

Document ref: C-02035-CALA-M1-LR-004

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18 October 2019

Parcel M1, Princess Royal Barracks, Deepcut, Surrey - Validation of clean Cover System in garden areas

Dear Adam,

We are writing to provide a summary of the validation of the clean Cover System implemented in the garden areas of Parcel M1 at Princess Royal Barracks, Deepcut, Surrey. This report details the works undertaken to date.

1. INTRODUCTION

Hydrock Consultants Limited was commissioned by CALA Homes (Thames) Ltd to undertake validation of the clean Cover System implemented across private gardens in the residential development at Parcel M1 of the above-mentioned site.

A site plan showing the proposed development layout is provided by Ashby Design Limited (00263-ASH-XX-TA-SP-3000_T1) and presented in the appendix.

2. GARDEN VALIDATION

Validation works were carried out to confirm a minimum engineered capping thickness of 600mm was placed in the gardens (Cover System). As agreed with the Local Authority (Surrey Heath Borough Council) at least 150mm of soils within the Cover System should comprise topsoil over a minimum of 450mm subsoil. Where Made Ground is identified below the 600mm engineered capping material a geotextile membrane should be present to separate the materials. It is noted that the Local Authority have stipulated that no "man-made materials" should be present within the Cover System (e.g. brick, crushed concrete, glass etc). The minimum testing ratio at the site has been agreed as 40% of plots to be tested.

The Cover System was derived from site-won soils. The soils were tested prior to initial excavation, screened and tested again after placement in gardens.

The validation works were carried out in accordance with Hydrock's Remediation Method Statement (report ref: C14817-0019).

2.1 Site inspections

The site was visited to complete a plot inspection as detailed in Table 1.0 below. Hydrock will continue to visit the site when plots are ready for inspection as informed by CALA.

Table 1.0: Summary of site inspections for garden validation works

Date of inspection	Plots inspected
23/08/2019	27
10/10/2019	27

Two separate visits were undertaken at Plot 27 due to unexpected results encountered within subsoil from the first visit. In order to determine whether this was an anomaly, a second visit was undertaken to complete additional testing.

A series of hand excavated trial pits were undertaken to a minimum depth of 0.6m in the rear garden areas of the plots to assess installation of the Cover System and inspect topsoil and subsoil materials present. Photographic records are presented in the Appendix.

Representative soil samples were obtained and scheduled for laboratory testing which incorporated a comprehensive soils suite. Laboratory test results are presented in the Appendix.

2.2 Soils Assessment

Laboratory results were compared to soil screening values for the residential with plant uptake land use scenario. The soil screening values used are generic assessment criteria (GAC). The Category 4 Screening Levels (C4SL) have been used for Benzo(a) Pyrene (5mg/kg) as agreed with the Local Authority. Statistical testing is used where data sets are suitable.

The results of the assessment are summarised below and screening tables are presented in the Appendix.

2.2.1 Topsoil results

From the comparison of topsoil test results against the relevant GAC's, the following comments apply:

- Benzo(a)anthracene has been detected at 4.7 mg/kg which is marginally above the GAC of 4.2 mg/kg. This exceedance is not considered to pose an unacceptable risk to human health.
- The screening exercise confirmed that topsoil samples obtained from the tested plots were not in exceedance of the relevant GAC's (with the exception of Benzo(a)anthracene) and the material is deemed suitable for use.
- No asbestos was identified within the topsoil materials.
- A minimum of 150mm of topsoil was present, no significant "man-made materials" were encountered.

2.2.2 Subsoil results

From the comparison of subsoil test results against the relevant GAC's, the following comments apply:

- From the first visit the screening exercise identified that the subsoil sample tested within plot 27 at 0.4m bgl contained several PAHs identified above the relevant GAC's;

- From the second visit the screening exercise confirmed that the four additional subsoil samples were not in exceedance of the relevant GAC's. On this basis it is considered that the results of the first round of testing were anomalous and the material is deemed suitable for use;
- No asbestos was identified within the subsoil materials.
- A minimum of 450mm subsoil was present, no significant "man-made materials" were encountered.
- A geotextile membrane was not noted within plot 27, where subsoil materials were noted to extend to depths greater than 0.6m bgl.

3. Conclusions

Based on the remediation and verification works undertaken, the results of the plot inspections are outlined in Table 2.0 below. Those noted as "pass" are considered suitable for use and no further remedial works are required. Those noted as "fail" are subject to further remediation.

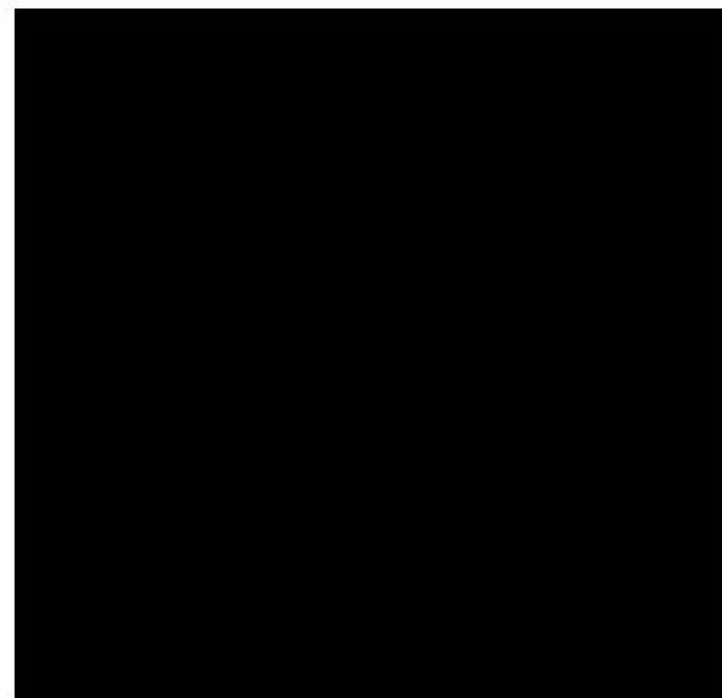
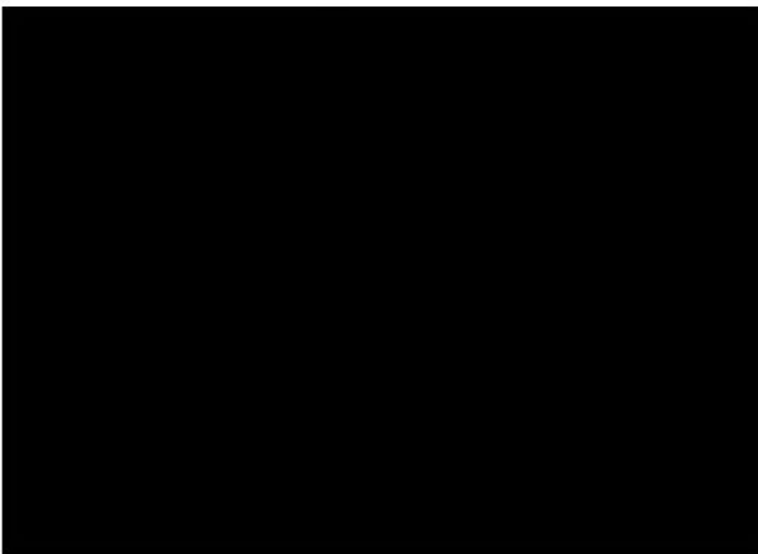
Table 2.0: Summary of site inspections for garden validation works

Plots Inspected	Recommendation	Notes
27	Pass	Marginal exceedance of Benzo(a)anthracene in topsoil, not considered significant. Initial exceedance of PAHs in subsoil, further testing confirmed PAHs below the relevant GAC's.

It is recommended that this summary report be passed to the relevant regulators (Local Authority and NHBC) for review.

Should you have any queries, please do not hesitate to contact the undersigned.

Yours faithfully



Appendices

Appendix A – Drawings

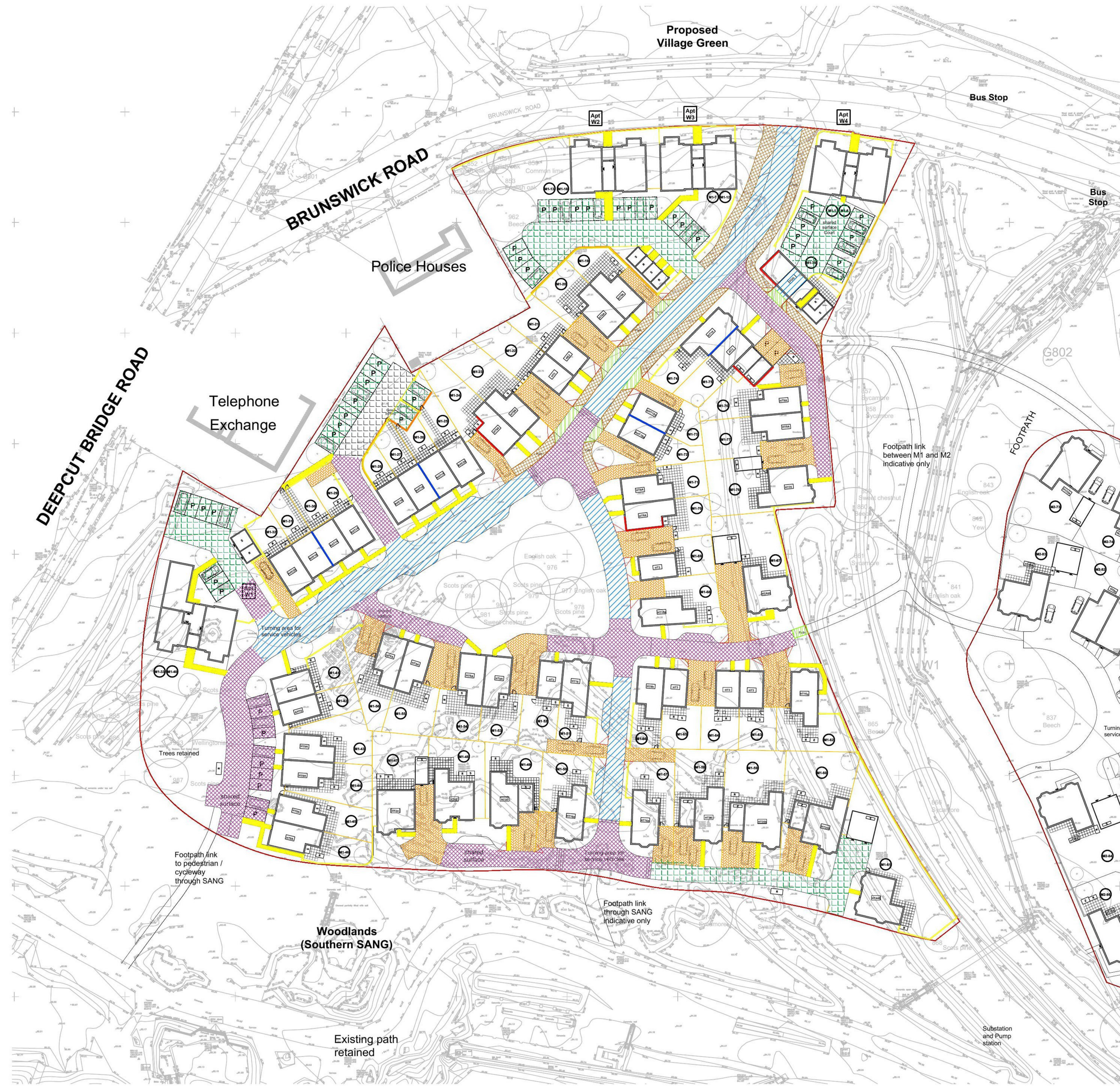
Appendix B – Site Visit Records

Appendix C – Laboratory Results/ Testing Certificates

Appendix D – Screening Tables

Appendix A

Drawings



GENERAL KEY	
	CARRIAGEWAY - IMPERMEABLE BLOCKWORK (PAVEMENT TYPE B)
	PRIVATE DRIVE - BLOCK PAVING (PAVING TYPE A)
	PAVING - PERMEABLE BLOCKWORK (PAVEMENT TYPE E)
	PRIVATE FOOTPATH - INDIAN SANDSTONE (PAVEMENT TYPE C)
	ROAD - TARMAC (PAVEMENT TYPE D)
	PATIOS
	TARMAC FOOTPATH
	VEHICLE CROSSOVER
	SITE BOUNDARY
	BOUNDARY WALL - 1.8M HIGH WITH PIERS
	RETAINING WALL
	EXPOSED BRICK
	STEP BETWEEN FINISHED FLOOR LEVELS
	PARKING BAY
	VISIBILITY SPLAYS (2m x 2m)
	PROPOSED NEW TREE (TBC BY LANDSCAPE ARCHITECT)
	EXISTING TREE TO BE REMOVED (TBC BY LANDSCAPE ARCHITECT)
	DOOR ENTRANCE (LEVEL THRESHOLD)
	REFUSE
	CYCLE STORE

DRAWINGS TO BE READ IN CONJUNCTION WITH ENGINEERS' & LANDSCAPE ARCHITECTS UP TO DATE DRAWINGS & SPECIFICATION



BRUNSWICK ROAD

ROAD

Police Houses

Telephone Exchange

Footpath link between M1 and M2 indicative only



KEY

- Sample Location
- Plot covered by validation

NOTES

- All dimensions are to be checked on site before the commencement of works. Any discrepancies are to be reported to the Architect & Engineer for verification. Figured dimensions only are to be taken from this drawing.
- This drawing is to be read in conjunction with all relevant Engineers' and Service Engineers' drawings and specifications.
- This drawing has been based on the following drawings and information:
Topographic survey provided by Skanska Construction UK Limited on Sept 2016. Drawing Ref. DC1-SMS-EU-101-00-DR-05-T001 22/12/15
- Land use boundaries taken from JTP Drawing no: 00752_SK030 Rev M 03/08/17.
- Layout based on unreferenced drawing supplied by the Client.

P4	SAMPLE LOCATIONS ADDED	SD	17/10/19	JB	17/10/19
P3	SAMPLE LOCATIONS ADDED	SD	07/10/19	JB	07/10/19
P2	SAMPLE LOCATIONS UPDATED	SD	20/08/19	JB	20/08/19
P1	FIRST ISSUE	SD	18/07/19	AJ	18/07/19
REV.	REVISION NOTES/COMMENTS	DRAWN BY	DATE	CHECKED BY	DATE
				APPROVED BY	DATE

<p>Over Court Barrs Over Lane Almondsbury, Bristol BS32 4DF TEL: 01454 619 533 FAX: 01454 614 125 E-Mail: bristol@hydrock.com or visit www.hydrock.com</p>	
CLIENT	<p>CALA Homes (Thames)</p>
PROJECT	<p>PRINCESS ROYAL BARRACKS, DEEPCUT</p>

<p>TITLE</p> <p>SAMPLE LOCATION PLAN (PARCEL M1)</p>	
HYDROCK PROJECT NO.	SCALE @ A3
<p>C-02035-C</p>	<p>PURPOSE OF ISSUE</p> <p>SUITABLE FOR CO-ORDINATION</p>
<p>DRAWING NO. (PROJECT CODE-ORIGINATOR_ZONE-LEVEL-TYPE_ROLE-NUMBER)</p> <p>02035-HYD-XX-ZZ-DR-GE-1001</p>	<p>STATUS</p> <p>S1</p>
	<p>REVISION</p> <p>P4</p>

Appendix B

Site Visit Records

SITE VISIT RECORD 006		SHEET NO: 1 of 2
Project: Princess Royal Barrack, Deepcut, Surrey		Date of Visit: 23.08.2019
Client: CALA Homes (Thames) Ltd	Weather Conditions: Overcast and cloudy	
Contract No.: C-02035-C		
Visit Carried Out By: Jane Baird		
Present: Hydrock Consultants		

Summary of Work Activities:
Validation sampling of garden plot 27

Comments/Discussions:
Geology descriptions of hand excavated pits comprised: Plot 27 Ground level to 0.3m bgl comprised topsoil of dark greyish brown sandy slightly gravelly silt with roots and rootlets. Sand was fine to medium grained. Gravel was flint. Between 0.3m and 0.6m was dark greyish brown sandy slightly gravelly silt. Gravel was flint. Geotextile membrane was not encountered.

SITE INSPECTION REPORT 006

SHEET NO: 2 of 2



Plot 27 hand excavated pit



Plot 27 arisings

SITE VISIT RECORD 007		SHEET NO: 1 of 3
Project: Princess Royal Barrack, Deepcut, Surrey		Date of Visit: 10.10.2019
Client: CALA Homes (Thames) Ltd	Weather Conditions: Overcast and cloudy	
Contract No.: C-02035-C		
Visit Carried Out By: Jane Baird		
Present: Hydrock Consultants		

Summary of Work Activities:
Validation sampling of garden plot 27

Comments/Discussions:
<p>Geology descriptions of hand excavated pits comprised:</p> <p>Plot 27A</p> <p>Ground level to 0.3m bgl comprised topsoil of dark greyish brown sandy slightly gravelly silt with roots and rootlets. Sand was fine to medium grained. Gravel was flint. Between 0.3m and 0.6m was dark greyish brown sandy slightly gravelly silt. Gravel was flint. Geotextile membrane was not encountered.</p> <p>Plot 27B</p> <p>Ground level to 0.3m bgl comprised topsoil of dark greyish brown sandy slightly gravelly silt with roots and rootlets. Sand was fine to medium grained. Gravel was flint. Between 0.3m and 0.6m was dark greyish brown sandy slightly gravelly silt. Gravel was flint. Geotextile membrane was not encountered.</p> <p>Plot 27C</p> <p>Ground level to 0.3m bgl comprised topsoil of dark greyish brown sandy slightly gravelly silt with roots and rootlets. Sand was fine to medium grained. Gravel was flint. Between 0.3m and 0.6m was dark greyish brown sandy slightly gravelly silt. Gravel was flint. Geotextile membrane was not encountered.</p> <p>Plot 27D</p> <p>Ground level to 0.3m bgl comprised topsoil of dark greyish brown sandy slightly gravelly silt with roots and rootlets. Sand was fine to medium grained. Gravel was flint. Between 0.3m and 0.6m was dark greyish brown sandy slightly gravelly silt. Gravel was flint. Geotextile membrane was not encountered.</p>

SITE INSPECTION REPORT 006

SHEET NO: 2 of 3



Plot 27A hand excavated pit



Plot 27B hand excavated pit

SITE INSPECTION REPORT 006

SHEET NO: 3 of 3



Plot 27C hand excavated pit



Plot 27D hand excavated pit

Appendix C

Laboratory Results/ Testing Certificates



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Analytical Report Number : 19-56478-C

Replaces Analytical Report Number : 19-56478, issue no. 4

Project / Site name:	Deepcut	Samples received on:	27/08/2019
Your job number:	C-02035-C	Samples instructed on:	27/08/2019
Your order number:	POP031650	Analysis completed by:	30/09/2019
Report Issue Number:	5	Report issued on:	08/10/2019
Samples Analysed:	2 soil samples		


Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 19-56478-5C Deepcut C-02035-C

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number: 19-56478-C

Project / Site name: Deepcut

Your Order No: POP031650

Lab Sample Number	1300875	1300880			
Sample Reference	Plot 27	Plot 27			
Sample Number	None Supplied	None Supplied			
Depth (m)	0.10	0.40			
Date Sampled	23/08/2019	23/08/2019			
Time Taken	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	9.2
Moisture Content	%	N/A	NONE	13	11
Total mass of sample received	kg	0.001	NONE	1.1	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.4	7.2
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.10	0.22
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.029	0.033

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.27	33
Acenaphthene	mg/kg	0.05	MCERTS	0.25	5.4
Fluorene	mg/kg	0.05	MCERTS	0.27	31
Phenanthrene	mg/kg	0.05	MCERTS	4.8	230
Anthracene	mg/kg	0.05	MCERTS	1.2	56
Fluoranthene	mg/kg	0.05	MCERTS	8.8	230
Pyrene	mg/kg	0.05	MCERTS	7.5	190
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.7	86
Chrysene	mg/kg	0.05	MCERTS	3.6	70
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	4.9	67
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.7	34
Benzo(a)pyrene	mg/kg	0.05	MCERTS	4.3	59
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.2	32
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.69	9.2
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.5	32

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	47.7	1160

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	14
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.50	0.43
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	15	15
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	19	20
Lead (aqua regia extractable)	mg/kg	1	MCERTS	85	58
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.5	8.7
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	23	22
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	73	65



Analytical Report Number : 19-56478-C

Project / Site name: Deepcut

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1300875	Plot 27	None Supplied	0.10	Brown loam and sand with gravel.
1300880	Plot 27	None Supplied	0.40	Brown loam and sand with stones and vegetation.

Analytical Report Number : 19-56478-C

Project / Site name: Deepcut

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L009-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.



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Analytical Report Number : 19-65200

Project / Site name:	Deepcut - Parcel M1	Samples received on:	10/10/2019
Your job number:	C-02035	Samples instructed on:	10/10/2019
Your order number:		Analysis completed by:	16/10/2019
Report Issue Number:	1	Report issued on:	16/10/2019
Samples Analysed:	4 soil samples		


Karolina Marek
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

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soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Iss No 19-65200-1 Deepcut - Parcel M1 C-02035

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number: 19-65200

Project / Site name: Deepcut - Parcel M1

Lab Sample Number	1327117	1327118	1327119	1327120			
Sample Reference	Plot 27 A	Plot 27 B	Plot 27 C	Plot 27 D			
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied			
Depth (m)	0.40	0.50	0.40	0.50			
Date Sampled	10/10/2019	10/10/2019	10/10/2019	10/10/2019			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	17	17	18	16
Total mass of sample received	kg	0.001	NONE	1.2	1.1	1.1	1.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected
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General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.6	7.5	7.7
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.066	0.068	0.12	0.087
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.028	0.029	0.022	0.018

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.32	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	2.3	0.94	1.2	1.4
Anthracene	mg/kg	0.05	MCERTS	0.49	0.20	0.21	0.29
Fluoranthene	mg/kg	0.05	MCERTS	5.8	2.7	2.7	4.0
Pyrene	mg/kg	0.05	MCERTS	5.3	2.4	2.5	3.7
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.0	1.4	1.4	2.6
Chrysene	mg/kg	0.05	MCERTS	2.7	1.5	1.5	2.3
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.9	1.4	1.9	2.6
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.5	0.94	0.65	1.3
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.6	1.5	1.6	2.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.5	0.84	0.86	1.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.41	0.24	0.22	0.34
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.8	1.0	1.0	1.5

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	30.6	15.0	15.7	23.8
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.9	5.1	9.8	8.7
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.48	0.45	0.40	0.39
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	1.6	1.2	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (III)	mg/kg	1	NONE	14	12	13	11
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	12	13	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	16	15	16	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	72	59	59	41
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	8.9	8.2	7.8	7.8
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	20	20	19	19
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	71	72	69	54

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The results included within the report are representative of the samples submitted for analysis.

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Analytical Report Number : 19-65200

Project / Site name: Deepcut - Parcel M1

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and topsoil/loam soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1327117	Plot 27 A	None Supplied	0.40	Grey loam and clay with gravel.
1327118	Plot 27 B	None Supplied	0.50	Grey loam and clay with gravel and vegetation.
1327119	Plot 27 C	None Supplied	0.40	Grey loam and clay with gravel and vegetation.
1327120	Plot 27 D	None Supplied	0.50	Grey loam and clay with gravel and vegetation.

Analytical Report Number : 19-65200

Project / Site name: Deepcut - Parcel M1

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Cr (III) in soil	In-house method by calculation from total Cr and Cr VI.	In-house method by calculation	L080-PL	W	NONE
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L009-PL	D	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

Appendix D

Screening Tables

Assessment of Chemicals of Potential Concern to Human Health



Chemical of Potential Concern	Lab. RL	No. Samples	All values in mg/kg unless otherwise stated					Soil Type					GAC	Result of Significance Test							
			Min. Value	Max. Value	No. Samples > or = GAC	Location & Depth															
						Plot 27	Plot 27 A	Plot 27 B	Plot 27 C	Plot 27 D											
							SS	SS	SS	SS	SS										
							0.4	0.4	0.5	0.4	0.5										
Arsenic	1	5	5.1	14	0	37	POTENTIALLY SUITABLE FOR USE	14	5.9	5.1	9.8	8.7									
Beryllium	0.06	5	0.39	0.48	0	73	POTENTIALLY SUITABLE FOR USE	0.43	0.48	0.45	0.4	0.39									
Boron	0.2	5	0.6	1.6	0	300	POTENTIALLY SUITABLE FOR USE	0.6	0.9	1.6	1.2	0.7									
Cadmium	0.2	5	0.2	0.2	0	14	POTENTIALLY SUITABLE FOR USE	0.2	0.2	0.2	0.2	0.2									
Chromium (III)	1	5	11	15	0	890	POTENTIALLY SUITABLE FOR USE	15	14	12	13	11									
Chromium (VI)	1.2	5	1.2	1.2	0	6.1	POTENTIALLY SUITABLE FOR USE	1.2	1.2	1.2	1.2	1.2									
Copper	1	5	14	20	0	2500	POTENTIALLY SUITABLE FOR USE	20	16	15	16	14									
Lead	2	5	41	72	0	200	POTENTIALLY SUITABLE FOR USE	58	72	59	59	41									
Mercury, inorganic	0.3	5	0.3	0.3	0	170	POTENTIALLY SUITABLE FOR USE	0.3	0.3	0.3	0.3	0.3									
Nickel	2	5	7.8	8.9	0	130	POTENTIALLY SUITABLE FOR USE	8.7	8.9	8.2	7.8	7.8									
Selenium	1	5	1	1	0	360	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1									
Vanadium	1	5	19	22	0	410	POTENTIALLY SUITABLE FOR USE	22	20	20	19	19									
Zinc	2	5	54	72	0	3900	POTENTIALLY SUITABLE FOR USE	65	71	72	69	54									
Cyanide (free)	1	5	1	1	0	790	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1									
Phenol (total)	2	5	1	1	0	290	POTENTIALLY SUITABLE FOR USE	1	1	1	1	1									
Acenaphthene	0.05	5	0.05	5.4	0	220	POTENTIALLY SUITABLE FOR USE	5.4	0.05	0.05	0.05	0.05									
Acenaphthylene	0.05	5	0.05	33	0	180	POTENTIALLY SUITABLE FOR USE	33	0.05	0.05	0.05	0.05									
Anthracene	0.05	5	0.2	56	0	2400	POTENTIALLY SUITABLE FOR USE	56	0.49	0.2	0.21	0.29									
Benz(a)anthracene	0.05	5	1.4	86	1	4.2	FURTHER ASSESSMENT REQUIRED	86	3	1.4	1.4	2.6									
Benzo(a)pyrene	0.05	5	1.5	59	5	1.5	FURTHER ASSESSMENT REQUIRED	59	2.6	1.5	1.6	2.4									
Benzo(b)fluoranthene	0.05	5	1.4	67	1	7.6	FURTHER ASSESSMENT REQUIRED	67	2.9	1.4	1.9	2.6									
Benzo(ghi)perylene	0.05	5	1	32	0	64	POTENTIALLY SUITABLE FOR USE	32	1.8	1	1	1.5									
Benzo(k)fluoranthene	0.05	5	0.65	34	1	12	FURTHER ASSESSMENT REQUIRED	34	1.5	0.94	0.65	1.3									
Chrysene	0.05	5	1.5	70	1	7.7	FURTHER ASSESSMENT REQUIRED	70	2.7	1.5	1.5	2.3									
Dibenz(a,h)anthracene	0.05	5	0.22	9.2	1	1.1	FURTHER ASSESSMENT REQUIRED	9.2	0.41	0.24	0.22	0.34									
Fluoranthene	0.05	5	2.7	230	0	290	POTENTIALLY SUITABLE FOR USE	230	5.8	2.7	2.7	4									
Fluorene	0.05	5	0.05	31	0	170	POTENTIALLY SUITABLE FOR USE	31	0.05	0.05	0.05	0.05									
Indeno(1,2,3,cd)pyrene	0.05	5	0.84	32	1	4.3	FURTHER ASSESSMENT REQUIRED	32	1.5	0.84	0.86	1.3									
Naphthalene	0.05	5	0.05	0.32	0	2.2	POTENTIALLY SUITABLE FOR USE	0.05	0.32	0.05	0.05	0.05									
Phenanthrene	0.05	5	0.94	230	1	97	FURTHER ASSESSMENT REQUIRED	230	2.3	0.94	1.2	1.4									
Pyrene	0.05	5	2.4	190	0	620	POTENTIALLY SUITABLE FOR USE	190	5.3	2.4	2.5	3.7									
Asbestos identified	Y/N							N	N	N	N	N									
FOC (dimensionless)	0.026	(mean)						0.033	0.028	0.029	0.022	0.018									
SOM (calculated)	4.48%	(mean)						5.69%	4.83%	5.00%	3.79%	3.10%									
pH (su)	7.5	(mean)						7.2	7.7	7.6	7.5	7.7									

Risk parameter: Human health - residential with plant uptake (1%SOM)

Data set: Subsoil
Client: CALA Homes Ltd
Site: Parcel M1 - Deepcut
Job no.: C-02035
Lab. report no(s): 19-56478, 19-65200

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate. Values in red are equal to, or greater than, the generic assessment criterion (GAC). SS denotes Subsoil

Assessment of Chemicals of Potential Concern to Plant Life

All values in mg/kg unless otherwise stated								Soil Type										
Chemical of Potential Concern	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	Result of Significance Test	Location & Depth										
								SS	SS	SS	SS	SS	Plot 27	Plot 27 A	Plot 27 B	Plot 27 C	Plot 27 D	
								0.4	0.4	0.5	0.4	0.5						
Arsenic	1	5	5.1	14	0	250	POTENTIALLY SUITABLE FOR USE	14	5.9	5.1	9.8	8.7						
Boron	0.2	5	0.6	1.6	0	3	POTENTIALLY SUITABLE FOR USE	0.6	0.9	1.6	1.2	0.7						
Chromium (III)	1	5	11	15	0	400	POTENTIALLY SUITABLE FOR USE	15	14	12	13	11						
Chromium (VI)	1.2	5	1.2	1.2	0	25		1.2	1.2	1.2	1.2	1.2						
Copper	1	5	14	20	0	135	POTENTIALLY SUITABLE FOR USE	20	16	15	16	14						
Nickel	2	5	7.8	8.9	0	75	POTENTIALLY SUITABLE FOR USE	8.7	8.9	8.2	7.8	7.8						
Zinc	2	5	54	72	0	300	POTENTIALLY SUITABLE FOR USE	65	71	72	69	54						
	Mean																	
pH (su)	7.5							7.2	7.7	7.6	7.5	7.7						

Risk parameter: Plant life pH 7

Data set: Subsoil

Client: CALA Homes Ltd

Site: Parcel M1 - Deepcut

Job no.: C-02035

Lab. report no(s).: 19-56478, 19-65200

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate. Values in red are equal to, or greater than, the generic assessment criterion (GAC). SS denotes Subsoil

Assessment of Chemicals of Potential Concern to Human Health

Chemical of Potential Concern	All values in mg/kg unless otherwise stated						Soil Type	TS												
	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	Location & Depth	Plot 27 0.1												
Arsenic	1	1	11	11	0	37		11												
Beryllium	0.06	1	0.5	0.5	0	73		0.5												
Boron	0.2	1	0.5	0.5	0	300		0.5												
Cadmium	0.2	1	0.2	0.2	0	14		0.2												
Chromium (III)	1	1	13.8	13.8	0	890		13.8												
Chromium (VI)	1.2	1	1.2	1.2	0	6.1		1.2												
Copper	1	1	19	19	0	2500		19												
Lead	1	1	85	85	0	200		85												
Mercury, inorganic	0.3	1	0.3	0.3	0	170		0.3												
Nickel	2	1	9.5	9.5	0	130		9.5												
Selenium	1	1	1	1	0	360		1												
Vanadium	1	1	23	23	0	410		23												
Zinc	1	1	73	73	0	3900		73												
Cyanide (free)	1	1	1	1	0	790		1												
Phenol (total)	1	1	1	1	0	290		1												
Acenaphthene	0.05	1	0.25	0.25	0	220		0.25												
Acenaphthylene	0.05	1	0.27	0.27	0	180		0.27												
Anthracene	0.05	1	1.2	1.2	0	2400		1.2												
Benz(a)anthracene	0.05	1	4.7	4.7	1	4.2		4.7												
Benzo(a)pyrene	0.05	1	4.3	4.3	1	1.5		4.3												
Benzo(b)fluoranthene	0.05	1	4.9	4.9	0	7.6		4.9												
Benzo(ghi)perylene	0.05	1	2.5	2.5	0	64		2.5												
Benzo(k)fluoranthene	0.05	1	1.7	1.7	0	12		1.7												
Chrysene	0.05	1	3.6	3.6	0	7.7		3.6												
Dibenz(a,h)anthracene	0.05	1	0.69	0.69	0	1.1		0.69												
Fluoranthene	0.05	1	8.8	8.8	0	290		8.8												
Fluorene	0.05	1	0.27	0.27	0	170		0.27												
Indeno(1,2,3,cd)pyrene	0.05	1	2.2	2.2	0	4.3		2.2												
Naphthalene	0.05	1	0.05	0.05	0	2.2		0.05												
Phenanthrene	0.05	1	4.8	4.8	0	97		4.8												
Pyrene	0.05	1	7.5	7.5	0	620		7.5												
Asbestos identified	Y/N							N												
FOC (dimensionless)	0.029 (mean)							0.029												
SOM (calculated)	5.00% (mean)							5.00%												
pH (su)	6.4 (mean)							6.4												

Risk parameter: Human health - residential with plant uptake (1%SOM)

Data set: Topsoil

Client: Cala Homes Ltd

Site: Deepcut - Parcel M1

Job no.: C-02035-C

Lab. report no(s): 19-56478

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate. Values in red are equal to, or greater than, the generic assessment criterion (GAC). TS denotes Topsoil

Assessment of Chemicals of Potential Concern to Plant Life

Chemical of Potential Concern	All values in mg/kg unless otherwise stated						Soil Type	TS														
	Lab. RL	No. Samples	Min. Value	Max. Value	No. Samples > or = GAC	GAC	Location & Depth	Plot 27	0.1													
Arsenic	1	1	11	11	0	250		11														
Boron	0.2	1	0.5	0.5	0	3		0.5														
Chromium (III)	1	1	13.8	13.8	0	400		13.8														
Chromium (VI)	1.2	1	1.2	1.2	0	25		1.2														
Copper	1	1	19	19	0	135		19														
Nickel	2	1	9.5	9.5	0	75		9.5														
Zinc	1	1	73	73	0	300		73														
	Mean																					
pH (su)	6.4							6.4														

Risk parameter: Plant life pH 7
Data set: Topsoil
Client: Cala Homes Ltd
Site: Deepcut - Parcel M1
Job no.: C-02035-C
Lab. report no(s): 19-56478

Legend: Values in blue are at or below the laboratory reporting limit (where a single value is indicated) and are considered as being at the detection limit for the purposes of statistical analysis, as a conservative estimate. Values in red are equal to, or greater than, the generic assessment criterion (GAC).
 TS denotes Topsoil