Angel Sandpit Storrington
Soakaway Calculations Page 2

Chamber Diameter:	1.2	m
Head Depth:	5	m
Syphon Above Seal:	1	m
Liner Diameter:	225	mm
Borehole Diamter:	450	mm
Safety Factor:	2	

Test 1 - Exposure: 12m to 14m BGL	
Head (m)	Field Soakage Rate (l/m2/min)
2	5
3	10
5	15
7	20
9	25
11	30
12.5	39 (Extrap)
13	42
15	54
15.5	57 (Extrap)

Test 2 - Exposure: 18m to 20m BGL	
Head (m)	Field Soakage Rate (l/m2/min)
3	10
5	20
8	30
11	40
14	50
17	60
18.5	65 (Extrap)
20	70 (Extrap)
21.5	75 (Extrap)
23	80 (Extrap)

Chamber Depth (m BGL)	Effective Soakaway Depth (m)	Effective Storage Volume (m3)	Reduction Factor (Refer to Fig.17)	Required Discharge Rate (l/s)
3	1	1.13	1.10	18.18
4	2	2.26	3.90	5.13
5	3	3.39	7.00	2.86
6	4	4.52	12.00	1.67

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Head (m)	Field Soakage Rate (Extrapolated) (l/m2/min)
20	70
23	80

Depth to base of liner (m BGL)	Perforated Length (m)	Soakage Area (m2)
15	3	4.24
18	6	8.48
21	9	12.73
24	12	16.97

Depth to base of liner (m BGL)	Increment of Discharge (m BGL)	Maximum driving Head (m)	Area of exposed Sandstone* (m2)	Unit Field Soakage rate (l/m2/min)	Unit Design Soakage rate (l/m2/min)	Increments of available discharge (l/min)
15	12 to 15	12.5	4.24	39	19.5	82.7
18	12 to 15	12.5	4.24	39	19.5	82.7
	15 to 18	15.5	4.24	57	28.5	120.9
21	12 to 15	12.5	4.24	39	19.5	82.7
	15 to 18	15.5	4.24	57	28.5	120.9
	18 to 21	18.5	4.24	65	32.5	137.9
24	12 to 15	12.5	4.24	39	19.5	82.7
	15 to 18	15.5	4.24	57	28.5	120.9
	18 to 21	18.5	4.24	65	32.5	137.9
	21 to 24	21.5	4.24	75	37.5	159.1

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Chamber Depth (m BGL)	Effective Storage Volume (m3)	Required Discharge Rate (l/s)	Depth to base of liner (m BGL)	Total available discharge (l/s)
3	1.13	18.18	15	1.38
			18	3.39
			21	5.69
			24	8.34
4	2.26	5.13	15	1.38
			18	3.39
			21	5.69
			24	8.34
5	**3.39**	**2.86**	15	1.38
			18	**3.39**
			21	5.69
			24	8.34
6	4.52	1.67	15	1.38
			18	3.39
			21	5.69
			24	8.34

From the above results:

1. The Chamber should be 5m deep
2. The Liner installed to a depth of 18m BGL

Appendix H

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6. THE LEVEL OF THE EXISTING FOUL AND STORM SEWERS ON SITE HAS BEEN EXTRAPOLATED FROM THE LEVELS OF ADJACENT MANHOLES THE EXACT LEVEL AT THE POINT OF CONNECTION SHALL BE CHECKED PRIOR TO THE COMMENCEMENT OF THE WORKS AND ANY VARIANCE REPORTED TO THE ENGINEER IMMEDIATELY
7. ALL DRAINAGE TO BE IN ACCORDANCE WITH BUILDING REGULATIONS PART H. SEWERS NOTED AS ADOPTABLE SHALL BE TO SEWERS FOR ADOPTION 7th EDITION,.
8. THE LOCATION OF EXISTING UNDERGROUND UTILITY SERVICES IS AS PROVIDED BY THE RELEVANT STATUTORY UNDERTAKERS THE CONTRACTOR IS TO ASCERTAIN THE EXACT LOCATION PRIOR TO COMMENCEMENT OF WORKS.
9. UNLESS NOTED OTHERWISE ALL DRAINAGE PIPES ARE TO BE 100mm Ø ALL GULLY LEADS ARE TO BE 150mm Ø. MINIMUM ADOPTABLE SEWER 150mmØ



KEY PLAN
(NOT TO SCALE)

LEGEND:

- SURFACE WATER DRAIN 100mm DIA. (U.N.O.)
- PROPOSED ADOPTABLE FOUL SEWER.
- PROPOSED PRIVATE FOUL WATER SEWER 100mm DIA. (U.N.O.)
- EXISTING FOUL WATER SEWER
- PROPOSED 1.2m PC FOUL WATER MANHOLE
- PROPOSED 0.6m FOUL WATER INSPECTION CHAMBER
- EXISTING ADOPTED FOUL WATER MANHOLE
- BOREHOLE SOAKAWAY
- XX.XXX — MINIMUM FINISHED FLOOR LEVEL
- SITE BOUNDARY.
- PERMEABLE PAVING

Rev	Description	Date	By	Chkd
B	UPDATED TO SUIT NEW LAYOUT	08.07.2020	CLP	COH
A	UPDATED TO SUIT NEW LAYOUT	27.05.2020	RW	COH

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Lancaster Court, 8 Barnes Wallis Road, Fareham, PO15 5TU
01489 668134
info@paulbashamassociates.com www.paulbashamassociates.com

Client: MiBri Limited

Project Name: ANGELS SANDPIT, WASHINGTON ROAD
STORRINGTON, WEST SUSSEX

Title: SITE LAYOUT: DRAINAGE STRATEGY
SHEET 1 OF 2

Project Phase: PRELIMINARY

Checked By	Checked Date	Drawn By	Drawn Date
RW	26.07.18	RL	26.07.18

Client Drawing No.: -
Scale: 1:250 (AT A1 SIZE)

PBA Drawing No.: 020.5383.003
Revision: B

1:250 0m 10m

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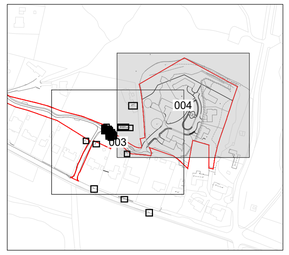
NORTH

NOTES.

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS, SERVICES AND SPECIALIST DRAWINGS AND SPECIFICATION.
2. THESE DRAWINGS IN TERMS OF DIMENSIONS OR DETAILS SHOULD BE DRAWN TO THE ATTENTION OF THE ARCHITECT AND/OR THE ENGINEER FOR CLARIFICATION.
3. PAUL BASHAM ASSOCIATES ACCEPTS NO RESPONSIBILITY FOR THE ACCURACY OF BACKGROUND INFORMATION PRODUCED BY THIRD PARTIES - THIS MUST BE TREATED AS INDICATIVE ONLY.
4. ALL DIMENSIONS AND LEVELS ARE IN METRES. DO NOT SCALE THIS DRAWING, PRINT, PLOT OR DISK.
5. THIS DRAWING SHOULD ONLY BE USED FOR CONSTRUCTION IF THE PROJECT PHASE IN THE TITLE FRAME BELOW IS SHOWN AS "CONSTRUCTION" PAUL BASHAM ASSOCIATES TAKE NO RESPONSIBILITY FOR CONSTRUCTION WORKS UNDERTAKEN TO DRAWINGS WHICH ARE NOT MARKED UNDER THIS PHASE.
6. THE LEVEL OF THE EXISTING FOUL AND STORM SEWERS ON SITE HAS BEEN EXTRAPOLATED FROM THE LEVELS OF ADJACENT MANHOLES THE EXACT LEVEL AT THE POINT OF CONNECTION SHALL BE CHECKED PRIOR TO THE COMMENCEMENT OF THE WORKS AND ANY VARIANCE REPORTED TO THE ENGINEER IMMEDIATELY
7. ALL DRAINAGE TO BE IN ACCORDANCE WITH BUILDING REGULATIONS PART H. SEWERS NOTED AS ADOPTABLE SHALL BE TO SEWERS FOR ADOPTION 7th EDITION,.
8. THE LOCATION OF EXISTING UNDERGROUND UTILITY SERVICES IS AS PROVIDED BY THE RELEVANT STATUTORY UNDERTAKERS THE CONTRACTOR IS TO ASCERTAIN THE EXACT LOCATION PRIOR TO COMMENCEMENT OF WORKS.
9. UNLESS NOTED OTHERWISE ALL DRAINAGE PIPES ARE TO BE 100mm Ø ALL GULLY LEADS ARE TO BE 150mm Ø. MINIMUM ADOPTABLE SEWER 150mmØ



KEY PLAN
(NOT TO SCALE)

LEGEND:

- SURFACE WATER DRAIN 100mm DIA. (U.N.O.)
- PROPOSED ADOPTABLE FOUL SEWER.
- PROPOSED PRIVATE FOUL WATER SEWER 100mm DIA. (U.N.O.)
- EXISTING FOUL WATER SEWER
- PROPOSED 1.2m PC FOUL WATER MANHOLE
- PROPOSED 0.6m FOUL WATER INSPECTION CHAMBER
- EXISTING ADOPTED FOUL WATER MANHOLE
- BOREHOLE SOAKAWAY
- XX.XXX MINIMUM FINISHED FLOOR LEVEL
- SITE BOUNDARY.
- PERMEABLE PAVING

Rev	Description	Date	By	Chkd
B	UPDATED TO SUIT NEW LAYOUT	08.07.2020	CLP	COH
A	UPDATED TO SUIT NEW LAYOUT	27.05.2020	RW	COH

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Client: MiBri Limited

Project Name: ANGELS SANDPIT, WASHINGTON ROAD
STORRINGTON, WEST SUSSEX

Title: SITE LAYOUT: DRAINAGE STRATEGY
SHEET 2 OF 2

Project Phase: PRELIMINARY

Checked By	Checked Date	Drawn By	Drawn Date
RW	26.07.18	RL	26.07.18

Client Drawing No.: -
Scale: 1:250 (AT A1 SIZE)

PBA Drawing No.: 020.5383.004
Revision: B

1:250
0m 10m

n.j.a town planning Ltd

Applications & Appeals Services
The Beehive, City Place, Gatwick, RH6 0PA
Tel: 01403 252231 email: njaltd@gmail.com

Horsham District Council
Parkside
Chart Way
Horsham
West Sussex
RH12 1RL
FAO Development Management

Ref: 22/132

19 April 2023

DISCHARGE OF CONDITION APPLICATION

Dear Sir/Madam

LPA Ref:	**DC/21/0057**
Applicant	**MiBri Ltd**
Proposal:	**Discharge of Conditions 11 (Drainage & Soils) & 14 (Materials & Finishes) of planning application DC/21/0057 for A phased development for the erection of 6no detached houses (of which up to 4no. are to be self-build) with associated landscaping, drainage and access improvements to Heather Way at Angell Sandpit, Storrington**
Site:	**Angell Sandpit, Washington Road, Storrington, West Sussex, RH20 4DE**

Please accept this Discharge of Condition Application to Discharge Conditions 11 & 14 (a copy of the decision is submitted with the application for ease of reference).

11) *No development shall commence until a drainage strategy detailing the proposed means of foul and surface water disposal has been submitted to and approved in writing by the Local Planning Authority. As part of the details, no drainage systems for the infiltration of surface water to the ground are permitted other than with the written consent of the local planning authority. Any proposals for such systems must be supported by an assessment of the risks to controlled waters. The development shall be carried out in accordance with the approved details.*

Reason: Given the previous use of the land as a landfill this condition is required to ensure that the development does not contribute to, is not put at unacceptable risk from, or adversely affected by, unacceptable levels of water pollution caused by mobilised contaminants, and to ensure that the development is properly drained and to comply with Policy 38 of the Horsham District Planning Framework (2015) and paragraph 170 of the National Planning Policy Framework.

14) *No development above ground floor slab level of any plot of the development hereby permitted shall take place until a schedule of materials and finishes and colours to be used for external walls, roofs and skylights of the approved building has been submitted to and approved by the Local Planning Authority in writing and all materials used in the construction of the development hereby permitted shall conform to those approved.*

Reason: As this matter is fundamental to enable the Local Planning Authority to control the development in detail in the interests of amenity by endeavouring to achieve a building of visual quality in accordance with Policy 33 of the Horsham District Planning Framework (2015).

In respect of Condition 11 document "COND 11 – FRA from Paul Babsham Associates provides the relevant details and is submitted in full discharge.

In respect of discharge of Condition 14 the attached document "COND 14 - Material Palette" is submitted in full discharge.

I trust this is sufficient for now to enable you to validate the applications but should you have any queries please do not hesitate to contact me.

Yours faithfully



Nikolas J. Antoniou
BSc HONS DIPTP MRTPI
Chartered Town Planner
For and on behalf of NJA Town Planning Limited