SUPERSEDED

Validation report

9a Darwin Street, Kirton in Lindsey

Produced for C&K Builders (Mr K McCabe)

Humberside Materials Laboratory Ltd
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Document history

Title:	Phase 4: Validation report 9a Darwin Street, Kirton in Lindsey
Client:	C&K Builders (Mr Ken McCabe)
Date:	September 2020
Report number:	1166/4758/P/P4

Document number:				
Revision	*Purpose*	*Originated*	*Checked*	*Date*
0.0	Document for issue	D Driver *Director*	R Lester *Geo-Env Engineer*	Sept 2020

Phase 4 (Validation) report

Contents

1 Introduction

The client, C&K Builders (Mr K McCabe), have undertaken the remediation of a site known as 9a Darwin Street in Kirton in Lindsey, North Lincolnshire. The land will be hereinafter described as *the site*.

Humberside Materials Laboratory were appointed as the independent consultant to witness and validate the remediation. This report is produced to this effect for submission to the local authority as evidence.

1.1 Conditions and Limitations

This report is produced solely for the client and should only be copied in full. When transmitted electronically, the definitive copy of the report is held by Humberside Materials Laboratory Ltd.

This report is prepared on the assumption that all facts have been disclosed.

The comments given in this report and the opinions expressed assume that conditions do not vary beyond the range revealed by this study and the information provided in the production of this report is complete and reliable.

2 Background

The site has been the subject of previous site investigation reports by Humberside Material Laboratory (HML), site plans are within appendix A.

- HML (Phase 1) Desk study report Revision A (1166/4758/P1/P) dated January 2019
- HML (Phase 2) Site investigation report Revision 1.0 (1166/4758/P/P2) dated July 2019
- HML (Phase 3) Method statement (1166/4758/P/P3) dated July2019

The above reports identified contamination-related issues as detailed in the HML remediation method statement (HML Ref: 0135/4970/P/P3). In summary, these include:

- One potentially elevated species of PAH in the on-site mound / stockpile
- There is evidence of potential contamination in the near surface soils in the northeast part of the site (in BH2). Slightly elevated PAHs were found in a sample from BH2. Asbestos fibres (chrysotile, loose) were also detected.
- Some potential contamination was found in the near surface soils in the southeast corner of the site (in BH4). A slightly elevated level of lead was detected in shallow natural soil from BH4.
- No elevated TPH contamination has been found. However, some suspected traces of red diesel were detected.

Any unforeseen contamination encountered during the development of the site should be reported to the local authority. Work should be halted in any area of the revealed potential contamination and the contamination investigated/assessed to the satisfaction of the local authority.

3.0 Site

3.1 Location and description

The site is the land occupied by 9a Darwin Street, located on the north side of Darwin Street, Kirton in Lindsey, North Lincolnshire, DN21 4BZ. The site is centred around national grid reference (NGR) 493287, 398801. A site location plan is included in Appendix A.

The site is about 35m long and about 15m wide.

There are no significant above-ground features on the site, apart from a site stockpile / mound of topsoil in the northeast corner of the site. The stockpile appears to mainly consist of natural soils (clays, silts and sands).

There are concrete floor slabs in the southwest part of the site and some gravel hardstanding in the east part of the site. There is also some grassy bare earth to the rear of the site.

The entrance to the site is gated and walled with a drop kerb allowing vehicle access from Darwin Street. The other boundaries are defined by brick and masonry walls, tree and shrub vegetation, timber fencing and neighbouring brick buildings.

There are also several trees in adjacent residential properties. There are leylandii along the rear boundary and a tall tree adjacent to the east boundary.

No visual or olfactory evidence of potential contamination was noted during the site works. No surface staining was noticed or evidence of vegetative distress. No tanks or containers for liquid storage were found. No unusual odour was detected.

3.2 Proposed development

The proposed development comprises a pair of low-rise semi-detached dwellings located near the centre of the site. The front (south) part of the site will be hardstanding and the rear (north) will be gardens.

2.21 Garden and hardstanding areas

The client has recently confirmed the details of the front and rear gardens. These are as follows.

The front of the site will be covered entirely with hardstanding which will provide off-road parking for the proposed dwellings as well as pedestrian access.

The rear gardens will consist of patio areas adjacent to the houses with soft landscaping to the rear. The patio areas will extend about 3.7m (i.e. 12ft) beyond the rear walls of the proposed dwellings. At this stage, it is understood that the finished floor levels in the soft landscaped area could be elevated by about 0.5m above average existing ground levels with the aid of traditional short retaining walls (i.e. dwarf walls).

The space around the site is limited and access and egress will be further restricted as the structural works commence. Due to boundary restrictions (i.e. fences and trees) the only way to the rear of the property is through the front of the property. Only narrow pathways will remain around the outside of the proposed building once it is built.

A proposed development layout is shown in Appendix A.

4 Remediation

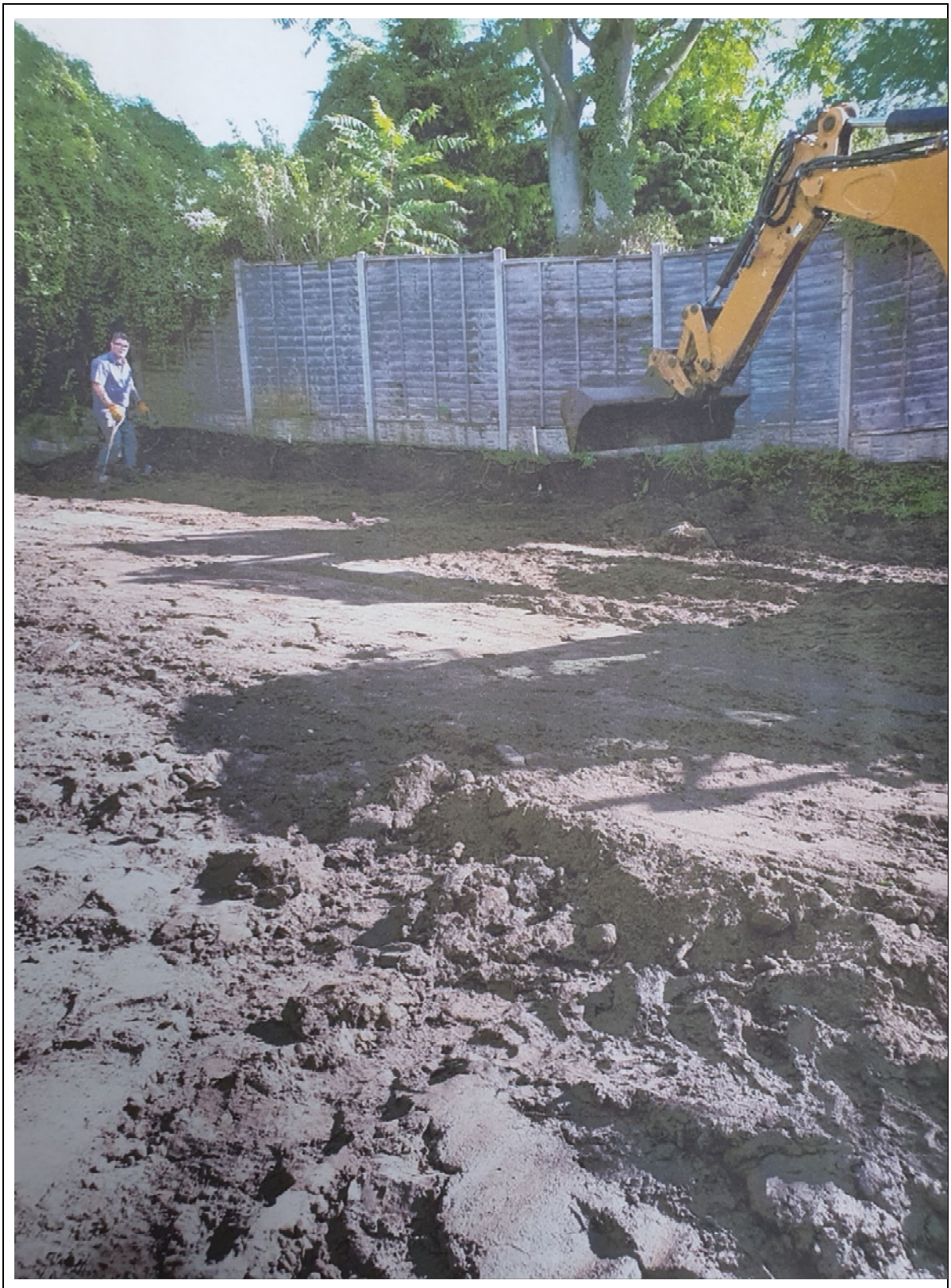
4.1 Structural work

Structural work to the properties was undertaken after the initial preparation of the rear garden areas due to practical plant assess, only foot access will be available to the rear of the properties post construction. The initial preparation included removal of madeground / soil to required depth, placement of a geotextile, importation of granular capillary break layer and placement of topsoil. A proposed retaining wall was built to offer protection to the remediation works during construction.

4.2 Implementation

The made ground and natural soils within the rear garden areas were excavated to 600mm below proposed final levels, as discussed within the phase 3. This would equate to approximately 100mm in depth as the rear garden areas are to be raised by 500mm. Level controls were monitored by the contractor during remediation, this included datum points from the adjoining block wall, brick wall and fence line. Initial spoil from the excavation were placed directly into a licensed waste skip and subsequently removed by the provider to an appropriate waste management facility (Ellgia, Scunthorpe). Further removal from site foundation digs was via spoil loaded directly into lorries and removed to an appropriate waste management facility (Sandstop Quarries Ltd, Drax golf course). Placement of the subsequent geotextile membrane, granular capillary layer and topsoil took place within the following days. Photographs below show the following,

- Removal of spoil
- Placement of geotextile membrane
- Placement of granular capillary break layer
- Construction of retaining wall to rear gardens
- Evidence of level control
- Placement of topsoil



Made ground /soil removal from rear garden areas

On-site waste skip serial number

Placement of geotextile


432E

Placement of granular capillary break layer

Construction of retaining wall

Evidence of level control

Placement of topsoil

As per the agreed plans the rear gardens include hardstanding patio areas, hardstanding side walkways and hardstanding parking areas to the front of the properties.

Hardstanding to the rear gardens and side walkways included limestone and concrete cast slabs on 50mm down chalk granular fill supplied by Brianplant loaded from Singleton Birch, this included two deliveries on 23rd October 2019 totalling 37tonnes with conveyance note no's 11760 and 11761, a copy of the conveyance notes are included within appendix C.

Hardstanding to the front parking areas included 50mm down blast furnace slag granular fill supplied by ???? loaded from ???, this included two deliveries on 23rd October 2019 totalling 37tonnes with conveyance note no's 0 and 1. This area will also include bituminous surfacing which was still to be undertake after the final validation visit. Copies of the conveyance notes are included within appendix C.

Photographs below show evidence of the above.

Plot 1 side walkway

Plot 2 side garden area and walkway

Plot 2 rear garden

Plot 1 rear garden

Plot 2 front parking area

Plot 1 front parking area

5 Validation

5.1 Contaminated material

Material identified within the phase 2 report as unsuitable to be retained within garden areas was excavated straight into an on-site waste management skip. This was then transported to a suitable waste management facility by a licensed haulage company at a later date. Ellgia were utilised for the skip and haulage with the waste being taken to FCC Winterton Landfill, Integrated Waste Management Winterton (DN15 9AP). This included one skip totalling 7 tonnes. Further soil from foundation excavations and general workings were loaded directly into lorries and transported to Drax Golf Course by Sandstop Quarries Ltd, this include two lorries totalling 39tonnes. Table 1 below summarises the removed waste removed with copies of the consignment notes included within appendix C.

Table 1 – Made ground / soil removed		
Date	Weight (tonnes)	Ticket No
24/10/2019	6.96	974893
26/09/2019	19.64	21121
	19.54	21123
Total	46.14	

5.7 Geotextile

A geotextile membrane was placed on the excavated areas within the gardens, photographic evidence of the membrane placement is included within section 4. The geotextile was sourced from Travis Perkins as a Wrekin woven geotextile Fastrack membrane, a delivery note is included within appendix C with Travis Perkins reference 09B82840.

5.8 Capillary layer

On 29th September 2019 a total of 39.64tonnes of 50mm clean Chalk granular fill was delivered from Brianplant Manton Quarry. A summary of the consignment notes is included below in table 2 with copies of the consignment notes included within appendix C.

Table 2 – Capillary layer		
Date	Weight (tonnes)	Ticket No
29/09/2019	19.64	235256
	19.75	235258
Total	39.64	

With a total area of 123m^2 mentioned above and a required minimum depth of 0.1m this would equal a required total 21tonnes utilising a bulk density of 1.70kg/m^3. The total quantity delivered is greater than 21tonnes which indicates sufficient material to achieve an average capillary break layer of 0.15m in thickness.

Photograph within section 4.2 show the capillary layer to appear level with no major undulations indicating good level control. Trial pits within both plots were hand excavated on completion of the rear gardens to prove depths achieved, these were undertaken after seeding with some grass growth visible. In total three trial pits were excavated; these were evenly spaced throughout the garden areas. Locations of the trial pits are marked on the site plan within appendix A. The topsoil was excavated and placed to one side for sampling, this exposed the chalk granular capillary layer. The depth of the granular capillary layer was proven by further excavation to the geotextile layer. Table 3 below shows the depths encounter followed by photographic evidence.

Table 3 – depth of rear garden capillary layer

Trial pit	Topsoil depth (mm)	Depth to geotextile membrane (mm)	Capillary layer depth (mm)
1	490	611	121
2	435	614	179
3	480	605	125

Trial pit 1 – rear garden granular capillary layer

Trial pit 2 – rear garden granular capillary layer

Trial pit 3 – rear garden granular capillary layer

The trial pits show an average depth of 142mm for the rear gardens.

One number sample of the chalk granular fill was taken on 24th August 2020 from a combined sample from the three trial pits within the rear gardens. The sample was subject to a suite of metals/metalloids, this was undertaken at a UKAS accredited laboratory with a sample reference 88704-1. Table 4 below shows assessment criteria for an imported inert quarried granular fill along with results from the analysis.

Table 4: assessment criteria & results

Element	Residential with plant uptake GAC	Sample ref 88704 results
Arsenic (total)	37	6.1
Boron (water soluble)	290	0.5
Cadmium (total)	11	2.5
Chromium (III)	910	50
Copper (total)	2400	21
Lead (total)	200	19
Mercury (total)	1.2	<0.5
Nickel (total)	130	25
Selenium (total)	250	<0.3
Vanadium (total)	410	42

Results show no exceedances of the assessment criteria for a residential garden with plant uptake. This material as a capillary break layer is deemed suitable for use.

5.9 Topsoil

On 26th and 28th of September 2019 a total of 141.27tonnes of topsoil was delivered from Brianplant, Manton source. A summary of the consignment notes is included below in table 5 with copies of the consignment notes included within appendix C.

Table 5 – Topsoil		
Date	Weight (tonnes)	Ticket No
26/09/2019	19.7	235259
	19.75	235261
	19.6	235264
	15.46	235257
	15.46	235260
	15.68	235262
	16.0	235265
28/09/2019	19.62	235266
Total	141.27	

With a total area of 123m^2 mentioned above and a required depth of 0.45m this would equal a required total 111tonnes utilising a bulk density of 2.00kg/m^3. The total quantity delivered is greater than 111tonnes which indicates sufficient quantity to achieve a topsoil layer of 0.45m in thickness.

When delivered the topsoil was placed onto the granular capillary layer and transported around the site with appropriate plant, topsoil was only placed within the rear garden areas to prevent cross contamination. Photographs within section 4.2 show the topsoil placement. Trial pits within both plots were hand excavated on completion of the rear gardens to prove depths achieved, these were undertaken after seeding which some grass growth visible. In total three trial pits were excavated and evenly spaced throughout the garden areas; locations of the trial pits are marked on the site plan within appendix A. The topsoil was excavated and placed to one side for sampling, this exposed the chalk granular capillary layer. The depth of the topsoil was dipped from the top of the granular capillary layer to the surface. Table 6 below shows the depths encounter followed by photographic evidence.

Table 6 – depth of rear garden topsoil			
Trial pit	Topsoil depth (mm)	Depth to geotextile membrane (mm)	Capillary layer depth (mm)
1	490	611	121
2	435	614	179
3	480	605	125

Trial pit 1 – rear garden topsoil

Trial pit 2 – rear garden topsoil

Trial pit 3 – rear garden topsoil

The trial pits show an average depth of 468mm for the rear gardens.

Sampling of the topsoil was undertaken during hand excavating the trial pits. In total three number samples were subject to suites of metal/metalloids, Poly Aromatic hydrocarbons (PAH) and Asbestos identification, a sample summary is included below in table 7,

Table 7: Schedule of laboratory testing						
Sample	*HML Sample ref. (S/__)*	*Chemtech sample ref.*	*Depth (m bgl)*	*Metals*	*Speciated PAHs*	*Asbestos*
HP1	56984	88704-1	0.05-0.4	**P**	**P**	**P**
HP 2	56985	88704-2	0.05-0.4	**P**	**P**	**P**
HP 3	56986	88704-3	0.05-0.4	**P**	**P**	**P**

5.9.1 Metals and metalloids

Table 8 (below) gives the GAC for metal (and metalloid) contaminants considered for the site.

Table 8: Generic assessment criteria for metals - *Residential with plant uptake*	
Element	*(mg/kg)*
Arsenic	37
Boron	290
Cadmium	11
Chromium III	910
Chromium VI	6
Copper	2400
Lead**	200
Mercury element	1.2
Mercury inorganic	40
Mercury methyl	11
Nickel	130
Selenium	250
Vanadium	410
Zinc	3700
* from LQM/CIEH (2015) except: ** from Defra (2014)	

Table 9 (below) gives the GAC (from LQM/CIEH, 2015) for speciated PAH contaminants. These vary with soil organic matter (SOM) content. At this stage, the most onerous SOM of 1% is assumed, which should be reasonably conservative.

Table 9: Soil GACs for PAH - Residential with plant uptake			
Element	*SOM of 1%*	*SOM of 2.5%*	*SOM of 6%*
Acenaphthene	210	510	1100
Acenaphthylene	170	420	920
Anthracene	2400	5400	11000
Benzo(a)anthracene	7.2	11	13
Benzo(a)pyrene	2.2	2.7	3
Benzo(b)fluoranthene	2.6	3.3	3.7
Benzo(k)fluoranthene	77	93	100
Benzo(ghi)perylene	320	340	350
Chrysene	15	22	27
Dibenzo(ah)anthracene	0.36	0.38	0.4
Fluoranthene	280	560	890
Fluorene	170	400	860
Indeno(123-cd) pyrene	27	36	41
Naphthalene	3.3	5.6	13
Phenanthrene	95	220	440
Pyrene	620	1200	2000
BaP as Surrogate marker	0.79	0.98	1.1

All three samples show no exceedances for limits identified within tables 8 or 9 for Metals and PAH analysis. No asbestos was identified in any of the three samples. Considering the above the topsoil delivered to site is suitable to be retained on site as part of a cover system.

The complete test results are presented later (in Appendix B).

6 Conclusion

A total of 46.14 tonnes of existing site spoil was removed within garden areas prior to remediation. This consisted of spoil being loaded directly into an on-site skip or lorries and transported to an appropriate waste management facility by Ellgia or Sandstop Quarries Ltd.

Placement of an appropriate geo-textile membrane in the form of a Wrekin Woven Geotextile Fastrack membrane have been provided within section 5.7. The membrane was sourced from Travis Perkins. Evidence of its placement is included within section 4.2.

A total of 39.64 tonnes of 50mm down Chalk granular fill has been imported to provide a suitable capillary break layer, this was sourced from Singleton Birch, hauled by Brianplant. On site hand excavated trial pits show a capillary break layer average depth of 142mm. Chemical analysis shows the material to be suitable as a capillary break layer.

A total of 141.27 tonnes of topsoil has been imported, this was sourced from Brainplant, Manton as a greenfield topsoil. On site hand excavated trial pits show a topsoil layer average depth of 468mm. Chemical analysis shows the material to be suitable as a capillary break layer.

Photographic evidence has been provided throughout various stages of the remediation and a total average cover system of 605mm to 614mm has been achieved in the rear gardens. The cover system achieved meets the required depth agreed within the phase 3 method statement. Materials utilised are within the required specification for use within a cover system for a residential development.

-- End of Report –

7 References

BS 5930 (2015) Code of Practice for Site Investigations, British Standards Institute.

BS 10175:2011 (plus A1:2013) Investigation of potentially contaminated sites – code of practice, British Standards Institute

BS 8485:2007 Code of practice for the characterisation and remediation from ground gas in affected developments, British Standards Institute

CLEA documents published by DEFRA and the Environment Agency.

EA/Defra (2004) Model Procedures for the Management of Land Contamination, Contaminated Land Report 11, Environment Agency, Department for Environment Food and Rural Affairs. Bristol: Environment Agency.

Harris, M. R., Herbert, S. M. and Smith, M. A. (2005) Remedial treatment for contaminated land, Vols I-XII, CIRIA Special Publication 164. London: CIRIA.

LQM/CIEH S4Uls for human health risk assessment

NHBC (2006) NHBC Standards.

Rudland, D. J., Lancefield, R. M., Mayell, P. N. (2001) CIRIA C552 Contaminated Land Risk Assessment: A guide to good practice, London: CIRIA.

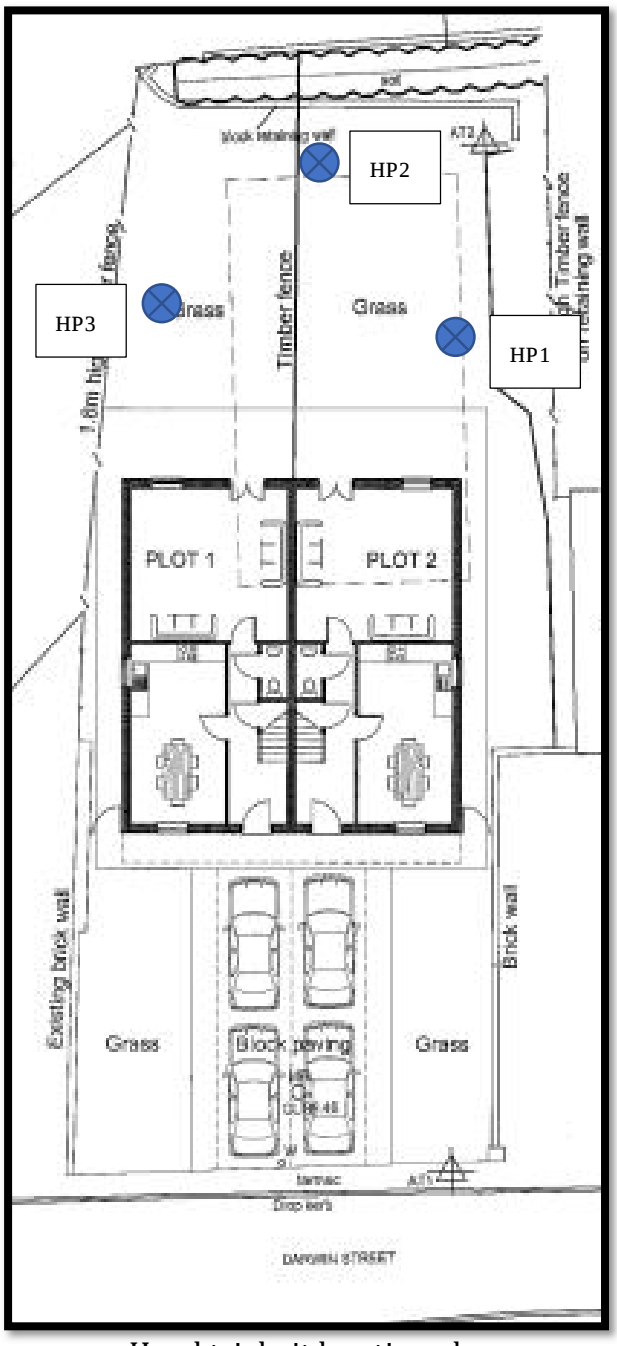
YALPAG The council contaminated land planning guidance document produced in collaboration with other local authority Yorkshire and Lincolnshire Pollution Advisory Group (YALPAG)

Appendix A

Plans

Location plan

Aerial view of the site (north is up page)



Hand trial pit location plan

Appendix B

Test Reports

Humberside Materials Laboratory Ltd
Atherton Way, Brigg
North Lincs DN20 8AR

Tel & fax 01652 652753

TOPSOIL CLASSIFICATION - BS 3882:2015

Sample Ref	**S/50053/01**	**Client**	Brianplant
Site	Manton Quarry	Date sampled	04/09/2018
Location	current stock	Sampled by	M. Driver

		Test data		Class limits			
Soil texture				Multipurpose	Acidic	Low fertility	Calcareous
Clay content	%	11		5-35			
Silt content	%	20		0-65			
Sand content	%	55		30-85			
Soil organic matter clay 5-12	%	6.5		3-20	3-30	1-10	3-30
Soil organic matter clay 20-35	%	n/a		5-20	3-30	1-10	5-30
Coarse fragments							
>2	%	3.8		0-30			
>20	%	0		0-10			
>50	%	0		0			
pH		7.6		5.5-8.5	3.5-5.5	3.5-9.0	7.5-9.0
Carbonate	%	2.3					>1
Available nutrients							
Nitrogen	%	0.23		>0.15	>0.15	See a)	>0.15
Extractable Phosphorus	mg/l	17		16-140	16-140	<20	16-140
Extractable Potassium	mg/l	170		121-1500	121-1500		121-1500
Extractable Magnesium	mg/l	57		51-600	51-600	<600	51-600
Carbon nitrogen ratio		14:1		<20:1	<20:1	<35:1	<20:1
Exchangeable sodium	%	NR					

Phytotoxic contaminants							
Zinc	mg/kg	85		<300			
Copper	mg/kg	16		<200			
Nickel	mg/kg	15		<110			

Visible contaminants							
>2mm	%	<0.5		<0.5			
plastics	%	N.D.		<0.25			
Sharps	%	N.D.		0			
Conductivity	µs/cm	2300					

				Domestic	Commercial
Contamination					
Arsenic	mg/kg	19.0		37	640
Boron	mg/kg	<1		290	240000
Cadmium	mg/kg	<1		11	190
Chromium	mg/kg	19		910	8600
Copper	mg/kg	16		2400	68000
Nickel	mg/kg	15		130	980
Lead	mg/kg	44		200	1100-6000
Selenium	mg/kg	<3		250	12000
Mercury	mg/kg	<1		1.2	58
Naphthalene	mg/kg	0.02		2.3	190
Acenaphthylene	mg/kg	0.03		210	83000
Acenaphthene	mg/kg	0.11		170	84000
Fluorene	mg/kg	0.14		170	63000
Phenanthrene	mg/kg	2.50		95	22000
Anthracene	mg/kg	1.00		2400	520000
Fluoranthene	mg/kg	5.50		280	23000
Pyrene	mg/kg	4.50		620	54000
Benzo anthracene	mg/kg	3.10		7.2	170
Chrysene	mg/kg	2.70		15	350
Benzo b/k fluoranthene	mg/kg	4.4		2.6	44
Benzo pyrene	mg/kg	2.30		2.2	35
Indeno pyrene	mg/kg	1.10		27	500
Dibenzo anthracene	mg/kg	0.50		0.24-0.3	3.5
Benzo perylene	mg/kg	1.10		320-350	3900

Domestic - *General assessment criteria (GAC)domestic gardens with plant uptake included*
Commercial - *General assessment criteria (GAC) commercial situation*

Comments

The GAC levels quoted are a maintained extract from LQM/CIEH report, (Generic assessment criteria S4ULs).
The PAH contaminant suite recorded levels greater than the GAC levels quoted above for domestic gardens.
The topsoil is compliant with commercial GAC limits.

Where contaminant levels are acceptable and assessed with BS 3882: 2015 the material classifies as a "Multipurpose Topsoil"

Notes: -

a) The total nitrogen concentration in low fertility topsoil is not critical. A concentration >0.15 can aid initial establishment of plants.

"NR" Not Required

File Ref 0018/0703/G

Date tested 12-21/09/2018 Signed

Date reported 24/09/2018 M Green / C Driver

HUMBERSIDE MATERIALS LABORATORY LTD

Atherton Way, Brigg
North Lincs, DN21 4DT
Tel & Fax 01652 652753

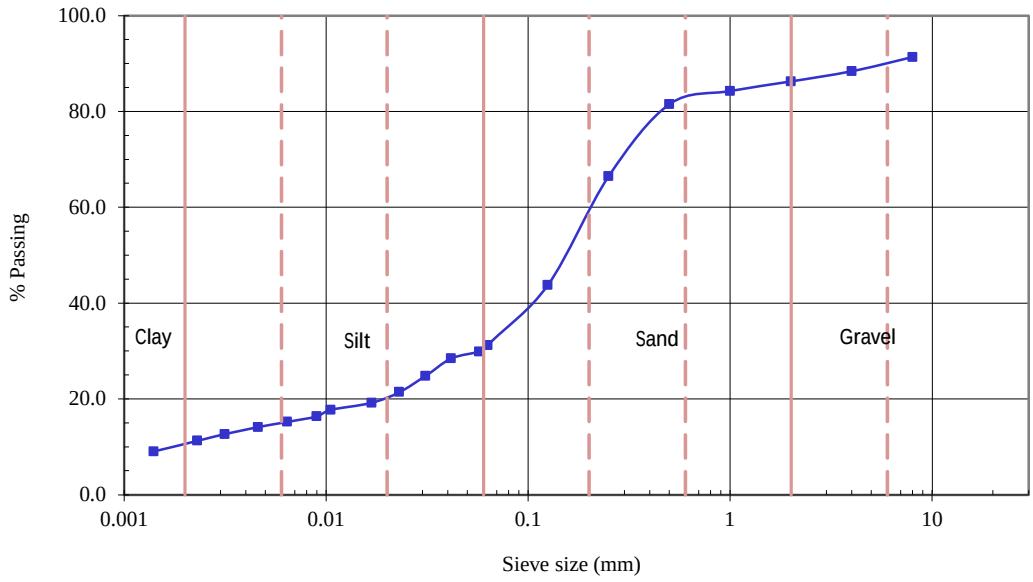
Particle Size Distribution

Sample Ref	**A/50053**	**Client**	Brianplant Grimsby

Site	Manton Quarry		
Location	current production		
Material	Topsoil		
Date/Time sampled	04/09/2018	TP/BH	N/A
Client sample No		Depth	N/A
Sampled by	M. Driver	Sample Type	Bulk

Determination of Particle size distribution - Sedementation method

Test method BS 1377 Part 2 1990



	%
Clay	11
Silt	20
Sand	55
Gravel	14

Comments

File ref	0018/0703/G
Date tested	13/09/2018
Date reported	14/09/2018

Signed M.J. Green C. Driver
Director

Certificate of sampling when submitted is retained by the Laboratory and available upon request
Samples will normally be kept for 14 days from the date reported

2531

ANALYTICAL TEST REPORT

Contract no: 88704

Contract name: 9a Darwin Street, Kirton Lindsey

Client reference: 1166/4758

Clients name: Humberside Materials Laboratory

Clients address: Atherton Way
Brigg
North Lincolnshire
DN20 8AR

Samples received: 26 August 2020

Analysis started: 26 August 2020

Analysis completed: 03 September 2020

Report issued: 03 September 2020

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
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
NAD No Asbestos Detected

Approved by: [redacted]
Dave Bowerbank
Customer Support Hero

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
88704-1	S/56984	-	Sandy Clay with Gravel & Roots	-	-	12.2
88704-2	S/56985	-	Sandy Clay with Gravel & Roots	-	-	11.8
88704-3	S/56986	-	Sandy Clay with Gravel & Roots	-	-	12.9

Chemtech Environmental Limited

SOILS

Lab number			88704-1	88704-2	88704-3
Sample id			S/56984	S/56985	S/56986
Location			HP1	HP2	HP3
Depth (m)			-	-	-
Date sampled			24/08/2020	24/08/2020	24/08/2020
Test	**Method**	**Units**			
Arsenic (total)	CE054	mg/kg As	22	14	13
Beryllium (total)	CE054	mg/kg Be	1.3	1.5	0.5
Boron (water soluble)	CE063 M	mg/kg B	0.6	1.3	0.7
Cadmium (total)	CE054	mg/kg Cd	3.8	2.7	2.1
Chromium (total)	CE054	mg/kg Cr	114	67	54
Copper (total)	CE054	mg/kg Cu	315	67	25
Lead (total)	CE054	mg/kg Pb	47	48	41
Mercury (total)	CE054	mg/kg Hg	<0.5	<0.5	<0.5
Nickel (total)	CE054	mg/kg Ni	27	14	11
Selenium (total)	CE054	mg/kg Se	<0.3	<0.3	0.4
Vanadium (total)	CE054	mg/kg V	400	110	75
PAH					
Naphthalene	CE087 M	mg/kg	0.02	0.07	<0.02
Acenaphthylene	CE087 M	mg/kg	0.03	0.04	0.03
Acenaphthene	CE087 M	mg/kg	0.02	0.07	<0.02
Fluorene	CE087 U	mg/kg	0.03	0.06	<0.02
Phenanthrene	CE087 M	mg/kg	0.55	1.17	0.27
Anthracene	CE087 U	mg/kg	0.23	0.44	0.08
Fluoranthene	CE087 M	mg/kg	1.47	3.79	0.92
Pyrene	CE087 M	mg/kg	1.26	3.41	0.83
Benzo(a)anthracene	CE087 U	mg/kg	0.91	2.21	0.62
Chrysene	CE087 M	mg/kg	0.96	2.30	0.68
Benzo(b)fluoranthene	CE087 M	mg/kg	1.10	2.59	0.84
Benzo(k)fluoranthene	CE087 M	mg/kg	0.49	1.12	0.36
Benzo(a)pyrene	CE087 U	mg/kg	0.86	2.13	0.60
Indeno(123cd)pyrene	CE087 M	mg/kg	0.65	1.65	0.53
Dibenz(ah)anthracene	CE087 M	mg/kg	0.14	0.32	0.10
Benzo(ghi)perylene	CE087 M	mg/kg	0.54	1.28	0.43
PAH (total of USEPA 16)	CE087	mg/kg	9.26	22.7	6.28
Subcontracted analysis					
Asbestos (qualitative)	$	-	NAD	NAD	NAD

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SOLIDS

Lab number			88704
Sample id			S/56988
Location			HP1 Cap Layer
Date sampled			24/08/2020
Test	**Method**	**Units**	
Arsenic (total)	CE054	mg/kg As	6.1
Beryllium (total)	CE054	mg/kg Be	1.9
Boron (water soluble)	CE063	mg/kg B	0.5
Cadmium (total)	CE054	mg/kg Cd	2.5
Chromium (total)	CE054	mg/kg Cr	50
Copper (total)	CE054	mg/kg Cu	21
Lead (total)	CE054	mg/kg Pb	19
Mercury (total)	CE054	mg/kg Hg	<0.5
Nickel (total)	CE054	mg/kg Ni	25
Selenium (total)	CE054	mg/kg Se	<0.3
Vanadium (total)	CE054	mg/kg V	42

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg As
CE054	Beryllium (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Be
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	Dry		0.2	mg/kg Cd
CE054	Chromium (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Cr
CE054	Copper (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Cu
CE054	Lead (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Pb
CE054	Mercury (total)	Aqua regia digest, ICP-OES	Dry		0.5	mg/kg Hg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Ni
CE054	Selenium (total)	Aqua regia digest, ICP-OES	Dry		0.3	mg/kg Se
CE054	Vanadium (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg V
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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METHOD DETAILS

METHOD	SOLIDS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE054	Arsenic (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg As
CE054	Beryllium (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Be
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry		0.5	mg/kg B
CE054	Cadmium (total)	Aqua regia digest, ICP-OES	Dry		0.2	mg/kg Cd
CE054	Chromium (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Cr
CE054	Copper (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Cu
CE054	Lead (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Pb
CE054	Mercury (total)	Aqua regia digest, ICP-OES	Dry		0.5	mg/kg Hg
CE054	Nickel (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg Ni
CE054	Selenium (total)	Aqua regia digest, ICP-OES	Dry		0.3	mg/kg Se
CE054	Vanadium (total)	Aqua regia digest, ICP-OES	Dry		1	mg/kg V

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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)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
88704-1	S/56984	-	N	
88704-2	S/56985	-	N	
88704-3	S/56986	-	N	

Appendix C

Consignment notes