Our Ref	AJH/16147VA/JJ	ASHBURNHAM HOUSE	
		1 MAITLAND ROAD	RS
		LION BARN ESTATE	
		NEEDHAM MARKET	
26 April 202	3	SUFFOLK	9
		IP6 8NZ	
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Tango Holdiı Cambridge C	-	Fax (01449) 723 907	
Toft Road		www.rsa-geotechnics.co.uk	സ്
Bourn			
Cambridge C	CB23 2TT		
For the atte	ention of		
	<i>a</i> -		6
		By Email only –	
			00
Dear			

CLEAN COVER VALIDATION OF GARDENS AT THE FAIRWAYS, TOFT ROAD, BOURN, CAMBRIDGE, CB23 2TT

1. Introduction

Please find attached the analytical results and comments on the validation works covering areas of the private garden areas at The Fairways, Toft Road, Bourn, Cambridge CB23 2TT that were accessible at the time of the site visit.

The proposed scheme comprises the conversion of a disused clubhouse building to make three residential dwellings. Drawings included in planning application 22/01954/PRIOR submitted to South Cambridgeshire District Council in support of the application show the proposed development to include private gardens, car parking and an access road.

This letter report provides an independent review of the validation works carried out on behalf of the Client, Tango Holdings Limited. The scope of works was originally set out in RSA Geotechnics Limited's quotation number AJS/Quo/8497.2809 dated 19 January 2023.

Authorisation for the validation work to proceed at The Fairways redevelopment was given by **Control of Control of Contro**

> Directors: **P A GAWNE** BSc MSc DIC FGS **A M PHILLIPS** FGS **A J SYMIS** Eng Tech TMICE FGS Directors & Consultants: **G J T SOUTHGATE** BSc CEng MICE **G L DAVIS** BSc CEng MIMMM CGeol FGS Registered Office: Ashburnham House 1 Maitland Road Needham Market Suffolk IP6 8NZ Registered No 1494361 VAT No 344 4442 66

2. Remedial Strategy

Recommendations for the remediation strategy for The Fairways were presented in RSA Geotechnics Limited's Remediation Method Statement report number 14697RS (Version 2) dated February 2023.

Significant levels of soil contamination have not been recorded for the Fairways site, and asbestos has not been identified by the investigation and testing to date.

The shallow site soils were however not considered physically suitable to provide a healthy growing environment for garden and soft landscaped areas, and the provision of suitable clean imported topsoil/subsoil was recommended for such areas.

As no contamination was identified in the underlying soils, there was no minimum thickness requirements for topsoil/subsoil; the required thickness will however be influenced by the proposed planting scheme.

Guidance in BS3882: 'Topsoil', suggests that the thickness of topsoil should not normally exceed 300 mm, and that greater thicknesses of cover soils should incorporate a suitable subsoil layer.

Details of the source and compliance certification of the topsoil/subsoil were not provided. Materials imported for use in garden/soft landscaped areas were to be sampled and tested to confirm their chemical suitability for use in a residential setting.

3. Validation

An initial inspection and sampling visit was undertaken on 15 March 2023. Access was limited to the front and rear gardens of the central house only. Validation samples were recovered from installed topsoil within the rear garden area. However, inspection of the front garden area identified the presence of made ground rather than the natural Lowestoft Formation soils previously present. The Client agreed to arrange the removal and replacement of the made ground and replace it with fresh topsoil.

A second site visit was made to inspect the newly placed clean cover materials in the front garden area of the central house on 28 March 2023, and validation samples were recovered for laboratory testing. The locations of the validation excavations for both visits are shown on drawing number 16147VA/1.

The samples were recovered during both visits by an experienced soil technician using hand tools.

Table 3 – Summary of findings from validation visits on 15 and 28 March 2023									
Location Topsoil Thickness Subsoil Thickness Total Thickness									
(mm) (mm) (mm)									
VA3	300	*	300						
VA4 300 200 500									
VA5 400 150 550									
*The topsoil directly overlay the natural deposits									

A summary of the inspections is presented in Table 3.

The topsoil and subsoil materials were described as dark brown and brown sandy silty clay with some subangular to subrounded gravel.

4. Laboratory Testing

Five samples (three topsoil and two subsoil) were scheduled for analysis for a range of commonly occurring contaminants including heavy metals/metalloids, phenols, cyanide, pH and water-soluble sulphate, soil organic matter, polycyclic aromatic hydrocarbons (PAH) and screening for the presence of asbestos.

The chemical analyses were undertaken between 17 March and 18 April July 2023 by DETS Ltd who holds UKAS, MCERTS and ISO17025 accreditation. Copies of the test certificates (DETS report numbers 23-03824 and 23-04438) are attached to this report.

Photo-Ionisation Detector (PID) tests were undertaken on all samples retrieved to check for Volatile Organic Compounds (VOC). The PID screening was undertaken at RSA Geotechnics' Iaboratory on 16 and 29 March 2023.

5. Analytical Results

The results of the analyses were reviewed against the Tier 1 screening values for a 'residential with homegrown produce' end use. The Tier 1 screening values adopted in the assessment are attached in Table 1 at the back of this report. The soil organic matter content adopted in the assessment of the topsoil and subsoil was 2.5%.

5.1 Human Health

The analysis did not record any concentrations of determinands that exceeded the Tier 1 human health screening values within any of the samples tested. No asbestos was recorded to be present in the samples screened. No elevated PID results were recorded.

5.1 Plant Health

Concentrations of the phytotoxic determinands zinc, copper, and nickel were found to be below the screening limits as presented in BS 3882: 2015, 'Specification for topsoil'. A negligible phytotoxic risk to vegetation was established.

5.1 Waste Review

No information regarding a watching brief or waste transfer documentation was provided by the contractor.

6. Conclusions

The validation inspection of the private front and rear gardens of the central property recorded that topsoil and subsoil materials had been installed over the original site soils.

The results of the laboratory analysis undertaken on the validation soil samples indicated that concentrations of contaminants within the imported soils were compliant with residential screening thresholds for a residential development.

This report has been prepared for the sole internal use and reliance of the Client, Tango Holdings Ltd. It shall not be relied upon by other parties without the express written authority of RSA Geotechnics Limited. If an unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors owe them no duty of care and skill.

RSA Geotechnics Limited have based this report on the sources detailed within the report, which are believed to be reliable. However, RSA Geotechnics Limited cannot and does not guarantee the authenticity or reliability of the third-party information it has relied upon.

We trust this letter report will fulfil your present requirements, but should you need further advice or investigation, please contact us again.

Yours sincerely RSA Geotechnics Ltd



Geotechnical/Geoenvironmental Engineer

Encs Chemical contamination analyses results (DETS report numbers 23-03824 and 23-04438) Headspace monitoring record sheet Tier 1 screening values Validation sample location plan - drawing number 16147VA/1 Photograghs of validation sampling locations

Copy Brown and Co By Email Only:



Adrian Phillips RSA Geotechnics Ltd Ashburnham House 1 Maitland Road Lion Barn Estate Needham Market Suffolk IP6 8NZ



Derwentside Environmental Testing Services Ltd Unit 1 Rose Lane Industrial Estate Rose Lane Lenham Heath Kent ME17 2JN t: 01622 850410

DETS Report No: 23-03824

Site Reference:	The Fairways, Toft Road, Bourne, Cambridge
Project / Job Ref:	16147VA
Order No:	None Supplied
Sample Receipt Date:	17/03/2023
Sample Scheduled Date:	17/03/2023
Report Issue Number:	1
Reporting Date:	28/03/2023



Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.





Soil Analysis Certificate					
DETS Report No: 23-03824			Date Sampled	15/03/23	
RSA Geotechnics Ltd			Time Sampled	None Supplied	
Site Reference: The Fairways, Toft Ro	ad. Bourne.		TP / BH No	VA3	
Cambridge					
Project / Job Ref: 16147VA		A	dditional Refs	D1	
Order No: None Supplied			Depth (m)	0.15	
Reporting Date: 28/03/2023		DE	TS Sample No	641606	
		51			
Determinand	Unit		Accreditation		
Asbestos Screen (S)	N/a	N/a	IS017025	Not Detected	
рН	pH Units	N/a	MCERTS	7.9	
Total Cyanide	mg/kg	< 1	NONE	< 1	
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	54	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.05	
Elemental Sulphur	mg/kg	< 10 < 0.1	NONE MCERTS	< 10 7.6	
Organic Matter (SOM)	%	-			
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	4.4	
Arsenic (As) Barium (Ba)	mg/kg	< 2 < 2.5	MCERTS MCERTS	14 59	
Banum (Ba) Beryllium (Be)	mg/kg	< 2.5	MCERTS	0.9	
W/S Boron	mg/kg		NONE	0.9	
Cadmium (Cd)	mg/kg	< 1 < 0.2	MCERTS	< 0.2	
Chromium (Cd)	mg/kg mg/kg	< 0.2	MCERTS	< 0.2	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	
Chiomium (nezavalent) Copper (Cu)	mg/kg	< 4	MCERTS	20	
Lead (Pb)	mg/kg	< 3	MCERTS	20	
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	19	
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	
Vanadium (V)	mg/kg	< 1	MCERTS	44	
Zinc (Zn)	mg/kg	< 3	MCERTS	77	
Total Phenols (monohydric)	mg/kg	< 2	NONE	4	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion Subcontracted analysis (S)





Soil Analysis Certificate - Speciated PAHs							
DETS Report No: 23-0382	24		Date Sampled	15/03/23			
RSA Geotechnics Ltd			Time Sampled	None Supplied			
Site Reference: The Fairw	vays, Toft Road,		TP / BH No	VA3			
Bourne, Cambridge	-						
Project / Job Ref: 16147	VA	ŀ	Additional Refs	D1			
Order No: None Supplied			Depth (m)	0.15			
Reporting Date: 28/03/2	023	D	ETS Sample No	641606			
Determinand	Unit		Accreditation				
Naphthalene	mg/kg		MCERTS	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	0.14			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	0.35			
Pyrene	mg/kg	< 0.1	MCERTS	0.32			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.16			
Chrysene	mg/kg	< 0.1	MCERTS	0.17			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.19			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.17			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6			





Soil Analysis Certificate - Sample Descriptions
DETS Report No: 23-03824
RSA Geotechnics Ltd
Site Reference: The Fairways, Toft Road, Bourne, Cambridge
Project / Job Ref: 16147VA
Order No: None Supplied
Reporting Date: 28/03/2023

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
641606	VA3	D1	0.15	30.5	Grey loamy sand with vegetation

Moisture content is part of procedure E003 & is not an accredited test Insufficient Sample 1/S

Unsuitable Sample U/S





Soil Analysis Certificate - Methodology & Miscellaneous Information DETS Report No: 23-03824 RSA Geotechnics Ltd Site Reference: The Fairways, Toft Road, Bourne, Cambridge Project / Job Ref: 16147VA Order No: None Supplied Reporting Date: 28/03/2023

Soil Soil Soil Soil Soil Soil Soil Soil	On D AR D D	BTEX	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	No E012
Soil Soil Soil Soil Soil	AR D	BTEX		
Soil Soil Soil Soil Soil	D	BTEX		
Soil Soil Soil Soil			Determination of BTEX by headspace GC-MS	E001
Soil Soil Soil			Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of	E016
Soil			1,5 diphenylcarbazide followed by colorimetry	
	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR		Determination of free cyanide by distillation followed by colorimetry	E015
	AR		Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D		Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR		Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
	4.5		Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by	5004
Soil	AR	C12-C16, C16-C21, C21-C40)		E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D		Determination of TOC by combustion analyser.	E027
Soil	D		Determination of TOC by combustion analyser.	E027
Soil	AR		Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by	E010
┟────╂			titration with iron (II) sulphate	
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble		E025
Soil	D			E002
			Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE	
Soil	AR	Mineral Oil (C10 - C40)	cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D		Determination of nitrate by extraction with water & analysed by ion chromatography	E009
			Determination of organic matter by oxidising with potassium dichromate followed by titration with	
Soil	D	Organic Matter	iron (II) sulphate	E010
	4.5		Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the	5005
Soil	AR	PAH - Speciated (EPA 16)	use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D		Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR		Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR		Determination of phenols by distillation followed by colorimetry	E021
Soil	D		Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D		Determination of total sulphate by extraction with water & analysed by for chromatography Determination of total sulphate by extraction with 10% HCI followed by ICP-OES	E013
Soil	D		Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D		Determination of water soluble sulphate by extraction with water a analysed by for circlinatography	E014
Soil	AR		Determination of sulphide by distillation followed by colorimetry	E014 E018
Soil	D		Determination of total sulphur by extraction with agua-regia followed by ICP-OES	E018
			Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by	
Soil	AR	SVOC	GC-MS	E006
			Determination of thiocyanate by extraction in caustic soda followed by acidification followed by	<u> </u>
Soil	AR	Thiocyanate (as SCN)	addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
			Determination of organic matter by oxidising with potassium dichromate followed by titration with	
Soil	D	Total Organic Carbon (TOC)	iron (II) sulphate	E010
		TPH CWG (ali: C5- C6, C6-C8, C8-C10,		
i I		C10-C12, C12-C16, C16-C21, C21-C34,	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE	
Soil	AR	aro: C5-C7, C7-C8, C8-C10, C10-C12,	cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
		C12-C16, C16-C21, C21-C35)		
		012-010, 010-021, 021-035)		
		TPH LQM (ali: C5-C6, C6-C8, C8-C10,		
		-	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE	1
Soil	AR			E004
3011		aro: C5-C7, C7-C8, C8-C10, C10-C12,	cartridge for C8 to C44. C5 to C8 by headspace GC-MS	
301		C12-C16, C16-C21, C21-C35, C35-C44)		
5011				5004
Soil	AR		Determination of volatile organic compounds by headspace GC-MS	E001
	AR AR		Determination of volatile organic compounds by headspace GC-MS Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001 E001

AR As Received





List of HWOL Acronyms and Operators
DETS Report No: 23-03824
RSA Geotechnics Ltd
Site Reference: The Fairways, Toft Road, Bourne, Cambridge
Project / Job Ref: 16147VA
Order No: None Supplied
Reporting Date: 28/03/2023

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total
	Dat Assaura

Det - Acronym



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Derwentside Environmental Testing Services Ltd Unit 1 Rose Lane Industrial Estate Rose Lane Lenham Heath Kent ME17 2JN t: 01622 850410

DETS Report No: 23-04438

Site Reference:	The Fairways, Toft Road, Bourne, Cambridge
Project / Job Ref:	16147VA
Order No:	None Supplied
Sample Receipt Date:	30/03/2023
Sample Scheduled Date:	30/03/2023
Report Issue Number:	1
Reporting Date:	18/04/2023

Operations Director

Dates of laboratory activities for each tested analyte are available upon request.

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Soil Analysis Certificate						
DETS Report No: 23-04438	Date Sampled	28/03/23	28/03/23	28/03/23	28/03/23	
RSA Geotechnics Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: The Fairways, Toft Road, Bourne,	TP / BH No	VA4	VA4	VA5	VA5	
Cambridge						
Project / Job Ref: 16147VA	Additional Refs	D1	D2	D1	D2	
Order No: None Supplied	Depth (m)	0.20	0.40	0.20	0.50	
Reporting Date: 18/04/2023	DETS Sample No	644193	644194	644195	644196	

Determinand	Unit	RL						
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	
рН	pH Units	N/a	MCERTS	7.6	7.6	7.7	7.7	
Total Cyanide	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	541	499	399	502	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.54	0.50	0.40	0.50	
Elemental Sulphur	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	
Organic Matter (SOM)	%	< 0.1	MCERTS	3.9	3.9	3.9	3.8	
TOC (Total Organic Carbon)	%	< 0.1	MCERTS	2.2	2.3	2.3	2.2	
Arsenic (As)	mg/kg	< 2	MCERTS	8	8	9	9	
Barium (Ba)	mg/kg	< 2.5	MCERTS	42	32	34	36	
Beryllium (Be)	mg/kg	< 0.5	MCERTS	< 0.5	< 0.5	< 0.5	< 0.5	
W/S Boron	mg/kg	< 1	NONE	< 1	1.2	< 1	< 1	
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.2	< 0.2	< 0.2	0.2	
Chromium (Cr)	mg/kg	< 2	MCERTS	20	12	13	13	
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	
Copper (Cu)	mg/kg	< 4	MCERTS	19	14	15	17	
Lead (Pb)	mg/kg	< 3	MCERTS	23	17	17	17	
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	
Nickel (Ni)	mg/kg	< 3	MCERTS	12	9	11	10	
Selenium (Se)	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	
Vanadium (V)	mg/kg	< 1	MCERTS	20	20	23	22	
Zinc (Zn)	mg/kg	< 3	MCERTS	51	42	44	45	
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion Subcontracted analysis (S)





Soil Analysis Certificate	oil Analysis Certificate - Speciated PAHs							
DETS Report No: 23-0443	38		Date Sampled	28/03/23	28/03/23	28/03/23	28/03/23	
RSA Geotechnics Ltd			Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: The Fairw	vays, Toft Road,		TP / BH No	VA4	VA4	VA5	VA5	
Bourne. Cambridge								
Project / Job Ref: 16147		ļ	Additional Refs	D1	D2	D1	D2	
Order No: None Supplied			Depth (m)	0.20	0.40	0.20	0.50	
Reporting Date: 18/04/2	023	D	ETS Sample No	644193	644194	644195	644196	
Determinand		RL						
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthylene	5 5	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Acenaphthene	55	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg		MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Fluoranthene	5 5	< 0.1	MCERTS	0.12	< 0.1	< 0.1	< 0.1	
Pyrene	mg/kg	< 0.1	MCERTS	0.12	< 0.1	< 0.1	< 0.1	
Benzo(a)anthracene	5 5		MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Chrysene		< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(k)fluoranthene	5 5	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(a)pyrene			MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene		< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Benzo(ghi)perylene		< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	





Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 23-04438	
RSA Geotechnics Ltd	
Site Reference: The Fairways, Toft Road, Bourne, Cambridge	
Project / Job Ref: 16147VA	
Order No: None Supplied	
Reporting Date: 18/04/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
644193	VA4	D1	0.20	11.6	Brown sandy clay with stones
644194	VA4	D2	0.40	19.3	Brown sandy clay with stones
644195	VA5	D1	0.20	12.4	Brown sandy clay with stones
644196	VA5	D2	0.50	18.4	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test Insufficient Sample ^{I/s} Unsuitable Sample ^{I/s}





Soil Analysis Certificate - Methodology & Miscellaneous Information DETS Report No: 23-04438 RSA Geotechnics Ltd Site Reference: The Fairways, Toft Road, Bourne, Cambridge Project / Job Ref: 16147VA Order No: None Supplied Reporting Date: 18/04/2023

Soil Soil Soil Soil Soil Soil Soil Soil	On D AR D D	BTEX	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	No E012
Soil Soil Soil Soil Soil	AR D	BTEX		
Soil Soil Soil Soil Soil	D	BTEX		
Soil Soil Soil Soil			Determination of BTEX by headspace GC-MS	E001
Soil Soil Soil			Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of	E016
Soil			1,5 diphenylcarbazide followed by colorimetry	
	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR		Determination of free cyanide by distillation followed by colorimetry	E015
	AR		Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D		Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 – C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR		Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
	4.5		Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by	5004
Soil	AR	C12-C16, C16-C21, C21-C40)		E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D		Determination of TOC by combustion analyser.	E027
Soil	D		Determination of TOC by combustion analyser.	E027
Soil	AR		Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by	E010
┟────╂			titration with iron (II) sulphate	
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble		E025
Soil	D			E002
			Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE	
Soil	AR	Mineral Oil (C10 - C40)	cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D		Determination of nitrate by extraction with water & analysed by ion chromatography	E009
			Determination of organic matter by oxidising with potassium dichromate followed by titration with	
Soil	D	Organic Matter	iron (II) sulphate	E010
	4.5		Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the	5005
Soil	AR	PAH - Speciated (EPA 16)	use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D		Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR		Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR		Determination of phenols by distillation followed by colorimetry	E021
Soil	D		Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D		Determination of total sulphate by extraction with water & analysed by for chromatography Determination of total sulphate by extraction with 10% HCI followed by ICP-OES	E013
Soil	D		Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D		Determination of water soluble sulphate by extraction with water a analysed by for circlinatography	E014
Soil	AR		Determination of sulphide by distillation followed by colorimetry	E014 E018
Soil	D		Determination of total sulphur by extraction with agua-regia followed by ICP-OES	E018
			Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by	
Soil	AR	SVOC	GC-MS	E006
			Determination of thiocyanate by extraction in caustic soda followed by acidification followed by	<u> </u>
Soil	AR	Thiocyanate (as SCN)	addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
			Determination of organic matter by oxidising with potassium dichromate followed by titration with	
Soil	D	Total Organic Carbon (TOC)	iron (II) sulphate	E010
		TPH CWG (ali: C5- C6, C6-C8, C8-C10,		
i I		C10-C12, C12-C16, C16-C21, C21-C34,	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE	
Soil	AR	aro: C5-C7, C7-C8, C8-C10, C10-C12,	cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
		C12-C16, C16-C21, C21-C35)		
		012-010, 010-021, 021-035)		
		TPH LQM (ali: C5-C6, C6-C8, C8-C10,		
		-	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE	1
Soil	AR			E004
3011		aro: C5-C7, C7-C8, C8-C10, C10-C12,	cartridge for C8 to C44. C5 to C8 by headspace GC-MS	
301		C12-C16, C16-C21, C21-C35, C35-C44)		
5011				5004
Soil	AR		Determination of volatile organic compounds by headspace GC-MS	E001
	AR AR		Determination of volatile organic compounds by headspace GC-MS Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001 E001

AR As Received

Received





List of HWOL Acronyms and Operators
DETS Report No: 23-04438
RSA Geotechnics Ltd
Site Reference: The Fairways, Toft Road, Bourne, Cambridge
Project / Job Ref: 16147VA
Order No: None Supplied
Reporting Date: 18/04/2023

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total
	Dat Assaura

Det - Acronym

HEADSPACE MONITORING RECORD SHEET

Type of Test: Photoionisation Detector (PID)

Date	Location	Sample Ref	Depth (m)	Volatile (ppm)
16/03/2023	VA3	D1	0.15	<0.1
29/03/2023	VA4	D1 D2	0.20 0.40	<0.1 <0.1
	VA5	D1 D2	0.20 0.50	<0.1 <0.1

GENERIC SCREENING VALUES ADOPTED IN THE ASSESSMENT

HUMAN HEALTH SCREENING VALUES

Table 1 – Soil Screening Values, Resid	ential with H	lomegrown F	Produce End	<u>Use</u>
Determinand	Screening	Value (mg/k	g)	Source
	Soil Organ	ic Matter Coi	ntent	
	1%	2.5%	6%	
Arsenic	37	37	37	LQM/CIEH 2015
Barium	1300*	1300*	1300*	CL:AIRE GAC 2010
Beryllium	1.7	1.7	1.7	LQM/CIEH 2015
Boron	290	290	290	LQM/CIEH 2015
Cadmium	11	11	11	LQM/CIEH 2015
Chromium (III)	910	910	910	LQM/CIEH 2015
Chromium (VI)	6	6	6	LQM/CIEH 2015
Copper	2400	2400	2400	LQM/CIEH 2015
Lead	200	200	200	DEFRA 2014
Mercury	40	40	40	LQM/CIEH 2015
Nickel	130	130	130	LQM/CIEH 2015
Selenium	250	250	250	LQM/CIEH 2015
Vanadium	410	410	410	LQM/CIEH 2015
Zinc	3700	3700	3700	LQM/CIEH 2015
Cyanide	34	34	34	ATRISK SOIL
Phenol	120	200	380	LQM/CIEH 2015**
Benzene	0.087	0.17	0.37	LQM/CIEH 2015**
Toluene	130	290	660	LQM/CIEH 2015**
Ethylbenzene	47	110	260	LQM/CIEH 2015**
Xylenes	56	130	310	LQM/CIEH 2015**
MTBE	49	84	160	CL:AIRE GAC 2010
TPH CWG - Aliphatic >C5-C6	42	78	160	LQM/CIEH 2015**
TPH CWG - Aliphatic >C6-C8	100	230	530	LQM/CIEH 2015**
TPH CWG - Aliphatic >C8-C10	27	65	150	LQM/CIEH 2015**
TPH CWG - Aliphatic >C10-C12	130	330	760	LQM/CIEH 2015**
TPH CWG - Aliphatic >C12-C16	1100	2400	4300	LQM/CIEH 2015**
TPH CWG - Aliphatic >C16-C35	65000	92000	110000	LQM/CIEH 2015**
TPH CWG - Aliphatic >C35-C44	65000	92000	110000	LQM/CIEH 2015**
TPH CWG - Aromatic >C5-C7	70	140	300	LQM/CIEH 2015**
TPH CWG - Aromatic >C7-C8	130	290	660	LQM/CIEH 2015**
TPH CWG - Aromatic >C8-C10	34	83	190	LQM/CIEH 2015**
TPH CWG - Aromatic >C10-C12	74	180	380	LQM/CIEH 2015**
TPH CWG - Aromatic >C12-C16	140	330	660	LQM/CIEH 2015**
TPH CWG - Aromatic >C16-C21	260	540	930	LQM/CIEH 2015**
TPH CWG - Aromatic >C21-C35	1100	1500	1700	LQM/CIEH 2015**
TPH CWG - Aromatic >C35-C44	1100	1500	1700	LQM/CIEH 2015**

Table 1 – Soil Screening Values, Resid	ential with H	lomegrown F	Produce End	<u>Use continued</u>
Determinand	Screening	Value (mg/kg	g)	Source
	Soil Organ	ic Matter Cor	ntent	
	1%	2.5%	6%	
Naphthalene	2.3	5.6	13	LQM/CIEH 2015**
Acenaphthylene	170	420	920	LQM/CIEH 2015**
Acenaphthene	210	510	1100	LQM/CIEH 2015**
Fluorene	170	400	860	LQM/CIEH 2015**
Phenanthrene	95	220	440	LQM/CIEH 2015**
Anthracene	2400	5400	11000	LQM/CIEH 2015**
Fluoranthene	280	560	890	LQM/CIEH 2015**
Pyrene	620	1200	2000	LQM/CIEH 2015**
Benzo(a)anthracene	7.2	11	13	LQM/CIEH 2015**
Chrysene	15	22	27	LQM/CIEH 2015**
Benzo(b)fluoranthene	2.6	3.3	3.7	LQM/CIEH 2015**
Benzo(k)fluoranthene	77	93	100	LQM/CIEH 2015**
Benzo(a)pyrene	2.2	2.7	3.0	LQM/CIEH 2015**
Indeno(1,2,3-cd)pyrene	27	36	41	LQM/CIEH 2015**
Di-benzo(a,h)anthracene	0.24	0.28	0.3	LQM/CIEH 2015**
Benzo(g,h,i)perylene	320	340	350	LQM/CIEH 2015**
Chloromethane	0.0083	0.0098	0.013	CL:AIRE GAC 2010
Chloroethane	8.3	11	18	CL:AIRE GAC 2010
Vinyl Chloride	0.00064	0.00087	0.0014	LQM/CIEH 2015**
1,1-dichloroethene	0.23	0.4	0.82	CL:AIRE GAC 2010
Cis-1,2-dichloroethene	0.11	0.19	0.37	CL:AIRE GAC 2010
1,1-dichloroethane	2.4	3.9	7.4	CL:AIRE GAC 2010
Trichloromethane	0.91	1.7	3.4	LQM/CIEH 2015**
1,1,1-Trichloroethane	8.8	18	39	LQM/CIEH 2015**
Trans-1,2-dichloroethene	0.19	0.34	0.7	CL:AIRE GAC 2010
Tetrachloromethane	0.026	0.056	0.13	LQM/CIEH 2015**
1,2-dichloropropane	0.024	0.042	0.084	CL:AIRE GAC 2010
Trichloroethene	0.016	0.034 0.03	0.075 0.061	LQM/CIEH 2015** CL:AIRE GAC 2010
Bromodichloromethane 1,1,2-Trichloroethane	0.016 0.6	0.03 1.2	2.7	CL:AIRE GAC 2010 CL:AIRE GAC 2010
Tetrachloroethene	0.0	0.39	0.9	LQM/CIEH 2015**
Chlorobenzene	0.16	1	2.4	LQM/CIEH 2015**
1,1,1,2-Tetrachloroethane	0.40 1.2	2.8	2.4 6.4	LQM/CIEH 2015**
Styrene	8.1	19	43	CL:AIRE GAC 2010
1,1,2,2-Tetrachloroethane	1.6	3.4	7.5	LQM/CIEH 2015**
Isopropylbenzene	11	27	64	CL:AIRE GAC 2010
Bromobenzene	0.87	2	4.7	CL:AIRE GAC 2010
N-Propylbenzene	34	82	190	CL:AIRE GAC 2010
1,2,4-Trimethylbenzene	0.35	0.85	2	CL:AIRE GAC 2010
1,2,3-Trichlorobenzene	1.5	3.6	8.6	LQM/CIEH 2015**
1,3-Dichlorobenzene	0.4	1	2.3	LQM/CIEH 2015**
1,2-Dichlorobenzene	23	55	130	LQM/CIEH 2015**
1,4-Dichlorobenzene	61	150	350	LQM/CIEH 2015**
Hexachloroethane	0.2	0.48	1.1	CL:AIRE GAC 2010

Table 1 – Soil Screening Values, Resi	dential with	Homegrown	Produce En	d Use continued
Determinand	Screenin	g Value (mg/	kg)	Source
	Soil Orga	nic Matter C	ontent	
	1%	2.5%	6%	
2,4-Dimethylphenol	19	43	97	CL:AIRE GAC 2010
1,2,4-Trichlorobenzene	2.6	6.4	15	LQM/CIEH 2015**
Hexachlorobutadiene	0.29	0.7	1.6	LQM/CIEH 2015**
2-Chloronaphthalene	3.7	9.2	22	CL:AIRE GAC 2010
2,6-Dinitrotoluene	0.78	1.7	3.9	CL:AIRE GAC 2010
2,4-Dinitrotoluene	1.5	3.2	7.2	CL:AIRE GAC 2010
Diethyl phthalate	120	260	570	CL:AIRE GAC 2010
Hexachlorobenzene	1.8	3.3	4.9	LQM/CIEH 2015**
Butyl benzyl phthalate	1400	3300	7200	CL:AIRE GAC 2010
Di-n-octylphthalate	2300	2800	3100	CL:AIRE GAC 2010
Bis(2-ethylhexyl)phthalate	280	610	1100	CL:AIRE GAC 2010
Pentachlorophenol	0.22	0.52	1.2	LQM/CIEH 2015**

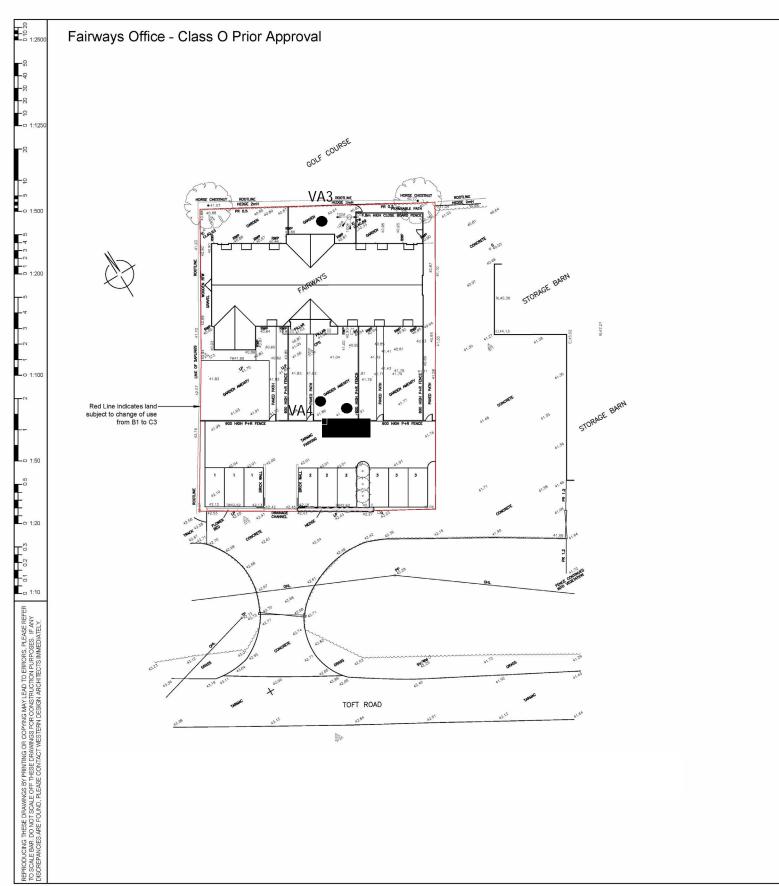
* Based on residential without home grown produce

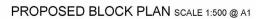
** Assumes no free product

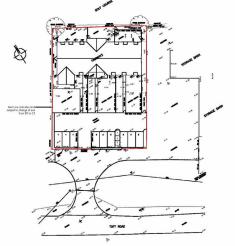


FAIRWAYS, TOFT ROAD, CAMBRIDGE

VALIDATION SAMPLES LOCATION PLAN (Based upon Western Design Architects drawing number 21)







DESIGNERS RISK ASSES HEALTH AND SAFETY THE CONSTRUCTION (DESIGN AND MO			
For significant hazards specific to Drawing CDM01 where appropriat	the project please refer to		
NOTES:-			
A West Gable Doors Added REV. REVISION DETAILS	MW MW 12.05.20 BY CKD DATE		
VV/F			
)A		
westerndesign	architects com		
	Western Design Architects Park, Tarrant Hinton, Dorset, DT11 & F 0675 E:Info@westerndesign.co.uk		
CLIENT			
Tango Holdi	ngs Limited		
PROJECT	s Office		
DRAWING TITLE	9 Plank Dir		
Proposed Site	DATE		
MJW - SCALE Varies@A1	14.05.2020 JOB NO. 1920126		
21	REVISION	1	
PLAN THIS DRAWING IS COPYRIG			
		•	

	Date 26 APRIL 2023
	Scale NOT TO SCALE
	Drawing No 16147VA/1 Version A



VA3 - Rear Garden



VA3 - view of rear garden looking north-east.



VA4 – Front Garden



VA5 – Front Garden





VA4 and VA5 - view of front garden looking north-east.

No. 1 e N

16147VA MARCH 2023