Geotechnical & Environmental Consultants

Our ref: D34136/PK

22nd December 2017

Seagate Homes Ltd
C/o Kris Baxter
Eleven Consultants Ltd.
The Boathouse
Harbour Square
Nene Parade
Wisbech
PE13 3BH

For the attention of Mr K. Baxter

Dear Kris

Re: Validation Report (Plots 1 to 19) - Church Street, Holbeach

Further to our recent site visits, we are pleased to provide the following validation report in relation to the gardens at Plots 1 to 19 at the above site.

PROJECT SUMMARY

The following reports have previously been prepared in relation to the site:

- GeoDyne Limited report entitled '*Church Street, Holbeach – Combined Phase I Desk Study & Phase II Exploratory Investigation*' produced for Langwith Construction, reference D34136, dated 17th February 2015.
- GeoDyne Limited letter report '*Church Street, Holbeach – Post Demolition Investigation Report*', reference D34136/CB, dated 9th May 2017.
- GeoDyne Limited report entitled '*Church Street, Holbeach – Remediation Method Statement For Seagate Homes Ltd*', reference D34136, dated 26th July 2017.

We would recommend that the above reports are read in conjunction with this report. This validation report has been produced based on the assumption that the above reports have been reviewed and approved by the Local Authority.

REMEDIATION PROPOSALS

The post demolition contamination assessment (reported in May 2017) revealed the Made Ground to contain elevated concentrations of PAHs and lead with respect to the proposed residential end-use. Furthermore, the Made Ground was considered to be undesirable and was found to incorporate localised chrysotile asbestos (as loose fibres). On this basis, it was considered necessary to undertake remediation within garden areas to afford an appropriate level of protection to human health (i.e. the end-users).

Our post demolition contamination report recommended the provision of 1.00m of suitably clean remedial capping to all gardens or, as an alternative, a reduced thickness of suitably clean remedial capping (0.60m) placed over a suitably robust geotextile membrane.

The Client (Seagate Homes) elected to undertake a reduced level dig and utilise a geotextile membrane (Geosynthetics Ekotex) beneath a minimum of 0.60m of remedial capping within all gardens.

The RMS recommended that the formation level be inspected prior to the placement of the geotextile membrane and that any potentially sharp deleterious materials (i.e. glass shards, brick fragments etc.) present at formation level be removed to minimise the risk of puncture to the underside of the membrane.

WATCHING BRIEF

As stated previously, post demolition works revealed the presence of chrysotile asbestos (loose fibres) within the Made Ground. The RMS recommended that a watching brief be maintained at the site by an appropriately qualified Contractor during site excavation/construction works to identify the potential presence of any Asbestos Containing Material (ACM) within the Made Ground. The Site Manager has confirmed to GeoDyne that a watching brief was maintained by the Contractor and that no further ACM was encountered during site excavation/construction works. We would note that the remediation proposals included the provision of a suitably robust geotextile membrane (i.e. hard to dig layer) at the base of a suitably clean remedial capping layer within gardens to minimise the risk of exposure of the site end-users should any residual ACM be present within the Made Ground.

Previous works undertaken at the site by GeoDyne also identified the potential presence of a pumped well and interceptor chambers associated with historic activities at the site. Our RMS recommended that a watching brief be maintained by the Contactor during excavation/construction works at the site to attempt to identify these features, where present. The Site Manager has confirmed to GeoDyne that a watching brief was maintained by the Contractor and that the presence of a pumped well or interceptor chambers were not identified.

FORMATION INSPECTION & GEOTEXTILE MEMBRANE

It is understood that a reduced level dig was undertaken within the rear garden areas at Plots 1 to 19 to expose the formation level, prior to placement of the Geosynthetics Ekotex membrane. During our site visits during November and December 2017, the formation level was inspected within the rear gardens. We can confirm that no deleterious materials were present at formation level within the inspected rear gardens prior to placement of the membrane, in accordance with the RMS. Photographs of the exposed formation level at selected plots are attached to this report (see Plate No. GV1 – Photos A to C).

Whilst GeoDyne were not requested by the Client to inspect the placement of the geotextile membrane, we have been forwarded by the Site Manager photographic evidence during placement of the membrane within selected rear gardens. These photographs are attached to this report (see Plate No. GV2 – Photo A and Plate No GV3 – Photos A to C).

REMEDIAL CAPPING MATERIALS

The remedial capping materials placed in the rear gardens comprised entirely of imported topsoil. No subsoil was imported to the site. It is understood that donor topsoil from a site known as ‘Saddlebrow, Kings Lynn’ was selected by the Client for the Church Street site.

Prior to importation, we were forwarded (by the Client) a copy of laboratory chemical analysis test results relating to a single sample of topsoil, together with a single sample of subsoil from the Saddlebrow donor site for review. From our review of the results, the topsoil appeared to be chemically suitable for use at the site based on the single result.

However, further testing of the donor topsoil (to provide a minimum of 3No. test results) was recommended by GeoDyne, in accordance with the requirements of the RMS. At the request of the Client, the single result relating to the donor topsoil was submitted by GeoDyne to the Local Authority for review. The Local Authority concluded that they were satisfied with the topsoil source provided that further testing of the topsoil was undertaken in accordance with the RMS, to confirm its suitability for re-use. A copy of the correspondence from the Local Authority is attached.

Following importation of the donor ‘Saddlebrow’ topsoil, we were requested by the Client to attend site to sample the topsoil for further chemical analysis, in accordance with the RMS and the requirements of the Local Authority.

A total of 5No. visually representative samples of the donor topsoil were obtained during our visit. These samples were commissioned for chemical analysis for a standard suite of determinands (i.e. metals and speciated PAHs) as detailed in the RMS. The results of the analysis (both supplied by the Client and undertaken by GeoDyne) are summarised in Table 1 and the results confirmed the topsoil to be chemically suitable for use within gardens at the site from a human health perspective.

The laboratory test results are attached to this report for information purposes.

TABLE 1– SUMMARY OF IMPORTED TOPSOIL ANALYSIS RESULTS (RESIDENTIAL END-USE WITH PLANT UPTAKE)

Determinand	Tier 1 SAC (mg/kg)	Donor Topsoil Concentration – Results supplied by the Client (mg/kg)	Donor Topsoil Concentration Range – Results obtained by GeoDyne (Samples A to E) (mg/kg)	PASS/FAIL?
Metals				
Arsenic	37 S4UL	8	9 – 11	Pass
Cadmium	11 S4UL	0.6	<0.5 – 0.7	Pass
Chromium III	910 S4UL	15	19 – 23	Pass
Chromium VI	6 S4UL	<1	<1	Pass
Lead	200 C4SL	37	62 – 80	Pass
Inorganic Mercury	40 S4UL	<0.17	<0.17	Pass
Selenium	250 S4UL	<1	<1	Pass
Nickel	130 S4UL	13	17 – 20	Pass
Copper	2400 S4UL	10	19 – 26	Pass
Zinc	3700 S4UL	50	81 – 97	Pass
PAHs				
Acenaphthene	210 S4UL	0.02	<0.1	Pass
Acenaphthylene	170 S4UL	<0.01	<0.1	Pass
Anthracene	2400 S4UL	0.03	<0.1 – 0.1	Pass
Benz(a)anthracene	7.2 S4UL	0.2	0.3 – 1.1	Pass
Benzo(a)pyrene	2.2 S4UL	0.23	0.3 – 1.1	Pass
Benzo(b)fluoranthene	2.6 S4UL	0.27	0.4 – 1.4	Pass
Benzo(ghi)perylene	320 S4UL	0.11	0.2 – 0.5	Pass
Benzo(k)fluoranthene	77 S4UL	0.10	0.1 – 0.4	Pass
Chrysene	15 S4UL	0.25	0.3 – 1.1	Pass
Dibenzo(ah)anthracene	0.24 S4UL	0.04	<0.1 – 0.1	Pass
Fluoranthene	280 S4UL	0.33	0.5 – 1.1	Pass
Fluorene	170 S4UL	0.02	<0.1	Pass
Indeno(123-cd)pyrene	27 S4UL	0.16	0.2 – 0.7	Pass
Naphthalene	2.3 S4UL	<0.03	<0.1	Pass
Phenanthrene	95 S4UL	0.26	0.2 – 0.7	Pass
Pyrene	620 S4UL	0.29	0.5 – 1.9	Pass

Key

S4UL – CIEH/LQM Suitable 4 Use Levels (2015). Copyright Land Quality Management Limited. All rights reserved.

C4SL - value for Lead taken from DEFRA publication SP1010.

Note

SAC values for metals derived from S4UL values assume 6% Soil Organic Matter.

SAC values for PAHs derived from S4UL values assume 1% SOM in the first instance (where appropriate, S4UL values for 2.5% or 6% SOM may be considered for the assessment of donor soils).

It should be noted that the topsoil results supplied by the Client also included analysis of the topsoil sample in accordance with BS3882: 2015 *'Specification for topsoil'*. The analysis revealed that the topsoil does not fully comply with the requirements of BS8832:2015 with respect to nutrient levels. Following their review of the topsoil analysis results, the LA commented '*…that in accepting soil onto the site that may be nutritionally sub-standard, the developer accepts full responsibility for any issues arising once the properties are occupied as a consequence i.e. failure of plants, grass etc*'. We would concur with this comment.

REMEDIAL CAPPING THICKNESS

At the request of the Client and in accordance with the RMS, an Engineer attended site to inspect the thickness of remedial capping (i.e. imported topsoil) placed over the geomembrane within the rear gardens to Plots 1 to 19.

In accordance with the RMS, validation of the remedial capping was undertaken utilising a drainpipe placed vertically onto the geotextile membrane to create a preformed validation hole, prior to placement of the imported topsoil. This methodology of validation was proposed to minimise the risk of damage to the membrane from a spade/auger during validation works.

In all instances, the presence of the geomembrane within the validation hole was confirmed and a minimum of 0.60m of the imported topsoil was present at each validation hole location. No significant deleterious materials where observed within the imported topsoil, which was sandy, clayey and gravelly in composition and visually appeared of good quality.

Plates showing the placed topsoil and validation holes within selected rear gardens are attached to this report (see Plate No. GV4 – Photos A and B, Plate No. GV5 – Photos A and B & Plate No. GV6 – Photo A).

We understand from the client that topsoil will not be utilised within the front garden areas as they are of limited size and are to be finished with a layer of compacted gravel. This is primarily due to the presence of a significant number of buried services passing through the front gardens with separate service runs feeding the individual plots. Whilst it is acknowledged that the RMS recommended the placement of a geotextile membrane overlain by a minimum of 0.60m of suitably clean remedial capping within the front gardens, we would note that the presence of the gravel surround to the buried services and the services themselves are considered to provide a hard to dig layer and a suitable break in the contaminant-pathway-receptor linkage.

On this basis, we understand that a geotextile membrane will not be placed in the front garden areas and we do not envisage undertaking validation works within the completed front gardens for health and safety reasons based on the presence of buried services.

Plates showing the front garden areas at selected plots during our site visits are attached to this report (see Plate No. GV7 – Photos A and B).

CONCLUSIONS

On the basis of the above information, it is considered that the recommendations within our RMS have been adhered to within the gardens of Plots 1 to 19 at the site, and inspection of remedial capping placed within the rear gardens has demonstrated compliance with the recommendations.

Taking account of the significant number of shallow services within the front gardens and the presence of compacted gravel, it is considered that the front gardens have been remediated as far as reasonably practicable.

We therefore consider that the required remedial measures applicable to gardens for Plots 1 to 19 as approved by the Local Authority have been appropriately implemented at these plots, as far as reasonably practicable.

REGULATORY CONSULTATION

We would recommend that a copy of this report is issued to the Local Authority (South Holland District Council), together with the NHBC (as necessary) for comment/approval.

We trust the above report is suitable to your current requirements. However should you require any further information at this stage, please do not hesitate to contact the undersigned.

Yours sincerely
For and on behalf of GeoDyne Limited



Paul Kershaw
Director

Encl Donor Topsoil - Laboratory Soil Test Results
Local Authority Correspondence
Plates GV1 to GV7
Conditions & Limitations

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/06333
Issue Number: 1 **Date:** 29 September, 2017

Client:
Norfolk Partnership Laboratory
Environment, Transport and Development Department
Norfolk County Council
County Hall
Norwich
Norfolk
NR1 2SG

Project Manager: Sharon Woods; Simon Holden
Project Name: King's Lynn. Saddlebrow
Project Ref: WGSG0001
Order No: 564842
Date Samples Received: 18/09/17
Date Instructions Received: 18/09/17
Date Analysis Completed: 29/09/17

Prepared by:

Danielle Brierley
Client Manager

Approved by:

John Gustafson
Director

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME
UKAS TESTING 1247

Envirolab Job Number: 17/06333

Client Project Name: King's Lynn. Saddlebrow

Client Project Ref: WGSG0001

Lab Sample ID	17/06333/1	17/06333/2							Units	Method ref
Client Sample No	091512	091513								
Client Sample ID	10mm Topsoil	20mm Subsoil								
Depth to Top	0.10	0.20								
Depth To Bottom										
Date Sampled	11-Sep-17	11-Sep-17								
Sample Type	Soil - D	Soil - D								
Sample Matrix Code	5A	5A								
% Stones >10mm$_A$	<0.1	2.7							% w/w	A-T-044
pH$_D$ M#	8.14	8.42							pH	A-T-031s
Sulphate (water sol 2:1)$_D$ M#	0.04	0.03							g/l	A-T-026s
Sulphate (acid soluble)$_D$ M#	470	430							mg/kg	A-T-028s
Cyanide (total)$_A$ M#	2	2							mg/kg	A-T-042sTCN
Phenols - Total by HPLC$_A$	<0.2	<0.2							mg/kg	A-T-050s
Sulphide$_A$	<15	<15							mg/kg	A-T-S2-s
Sulphur (elemental)$_D$ M#	<5	<5							mg/kg	A-T-029s
Organic matter$_D$ M#	2.7	2.0							% w/w	A-T-032 OM
Arsenic$_D$ M#	8	8							mg/kg	A-T-024s
Boron (water soluble)$_D$ M#	<1.0	<1.0							mg/kg	A-T-027s
Cadmium$_D$ M#	0.6	<0.5							mg/kg	A-T-024s
Copper$_D$ M#	10	10							mg/kg	A-T-024s
Chromium$_D$ M#	15	15							mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	<1							mg/kg	A-T-040s
Lead$_D$ M#	37	29							mg/kg	A-T-024s
Mercury$_D$	<0.17	<0.17							mg/kg	A-T-024s
Nickel$_D$ M#	13	12							mg/kg	A-T-024s
Selenium$_D$ M#	<1	<1							mg/kg	A-T-024s
Zinc$_D$ M#	50	44							mg/kg	A-T-024s

Envirolab Job Number: 17/06333

Client Project Name: King's Lynn. Saddlebrow

Client Project Ref: WGSG0001

Lab Sample ID	17/06333/1	17/06333/2							Units	Method ref
Client Sample No	091512	091513								
Client Sample ID	10mm Topsoil	20mm Subsoil								
Depth to Top	0.10	0.20								
Depth To Bottom										
Date Sampled	11-Sep-17	11-Sep-17								
Sample Type	Soil - D	Soil - D								
Sample Matrix Code	5A	5A								
PAH 16										
Acenaphthene$_A^{M\#}$	0.02	<0.01							mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	<0.01							mg/kg	A-T-019s
Anthracene$_A^{M\#}$	0.03	0.02							mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.20	0.17							mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.23	0.20							mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.27	0.24							mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.11	0.11							mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.10	0.09							mg/kg	A-T-019s
Chrysene$_A^{M\#}$	0.25	0.20							mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	<0.04							mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	0.33	0.28							mg/kg	A-T-019s
Fluorene$_A^{M\#}$	0.02	<0.01							mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.16	0.14							mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.03	<0.03							mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	0.26	0.13							mg/kg	A-T-019s
Pyrene$_A^{M\#}$	0.29	0.24							mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	2.28	1.83							mg/kg	A-T-019s

REPORT NOTES

General:
This report shall not be reproduced, except in full, without written approval from Envirolab.
All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

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Final Test Report

BS3882 - 2015 Specification for Topsoil, with classification

Envirolab Job Number:	17/06333	Date:	29/09/2017
Issue Number:	1		

Client: Norfolk Partnership Laboratory
Environment, Transport and Development Department
Norfolk County Council
County Hall
Norwich
Norfolk, NR1 2SG

Project Manager:	Sharon Woods/Simon Holden/
Project Name:	King's Lynn. Saddlebrow
Project Ref:	WGSG0001
Order No:	564842
Date Samples Received:	18/09/2017
Date Instructions Received:	18/09/2017
Date Analysis Completed:	29/09/2017

Notes

All results are reported as dry weight (<40°C).

All analysis is performed on the dried sample crushed to pass a 2mm sieve, after removal of stones.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible.

Please contact us if you need any further information.

Prepared by:

Danielle Brierley
Client Manager

Approved by:

John Gustafson
Director

envirolab

Sample Details	
Lab Sample ID	**17/06333/1**
Client Sample Number	**91512**
Client Sample ID	10mm Topsoil
Depth to Top	0.1
Depth to Bottom	
Date Sampled	11-Sep-17

Analyte	Units	Result	Compliant with range (Y / N)					
			Multi-P	Acidic	Calcareous	Low Fertility	Low Fertility Acidic	Low Fertility Calcareous
% Clay	% w/w	14						
% Silt	% w/w	35.2						
% Sand	% w/w	50.8						
Textural class	N/A	Sandy Loam						
Acceptable textural classification?	N/A	Yes	Y	Y	Y	Y	Y	Y
% Coarse Fragment Content >2mm	% w/w	3.7	Y	Y	Y	Y	Y	Y
% Coarse Fragment Content >20mm	% w/w	0	Y	Y	Y	Y	Y	Y
% Coarse Fragment Content >50mm	% w/w	0	Y	Y	Y	Y	Y	Y
Loss on Ignition	%	2.6	N	N	N	Y	Y	Y
pH	pH	8.55	N	N	Y	Y	N	Y
Carbonate as CaCO3	% w/w	4.1			Y			Y
Nitrogen	% w/w	0.0557	N	N	N			
Extractable Phosphate	mg/l	77	Y	Y	Y	N	N	N
Extractable Potassium	mg/l	52	N	N	N			
Extractable Magnesium	mg/l	117	Y	Y	Y			
Carbon:Nitrogen Ratio	:1	27.5	N	N	N	Y	Y	N
Electrical conductivity	µs/cm	2150	Y	Y	Y	Y	Y	Y
Zinc (HNO3 extractable)	mg/kg	50	Y	Y	Y	Y	Y	Y
Copper (HNO3 extractable)	mg/kg	11	Y	Y	Y	Y	Y	Y
Nickel (HNO3 extractable)	mg/kg	13	Y	Y	Y	Y	Y	Y
% Visible Contaminants >2mm	% w/w	0	Y	Y	Y	Y	Y	Y
% Visible Contaminants Plastics	% w/w	0	Y	Y	Y	Y	Y	Y
Sharps, number	N/A	0	Y	Y	Y	Y	Y	Y
	Compliancy		**N**	**N**	**N**	**N**	**N**	**N**

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Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 17/08193
Issue Number: 1 **Date:** 05 December, 2017

Client:
GeoDyne (Derby)
9 Brunel Parkway
Pride Park
Derby
Derbyshire
UK
DE24 8HR

Project Manager: Paul Kershaw
Project Name: Saddlebrow (Donor Topsoil)
Project Ref: D34136
Order No: D34136
Date Samples Received: 01/12/17
Date Instructions Received: 01/12/17
Date Analysis Completed: 05/12/17

Prepared by:
Melanie Marshall
Laboratory Coordinator

Approved by:
John Gustafson
Director

Envirolab Job Number: 17/08193

Client Project Name: Saddlebrow (Donor Topsoil)

Client Project Ref: D34136

Lab Sample ID	17/08193/1	17/08193/2	17/08193/3	17/08193/4	17/08193/5				Units	Method ref
Client Sample No										
Client Sample ID	A	B	C	D	E					
Depth to Top										
Depth To Bottom										
Date Sampled	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17					
Sample Type	Soil	Soil	Soil	Soil	Soil					
Sample Matrix Code	4AE	4A	4AE	4AE	4A					
% Stones >10mm$_A$	5.1	9.5	4.5	11.2	7.4				% w/w	A-T-044
pH$_D$	7.89	7.93	7.94	8.04	8.05				pH	A-T-031s
Total Organic Carbon$_D^{M\#}$	1.80	1.42	1.53	1.39	1.42				% w/w	A-T-032s
Arsenic$_D^{M\#}$	9	10	11	11	11				mg/kg	A-T-024s
Cadmium$_D^{M\#}$	<0.5	0.5	0.6	0.7	0.6				mg/kg	A-T-024s
Copper$_D^{M\#}$	21	26	23	26	19				mg/kg	A-T-024s
Chromium$_D^{M\#}$	20	19	23	20	20				mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	<1	<1				mg/kg	A-T-040s
Chromium (trivalent)	20	19	23	20	20				mg/kg	Calc
Lead$_D^{M\#}$	69	63	80	71	62				mg/kg	A-T-024s
Mercury$_D$	<0.17	<0.17	<0.17	<0.17	<0.17				mg/kg	A-T-024s
Nickel$_D^{M\#}$	17	18	20	18	18				mg/kg	A-T-024s
Selenium$_D^{M\#}$	<1	<1	<1	<1	<1				mg/kg	A-T-024s
Zinc$_D^{M\#}$	84	97	96	90	81				mg/kg	A-T-024s

Envirolab Job Number: 17/08193

Client Project Name: Saddlebrow (Donor Topsoil)

Client Project Ref: D34136

Lab Sample ID	17/08193/1	17/08193/2	17/08193/3	17/08193/4	17/08193/5				Units	Method ref
Client Sample No										
Client Sample ID	A	B	C	D	E					
Depth to Top										
Depth To Bottom										
Date Sampled	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17	29-Nov-17					
Sample Type	Soil	Soil	Soil	Soil	Soil					
Sample Matrix Code	4AE	4A	4AE	4AE	4A					
PAH 16										
Acenaphthene$_A^{M\#}$	<0.1	<0.1	<0.1	<0.1	<0.1				mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.1	<0.1	<0.1	<0.1	<0.1				mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<0.1	<0.1	0.1	<0.1	<0.1				mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.4	0.3	0.6	1.1	0.4				mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.4	0.3	0.7	1.1	0.5				mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.7	0.4	0.9	1.4	0.6				mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.3	0.2	0.3	0.5	0.3				mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.2	0.1	0.2	0.4	0.2				mg/kg	A-T-019s
Chrysene$_A^{M\#}$	0.4	0.3	0.7	1.1	0.5				mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.1	<0.1	<0.1	0.1	<0.1				mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	0.7	0.5	1.1	1.7	0.9				mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.1	<0.1	<0.1	<0.1	<0.1				mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.3	0.2	0.4	0.7	0.3				mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.1	<0.1	<0.1	<0.1	<0.1				mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	0.3	0.2	0.7	0.3	0.2				mg/kg	A-T-019s
Pyrene$_A^{M\#}$	0.7	0.5	1.0	1.9	0.9				mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	4.6	3.5	6.8	10.8	5.1				mg/kg	A-T-019s

REPORT NOTES

General:
This report shall not be reproduced, except in full, without written approval from Envirolab.
All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Paul Kershaw

From: Richard Boole [Richard.boole@breckland-sholland.gov.uk]
Sent: 21 November 2017 11:51
To: Chris Bowley; Paul Kershaw
Subject: FW: Church Street, Holbeach - topsoil testing prior to importation query
Attachments: 17-06333 Saddlebow Topsoil contamination results.pdf; 17-06333 Saddlebow Topsoil-BS3882 (1).pdf

Hi Paul

Further to our phone conversation earlier this morning, here's confirmation of my stance / SHDC's stance having taken advice from other contaminated land officers:-

The first point of concern was that the sampling undertaken to date doesn't meet the standard already laid out in your own report, in so much as only two samples have been taken from the source site / stockpile as opposed to a minimum of 3.

The second point was that the nutritional value of the soil doesn't meet the standard laid out in your own report in so much as it doesn't meet BS3882 standards in this respect.

I understand that the developer is keen to get the soil onto site and that if he's allowed allowed to, you'll be ensuring that further testing is undertaken in-situ.

Our primary concern is that the soil is free from relevant contamination and whilst we'd commend meeting the BS3882 standard, much of this standard relates to nutritional quality of the soil which we don't directly control under the contaminated land regime. I must state therefore that in accepting soil onto the site that may be nutritionally sub-standard, the developer accepts full responsibility for any issues arising once the properties are occupied as a consequence i.e. failure of plants, grass etc.

It may be that the developer could also bring some organic dressing material onto site and blend this with the new soil to improve the nutritional value, however it must be ensured that this is also not contaminated and is of a type that won't give rise to such as odour nuisance.

With all of the above in mind I'm happy for the soil to be brought onto site, but on the understanding that if further sampling reveals any contamination it is brought to our attention and dealt with appropriately. My recommendation would be that the soil be sampled and certified as uncontaminated before it is brought onto site, however this is a risk the developer will have to carry if doing otherwise.

Regards

Richard

Richard Boole | Environmental Protection Manager
Breckland Council and South Holland District Council
Mobile: 07827 827047 Direct Dial (South Holland): 01775-764667
www.breckland.gov.uk | www.sholland.gov.uk

From: Gordon, Diane [mailto:DGordon@sholland.gov.uk]
Sent: 17 November 2017 10:00
To: Richard Boole <Richard.boole@breckland-sholland.gov.uk>
Subject: FW: Church Street, Holbeach - topsoil testing prior to importation query



Photo A - Plots 1 to 6



Photo B - Plots 1 to 6



Photo C - Plots 7 to 12

Project No.	D34136	Drawn	CEH
Client	Seagate Homes Ltd	Checked	PK
		Approved	PK
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	22/12/2017
Title	Garden Validation Works - Exposed formation level at Plots 1 to 6 and Plots 7 to 12	Rev.	
		Plate No.	GV1

GeoDyne



Photo A

Project No.	D34136	Drawn	CEH
Client	Seagate Homes Ltd	Checked	PK
		Approved	PK
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	22/12/2017
Title	Garden Validation Works - Placement of geotextile membrane at Plots 11 & 12	Rev.	
		Plate No.	GV2

GeoDyne



Photo A



Photo B



Photo C

Project No.	D34136	Drawn	CEH
Client	Seagate Homes Ltd	Checked	PK
		Approved	PK
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	22/12/2017
Title	Garden Validation Works - Placement of geotextile membrane at Plots 13 to 19	Rev.	
		Plate No.	GV3

GeoDyne



Photo A - Plots 1 & 2



Photo B - Plots 7 to 10

Project No.	D34136	Drawn	CEH
Client	Seagate Homes Ltd	Checked	PK
		Approved	PK
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	22/12/2017
		Rev.	
Title	Garden Validation Works - Topsoil within rear gardens at Plots 1 & 2 and Plots 7 to 10	Plate No.	GV4

GeoDyne



Photo A



Photo B

Project No.	D34136	Drawn	CEH
Client	Seagate Homes Ltd	Checked	PK
		Approved	PK
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	22/12/2017
		Rev.	
Title	Garden Validation Works - Topsoil within rear gardens at Plots 13 to 17	Plate No.	GV5

GeoDyne



Photo A

Project No.	D34136	Drawn	CEH
Client	Seagate Homes Ltd	Checked	PK
		Approved	PK
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	22/12/2017
		Rev.	
Title	Garden Validation Works - Topsoil within rear gardens at Plots 18 & 19	Plate No.	GV6

GeoDyne



Photo A - Plots 13 to 19



Photo B - Plots 1 to 4

Project No.	D34136	Drawn	CEH
Client	Seagate Homes Ltd	Checked	PK
		Approved	PK
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	22/12/2017
		Rev.	
Title	Garden Validation Works - Services and compacted gravel within the front gardens at Plots 1 to 4 and Plots 13 to 19	Plate No.	GV7

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Conditions & Limitations

Phase I Desk Studies

1. Works undertaken to provide the basis of the Phase I Desk Study report comprise a review of information available from a number of sources/parties (potentially also including the Client) together with a walk over of the site (where applicable and included within the quotation). The opinions given in the Phase I Desk Study are based on the information available from third parties/sources that has been obtained within the available timeframe. GeoDyne Limited assumes all third party information to be true and correct and therefore cannot accept liability for the accuracy of such information supplied.

2. Should additional information become available that may affect the comments and opinions made within the Phase I Desk Study, GeoDyne Limited reserves the right to review such information and make modifications to comments/opinions as appropriate.

3. It should be borne in mind that a Phase I Desk Study collates available information to generate a conceptual model of the site. The actual geotechnical and environmental considerations can only be fully quantified by intrusive investigation works to confirm the accuracy of the conceptual site model.

Phase II Intrusive Investigations

1. Our quotation assumes that access to the site will be arranged by others at no cost to ourselves.

2. We have assumed that free access is available throughout to the entire site and that works can be undertaken during a single mobilisation. Where restricted access is encountered, or where additional unscheduled mobilisations are required, additional costs may be incurred to the client.

3. We have assumed that all available information relating to buried services will be supplied by the Client at no cost to ourselves. No responsibility will be accepted for damage to underground services that have not been brought to our prior attention by the Client.

4. All excavations/boreholes will be backfilled with compacted arisings upon completion, with any excess arisings left proud of ground levels. Excess arisings will not be removed from the site unless specifically requested by the Client. Where we are requested to remove excess arisings, all associated costs will be passed to the Client.

5. We will attempt to leave the site in a clean and tidy state, however, it must be understood that some disturbance of the site is unavoidable during intrusive works.

6. Exploratory holes are positioned approximately on site by GeoDyne Limited. Should the client require precise locations of all exploratory points, additional fees will be incurred. It must be borne in mind that backfilled trial pits can create ‘soft spots’, therefore, should the Client wish to designate ‘no dig’ zones, for example under the footprint of proposed structures, these must be brought to our attention prior to commencement of works.

7. Groundwater observations relate to conditions encountered at the time of investigation. It must be understood that groundwater levels may vary as a result of recent climatic conditions or seasonal variation.

8. Trial pits and boreholes examine only a small proportion of the total site area. No liability can be accepted for conditions not revealed in exploratory holes, particularly between positions. All extrapolations of available data are given in good faith.

Payment

1 Payment terms are strictly 28 days from the invoice date.

2 Prior to commencement of works, we require receipt of formal written instruction from the party accepting full financial responsibility for the work. In the absence of such an instruction, we would expect the instructing Consulting Engineers/Architects to accept full financial responsibility for the works.

3 Receipt of instruction to commence work shall be taken as acceptance and compliance of the foregoing conditions.

Liability

1. GeoDyne Limited offer £5,000,000.00 Professional Indemnity Insurance (in aggregate over the year). This shall be the limit of our liability for works undertaken. No individual liability shall be implied to, or accepted by, any employee for works undertaken for and on the behalf of GeoDyne Limited.