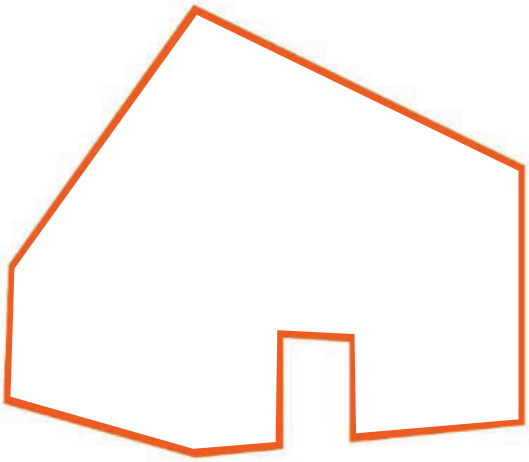
Maggie's Centre
Soil Reports Package

13th September 2023

Martha Schwartz Partners MSP



MAGGIE'S

ROYAL FREE HOSPITAL, LONDON

1.0
TS 6 Top Soil Report

Sir Robert McALPINE

TECHNICAL SUBMISSION APPROVAL FORM

CONTRACT:	007562 Maggie's Centre, Royal Free Hospital

TECH SUB NUMBER	007562-WYL-XX-ZZ-TS-X-0001	TEC SUB REVISION	P01 For information	TEC SUB STATUS	

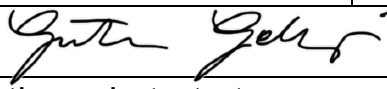
TS 6 Top Soil Report

See attachment for information

TEC SUB provided by:	Willerby Landscapes
Date sent:	27/03/2023
Description of sample:	Bourne Amenity TS6 TOP SOIL Report
Relevant Drawings:	NA
Work Package:	007562

Sample Storage Location:

Sample Installed Location:

On behalf of Client			Date	11/04/2023		
Company	MSP		Status*	Status B	A	B (X) C
			*delete as applicable			
Name	Gunther Galligioni	Signature				
Comment	suitable, subject to the application of the substrate to a max depth of 300mm as per Soil Specialist's recommendation.					
On behalf of SRM Design Team			Date			
Company			Status*		A	B C
			*delete as applicable			
Name		Signature				
Comment						
On behalf of Clients Monitoring Team			Date			
Company			Status*			

TECHNICAL SUBMISSION APPROVAL FORM					
CONTRACT:	007562 Maggie's Centre, Royal Free Hospital				
		*delete as applicable	**A**	**B**	**C**
Name		Signature			
Comment					

On behalf of Tenant			Date			
Company			Status*	**A**	**B**	**C**
		*delete as applicable				
Name		Signature				
Comment						
KEY TO STATUS: A=APPROVED, B=APPROVED WITH COMMENTS, C=REJECTED.						

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Jonathan Bourne
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

22nd February 2023
Our Ref: TOHA/23/7818/5/SS
Your Ref: PO 114359

Dear Sirs

Topsoil Analysis Report: LBS TS6 Topsoil

We have completed the analysis of the soil sample recently received, referenced *LBS TS6 Topsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for general landscape purposes (trees, shrubs, amenity grass). In addition, this sample has been assessed to determine its compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

This report presents the results of analysis for the sample received, and it should be considered 'indicative' of the topsoil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, waste designation purposes or for any project-specific application, especially after the topsoil has left the Bourne Amenity site.

SAMPLE EXAMINATION

The sample was described as a very dark brown (Munsell Colour 10YR 2/2), slightly moist, friable, slightly calcareous LOAMY SAND with a weakly developed, very fine to fine granular and sub-angular structure*. The sample was very slightly stony and contained a high proportion of organic fines. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

*This appraisal of soil structure was made from examination of a disturbed sample. Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

Plate 1: LBS TS6 Topsoil Sample

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- visible contaminants (>2mm);
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, V, Zn);
- total cyanide and total (mono) phenols;
- elemental sulphur, acid volatile sulphur and water soluble sulphate;
- speciated PAHs (US EPA16 suite);
- aromatic and aliphatic TPH (C5-C35 banding);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Detailed Particle Size Analysis and Stone Content

The sample fell into the *loamy sand* texture class, which is usually considered suitable for general landscape applications provided the soil's physical condition is satisfactory.

Further detailed particle size analysis revealed the grading to comprise predominantly *medium sand* (0.25-0.50mm), with reasonably equal proportions of the remaining mineral fractions. As such, this topsoil could potentially allow reasonable drainage performance, although the proportion of 'fines' (particles <0.15mm: 22%) could interpack the pore spaces between the larger particles and reduce this to an extent. To reduce this risk, it is important not to over-compact this topsoil during placement and we recommend it is not placed thicker than a maximum depth of 300mm, which is in line with *BS3882:2015*, section A.3.

The sample was very slightly stony and, as such, stones should not restrict the use of the soil for general landscape purposes.

pH and Electrical Conductivity Values

The sample was strongly alkaline in reaction (pH 8.3). This pH value would be considered suitable for general landscape purposes provided species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderate, which indicates that soluble salts should not be present at levels that would be harmful to plants.

The electrical conductivity value by $CaSO_4$ extract (*BS3882* requirement) fell below the maximum specified value (3300 µS/cm) given in *BS3882:2015 – Table 1*.

Organic Matter and Fertility Status

The sample was adequately supplied with organic matter and major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

With reference to *BS3882:2015 - Table 1*: Notes 3 and 4, there is a requirement to confirm levels of potential contaminants in relation to the topsoil's proposed end use. This includes human health, environmental protection and metals considered toxic to plants. In the absence of site-specific assessment criteria, the concentrations that affect human health have been compared with the *residential with homegrown produce* land use in the Suitable For Use Levels (S4ULs) presented in *The LQM/CIEH S4ULs for Human Health Risk Assessment* (2015) and the DEFRA SP1010: *Development of Category 4 Screening Levels* (C4SLs) *for Assessment of Land Affected by Contamination – Policy Companion Document* (2014).

Of the potential contaminants determined, none was found at levels that exceeded their guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded the maximum permissible levels specified in *BS3882:2015 – Table 1*.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil sample for general landscape purposes. The analysis has also been undertaken to determine the sample's compliance with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil).*

From the soil examination and subsequent laboratory analysis, the sample was described as a strongly alkaline, non-saline, slightly calcareous loamy sand, with a weakly developed structure and very low stone content. The sample contained sufficient reserves of organic matter and major plant nutrients. Of the potential contaminants determined, none exceeded their respective guideline values.

To conclude, based on our findings, the topsoil represented by this sample would be considered suitable for general landscape purposes (trees, shrubs, and amenity grass), provided the soil's physical condition is satisfactory.

To minimise the risk of self-compaction and anaerobism, we recommend that this soil is not placed thicker than a maximum depth of **300**mm.

The topsoil was fully compliant with the requirements of the British Standard for Topsoil *(BS3882:2015 – Specification for Topsoil – Table 1, Multipurpose Topsoil)*.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. stockpiling, respreading, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

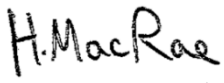
It is important to ensure that the soil is not unnecessarily compacted by trampling or trafficking by site machinery, and soil handling should be stopped during and after heavy rainfall and not continued until the soil is friable in consistency. If the soil is structurally damaged and compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction and to restore the soil's structure prior to any planting, turfing or seeding.

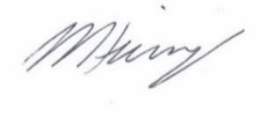
Further details on soil handling are provided in Annex A of *BS3882:2015*.

_____

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Yours faithfully





Harriet MacRae
BSc MSc
Graduate Soil Scientist

Matthew Heins
BSc (Hons) MISoilSci
Senior Soil Scientist

For & on behalf of Tim O'Hare Associates LLP

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Ltd**
Project:	**LBS TS6 Topsoil**
Job:	**Topsoil Analysis (BS3882:2015)**
Date:	**22/02/2023**
Job Ref No:	**TOHA/23/7818/5/SS**

Sample Reference			**LBS TS6 Topsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	12
Silt (0.002-0.05mm)	%	UKAS	5
Very Fine Sand (0.05-0.15mm)	%	UKAS	5
Fine Sand (0.15-0.25mm)	%	UKAS	12
Medium Sand (0.25-0.50mm)	%	UKAS	38
Coarse Sand (0.50-1.0mm)	%	UKAS	16
Very Coarse Sand (1.0-2.0mm)	%	UKAS	12
Total Sand (0.002 - 2.0mm)	%	UKAS	83
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	GLP	1
Stones (20-50mm)	% DW	GLP	0
Stones (>50mm)	% DW	GLP	0
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0
pH Value (1:2.5 water extract)	units	UKAS	8.3
Calcium Carbonate	%	UKAS	2.9
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	875
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2735
Exchangeable Sodium Percentage	%	UKAS	2.7
Organic Matter (LOI)	%	UKAS	5.0
Total Nitrogen (Dumas)	%	UKAS	0.18
C : N Ratio	ratio	UKAS	17
Extractable Phosphorus	mg/l	UKAS	28
Extractable Potassium	mg/l	UKAS	1121
Extractable Magnesium	mg/l	UKAS	128
Total Antimony (Sb)	mg/kg	MCERTS	< 1.0
Total Arsenic (As)	mg/kg	MCERTS	21
Total Barium (Ba)	mg/kg	MCERTS	27
Total Beryllium (Be)	mg/kg	MCERTS	0.73
Total Cadmium (Cd)	mg/kg	MCERTS	0.3
Total Chromium (Cr)	mg/kg	MCERTS	42
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	6
Total Lead (Pb)	mg/kg	MCERTS	13
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	25
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	91
Total Zinc (Zn)	mg/kg	MCERTS	46
Water Soluble Boron (B)	mg/kg	MCERTS	1.4
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur	mg/kg	MCERTS	12
Water Soluble Sulphate (SO_4)	g/l	MCERTS	1.9
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	< 0.05
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	< 0.05
Pyrene	mg/kg	MCERTS	< 0.05
Benzo(a)anthracene	mg/kg	MCERTS	< 0.05
Chrysene	mg/kg	MCERTS	< 0.05
Benzo(b)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(k)fluoranthene	mg/kg	MCERTS	< 0.05
Benzo(a)pyrene	mg/kg	MCERTS	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	< 0.05
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	< 0.05
Total PAHs (sum USEPA16)	mg/kg	MCERTS	< 0.80
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	93
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	96
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.005
Toluene	mg/kg	MCERTS	< 0.005
Ethylbenzene	mg/kg	MCERTS	< 0.005
p & m-xylene	mg/kg	MCERTS	< 0.005
o-xylene	mg/kg	MCERTS	< 0.005
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.005
Asbestos Screen	ND/D	ISO 17025	Not-detected

LS = LOAMY SAND

Visual Examination

The sample was described as a very dark brown (Munsell Colour 10YR 2/2), slightly moist, friable, slightly calcareous LOAMY SAND with a weakly developed, very fine to fine granular and sub-angular structure. The sample was virtually stone free, and contained a high proportion of organic fines. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

H.MacRae

Harriet MacRae
BSc MSc
Graduate Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

2.0
Rain Garden Soil Report

Sir Robert McALPINE

TECHNICAL SUBMISSION APPROVAL FORM

CONTRACT:	007562 Maggie's Centre, Royal Free Hospital

TECH SUB NUMBER	007562-WYL-XX-ZZ-SB-X-0002	TEC SUB REVISION	P03 For information	TEC SUB STATUS	

Rain Garden Soil Report

See report for information

TEC SUB provided by:	Willerby Landscapes
Date sent:	08/092023
Description of submission	Bourne Amenity Rain Garden Soil Report
Relevant Drawings:	NA
Work Package:	007562

Sample Storage Location:

Sample Installed Location:

On behalf of Client			Date	13/09/2023			
Company	Martha Schwartz Partners		Status*	*A*	A	~~B~~	~~C~~
			*Delete as applicable				
Name	Ceylan Belek Ombregt, ASLA PLA	Signature					
Comment							
On behalf of SRM Design Team			Date				
Company			Status*		A	B	C
			*Delete as applicable				
Name		Signature					
Comment							
On behalf of Clients Monitoring Team			Date				

TECHNICAL SUBMISSION APPROVAL FORM						
CONTRACT:	007562 Maggie's Centre, Royal Free Hospital					
Company			Status*	A	B	C
		*Delete as applicable				
Name		Signature				
Comment						

Rain Gardens are another aspect of SuDS and serve as more of an attractive landscaping feature rather than acting like a bio retention swale and functionally managing rain water run-off. The principle is similar to the bio retention soil and acts to slowly store and manage the rain water, which moves through the soil at a controlled rate in order to avoid flooding. Rain gardens usually move water at a rate of approximately 25-150mm per hour, and we can control this through the use of materials like as expanded clay pellets and varying levels of organic matter

On behalf of Tenant			Date			
Company			Status*	A	B	C
		*delete as applicable				
Name		Signature				
Comment						
KEY TO STATUS: A=APPROVED, B=APPROVED WITH COMMENTS, C=REJECTED.						

Material: Rain Garden Soil

Source: Bourne Amenity Ltd

Date Tested: 01/08/2023

Tested By: Tim O'Hare Associates (Report ID TOHA/23/1018/8/2023)

Parameter	Unit	BS3882:2015 Multipurpose (Guide Range)	Result
Texture:			
Clay (<0.002mm)	% w/w	5 - 30%	3
Silt (0.002 - 0.05mm)	% w/w	0 - 65%	1
Sand (0.05 - 2.0mm)	% w/w	20 - 90%	96
Textual Class:	**Sand**		
Stones (2-4mm)	% w/w DW	0 - 30%	0
Stones (4-8mm)	% w/w DW		0
Stones (>8mm)	% w/w DW		0
Sand Fraction (USGA Sieve Sizes):			
Very Fine Sand (0.05 - 0.15mm)	% w/w	n/a	2
Fine Sand (0.15 - 0.25mm)	% w/w	n/a	9
Medium Sand (0.25 - 0.50mm)	% w/w	n/a	52
Coarse Sand (0.50 - 1.0mm)	% w/w	n/a	31
Very Coarse Sand (1.0 - 2.0mm)	% w/w	n/a	2
Organic Matter (LOI)	% w/w	3.0 - 20.0	2.5
Ph		5.5 - 8.5	8.2
Available Nutrients:			
Nitrogen	mg/l	>0.15	0.10
Plant Available Phosphate	mg/l	--	41
Plant Available Potassium	mg/l	--	455
Plant Available Magnesium	mg/l	--	51
Additional Analysis:			
Electrical Conductivity (1:2.5 water extract)	µS/cm	<1500	509
Saturated Hydraulic Conductivity	mm/hr	--	193
Total Porosity	%	--	43
Air-Filled Porosity	%	--	26
Water-Filled Porosity	%	--	17
Calcium Carbonate	%	--	<1.0
Exchanageble Sodium Percentage	%	--	5.0

Bourne Amenity Ltd, The Wharf, Rye Road, Newenden, Kent TN18 SQG
01797 252299 • info@bourneamenity.co.uk
www.bourneamenity.co.uk
VAT No: 863 1196 22 • Registered in England No: 3453821

Parameter	Unit	Guidelines	Value	Result	Compliance
Heavy Metals and Hydrocarbons					
Total Antimony (Sb)	mg/kg	S4UL	<500	<1.0	*Yes*
Total Arsenic (As)	mg/kg	S4UL	<37	10	*Yes*
Total Barium (Ba)	mg/kg	S4UL	<1300	11	*Yes*
Total Beryllium (Be)	mg/kg	S4UL	<1.7	0.26	*Yes*
Total Cadmium (Cd)	mg/kg	S4UL	<11	<0.26	*Yes*
Total Chromium III (Cr)	mg/kg	S4UL	<910	6	*Yes*
Hexavalent Chromium (Cr Vi)	mg/kg	S4UL	<6	<1.8	*Yes*
Total Cyanide (Cn)	mg/kg	Dutch Action Value (DAV)	<20	<1.0	*Yes*
Total Lead (Pb)	mg/kg	SP1010 (Defra Category 4)	<200	9	*Yes*
Total Mercury (Hg)	mg/kg	S4UL	<1.2	<0.3	*Yes*
Total (mono) Phenols	mg/kg	S4UL^	<550	<1.0	*Yes*
Total Selenium (Se)	mg/kg	S4UL	<250	<1.0	*Yes*
Total Vanadium (V)	mg/kg	S4UL	<410	16	*Yes*
Water Soluble Boron (B)	mg/kg	S4UL	<290	0.5	*Yes*
Acenaphthylene	mg/kg	S4UL^	<420	<0.05	*Yes*
Acenaphthene	mg/kg	S4UL^	<510	<0.05	*Yes*
Anthracene	mg/kg	S4UL^	<5400	<0.05	*Yes*
Benzo (a) Anthracene	mg/kg	S4UL^	<11	<0.05	*Yes*
Benzo (a) Pyrene	mg/kg	S4UL^	<2.7	<0.05	*Yes*
Benzo (b) Fluoranthene	mg/kg	S4UL^	<3.3	<0.05	*Yes*
Benzo (g,h,i) Perylene	mg/kg	S4UL^	<340	<0.05	*Yes*
Benzo (k) Fluoranthene	mg/kg	S4UL^	<93	<0.05	*Yes*
Chrysene	mg/kg	S4UL^	<22	<0.05	*Yes*
Dibenzo (a,h) Anthracene	mg/kg	S4UL^	<0.28	<0.05	*Yes*
Fluoranthene	mg/kg	S4UL^	<560	<0.05	*Yes*
Fluorene	mg/kg	S4UL^	<400	<0.05	*Yes*
Indeno (1,2,3-cd) Pyrene	mg/kg	S4UL^	<36	<0.05	*Yes*
Naphthalene	mg/kg	S4UL^	<5.6	<0.05	*Yes*
Phenanthrene	mg/kg	S4UL^	<220	<0.05	*Yes*
Pyrene	mg/kg	S4UL^	<1200	<0.05	*Yes*
Aliphatic TPH (C5 - C6)	mg/kg	S4UL^	<78	<0.001	*Yes*
Aliphatic TPH (C6 - C8)	mg/kg	S4UL^	<230	<0.001	*Yes*
Aliphatic TPH (C8 - C10)	mg/kg	S4UL^	<65	<0.001	*Yes*
Aliphatic TPH (C10 - C12)	mg/kg	S4UL^	<330	<1.0	*Yes*
Aliphatic TPH (C12 - C16)	mg/kg	S4UL^	<2400	<2.0	*Yes*
Aliphatic TPH (C16 - C21)	mg/kg	S4UL^	<92000	<8.0	*Yes*
Aliphatic TPH (C21 - C35)	mg/kg	S4UL^		<8.0	*Yes*
Aliphatic TPH (C5 - C35)	mg/kg	S4UL^	<92000	<10	*Yes*
Aromatic TPH (C5 - C7)	mg/kg	S4UL^	<140	<0.001	*Yes*
Aromatic TPH (C7 - C8)	mg/kg	S4UL^	<290	<0.001	*Yes*
Aromatic TPH (C8 - C10)	mg/kg	S4UL^	<83	<0.001	*Yes*
Aromatic TPH (C10 - C12)	mg/kg	S4UL^	<180	<1.0	*Yes*
Aromatic TPH (C12 - C16)	mg/kg	S4UL^	<330	<2.0	*Yes*
Aromatic TPH (C16 - C21)	mg/kg	S4UL^	<540	<10	*Yes*
Aromatic TPH (C21 - C35)	mg/kg	S4UL^	<1500	<10	*Yes*
Aromatic TPH (C5 - C35)	mg/kg	S4UL^	<1500	<10	*Yes*
Benzene	mg/kg	S4UL^	<0.17	<0.005	*Yes*
Toluene	mg/kg	S4UL^	<290	<0.005	*Yes*
Ethylbenzene	mg/kg	S4UL^	<110	<0.005	*Yes*
O-xylene	mg/kg	S4UL^	<140	<0.005	*Yes*
M-xylene	mg/kg	S4UL^	<140	<0.005	*Yes*
P-xylene	mg/kg	S4UL^	<130		*Yes*
MTBE	mg/kg	Sail Guideline Values	<470	<0.005	*Yes*
Asbestos	mg/kg	Control of Asbestos Regulations 2006	Absent	Absent	*Yes*

Bourne Amenity Ltd, The Wharf, Rye Road, Newenden, Kent TN18 5QG
01797 252299 • info@bourneamenity.co.uk
www.bourneamenity.co.uk
VAT No: 863 1196 22 • Registered in England No: 3453821

3.0
Washed Sand Subsoil Report

Sir Robert McALPINE

TECHNICAL SUBMISSION APPROVAL FORM

CONTRACT:	007562 Maggie's Centre, Royal Free Hospital

TECH SUB NUMBER	007562-WYL-XX-ZZ-TS-X-0003	TEC SUB REVISION	P01 For information	TEC SUB STATUS	

Washed Sand Subsoil Report

See attachment for information

TEC SUB provided by:	Willerby Landscapes
Date sent:	28/03/2023
Description of submission	Bourne Amenity Washed Sand Subsoil
Relevant Drawings:	NA
Work Package:	007562

Sample Storage Location: SRM to confirm

Sample Installed Location:

On behalf of Client			Date 11/04/2023				
Company	MSP		Status* A		~~A~~	B	C
			*delete as applicable				
Name	Gunther Galligioni	Signature					
Comment							
On behalf of SRM Design Team			Date				
Company			Status*		A	B	C
			*delete as applicable				
Name		Signature					
Comment							

TECHNICAL SUBMISSION APPROVAL FORM						
CONTRACT:	007562 Maggie's Centre, Royal Free Hospital					
On behalf of Clients Monitoring Team			Date			
Company			Status*	**A**	**B**	**C**
		*delete as applicable				
Name		Signature				
Comment						

Rain Gardens are another aspect of SuDS and serve as more of an attractive landscaping feature rather than acting like a bio retention swale and functionally managing rain water run-off. The principle is similar to the bio retention soil and acts to slowly store and manage the rain water, which moves through the soil at a controlled rate in order to avoid flooding. Rain gardens usually move water at a rate of approximately 25-150mm per hour, and we can control this through the use of materials like as expanded clay pellets and varying levels of organic matter

On behalf of Tenant			Date			
Company			Status*	**A**	**B**	**C**
		*delete as applicable				
Name		Signature				
Comment						
KEY TO STATUS: A=APPROVED, B=APPROVED WITH COMMENTS, C=REJECTED.						

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Jonathan Bourne
Bourne Amenity Ltd
The Wharf
Newenden
Cranbrook
Kent TN18 5QG

22nd February 2023
Our Ref: TOHA/23/7818/8/SS
Your Ref: PO 114359

Dear Sirs

Structural Subsoil Analysis Report – Washed Sand Subsoil

We have completed the analysis and testing of the sample recently submitted, referenced *Washed Sand Subsoil,* and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the sample for use as a 'structural subsoil for tree planting in hard landscape situations'.

This report presents the results of analysis for the sample submitted to our office, and it should be considered 'indicative' of the soil source. The report and results should therefore not be used by third parties as a means of verification or validation testing, waste designation purposes or for any project-specific application, especially after the material has left the Bourne Amenity Ltd site.

SAMPLE EXAMINATION

The sample was described as a brownish yellow (Munsell Colour 10YR 6/8), moist, friable, non-calcareous SAND with a single grain structure. The sample was very slightly stony and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were recorded.

Plate 1: Washed Sand Subsoil Sample

ANALYTICAL SCHEDULE

The sample was submitted to the laboratory for a range of physical and chemical analyses in accordance with the following schedule:

Geotechnical Properties

- permeability;
- total, air-filled and capillary porosity;
- bulk density;
- California Bearing Ratio (CBR).

Horticultural Properties

- detailed particle size distribution;
- stone content;
- moisture content;
- pH value;
- calcium carbonate;
- organic matter content;
- electrical conductivity values;
- exchangeable sodium percentage;
- visible contaminants (>2mm).

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below

RESULTS OF ANALYSIS

Particle Size Distribution and Stone Content

The sample fell into the *sand* texture class. The grading of the sand indicates a narrow particle size distribution and a predominance of *medium sand* (0.25-0.50mm), followed by *coarse sand* (0.50-1.0mm). This is acceptable for a 'structural subsoil' as sufficient porosity levels are maintained in a compacted state and the risk of particle interpacking is minimised.

The sample was virtually stone-free and as such, stones should not restrict the use of the sand for landscape purposes.

Permeability and Porosity

The permeability of the sample when in a compacted state (Standard Compaction) was high (376mm/hr) and indicates that the sand would demonstrate a high drainage performance for tree planting in hard landscape situations. This would probably need to be compensated for by an irrigation system.

The sample displayed a reasonable total porosity value in a compacted state, comprising mainly capillary pores. This indicates that the sample has a good water-holding capacity, and given its particle size distribution, a significant proportion of the water is likely to be plant available.

California Bearing Ratio

A re-compacted California Bearing Ratio (CBR) was completed as part of the engineering testing undertaken on the sample. The sample was re-compacted using the 2.5kg rammer at the as received moisture content and the sample returned a minimum CBR of 10%. Assuming that the in-situ compaction method selected during installation provides similar levels of compaction to that of the laboratory test, the in-situ performance of the material should be able to achieve a similar result (provided it is compacted at the same moisture content (3.4%)).

As the performance of the sand will be linked to the moisture content at time of compaction, further work may be required in order to correlate the change in engineering performance of the material over the range of moisture contents at which the soil is likely to be placed and compacted.

We recommend a more conservative approach with the performance of the material, and as opposed to a CBR of 10%, we would quote "should achieve a CBR in excess of 5%..." The 5% CBR is important as this is the lower limit for the sub-grade for the minimum construction thickness.

pH and Electrical Conductivity Values

The sample was slightly acid in reaction (pH 6.7), with a pH value that would be considered ideal for landscape purposes.

The electrical conductivity (salinity) value (water and $CaSO_4$ extracts) was low, which indicates that soluble salts were not present at levels that would be harmful to plants.

Organic Matter and Fertility Status

The sample contained a low organic matter content, which is appropriate for a 'structural subsoil' material.

CONCLUSION

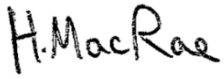
The purpose of the analysis was to determine the suitability of the sample for use as a 'structural subsoil for tree planting in hard landscape situations'.

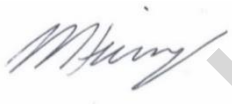
From the visual examination and laboratory analysis undertaken, the sample can be described as a slightly acid, non-saline, non-calcareous SAND with a low stone content. The organic matter content of the sample was low and the permeability rate was high, with sufficient total porosity recorded.

Based on our findings, the horticultural and geotechnical properties of the sand represented by this sample would be considered suitable for use as a structural subsoil for tree planting in hard landscape situations.

We hope this report meets with your approval. Please call us if you wish to talk through the findings and recommendations.

Yours faithfully





Harriet MacRae
BSc MSc
Graduate Soil Scientist

Matthew Heins
BSc (Hons) MISoilSci
Senior Soil Scientist

For and on behalf of Tim O'Hare Associates LLP

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Ltd**
Project	**Washed Sand Subsoil**
Date:	**22/02/2023**
Job Ref No:	**TOHA/23/7818/8/SS**

Sample Reference			**Washed Sand Subsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	2
Silt (0.002-0.05mm)	%	UKAS	1
Very Fine Sand (0.05-0.15mm)	%	UKAS	2
Fine Sand (0.15-0.25mm)	%	UKAS	9
Medium Sand (0.25-0.50mm)	%	UKAS	46
Coarse Sand (0.50-1.0mm)	%	UKAS	26
Very Coarse Sand (1.0-2.0mm)	%	UKAS	14
Total Sand (0.05-2.0mm)	%	UKAS	97
Texture Class (UK Classification)	--	UKAS	S
Stones (2-20mm)	% DW	GLP	1
Stones (20-50mm)	% DW	GLP	1
Stones (>50mm)	% DW	GLP	0
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0
pH Value (1:2.5 water extract)	units	UKAS	6.7
Calcium Carbonate	%	UKAS	<1.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	96
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	2112
Exchangeable Sodium Percentage	%	UKAS	1.2
Organic Matter (LOI)	%	UKAS	<0.5
Determination of Permeability and Porosity - K H Volume 10.7 method			
Initial Height	mm	UKAS	129.7
Initial Diameter	mm	UKAS	100.1
Particle Density	Mg/m^3	UKAS	2.66
Initial Bulk Density	Mg/m^3	UKAS	1.75
Final Bulk Density	Mg/m^3	UKAS	1.96
Initial Moisture Content	%	UKAS	4
Final Moisture Content	%	UKAS	17
Initial Dry Density	Mg/m^3	UKAS	1.69
Final Dry Density	Mg/m^3	UKAS	1.68
Total Porosity (Initial)	%	UKAS	37
Total Porosity (Final)	%	UKAS	37
Air Filled Porosity (Initial)	%	UKAS	31
Air Filled Porosity (Final)	%	UKAS	9
Capillary Porosity (Initial)	%	UKAS	6
Capillary Porosity (Final)	%	UKAS	28
Permeability	mm/hr	UKAS	376
California Bearing Ratio - BS 1377-4:1990:Method 7.4			
Moisture Content (Initial)	%	UKAS	3.5
Moisture Content (Top)	%	UKAS	3.4
Moisture Content (Base)	%	UKAS	3.4
Moisture Content (Mean)	%	UKAS	3.4
Initial Bulk Density	Mg/m^3	UKAS	1.78
Initial Dry Density	Mg/m^3	UKAS	1.73
CBR Top	%	UKAS	10
CBR Base	%	UKAS	27

Determination of Permeability and Porosity - K H Volume 10.7 method

Notes
Material recompacted at the 'as-received' moisture with a 2.5kg rammer
Sample is assumed to be fully saturated when a rate of steady flow is achieved
Permeability is determined when sample achieved a state of steady flow

Determination of California Bearing Ratio - BS 1377-4:1990:Method 7.4

Notes
Material recompacted at the 'as-received' moisture with a 2.5kg rammer
Sample tested in an unsoaked condition
Applied Seating Load (top) : 48N
Applied Seating Load (base) : 48N
Applied Surcharge : 12.0kg

S = SAND

Visual Examination

The sample was described as a brownish yellow (Munsell Colour 10YR 6/8), moist, friable, non-calcareous SAND with a single grain structure. The sample was slightly stony and no unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were recorded.

H.MacRae

Harriet MacRae
BSc MSc
Graduate Soil Scientist

4.0
Lightweight, Intensive Topsoil Report

Sir Robert McALPINE

TECHNICAL SUBMISSION APPROVAL FORM

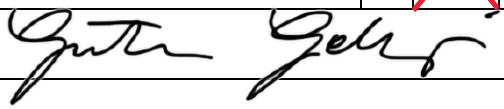
CONTRACT:	007562 Maggie's Centre, Royal Free Hospital

TECH SUB NUMBER	007562-WYL-XX-ZZ-TS-X-0004	TEC SUB REVISION	P01 For information	TEC SUB STATUS	

Lightweight (Intensive) Top Soil Report

See attachment for information

TEC SUB provided by:	Willerby Landscapes
Date sent:	27/03/2023
Description of sample:	Bourne Amenity Lightweight (Intensive) Top Soil
Relevant Drawings:	NA
Work Package:	007562

Sample Storage Location:						
Sample Installed Location:						
On behalf of Client			Date 11/04/2023			
Company	MSP		Status* Status B	A	B (X)	C
			*delete as applicable			
Name	Gunther Galligioni	Signature				
Comment	Status B subject to approval by the Structural Engineer					
On behalf of SRM Design Team			Date			
Company			Status*	A	B	C
			*delete as applicable			
Name		Signature				
Comment						
On behalf of Clients Monitoring Team			Date			
Company			Status*	A	B	C
			*delete as applicable			

TECHNICAL SUBMISSION APPROVAL FORM			
CONTRACT:	007562 Maggie's Centre, Royal Free Hospital		
Name		Signature	
Comment			

On behalf of Tenant			Date			
Company			Status*	**A**	**B**	**C**
		*delete as applicable				
Name		Signature				
Comment						
KEY TO STATUS: A=APPROVED, B=APPROVED WITH COMMENTS, C=REJECTED.						

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Mr Jonathan Bourne
Bourne Amenity Ltd
The Wharf
Rye Road
Newenden
Kent TN18 5QG

28th October 2022
Our Ref: TOHA/22/7681/SS
Your Ref: PO 110203

Dear Sirs

Soil Analysis Report: Lightweight Topsoil

We have completed the analysis of the soil sample recently submitted (22/09/22), referenced *Intensive Lightweight Topsoil*, and have pleasure reporting our findings.

The purpose of the analysis was to determine the suitability of the material for use as an intensive lightweight topsoil in a podium or rooftop garden environment.

This report presents the results of analysis for the sample submitted to our office, and it should be considered 'indicative' of the soil source. The report and results should therefore not be used by third parties as a means of verification or validation testing or waste designation purposes, especially after the soil has left the Bourne Amenity Ltd site.

SAMPLE EXAMINATION

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), dry, friable, slightly calcareous LOAMY SAND with a weakly developed, very fine to fine granular structure*. The sample was slightly stony and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.

* This appraisal of soil structure was made from examination of a disturbed sample. Structure is a key soil characteristic that may only be accurately assessed by examination in an in-situ state.

ANALYTICAL SCHEDULE

The sample was submitted to a UKAS and MCERTS accredited laboratory for a range of physical and chemical tests to confirm the composition and fertility of the soil, and the concentration of selected potential contaminants. The following parameters were determined:

- detailed particle size analysis (5 sands, silt, clay);
- stone content (2-20mm, 20-50mm, >50mm);
- bulk density (oven dry, field capacity, saturated);
- saturated hydraulic conductivity;
- visible contaminants (>2mm);
- pH and electrical conductivity values;
- calcium carbonate;
- exchangeable sodium percentage;
- major plant nutrients (N, P, K, Mg);
- organic matter content;
- C:N ratio;
- heavy metals (Sb, As, B, Ba, Be, Cd, Cr, Cr VI, Cu, Pb, Hg, Ni, Se, V, Zn);
- soluble sulphate, elemental sulphur, acid volatile sulphide;
- total cyanide and total (mono) phenols;
- aromatic and aliphatic TPH (C5-C44 banding);
- speciated PAHs (US EPA16 suite);
- benzene, toluene, ethylbenzene, xylene (BTEX);
- asbestos screen.

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

RESULTS OF ANALYSIS

Particle Size Analysis

The less than 2mm fraction fell into the *loamy sand* texture class. Further detailed particle size analysis revealed the sample to have a sand fraction containing a reasonable proportion of *medium sand* (0.25-0.50mm) followed by relatively even fractions of particles less than 0.25mm. This would be considered suitable for topsoil in a podium or roof garden environment, provided the physical condition of the topsoil is maintained, with no compaction in the profile. It is advised that the material is not placed thicker than 300mm. Any supporting irrigation system should take into account the drainage rate of this material (see below).

With the exception of 'LECA' particles, the sample was contained a low proportion of 'stone' sized material (>2mm).

Bulk Density and Saturated Hydraulic Conductivity

The sample displayed low bulk density values compared to those typically recorded for this type of material without the addition of LECA. These bulk density values should be cross-referenced against the specific loading restrictions of the structure the soil is to be placed on.

The saturated hydraulic conductivity of the sample was moderate for a topsoil medium (25 mm/hour) and indicates that the substrate should offer sufficient drainage performance in a typical podium or rooftop garden environment provided its physical condition is adequate. Soils used in a rooftop environment require a reasonable drainage performance to avoid stagnation (and therefore excess weight) and to enable efficient conveyance of water into the underlying drainage system.

pH and Electrical Conductivity Values

The sample was alkaline in reaction (pH 7.9). This pH value would be considered suitable for general landscape purposes providing species with a wide pH tolerance or those known to prefer alkaline soils are selected for planting, turfing and seeding.

The electrical conductivity (salinity) value (water extract) was moderately high. When reviewed in the context of the full results, it is likely to be the higher concentration of potassium ions that is contributing to the elevated proportion of soluble salts in this instance.

The electrical conductivity value by $CaSO_4$ extract (3318 µS/cm) slightly exceeded our maximum recommended value (3300 µS/cm).

Organic Matter and Fertility Status

The sample was well supplied with organic matter and all major plant nutrients.

The C:N ratio of the sample was acceptable for general landscape purposes.

Potential Contaminants

In the absence of site-specific criteria, the concentrations that affect human health have been assessed for *residential with homegrown produce* end-use against the Suitable For Use Levels (S4ULs) presented in the LQM/CIEH S4ULs for Human Health Risk Assessment (2015) and the DEFRA SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document (2014).

Of the potential contaminants determined, none was found at levels that exceed their guideline values.

Phytotoxic Contaminants

Of the phytotoxic (toxic to plants) contaminants determined (copper, nickel, zinc), none was found at levels that exceeded their guideline values.

CONCLUSION

The purpose of the analysis was to determine the suitability of the material for use as an intensive lightweight substrate for landscaping purposes in a rooftop garden environment.

From the sample examination and laboratory analysis, the substrate was described as an alkaline, moderately saline, slightly calcareous loamy sand with frequent LECA particles. The drainage performance of the material was found to be satisfactory. Moderate reserves of organic matter and major plant nutrients were recorded. Of the potential contaminants determined, none exceeded their respective guideline values.

The electrical conductivity values (water and $CaSO_4$ extract) were slightly high, and this is likely to be linked to the proportion / properties of the compost used in the topsoil blend. It is anticipated however that these levels should reduce once the soil is wetted by prolonged rainfall and/or irrigation inputs, and so would not be considered significant when viewed in the context of all other results.

Based on our findings, the lightweight topsoil represented by this sample would be considered suitable for use in rooftop/podium environments, provided the soil's physical condition is maintained and it is not over-compacted. Selected species should be tolerant of alkaline soil conditions.

The suitability of the bulk density and saturated hydraulic conductivity results should be confirmed by the project engineer for the recipient site.

The substrate should be underlain by a suitably graded subsoil product to interface with underlying structures and / or drainage infrastructure, as appropriate.

Soil Handling Recommendations

It is important to maintain the physical condition of the soil and avoid structural damage during all phases of soil handling (e.g. placement, cultivating, planting, seeding or turfing). As a consequence, soil handling operations should be carried out when soil is reasonably dry and non-plastic (friable) in consistency.

It is important to ensure that the soil is not unnecessarily compacted by foot trampling or trafficking by site machinery. If the soil is compacted at any stage during the course of soiling or landscaping works, it should be cultivated appropriately to relieve the compaction prior to (and after, if necessary) any planting, turfing or seeding.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if we can be of further assistance.

Matthew Heins
BSc (Hons) MISoilSci
Senior Soil Scientist

Ceri Spears
BSc MSc MISoilSci
Senior Associate

For & on behalf of Tim O'Hare Associates LLP

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

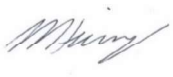
Client:	**Bourne Amenity Ltd**
Project	**Lightweight Topsoil**
Job:	**Physical and Horticultural Properties**
Date:	**28/10/2022**
Job Ref No:	**TOHA/22/7681/SS**

Sample Reference			**Intensive Lightweight Topsoil**
		Accreditation	
Clay (<0.002mm)	%	UKAS	8
Silt (0.002-0.063mm)	%	UKAS	13
Very Fine Sand (0.05-0.15mm)	%	UKAS	18
Fine Sand (0.15-0.25mm)	%	UKAS	16
Medium Sand (0.25-0.50mm)	%	UKAS	33
Coarse Sand (0.50-1.0mm)	%	UKAS	7
Very Coarse Sand (1.0-2.0mm)	%	UKAS	5
Total Sand (0.05-2.0mm)		UKAS	79
Texture Class (UK Classification)	--	UKAS	LS
Stones (2-20mm)	% DW	UKAS	3
Stones (20-50mm)	% DW	UKAS	1
Stones (>50mm)	% DW	UKAS	0
Saturated Hydraulic Conductivity	mm/hr	A2LA	25
Bulk Density (when Oven Dried)	Mg/m^3	UKAS	1.09
Bulk Density (at Field Capacity)	Mg/m^3	UKAS	1.38
Bulk Density (at Saturation)	Mg/m^3	UKAS	1.11
pH Value (1:2.5 water extract)	units	UKAS	7.9
Calcium Carbonate	%	UKAS	6.0
Electrical Conductivity (1:2.5 water extract)	uS/cm	UKAS	1592
Electrical Conductivity (1:2 $CaSO_4$ extract)	uS/cm	UKAS	3318
Exchangeable Sodium Percentage	%	UKAS	8.4
Organic Matter (LOI)	%	UKAS	6.6
Total Nitrogen (Dumas)	%	UKAS	0.36
C : N Ratio	ratio	UKAS	11
Extractable Phosphorus	mg/l	UKAS	43
Extractable Potassium	mg/l	UKAS	1271
Extractable Magnesium	mg/l	UKAS	102
Visible Contaminants: Plastics >2.00mm	%	UKAS	0
Visible Contaminants: Sharps >2.00mm	%	UKAS	0

LS = LOAMY SAND

Visual Examination

The sample was described as a very dark greyish brown (Munsell Colour 10YR 3/2), dry, friable, slightly calcareous LOAMY SAND with a weakly developed, very fine to fine granular structure. The sample was slightly stony and contained a moderate proportion of organic fines and occasional woody fragments. No unusual odours, deleterious materials, roots or rhizomes of pernicious weeds were observed.



Matthew Heins
BSc (Hons) MISoilSci
Senior Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with

TIM O'HARE ASSOCIATES
SOIL & LANDSCAPE CONSULTANCY

Client:	**Bourne Amenity Limited**
Project	**Intensive Lightweight Topsoil**
Job:	**Chemical Properties**
Date:	**28/10/2022**
Job Ref No:	**TOHA/22/7681/SS**

Sample Reference			**Intensive Lightweight Topsoil**
		Accreditation	
Total Antimony (Sb)	mg/kg	MCERTS	3.3
Total Arsenic (As)	mg/kg	MCERTS	17
Total Barium (Ba)	mg/kg	MCERTS	52
Total Beryllium (Be)	mg/kg	MCERTS	0.43
Total Cadmium (Cd)	mg/kg	MCERTS	< 0.2
Total Chromium (Cr)	mg/kg	MCERTS	21
Hexavalent Chromium (Cr VI)	mg/kg	MCERTS	< 1.8
Total Copper (Cu)	mg/kg	MCERTS	61
Total Lead (Pb)	mg/kg	MCERTS	39
Total Mercury (Hg)	mg/kg	MCERTS	< 0.3
Total Nickel (Ni)	mg/kg	MCERTS	22
Total Selenium (Se)	mg/kg	MCERTS	< 1.0
Total Vanadium (V)	mg/kg	MCERTS	25
Total Zinc (Zn)	mg/kg	MCERTS	140
Water Soluble Boron (B)	mg/kg	MCERTS	1.8
Total Cyanide (CN)	mg/kg	MCERTS	< 1.0
Total (mono) Phenols	mg/kg	MCERTS	< 1.0
Elemental Sulphur (S)	mg/kg	MCERTS	360
Acid Volatile Sulphide (S)	mg/kg	MCERTS	96
Water Soluble Sulphate (SO_4)	g/l	MCERTS	0.57
Naphthalene	mg/kg	MCERTS	< 0.05
Acenaphthylene	mg/kg	MCERTS	< 0.05
Acenaphthene	mg/kg	MCERTS	< 0.05
Fluorene	mg/kg	MCERTS	< 0.05
Phenanthrene	mg/kg	MCERTS	0.61
Anthracene	mg/kg	MCERTS	< 0.05
Fluoranthene	mg/kg	MCERTS	1.3
Pyrene	mg/kg	MCERTS	1.1
Benzo(a)anthracene	mg/kg	MCERTS	0.55
Chrysene	mg/kg	MCERTS	0.58
Benzo(b)fluoranthene	mg/kg	MCERTS	0.64
Benzo(k)fluoranthene	mg/kg	MCERTS	0.28
Benzo(a)pyrene	mg/kg	MCERTS	0.45
Indeno(1,2,3-cd)pyrene	mg/kg	MCERTS	0.27
Dibenzo(a,h)anthracene	mg/kg	MCERTS	< 0.05
Benzo(g,h,i)perylene	mg/kg	MCERTS	0.31
Total PAHs (sum USEPA16)	mg/kg	MCERTS	6.03
Aliphatic TPH >C5 - C6	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C6 - C8	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aliphatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aliphatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aliphatic TPH >C16 - C21	mg/kg	MCERTS	< 8.0
Aliphatic TPH >C21 - C35	mg/kg	MCERTS	< 8.0
Aliphatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Aromatic TPH >C5 - C7	mg/kg	MCERTS	< 0.001
Aromatic TPH >C7 - C8	mg/kg	MCERTS	< 0.001
Aromatic TPH >C8 - C10	mg/kg	MCERTS	< 0.001
Aromatic TPH >C10 - C12	mg/kg	MCERTS	< 1.0
Aromatic TPH >C12 - C16	mg/kg	MCERTS	< 2.0
Aromatic TPH >C16 - C21	mg/kg	MCERTS	< 10
Aromatic TPH >C21 - C35	mg/kg	MCERTS	< 10
Aromatic TPH (C5 - C35)	mg/kg	MCERTS	< 10
Benzene	mg/kg	MCERTS	< 0.001
Toluene	mg/kg	MCERTS	< 0.001
Ethylbenzene	mg/kg	MCERTS	< 0.001
p & m-xylene	mg/kg	MCERTS	< 0.001
o-xylene	mg/kg	MCERTS	< 0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	MCERTS	< 0.001
Asbestos	ND/D	ISO 17025	Not-detected

Matthew Heins
BSc (Hons) MISoilSci
Senior Soil Scientist

Results of analysis should be read in conjunction with the report they were issued with