

June 20th 2019

Your Environment
Chilgrove Business Centre
Chilgrove
West Sussex
PO18 9HU

Dear Knightsgate UK,

Re: Southmere Farm, The Mallards, Havant, PO9 1SS.

With reference to the above named site and the additional groundwater testing completed at the above site, we are writing to provide information regarding the results returned from laboratory analysis.

Introduction

In June 2019, Your Environment (YE) was commissioned by Knightsgate UK (the client) to undertake contamination testing on an additional groundwater sample collected from BH01 at the site located at Southmere Farm, The Mallards, Havant, PO9 1SS.

This letter report has been produced to describe the testing undertaken and to report on the results of laboratory contamination testing. The purpose of this testing was to assess the extent of the exceedances encountered in the groundwater tested within the Phase 2 report (Report Reference: YE6611, Issued: February 2019) and confirm if there has been any contamination within the groundwater on the site.

From the visit, one (1no.) sample was collected by a Geo-Environmental Engineer from YE from the previously installed borehole position BH01.

Groundwater Testing

A Geo-Environmental Engineer from YE attended the site on 14th June 2019 to obtain one (1no.) groundwater sample from the installed cable percussive borehole (detailed in report YE6610) and was analysed by DETS Ltd in their UKAS and MCERTS accredited laboratory testing facility in accordance with laboratory protocol.

The testing completed comprised of a suite of testing the same as that undertaken for the initial groundwater sample, such as heavy metals, pH, speciated Total Petroleum Hydrocarbons (Aromatic/ Aliphatic Split) and speciated Polycyclic Aromatic Hydrocarbons (PAH - including the more carcinogenic forms naphthalene and benzo(a)pyrene), total cyanide, total phenols, BTEX, MTBE, ammonia, nitrate, nitrite and pH.

The results of this laboratory testing have been compared to the UK Drinking Water Standards (DWS) for inorganic and contaminants, where available which is considered to be overly protective given the low risk which has been attributed to the groundwater as a potable resource.

Groundwater Results

The results of the groundwater testing are shown in the following tables below where they are compared to the available Drinking Water Standards.

Metalloids

Determinant	BH01	GAC	Number of exceedances
Arsenic	<5	10	0
Beryllium	<3		0
Boron	104 µg/l	1 mg/l	0
Cadmium	<0.4	5.0	0
Chromium	<5	50	0
Copper	<5 µg/l	2.0 mg/l	0
Lead	<5	10	0
Mercury	0.12	10	0
Nickel	<5	20	0
Selenium	<5	10	0
Vanadium	<5		0
Total Phenols	<10		0
Total Cyanide	6	50	0

Table 1: Metalloids Groundwater Exceedances

Organics

Determinant	BH01	GAC	Number of exceedances
Polycyclic Aromatic Hydrocarbons	<0.01	0.10*	0

Table 2: PAH Groundwater Exceedances

* Based on the sum of 4 named PAH congeners (benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene).

Determinant	BH01	GAC	Number of individual exceedances
Total TPH >C5 - C35	<10	10+	0

Table 3: TPH Groundwater Exceedances

+ Based on individual TPH fractions.

Determinant	BH01	GAC	Number of exceedances
Benzene	<1		0
Toluene	<5		0
Ethylbenzene	<5		0
p & m-xylene	<10		0
o-xylene	<5		0
MTBE	<10		0

Table 4: BTEX and MTBE Groundwater Exceedances

Inorganics

Determinant	BH01 (mg/l)	GAC (mg/l)	Number of individual exceedances
Ammonia	7.23	0.5*	1
Nitrate	135	50	1
Nitrite	6.6	0.50	1

Table 5: TPH Groundwater Exceedances

* UK Drinking Water Quality Regulations

In summary, the groundwater monitoring results show:

- There were no exceedances from the water sample analysed in respect of metalloids.
- There were no exceedances from the water sample analysed in respect of PAH, TPH and BTEX & MTBE, all of which were below the limit of detection.
- There are elevated concentrations of ammonia, nitrate and nitrite.

The groundwater contamination laboratory certificates can be reviewed within **Appendix A**.

We trust that this information is of interest and should you have any other requirements do not hesitate to contact us.

Yours sincerely,



Rachael Giles
Junior Geo-Environmental Engineer
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Enc.

Appendix A: Groundwater contamination laboratory certificate

Appendix A: Groundwater Contamination Laboratory Certificate





Rachael Giles
Your Environment
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Chichester
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PO18 9HU

DETS Ltd
Unit 1
Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Kent
ME17 2JN
t: 01622 850410

DETS Report No: 19-08525

Site Reference: Southmere Farm

Project / Job Ref: YE7106

Order No: None Supplied

Sample Receipt Date: 17/06/2019

Sample Scheduled Date: 17/06/2019

Report Issue Number: 1

Reporting Date: 19/06/2019

Authorised by:



Dave Ashworth
Deputy Quality Manager

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.



DETS Ltd
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Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Water Analysis Certificate

DETS Report No: 19-08525	Date Sampled	14/06/19				
Your Environment	Time Sampled	None Supplied				
Site Reference: Southmere Farm	TP / BH No	WS01				
Project / Job Ref: YE7106	Additional Refs	MON2				
Order No: None Supplied	Depth (m)	None Supplied				
Reporting Date: 19/06/2019	DETS Sample No	415302				

Determinand	Unit	RL	Accreditation	(ns)			
pH	pH Units	N/a	ISO17025	7.5			
Electrical Conductivity	uS/cm	< 5	NONE	1150			
Total Cyanide	ug/l	< 5	NONE	6			
Sulphate as SO ₄	mg/l	< 1	ISO17025	67			
Ammonia as NH ₄	ug/l	< 50	NONE	7230			
Nitrate as NO ₃	mg/l	< 0.5	ISO17025	135			
Nitrite as NO ₂	mg/l	< 0.5	NONE	6.6			
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	62.6			
Hardness - Total	mgCaCO ₃ /l	< 1	NONE	340			
Arsenic (dissolved)	ug/l	< 5	ISO17025	< 5			
Barium (dissolved)	ug/l	< 5	ISO17025	127			
Beryllium (dissolved)	ug/l	< 3	ISO17025	< 3			
Boron (dissolved)	ug/l	< 5	ISO17025	104			
Cadmium (dissolved)	ug/l	< 0.4	ISO17025	< 0.4			
Chromium (dissolved)	ug/l	< 5	ISO17025	< 5			
Copper (dissolved)	ug/l	< 5	ISO17025	< 5			
Lead (dissolved)	ug/l	< 5	ISO17025	< 5			
Mercury (dissolved)	ug/l	< 0.05	ISO17025	0.12			
Nickel (dissolved)	ug/l	< 5	ISO17025	< 5			
Selenium (dissolved)	ug/l	< 5	ISO17025	< 5			
Vanadium (dissolved)	ug/l	< 5	ISO17025	< 5			
Zinc (dissolved)	ug/l	< 2	ISO17025	3			
Total Phenols (monohydric)	ug/l	< 10	NONE	< 10			

Subcontracted analysis ^{NS}

Insufficient sample ^{IS}

Unsuitable Sample ^{US}

(ns) Please note deviating sample due to head space in container



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Water Analysis Certificate - Speciated PAH

DETS Report No: 19-08525	Date Sampled	14/06/19				
Your Environment	Time Sampled	None Supplied				
Site Reference: Southmere Farm	TP / BH No	WS01				
Project / Job Ref: YE7106	Additional Refs	MON2				
Order No: None Supplied	Depth (m)	None Supplied				
Reporting Date: 19/06/2019	DETS Sample No	415302				

Determinand	Unit	RL	Accreditation	(hs)				
Naphthalene	ug/l	< 0.01	NONE	< 0.01				
Acenaphthylene	ug/l	< 0.01	NONE	< 0.01				
Acenaphthene	ug/l	< 0.01	NONE	< 0.01				
Fluorene	ug/l	< 0.01	NONE	< 0.01				
Phenanthrene	ug/l	< 0.01	NONE	< 0.01				
Anthracene	ug/l	< 0.01	NONE	< 0.01				
Fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Pyrene	ug/l	< 0.01	NONE	< 0.01				
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01				
Chrysene	ug/l	< 0.01	NONE	< 0.01				
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01				
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01				
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01				
Benzo(ghi)perylene	ug/l	0.008	NONE	< 0.008				
Total EPA-16 PAHs	ug/l	< 0.01	NONE	< 0.01				



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Water Analysis Certificate - TPH CWG Banded

DETS Report No: 19-08525	Date Sampled	14/06/19				
Your Environment	Time Sampled	None Supplied				
Site Reference: Southmere Farm	TP / BH No	WS01				
Project / Job Ref: YE7106	Additional Refs	MON2				
Order No: None Supplied	Depth (m)	None Supplied				
Reporting Date: 19/06/2019	DETS Sample No	415302				

Determinand	Unit	RL	Accreditation	(hs)				
Aliphatic >C5 - C6	ug/l	< 10	NONE	< 10				
Aliphatic >C6 - C8	ug/l	< 10	NONE	< 10				
Aliphatic >C8 - C10	ug/l	< 10	NONE	< 10				
Aliphatic >C10 - C12	ug/l	< 10	NONE	< 10				
Aliphatic >C12 - C16	ug/l	< 10	NONE	< 10				
Aliphatic >C16 - C21	ug/l	< 10	NONE	< 10				
Aliphatic >C21 - C34	ug/l	< 10	NONE	< 10				
Aliphatic (C5 - C34)	ug/l	< 70	NONE	< 70				
Aromatic >C5 - C7	ug/l	< 10	NONE	< 10				
Aromatic >C7 - C8	ug/l	< 10	NONE	< 10				
Aromatic >C8 - C10	ug/l	< 10	NONE	< 10				
Aromatic >C10 - C12	ug/l	< 10	NONE	< 10				
Aromatic >C12 - C16	ug/l	< 10	NONE	< 10				
Aromatic >C16 - C21	ug/l	< 10	NONE	< 10				
Aromatic >C21 - C35	ug/l	< 10	NONE	< 10				
Aromatic (C5 - C35)	ug/l	< 70	NONE	< 70				
Total >C5 - C35	ug/l	< 140	NONE	< 140				

(hs) Please note deviating sample due to head space in container



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Water Analysis Certificate - BTEX / MTBE						
DETS Report No: 19-08525	Date Sampled	14/06/19				
Your Environment	Time Sampled	None Supplied				
Site Reference: Southmere Farm	TP / BH No	WS01				
Project / Job Ref: YE7106	Additional Refs	MON2				
Order No: None Supplied	Depth (m)	None Supplied				
Reporting Date: 19/06/2019	DETS Sample No	415302				

Determinand	Unit	RL	Accreditation	(hs)			
Benzene	ug/l	< 1	ISO17025	< 1			
Toluene	ug/l	< 5	ISO17025	< 5			
Ethylbenzene	ug/l	< 5	ISO17025	< 5			
p & m-xylene	ug/l	< 10	ISO17025	< 10			
o-xylene	ug/l	< 5	ISO17025	< 5			
MTBE	ug/l	< 10	ISO17025	< 10			

(hs) Please note deviating sample due to head space in container

Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 19-08525

Your Environment

Site Reference: Southmere Farm

Project / Job Ref: YE7106

Order No: None Supplied

Reporting Date: 19/06/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR detection	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO ₄)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	TPH CWG (all: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	TPH LQM (all: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered