

MJH/J1611/01

25th October 2017

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For the attention of: Mr Cyril Ronaghan

Dear Sirs

Site at St. John's Road, Spalding

Introduction & Background

We have now received the results of the chemical contamination analyses undertaken on the samples recovered following the remediation of the hydrocarbon hotspot in the north - western area of the site and the excavation of the significantly contaminated strata in the southern area of the site, and have pleasure in reporting as follows.

Hydrocarbon contamination was encountered in the north – western area of the site during an investigation undertaken by MEC in November 2016 and a supplementary investigation of that area undertaken by Emcus in July 2017. The supplementary investigation report and remediation method statement for that area prepared by Emcus (report ref MJH/J1611/D1/1, August 2017) recommended that the significantly impacted strata should be excavated, for appropriate off-site disposal at a suitably licensed waste management / recycling facility. For the hotspot remediation, it was recommended that the LQM/CIEH Generic Assessment Criteria for Petroleum Hydrocarbons for the residential end use are adopted as 'target' concentrations.

In addition to that hotspot in the north-western area of the site, a historic fuel line and strata with hydrocarbon contamination was encountered by GEDA in the southern area of the site, during the excavation of historic foundations / services, etc. Following further investigation by GEDA, the most significantly impacted strata in that southern area of the site has also been excavated, for off-site disposal.

Validation

An experienced Geo-Environmental Engineer from Emcus attended site on 10th October 2017 to recover representative samples from the base and sides of the hotspot excavation in the north-western area of the site and the excavation in the southern area of the site, to confirm that the significantly hydrocarbon impacted strata had been removed from those areas. At the time of the site visit, the excavation in the southern area of the site was being enlarged northwards, to 'chase out' the impacted soils. In addition, the south-eastern and western edges of the excavation were restricted by St John's Road and a boundary wall respectively. The approximate locations of the excavations and the validation samples are indicated approximately on drawing J1611/05. The excavations in the north-western and southern areas of the site were a maximum of approximately 2m deep, where groundwater had been encountered.

The samples recovered by the Geo-Environmental Engineer were placed into sealable plastic containers and glass jars, provided by the analytical laboratory for that purpose and placed immediately into a 'cool box'. The samples recovered from the excavations were subsequently submitted to the MCERTS and UKAS accredited laboratories of Chemtech Environmental for chemical analysis comprising Total Petroleum Hydrocarbons speciated in accordance with current UK guidelines (TPH-CWG) and Total Organic Carbon.

The results of the chemical analyses undertaken on the 6 samples from the hotspot in the north-western area of the site (identified as North Area 1 – 6 on the Chemtech Test Report), have generally revealed concentrations falling below the respective assessment criteria (LQM/CIEH Generic Assessment Criteria) for the proposed residential end use. However, the sample from the base of the hotspot excavation at 2m bgl., (North Area 6), has revealed TPH



concentrations within the C8 – C10 & C10 – C12 bandings, which marginally exceed the LQM/CIEH target concentrations.

The results of the chemical analyses undertaken on the 4 samples from the southern area of the site (identified as Fuel Line 1 – 4 on the Chemtech Test Report), have also generally revealed concentrations falling below the respective assessment criteria (LQM/CIEH Generic Assessment Criteria) for the proposed residential end use. However, all 4 of the samples have revealed TPH concentrations within the C8 – C10 & C10 – C12 bandings, which marginally exceed the LQM/CIEH target concentrations. The sample from the south-eastern margin of the excavation (Fuel Line 1) has also revealed an elevated concentration within the C12 – C16 banding. [All of the samples from the southern area of the site have revealed concentrations falling well below the respective assessment criteria (LQM/CIEH Generic Assessment Criteria) for a commercial / industrial end use].

Summary

The results of the validation analyses confirm that the significantly impacted hydrocarbon strata in the north-western and southern areas of the site have generally been excavated by GEDA, for appropriate off-site disposal. However, strata with TPH concentrations which slightly exceed the LQM/CIEH assessment criteria for a residential end use remains below 2m bgl., in both areas of the site and at shallower depth along the south-eastern margin and south-western 'dog leg' of the site. The excavations in the south-eastern margin and south-western 'dog leg' were restricted by St John's Road and a boundary wall respectively.

It is considered that the slightly elevated hydrocarbon concentrations which remain at the bottom of the excavations will not pose a significant risk to the end users of the site, following reinstatement of ground level with clean inert strata.

In addition, the hardcover of buildings, parking areas and pathways will generally provide a break in the contamination source to receptor pathway and prevent the remaining hydrocarbon concentrations at shallower depth along the south-western margin and south-western 'dog-leg' of the site from posing a significant risk to end users in those areas. However, the proposed site layout (Corporate Architecture Limited, drawing 4070/KPG/16/008, March 2016) indicates that 3 landscaping areas / front gardens (associated with plots 23, 24 & 25) will be present along the south-eastern margin of the site and a side / rear garden (associated with plot 23) will be present along the south-western dog leg of the site. In those landscaping areas and gardens alone, it is recommended that the existing strata is sufficiently excavated to allow a minimum 0.6m thick environmental capping of clean inert subsoil and topsoil to be placed. It is considered that environmental capping will prevent any slightly elevated concentrations of TPH which remain along the south-eastern margin and south-western 'dog leg' of the site from posing a significant risk to users in those areas.

It is considered that the slightly elevated TPH concentrations which remain below 2m bgl., in both areas of the site and at shallower depth along the south-eastern margin and south-western 'dog leg' of the site will not pose a significant risk to environmental receptors, (i.e. groundwater and surface water).

Finally, the excavation of the significantly hydrocarbon impacted strata should be continued northwards from the excavation in the southern area of the site. It is recommended that the significantly hydrocarbon impacted strata is continued to be excavated to a maximum depth of 2m bgl., (at which depth groundwater prevents effective deepening), and ground levels reinstated with chemically suitable fill. It is considered that any remaining hydrocarbon impacted strata at more than 2m bgl., and with concentrations below the LQM/CIEH Generic Assessment Criteria for a commercial / industrial end use will not pose a significant risk to end users and / or environmental receptors. Following excavation, further validation sampling and laboratory analyses will be required.

We recommend that the above geo-environmental assessment is discussed and agreed with the Local Authority Environmental Health Department, etc., prior to any irrevocable actions being taken.

We trust that the above and attached provides all the information you require and is acceptable to yourselves. Should you have any comments or queries, however, or wish to discuss any of the above, please do not hesitate to contact us.

Yours faithfully

For & on behalf of Emcus Limited

A handwritten signature in black ink, appearing to read 'M Hanford', written in a cursive style.

Marcus Hanford
Technical Director
mhanford@emcus.co.uk



Drawing Title	Hydrocarbon Excavation and Validation Sampling - 10th October 2017 (Also showing proposed development)		J1611/05	
			Scale at A4: NTS	
Project	St John's Road, Spalding		Drawn	Approved
			MJH	MJH
Client	GEDA Construction		Date	Date
			25/10/2017	25/10/2017



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ANALYTICAL TEST REPORT

Contract no: 67821
Contract name: St Johns Road, Spalding
Client reference: J1611V2
Clients name: Emcus
Clients address: 42 Mount Pleasant Drive
Belper
Derbyshire
DE56 2TH

Samples received: 12 October 2017

Analysis started: 12 October 2017

Analysis completed 19 October 2017

Report issued: 19 October 2017

Notes: Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key: U UKAS accredited test
M MCERTS & UKAS accredited test
\$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:

James Spittle
Customer Services Team Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
67821-1	Fuel Line 1	1.00	Sandy Clay	-	-	21.9
67821-2	Fuel Line 2	1.00	Silty Clay	-	-	24.0
67821-3	Fuel Line 3	2.00	Silty Clay	-	-	21.6
67821-4	Fuel Line 4	2.00	Silty Clay	-	-	23.4
67821-5	North Area 1	1.00	Sandy Silty Clay	-	-	25.4
67821-6	North Area 2	1.00	Silty Clay	-	-	22.1
67821-7	North Area 3	1.00	Silty Clay	-	-	22.2
67821-8	North Area 4	1.00	Silty Clay	-	-	23.0
67821-9	North Area 5	2.00	Silty Clay	-	-	25.7
67821-10	North Area 6	2.00	Silty Clay	-	-	24.5

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SOILS

Lab number			67821-1	67821-2	67821-3	67821-4	67821-5	67821-6
Sample id			Fuel Line 1	Fuel Line 2	Fuel Line 3	Fuel Line 4	North Area 1	North Area 2
Depth (m)			1.00	1.00	2.00	2.00	1.00	1.00
Date sampled			10/10/2017	10/10/2017	10/10/2017	10/10/2017	10/10/2017	10/10/2017
Test	Method	Units						
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	0.54	1.39	0.30	0.40	1.03	0.31
Estimate of OMC (calculated from TOC)	CE072 ^M	% w/w	0.93	2.40	0.52	0.69	1.78	0.53
TPH								
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	5.74	5.22	1.72	3.98	0.12	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	3	<1	<1	<1	<1	<1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1	<1	<1	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	0.3	2.0	0.7	4	0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	15	43	5	34	0.6	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	245	119	40	95	2.3	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	831	377	209	151	5	4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	1267	702	619	297	15	12
EPH Aliphatic (>C16-C35)	CE068	mg/kg	739	546	680	258	72	61
EPH Aliphatic (>C35-C44)	CE068	mg/kg	29	39	32	15	12	16

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SOILS

Lab number			67821-7	67821-8	67821-9	67821-10
Sample id			North Area 3	North Area 4	North Area 5	North Area 6
Depth (m)			1.00	1.00	2.00	2.00
Date sampled			10/10/2017	10/10/2017	10/10/2017	10/10/2017
Test	Method	Units				
Total Organic Carbon (TOC)	CE072 ^M	% w/w C	0.19	0.37	0.26	0.35
Estimate of OMC (calculated from TOC)	CE072 ^M	% w/w	0.33	0.64	0.45	0.60
TPH						
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	0.03
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	0.04	<0.01	1.74
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	<1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	<1	<1	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	<1	<1	<1	<1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	<1	<1	<1	<1
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	<1	<1	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	0.2
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	0.2	<0.1	2
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	0.7	0.3	39
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4	<4	<4	170
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4	<4	5	235
EPH Aliphatic (>C16-C35)	CE068	mg/kg	<10	<10	25	213
EPH Aliphatic (>C35-C44)	CE068	mg/kg	<10	<10	<10	79

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE072	Total Organic Carbon (TOC)	Removal of IC by acidification, Carbon Analyser	Dry	M	0.1	% w/w C
CE072	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry	M	0.1	% w/w
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	Wet		10	mg/kg

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DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
67821-1	Fuel Line 1	1.00	N	
67821-2	Fuel Line 2	1.00	N	
67821-3	Fuel Line 3	2.00	N	
67821-4	Fuel Line 4	2.00	N	
67821-5	North Area 1	1.00	N	
67821-6	North Area 2	1.00	N	
67821-7	North Area 3	1.00	N	
67821-8	North Area 4	1.00	N	
67821-9	North Area 5	2.00	N	
67821-10	North Area 6	2.00	N	