



ENVIRONMENTAL
CONSULTING

Omnia Environmental Consulting
10 Manor Court, Barnes Wallis Road,
Segensworth,
Fareham,
PO15 5TH
Tel: 01489 808088
Email: info@omnia-consulting.co.uk
Web: www.omnia-consulting.co.uk

14th November 2018

ref: A10965/181112/L1

Matt McGee
PMC Construction and Development Services Ltd
80A High Street
Cosham
Portsmouth
PO6 3FL

Dear Matt,

RE: Proposed Residential Development, Lovedean Lane, Waterlooville – Supplementary Geo Environmental Investigation

Please find attached OEC Report A10965/19092018/L1 detailing the results of the return ground investigation works at the above site.

If you have any questions, please do not hesitate to contact us.

Yours sincerely

For Omnia Environmental Consulting



Supplementary Report

Site Address	Proposed Residential Development, Lovedean Lane, Waterlooville
Grid Reference	468747, 112257

1.0 Objectives & Terms of Reference

The objective of the report is to provide a further assessment of the northern area of the site, around WS101 where previous investigation has identified elevated concentrations of heavy metals and PAHs within the near surface. The current investigation is proposed both as a delineation exercise and a further exploratory investigation across this portion of the site.

Alongside this, further ground gas monitoring was required in order to enhance the dataset and provide a total of six return gas monitoring visits.

The contents of this letter report have been produced within the Limitations and Constraints presented in Attachment 1.

A site location map is presented in Attachment 2 as Figure 1.0.

2.0 Background

The site has previously been subject to a Phase I and II report as detailed within the report prepared by Omnia Environmental Consulting (OEC) entitled 'Residential Development, Lovedean Lane, Waterlooville, Hampshire, PO8 9RN, dated July 2018 ref A10965/1.0.

As set out above, the previous investigation identified the presence of elevated concentrations in the area of WS101, these being of PAH and Cadmium at a depth of 0.15-0.25m bgl. Further ground gas monitoring was also recommended, as set out above.

3.0 Site Description

The site at Lovedean Lane, Waterlooville is situated approximately 2.7km north of Waterlooville Town Centre and was accessed from Lovedean Lane in the east.

The site was unchanged since the time of the previous investigation, being open aspect with a single building present within the centre of the site. Reference should be made to the Phase I-II report for a detailed walkover description.

4.0 Scope of works

As set out within OEC cost proposal ref A10965/180802/L2 the scope of works comprised the advancement of hand dug pits to a maximum depth of 0.6m bgl in the vicinity of location WS101, with subsequent laboratory testing alongside a further three ground gas monitoring visits.

5.0 Site Work

The return site investigation works were undertaken on 31st August, with return gas monitoring undertaken on three further occasions between 23rd August and 05th September 2018.

The site investigation comprised the advancement of 5no hand dug pits in the vicinity of location WS101 as set out on Figure 2.0.

5.1 Ground Conditions Encountered

The return ground investigation encountered the following strata:

5.1.1 Made Ground

Made Ground was encountered to a maximum depth of 0.55m bgl, and comprised a Type 1 sub-base over brown, grey and reddish sand and gravel. The sand was logged as fine to coarse and the gravels were angular to sub rounded fine to coarse flint and brick with occasional rootlets, glass, wood fragments and clay pockets.

The base of Made Ground was not encountered within HP203 and HP204, however with reference to information from the previous report the average depth to the base of Made Ground in the area of WS101 was 0.80m bgl.

5.1.2 Superficial Deposits – Head Deposits

Superficial deposits attributed to Head Deposits were encountered within three (3no.) intrusive locations (HP201, HP202 and HP205). Made Ground was found to be immediately underlain by a soft to firm, brownish orange CLAY with variable sand and gravel content. Superficial deposits were encountered at a minimum depth of 0.16m bgl with a maximum proven thickness of 0.60m bgl.

6.0 Laboratory Analysis

Selected soil samples were submitted to Jones Environmental Laboratory for a general soil suite comprising asbestos, metals, TPH, PAH, pH and soluble sulphate (2:1 extract).

The analytical results have been directly compared to the Tier I human health screening criteria for a residential end use with homegrown produce. This comparison is detailed within Table 1 below.

Table 1.0 Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Residential End use with Home Grown Produce

Determinant	Units	GAC	n	MC	Loc. of Ex	Pathway	Assessment
Inorganics							
Arsenic	mg/kg	37	5	21.2	N/A	1	No Further Assessment
Beryllium	mg/kg	1.7	5	1.5	N/A	1	No Further Assessment
Boron	mg/kg	290	5	1.0	N/A	1	No Further Assessment
Cadmium	mg/kg	11	5	1.3	N/A	1	No Further Assessment
Chromium (III)	mg/kg	910	5	33.5	N/A	1	No Further Assessment
Chromium (VI)	mg/kg	6	5	<0.3	N/A	1	No Further Assessment
Copper	mg/kg	2400	5	32	N/A	1	No Further Assessment
Lead	mg/kg	200	5	279	HP202 0.2-0.3	2	Further Assessment Required
Mercury	mg/kg	40	5	<0.1	N/A	1	No Further Assessment
Nickel	mg/kg	180	5	24.9	N/A	1	No Further Assessment
Selenium	mg/kg	250	5	1	N/A	1	No Further Assessment
Vanadium	mg/kg	410	5	62	N/A	1	No Further Assessment
General Inorganics							
Asbestos	-	N.D ^{III}	5	<0.001	HP202 0.2-0.3	4	Further Assessment Required
Cyanide	mg/kg	50	5	<0.5	N/A	1	No Further Assessment
General Organics							
Phenol	mg/kg	280	5	<0.15	N/A	1	No Further Assessment

PAH							
Naphthalene	mg/kg	2.3	5	0.48	N/A	2	No Further Assessment
Acenaphthylene	mg/kg	170	5	0.93	N/A	3	No Further Assessment
Acenaphthene	mg/kg	210	5	0.28	N/A	1	No Further Assessment
Fluorene	mg/kg	170	5	0.38	N/A	1	No Further Assessment
Phenanthrene	mg/kg	95	5	3.91	N/A	3	No Further Assessment
Anthracene	mg/kg	2400	5	1.30	N/A	3	No Further Assessment
Fluoranthene	mg/kg	280	5	5.15	N/A	3	No Further Assessment
Pyrene	mg/kg	620	5	4.27	N/A	3	No Further Assessment
Benzo(a)Anthracene	mg/kg	7.2	5	3.54	N/A	3	No Further Assessment
Chrysene	mg/kg	15	5	2.16	N/A	3	No Further Assessment
Benzo(b)Fluoranthene ⁽ⁱ⁾	mg/kg	2.6	5	3.54	HP202 0.20-0.30	3	Further Assessment Required
Benzo(k)Fluoranthene ⁽ⁱ⁾	mg/kg	77	5	1.38	N/A	3	No Further Assessment
Benzo(a)Pyrene	mg/kg	2.2	5	2.90	HP202 0.20-0.30	3	Further Assessment Required
Indeno(123-cd)Pyrene	mg/kg	27	5	1.59	N/A	3	No Further Assessment
Dibenzo(a,h)Anthracene	mg/kg	0.24	5	0.47	HP202 0.30-0.30	3	Further Assessment Required
Benzo(ghi)Perylene	mg/kg	320	5	1.72	N/A	3	No Further Assessment
Banded TPH							
TPH C ₄ -C ₆ (aliphatic)*	mg/kg	42	N/A	<0.01	N/A	2	No Further Assessment
TPH C ₆ -C ₈ (aliphatic)*	mg/kg	100	N/A	<0.01	N/A	2	No Further Assessment
TPH C ₈ -C ₁₀ (aliphatic)*	mg/kg	27	5	<5	N/A	2	No Further Assessment
TPH C ₁₀ -C ₁₂ (aromatic)*	mg/kg	74	5	<10	N/A	2	No Further Assessment
TPH C ₁₂ -C ₁₆ (aromatic)*	mg/kg	140	5	<10	N/A	1,4	No Further Assessment
TPH C ₁₆ -C ₂₁ (aromatic)*	mg/kg	260	5	30	N/A	1,4	No Further Assessment
TPH C ₂₁ -C ₄₀ (aromatic)*	mg/kg	1100	5	219	N/A	1,4	No Further Assessment

Notes

Main Exposure Pathways: 1 = Soil Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation.

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

* Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(i) Benzo (b) Fluoranthene (2.6mg/kg) Benzo (k) Fluoranthene (77mg/kg)

The origin of the Tier I Screening Criteria is presented in Attachment 2, with laboratory reports presented in Attachment 3.

All soils pass the Tier 1 screen with the exception of asbestos, lead and three speciated PAHs.

These determinands are further considered below:

6.1 Asbestos

Screening values for the potential risk to human health from asbestos content are not currently set out in UK guidance. As such it has been necessary to utilise the former ICRL guidance figure of <0.001% when assessing risk. While this value has not been produced to act as a screening value it has been noted that above 0.001% fibre release can occur and as such OEC have adopted this as a means of risk assessment.

Table 2 – Asbestos Quantification Results

Sample	Asbestos Detected	ACM	Quantification %	Exceeds ICRL value (<0.001%)
HP202	Y	Chrysotile	<0.001	Pass

Referring to Table 2 all five (5no.) of samples pass the criteria for the adopted screening criteria set out by ICRL of <0.001% and therefore no further action is deemed necessary as there is no risk to human health.

Review of the previous report indicated that no elevated asbestos content was identified from the 5no. soils previously screened for asbestos content, which further supports the assessment that the identified results does not present a significant risk and is not representative of widespread asbestos in the near surface.

6.2 Lead and PAH

Elevated lead and PAH concentrations of Benzo(b)Fluoranthene, Benzo(a)Pyrene and Dibenzo(a,h)Anthracene were found within the near surface in location, HP202 at 0.20-0.30m bgl. The pollution pathways associated with these determinants are via soil ingestion and dermal contact.

Review of the historic maps and the existing site set up, it is apparent that the area of HP202, and the area where elevated concentrations were identified previously, WS101 were located in an area adjacent to an outbuilding, with structures present on this area since c.1958. Given this it considered that the elevated concentrations are likely associated with this past use, and thereby restricted in extent. Given that the concentrations are restricted the risk associated with the pollution linkage is only present in the immediate area of HP202 and WS101.

Review of the proposed site layout (Figure 2) indicates that this area is proposed as an area of hard paving. Given this the identified concentrations are not considered to pose a risk to future site users as the pollution pathway will be inactive. However, should the proposed layout change it is recommended that this risk assessment is reviewed with Remedial works required should this area be proposed as areas of soft landscaping.

7.0 Ground Gas Risk Assessment

Following the intrusive phase of site works, three further ground gas and groundwater monitoring visits were undertaken between the 23rd August and 05th September 2018

Concentrations of methane (CH₄), carbon dioxide (CO₂) and oxygen (O₂) were measured using an infra-red gas analyser (GA5000), and gas flow rates were measured using an internal flow pod. Gas measurements were recorded until gas concentrations stabilised for three consecutive readings for a minimum duration of ninety seconds at each location, at which point the maximum concentration of CH₄ and CO₂, together with the lowest concentration of O₂ were recorded.

Groundwater monitoring was undertaken using an electronic dip tape to record the depth to groundwater and presented over page:

Well	Date	Methane Peak	Methane Steady	Methane GSV	Carbon Dioxide Peak	Carbon Dioxide Steady	Carbon Dioxide GSV	Oxygen %v/v	Atmos.	Atmos Dynamic	Flow	Depth to Base	Depth to Water
		%v/v	%v/v	l/hr	%v/v	%v/v	l/hr						
WS102	12/06/2018	<0.1	<0.1	0.0001	1.6	1.6	0.0016	19.5	1013	Rising	0.1	3.00	N/A
	18/06/2018	<0.1	<0.1	0.0001	3.3	2.6	0.0033	17.3	1014	Rising	0.1	2.99	N/A
	25/06/2018	<0.1	<0.1	0.0001	3.8	3.1	0.0038	16.2	1022	Rising	0.1	2.92	N/A
	23/08/2018	<0.1	<0.1	0.0001	5.6	4.7	0.0056	15.9	1007	Rising	0.1	2.91	N/A
	31/08/2018	<0.1	<0.1	0.0003	4.5	4.5	0.0135	16.8	1017	Rising	0.3	2.91	N/A
	05/09/2018	<0.1	<0.1	0.0001	3.3	3.3	0.0033	18.5	1014	Rising	0.1	2.93	N/A
WS103	12/06/2018	<0.1	<0.1	0.0001	1.0	1.0	0.0010	20.2	1014	Rising	0.1	3.07	N/A
	18/06/2018	<0.1	<0.1	0.0001	5.0	5.0	0.0050	12.4	1014	Rising	0.1	3.08	N/A
	25/06/2018	<0.1	<0.1	0.0001	3.6	3.6	0.0036	18.3	1022	Rising	0.1	3.09	N/A
	23/08/2018	<0.1	<0.1	0.0002	7.6	7.6	0.0152	10.5	1007	Rising	0.2	3.04	N/A
	31/08/2018	<0.1	<0.1	0.0003	3.3	3.3	0.0099	18.1	1016	Rising	0.3	3.07	N/A
	05/09/2018	<0.1	<0.1	0.0001	3.5	3.5	0.0035	17.9	1013	Rising	0.1	3.09	N/A
WS105	12/06/2018	<0.1	<0.1	0.0001	2.7	2.7	0.0027	18.8	1014	Rising	0.1	3.08	N/A
	18/06/2018	<0.1	<0.1	0.0001	3.1	3.1	0.0031	17.8	1014	Rising	0.1	3.07	N/A
	25/06/2018	<0.1	<0.1	0.0001	3.0	3.0	0.0030	17.4	1022	Rising	0.1	3.08	N/A
	23/08/2018	<0.1	<0.1	0.0004	5.4	5.3	0.0216	14.80	1008	Rising	0.4	3.08	N/A
	31/08/2018	<0.1	<0.1	0.0003	3.6	3.6	0.0108	16.60	1018	Rising	0.3	3.06	N/A
	05/09/2018	<0.1	<0.1	0.0001	3.3	3.3	0.0033	16.90	1015	Rising	0.1	3.09	2.96

7.2 Ground Gas Assessment

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report C665 (*Assessing risks posed by hazardous ground gases to buildings*, 2007). However, it is recommended that the full ground gas assessment and any recommended protection measures are agreed with the local authority prior to the adoption of any protection measures on-site. Furthermore, the installation of any gas protection measures should be validated by a suitably qualified engineer.

The results of the ground gas monitoring and calculated Gas Screening Values (GSVs) are presented above.

In total, six (6no.) groundwater and ground gas monitoring visits have been undertaken at locations WS102, WS103 and WS105 between 12th June 2018 and 5th September 2018 with no concentrations of methane (CH₄) greater than the equipment Limit of Detection (LOD) of 0.1% v/v recorded. Carbon Dioxide (CO₂) concentrations were recorded with a maximum of 7.6% v/v at location WS103 on 23rd June 2018.

In accordance with the methodology outlined within the CIRIA publication C665, OEC have utilised the results of the ground gas monitoring visits to calculate tentative Gas Screening Values (GSVs). The maximum GSV calculated for methane was 0.0004l/hr whilst the maximum GSV for carbon dioxide of 0.0216l/hr.

It is understood that the proposed development will comprise the construction of three (3no.) to four (4no.) residential houses with associated private gardens and car parking. The proposed development has therefore been classified as Situation B as set out in CIRIA C665 and the gas assessment has been undertaken in accordance with the NHBC Traffic Light System.

Guidance set out in CIRIA C665, stipulates a maximum GSV for methane of 0.16l/hr and carbon dioxide of <0.78l/hr, with typical maximum permissible concentrations of 1% v/v (CH₄) and/or 5% v/v (CO₂) for classification as Green under the NHBC Traffic Light System.

The maximum recorded GSV for methane was 0.0004l/hr which is below the maximum permissible GSV of 0.16l/hr for a Green classification, with all return monitoring visits all below 1% v/v. The maximum recorded GSV for carbon dioxide was 0.0216l/hr which is below the maximum permissible GSV of 0.78l/hr for a Green classification.

On the 18th June 2018 CO₂ concentrations were recorded at 7.6%v/v in WS103 exceeding the maximum permissible concentration of CO₂ for a Green Classification. Consideration is given to increasing the classification above the Green criteria, however when reviewing the six (6no.) visits, with all remaining values being below at a maximum of 5.0%v/v, and the absence of significant flow (max 0.4l/hr) it is considered that the Green classification is suitable for the scheme.

Conclusions

Based on the proposed layout as set out in Figure 2 the site is not considered to have the potential to present a significant risk to Human Health, however should the layout vary, and any areas of soft landscaping be proposed across the north of the site this risk assessment should be reviewed.

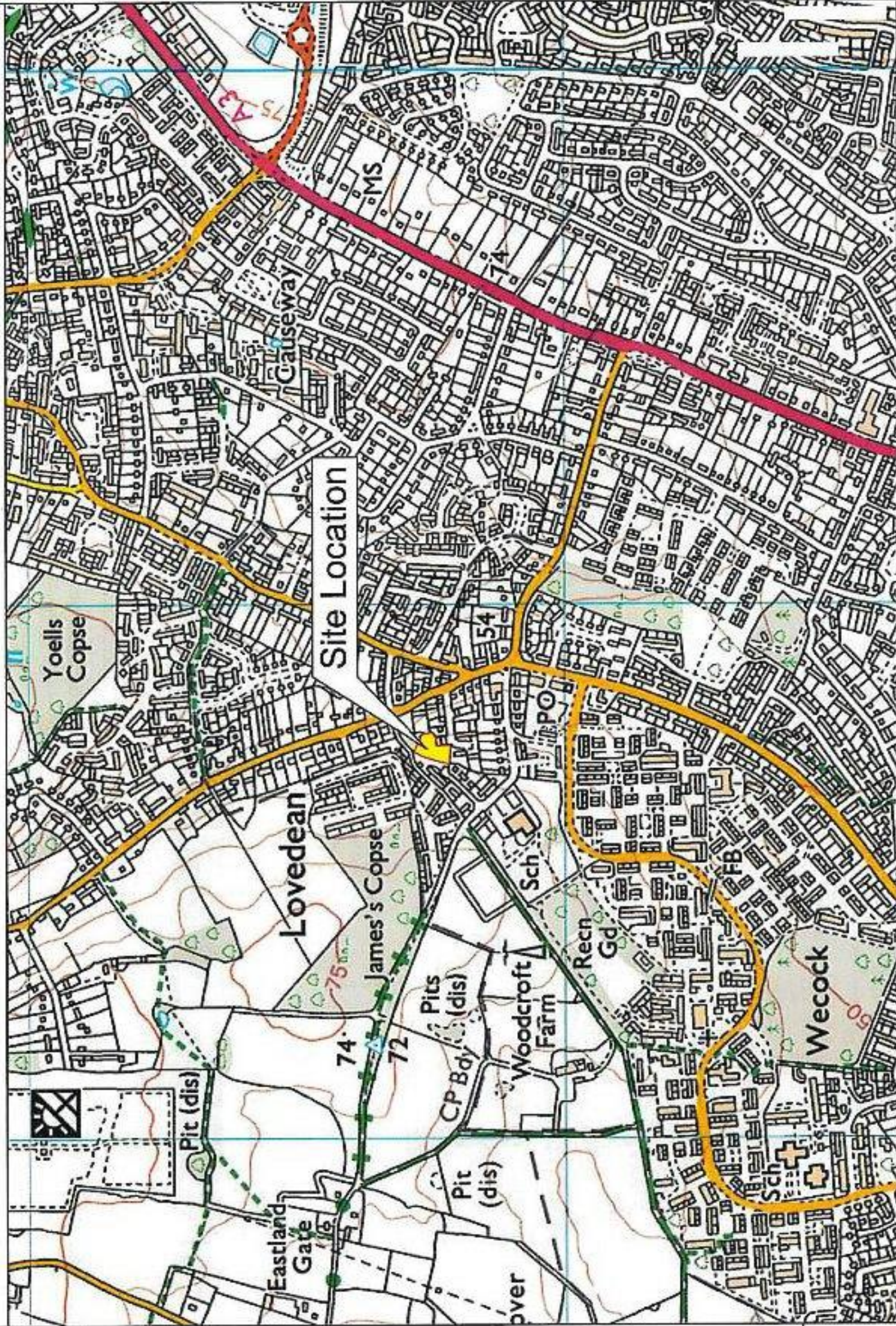
Gas monitoring has classified the site as Green in accordance with the NHBC Traffic Light System. Developments classified as Green do not require gas protection measures. It is recommended that the findings of this report are submitted to the Local Authority for signoff ahead of construction.

Attachment 1

Figures



Key



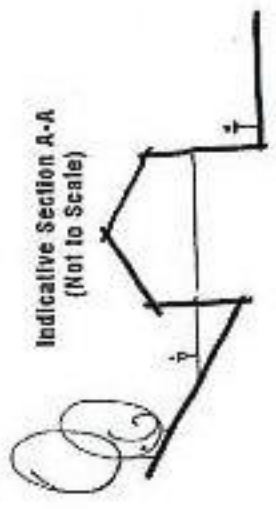
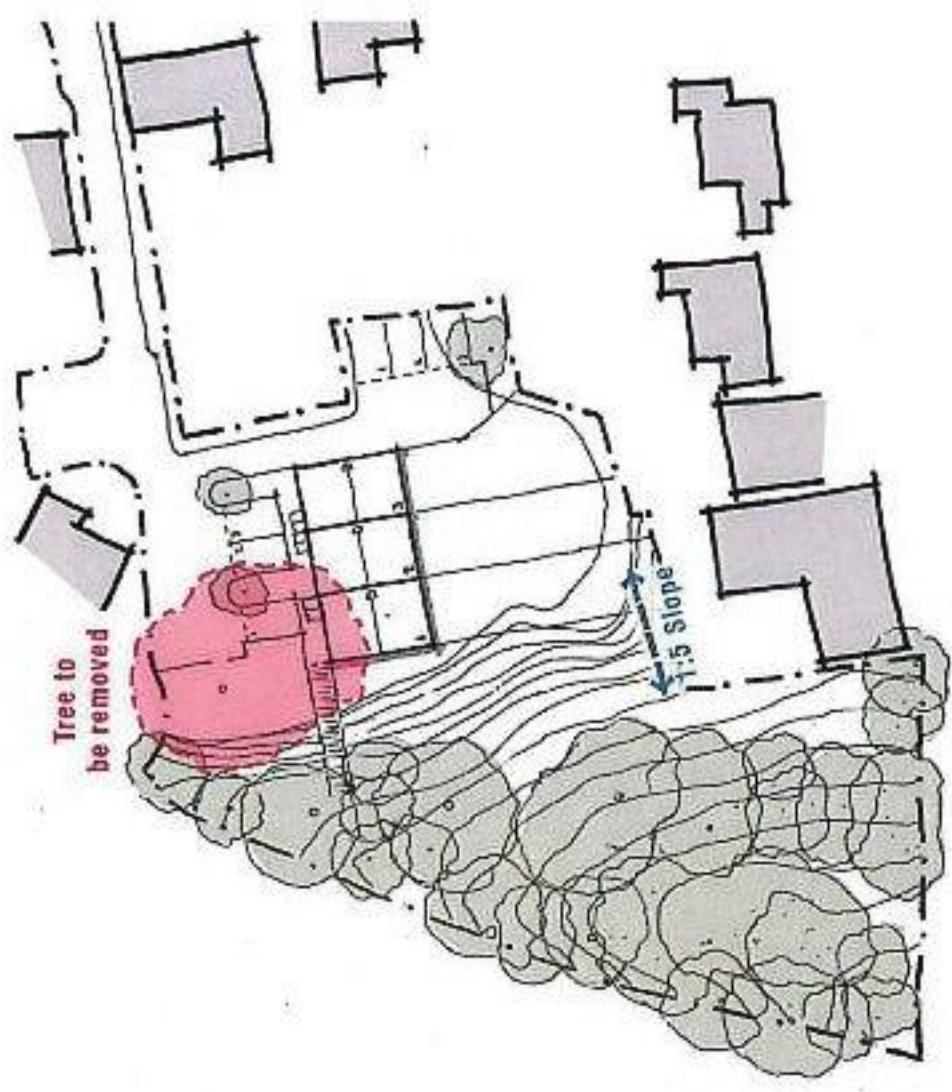
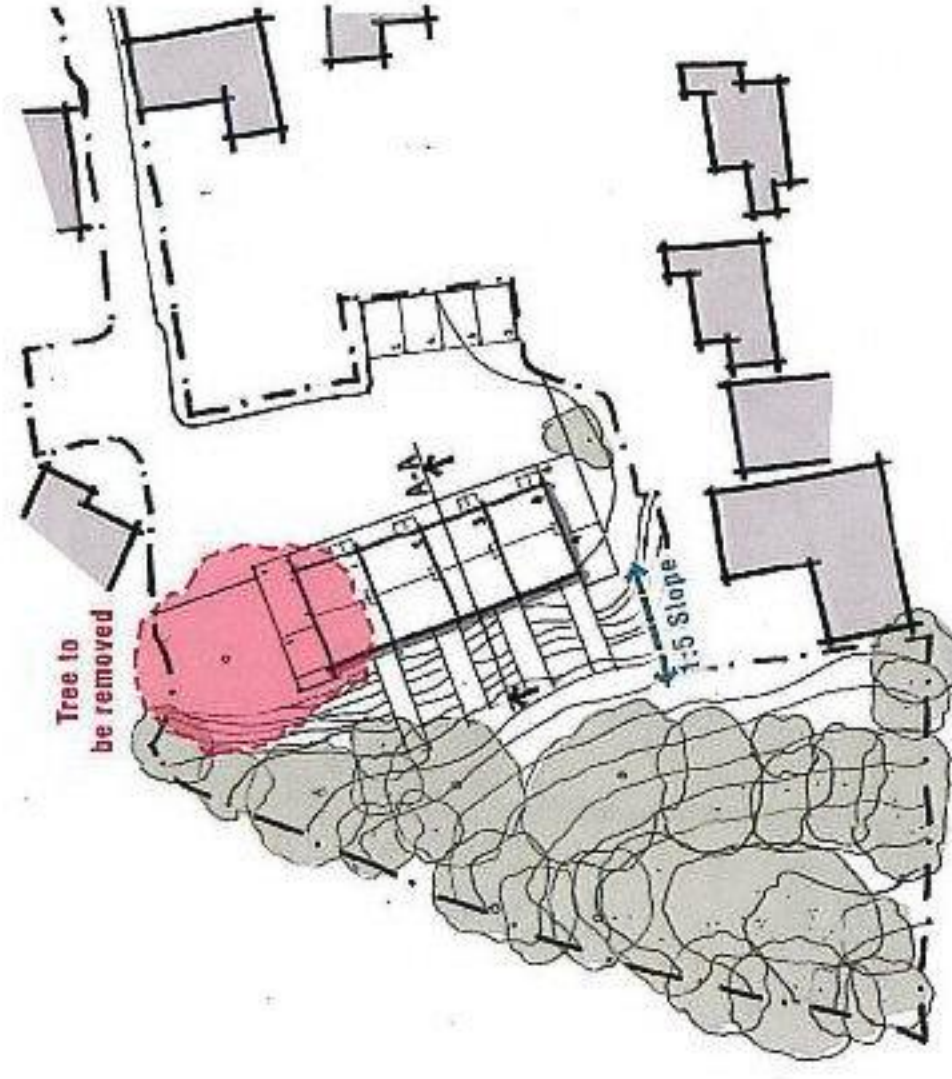
Job Title:		Client:		Drawing Title:	
Lovedean Lane, Waterloo		PMC		1.0 - Site Location	
Project No:		Date:		19/07/18	
A10965		Authorised By:		T.Mitchell	
Drawn By:		Scale:		1:25 000	
G.Larcombe					

This document is the property of Omnia Environmental Consulting (OEC) and is not to be reproduced or used in any way without the written permission of OEC. In the event that such written permission is not obtained, the user agrees to indemnify OEC for any damages and/or losses occurring as a result of the use of this document.

OMNIA
ENVIRONMENTAL CONSULTING

Omnia Environmental Consulting
10 Manor Court, Barnes Wallis Road,
Barnes, London W8 5AP
T: 020 8996 8888
E: info@omnia-consulting.co.uk
W: www.omnia-consulting.co.uk

Key



Proposal A - 4 Units

Proposal B - 3 Units



NOTE: LAYOUT INDICATIVE AND SUBJECT TO SURVEY



LOVEDEAN LANE, WATERLOOVILLE

Proposed Site Layouts - 1/500 @ A3 - May 2018

Job Title:		Client:		Drawing Title:	
Lovedean Lane, Waterloooville		PMC		2.0 - Proposed layout	
Project No:		Date:		19/07/18	
A10965		Authorized By:		T.Mitchell	
Drawn By:		Scale:		NTS	
G.Larcombe					

The Environmental Impact Assessment, Design & Construction of the proposed development is the responsibility of the Client. The Client is responsible for ensuring that the proposed development complies with all relevant planning and regulatory requirements. The Client is also responsible for ensuring that the proposed development is constructed in accordance with the approved plans and specifications. The Client is also responsible for ensuring that the proposed development is maintained in accordance with the approved plans and specifications.

Omnia Environmental Consulting
20 Manor Court, Berrins Works Road,
Berrins Works,
PO Box 574
T: 03 483 88888
E: info@omnia-consulting.co.uk
W: www.omnia-consulting.co.uk



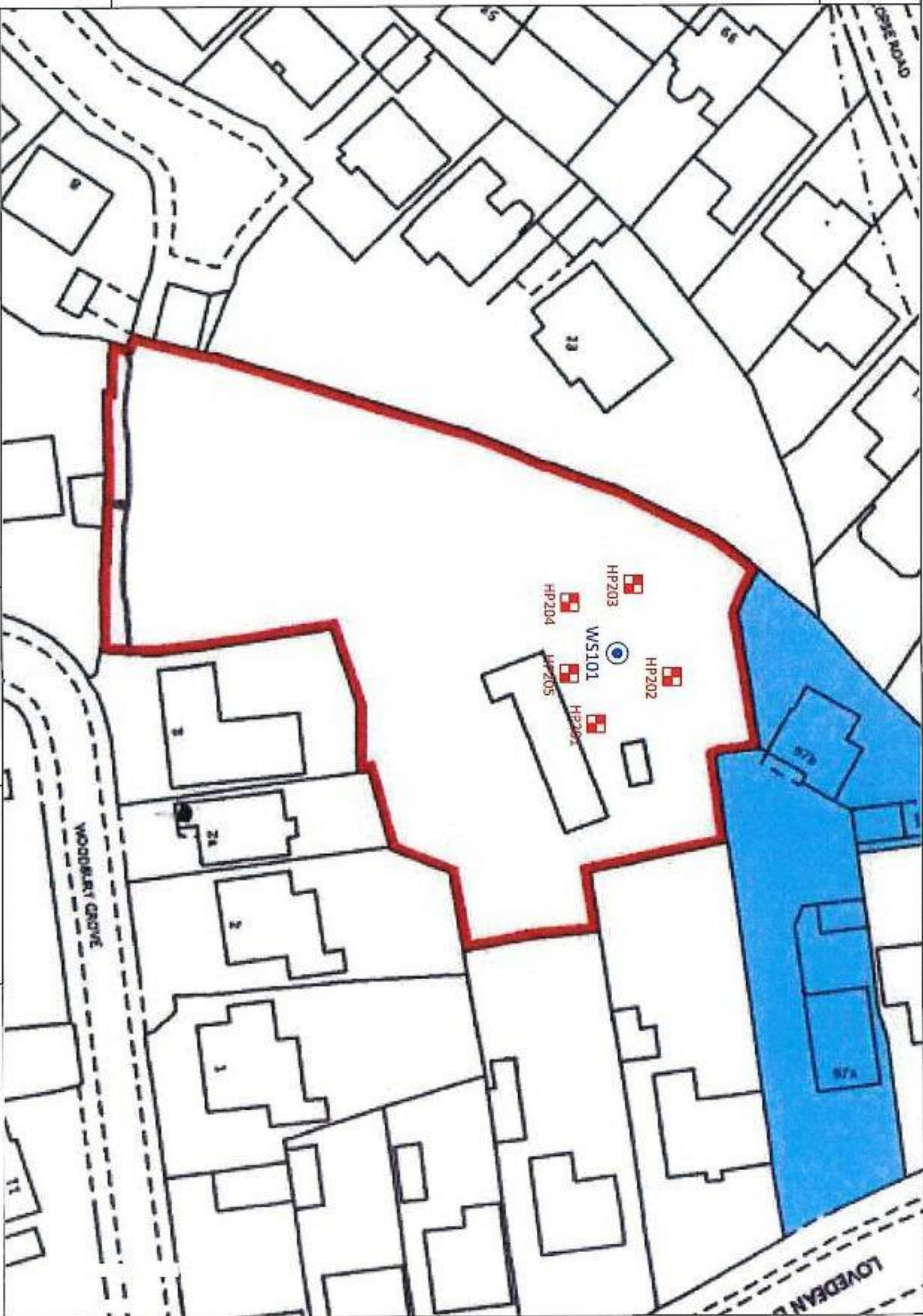
Key



- Approximate Location of Window Sample 101
- Approximate Hand Dug Pit Location

This plan is for information only and does not constitute a guarantee of accuracy. It is the responsibility of the client to verify the information provided. The client acknowledges that the information provided is for informational purposes only and is not to be used for any other purpose. The client agrees to indemnify and hold the consultant harmless from all claims, damages, and expenses, including reasonable attorneys' fees, arising out of or from the use of this plan.

Omnia Environmental Consulting
100 River Court, Fort Worth, TX 76104
Phone: 817.343.8888
Fax: 817.343.8888
Email: info@omnia-environmental.com
Website: www.omnia-environmental.com



Job Title:	Client:	Project No.	Date:	Drawing Title:
Lovedean Lane, Waterlooville	PMC	A10965	20/09/2018	3.0 - Intrusive Hole Location Plan
		Drawn By:	As Checked By:	
		B. Edmonds	T. Mitchell	
		Scale:	Notes:	
		NTS		

Attachment 2

Origin of Tier I Screening Criteria



ENVIRONMENTAL
CONSULTING

DOC REF

DOCUMENT NAME

TECH111

Residential End Use with Homegrown Produce

Determinant	Unit	GAC	Origin of Risk Assessment Value
Inorganics			
Metals			
Arsenic	mg/kg	37	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Arsenic
Beryllium	mg/kg	1.7	LQM CIEH Suitable for Use Levels (S4UL) 2015
Boron	mg/kg	290	
Cadmium	mg/kg	11	
Chromium (III)	mg/kg	910	
Chromium (VI)	mg/kg	6	
Copper	mg/kg	2,400	
Lead	mg/kg	200	Category 4 Screening Level (C4SL) utilising exposure parameters from CLEA SR3 report.
Mercury	mg/kg	40	LQM CIEH Suitable for Use Levels (S4UL) 2015- Inorganic Mercury
Nickel	mg/kg	180	LQM CIEH Suitable for Use Levels (S4UL) 2015
Selenium	mg/kg	250	
Vanadium	mg/kg	410	
Zinc	mg/kg	3,700	
General Inorganics			
Total Cyanide	mg/kg	50	Dutch Intervention Values 2010
Organics			
General Organics			
Phenol	mg/kg	280	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
PAH			
Naphthalene	mg/kg	2.3	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Acenaphthylene	mg/kg	170	
Acenaphthene	mg/kg	210	
Fluorene	mg/kg	170	
Phenanthrene	mg/kg	95	
Anthracene	mg/kg	2,400	
Fluoranthene	mg/kg	280	
Pyrene	mg/kg	620	
Benzo[a]Anthracene ¹	mg/kg	7.2	
Chrysene	mg/kg	15	
Benzo[b]Fluoranthene	mg/kg	2.6	
Benzo[k]Fluoranthene	mg/kg	77	
Benzo[a]Pyrene	mg/kg	2.2	
Indeno(123-cd)Pyrene	mg/kg	27	
Dibenzo[a,h]Anthracene	mg/kg	0.24	

DOCUMENT VERSION	DOCUMENT DATE	OWNER
3	October 2017	A.King

This document is uncontrolled if printed, check with master held on the server for latest version.



ENVIRONMENTAL
CONSULTING

DOC REF

DOCUMENT NAME

TECH111

Residential End Use with Homegrown Produce

Determinant	Unit	GAC	Origin of Risk Assessment Value
Benzo(ghi)Perylene	mg/kg	320	
BTEX			
Benzene	mg/kg	0.087	LQM CIEH Suitable for Use Levels (S4UL) 2015 1% SOM
Toluene	mg/kg	130	
Ethylbenzene	mg/kg	47	
Xylenes	mg/kg	56	LQM CIEH Suitable for Use Levels (S4UL) 2015 1% SOM o-Xylene
TPH CWG (Speciated)			
Aliphatic			LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aliphatic EC 5-6	mg/kg	42	
Aliphatic EC >6-8	mg/kg	100	
Aliphatic EC >8-10	mg/kg	27	
Aliphatic EC >10-12	mg/kg	130	
Aliphatic EC > 12-16	mg/kg	1,100	
Aliphatic EC > 16-35	mg/kg	65,000	
Aliphatic EC >35-44	mg/kg	65,000	
Aromatic			LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM
Aromatic EC 5-7	mg/kg	70	
Aromatic EC>7-8	mg/kg	130	
Aromatic EC> 8-10	mg/kg	34	
Aromatic EC> 10-12	mg/kg	74	
Aromatic EC> 12-16	mg/kg	140	
Aromatic EC> 16-21	mg/kg	260	
Aromatic EC> 21-35	mg/kg	1,100	
Aromatic EC> 35-44	mg/kg	1,100	
Banded TPH			
TPH EC 5-6*	mg/kg	42	LQM CIEH Suitable for Use Levels (S4UL) 2015 based on a sandy loam as defined in SR3 (EA 2009) 1% SOM, utilising the most conservative of the Al/Aro chain lengths.
TPH EC >6-8*	mg/kg	100	
TPH EC >8-10*	mg/kg	27	
TPH EC> 10-12*	mg/kg	74	
TPH EC> 12-16*	mg/kg	140	
TPH EC> 16-21*	mg/kg	260	
TPH EC> 21-35*	mg/kg	1,100	
TPH EC> 35-44*	mg/kg	1,100	

DOCUMENT VERSION	DOCUMENT DATE	OWNER
3	October 2017	A.King

This document is uncontrolled if printed, check with master held on the server for latest version.

	DOC REF	DOCUMENT NAME
	TECH111	Residential End Use with Homegrown Produce

Notes

Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex = Location of Exceedance.

* Total cyanide Tier 1 GAC is taken from the Dutch Intervention Value (2010) for complex cyanide.

** The Tier 1 GAC for the banded hydrocarbon fraction is derived from the CIEH/S4UL assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. OEC has utilised the lowest of the aliphatic and aromatic chain lengths in order to adopt a conservative approach, which is considered satisfactory for the protection of human health.

(i) Benzo (b) Fluoranthene (2.6mg/kg) Benzo (k) Fluoranthene (77mg/kg)

DOCUMENT VERSION	DOCUMENT DATE	OWNER
3	October 2017	A.King

This document is uncontrolled if printed, check with master held on the server for latest version.

Attachment 3
Chemical Testing Results



Exova Jones Environmental

Registered Office: Exova Jones Environmental UK Limited, 20 Havelock Square, London, WC1N 2AF, UK. Tel: +44 (0) 1244 833780. Fax: +44 (0) 1244 833781

Omnia
10 Manor Court
2 Barnes Wallis Road
Segensworth
Fareham
PO15 5TH

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781



Attention :	Ben Edmonds
Date :	14th September, 2018
Your reference :	A10965
Our reference :	Test Report 18/14017 Batch 1
Location :	Lovedean Lane
Date samples received :	4th September, 2018
Status :	Final report
Issue :	1

Ten samples were received for analysis on 4th September, 2018 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:



Project Co-ordinator

Client Name: Omnia
 Reference: A10985
 Location: Lovedean Lane
 Contact: Ben Edmonds
 JE Job No.: 18/14017

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-2	5-6	13-14	17-18	19-20						Please see attached notes for all abbreviations and acronyms		
Sample ID	HP201	HP202	HP204	HP205	HP209								
Depth	0.15-0.25	0.20-0.30	0.20-0.30	0.20-0.30	0.10-0.20								
COC No / misc													
Containers	V J	V J	V J	V J	V J								
Sample Date	31/08/2018	31/08/2018	31/08/2018	31/08/2018	31/08/2018								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1								
Date of Receipt	04/09/2018	04/09/2018	04/09/2018	04/09/2018	04/09/2018								
											LOQ/LOR	Units	Method No.
Arsenic*	5.5	-	9.9	7.5	5.5						<0.5	mg/kg	TM30/PM15
Barium*	166	-	271	65	212						<1	mg/kg	TM30/PM15
Beryllium	0.7	-	1.5	1.1	<0.5						<0.5	mg/kg	TM30/PM15
Cadmium*	0.6	-	0.1	0.2	0.4						<0.1	mg/kg	TM30/PM15
Chromium*	16.5	-	31.1	33.5	9.4						<0.5	mg/kg	TM30/PM15
Copper*	21	-	32	12	11						<1	mg/kg	TM30/PM15
Lead*	12	-	47	70	37						<5	mg/kg	TM30/PM15
Mercury*	<0.1	-	<0.1	<0.1	<0.1						<0.1	mg/kg	TM30/PM15
Nickel*	15.1	-	24.9	16.3	10.3						<0.7	mg/kg	TM30/PM15
Selenium*	<1	-	1	1	<1						<1	mg/kg	TM30/PM15
Vanadium	30	-	62	47	17						<1	mg/kg	TM30/PM15
Water Soluble Boron*	0.4	-	0.4	1.0	0.5						<0.1	mg/kg	TM74/PM32
Zinc*	331	-	152	252	103						<5	mg/kg	TM30/PM15
Arsenic	-	21.2	-	-	-						<0.5	mg/kg	TM30/PM62
Barium	-	1298	-	-	-						<1	mg/kg	TM30/PM62
Beryllium	-	1.0	-	-	-						<0.5	mg/kg	TM30/PM62
Cadmium	-	1.3	-	-	-						<0.1	mg/kg	TM30/PM62
Chromium	-	16.4	-	-	-						<0.5	mg/kg	TM30/PM62
Copper	-	28	-	-	-						<1	mg/kg	TM30/PM62
Lead	-	279	-	-	-						<5	mg/kg	TM30/PM62
Mercury	-	<0.1	-	-	-						<0.1	mg/kg	TM30/PM62
Nickel	-	18.8	-	-	-						<0.7	mg/kg	TM30/PM62
Selenium	-	<1	-	-	-						<1	mg/kg	TM30/PM62
Vanadium	-	37	-	-	-						<1	mg/kg	TM30/PM62
Water Soluble Boron	-	1.0	-	-	-						<0.1	mg/kg	TM74/PM61
Zinc	-	505	-	-	-						<5	mg/kg	TM30/PM62

Exova Jones Environmental

Client Name: Omnia
Reference: A10965
Location: Lovedean Lane
Contact: Ben Edmonds
JE Job No.: 18/14017

Report: Solid

Solids: V=80g VOC jar, J=250g glass jar, T=plastic tub

JE Sample No.	1-2	5-6	13-14	17-18	19-20						Please see attached notes for all abbreviations and acronyms		
Sample ID	HP201	HP202	HP204	HP205	HP211								
Depth	0.15-0.25	0.20-0.30	0.20-0.30	0.20-0.30	0.10-0.20								
COC No / misc													
Containers	VJ	VJ	VJ	VJ	VJ								
Sample Date	31/08/2019	31/08/2019	31/09/2016	31/09/2018	31/09/2016								
Sample Type	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1						LOQ/LOR	Units	Method No.
Date of Receipt	04/05/2018	04/05/2019	04/09/2016	04/09/2018	04/09/2016								
PAH MS													
Naphthalene*	0.10	0.48	0.05	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.04	0.16	0.93	<0.03	<0.03						<0.03	mg/kg	TM4/PM8
Acenaphthene*	<0.05	0.28	<0.05	<0.05	<0.05						<0.05	mg/kg	TM4/PM8
Fluorene*	<0.04	0.36	0.05	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Phenanthrene*	0.45	3.91	0.23	<0.03	<0.03						<0.03	mg/kg	TM4/PM8
Anthracene*	0.14	1.30	0.75	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Fluoranthene*	1.09	5.15	0.72	0.06	0.03						<0.05	mg/kg	TM4/PM8
Pyrene*	1.02	4.27	0.78	0.06	0.03						<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene*	0.79	3.54	0.42	<0.06	<0.05						<0.05	mg/kg	TM4/PM8
Chrysene*	0.89	2.16	0.37	0.04	<0.02						<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene*	2.50	4.92	0.99	<0.07	<0.07						<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene*	1.59	2.90	0.62	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene*	1.52	1.50	0.38	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene*	0.26	0.47	0.10	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene*	1.57	1.72	0.38	<0.04	<0.04						<0.04	mg/kg	TM4/PM8
PAH 18 Total	12.2	55.2	5.8	<0.6	<0.5						<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	1.80	3.54	0.71	<0.05	<0.05						<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.70	1.39	0.28	<0.02	<0.02						<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	91	92	95	93	93						<0	%	TM4/PM8
EPH >C8-C10*													
EPH >C10-C12*	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8
EPH >C12-C16*	<10	<10	<10	<10	<10						<10	mg/kg	TM5/PM8
EPH >C16-C21*	28	30	28	<10	<10						<10	mg/kg	TM5/PM8
EPH >C21-C40	162	219	167	66	80						<10	mg/kg	TM5/PM8
EPH >C8-C40	190	249	195	66	80						<30	mg/kg	TM5/PM8
GRO (>C4-C8)													
GRO (>C8-C8)*	<100	<100	<100	<100	<100						<100	ug/kg	TM36/PM12
GRO (>C4-C9)	<100	<100	<100	<100	<100						<100	ug/kg	TM36/PM12
Total Phenols HPLC													
	<0.15	<0.15	<0.15	<0.15	<0.15						<0.15	mg/kg	TM26/PM21
Natural Moisture Content													
	8.9	11.4	12.6	29.8	4.2						<0.1	%	PM4/PM0
Hexavalent Chromium*													
	<0.3	<0.3	<0.3	<0.3	<0.3						<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2.1 Ex)*													
	0.0174	-	0.0152	<0.0015	0.0452						<0.0015	g/l	TM38/PM20
Sulphate as SO4 (2.1 Ex)													
	-	<0.0015	-	-	-						<0.0015	g/l	TM38/PM60
Chromium III													
	16.5	NOP	31.1	33.5	9.4						<0.5	mg/kg	NONE/NONE
Chromium III													
	-	16.4	-	-	-						<0.5	mg/kg	NONE/NONE
Total Cyanide*													
	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	mg/kg	TM59/PM45

Exova Jones Environmental

Client Name: Omnia
Reference: A10965
Location: Lovedean Lane
Contact: Ben Edmonds
JE Job No.: 18/14017

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Client Name: Omnia
 Reference: A10965
 Location: Lovedean Lane
 Contact: Ben Edmonds

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
16/14017	1	HP201	0.15-0.25	2	06/09/2018	General Description (Bulk Analysis)	soil/stones
					06/09/2018	Asbestos Fibres	NAD
					06/09/2018	Asbestos ACM	NAD
					06/09/2018	Asbestos Type	NAD
					06/09/2018	Asbestos Level Screen	NAD
16/14017	1	HP202	0.20-0.30	6	06/09/2018	General Description (Bulk Analysis)	soil/stones
					06/09/2018	Asbestos Fibres	Fibre Bundles
					06/09/2018	Asbestos ACM	NAD
					06/09/2018	Asbestos Type	Chrysotile
					06/09/2018	Asbestos Level Screen	less than 0.1%
					14/09/2018	Total ACM Gravimetric Quantification (% Asb)	<0.001 (mass %)
					14/09/2018	Total Detailed Gravimetric Quantification (% Asb)	<0.001 (mass %)
					14/09/2018	Total Gravimetric Quantification (ACM + Detailed) (% Asb)	<0.001 (mass %)
					14/09/2018	Asbestos PCOM Quantification (Fibres)	<0.001 (mass %)
					14/09/2018	Asbestos Gravimetric & PCOM Total	<0.001 (mass %)
16/14017	1	HP204	0.20-0.30	14	06/09/2018	General Description (Bulk Analysis)	soil/stones
					06/09/2018	Asbestos Fibres	NAD
					06/09/2018	Asbestos ACM	NAD
					06/09/2018	Asbestos Type	NAD
					06/09/2018	Asbestos Level Screen	NAD
16/14017	1	HP205	0.20-0.30	18	06/09/2018	General Description (Bulk Analysis)	soil/stones
					06/09/2018	Asbestos Fibres	NAD
					06/09/2018	Asbestos ACM	NAD
					06/09/2018	Asbestos Type	NAD
					06/09/2018	Asbestos Level Screen	NAD
16/14017	1	HP203	0.10-0.20	20	06/09/2018	General Description (Bulk Analysis)	soil/stones
					06/09/2018	Asbestos Fibres	NAD
					06/09/2018	Asbestos ACM	NAD
					06/09/2018	Asbestos Type	NAD
					06/09/2018	Asbestos Level Screen	NAD

Client Name: Omnia
Reference: A10965
Location: Lovedean Lane
Contact: Ben Edmonds

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	NDP Reason
18/14017	1	HP202	0.20-0.30	5-6	Asbestos detected in sample

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 18/14017

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory.

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Please include all sections of this report if it is reproduced

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 18/14017

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK sole only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon ranging within the range C6-C40 GC-FID.	PM9	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon ranging within the range C6-C40 GC-FID.	PM9	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1985, ISO10694:1985 Determination of Total Organic Carbon or Total Carbon by combustion in an Eira TOC analyser in the presence of oxygen. The CO2 generated is quantified using infrared detection. Organic Matter (SOM) calculated as per EA NCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phase HPLC High Performance Liquid Chromatography and Electro Chemical Detector.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (90:10) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11935 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11935 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11935 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes

Exova Jones Environmental

JE Job No: 18/14017

Method Code Appendix

[illegible]