

17 January 2020

Your ref:

Our ref: J16120/db/c08

Darren Schofield
BDW Southampton
Tollbar House, Tollbar Way
Hedge End
Southampton
SO30 2UH

Dear Mr Schofield,

**RE: FORTY ACRE FARM DEVELOPMENT SITE, BEDHAMPTON
CONTAMINATED LAND REVIEW AND DISCUSSION**

This letter provides a discussion and review of the contaminated land aspects of the proposed development of this site, based upon the enclosed factual records of the desk study and multiphased ground investigation. This letter and the enclosed records are provided in accordance with our standard terms and conditions of contract and should be viewed as preliminary advice and recommendation pending consideration of the full set of laboratory test results.

Development Proposals

This site is to be developed through a residential housing scheme that is to be constructed upon a raised earthworks platform that is required to be formed using imported fill materials to ensure that the development is raised above potential flood risk levels.

The scheme is to include a range of two storey traditional housing units together with access roads, areas of hardstanding for car parking, private domestic gardens and areas of ancillary soft landscaping. In addition, a series of surface water attenuation basins are to be formed within the southern part of the site together with a new area of ecology focused soft landscaping to the east.

The earthworks land raising is to be carried out using geotechnically and chemically suitable fill materials that are to be sourced from nearby greenfield development sites and imported under a regime defined by a Materials Management Plan in accordance with the Definition of Waste. A copy of the text to the Materials Management Plan and Earthworks Support Document is also enclosed, with a full set of the appendices to that document available to be issued on a data link if required.

Foundations to the new buildings that are to be constructed across the residential development area are to comprise a combination of continuous flight auger installed piled foundations, with selected use of vibro ground improvement across the greenfield part of the site that is to be redeveloped for housing. No new foundations are proposed within the area of the former farmyard area.

Desk Study Summary and Environmental Setting

The majority of the site has not been previously developed and may be defined as a greenfield site that is currently used for agriculture and as a site for a weekly car boot sale.

Within the southern central part of the site is a former farmyard area comprising a series of barns and outbuildings together with areas of hardstanding. This part of the site has subsequently been used as an office, workshop and storage area for a local building contractor. This area is however located outside of the proposed residential development area and is to form part of an area of communal access soft landscaping after it is no longer required for use as a construction compound to support the development.

Desk study searches indicate the presence of an historical landfill site approximately 170m to the southeast of the site (approximately 300m to the southeast of the residential development area) and has not indicated any other issues of potential concern in the vicinity of the site. The site is not indicated to be located in an area affected by radon.

The desk study has not indicated a raised potential for unexpected ground contamination across the majority of the site, although within the vicinity of the historical farm yard buildings that are now used as an office, workshops and stores for a local building contractor, there is an increased risk of localised contamination associated with the potential use, storage and possible spillage of a wide range of oils, greases, solvents and fuels.

The desk study has indicated a minimal potential for potentially mobile contaminants and soil gasses to be associated with the historical landfill site located to the southeast of the site. It is understood that this landfill was not lined and was designed on the basis of a dilute and disperse approach within the tidally influenced area. It is considered unlikely that this site would continue to pose any risk to the proposed development site, although there is a perhaps minimal to low risk of potentially mobile soil gasses that could migrate and affect the proposed development site.

Prevailing Ground Conditions

The ground investigation entailed 36 small diameter boreholes drilled in locations across the site to depths of up to 5.45 m below ground level and encountered variable ground conditions.

Further works in the form of deep cable percussion drilled boreholes to 15m below ground level have also been carried out to provide information to support the design of piled foundations, together with an extensive phase of archaeological trenching which has been carried out under a geo-environmental watching brief to check for the presence of any suspicious or potentially contaminated ground

These various phases of exploratory works have indicated the presence of an initial layer of topsoil extending to a depth of less than 0.30 m below ground level across the majority of the site (and locally deeper where ploughed and cultivated). Underlying the topsoil, Raised Beach Deposits were encountered to depths of between 1.60 m and in excess of at least 4.00 m below ground level.

The Raised Beach Deposits were found to comprise a mixture of firm, stiff, soft and very soft clay, silt and sand soils. The clay soils have been found to be medium plasticity clay although no evidence of the effects of trees or significantly widespread desiccation was noted as part of the site investigation works.

Underlying the Raised Beach Deposits, where proved, weathered becoming sound white chalk was encountered to the maximum depth of ground investigation.

No visual or olfactory indications of contamination were noted across the majority of the site as part of the site investigation works and no suspicious soils were encountered as part of the archaeological trenching, although it is understood that remains of potential archaeological interest were encountered and have been recorded by the archaeologists.

Within the southern central part of the site, outside of the residential development area, ground conditions within the vicinity of the former farm yard included made ground to a depth of 0.80 m overlying layers of peat and decayed topsoil. Soil contamination testing has not indicated the presence of soil contamination although the scope of investigation within this part of the site has been limited by the ongoing use of the buildings and yard storage area.

Once the buildings and areas of hardstanding are no longer occupied and access becomes available, it is proposed to carry out an additional phase of ground investigation in this area, including holes drilled through the building floor slabs to facilitate inspection and recovery of soil samples for contamination testing of the near surface soils.

Groundwater was encountered as part of the site works and monitoring of installed standpipes to date has indicated the presence of near surface ground water, which is particularly shallow during the winter months at less than 1.00 m below existing ground level.

Soil Contamination

No visual or olfactory indications of contamination were noted as part of the site investigation works.

The significance of the measured concentrations of any chemicals of concern has therefore been assessed in relation to the available Environment Agency provided statutory C4SLs, supplemented with the available S4UL values that have been adopted by the Chartered Institute of Environmental Health (CIEH) for a residential with plant uptake end use and a soil organic matter representative of the results of the testing carried out (1%). These values are widely accepted as providing a suitable initial screening value against which measured concentrations of potential contaminants can be assessed to determine the requirement for site specific quantitative risk assessment. With regards to lead, in the absence of robust current guidance to the contrary, we have adopted an assessment criteria of 200mg/kg in line with the previously issued SGV. The acceptability criteria are presented as follows;

Determinant	Acceptability Criteria (residential with plant uptake) mg/kg	Number of exceedances	Location and value of exceedances
Asbestos	No asbestos	None	--
Arsenic (As)	32	None	--
Cadmium (Cd)	10	None	--
Chromium (hex)	4.3	None	--
Chromium (Cr)	3000	None	--
Copper (Cu)	2330	None	--
Lead (Pb)	200	None	--
Mercury (Hg)	1.0	None	--
Nickel (Ni)	130	None	--
Selenium (Se)	350	None	--
Zinc (Zn)	3750	None	--
Benzo(a)pyrene	1.0	None	--
Total Phenols (mono)	420	None	--
Aliphatic >C5 - C6	42	None	--
Aliphatic >C6 - C8	100	None	--
Aliphatic >C8 - C10	27	None	--
Aliphatic >C10 - C12	130	None	--
Aliphatic >C12 - C16	1100	None	--
Aliphatic >C16 - C21	65000	None	--
Aliphatic >C21 - C34	65000	None	--
Aromatic >C5 - C7	13	None	--
Aromatic >C7 - C8	22	None	--
Aromatic >C8 - C10	8.6	None	--
Aromatic >C10 - C12	13	None	--
Aromatic >C12 - C16	23	None	--
Aromatic >C16 - C21	46	None	--
Aromatic >C21 - C35	370	None	--

The results of testing have essentially confirmed that no raised or elevated concentrations of a wide range of potential soil contaminants have been encountered within the representative selected soil samples tested.

Soil Gas and Radon Protection

The site is not within a radon affected area such that radon precautions are not required.

The desk study has indicated the presence of an historical landfill sit to the southeast of the site which could present a potential for relic potentially mobile ground and soil gas contamination, although the time that has elapsed since landfilling ceased at this site, will have mitigated the risk currently posed by this landfill site.

Limited soil gas monitoring has not indicated the presence of elevated soil gas conditions of concern such that a requirement for gas protection with regards to methane and carbon dioxide is not envisaged.

Earthworks Strategy

The development at this site is to be constructed upon a raised earthworks platform required for flood protection. The raised plateau will require the importation and placement of approximately 60,000m³ of fill materials.

The earthworks filling will be carried out in accordance with the requirements of a Materials Management Plan and Earthworks Strategy produced in accordance with the Code of Practice for the Definition of Waste and the Series 600 Highways Specification for earthworks documents. The enclosed strategy sets out the acceptability criteria for geotechnical and chemical properties of imported soils. The chemical acceptability criteria are based upon a Residential with Plant Uptake end use.

Buried Utilities

Precautions to ensure the protection of potentially sensitive underground services with regards to ground contamination are not envisaged as part of the development of this site.

Topsoil

The existing topsoil present across the site is to be treated as a resource and will be striped off the site prior to earthworks placement in any one area and stockpiled on site for reuse. Soil stockpiled are to be formed in accordance with the DEFRA guidance to maximise the suitability of the topsoil for reuse. Selected samples of topsoil has been tested for physical properties in addition to chemical suitability in order to ensure that these soils are suitable for reuse. Additional samples will need to be taken in due course from the stockpiles that will be formed in order to demonstrate the ongoing suitability of topsoil for reuse at the time of placement.

We trust that this contaminated land review provides sufficient information for your needs at present, although please do not hesitate to contact me directly should you have any queries or questions or wish to discuss any aspect of the development

Yours sincerely
Wilson Bailey Partnership

Dominic Brightman
BSc MSc DIC FGS CGeol ARSM

Encs Borehole logs
 Chemical test results and Topsoil testing
 Soil Gas Monitoring Results
 Site Plan
 MMP and Earthworks Strategy Support Document (text only)

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

1:50

Client: BDW Southampton

Dates: 03/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.35			TOPSOIL	
		0.50	D					Firm locally stiff pale brown and orange-brown silty slightly sandy CLAY with abundant fine gravel and occasional flint cobbles	1
		1.00	D		1.20			Pale yellowish silty SAND with abundant fine chalk fragments, occasional flint cobbles and pockets of firm brown clay	
		1.50	D						2
		2.00	D						
		2.50	D						
					3.00			End of Borehole at 3.00 m	3
									4
									5
									6
									7
									8
									9

Remarks: Groundwater not encountered. Standpipe installed with a response zone from 1.00m to 3.00m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

1:50

Client: BDW Southampton

Dates: 03/08/2016

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DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			TOPSOIL	
		0.50	D					Soft slightly sandy very clayey SILT locally grading into very silty clay with occasional fine to medium flint gravel and occasional fine chalk fragments	1
		1.00	D						
		1.50	D		1.40			Soft and very soft pale yellowish brown and brown silty fine SAND with abundant fine chalk fragments and scattered fine flint gravel	2
		2.00	D						
		2.50	D		2.30			Off white, yellowish brown and orange-brown mottled clayey sandy SILT with abundant chalk and fine flint gravel and occasional fine to medium flint gravel	3
		3.00	D						
		3.50	D		3.40			Soft pale grey CLAY	4
					4.00			End of Borehole at 4.00 m	5
									6
									7
									8
									9

Remarks: Groundwater encountered at 2.40m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

Dates: 03/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15						TOPSOIL	
		0.50	D					Soft becoming from pale brown very silty slightly sandy CLAY with scattered fine flint and chalk gravel	
		1.00	D						1
		1.50	D						
		2.00	D						2
		2.40	D						
		2.50	D		2.40			Soft pale brown and off white clayey SILT with abundant fine chalk and flint gravel	
		3.00	D		3.20				3
		3.50	D					Recovered as white and off white completely weathered CHALK	
					4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater seepage at 3.00m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

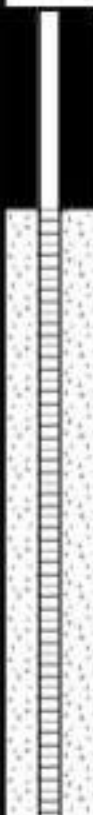
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Client: BDW Southampton

Dates: 03/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20			0.20			MADE GROUND (crushed tarmac and brick rubble)	
		0.50	D					Soft pale brown and brown silty locally very silty CLAY with scattered fine flint and chalk gravel	1
		1.00	D						
		1.50	D						
		2.00	D						2
		2.30			2.30			Pale yellowish brown, pale brown, pale orange-brown and off white sandy clayey SILT with scattered fine flint and chalk gravel	
		2.50	D						
		3.00	D						3
		3.20			3.20			Pale yellowish orange-brown silty SAND with fine chalk and flint gravel	
		3.50	D		3.50			Soft pale grey CLAY with yellowish brown mottled chalk gravel	
		4.00			4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater seepage at 3.20m. Standpipe installed with a response zone from 1.00m to 4.00m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

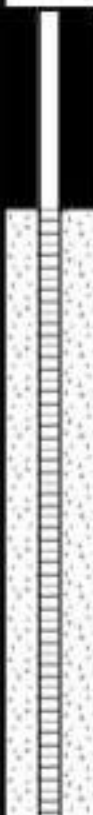
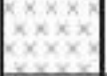
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Client: BDW Southampton

Dates: 03/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.15			0.15			TOPSOIL	
		0.50	D					Firm orange-brown silty sandy CLAY with occasional fine chalk and flint gravel	1
		1.00	D		1.10			Soft locally firm pale grey and pale brown very sandy silty CLAY with occasional fine chalk gravel	
		1.50	D						
		2.00	D						2
		2.30			2.30			Pale grey with orange-brown mottled silty clayey fine SAND	
		2.50	D						3
		3.00	D						
		3.50	D		3.60			Off white chalk derived sandy SILT with flint cobbles	
		4.00			4.00				4
								End of Borehole at 4.00 m	5
									6
									7
									8
									9

Remarks: Groundwater encountered at 2.50m. Standpipe installed with a response zone from 1.00m to 4.00m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

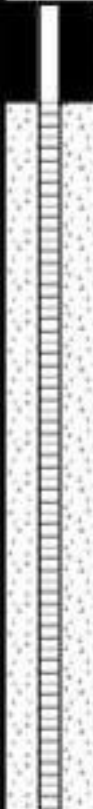
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Client: BDW Southampton

Dates: 03/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15			TOPSOIL	
		0.50	D					Soft pale brown silty sandy CLAY with abundant fine chalk gravel	1
		1.00	D						
		1.50	D		1.40			Soft pale brown and pale yellowish brown silty sandy CLAY with scattered flint and chalk gravel	2
		2.00	D						
		2.50	D		2.20			Off white chalk derived very silty GRAVEL of flint and chalk	3
		3.00	D						
		3.50	D						
					3.80			Recovered as completely weathered CHALK	4
					4.00			End of Borehole at 4.00 m	

Remarks: Groundwater encountered at 1.80m. Standpipe installed with a response zone from 0.50m to 4.00m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

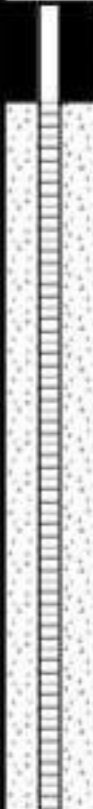
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Client: BDW Southampton

Dates: 03/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	D		0.50			TOPSOIL	
		1.00	D		1.20			Firm orange-brown and brown silty sandy CLAY with scattered fine flint and chalk gravel	1
		1.50	D					Soft pale yellowish brown silty sandy CLAY	
		2.00	D						2
		2.50	D		2.30			Soft pale yellowish brown silty sandy CLAY with abundant fine chalk gravel	
		3.00	D						3
		3.50	D						
					4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater not encountered. Standpipe installed with a response zone from 0.50m to 4.00m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

1:50

Client: BDW Southampton

Dates: 03/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	D		0.30			TOPSOIL	
		0.50	D					Firm brown and dark brown silty sandy CLAY	
		0.75	D						
		1.00	D		0.90			Soft pale yellowish brown very silty locally sandy CLAY with abundant fine flint and chalk gravel and occasional flint cobbles	1
		1.50	D						
		2.00	D						2
		2.50	D						
		3.00	D						3
		3.50	D						
					4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater encountered at 2.80m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

Dates: 03/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			MADE GROUND (crushed gravel and tarmac)	
		0.50	D					Soft locally firm pale brown silty very silty CLAY with occasional flint and chalk gravel	
		1.00	D						1
		1.50	D						
		2.00	D		2.10				2
	▽	2.50	D					Soft pale grey and pale brown mottled clayey SILT with silty sandy partings and occasional fine chalk gravel	
		3.00	D						3
		3.50	D						
					4.00				4
								End of Borehole at 4.00 m	
									5
									6
									7
									8
									9

Remarks: Groundwater encountered at 2.30m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

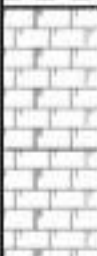
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Scale
1:50

Client: BDW Southampton

Dates: 03/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	D					Ploughed TOPSOIL	
		0.50	D		0.40			Firm dark brown and brown silty sandy CLAY with occasional flint cobbles	1
		1.00	D						
		1.50	D		1.30			Soft pale yellowish brown very silty CLAY with abundant fine chalk fragments, flint gravel and occasional flint cobbles	2
		2.00	D						
		2.50	D		2.70			Recovered as completely weathered white and off white CHALK	3
		3.00	D						
		3.50	D						
					4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater encountered at 2.70m as seepage.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

Dates: 03/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.50	D		0.50			Ploughed TOPSOIL	
		1.00	D					Firm locally soft dark brown silty sandy CLAY with occasional flint cobbles	1
		1.50	D						
		2.00	D		1.80			Off white and pale yellowish brown chalk derived sandy SILT with abundant fragments of weak white chalk, occasional flint gravel and scattered flint cobbles	2
		2.50	D						
		3.00	D						3
		3.50	D						
					4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater not encountered.

Project Name
40 Acre Farm

Project No.
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Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

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Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	D		0.30			MADE GROUND (reworked topsoil wth gravel)	
		0.50	D					Firm becoming soft below 1.20m brown silty sandy CLAY with occasional fine chalk fragments	
		1.00	D						1
		1.50	D						
		2.00	D						2
		2.30	D		2.30				
		2.50	D					Soft and very soft pale yellowish brown and off white sandy SILT with abundant fine chalk fragments	
		3.00	D		3.00				3
								End of Borehole at 3.00 m	
									4
									5
									6
									7
									8
									9

Remarks: Groundwater encountered at 2.80m.

Project Name
40 Acre Farm

Project No.
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Hole Type
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Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

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Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10			MADE GROUND (tarmac)	
		0.50	D		0.60			MADE GROUND (black sandy gravel with brick and gravel)	
		1.00	D					Very soft grey silty CLAY with occasional decayed organic matter	1
	▽	1.50	D						2
		2.00	D						3
		2.50	D						4
		2.80			2.80			Very soft pale grey silty clayey locally clayey SILT with occasional weak chalk gravel	5
		3.00			3.00			End of Borehole at 3.00 m	6
									7
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Remarks: Groundwater encountered at 1.50m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

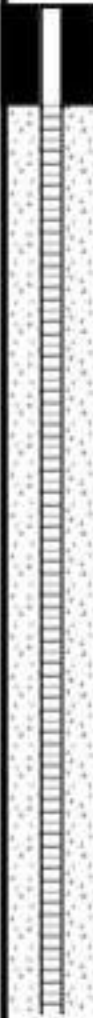
Level: -

Scale
1:50

Client: BDW Southampton

Dates: 06/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.25	D		0.35			TOPSOIL (dry and dusty)		
		0.50	D					"Stiff" dark orange-brown and brown silty sandy CLAY with occasional fine gravel, roots, rootlets and root hairs - desiccated soil		
		1.00 1.00	SPT D	N=14 (2,3/ 3,3,4,4)				1		
		1.50	D		2.00 2.15			Firm dark orange-brown and brown silty sandy CLAY	2	
		2.00 2.00	SPT D	N=8 (2,2/ 2,2,2,2)				Soft locally firm pale yellowish brown, pale orange-brown and pale grey very silty sandy CLAY with abundant fine chalk gravel		
		2.50	D							
		3.00 3.00	SPT D	N=7 (2,2/ 2,1,2,2)	4.40 4.60			Pale off white SILT	3	
		3.50	D					Soft pale grey very silty CLAY		
		4.00 4.00	SPT D	N=8 (1,2/ 2,2,2,2)					4	
		4.50	D		5.00					
		5.00	SPT	N=7 (1,2/ 2,1,2,2)					5	
									End of Borehole at 5.00 m	6
										7
										8
										9

Remarks: Groundwater encountered at 3.20m. Standpipe installed with a response zone from 0.50m to 5.00m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

Dates: 06/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								TOPSOIL	
		0.50	D		0.35			"Firm" pale orange-brown and brown silty slightly sandy CLAY with occasional flint cobbles - desiccated	
		1.00	D		0.90			Pale yellowish and off white silty fine SAND with abundant fine chalk fragments	1
	▽	1.50	D						2
		2.00	D						3
		2.50	D						4
		3.00	D						5
		3.50	D						6
		4.00	D		4.00			End of Borehole at 4.00 m	7
									8
									9
									10
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									100

Remarks: Groundwater encountered at 1.50m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

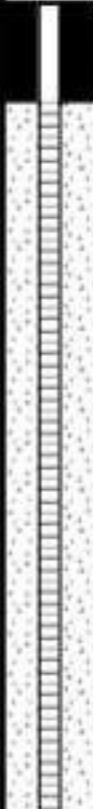
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Client: BDW Southampton

Dates: 06/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL	
		0.50	D					Stiff brown and dark orange-brown silty sandy CLAY	
		0.75	D		0.80				
		1.00	D					Firm becoming soft brown and dark orange-brown silty sandy CLAY	1
		1.50	D						
					1.80			Very soft pale grey silty CLAY with fine chalk gravel	2
		2.00	D						
		2.50	D		2.60			White and off white completely weathered CHALK	3
		3.00	D						
		3.50	D						
		4.00	D		4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater seepage at 2.60m. Standpipe installed with a resonance zone from 0.50m to 4.00m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

Dates: 06/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.25	D		0.40			TOPSOIL	
		0.50	D					Firm orange-brown silty sandy CLAY with occasional flint cobbles	
		1.00	SPT	N=7	1.80				1
		1.00	D	(1,1/ 1,2,2,2)					
		1.50	D						
		2.00	SPT	N=6				Soft pale yellowish brown silty locally very sandy CLAY with abundant fine chalk gravel	2
		2.00	D	(2,1/ 2,1,2,1)					
		2.50	D						
		3.00	SPT	N=10	4.00				3
		3.00	D	(2,2/ 2,3,2,3)					
		3.50	D						
		4.00	D					End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater seepage at 1.90m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

1:50

Client: BDW Southampton

Dates: 07/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.35			TOPSOIL	
		0.50	D					Firm brown silty sandy CLAY with occasional fine flint and chalk gravel	1
		1.00	D						
		1.50	D						
		2.00	D		1.90			Soft pale yellowish brown very silty very sandy CLAY with abundant flint and chalk gravel	2
		2.50	D						
		3.00	D		2.80			Recovered as completely weathered white CHALK	3
		3.50	D						
		4.00	D		4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater encountered at 2.30m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

Dates: 07/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			TOPSOIL	
		0.50	D					Firm brown silty sandy CLAY with occasional flint cobbles	
		1.00	D						1
		1.50	D						
		2.00	D						2
		2.10			2.10				
		2.50	D					Pale orange-brown silty very sandy CLAY with abundant fine chalk gravel and occasional flint cobbles	
		3.00	D						3
		3.20			3.20				
		3.50	D					Recovered as completely weathered white CHALK	
		4.00	D		4.00				4
								End of Borehole at 4.00 m	
									5
									6
									7
									8
									9

Remarks: Groundwater not encountered. Damp below 2.90m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

Level: -

Scale
1:50

Client: BDW Southampton

Dates: 07/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.35			TOPSOIL	
		0.50	D					Firm brown silty sandy CLAY with occasional flint cobbles	1
		1.00	D						
		1.50	D						
		2.00	D		2.10			Pale yellowish silty SAND with layers of silty sandy clay and abundant fine flint and chalk gravel	2
		2.50	D						
		3.00	D		2.80			Pale brown silty SAND with abundant fine chalk gravel	3
		3.50	D						
		4.00	D		4.00			End of Borehole at 4.00 m	4
									5
									6
									7
									8
									9

Remarks: Groundwater not encountered. Damp below 3.10m. Poor recovery 2.00m to 3.00m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

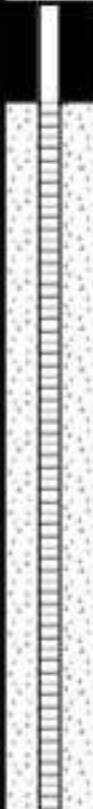
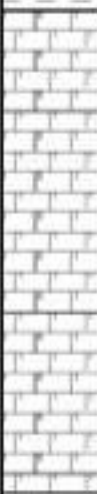
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Client: BDW Southampton

Dates: 07/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.20			0.20			TOPSOIL	
		0.50	D					Firm brown silty sandy CLAY with occasional flint and chalk gravel	
		1.00	SPT	N=10					1
		1.00	D	(3,2/ 3,2,3,2)					
		1.50	D					Recovered as completely weathered CHALK	
		2.00	SPT	N=18	1.60				2
		2.00	D	(3,4/ 5,5,4,4)					
		2.50	D						
		3.00	SPT	N=13					3
		3.00	D	(3,3/ 3,2,4,4)					
		3.50	D						
		4.00	SPT	N=16	4.00				4
		4.00	D	(4,4/ 4,4,4,4)				End of Borehole at 4.00 m	
									5
									6
									7
									8
									9

Remarks: Groundwater not encountered. Damp below 1.80m. Standpipe installed with a response zone from 0.50m to 4.00m.

Project Name
40 Acre Farm

Project No.
J16120

Co-ords: -

Hole Type
WLS

Location: Havant Road, Bedhampton

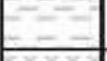
Level: -

Scale
1:50

Client: BDW Southampton

Dates: 07/08/2016

Logged By
DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			TOPSOIL	
		0.50	D		0.60			Firm dark orange-brown silty sandy CLAY with occasional fine chalk gravel	
		1.00	D		1.10			White and off white sandy SILT	1
		1.50	D					Soft pale yellowish brown silty sandy CLAY with abundant fine chalk gravel and occasional flint cobbles	2
		2.00	D		2.40			Recovered as completely weathered CHALK with occasional flint cobbles	3
		2.50	D						
		3.00	D						
		3.50	D						
		4.00	D		4.00				4
								End of Borehole at 4.00 m	5
									6
									7
									8
									9

Remarks: Groundwater not encountered. Damp below 2.80m.

Project Name

40 Acre Farm

Project No.

J16120

Co-ords: -

Hole Type

WLS

Location: Havant Road, Bedhampton

Level: -

Scale

1:50

Client: BDW Southampton

Dates: 07/08/2016

Logged By

DPB

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25			TOPSOIL	
		0.50	D					Firm orange-brown and brown silty sandy CLAY with occasional fine to medium flint and chalk gravel	1
		1.00	SPT	N=8					
		1.00	D	(1,1/ 2,2,2,2)					
		1.50	D						
		2.00	SPT	N=7	1.90			Pale brown and off white clayey silty SAND with abundant fine to medium flint and chalk gravel and occasional flint cobbles	2
		2.00	D	(1,1/ 2,2,1,2)					
		2.50	D						
		3.00	SPT	N=7					3
		3.00	D	(1,2/ 1,2,2,2)					
		3.50	D						
		4.00	SPT	N=7					4
		4.00	D	(2,2/ 1,2,2,2)					
		4.50	D						
		5.00	D		5.00			End of Borehole at 5.00 m	5
									6
									7
									8
									9

Remarks: Groundwater not encountered. Damp below 2.50m.



Dominic Brightman
Wilson Bailey Geotechnical & Environmental Ltd
Carters Cottage
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BA12 0SN



QTS Environmental Ltd
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Rose Lane
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ME17 2JN
t: 01622 850410
russell.jarvis@qtsevenvironmental.com

QTS Environmental Report No: 16-48037

Site Reference: 40 Acre Farm

Project / Job Ref: None Supplied

Order No: None Supplied

Sample Receipt Date: 16/08/2016

Sample Scheduled Date: 16/08/2016

Report Issue Number: 1

Reporting Date: 19/08/2016

Authorised by:



Kevin Old
Associate Director of Laboratory

Authorised by:



Russell Jarvis
Associate Director of Client Services

Soil Analysis Certificate

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	BH2	BH5	BH7	BH8	BH9
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.50	0.50	0.50	0.25	0.35
Reporting Date: 19/08/2016	QTSE Sample No	222900	222901	222902	222903	222904

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.1	7.2	7.8	7.6	7.6
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	0.7	0.9	0.3	0.3	0.8
Arsenic (As)	mg/kg	< 2	MCERTS	7	9	7	9	12
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	21	22	32	26	28
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	9	11	13	12	13
Lead (Pb)	mg/kg	< 3	MCERTS	13	16	10	9	14
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	10	14	24	18	17
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	44	43	50	43	48
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.

Analysis carried out on the dried sample is corrected for the stone content.

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification).

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽²⁾

Soil Analysis Certificate

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	BH12	BH14	BH15	BH16	BH17
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.25	0.25	0.25	0.50	0.50
Reporting Date: 19/08/2016	QTSE Sample No	222905	222906	222907	222908	222909

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.7	7.7	7.8	7.6	7.4
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	1.9	1.1	1	0.5	4.6
Arsenic (As)	mg/kg	< 2	MCERTS	14	7	11	13	9
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	1.2	1.2
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3	0.2	< 0.2	< 0.2	0.7
Chromium (Cr)	mg/kg	< 2	MCERTS	19	18	25	26	16
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	19	12	14	13	21
Lead (Pb)	mg/kg	< 3	MCERTS	55	18	20	14	73
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	14	10	14	24	13
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	64	42	51	48	474
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.

Analysis carried out on the dried sample is corrected for the stone content.

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification).

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽²⁾

Soil Analysis Certificate

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied		
Wilson Bailey Geotechnical & Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 40 Acre Farm	TP / BH No	BH17	BH17	BH17		
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	1.00	2.00	2.50		
Reporting Date: 19/08/2016	QTSE Sample No	222910	222911	222912		

Determinand	Unit	RL	Accreditation					
Asbestos Screen	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected		
pH	pH Units	N/a	MCERTS	7.5	7.4	8.0		
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	0.6	4.4	0.4		
Arsenic (As)	mg/kg	< 2	MCERTS	11	10	< 2		
W/S Boron	mg/kg	< 1	NONE	1	3.5	< 1		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS	23	21	8		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	20	20	7		
Lead (Pb)	mg/kg	< 3	MCERTS	24	29	4		
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS	21	14	6		
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3		
Zinc (Zn)	mg/kg	< 3	MCERTS	59	67	19		
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.

Analysis carried out on the dried sample is corrected for the stone content.

The samples have been examined to identify the presence of asbestiform minerals by polarising light microscopy and dispersion staining technique to In-House Procedures QTSE600 Determination of Asbestos in Bulk Materials; Asbestos in Soils/Sediments (fibre screening and identification).

This report refers to samples as received, and QTS Environmental Ltd, takes no responsibility for the accuracy or competence of sampling by others.

The material description shall be regarded as tentative and is not included in our scope of UKAS Accreditation.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

Asbestos Analyst: Graham Revell

RL: Reporting Limit

Pinch Test: Where pinch test is positive it is reported "Loose Fibres - PT" with type(s).

Subcontracted analysis ⁽²⁾

Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	BH2	BH5	BH7	BH8	BH9
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.50	0.50	0.50	0.25	0.35
Reporting Date: 19/08/2016	QTSE Sample No	222900	222901	222902	222903	222904

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.13	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 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	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 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	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	BH12	BH14	BH15	BH16	BH17
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.25	0.25	0.25	0.50	0.50
Reporting Date: 19/08/2016	QTSE Sample No	222905	222906	222907	222908	222909

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.19
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.45
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	0.38	< 0.1	< 0.1	< 0.1	0.59
Pyrene	mg/kg	< 0.1	MCERTS	0.32	< 0.1	< 0.1	< 0.1	0.50
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	0.15	< 0.1	< 0.1	< 0.1	0.17
Chrysene	mg/kg	< 0.1	MCERTS	0.23	< 0.1	< 0.1	< 0.1	0.26
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.28	< 0.1	< 0.1	< 0.1	0.33
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.15	< 0.1	< 0.1	< 0.1	0.15
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.24	< 0.1	< 0.1	< 0.1	0.22
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	0.16	< 0.1	< 0.1	< 0.1	0.20
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	0.13	< 0.1	< 0.1	< 0.1	0.17
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	2	< 1.6	< 1.6	< 1.6	3.2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied		
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 40 Acre Farm	TP / BH No	BH17	BH17	BH17		
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	1.00	2.00	2.50		
Reporting Date: 19/08/2016	QTSE Sample No	222910	222911	222912		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Soil Analysis Certificate - TPH CWG Banded

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	BH2	BH5	BH7	BH8	BH9
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.50	0.50	0.50	0.25	0.35
Reporting Date: 19/08/2016	QTSE Sample No	222900	222901	222902	222903	222904

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Soil Analysis Certificate - TPH CWG Banded

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	BH12	BH14	BH15	BH16	BH17
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.25	0.25	0.25	0.50	0.50
Reporting Date: 19/08/2016	QTSE Sample No	222905	222906	222907	222908	222909

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Soil Analysis Certificate - TPH CWG Banded

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied		
Wilson Bailey Geotechnical & Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 40 Acre Farm	TP / BH No	BH17	BH17	BH17		
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	1.00	2.00	2.50		
Reporting Date: 19/08/2016	QTSE Sample No	222910	222911	222912		

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3		
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3		
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10		
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21		
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05		
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2		
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3		
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10		
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21		
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C

Soil Analysis Certificate - BTEX / MTBE

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	BH2	BH5	BH7	BH8	BH9
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.50	0.50	0.50	0.25	0.35
Reporting Date: 19/08/2016	QTSE Sample No	222900	222901	222902	222903	222904

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.

Soil Analysis Certificate - BTEX / MTBE

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	BH12	BH14	BH15	BH16	BH17
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.25	0.25	0.25	0.50	0.50
Reporting Date: 19/08/2016	QTSE Sample No	222905	222906	222907	222908	222909

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.

Soil Analysis Certificate - BTEX / MTBE

QTS Environmental Report No: 16-48037	Date Sampled	None Supplied	None Supplied	None Supplied		
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 40 Acre Farm	TP / BH No	BH17	BH17	BH17		
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	1.00	2.00	2.50		
Reporting Date: 19/08/2016	QTSE Sample No	222910	222911	222912		

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.

Soil Analysis Certificate - Sample Descriptions

QTS Environmental Report No: 16-48037

Wilson Bailey Geotechnical & Environmental Ltd

Site Reference: 40 Acre Farm

Project / Job Ref: None Supplied

Order No: None Supplied

Reporting Date: 19/08/2016

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 222900	BH2	None Supplied	0.50	13.9	Brown loamy clay
^ 222901	BH5	None Supplied	0.50	12	Brown loamy clay
^ 222902	BH7	None Supplied	0.50	15.8	Light brown clay
^ 222903	BH8	None Supplied	0.25	15.7	Light brown clay
^ 222904	BH9	None Supplied	0.35	13.7	Light brown loamy clay
^ 222905	BH12	None Supplied	0.25	14.6	Brown loamy clay
^ 222906	BH14	None Supplied	0.25	12	Brown loamy clay
^ 222907	BH15	None Supplied	0.25	12	Brown loamy clay
^ 222908	BH16	None Supplied	0.50	17.8	Brown clay
^ 222909	BH17	None Supplied	0.50	32.1	Brown loamy clay with brick and chalk
^ 222910	BH17	None Supplied	1.00	18.4	Light grey clay
^ 222911	BH17	None Supplied	2.00	40	Black loamy clay with stones
^ 222912	BH17	None Supplied	2.50	11.9	Light grey clay with chalk and stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{IS}

Unsuitable Sample ^{US}

^ no sampling date provided; unable to confirm if samples are within acceptable holding times

Soil Analysis Certificate - Methodology & Miscellaneous Information

QTS Environmental Report No: 16-48037

Wilson Bailey Geotechnical & Environmental Ltd

Site Reference: 40 Acre Farm

Project / Job Ref: None Supplied

Order No: None Supplied

Reporting Date: 19/08/2016

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1.5 diphenvicarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	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	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
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	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the 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	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: 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 hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: 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 hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



Dominic Brightman
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QTS Environmental Report No: 16-48972

Site Reference: 40 Acre Farm

Project / Job Ref: None Supplied

Order No: None Supplied

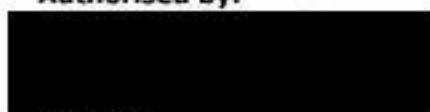
Sample Receipt Date: 09/09/2016

Sample Scheduled Date: 09/09/2016

Report Issue Number: 2

Reporting Date: 02/02/2018

Authorised by:



Kevin Old
Associate Director of Laboratory

Authorised by:



Russell Jarvis
Associate Director of Client Services

QTSE is the trading name of DETS Ltd, company registration number 03705645



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Soil Analysis Certificate						
QTS Environmental Report No: 16-48972	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	18	20	20	22	26
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.50	0.25	0.75	0.21	0.50
Reporting Date: 02/02/2018	QTSE Sample No	226702	226703	226704	226705	226706

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
pH	pH Units	N/a	MCERTS	7.1	7.4	7.7	7.9	7.2
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	0.7	0.5	0.1	0.9	1
Arsenic (As)	mg/kg	< 2	MCERTS	7	6	22	8	10
W/S Boron	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.2	0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	19	19	27	19	18
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	8	8	14	11	11
Lead (Pb)	mg/kg	< 3	MCERTS	12	10	10	17	23
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	11	11	27	13	12
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	42	46	55	48	47
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.

Subcontracted analysis (S)

Soil Analysis Certificate						
QTS Environmental Report No: 16-48972	Date Sampled	None Supplied	None Supplied			
Wilson Bailey Geotechnical & Environmental Ltd	Time Sampled	None Supplied	None Supplied			
Site Reference: 40 Acre Farm	TP / BH No	28	32			
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.25			
Reporting Date: 02/02/2018	QTSE Sample No	226707	226708			

Determinand	Unit	RL	Accreditation					
Asbestos Screen ^(S)	N/a	N/a	ISO17025	Not Detected	Not Detected			
pH	pH Units	N/a	MCERTS	7.5	7.5			
Total Organic Carbon (TOC)	%	< 0.1	MCERTS	0.4	0.2			
Arsenic (As)	mg/kg	< 2	MCERTS	11	9			
W/S Boron	mg/kg	< 1	NONE	< 1	< 1			
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2			
Chromium (Cr)	mg/kg	< 2	MCERTS	28	25			
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2			
Copper (Cu)	mg/kg	< 4	MCERTS	18	12			
Lead (Pb)	mg/kg	< 3	MCERTS	11	10			
Mercury (Hg)	mg/kg	< 1	NONE	< 1	< 1			
Nickel (Ni)	mg/kg	< 3	MCERTS	22	21			
Selenium (Se)	mg/kg	< 3	NONE	< 3	< 3			
Zinc (Zn)	mg/kg	< 3	MCERTS	50	44			
Total Phenols (monohydric)	mg/kg	< 2	NONE	< 2	< 2			

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.
 Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 16-48972	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	18	20	20	22	26
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.50	0.25	0.75	0.21	0.50
Reporting Date: 02/02/2018	QTSE Sample No	226702	226703	226704	226705	226706

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.14
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	0.13
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 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	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 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	< 1.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - Speciated PAHs

QTS Environmental Report No: 16-48972	Date Sampled	None Supplied	None Supplied			
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied			
Site Reference: 40 Acre Farm	TP / BH No	28	32			
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.25			
Reporting Date: 02/02/2018	QTSE Sample No	226707	226708			

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1			
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6			

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Soil Analysis Certificate - TPH CWG Banded

QTS Environmental Report No: 16-48972	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	18	20	20	22	26
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.50	0.25	0.75	0.21	0.50
Reporting Date: 02/02/2018	QTSE Sample No	226702	226703	226704	226705	226706

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	< 10	< 10	< 10
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	< 21	< 21	< 21
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	< 42	< 42	< 42

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C



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Soil Analysis Certificate - TPH CWG Banded

QTS Environmental Report No: 16-48972	Date Sampled	None Supplied	None Supplied			
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied			
Site Reference: 40 Acre Farm	TP / BH No	28	32			
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.25			
Reporting Date: 02/02/2018	QTSE Sample No	226707	226708			

Determinand	Unit	RL	Accreditation			
Aliphatic >C5 - C6	mg/kg	< 0.01	NONE	< 0.01	< 0.01	
Aliphatic >C6 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
Aliphatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	
Aliphatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	
Aliphatic >C12 - C16	mg/kg	< 3	MCERTS	< 3	< 3	
Aliphatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	
Aliphatic >C21 - C34	mg/kg	< 10	MCERTS	< 10	< 10	
Aliphatic (C5 - C34)	mg/kg	< 21	NONE	< 21	< 21	
Aromatic >C5 - C7	mg/kg	< 0.01	NONE	< 0.01	< 0.01	
Aromatic >C7 - C8	mg/kg	< 0.05	NONE	< 0.05	< 0.05	
Aromatic >C8 - C10	mg/kg	< 2	MCERTS	< 2	< 2	
Aromatic >C10 - C12	mg/kg	< 2	MCERTS	< 2	< 2	
Aromatic >C12 - C16	mg/kg	< 2	MCERTS	< 2	4	
Aromatic >C16 - C21	mg/kg	< 3	MCERTS	< 3	< 3	
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	< 10	< 10	
Aromatic (C5 - C35)	mg/kg	< 21	NONE	< 21	< 21	
Total >C5 - C35	mg/kg	< 42	NONE	< 42	< 42	

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Soil Analysis Certificate - BTEX / MTBE

QTS Environmental Report No: 16-48972	Date Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: 40 Acre Farm	TP / BH No	18	20	20	22	26
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Order No: None Supplied	Depth (m)	0.50	0.25	0.75	0.21	0.50
Reporting Date: 02/02/2018	QTSE Sample No	226702	226703	226704	226705	226706

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5	< 5	< 5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.



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Soil Analysis Certificate - BTEX / MTBE

QTS Environmental Report No: 16-48972	Date Sampled	None Supplied	None Supplied			
Wilson Bailey Geotechnical & Environmental L	Time Sampled	None Supplied	None Supplied			
Site Reference: 40 Acre Farm	TP / BH No	28	32			
Project / Job Ref: None Supplied	Additional Refs	None Supplied	None Supplied			
Order No: None Supplied	Depth (m)	0.50	0.25			
Reporting Date: 02/02/2018	QTSE Sample No	226707	226708			

Determinand	Unit	RL	Accreditation			
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	
Ethylbenzene	ug/kg	< 2	MCERTS	< 2	< 2	
p & m-xylene	ug/kg	< 2	MCERTS	< 2	< 2	
o-xylene	ug/kg	< 2	MCERTS	< 2	< 2	
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C.



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Soil Analysis Certificate - Sample Descriptions

QTS Environmental Report No: 16-48972

Wilson Bailey Geotechnical & Environmental Ltd

Site Reference: 40 Acre Farm

Project / Job Ref: None Supplied

Order No: None Supplied

Reporting Date: 02/02/2018

QTSE Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 226702	18	None Supplied	0.50	7	Brown clay with vegetation
^ 226703	20	None Supplied	0.25	11.5	Brown clay
^ 226704	20	None Supplied	0.75	15.9	Light brown clay
^ 226705	22	None Supplied	0.21	15	Brown clay
^ 226706	26	None Supplied	0.50	14.8	Brown clay
^ 226707	28	None Supplied	0.50	14.7	Light brown clay
^ 226708	32	None Supplied	0.25	12	Light brown clay

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{1/5}

Unsuitable Sample ^{1/5}

^ no sampling date provided; unable to confirm if samples are within acceptable holding times



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Soil Analysis Certificate - Methodology & Miscellaneous Information

QTS Environmental Report No: 16-48972

Wilson Bailey Geotechnical & Environmental Ltd

Site Reference: 40 Acre Farm

Project / Job Ref: None Supplied

Order No: None Supplied

Reporting Date: 02/02/2018

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1.5 diphenvicarbazine followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	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	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
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	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the 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	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: 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 hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: 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 hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



Dominic Brightman
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DETS Ltd
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DETS Report No: 19-14412

Site Reference: 40 Acres Farm

Project / Job Ref: None Supplied

Order No: None Supplied

Sample Receipt Date: 08/10/2019

Sample Scheduled Date: 08/10/2019

Report Issue Number: 1

Reporting Date: 29/10/2019

Authorised by:



Dave Ashworth
Technical Manager

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BS3882 Topsoil Suite							
DETS Report No: 19-14412		Date Sampled	None Supplied	Compliance with Range			
Wilson Bailey Geotechnical & Environmental Ltd		Time Sampled	None Supplied	Multipurpose	Acidic	Low Fertility	Calcareous
Site Reference: 40 Acres Farm		TP / BH No	Topsoil 1				
Project / Job Ref: None Supplied		Additional Refs	None Supplied				
Order No: None Supplied		Depth (m)	None Supplied				
Reporting Date: 29/10/2019		DETS Sample No	440194				
Determinand	Reporting Unit	RL					
Soil Texture							
Clay Content ^(S)	%	N/a	13.0	5 - 35			
Silt Content ^(S)	%	N/a	43.0	0 - 65			
Sand Content ^(S)	%	N/a	44.0	30 - 85			
Textural Class ^(S)	N/a	N/a	Sandy Silt Loam				
Loss on Ignition	%	< 0.01	2.60	Clay Content 5 - 20%			
				3 - 20	3 - 30	2 - 20	3 - 20
				Clay Content 20 - 35%			
				5 - 20	5 - 30	2 - 20	5 - 20
Coarse Fragment Content							
>2mm ^(S)	%	N/a	13.0	0 - 30	0 - 30	0 - 30	0 - 30
>20mm ^(S)	%	N/a	6.0	0 - 10	0 - 10	0 - 10	0 - 10
>50mm ^(S)	%	N/a	0.0	0	0	0	0
pH ^{MU}	pH Units	N/a	6.6	5.5 - 8.5	3.5 - 5.5	3.5 - 9.0	7.5 - 9.0
Carbonate	%	< 0.1	0.4				> 1
Available Plant Nutrients							
Total Nitrogen ^(S)	%	< 0.01	0.07	≥ 0.15	≥ 0.15		≥ 0.15
Phosphorus (Extractable) ^(S)	mg/l	< 3	14	16 - 140	16 - 140	≤ 15	16 - 140
Potassium (Extractable) ^(S)	mg/l	< 20	110	121 - 1500	121 - 1500		121 - 1500
Magnesium (Extractable) ^(S)	mg/l	< 1	63	51 - 600	51 - 600		51 - 600
Carbon / Nitrogen Ratio ^(S)	:1	< 0.1	33.0	< 20 : 1	< 20 : 1	< 20 : 1	< 20 : 1
Exchangeable Sodium ^(S)	%	< 0.1	< 0.1				
Phytotoxic Elements (by soil pH)				Multipurpose & Specific Purpose Topsoils at pH range			
				< 6.0	6.0 - 7.0	> 7.0	
Zinc ^{MU}	mg/kg	< 3	49	< 200	< 200	< 300	
Copper ^{MU}	mg/kg	< 4	16	< 100	< 135	< 200	
Nickel ^{MU}	mg/kg	< 3	14	< 60	< 75	< 110	
Visible Contaminants (Air Dried Soil)							
>2mm	%	N/a	0.0	< 0.5			
Plastics	%	N/a	0.00	< 0.25			
Sharps	%	N/a	0.0	0			
Additional Analytes							
Available Sodium ^(S)	mg/l	< 1	79				
Available Calcium ^(S)	mg/l	< 1	1800				
Electrical Conductivity	uS/cm	< 5	1186	3300			
OVERALL COMPLIANCY				N	N	N	N
Results are expressed on a dry weight basis, after correction for moisture content where applicable							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
U Denotes ISO17025 accredited test							
Subcontracted analysis ^(S)							



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BS3882 Topsoil Suite							
DETS Report No: 19-14412		Date Sampled	None Supplied	Compliance with Range			
Wilson Bailey Geotechnical & Environmental Ltd		Time Sampled	None Supplied	Multipurpose	Acidic	Low Fertility	Calcareous
Site Reference: 40 Acres Farm		TP / BH No	Topsoil 2				
Project / Job Ref: None Supplied		Additional Refs	None Supplied				
Order No: None Supplied		Depth (m)	None Supplied				
Reporting Date: 29/10/2019		DETS Sample No	440195				
Determinand	Reporting Unit	RL					
Soil Texture							
Clay Content ^(S)	%	N/a	15.0	5 - 35			
Silt Content ^(S)	%	N/a	48.0	0 - 65			
Sand Content ^(S)	%	N/a	37.0	30 - 85			
Textural Class ^(S)	N/a	N/a	Sandy Silt Loam	-			
Loss on Ignition	%	< 0.01	1.10	Clay Content 5 - 20%			
				3 - 20	3 - 30	2 - 20	3 - 20
				Clay Content 20 - 35%			
				5 - 20	5 - 30	2 - 20	5 - 20
Coarse Fragment Content							
>2mm ^(S)	%	N/a	12.0	0 - 30	0 - 30	0 - 30	0 - 30
>20mm ^(S)	%	N/a	0.0	0 - 10	0 - 10	0 - 10	0 - 10
>50mm ^(S)	%	N/a	0.0	0	0	0	0
pH ^{MU}	pH Units	N/a	6.7	5.5 - 8.5	3.5 - 5.5	3.5 - 9.0	7.5 - 9.0
Carbonate	%	< 0.1	0.4				> 1
Available Plant Nutrients							
Total Nitrogen ^(S)	%	< 0.01	0.13	≥ 0.15	≥ 0.15		≥ 0.15
Phosphorus (Extractable) ^(S)	mg/l	< 3	10	16 - 140	16 - 140	≤ 15	16 - 140
Potassium (Extractable) ^(S)	mg/l	< 20	140	121 - 1500	121 - 1500		121 - 1500
Magnesium (Extractable) ^(S)	mg/l	< 1	65	51 - 600	51 - 600		51 - 600
Carbon / Nitrogen Ratio ^(S)	:1	< 0.1	22.0	< 20 : 1	< 20 : 1	< 20 : 1	< 20 : 1
Exchangeable Sodium ^(S)	%	< 0.1	< 0.1				
Phytotoxic Elements (by soil pH)				Multipurpose & Specific Purpose Topsoils at pH range			
				< 6.0	6.0 - 7.0	> 7.0	
Zinc ^{MU}	mg/kg	< 3	49	< 200	< 200	< 300	
Copper ^{MU}	mg/kg	< 4	23	< 100	< 135	< 200	
Nickel ^{MU}	mg/kg	< 3	16	< 60	< 75	< 110	
Visible Contaminants (Air Dried Soil)							
>2mm	%	N/a	0.0	< 0.5			
Plastics	%	N/a	0.00	< 0.25			
Sharps	%	N/a	0.0	0			
Additional Analytes							
Available Sodium ^(S)	mg/l	< 1	41				
Available Calcium ^(S)	mg/l	< 1	1700				
Electrical Conductivity	uS/cm	< 5	1253	3300			
OVERALL COMPLIANCY				N	N	N	N
Results are expressed on a dry weight basis, after correction for moisture content where applicable							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
U Denotes ISO17025 accredited test							
Subcontracted analysis ^(S)							



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BS3882 Topsoil Suite							
DETS Report No: 19-14412		Date Sampled	None Supplied	Compliance with Range			
Wilson Bailey Geotechnical & Environmental Ltd		Time Sampled	None Supplied	Multipurpose	Acidic	Low Fertility	Calcareous
Site Reference: 40 Acres Farm		TP / BH No	Topsoil 3				
Project / Job Ref: None Supplied		Additional Refs	None Supplied				
Order No: None Supplied		Depth (m)	None Supplied				
Reporting Date: 29/10/2019		DETS Sample No	440196				
Determinand	Reporting Unit	RL					
Soil Texture							
Clay Content ^(S)	%	N/a	15.0	5 - 35			
Silt Content ^(S)	%	N/a	47.0	0 - 65			
Sand Content ^(S)	%	N/a	38.0	30 - 85			
Textural Class ^(S)	N/a	N/a	Sandy Silt Loam	-			
Loss on Ignition	%	< 0.01	2.60	Clay Content 5 - 20%			
				3 - 20	3 - 30	2 - 20	3 - 20
				Clay Content 20 - 35%			
				5 - 20	5 - 30	2 - 20	5 - 20
Coarse Fragment Content							
>2mm ^(S)	%	N/a	13.0	0 - 30	0 - 30	0 - 30	0 - 30
>20mm ^(S)	%	N/a	7.0	0 - 10	0 - 10	0 - 10	0 - 10
>50mm ^(S)	%	N/a	0.0	0	0	0	0
pH ^{MU}	pH Units	N/a	6.6	5.5 - 8.5	3.5 - 5.5	3.5 - 9.0	7.5 - 9.0
Carbonate	%	< 0.1	0.4				> 1
Available Plant Nutrients							
Total Nitrogen ^(S)	%	< 0.01	0.09	≥ 0.15	≥ 0.15		≥ 0.15
Phosphorus (Extractable) ^(S)	mg/l	< 3	11	16 - 140	16 - 140	≤ 15	16 - 140
Potassium (Extractable) ^(S)	mg/l	< 20	170	121 - 1500	121 - 1500		121 - 1500
Magnesium (Extractable) ^(S)	mg/l	< 1	82	51 - 600	51 - 600		51 - 600
Carbon / Nitrogen Ratio ^(S)	:1	< 0.1	24.0	< 20 : 1	< 20 : 1	< 20 : 1	< 20 : 1
Exchangeable Sodium ^(S)	%	< 0.1	< 0.1				
Phytotoxic Elements (by soil pH)				Multipurpose & Specific Purpose Topsoils at pH range			
				< 6.0	6.0 - 7.0		> 7.0
Zinc ^{MU}	mg/kg	< 3	47	< 200	< 200	< 300	
Copper ^{MU}	mg/kg	< 4	12	< 100	< 135	< 200	
Nickel ^{MU}	mg/kg	< 3	14	< 60	< 75	< 110	
Visible Contaminants (Air Dried Soil)							
>2mm	%	N/a	0.0	< 0.5			
Plastics	%	N/a	0.00	< 0.25			
Sharps	%	N/a	0.0	0			
Additional Analytes							
Available Sodium ^(S)	mg/l	< 1	42				
Available Calcium ^(S)	mg/l	< 1	1500				
Electrical Conductivity	uS/cm	< 5	1248	3300			
OVERALL COMPLIANCY				N	N	N	N
Results are expressed on a dry weight basis, after correction for moisture content where applicable							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
U Denotes ISO17025 accredited test							
Subcontracted analysis ^(S)							



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BS3882 Topsoil Suite											
DETS Report No: 19-14412		Date Sampled	None Supplied	Compliance with Range							
Wilson Bailey Geotechnical & Environmental Ltd		Time Sampled	None Supplied								
Site Reference: 40 Acres Farm		TP / BH No	Topsoil 4								
Project / Job Ref: None Supplied		Additional Refs	None Supplied								
Order No: None Supplied		Depth (m)	None Supplied								
Reporting Date: 29/10/2019		DETS Sample No	440197	Multipurpose	Acidic	Low Fertility	Calcareous				
Determinand	Reporting Unit	RL									
Soil Texture											
Clay Content ^(S)	%	N/a	20.0					5 - 35			
Silt Content ^(S)	%	N/a	42.0					0 - 65			
Sand Content ^(S)	%	N/a	38.0	30 - 85							
Textural Class ^(S)	N/a	N/a	Clay Loam	-							
Loss on Ignition	%	< 0.01	2.30	Clay Content 5 - 20%							
				3 - 20	3 - 30	2 - 20	3 - 20				
				Clay Content 20 - 35%							
				5 - 20	5 - 30	2 - 20	5 - 20				
Coarse Fragment Content											
>2mm ^(S)	%	N/a	18.0	0 - 30	0 - 30	0 - 30	0 - 30				
>20mm ^(S)	%	N/a	13.0	0 - 10	0 - 10	0 - 10	0 - 10				
>50mm ^(S)	%	N/a	0.0	0	0	0	0				
pH ^{MU}	pH Units	N/a	6.5	5.5 - 8.5	3.5 - 5.5	3.5 - 9.0	7.5 - 9.0				
Carbonate	%	< 0.1	0.9				> 1				
Available Plant Nutrients											
Total Nitrogen ^(S)	%	< 0.01	0.10	≥ 0.15	≥ 0.15		≥ 0.15				
Phosphorus (Extractable) ^(S)	mg/l	< 3	8	16 - 140	16 - 140	≤ 15	16 - 140				
Potassium (Extractable) ^(S)	mg/l	< 20	120	121 - 1500	121 - 1500		121 - 1500				
Magnesium (Extractable) ^(S)	mg/l	< 1	73	51 - 600	51 - 600		51 - 600				
Carbon / Nitrogen Ratio ^(S)	:1	< 0.1	23.0	< 20 : 1	< 20 : 1	< 20 : 1	< 20 : 1				
Exchangeable Sodium ^(S)	%	< 0.1	< 0.1								
Phytotoxic Elements (by soil pH)				Multipurpose & Specific Purpose Topsoils at pH range							
				< 6.0	6.0 - 7.0		> 7.0				
Zinc ^{MU}	mg/kg	< 3	46	< 200	< 200		< 300				
Copper ^{MU}	mg/kg	< 4	13	< 100	< 135		< 200				
Nickel ^{MU}	mg/kg	< 3	15	< 60	< 75		< 110				
Visible Contaminants (Air Dried Soil)											
>2mm	%	N/a	0.0	< 0.5							
Plastics	%	N/a	0.00	< 0.25							
Sharps	%	N/a	0.0	0							
Additional Analytes											
Available Sodium ^(S)	mg/l	< 1	36								
Available Calcium ^(S)	mg/l	< 1	1400								
Electrical Conductivity	uS/cm	< 5	1240	3300							
OVERALL COMPLIANCY				N	N	N	N				
Results are expressed on a dry weight basis, after correction for moisture content where applicable											
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation											
M Denotes MCERTS accredited test											
U Denotes ISO17025 accredited test											
Subcontracted analysis ^(S)											

BS3882 Topsoil Suite							
DETS Report No: 19-14412		Date Sampled	None Supplied	Compliance with Range			
Wilson Bailey Geotechnical & Environmental Ltd		Time Sampled	None Supplied	Multipurpose	Acidic	Low Fertility	Calcareous
Site Reference: 40 Acres Farm		TP / BH No	Topsoil 5				
Project / Job Ref: None Supplied		Additional Refs	None Supplied				
Order No: None Supplied		Depth (m)	None Supplied				
Reporting Date: 29/10/2019		DETS Sample No	440198				
Determinand	Reporting Unit	RL					
Soil Texture							
Clay Content ^(S)	%	N/a	12.0	5 - 35			
Silt Content ^(S)	%	N/a	48.0	0 - 65			
Sand Content ^(S)	%	N/a	40.0	30 - 85			
Textural Class ^(S)	N/a	N/a	Sandy Silt Loam				
Loss on Ignition	%	< 0.01	2.80	Clay Content 5 - 20%			
				3 - 20	3 - 30	2 - 20	3 - 20
				Clay Content 20 - 35%			
				5 - 20	5 - 30	2 - 20	5 - 20
Coarse Fragment Content							
>2mm ^(S)	%	N/a	13.0	0 - 30	0 - 30	0 - 30	0 - 30
>20mm ^(S)	%	N/a	0.0	0 - 10	0 - 10	0 - 10	0 - 10
>50mm ^(S)	%	N/a	0.0	0	0	0	0
pH ^{MU}	pH Units	N/a	6.6	5.5 - 8.5	3.5 - 5.5	3.5 - 9.0	7.5 - 9.0
Carbonate	%	< 0.1	2.1				> 1
Available Plant Nutrients							
Total Nitrogen ^(S)	%	< 0.01	0.10	≥ 0.15	≥ 0.15		≥ 0.15
Phosphorus (Extractable) ^(S)	mg/l	< 3	11	16 - 140	16 - 140	≤ 15	16 - 140
Potassium (Extractable) ^(S)	mg/l	< 20	220	121 - 1500	121 - 1500		121 - 1500
Magnesium (Extractable) ^(S)	mg/l	< 1	100	51 - 600	51 - 600		51 - 600
Carbon / Nitrogen Ratio ^(S)	:1	< 0.1	27.0	< 20 : 1	< 20 : 1	< 20 : 1	< 20 : 1
Exchangeable Sodium ^(S)	%	< 0.1	< 0.1				
Phytotoxic Elements (by soil pH)				Multipurpose & Specific Purpose Topsoils at pH range			
				< 6.0	6.0 - 7.0	> 7.0	
Zinc ^{MU}	mg/kg	< 3	52	< 200	< 200	< 300	
Copper ^{MU}	mg/kg	< 4	15	< 100	< 135	< 200	
Nickel ^{MU}	mg/kg	< 3	17	< 60	< 75	< 110	
Visible Contaminants (Air Dried Soil)							
>2mm	%	N/a	0.0	< 0.5			
Plastics	%	N/a	0.00	< 0.25			
Sharps	%	N/a	0.0	0			
Additional Analytes							
Available Sodium ^(S)	mg/l	< 1	49				
Available Calcium ^(S)	mg/l	< 1	1700				
Electrical Conductivity	uS/cm	< 5	1411	3300			
OVERALL COMPLIANCY				N	N	N	N
Results are expressed on a dry weight basis, after correction for moisture content where applicable							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
U Denotes ISO17025 accredited test							
Subcontracted analysis ^(S)							



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BS3882 Topsoil Suite							
DETS Report No: 19-14412		Date Sampled	None Supplied	Compliance with Range			
Wilson Bailey Geotechnical & Environmental Ltd		Time Sampled	None Supplied	Multipurpose	Acidic	Low Fertility	Calcareous
Site Reference: 40 Acres Farm		TP / BH No	Topsoil 6				
Project / Job Ref: None Supplied		Additional Refs	None Supplied				
Order No: None Supplied		Depth (m)	None Supplied				
Reporting Date: 29/10/2019		DETS Sample No	440199				
Determinand	Reporting Unit	RL					
Soil Texture							
Clay Content ^(S)	%	N/a	15.0	5 - 35			
Silt Content ^(S)	%	N/a	58.0	0 - 65			
Sand Content ^(S)	%	N/a	27.0	30 - 85			
Textural Class ^(S)	N/a	N/a	Sandy Silt Loam				
Loss on Ignition	%	< 0.01	2.10	Clay Content 5 - 20%			
				3 - 20	3 - 30	2 - 20	3 - 20
				Clay Content 20 - 35%			
				5 - 20	5 - 30	2 - 20	5 - 20
Coarse Fragment Content							
>2mm ^(S)	%	N/a	1.0	0 - 30	0 - 30	0 - 30	0 - 30
>20mm ^(S)	%	N/a	0.0	0 - 10	0 - 10	0 - 10	0 - 10
>50mm ^(S)	%	N/a	0.0	0	0	0	0
pH ^{MU}	pH Units	N/a	6.6	5.5 - 8.5	3.5 - 5.5	3.5 - 9.0	7.5 - 9.0
Carbonate	%	< 0.1	2.1				> 1
Available Plant Nutrients							
Total Nitrogen ^(S)	%	< 0.01	0.10	≥ 0.15	≥ 0.15		≥ 0.15
Phosphorus (Extractable) ^(S)	mg/l	< 3	14	16 - 140	16 - 140	≤ 15	16 - 140
Potassium (Extractable) ^(S)	mg/l	< 20	240	121 - 1500	121 - 1500		121 - 1500
Magnesium (Extractable) ^(S)	mg/l	< 1	110	51 - 600	51 - 600		51 - 600
Carbon / Nitrogen Ratio ^(S)	:1	< 0.1	23.0	< 20 : 1	< 20 : 1	< 20 : 1	< 20 : 1
Exchangeable Sodium ^(S)	%	< 0.1	< 0.1				
Phytotoxic Elements (by soil pH)				Multipurpose & Specific Purpose Topsoils at pH range			
				< 6.0	6.0 - 7.0	> 7.0	
Zinc ^{MU}	mg/kg	< 3	48	< 200	< 200	< 300	
Copper ^{MU}	mg/kg	< 4	13	< 100	< 135	< 200	
Nickel ^{MU}	mg/kg	< 3	14	< 60	< 75	< 110	
Visible Contaminants (Air Dried Soil)							
>2mm	%	N/a	0.0	< 0.5			
Plastics	%	N/a	0.00	< 0.25			
Sharps	%	N/a	0.0	0			
Additional Analytes							
Available Sodium ^(S)	mg/l	< 1	49				
Available Calcium ^(S)	mg/l	< 1	1800				
Electrical Conductivity	uS/cm	< 5	1190	3300			
OVERALL COMPLIANCY				N	N	N	N
Results are expressed on a dry weight basis, after correction for moisture content where applicable							
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepancies with current legislation							
M Denotes MCERTS accredited test							
U Denotes ISO17025 accredited test							
Subcontracted analysis ^(S)							



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



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 19-14412

Wilson Bailey Geotechnical & Environmental Ltd

Site Reference: 40 Acres Farm

Project / Job Ref: None Supplied

Order No: None Supplied

Reporting Date: 29/10/2019

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 440194	Topsoil 1	None Supplied	None Supplied	13	Brown sandy clay
^ 440195	Topsoil 2	None Supplied	None Supplied	13.7	Brown sandy clay
^ 440196	Topsoil 3	None Supplied	None Supplied	14.3	Brown sandy clay with stones
^ 440197	Topsoil 4	None Supplied	None Supplied	12.1	Brown sandy clay with stones
^ 440198	Topsoil 5	None Supplied	None Supplied	18.2	Brown sandy clay with vegetation
^ 440199	Topsoil 6	None Supplied	None Supplied	13	Brown sandy clay with vegetation

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample ^{IS}

Unsuitable Sample ^{US}

^ no sampling date provided; unable to confirm if samples are within acceptable holding times



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Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 19-14412

Wilson Bailey Geotechnical & Environmental Ltd

Site Reference: 40 Acres Farm

Project / Job Ref: None Supplied

Order No: None Supplied

Reporting Date: 29/10/2019

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1.5 diphenvicarbazine followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	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	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
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	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the 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	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: 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 hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: 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 hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCs	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received

Site	Forty Acre Farm Development Site, Bedhampton, Havant	Job Number	J16120
Client	BDW Southampton	Sheet	1/3

Date	22/11/2017
Air Temperature	12 °C
Barometric Pressure	1000 mB and falling
Visit No	1 of 3

Borehole No	BH1	BH4	BH5	BH7
Condition of Standpipe	good	good	good	good
Combustible gas (CH4) % LEL	0.0	0.0	0.0	0.0
Combustible gas (CH4) % vol	0.0	0.0	0.0	0.0
Combustible gas (CH4) ppmv by PID	<0.1	<0.1	<0.1	<0.1
Carbon Dioxide % vol	2.9	2.2	1.3	1.2
Oxygen % vol	18.6	18.2	18.6	18.1
Flow Rate (max) l/hr	0.0	0.0	0.0	0.0
Relative Downhole Pressure mb	+0.04	+0.51	+0.16	+0.22
Water Level m	1.87	1.62	1.22	1.39
Remarks				

Site	Forty Acre Farm Development Site, Bedhampton, Havant	Job Number	J16120
Client	BDW Southampton	Sheet	2/3

Date	14/12/2017
Air Temperature	5 °C
Barometric Pressure	991 mB and rising
Visit No	2 of 3

Borehole No	BH1	BH4	BH5	BH7
Condition of Standpipe	good	good	good	good
Combustible gas (CH4) % LEL	0.0	0.0	0.0	0.0
Combustible gas (CH4) % vol	0.0	0.0	0.0	0.0
Combustible gas (CH4) ppmv by PID	<0.1	<0.1	<0.1	<0.1
Carbon Dioxide % vol	2.2	1.2	1.8	1.2
Oxygen % vol	18.1	18.1	18.6	18.2
Flow Rate (max) l/hr	0.0	0.0	0.0	0.0
Relative Downhole Pressure mb	-0.69	+0.35	-0.26	+0.22
Water Level m	1.72	1.83	1.21	1.46
Remarks				

Site	Forty Acre Farm Development Site, Bedhampton, Havant	Job Number	J16120
Client	BDW Southampton	Sheet	3/3

Date	15/01/2018
Air Temperature	10 °C
Barometric Pressure	1010 mB and falling
Visit No	3 of 3

Borehole No	BH1	BH4	BH5	BH7
Condition of Standpipe	good	good	good	good
Combustible gas (CH4) % LEL	0.0	0.0	0.0	0.0
Combustible gas (CH4) % vol	0.0	0.0	0.0	0.0
Combustible gas (CH4) ppmv by PID	<0.1	<0.1	<0.1	<0.1
Carbon Dioxide % vol	1.2	0.9	1.1	0.8
Oxygen % vol	18.2	18.3	18.5	18.2
Flow Rate (max) l/hr	0.0	0.0	0.0	0.0
Relative Downhole Pressure mb	+0.21	+0.31	+0.22	+0.18
Water Level m	1.92	2.00	1.85	1.32
Remarks				

Site Forty Acre Farm, Havant Road, Bedhampton

Client BDW Southampton



Earthworks Strategy
and
Materials Management Plan
Support Document

Harbour Place Development
Forty Acre Farm Site
Bedhampton
Hampshire

Client

BDW Southampton

J16120

October 2019

Project title	Harbour Place Development / Forty Acre Farm Site, Bedhampton, Hampshire		Project ref J16120
Report prepared by	Dominic Brightman BSc MSc DIC FGS CGeol ARSM		
Issue No	Status	Date	Approved for Issue
1	Draft	14 October 2019	

This report has been prepared to a defined scope and under the terms and conditions of the contract agreed with the Client. In preparing this report, we have exercised reasonable skill, care and diligence, taking into account the project objectives, the agreed scope of work, prevailing site conditions and the degree of manpower and resources devoted to it in agreement with the Client. Wilson Bailey Partnership Limited accepts no responsibility to any parties whatsoever following the issue of the report for any matters arising outside of the agreed scope of work.

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APPENDIX

1.0 INTRODUCTION

This document is provided to accompany the materials Management Plan that has been produced as part of the CLAIRE Definition of Waste Protocols to facilitate the importation and reuse of Inert excavation arisings as part of a planning consented earthworks that are to form part of a new planning consented residential development that is to be carried out by Barratt David Wilson Homes Southampton as part of the construction of the Harbour Place Development.

This document has been produced to demonstrate that the appropriate lines of evidence required as part of a Materials Management Plan have been suitably marshalled in order to present a comprehensive support document.

1.1 Scope and Context

The requirement for the importation of fill materials has been established by the Civil Engineers as part of a flood risk mitigation strategy and to facilitate the formation of suitable development levels that support a gravity based drainage system.

The volume of the overall volume of the filling exercise required as part of these works has been assessed by the Civil Engineers to be in the region of 80,000m³.

The fill materials are to be sourced from three green field residential development sites that are operated by the developer within the vicinity of the Harbour Place Site. Ground Investigation reports for each site are appended to this document.

1.2 Register of Involved Parties

Developer:
Barratt David Wilson Homes Southampton Tollbar House Tollbar Way Hedge End Southampton SO30 2UH
Contact:
Gary Webster (Technical Director)

Consultant:	Consultant:
Wilson Bailey Partnership Limited Northdown Farmhouse Donhead St Mary Wiltshire SP7 9DD	Rogers Cory Partnership Ltd Architectural & Civil Consultants The Old School Old School Road Hook Hampshire RG27 9NJ
Contact:	Contact:
Dominic Brightman (Chartered Geologist)	Terry Seymour (Engineering Director)

Earthworks Contractor:
Not yet appointed

1.3 Summary of Contractors Responsibilities

It is important that all Contractors are aware of the expected requirements relating to Health, Safety and Welfare. In addition to statutory requirements and standard requirements of working on construction sites, particular attention shall be paid to the following;

- Provision of proper information, instruction, training and supervision of all site workers;
- site workers shall be made aware of the site history and the potential for contaminated soils to be present;
- all equipment, plant, machinery and apparatus shall be in a safe condition and may be used without risk to health; and
- appropriate protective clothing and/or equipment shall be available and shall be used in accordance with the manufacturer's guidelines.

BDW Southampton, Wilson Bailey Partnership and RCP retain the right to stop any operation, or the action at this site if it is considered that there is a hazard to safety and health. In the event of any such action site representatives shall be notified orally and then given confirmation in writing by the duly authorized representative.

The earthworks contractor will be required to import or accept importation of the source fill materials from the identified Donor Sites and to then place these materials on the Receptor site in accordance with the requirements of this document.

Upon importation materials will either need to be directly placed in accordance with the specification under supervision to record the suitability of the materials in accordance with the Tracking System, or placement materials into temporary stockpiles in accordance with the Stockpile Requirements excavate, segregate and appropriately stockpile soils. Separated stockpiles of segregated soils shall be formed within the designated area identified on the appended drawing.

The Earthworks Contractor shall be required to assist with the initial visual identification of any potentially unacceptable soils and to bring them to the attention of Wilson Bailey Partnership.

The earthworks contractor shall be required to identify any unsuitable soils that may be included within the materials imported to site, such as materials with inclusions of topsoil, vegetation or potentially deleterious construction materials. In the unlikely event that any such materials are imported, they shall be segregated and identified immediately to the Wilson Bailey Partnership and all material imports from the Donor Site shall be halted until the source of unsuitable materials has been identified. Any potentially unacceptable soils that are deemed suitable for treatment, such as segregation, to render them acceptable, may be formed into a separate stockpile for additional consideration, with any such additional stockpile clearly identified and separated from any earthwork suitable material stockpiles.

The Earthworks Contractor will also be responsible for all material movements and the procurement of materials and equipment as necessary.

The Earthworks Contractor shall be responsible for the formation and maintenance of any stockpiles of materials that are formed, in order to ensure that any stockpiled materials remain suitable for reuse on site and are not allowed to degrade. Reference to the DEFRA guidance on soil reuse may be of assistance in this regard.

2.0 GENERAL PLANS AND SCHEMATICS

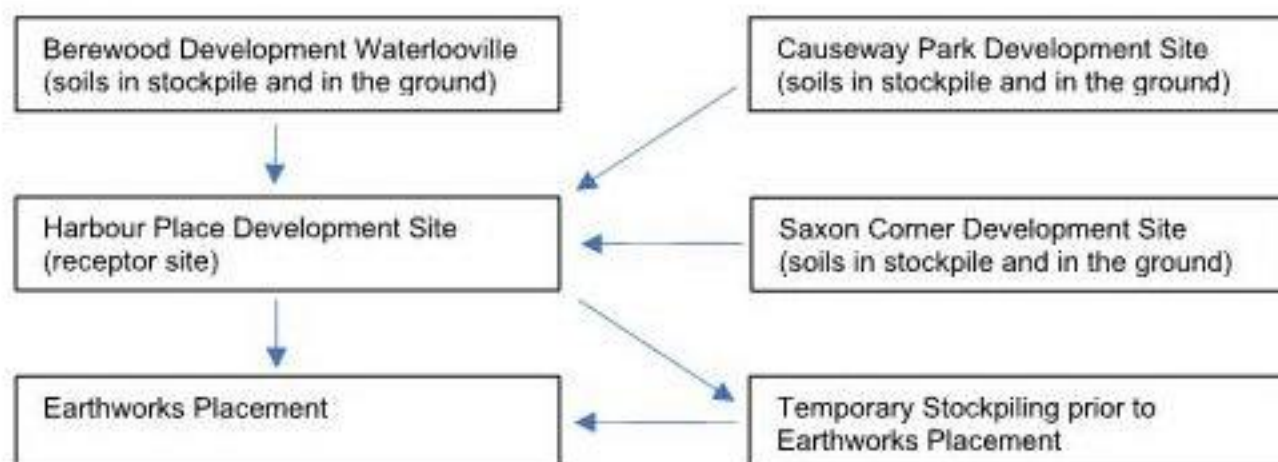
The plan below indicates the locations of the four sites that are considered as part of this materials management plan.

- Site No 1 – Harbour Place Development / Forty Acre Farm Site – Receptor Site
- Site No 2 – Phase 3b & 8, Berewood Development Site, Waterlooville – Donor Site
- Site No 3 – Saxon Corner Development Site, Emsworth – Donor Site
- Site No 4 – Causeway Park Development Site, Petersfield – Donor Site



3.0 SCHEMATIC OF MATERIAL MOVEMENT

Only Inert and Geotechnically suitable sub soils shall be transferred from the Donor Sites to the Receiving Site, there is no requirement for any form of treatment or remediation to render these soils suitable.



4.0 EARTHWORKS SPECIFICATION FOR PLACEMENT

4.1 Definition of Earthworks Suitable Fill

In order to ensure that the development platform is formed in such a way to ensure geotechnical stability and longevity, the earthworks materials are required to comply with the requirement for acceptable materials in accordance with Table 6/1: Acceptable Earthworks Material: Classification and Compaction Requirements of the 'Manual of Contract Documents for Highways Work. Volume 1. Specification for Highways Works. Series 600. Earthworks'.

Importation and placement of Chalk shall not be acceptable as part of the earthworks at this site.

The above referenced document defines the geotechnical suitability and material properties of Earthworks Suitable Fill. Any such soils deemed geotechnically suitable for import and placement at this site will also need to comply with the requirements of Section 5 of this document which sets out the chemical acceptability requirements of materials to be imported and placed as part of the proposed works.

In order to demonstrate the ongoing geotechnical and contaminated land suitability of materials imported from the identified Donor Sites, further testing shall be carried out at a rate of 1 sample per 500m³ per Donor Site with a minimum of three samples per Donor Site.

4.2 Placement of Earthworks Suitable Fill

The placement of the earthworks fill within the areas of designated fill placement is to be carried out by the Earthworks Contractor in accordance with the appropriate combination of roller type, layer thickness and number of passes for the identified Earthworks Suitable Material in accordance with the Specification for Highways Works. Series 600.

It is the responsibility of the contractor to ensure that appropriate plant and equipment is used in accordance with the above placement methodology and written confirmation of the selected combination of plant, layer thickness and number of passes shall be provided to Wilson Bailey Partnership.

Wilson Bailey Partnership shall, from time to time, inspect the placement of materials and confirm the adherence to the confirmed placement methodology.

Cobbles, boulders, rocks or fragments whose largest dimension is greater than two-thirds of the loose layer thickness shall not be incorporated into the Earthworks Material.

Any softened cohesive materials shall be removed and not incorporated into the fill. Potentially deleterious materials shall not be incorporated into the stockpiles.

The Earthworks Contractor shall take all necessary steps to ensure that the fill is placed at the moisture content necessary to achieve the specified level of compaction and shall, where necessary, add water to or dry the fill, in order to obtain this value. Where it is necessary to add water, this shall be done as a fine spray and in such a way that there is time for the water to be absorbed into the fill before being rolled by the plant. The use of additives such as lime as a drying agent shall be permitted.

The Earthworks Contractor shall be responsible for recording the movement of materials either from on site temporary stockpiles or from direct importation from the Donor Site to the location

of placement and confirming that only Earthworks Suitable fill materials are used. The earthwork fill materials shall be inspected on placement.

No fill shall be placed and left uncompacted at the end of the working day. All fill material shall be placed and compacted in layers that shall be graded to a gentle fall to ensure free runoff of rainwater without ponding. At the boundaries of the Earthworks Construction Areas the placement of fill shall be stepped up in layers to ensure the safety and stability of any level changes from filled areas to unfilled areas and ensure a safe working area.

If weather conditions are such that the specified moisture content and density values cannot be achieved, the ground works contractor shall cease work until such time that the fill can be placed, and compaction meets specification requirements.

No placement shall be permitted when the ground is subject to frost, standing water or snow, or where such conditions may be considered imminent.

4.3 Earthworks Testing to Confirm the Suitability of Placed Materials

In order to confirm the suitability and compaction of the placed earthworks materials the following testing shall be carried out; by a suitability qualified and accredited Laboratory Site Technician. The laboratory testing shall be carried out by an independent UKAS accredited soils testing laboratory.

Nuclear Density Meter testing with moisture content measurements and site specific calibration (or Sand Replacement Density test as an alternative option):

Minimum 1 test per layer per 1000 m² of placement.

The location of the testing shall be recorded to an accuracy of not less than 1.00m

Tests shall be performed in accordance with BS1377 Part 9.

Hand Shear Vane

Minimum 1 test per layer per 1000 m² of placement.

The location of the testing shall be recorded to an accuracy of not less than 1.00m

The locations where samples have been recovered and where insitu testing has been carried out shall be recorded to an accuracy of not less than 1m and the locations shall be included on the results sheets or on a separate sheet with clear reference to sample results / testing location references.

Copies of the in situ and laboratory test results shall be sent to the appointed Geotechnical Engineer.

5.0 CHEMICAL SUITABILITY REQUIREMENTS FOR REUSE

In addition to complying with the requirements of the geotechnical suitability of the proposed earthworks materials, it will be necessary to ensure that the soils are chemically suitable. Proposed earthwork suitable materials should be tested at a frequency of 1 sample per 500m³ with a minimum of three samples per site as standard. The results of which shall be assessed with regards to the chemical acceptability criteria proposed for this project as detailed below;

Determinant	Acceptability Criteria (mg/kg)
Asbestos	No quantifiable asbestos
Arsenic (As)	32
Cadmium (Cd)	10
Chromium (hex)	4.3
Chromium (Cr)	3000
Copper (Cu)	2330
Lead (Pb)	200
Mercury (Hg)	1.0
Nickel (Ni)	130
Selenium (Se)	350
Zinc (Zn)	3750
Benzo(a)pyrene	1.0
Total Phenols (mono)	420
Aliphatic >C5 - C6	42
Aliphatic >C6 - C8	100
Aliphatic >C8 - C10	27
Aliphatic >C10 - C12	130
Aliphatic >C12 - C16	1100
Aliphatic >C16 - C21	65000
Aliphatic >C21 - C34	65000
Aromatic >C5 - C7	13
Aromatic >C7 - C8	22
Aromatic >C8 - C10	8.6
Aromatic >C10 - C12	13
Aromatic >C12 - C16	23
Aromatic >C16 - C21	46
Aromatic >C21 - C35	370

The above table of proposed acceptability criteria are derived from the most conservative land use assessed as part of the available C4SLs, supplemented with the available S4ULs adopted by the CIEH. The selected values are at or below the published values. Laboratory testing for the presence of contaminants shall be carried out at an independent MCRETS and UKAS accredited specialist soils testing laboratory.

6.0 LOCAL AUTHORITY INFORMATION

Havant Borough Council have confirmed support for the scheme through provision of a Resolution to Grant the Planning Application.

Preliminary planning conditions have been issued by Havant Borough Council and these include a requirement for the provision of a Materials Management Plan which will require submission to the Local Authority for approval.

We have held preliminary discussions with Havant Borough Council Contaminated Land Officer in support of the proposals.

Contact Details for Havant Borough Council Contaminated Land Officer

Jonathan Driver - Environmental Control Officer

Havant Borough Council Environmental Health, Public Service Plaza, Civic Centre Road,
Havant, Hants PO9 2AX

Tel (Direct Dial): 023 9244 6677

Tel (Team Admin): 023 9244 6670

Email: jonathan.driver@havant.gov.uk

7.0 TRACKING SYSTEM

A tracking system is required in order to demonstrate that the soils imported to site have only come from the identified Donor Sites and that the imported materials are suitable for the proposed use.

In order to demonstrate that imported materials come only from the identified Donor Sites, each and every lorry load of imported soil will need to arrive on site with a tracking sheet. A copy of the tracking sheet is included within the appendix to this report. The first half of the tracking sheets requires completion prior to leaving the Donor Site, with the second half of the sheet completed upon arrival and inspection at the Receptor Site.

In order to confirm suitability for reuse, any excavated materials will also be required to demonstrate compliance with the adopted soil screening values with regards to soil contamination and geotechnical properties. An entry on the Sample Control Sheet will be required for each and every soil sample. A copy of the Sample Control Sheet is appended.

The acceptability criteria are proposed to provide an initial screen, should soils fail, it does not necessarily mean that they are contaminated and cannot be used. Failure of the adopted criteria indicates a requirement for further assessment of these soils to determine appropriate actions.

Soil sampling is to be carried out for the presence of soil contamination shall be carried out on the basis of one sample per layer per 1000m² of placed material, with the location of the soil sampling recorded to an accuracy of not less than 1.00m.

Should soils identified as potentially contaminated or unsuitable soils be encountered importation from the relevant Donor Site shall be halted and additional soil sampling carried out by Wilson Bailey Partnership on both the imported and placed materials and at the Donor Site to determine the source of the unsuitable or contaminated materials. In the albeit unlikely occurrence of this event, the regime of tracking may be altered for the relevant Donor Site with an increased regime of inspection and testing and potentially quarantined stockpiling and testing of future imports.

8.0 RECORD KEEPING AND DATA MANAGEMENT

The following documents and records shall be produced and collated as part of the supervision of the earthworks;

- Site Managers Diary on the receiving site;
- Completed Tracking Sheets for each and every lorry import of fill materials;
- Completed Sample Control Sheets covering each and every soil sample taken for geotechnical and contaminated land purposes;
- Results of geotechnical testing;
- Results of contamination testing;
- Plans, depth details and records (including photos) of any unacceptable materials identified as part of the tracking system and detailed of actions taken;
- Comprehensive photographic records of the site works; and
- Confirmation of completion of the earthworks on the receiving site in accordance with the consented development plans.

On the basis of the above information Wilson Bailey Partnership shall provide a clear and concise statement to confirm the material classification of the soils that have been relocated under this Materials Management Plan.

9.0 VERIFICATION PLAN

Wilson Bailey Partnership shall be responsible for the auditing of the earthworks operations leading to the provision of a Materials Management Plan Verification Report. that shall include records and test results detailed in Section 8.0 obtained as part of the tracking procedures outlined in Section 7.0.

It is anticipated that the Verification Report will be available late October 2020 following anticipated commencement of earthworks placement in March 2020.

A site manager on the receiving site shall provide daily supervision of the works and will be responsible for ensuring that the works are carried out in accordance with the Materials Management Plan and the Earthworks Strategy.

APPENDIX

Ground Investigation Report for Phase 3b & 8, Berewood Development Site, Waterloo
Ground Investigation Report for Saxon Corner Development Site, Emsworth
Ground Investigation Report for Causeway Park Development Site, Petersfield

Soil geotechnical and contaminated land testing from donor sites

Receiving Site Development Plans

Imported Materials Lorry Tracking Sheet

On-site Soil Sampling Control Sheet