

10th April 2017

ref: A10635/200317/L1

John Black
PMC Construction
106 Queens Road
Portsmouth
PO2 7NE

By Email John.Black@pmcconstruction.co.uk

Dear John,

RE: St. Georges Walk, Waterlooville – Validation Report

Please find attached OEC Report A10635/200317/L1 detailing the results of the validation works undertaken at the above site.

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

Yours sincerely,

For Omnia Environmental Consulting.

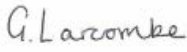


Grace Larcombe
Geo Environmental Consultant



Dr. Adrian King
Principal Consultant

Quality Assurance

Remarks	Draft
Date	April 2017
Prepared by	Grace Larcombe
Signature	
Checked by	Adrian King
Signature	
Authorised by	Lee McDonald
Signature	
Project number	A10635/200317/L1

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Omnia Environmental Consulting
10 Manor Court, Barnes Wallis Road, Segensworth, Fareham, PO15 5TH
Tel: (01489) 808 088

VALIDATION REPORT

Site Address	St Georges Walk, Waterloooville, PO7 7TU
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1.0 Objectives & Terms of Reference

The objective of this report is to provide an assessment of the remediation works undertaken through on-site observations and the chemical results of soil sampling, as set out within the Remediation Method Statement (A10635/151120/L1 dated November 2015).

2.0 Background

At present the development is near completion with validation being undertaken on the areas containing soft landscaping ahead of occupation.

The proposed site layout detailing the location of the development including validation pit locations is presented as Figure 1.0 (Attachment 1).

2.1 Soil Capping System

The Supplementary Geo-environmental Assessment and Remediation Strategy (ref: A10635/151119/L1 and ref: A10635/151120/L1) identified the presence of elevated concentrations of lead and the presence of asbestos fibres within the near surface soils across the site. It was stipulated by OEC that in all areas of soft landscaping Made Ground should be excavated to a depth of 300mm bFGL with the emplacement of a impermeable marker layer in the form of a membrane to be placed prior to the emplacement of clean imported soils.

The RMS stipulated the following sampling frequency to confirm the chemical suitability of all imported material.

Table 1.0 – Chemical Validation Schedule

Purpose	Classification	Testing Frequency	Chemical Analysis
Validation Testing	Topsoil	1 sample per area of soft landscaping	➤ Inorganic Compounds; ➤ Speciated Polycyclic Aromatic Hydrocarbons (PAH); ➤ Banded (C5-C35) Petroleum Hydrocarbons; ➤ Asbestos Identification.

3.0 Scope of works

3.1 Soil Capping System

The scope of works comprised the validation of areas of soft landscaping areas through the advancement of hand excavated pits to maximum depths of 600mm bFGL to retrieve samples from the emplaced topsoil. Soils were then subject to laboratory analysis for assessment of chemical suitability.

4.0 Site Work and Observations

4.1 Site Visit 1 – 13th March 2017

The first site visit was undertaken by a representative from Omnia Environmental Consulting on 13th March 2017. The visit was undertaken to confirm the placement of the clean imported soils and retrieve soil samples for laboratory testing for chemical suitability.

At the time of the site visit, the development was near completion with the soft landscaping awaiting the emplacement of turf. However, a small area of soft landscaping adjacent to the southwest corner of the building was awaiting the emplacement of clean imported soil.

During this visit two (2no.) hand dug inspection pits (HP101 and HP102) were advanced in areas where installation of the cover system was complete in order to retrieve samples, confirm the placement of at least 300mm of clean soil and confirm the placement of a membrane at the depth stipulated within the RMS (ref:A10635/151120/L1 dated 26/11/2015).

It was agreed with site that a second visit would be required to validate the cover system installation in the area adjacent to the southwest corner of the building which was awaiting the placement of soil.

4.2 Site Visit 2 – 28th March 2017

A second site visit was undertaken by a representative from Omnia Environmental Consulting on the 28th March 2017 in order to confirm the placement of clean imported soil and the installation of a membrane at a depth of at least 300mm bgl in the area adjacent to the southwest corner of the building which was awaiting topsoil during the site visit on 13th March 2017.

Two (2no.) hand dug inspection pits (HP201 and HP202) were advanced during this site visit and confirmed the placement of 300mm of clean cover. However, no membrane was encountered during the advancement of the hand excavated pits.

Site were notified that no membrane had been encountered and informed the OEC representative that the soils would be removed and the membrane installed ready for inspection on a third visit.

4.3 Site Visit 3 – 3rd April 2017

The third site visit was undertaken by a representative from Omnia Environmental Consulting on the 3rd April 2017 in order to validate the placement of a membrane at a depth of 300mm bgl and the emplacement of a cover system of 300mm of clean soil.

These works were undertaken in the area of soft landscaping adjacent to the southwest corner of the building where the membrane was found to be missing on the second visit (28/03/2017). A single hand dug inspection pit (HP301) was advanced to a depth of 300mm bgl where the presence of the membrane confirmed.

4.4 Ground Conditions Encountered

Within each residential plot, hand pits were excavated to the base of the emplaced growing medium, at depths ranging from 300mm - 600mm bgl. Soil conditions encountered are summarised below:

Topsoil:

Topsoil was found within all exploratory hole locations and comprised a dark brown, slightly silty, fine to medium SAND with rare rootlets and organic material. The emplaced Topsoil was found to range from 300 to 600mm in thickness. The emplaced cover system thickness encountered and the membrane installation depth at each location is summarised in the table overleaf.

Location	Cover System Thickness (mm bFGL)	No-dig Membrane Depth (mm bFGL)
HP101	FGL – 620	620
HP102	FGL - 600	600
HP301	FGL - 300	300

4.5 Laboratory Analysis

Soil samples were submitted to Exova Jones Environmental under UKAS accreditation for analysis comprising:

- CLEA Metals (Inc Cr (VI));
- Speciated PAHs (USEPA 16);
- Banded TPH;
- Asbestos Fibres in Soil;
- pH;
- Phenol; and,
- Cyanide.

Laboratory results for the soils emplaced are presented as Attachment 3.

4.6 Risk Assessment

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 2.0. The origin of the adopted Tier 1 values are presented as Attachment 4.

Table 2.0 Tier 1 Risk Assessment for a Residential End Use with Homegrown Produce

Determinand	Units	GAC	n	MC	Loc. of Ex	Pathway	Assessment
Inorganics							
Arsenic	mg/kg	37	2	34.7	N/A	1	No Further Action
Cadmium	mg/kg	11	2	<0.1	N/A	1	No Further Action
Chromium (III)	mg/kg	910	2	86.7	N/A	1	No Further Action
Copper	mg/kg	2400	2	14	N/A	1	No Further Action
Lead	mg/kg	200	2	48	N/A	1	No Further Action
Mercury	mg/kg	40	2	<0.1	N/A	2	No Further Action
Nickel	mg/kg	180	2	33.2	N/A	1	No Further Action
Selenium	mg/kg	250	2	<1	N/A	1	No Further Action
Vanadium	mg/kg	410	2	93	N/A	1	No Further Action
Zinc	mg/kg	3700	2	89	N/A	1	No Further Action
Asbestos	-	None Detect ^(iv)	2	NAD	N/A	2	No Further Action
Organics							
Phenol	mg/kg	280	2	<0.15	N/A	2	No Further Action
Cyanide	mg/kg	791	2	0.9	N/A	2	No Further Action
Naphthalene	mg/kg	2.3	2	<0.04	N/A	2	No Further Action
Acenaphthylene	mg/kg	170	2	<0.03	N/A	3	No Further Action
Acenaphthene	mg/kg	210	2	<0.05	N/A	1	No Further Action
Fluorene	mg/kg	170	2	<0.04	N/A	1	No Further Action
Phenanthrene	mg/kg	95	2	0.05	N/A	3	No Further Action
Anthracene	mg/kg	2400	2	<0.04	N/A	3	No Further Action
Fluoranthene	mg/kg	280	2	0.12	N/A	3	No Further Action
Pyrene	mg/kg	620	2	0.11	N/A	3	No Further Action
Benzo(a)Anthracene	mg/kg	7.2	2	0.10	N/A	3	No Further Action
Chrysene	mg/kg	15	2	0.07	N/A	3	No Further Action
Benzo(b/k)Fluoranthene ⁽ⁱ⁾	mg/kg	77	2	0.15	N/A	3	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	2	0.07	N/A	3	No Further Action
Indeno(123-cd)Pyrene	mg/kg	27	2	0.05	N/A	3	No Further Action

Determinand	Units	GAC	n	MC	Loc. of Ex	Pathway	Assessment
Dibenzo(a,h)Anthracene	mg/kg	0.24	2	<0.04	N/A	3	No Further Action
Benzo(ghi)Perylene	mg/kg	320	2	0.05	N/A	3	No Further Action
TPH (Banded)							
TPH C ₆ -C ₈ (aliphatic)*	mg/kg	100	2	<100	N/A	2	No Further Action
TPH C ₈ -C ₁₀ (aliphatic)*	mg/kg	27	2	<5	N/A	2	No Further Action
TPH C ₁₀ -C ₁₂ (aromatic)*	mg/kg	74	2	<10	N/A	1	No Further Action
TPH C ₁₂ -C ₁₆ (aromatic)*	mg/kg	140	2	<10	N/A	1	No Further Action
TPH C ₁₆ -C ₂₁ (aromatic)*	mg/kg	260	2	31	N/A	1	No Further Action
TPH C ₂₁ -C ₄₀ (aromatic)*	mg/kg	1100	2	351	N/A	1	No Further Action

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.

* 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)

A review of Table 2.0 indicates that all results fall below the adopted screening level for the protection of Human Health.

5.0 Conclusion

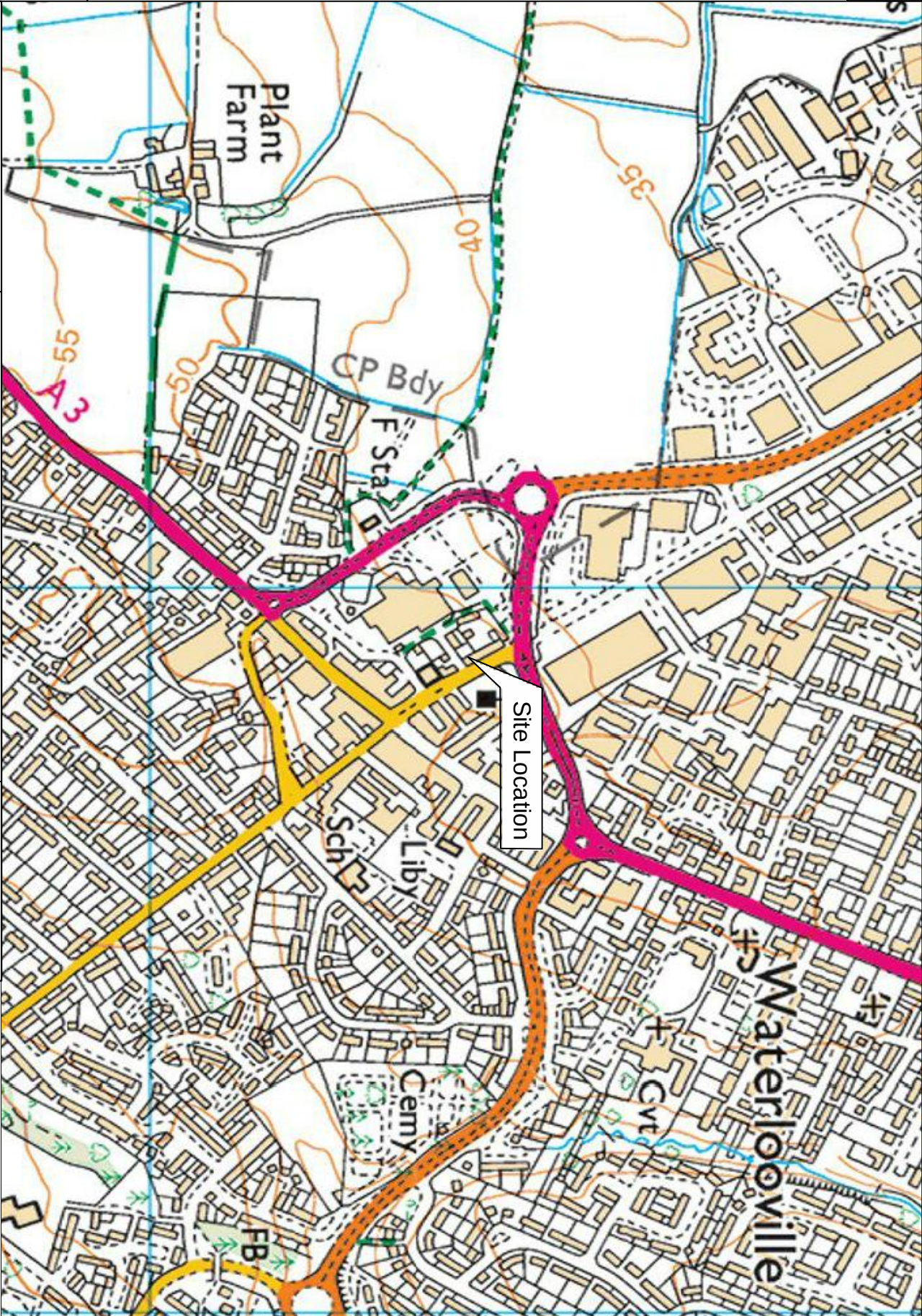
Based on the findings of the validation exercise OEC consider that following the placement of clean imported topsoil that:

- A topsoil growing medium has been emplaced within areas of soft landscaping in accordance with recommendations set out within the RMS;
- The imported topsoil meets the chemical suitability criteria set out within the RMS.

It is therefore considered that the tested soils within these areas of soft landscaping do not present a significant risk to human health, and are fit for the intended use.

Attachment 1

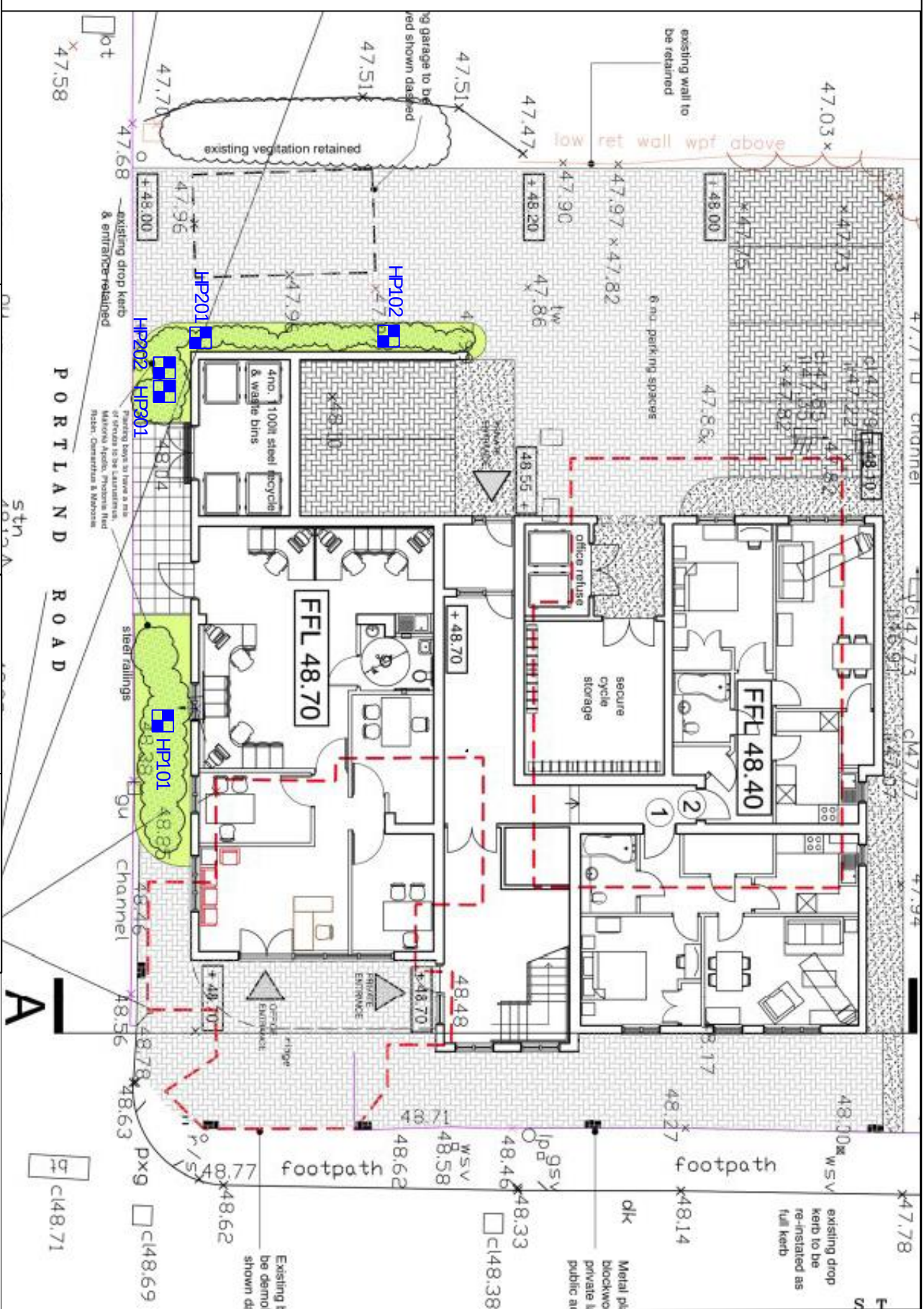
Figures



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Job Title:		Client:		Project No:		Date:		Drawing Title:	
St. Georges Walk		PMC Construction & Development Services Ltd.		A10635		20/03/2017		Figure 1. Site Location Plan	
				Drawn By:	D. Pokoj	Authorised By:	T. Mitchell		
				Scale:		Notes:			



Drawing Title:

PMC Construction &
Development Services Ltd.

Authorised By:	T.Mitchell
Notes	

Figure 1. Intrusive hole locations

Attachment 2

Topsoil Validation Pit Photographs

Topsoil Validation Pits



HP101 Soft landscaping validation at 0.60m bgl



HP102 Soft landscaping validation at 0.60m bgl



HP101 showing emplacement of black membrane



HP102 showing emplacement of black membrane



**HP301 showing emplacement of black membrane
at 300mm bgl.**

Attachment 3

Chemical Testing Results



Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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

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

Tel: +44 (0) 1244 833780

Fax: +44 (0) 1244 833781



Attention :	Grace Larcombe
Date :	20th March, 2017
Your reference :	A10635
Our reference :	Test Report 17/5402 Batch 1
Location :	St Georges Walk, Waterloooville
Date samples received :	14th March, 2017
Status :	Final report
Issue :	1

Two samples were received for analysis on 14th March, 2017 of which two 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:

Phil Sommerton BSc
Project Manager

Client Name: Omnia
Reference: A10635
Location: St Georges Walk, Waterlooville
Contact: Grace Larcombe
JE Job No.: 17/5402

Report : Solid

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

J E Sample No.	1-2	3-4									Please see attached notes for all abbreviations and acronyms		
Sample ID	HP101 ES1	HP102 ES1											
Depth	0.00-0.60	0.00-0.60											
COC No / misc													
Containers	V J	V J											
Sample Date	11/03/2017	11/03/2017											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	14/03/2017	14/03/2017									LOD/LOR	Units	Method No.
Arsenic #	31.2	34.7									<0.5	mg/kg	TM30/PM15
Barium #	39	49									<1	mg/kg	TM30/PM15
Beryllium	1.3	1.4									<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	<0.1									<0.1	mg/kg	TM30/PM15
Chromium #	78.4	86.7									<0.5	mg/kg	TM30/PM15
Copper #	2	14									<1	mg/kg	TM30/PM15
Lead #	41	48									<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1									<0.1	mg/kg	TM30/PM15
Nickel #	28.7	33.2									<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1									<1	mg/kg	TM30/PM15
Vanadium	80	93									<1	mg/kg	TM30/PM15
Water Soluble Boron #	1.4	1.4									<0.1	mg/kg	TM74/PM32
Zinc #	81	89									<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05									<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.04	0.05									<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.09	0.12									<0.03	mg/kg	TM4/PM8
Pyrene #	0.06	0.11									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	0.10									<0.06	mg/kg	TM4/PM8
Chrysene #	0.06	0.07									<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.11	0.15									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.05	0.07									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	0.05									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	0.05									<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	0.8									<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.08	0.11									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.03	0.04									<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	106	105									<0	%	TM4/PM8
EPH >C8-C10 #	<5	<5									<5	mg/kg	TM5/PM8
EPH >C10-C12 #	<10	<10									<10	mg/kg	TM5/PM8
EPH >C12-C16 #	<10	<10									<10	mg/kg	TM5/PM8
EPH >C16-C21 #	31	25									<10	mg/kg	TM5/PM8
EPH >C21-C40	351	290									<10	mg/kg	TM5/PM8
EPH >C8-C40	382	315									<30	mg/kg	TM5/PM8
GRO (>C4-C6)	<100	<100									<100	ug/kg	TM36/PM12
GRO (>C6-C8) #	<100	<100									<100	ug/kg	TM36/PM12

Please see attached notes for all abbreviations and acronyms

Client Name: Omnia
Reference: A10635
Location: St Georges Walk, Waterlooville
Contact: Grace Larcombe

Note:

Analysis was 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. Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, 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:

[Handwritten signature]

Ryan Butterworth
Asbestos Team Leader

[illegible]

Client Name: Omnia
Reference: A10635
Location: St Georges Walk, Waterlooville
Contact: Grace Larcombe

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/5402

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.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) 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 a 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: 17/5402

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils 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.				
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 banding within the range C8-C40 GC-FID.	PM8	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 banding within the range C8-C40 GC-FID.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) 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 and 6010B	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 and 6010B	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
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

JE Job No: 17/5402

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes

Attachment 4

Origin of Tier I Assessment Criteria

Constituent	Unit	GAC	Origin of Risk Assessment Value
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 VI	mg/kg	6	
Chromium III	mg/kg	910	
Lead	mg/kg	200	
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	
Copper	mg/kg	2400	
Zinc	mg/kg	3700	
Vanadium	mg/kg	410	
Phenol	mg/kg	280	LQM CIEH Suitable for Use Levels (S4UL) 2015 1%SOM
Cyanide	mg/kg	791	CLEA 1.04 OEC Derived Value
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	2400	
Fluoranthene	mg/kg	280	
Pyrene	mg/kg	620	
Benzo(a)Anthracene ^c	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	

Constituent	Unit	GAC	Origin of Risk Assessment Value
Benzo(ghi)Perylene	mg/kg	320	
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	1100	
Aliphatic EC > 16-35	mg/kg	65000	
Aliphatic EC >35-44	mg/kg	65000	
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	1100	
Aromatic EC> 35-44	mg/kg	1100	
Banded TPH			
Aliphatic 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 Ali/Aro chain lengths.
Aliphatic EC >6-8	mg/kg	100	
Aliphatic EC >8-10	mg/kg	27	
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	1100	

Constituent	Unit	GAC	Origin of Risk Assessment Value
Aromatic EC> 35-44	mg/kg	1100	
