



GRM Development Solutions Ltd
Laurus House
First Avenue
Centrum 100
Burton upon Trent
Staffordshire
DE14 2WH

Tel: 01283 551 249
Fax: 01283 211 968
Email: richard.hodgkinson@grm-uk.com
Web: www.grm-uk.com

Our Ref: P6559 Soil LET
Date: 19th August 2016

Forrest
BY EMAIL

For Attention of Mrs Vicky Cabo

Dear Vicky,

Re: Great Ancoats Street, Manchester POS soil validation

Further to your recent instructions soil capping validation of public open space has been completed.

Capping Validation

As set out previously, areas of public open space (planted beds) at the development require a 300mm soil cap. An engineer visited the site on the 11th August 2016 to validate the thickness of the capping layer. The validation confirmed the presence of at least 300mm topsoil. Soil validation photographs are included.

GRM have undertaken validation testing of the imported topsoil, the results are enclosed for reference. All results are below the relevant GRM Tier 1 Assessment criteria threshold values and as such the topsoil does not pose a risk to human health and is suitable for use in the capping layer. The threshold values are presented in Appendix D.

This letter should be forwarded to the local EHO for approval of the recommendations contained within.

Conclusions

It is considered that the required remediation for the areas of POS has been successfully completed and the residual risk to future end users will be negligible.

We trust this is suitable for your current requirements, should you require any further information or would like any clarification of the points raised please do not hesitate to contact us.

Yours sincerely,
for GRM Development Solutions Ltd



Richard Hodgkinson
Acting Senior Geotechnical Engineer



Richard Upton
Principal Geo-environmental Engineer

ENC:

Inspection sheet

Soil Validation Photographs

Capping Validation Data (chemical analysis results)

GRM Threshold Values

GRM SOIL VALIDATIONS AND SAMPLING RECORD SHEET

Project Number: P 6559	Date: 11/8/16
SITE NAME: Great Ancoats, Manchester	
CLIENT: Forest Ltd	

GARDEN VALIDATION (S)

Plot (s) POS1			Rear: /	Front: /	
SUBSOIL DEPTHS: mm	Samples taken 20	Sample depth taken at:	TOPSOIL DEPTHS: mm	Samples taken YN	Sample depth taken at: 0.1
PHOTOGRAPHS TAKEN (tick)	With staff - depths: /	Distance from hse: /	In pit showing strata: /	Other	
Measured depth of pit: mm		Hand dug: /	Machine: /	Pre dug:	Pipe: /

STOCKPILE/HEAP SAMPLING

HEAP TYPE : TICK	SUBSOIL	TOPSOIL	WASTE
For use on site:	For use on other site:	To be removed & disposed of:	
Approx. Heap size:	Number of standard samples taken:	Number of bulk bag samples taken:	
Depth samples taken at:		Other:	
PHOTOGRAPHS TAKEN	Whole Heap:	Close up of soil type:	

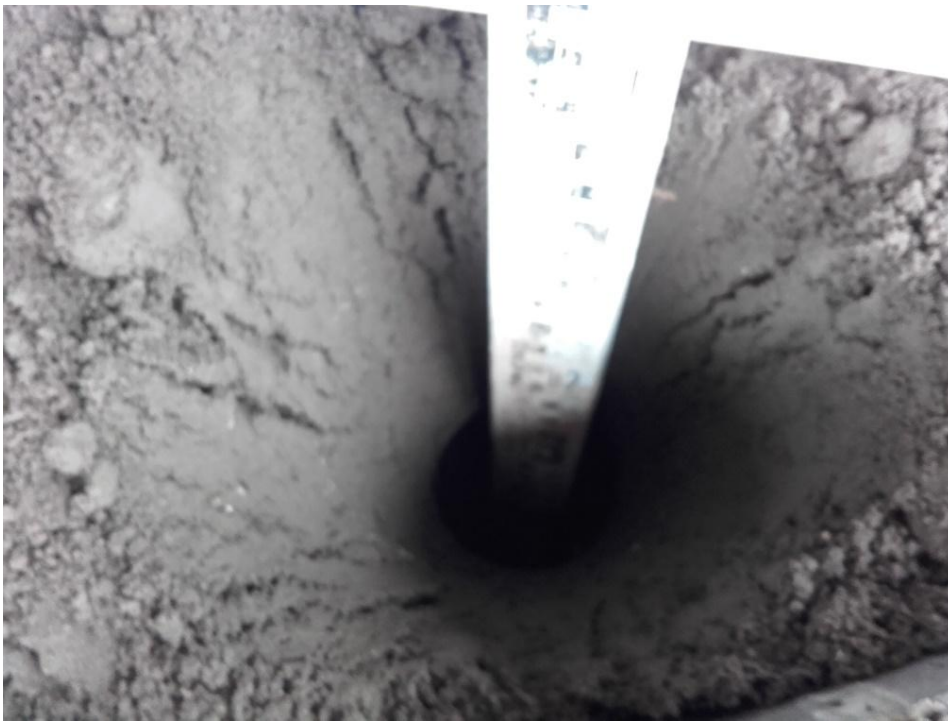
Weather conditions:	WED
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Visiting GRM Inspector/Engineer:	S. MORRIS
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Engineer to process samples & record sheet: RH.	Samples left where:	Shelf No: gone to lab	Bench:	Direct Lab:	By desk (if told):
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SKETCH PLAN OF PIT &, OR DEPTHS OF EACH PLOT STRATA/HEAP & WHERE SAMPLES TAKEN ETC:

POS1 0.0-0.4 Topsoil.



DO NOT SCALE
NOTES:



GRM Development Solutions Ltd
Laurus House, First Ave, Centrum 100,
Burton-on-Trent, Staffordshire
Tel: 01283 551 249 Fax: 01283 211 968
mail@grm-uk.com www.grm-uk.com

CLIENT:	
Forrest	
PROJECT:	
Great Ancoats Street, Manchester	
TITLE:	
POS Soil Validation Photographs	
SCALE@SIZE:	ISSUE:
NTS	FINAL
DESIGN/DRAWN:	DATE:
RJH	08/2016
PROJECT No:	DRAWING No:
P6559	
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Nicholls Colton Analytical
7 - 11 Harding Street
Leicester
LE1 4DH

GRM Development Solutions

Laurus House
First Avenue
Centrum 100
Burton Upon Trent
Staffs
DE14 2WH

Analytical Test Report: L16/1798/GRM/001

Your Project Reference:	Great Ancoats Street, Manchester	Samples Received on:	11.08.2016
Your Order Number:	P6559	Testing Instruction Received:	11.08.2016
Report Issue Number:	1	Sample Tested:	11 to 16.08.2016
Samples Analysed:	2 Soils	Report issued:	16.08.2016

Signed

M. Shelbourne
Director - Operations UK & Ireland
Nicholls Colton Analytical

Notes:

General

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report with the exception of the asbestos test portion which is held for 6 months unless otherwise requested.

Moisture Content was determined in accordance with NCA method statement MS - CL - Sample Prep, oven dried at <30°C.

Moisture Content is reported as a percentage of the dry mass of soil, this calculation is in accordance with BS1377, Part 2, 1990, Clause 3.2

Stone Content was determined in accordance with NCA method statement MS - CL - Sample Prep and refers to the percentage of stones retained on a 10mm BS test sieve.

With the exception of Sulphate, which is crushed over the 2mm test sieve, concentrations are reported as a percentage mass of the dry soil passing the 10mm BS test sieve. As received samples have been corrected for moisture content but not stone content.

Samples were supplied by customer.

Asbestos

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Deviant Samples

Samples were received in suitable containers **Yes**

A date and time of sampling was provided **Yes**

Sample handling times were exceeded prior to analysis of determinants **No**

Where samples do not meet one or more of the above criteria they will be classed as deviant, this means data may not be representative of the sample at the time of sampling and it is possible that results provided may be compromised.

Accreditation Key

UKAS = UKAS Accreditation, MCERTS = MCERTS Accreditation, u = Unaccredited



Nicholls Colton Analytical
7 - 11 Harding Street
Leicester
LE1 4DH

L16/1798/GRM/001

Project Reference - Great Ancoats Street, Manchester

Analytical Test Results - GRM Soil Suite

NCA Reference			16-25332	16-25333
Client Sample Reference			S1	S2
Client Sample Location				
Depth (m)			Not provided	Not provided
Date of Sampling			11.08.2016	11.08.2016
Time of Sampling			Not provided	Not provided
Sample Matrix			Loam	Loam
Determinant	Units	Accreditation		
Arsenic	(mg/kg)	MCERTS	< 10	< 10
Cadmium	(mg/kg)	MCERTS	0.3	0.3
Chromium (Total)	(mg/kg)	UKAS	7.6	7.6
Copper	(mg/kg)	MCERTS	18.2	17.9
Lead	(mg/kg)	MCERTS	32.2	26.6
Mercury	(mg/kg)	UKAS	< 2.5	< 2.5
Nickel	(mg/kg)	MCERTS	8.6	8.5
Selenium	(mg/kg)	u	< 8	< 8
Zinc	(mg/kg)	MCERTS	44.8	39.8
Total Phenols	(mg/kg)	MCERTS	< 1	< 1
Cyanide (Total)	(mg/kg)	MCERTS	< 1	< 1
Chromium (Hexavalent)	(mg/kg)	u	< 1	1.7
pH	pH Units	MCERTS	7.8	7.6
SOM	(%)	UKAS	3.0	3.5
Sulphate	(mg/l)	u	32	43
Acenaphthene	(mg/kg)	MCERTS	<0.02	<0.02
Acenaphthylene	(mg/kg)	UKAS	<0.02	<0.02
Anthracene	(mg/kg)	UKAS	<0.02	<0.02
Benzo (a) anthracene	(mg/kg)	MCERTS	0.05	0.03
Benzo (a) pyrene	(mg/kg)	MCERTS	0.05	0.04
Benzo (b) fluoranthene	(mg/kg)	MCERTS	0.07	0.05
Benzo (g, h, i) perylene	(mg/kg)	MCERTS	0.05	0.04
Benzo (k) fluoranthene	(mg/kg)	MCERTS	0.03	<0.02
Chrysene	(mg/kg)	MCERTS	0.06	0.06
Dibenzo (a,h) anthracene	(mg/kg)	MCERTS	<0.02	<0.02
Fluoranthene	(mg/kg)	MCERTS	0.09	0.08
Fluorene	(mg/kg)	MCERTS	<0.02	<0.02
Indeno (1, 2, 3,-cd) pyrene	(mg/kg)	MCERTS	0.04	0.03
Naphthalene	(mg/kg)	MCERTS	<0.02	<0.02
Phenanthrene	(mg/kg)	MCERTS	0.03	0.03
Pyrene	(mg/kg)	MCERTS	0.09	0.08
Total PAH (Sum of USEPA 16)	(mg/kg)	UKAS	0.70	0.62
Asbestos	-	UKAS	No asbestos detected	No asbestos detected

L16/1798/GRM/001

Project Reference - Great Ancoats Street, Manchester

Analytical Test Results - TPH CWG

NCA Reference			16-25332	16-25333
Client Sample Reference			S1	S2
Client Sample Location				
Depth (m)			Not provided	Not provided
Date of Sampling			11.08.2016	11.08.2016
Time of Sampling			Not provided	Not provided
Sample Matrix			Loam	Loam
Determinant	Units	Accreditation		
Aliphatics				
>C ₅ to C ₆	(mg/kg)	u	<0.04	<0.04
>C ₆ to C ₈	(mg/kg)	u	<0.04	<0.04
>C ₈ to C ₁₀	(mg/kg)	u	<0.04	<0.04
>C ₁₀ to C ₁₂	(mg/kg)	u	<12	<12
>C ₁₂ to C ₁₆	(mg/kg)	u	<12	<12
>C ₁₆ to C ₂₁	(mg/kg)	u	<12	<12
>C ₂₁ to C ₃₅	(mg/kg)	u	<12	<12
Aromatics				
>C ₅ to C ₇	(mg/kg)	u	<0.04	<0.04
>C ₇ to C ₈	(mg/kg)	u	<0.04	<0.04
>C ₈ to C ₁₀	(mg/kg)	u	<0.04	<0.04
>C ₁₀ to C ₁₂	(mg/kg)	u	<12	<12
>C ₁₂ to C ₁₆	(mg/kg)	u	<12	<12
>C ₁₆ to C ₂₁	(mg/kg)	u	<12	<12
>C ₂₁ to C ₃₅	(mg/kg)	u	<12	<12
Total				
>C ₅ to C ₃₅	(mg/kg)	u	<24	<24



Nicholls Colton Analytical
7 - 11 Harding Street
Leicester
LE1 4DH

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Project Reference - Great Ancoats Street, Manchester

Sample Descriptions

NCA Reference	Client Sample Reference	Sample Location	Description	Moisture Content (%)	Stone Content (%)
16-25332	S1	Stockpile	Brown sandy gravelly silt with organic matter.	15	22
16-25333	S2	Stockpile	Brown sandy gravelly silt with organic matter.	20	0



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Project Reference - Great Ancoats Street, Manchester

Analysis Methodologies

Matrix	Determinant	Sample condition for analysis	Test Method used
Soil	Metals	Air Dried	In house method statement - MS - CL - ICP metals
Soil	PAH	As Received	In house method statement - MS - CL - PAH (As received)
Soil	Phenols	As Received	In house method statement - MS - CL - Phenols (Skalar)
Soil	Chromium (hexavalent)	As Received	In house method statement - MS - CL - Chromium (Hexavalent)
Soil	Cyanide	As Received	In house method statement - MS - CL - Cyanide by Skalar
Soil	pH	As Received	In house method statement - MS - CL - pH (Soil) using a 1:3 soil to water extraction
Soil	SOM	Air Dried	In house method statement - MS - CL - TOC
Soil	Sulphate	Air Dried	In house method statement - MS - CL - Anions (Aquakem)
Soil	CWG	As Received	In house method statement - MS - CL - EPH and VPH
Soil	Asbestos	As Received	Fibre identification is in accordance with in house documented methods which are based on the procedure documented in the HSE Document HSG 248 "Asbestos: The analysts guide for sampling, analysis and clearance procedures"

	GRM TIER 1 ASSESSMENT CRITERIA		
LAND USE	Public Open Space 1 (residential)		
CONTAMINANT	1%	2.50%	6%
^e Arsenic	79	79	79
^e Cadmium	220	220	220
^b Chromium III	10500	10500	10500
^e Chromium VI	23	23	23
^e Lead	630	630	630
^g Mercury	502	502	502
^g Selenium	1380	1380	1380
^g Nickel	622	622	622
^b Phenols	8760	8810	8840
^b Copper	16400	16400	16400
^b Zinc	80700	80700	80700
^d Cyanide	34	34	34
^e Benzene	140	140	140
^b Toluene	55,000	55100	55200
^b Ethylbenzene	24,400	24600	24700
^b o - xylene	40,600	42000	42800
^b m - xylene	40,500	41900	42800
^b p - xylene	40,400	41800	42700
Non Genotoxic PAHs			
^b Acenaphthene	14600	14600	14600
^b Acenaphthylene	14600	14600	14600
^b Anthracene	72900	72900	72900
^b Fluoranthene	3030	3035	3040
^b Fluorene	9710	9710	9710
^b Naphthalene	3990	4360	4360
^b Phenanthrene	3020	3020	3020
^b Pyrene	7290	7290	7290
Genotoxic PAHs			
^{e/f} Benzo(a)pyrene	10	10	10
ALIPHATIC HYDROCARBONS			
^b C5-C6	567000	583000	596000
^b C6-C8	550000	565000	581000
^b C8-C10	12300	12400	12400
^b C10-C12	12400	12400	12400
^b C12-C16	12400	12400	12400
^b C16-35	249000	249000	249000
AROMATIC HYDROCARBONS			
^b C5-7 (benzene)	54800	55000	55100
^b C7-8 (toluene)	55000	55100	55200
^b C8-C10	4950	4960	4970
^b C10-C12	4970	4970	4970
^b C12-C16	4980	4980	4970
^b C16-C21	3730	3730	3730
^b C21-C35			

Notes

- a SGV (2009)
- b LQM/CIEH values or derived using CLEAv1.06 with LQM/CIEH Data.
- c SGV for inorganic Hg used (ref.2009 SGV, Pg5, Para.4)
- d Atkins ATRISKsoil Value
- e C4SL - SP1010 (2014)
- f Benzo(a)pyrene is a surrogate marker for the 8 genotoxic PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(ghi)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(ah)anthracene, Ideno(1,2,3-cd)pyrene)
- g Based on SGV TOX data with revised exposure parameters
- NB Where C4SLs/SGVs have not been produced, all TACs have been revised in line with report SP1010 (2014), however, the default consumption rates in the CLEAv1.06 model have been retained.

GRM.TAC.08.14