ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP10
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Gravelly silty clay, medium plasticity, brown, medium to coarse grained igneous and sandstone gravel, trace of plastic, and metal.	w<PL			BUCKET = 10L JHF12
							0.5							
	■		■		■		1			FILL: Silty clay, medium plasticity, brown, trace of medium to coarse igneous and sandstone gravel, glass, and ash.				BUCKET = 10L JHF13
							1.5							
	■		■		■		2			FILL: Silty clay, medium plasticity, dark brown, trace of medium to coarse igneous and sandstone gravel, plastic, and ash.				BUCKET = 10L
	■				■		2.5		SP	SAND: medium to coarse grained, dark grey.	W			
										END OF TEST PIT AT 2.8m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP11
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION							0			FILL: Silty clay, medium plasticity, brown, trace of igneous and sandstone gravel, shale, glass, root fibres, and ash.	w<PL			GRASS COVER BUCKET = 10L JHF14
							0.5							
							1							BUCKET = 10L
							1.5							
							2							BUCKET = 10L
							2.5		SP	SAND: medium to coarse grained, grey.	W			
										END OF TEST PIT AT 2.5m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP12
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 19/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	■		■		■		0			FILL: Silty clay, medium plasticity, brown, trace of igneous and sandstone gravel, glass, brick, concrete, and root fibres.	w<PL			GRASS COVER BUCKET = 10L JHF15
							0.5							
	■		■		■		1			as above, but dark brown.				BUCKET = 10L
							1.5							
	■		■		■		2							BUCKET = 10L
▶	■				■		2.5		SP	SAND: medium to coarse grained, grey.	W			
										END OF TEST PIT AT 2.6m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP13
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION							0			FILL: Gravelly silty clay, medium plasticity, brown, medium to coarse grained igneous and sandstone gravel, glass, shale, and ash.	w<PL			BUCKET = 10L KTF1
							0.5							
							1			FILL: Silty clay, medium plasticity, brown, trace of medium to coarse grained igneous and sandstone gravel, concrete, and brick.				BUCKET = 10L KTF2
							1.5							
							2			FILL: medium plasticity, dark brown, with trace of shale.				POSSIBLY NATURAL BUCKET = 10L
							2.5		SP	SAND: medium to coarse grained, grey.	W			
										END OF TEST PIT AT 2.8m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP14
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Gravelly silty clay, medium plasticity, brown, fine to coarse grained igneous and sandstone gravel, trace of plastic, metal, ash, and root fibres.	w<PL			BUCKET = 10L KTF3
							0.5							
	■		■				1			FILL: Sandy silty clay, medium plasticity, dark brown, trace of igneous gravel, and ash.				BUCKET = 10L
							1.5							
	■				■		2		CI	Sandy Silty CLAY: medium plasticity, dark brown, fine to coarse grained sand, trace of root fibres.	w=PL			
							2.5			END OF TEST PIT AT 2.3m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP15
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty clay, medium plasticity, brown, trace of brick, fibre cement, igneous gravel, asphalt, ash, and root fibres.	w<PL			GRASS COVER BUCKET = 10L KTF4
							0.5							
			■		■		1							BUCKET = 10L
	■						1.5		CI	Silty CLAY: medium plasticity, dark brown, trace of sand, and root fibres.	w=PL			
									SP	SAND: fine to coarse grained, dark grey, trace of shell.	W			
							2			END OF TEST PIT AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP16
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION			■		■		0			FILL: Silty clay, low to medium plasticity, grey, trace of fibre cement, tile, and root fibres.	w<PL			GRASS COVER BUCKET = 10L KTF6
			■		■		0.5			FILL: Silty clay, low to medium plasticity, brown, trace of plastic, tires, metal, tiles, fibre cement fragments, and ash, trace of igneous and sandstone gravel, and root fibres.				BUCKET = 10L KTF7
			■		■		1							BUCKET = 10L KTF5
					■		1.5							
							2		CI	Sandy Silty CLAY: medium plasticity, brown, fine to medium grained sand.	w=PL			
										END OF TEST PIT AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP17
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Gravelly silty clay, low to medium plasticity, brown, trace of sandstone blocks, igneous gravel, brick and concrete fragments, fibre cement, and root fibres.	w<PL			BUCKET = 10L KTF8
							0.5							
							1			FILL: Silty clay, medium plasticity, grey, trace of sandstone gravel, brick, plastic, glass, fibre cement fragments, and ash.				BUCKET = 10L KTF9
	■		■				1.5							
					■					FILL: Sandy silty clay, medium plasticity, dark grey, trace of igneous and sandstone gravel, and root fibres.				BUCKET = 10L
	■						2							
									SP	SAND: fine to coarse grained, grey, trace of shell.	M			
							2.5			END OF TEST PIT AT 2.5m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP18
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION			■		■		0			FILL: Gravelly silty clay, medium plasticity, grey brown, fine to coarse grained igneous and sandstone gravel, trace of brick, and concrete.	w<PL			BUCKET = 10L KTF10
							0.5							
			■		■		1			FILL: Silty clay, medium plasticity, dark grey, trace of igneous gravel, plastic, brick, glass, metal, ash, and root fibres.				BUCKET = 10L KTF11
							1.5							
					■		2		CI	Sandy Silty CLAY: medium plasticity, dark grey, fine to coarse grained sand, trace of root fibres.	w<PL			
							2.5			END OF TEST PIT AT 2.5m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP19
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Gravelly silty clay, medium plasticity, brown, fine to coarse grained igneous and sandstone gravel, trace of tile, concrete, glass, and metal.	w<PL			BUCKET = 10L
							0.5							
							1							
	■		■		■					FILL: Silty clay, medium plasticity, brown, trace of sandstone and igneous gravel, shale fragments, plastic, metal, and ash.				BUCKET = 10L
							1.5							
	■				■		2		CI	Sandy Silty CLAY: medium plasticity, dark grey, fine to coarse grained sand, trace of root fibres.	w<PL			
							2.5			END OF TEST PIT AT 2.4m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP20
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			■		■		0			FILL: Gravelly silty clay, medium plasticity, brown, fine to coarse grained igneous and sandstone gravel, trace of brick, concrete, shale, plastic, fibre cement fragments, ash, and root fibres.	w<PL			BUCKET = 10L KTF12
					■		0.5							
							1			FILL: Silty clay, medium plasticity, brown, trace of igneous and sandstone gravel, tile, brick, fibre cement fragments, and root fibres.				BUCKET = 10L KTF13
			■		■		1.5							
▶							2		CI	Sandy Silty CLAY: medium plasticity, fine to coarse grained sand, trace of root fibres.	w<PL			
							2.5			END OF TEST PIT AT 2.5m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP21
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION							0			FILL: Gravelly silty clay, medium plasticity, brown, fine to coarse grained igneous and sandstone gravel, with concrete, brick, tile, metal, plastic, fibre cement fragments, trace of ash, and root fibres.	w<PL			BUCKET = 10L KTF14
							0.5							
							1							BUCKET = 10L KTF15
							1.5							
							2		CI	Sandy Silty CLAY: medium plasticity, brown grey, fine to coarse grained sand.	w<PL			
							2.5			END OF TEST PIT AT 2.5m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP22
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty clay, medium plasticity, brown, trace of shale fragments, and root fibres.	w<PL			BUCKET = 10L KTF17
	■		■		■		0.5			FILL: Gravelly silty clay, medium plasticity, grey, fine to coarse grained igneous gravel, trace of brick, plastic, asphalt, and root fibres.				BUCKET = 10L
	■		■		■		1							
	■		■		■		1.5			FILL: Silty clay, low to medium plasticity, brown, trace of fibre cement fragments, timber, and ash.				BUCKET = 10L KTF16
					■		2							
							2.5			END OF TEST PIT AT 2.3m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP23
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION							0			FILL: Silty clay, medium plasticity, brown, trace of igneous gravel, pipe, concrete, and root fibres.	w<PL			BUCKET = 10L
							0.5			FILL: Silty clay, medium plasticity, dark brown, trace of igneous gravel, plastic, fibre cement fragments, and ash.				BUCKET = 10L KTF19
							1			FILL: Silty clay, low to medium plasticity, dark brown, trace of igneous gravel, brick, timber, fibre cement fragments, and ash.				BUCKET = 10L KTF18
							1.5							
							2			END OF TEST PIT AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP24
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Silty clay, medium plasticity, grey, trace of igneous gravel, and root fibres.	w<PL			GRASS COVER BUCKET = 10L KTF20
	■		■		■		0.5			FILL: Silty clay, medium plasticity, brown, trace of brick, fibre cement fragments, concrete, ash, and root fibres.				BUCKET = 10L KTF21
			■		■		1							
			■		■		1.5							BUCKET = 10L
	■						2							BUCKET = 10L
							2.5			END OF TEST PIT AT 2.5m				
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP25
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLET-ION			■		■		0			FILL: Sandy silty clay, medium to high plasticity, dark brown, fine to medium grained sand, trace of igneous gravel, metal, ash, and root fibres.	w<PL			GRASS COVER BUCKET = 10L
							0.5			FILL: Silty clay, medium plasticity, brown, trace of igneous and sandstone gravel, brick, glass, metal, plastic, ash, and root fibres.				BUCKET = 10L
			■		■		1							
							1.5							BUCKET = 10L KTF22
							2			END OF TEST PIT AT 2.0m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

ENVIRONMENTAL LOG

Test Pit No.
TP26
1/1

Environmental logs are not to be used for geotechnical purposes

Client: CITY OF PARRAMATTA COUNCIL

Project: PROPOSED PASSIVE OPEN SPACE DEVELOPMENT

Location: RANGIHOU RESERVE, PART OF 1C & 1D MORTON STREET, PARRAMATTA, NSW

Job No. E31269K **Method:** EXCAVATOR **R.L. Surface:** N/A

Date: 20/3/18 **Datum:**

Logged/Checked by: J.H./B.P.

Groundwater Record	SAMPLES ES	SAMPLES ASS	SAMPLES ASB	SAMPLES SAL	SAMPLES DB	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
DRY ON COMPLETION	■		■		■		0			FILL: Gravelly silty clay, medium plasticity, grey, fine to medium grained igneous gravel, trace of concrete, brick, metal, ash, and root fibres.	w<PL			BUCKET = 10L
										FILL: medium to high plasticity, brown, trace of sandstone gravel, brick, and plastic.				BUCKET = 10L
							0.5							
							1							
							1.5							BUCKET = 10L
							2							BUCKET = 10L
										END OF TEST PIT AT 2.4m				
							2.5							
							3							
							3.5							

ENVIRONMENTAL LOGS EXPLANATORY NOTES

INTRODUCTION

These notes have been provided to amplify the environmental report in regard to classification methods, field procedures and certain matters relating to the logging of soil and rock. Not all notes are necessarily relevant to all reports.

Where geotechnical borehole logs are utilised for environmental purpose, reference should also be made to the explanatory notes included in the geotechnical report. Environmental logs are not suitable for geotechnical purposes.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Environmental studies include gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726:2017 *'Geotechnical Site Investigations'*. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geoenvironmental practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached soil classification table qualified by the grading of other particles present (eg. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	< 0.002mm
Silt	0.002 to 0.075mm
Sand	0.075 to 2.36mm
Gravel	2.36 to 63mm
Cobbles	63 to 200mm
Boulders	> 200mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose (VL)	< 4
Loose (L)	4 to 10
Medium dense (MD)	10 to 30
Dense (D)	30 to 50
Very Dense (VD)	> 50

Cohesive soils are classified on the basis of strength (consistency) either by use of a hand penetrometer, vane shear, laboratory testing and/or tactile engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength (kPa)	Indicative Undrained Shear Strength (kPa)
Very Soft (VS)	≤ 25	≤ 12
Soft (S)	> 25 and ≤ 50	> 12 and ≤ 25
Firm (F)	> 50 and ≤ 100	> 25 and ≤ 50
Stiff (St)	> 100 and ≤ 200	> 50 and ≤ 100
Very Stiff (VSt)	> 200 and ≤ 400	> 100 and ≤ 200
Hard (Hd)	> 400	> 200
Friable (Fr)	Strength not attainable – soil crumbles	

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'shale' is used to describe fissile mudstone, with a weakness parallel to bedding. Rocks with alternating inter-laminations of different grain size (eg. siltstone/claystone and siltstone/fine grained sandstone) are referred to as 'laminite'.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All methods except test pits, hand auger drilling and portable Dynamic Cone Penetrometers require the use of a mechanical rig which is commonly mounted on a truck chassis or track base.

Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils and 'weaker' bedrock if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for a large excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the hand auger can occur on a variety of materials such as obstructions within any fill, tree roots, hard clay, gravel or ironstone, cobbles and boulders, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of limited reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock cuttings. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be assessed from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, NMLC or HQ triple tube core barrels, which give a core of about 50mm and 61mm diameter, respectively, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as NO CORE. The location of NO CORE recovery is determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the bottom of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289.6.3.1–2004 (R2016) *'Methods of Testing Soils for Engineering Purposes, Soil Strength and Consolidation Tests – Determination of the Penetration Resistance of a Soil – Standard Penetration Test (SPT)'*.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63.5kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as

  N = 13
  4, 6, 7

- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as

  N > 30
  15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

A modification to the SPT is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as 'N_c' on the borehole logs, together with the number of blows per 150mm penetration.

LOGS

The borehole or test pit logs presented herein are an interpretation of the subsurface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The terms and symbols used in preparation of the logs are defined in the following pages.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than 'straight line' variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or 'reverted' chemically if reliable water observations are to be made.

More reliable measurements can be made by installing standpipes which are read after the groundwater level has stabilised at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg. bricks, steel, etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably assess the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse environmental characteristics or behaviour. If the volume and nature of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing has not been undertaken to confirm the soil classification and rock strengths indicated on the environmental logs unless noted in the report.

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SYMBOL LEGENDS

SOIL


FILL


TOPSOIL


CLAY (CL, CI, CH)


SILT (ML, MH)


SAND (SP, SW)


GRAVEL (GP, GW)


SANDY CLAY (CL, CI, CH)


SILTY CLAY (CL, CI, CH)


CLAYEY SAND (SC)


SILTY SAND (SM)


GRAVELLY CLAY (CL, CI, CH)


CLAYEY GRAVEL (GC)


SANDY SILT (ML, MH)


PEAT AND HIGHLY ORGANIC SOILS (Pt)

ROCK


CONGLOMERATE


SANDSTONE


SHALE/MUDSTONE


SILTSTONE


CLAYSTONE


COAL


LAMINITE


LIMESTONE


PHYLLITE, SCHIST


TUFF


GRANITE, GABBRO


DOLERITE, DIORITE


BASALT, ANDESITE


QUARTZITE

OTHER MATERIALS


BRICKS OR PAVERS


CONCRETE


ASPHALTIC CONCRETE

CLASSIFICATION OF COARSE AND FINE GRAINED SOILS

Major Divisions		Group Symbol	Typical Names	Field Classification of Sand and Gravel	Laboratory Classification	
Coarse grained soil (more than 65% of soil excluding oversize fraction is greater than 0.075mm)	GRAVEL (more than half of coarse fraction is larger than 2.36mm	GW	Gravel and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 4$ $1 < C_c < 3$
		GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		GM	Gravel-silt mixtures and gravel-sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	Fines behave as silt
		GC	Gravel-clay mixtures and gravel-sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	Fines behave as clay
	SAND (more than half of coarse fraction is smaller than 2.36mm)	SW	Sand and gravel-sand mixtures, little or no fines	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	$C_u > 6$ $1 < C_c < 3$
		SP	Sand and gravel-sand mixtures, little or no fines	Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	≤ 5% fines	Fails to comply with above
		SM	Sand-silt mixtures	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength	≥ 12% fines, fines are silty	N/A
		SC	Sand-clay mixtures	'Dirty' materials with excess of plastic fines, medium to high dry strength	≥ 12% fines, fines are clayey	

Major Divisions		Group Symbol	Typical Names	Field Classification of Silt and Clay			Laboratory Classification
				Dry Strength	Dilatancy	Toughness	% < 0.075mm
ine grained soils (more than 35% of soil excluding oversize fraction is less than 0.075mm)	SILT and CLAY (low to medium plasticity)	ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity	None to low	Slow to rapid	Low	Below A line
		CL, CI	Inorganic clay of low to medium plasticity, gravelly clay, sandy clay	Medium to high	None to slow	Medium	Above A line
		OL	Organic silt	Low to medium	Slow	Low	Below A line
	SILT and CLAY (high plasticity)	MH	Inorganic silt	Low to medium	None to slow	Low to medium	Below A line
		CH	Inorganic clay of high plasticity	High to very high	None	High	Above A line
		OH	Organic clay of medium to high plasticity, organic silt	Medium to high	None to very slow	Low to medium	Below A line
	Highly organic soil	Pt	Peat, highly organic soil	–	–	–	–

Laboratory Classification Criteria

A well graded coarse grained soil is one for which the coefficient of uniformity $Cu > 4$ and the coefficient of curvature $1 < C_c < 3$. Otherwise, the soil is poorly graded. These coefficients are given by:

$$C_u = \frac{D_{60}}{D_{10}} \quad \text{and} \quad C_c = \frac{(D_{30})^2}{D_{10}\ D_{60}}$$

Where D_{10}, D_{30} and D_{60} are those grain sizes for which 10%, 30% and 60% of the soil grains, respectively, are smaller.

NOTES:

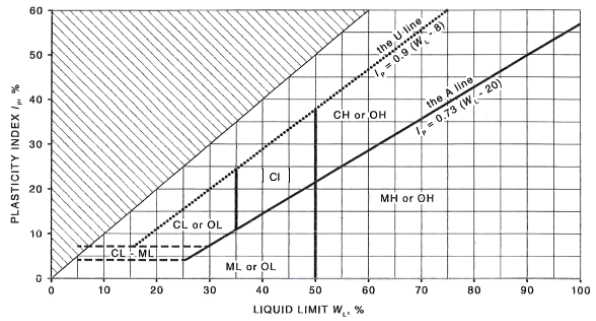
1 For a coarse grained soil with a fines content between 5% and 12%, the soil is given a dual classification comprising the two group symbols separated by a dash; for example, for a poorly graded gravel with between 5% and 12% silt fines, the classification is GP-GM.

2 Where the grading is determined from laboratory tests, it is defined by coefficients of curvature (C_c) and uniformity (C_u) derived from the particle size distribution curve.

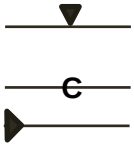
3 Clay soils with liquid limits > 35% and ≤ 50% may be classified as being of medium plasticity.

4 The U line on the Modified Casagrande Chart is an approximate upper bound for most natural soils.

Modified Casagrande Chart for Classifying Silts and Clays according to their Behaviour



LOG SYMBOLS

Log Column	Symbol	Definition
Groundwater Record		Standing water level. Time delay following completion of drilling/excavation may be shown. Extent of borehole/test pit collapse shortly after drilling/excavation. Groundwater seepage into borehole or test pit noted during drilling or excavation.
Samples	ES U50 DB DS ASB ASS SAL	Sample taken over depth indicated, for environmental analysis. Undisturbed 50mm diameter tube sample taken over depth indicated. Bulk disturbed sample taken over depth indicated. Small disturbed bag sample taken over depth indicated. Soil sample taken over depth indicated, for asbestos analysis. Soil sample taken over depth indicated, for acid sulfate soil analysis. Soil sample taken over depth indicated, for salinity analysis.
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'Refusal' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	N_c = 5 7 3R	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60° solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
	VNS = 25 PID = 100	Vane shear reading in kPa of undrained shear strength. Photoionisation detector reading in ppm (soil sample headspace test).
Moisture Condition (Fine Grained Soils)	w > PL $w \approx$ PL w < PL $w \approx$ LL w > LL	Moisture content estimated to be greater than plastic limit. Moisture content estimated to be approximately equal to plastic limit. Moisture content estimated to be less than plastic limit. Moisture content estimated to be near liquid limit. Moisture content estimated to be wet of liquid limit.
(Coarse Grained Soils)	D M W	DRY – runs freely through fingers. MOIST – does not run freely but no free water visible on soil surface. WET – free water visible on soil surface.
Strength (Consistency) Cohesive Soils	VS S F St VSt Hd Fr ( )	VERY SOFT – unconfined compressive strength ≤ 25kPa. SOFT – unconfined compressive strength > 25kPa and ≤ 50kPa. FIRM – unconfined compressive strength > 50kPa and ≤ 100kPa. STIFF – unconfined compressive strength > 100kPa and ≤ 200kPa. VERY STIFF – unconfined compressive strength > 200kPa and ≤ 400kPa. HARD – unconfined compressive strength > 400kPa. FRIABLE – strength not attainable, soil crumbles. Bracketed symbol indicates estimated consistency based on tactile examination or other assessment.
Density Index/ Relative Density (Cohesionless Soils)	VL L MD D VD ( )	**Density Index (I_D) Range (%)** / **SPT 'N' Value Range (Blows/300mm)** VERY LOOSE ≤ 15 — 0 – 4 LOOSE > 15 and ≤ 35 — 4 – 10 MEDIUM DENSE > 35 and ≤ 65 — 10 – 30 DENSE > 65 and ≤ 85 — 30 – 50 VERY DENSE > 85 — > 50 Bracketed symbol indicates estimated density based on ease of drilling or other assessment.
Hand Penetrometer Readings	300 250	Measures reading in kPa of unconfined compressive strength. Numbers indicate individual test results on representative undisturbed material unless noted otherwise.

Log Column	Symbol	Definition
Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Twin pronged tungsten carbide bit.
	T_{60}	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.
	Soil Origin	The geological origin of the soil can generally be described as:
		RESIDUAL – soil formed directly from insitu weathering of the underlying rock. No visible structure or fabric of the parent rock.
		EXTREMELY WEATHERED – soil formed directly from insitu weathering of the underlying rock. Material is of soil strength but retains the structure and/or fabric of the parent rock.
		ALLUVIAL – soil deposited by creeks and rivers.
		ESTUARINE – soil deposited in coastal estuaries, including sediments caused by inflowing creeks and rivers, and tidal currents.
		MARINE – soil deposited in a marine environment.
		AEOLIAN – soil carried and deposited by wind.
		COLLUVIAL – soil and rock debris transported downslope by gravity, with or without the assistance of flowing water. Colluvium is usually a thick deposit formed from a landslide. The description 'slopewash' is used for thinner surficial deposits.
		LITTORAL – beach deposited soil.

Classification of Material Weathering

Term		Abbreviation		Definition
Residual Soil		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered	Distinctly Weathered (Note 1)	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered		MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTE 1: The term 'Distinctly Weathered' is used where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock. 'Distinctly Weathered' is defined as follows: *'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'*. There is some change in rock strength.

Rock Material Strength Classification

Term	Abbreviation	Uniaxial Compressive Strength (MPa)	Guide to Strength	
			Point Load Strength Index $Is_{(50)}$ (MPa)	Field Assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	> 200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Appendix B: Laboratory Reports & COC Documents

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CERTIFICATE OF ANALYSIS 187888

Client Details

Client	Environmental Investigation Services
Attention	Katrina Taylor
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E31269K, Parramatta**
Number of Samples	59 Soil, 2 Material
Date samples received	22/03/2018
Date completed instructions received	22/03/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	29/03/2018
Date of Issue	29/03/2018

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Asbestos Approved By
Analysed by Asbestos Approved Identifier: Lulu Scott, Lucy Zhu, Matt Tang
Authorised by Asbestos Approved Signatory: Paul Ching

Results Approved By
Dragana Tomas, Senior Chemist
Jeremy Faircloth, Organics Supervisor
Leon Ow, Chemist
Nick Sarlamis, Inorganics Supervisor
Paul Ching, Senior Analyst

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187888-1	187888-2	187888-6	187888-9	187888-10
Your Reference	UNITS	TS	TB	BH01	BH01	BH02
Depth		-	-	0.0-0.1	3.2-3.45	0.0-0.1
Date Sampled		20/03/2018	20/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_6 - C_9	mg/kg	[NA]	[NA]	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	[NA]	[NA]	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	[NA]	[NA]	<25	<25	<25
Benzene	mg/kg	100%	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	100%	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	95%	<1	<1	<1	<1
m+p-xylene	mg/kg	97%	<2	<2	<2	<2
o-Xylene	mg/kg	96%	<1	<1	<1	<1
naphthalene	mg/kg	[NA]	[NA]	<1	<1	<1
Total +ve Xylenes	mg/kg	[NA]	[NA]	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	97	80	78	73	77

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187888-13	187888-14	187888-15	187888-18	187888-19
Your Reference	UNITS	BH02	TP04	TP04	TP07	TP07
Depth		3.2-3.45	0.0-0.2	0.7-1.0	0.0-0.2	1.0-1.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	71	75	76	78	77

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187888-21	187888-24	187888-25	187888-28	187888-29
Your Reference	UNITS	TP10	TP10	TP12	TP12	TP14
Depth		0.0-0.2	2.5-2.7	0.0-0.2	2.3-2.6	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	80	75	77	77	76

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187888-31	187888-32	187888-33	187888-34	187888-37
Your Reference	UNITS	TP14	TP15	TP15	TP17	TP17
Depth		2.0-2.2	0.0-0.2	1.2-1.4	0.0-0.2	2.3-2.5
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	76	75	72	78	74

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		187888-38	187888-40	187888-41	187888-42	187888-44
Your Reference	UNITS	TP19	TP19	TP22	TP22	TP24
Depth		0.0-0.2	2.0-2.2	0.0-0.2	0.5-0.7	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	75	72	74	77	75

vTRH(C6-C10)/BTEXN in Soil				
Our Reference		187888-45	187888-47	187888-48
Your Reference	UNITS	TP24	TP26	TP26
Depth		0.5-0.7	0.0-0.2	0.5-0.7
Date Sampled		20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018
TRH C_6 - C_9	mg/kg	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25
vTPH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1
naphthalene	mg/kg	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	75	76	72

svTRH (C10-C40) in Soil						
Our Reference		187888-6	187888-9	187888-10	187888-13	187888-14
Your Reference	UNITS	BH01	BH01	BH02	BH02	TP04
Depth		0.0-0.1	3.2-3.45	0.0-0.1	3.2-3.45	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	200	<100	120	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	160	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	250	<100	150	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	410	<50	150	<50	<50
Surrogate o-Terphenyl	%	93	86	93	87	95

svTRH (C10-C40) in Soil						
Our Reference		187888-15	187888-18	187888-19	187888-21	187888-24
Your Reference	UNITS	TP04	TP07	TP07	TP10	TP10
Depth		0.7-1.0	0.0-0.2	1.0-1.2	0.0-0.2	2.5-2.7
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	110	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	160	110	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	230	130	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	140	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	370	130	<50
Surrogate o-Terphenyl	%	89	93	93	95	86

svTRH (C10-C40) in Soil						
Our Reference		187888-25	187888-28	187888-29	187888-31	187888-32
Your Reference	UNITS	TP12	TP12	TP14	TP14	TP15
Depth		0.0-0.2	2.3-2.6	0.0-0.2	2.0-2.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	250	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	240	<100	130	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	440	<100	180	<100	<100
TRH >C_{34} -C_{40}	mg/kg	160	<100	110	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	600	<50	290	<50	<50
Surrogate o-Terphenyl	%	93	80	95	95	87

svTRH (C10-C40) in Soil						
Our Reference		187888-33	187888-34	187888-37	187888-38	187888-40
Your Reference	UNITS	TP15	TP17	TP17	TP19	TP19
Depth		1.2-1.4	0.0-0.2	2.3-2.5	0.0-0.2	2.0-2.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	24/03/2018	23/03/2018	23/03/2018	23/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	510	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	460	<100	<100	<100
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	880	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	310	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	1,200	<50	<50	<50
Surrogate o-Terphenyl	%	85	101	87	87	85

svTRH (C10-C40) in Soil						
Our Reference		187888-41	187888-42	187888-44	187888-45	187888-47
Your Reference	UNITS	TP22	TP22	TP24	TP24	TP26
Depth		0.0-0.2	0.5-0.7	0.0-0.2	0.5-0.7	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	24/03/2018	24/03/2018	24/03/2018	24/03/2018	24/03/2018
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	180
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	140	620
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	160	590
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	120	780
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	280	1,400
Surrogate o-Terphenyl	%	85	93	89	88	95

svTRH (C10-C40) in Soil		
Our Reference		187888-48
Your Reference	UNITS	TP26
Depth		0.5-0.7
Date Sampled		20/03/2018
Type of sample		Soil
Date extracted	-	23/03/2018
Date analysed	-	24/03/2018
TRH C_{10} - C_{14}	mg/kg	<50
TRH C_{15} - C_{28}	mg/kg	<100
TRH C_{29} - C_{36}	mg/kg	230
TRH >C_{10} -C_{16}	mg/kg	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	mg/kg	<50
TRH >C_{16} -C_{34}	mg/kg	250
TRH >C_{34} -C_{40}	mg/kg	250
Total +ve TRH (>C10-C40)	mg/kg	500
Surrogate o-Terphenyl	%	88

PAHs in Soil						
Our Reference		187888-6	187888-9	187888-10	187888-13	187888-14
Your Reference	UNITS	BH01	BH01	BH02	BH02	TP04
Depth		0.0-0.1	3.2-3.45	0.0-0.1	3.2-3.45	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.3	<0.1	<0.1	<0.1	0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	0.2	<0.1	0.9
Anthracene	mg/kg	0.2	<0.1	0.2	<0.1	0.2
Fluoranthene	mg/kg	0.2	<0.1	0.6	0.2	1.7
Pyrene	mg/kg	0.2	<0.1	0.6	0.2	1.7
Benzo(a)anthracene	mg/kg	0.1	<0.1	0.3	<0.1	0.7
Chrysene	mg/kg	0.2	<0.1	0.4	0.1	1
Benzo(b,j+k)fluoranthene	mg/kg	0.3	<0.2	<0.2	<0.2	1
Benzo(a)pyrene	mg/kg	0.2	<0.05	0.4	0.09	0.92
Indeno(1,2,3-c,d)pyrene	mg/kg	0.2	<0.1	0.3	<0.1	0.8
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Benzo(g,h,i)perylene	mg/kg	0.6	<0.1	0.4	<0.1	0.8
Total +ve PAH's	mg/kg	2.5	<0.05	3.4	0.55	10
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	0.5	<0.5	1.4
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	0.6	<0.5	1.4
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	0.6	<0.5	1.4
Surrogate p-Terphenyl-d14	%	100	96	98	97	99

PAHs in Soil						
Our Reference		187888-15	187888-18	187888-19	187888-21	187888-24
Your Reference	UNITS	TP04	TP07	TP07	TP10	TP10
Depth		0.7-1.0	0.0-0.2	1.0-1.2	0.0-0.2	2.5-2.7
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Naphthalene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.2	<0.1	0.5	0.4	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Phenanthrene	mg/kg	0.8	0.5	2.6	1.3	<0.1
Anthracene	mg/kg	0.3	0.1	0.9	0.5	<0.1
Fluoranthene	mg/kg	1.9	1.2	7.2	3.9	<0.1
Pyrene	mg/kg	1.8	1.1	7.3	4.0	<0.1
Benzo(a)anthracene	mg/kg	0.8	0.4	3.4	2.0	<0.1
Chrysene	mg/kg	1.0	0.6	4.4	2.7	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	2	1	7.2	4.3	<0.2
Benzo(a)pyrene	mg/kg	1.1	0.65	4.5	2.8	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.9	0.5	3.5	2.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	0.2	<0.1	0.7	0.4	<0.1
Benzo(g,h,i)perylene	mg/kg	0.9	0.5	3.6	2.3	<0.1
Total +ve PAH's	mg/kg	12	6.7	46	27	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.6	0.9	6.7	4.1	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.6	0.9	6.7	4.1	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.6	1	6.7	4.1	<0.5
Surrogate p-Terphenyl-d14	%	99	96	102	99	95

PAHs in Soil						
Our Reference		187888-25	187888-28	187888-29	187888-31	187888-32
Your Reference	UNITS	TP12	TP12	TP14	TP14	TP15
Depth		0.0-0.2	2.3-2.6	0.0-0.2	2.0-2.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Naphthalene	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	1.3	<0.1	0.5	<0.1	0.2
Acenaphthene	mg/kg	0.8	<0.1	0.1	<0.1	<0.1
Fluorene	mg/kg	0.8	<0.1	0.2	<0.1	<0.1
Phenanthrene	mg/kg	13	<0.1	3.6	<0.1	0.9
Anthracene	mg/kg	3.5	<0.1	1.3	<0.1	0.3
Fluoranthene	mg/kg	23	0.3	9.4	0.2	1.9
Pyrene	mg/kg	21	0.3	8.8	0.2	1.9
Benzo(a)anthracene	mg/kg	9.4	0.1	4.4	<0.1	0.8
Chrysene	mg/kg	12	0.2	5.4	0.1	1.1
Benzo(b,j+k)fluoranthene	mg/kg	19	0.2	8.3	<0.2	2
Benzo(a)pyrene	mg/kg	12	0.2	5.2	0.09	0.99
Indeno(1,2,3-c,d)pyrene	mg/kg	8.2	<0.1	4.0	<0.1	0.7
Dibenzo(a,h)anthracene	mg/kg	1.6	<0.1	0.8	<0.1	0.1
Benzo(g,h,i)perylene	mg/kg	7.8	<0.1	3.8	<0.1	0.8
Total +ve PAH's	mg/kg	130	1.3	56	0.52	11
Benzo(a)pyrene TEQ calc (zero)	mg/kg	17	<0.5	7.8	<0.5	1.4
Benzo(a)pyrene TEQ calc(half)	mg/kg	17	<0.5	7.8	<0.5	1.4
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	17	<0.5	7.8	<0.5	1.4
Surrogate p-Terphenyl-d14	%	104	94	105	98	102

PAHs in Soil						
Our Reference		187888-33	187888-34	187888-37	187888-38	187888-40
Your Reference	UNITS	TP15	TP17	TP17	TP19	TP19
Depth		1.2-1.4	0.0-0.2	2.3-2.5	0.0-0.2	2.0-2.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Naphthalene	mg/kg	<0.1	0.5	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	3.5	<0.1	0.3	<0.1
Acenaphthene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	0.3	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	8.4	<0.1	1.2	0.3
Anthracene	mg/kg	<0.1	3.8	<0.1	0.4	<0.1
Fluoranthene	mg/kg	<0.1	36	<0.1	2.9	0.8
Pyrene	mg/kg	<0.1	32	<0.1	2.9	0.7
Benzo(a)anthracene	mg/kg	<0.1	16	<0.1	1.4	0.3
Chrysene	mg/kg	<0.1	20	<0.1	1.9	0.4
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	29	<0.2	3.2	0.6
Benzo(a)pyrene	mg/kg	<0.05	16	<0.05	2.0	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	11	<0.1	1.6	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	2.8	<0.1	0.3	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	12	<0.1	1.8	0.2
Total +ve PAH's	mg/kg	<0.05	190	<0.05	20	3.9
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	25	<0.5	3.0	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	25	<0.5	3.0	0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	25	<0.5	3.0	0.6
Surrogate p-Terphenyl-d14	%	97	110	98	97	102

PAHs in Soil						
Our Reference		187888-41	187888-42	187888-44	187888-45	187888-47
Your Reference	UNITS	TP22	TP22	TP24	TP24	TP26
Depth		0.0-0.2	0.5-0.7	0.0-0.2	0.5-0.7	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	0.1	0.2	0.2	0.4
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Phenanthrene	mg/kg	<0.1	0.9	1.2	0.7	1.3
Anthracene	mg/kg	<0.1	0.3	0.4	0.2	0.6
Fluoranthene	mg/kg	0.2	2.2	2.5	2.2	3.1
Pyrene	mg/kg	0.2	2.3	2.3	2.2	3.0
Benzo(a)anthracene	mg/kg	<0.1	0.9	0.9	0.9	1.2
Chrysene	mg/kg	0.2	1.3	1.3	1.3	1.7
Benzo(b,j+k)fluoranthene	mg/kg	0.2	2.2	2	2.0	3.2
Benzo(a)pyrene	mg/kg	0.2	1.5	1.2	1.3	2.2
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	1.1	0.8	0.8	2.0
Dibenzo(a,h)anthracene	mg/kg	<0.1	0.2	0.2	0.2	0.3
Benzo(g,h,i)perylene	mg/kg	0.2	1.1	0.8	0.9	2.7
Total +ve PAH's	mg/kg	1.3	14	14	13	22
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	2.1	1.7	1.9	3.2
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	2.1	1.7	1.9	3.2
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	2.1	1.7	1.9	3.2
Surrogate p-Terphenyl-d14	%	102	99	101	95	99

PAHs in Soil		
Our Reference		187888-48
Your Reference	UNITS	TP26
Depth		0.5-0.7
Date Sampled		20/03/2018
Type of sample		Soil
Date extracted	-	23/03/2018
Date analysed	-	23/03/2018
Naphthalene	mg/kg	<0.1
Acenaphthylene	mg/kg	0.3
Acenaphthene	mg/kg	<0.1
Fluorene	mg/kg	<0.1
Phenanthrene	mg/kg	1
Anthracene	mg/kg	0.4
Fluoranthene	mg/kg	2.8
Pyrene	mg/kg	2.7
Benzo(a)anthracene	mg/kg	1.3
Chrysene	mg/kg	1.7
Benzo(b,j+k)fluoranthene	mg/kg	2.8
Benzo(a)pyrene	mg/kg	1.8
Indeno(1,2,3-c,d)pyrene	mg/kg	1.4
Dibenzo(a,h)anthracene	mg/kg	0.3
Benzo(g,h,i)perylene	mg/kg	1.6
Total +ve PAH's	mg/kg	18
Benzo(a)pyrene TEQ calc (zero)	mg/kg	2.7
Benzo(a)pyrene TEQ calc(half)	mg/kg	2.7
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	2.7
Surrogate p-Terphenyl-d14	%	94

Organochlorine Pesticides in soil						
Our Reference		187888-6	187888-10	187888-14	187888-18	187888-21
Your Reference	UNITS	BH01	BH02	TP04	TP07	TP10
Depth		0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	110	110	110	112	114

Organochlorine Pesticides in soil						
Our Reference		187888-25	187888-29	187888-32	187888-34	187888-38
Your Reference	UNITS	TP12	TP14	TP15	TP17	TP19
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	110	112	110	112	114

Organochlorine Pesticides in soil				
Our Reference		187888-41	187888-44	187888-47
Your Reference	UNITS	TP22	TP24	TP26
Depth		0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018
HCB	mg/kg	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	110	114	110

Organophosphorus Pesticides						
Our Reference		187888-6	187888-10	187888-14	187888-18	187888-21
Your Reference	UNITS	BH01	BH02	TP04	TP07	TP10
Depth		0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	110	110	110	112	114

Organophosphorus Pesticides						
Our Reference		187888-25	187888-29	187888-32	187888-34	187888-38
Your Reference	UNITS	TP12	TP14	TP15	TP17	TP19
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCMX	%	110	112	110	112	114

Organophosphorus Pesticides				
Our Reference		187888-41	187888-44	187888-47
Your Reference	UNITS	TP22	TP24	TP26
Depth		0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1
Dichlorvos	mg/kg	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1
Surrogate TCMX	%	110	114	110

PCBs in Soil						
Our Reference		187888-6	187888-10	187888-14	187888-18	187888-21
Your Reference	UNITS	BH01	BH02	TP04	TP07	TP10
Depth		0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.2
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.2
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.2
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.2
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.2
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.2
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.2
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.2
Surrogate TCLMX	%	110	110	110	112	114

PCBs in Soil						
Our Reference		187888-25	187888-29	187888-32	187888-34	187888-38
Your Reference	UNITS	TP12	TP14	TP15	TP17	TP19
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	110	112	110	112	114

PCBs in Soil				
Our Reference		187888-41	187888-44	187888-47
Your Reference	UNITS	TP22	TP24	TP26
Depth		0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil
Date extracted	-	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	23/03/2018	23/03/2018	23/03/2018
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1
Surrogate TCLMX	%	110	114	110

Acid Extractable metals in soil						
Our Reference		187888-3	187888-6	187888-9	187888-10	187888-13
Your Reference	UNITS	DUPKT1	BH01	BH01	BH02	BH02
Depth		-	0.0-0.1	3.2-3.45	0.0-0.1	3.2-3.45
Date Sampled		20/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	25/03/2018	25/03/2018	25/03/2018	25/03/2018	25/03/2018
Arsenic	mg/kg	10	<4	21	<4	4
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	18	39	8	20	13
Copper	mg/kg	52	48	38	38	17
Lead	mg/kg	100	23	7	21	39
Mercury	mg/kg	0.2	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	16	55	8	29	7
Zinc	mg/kg	85	50	17	46	33

Acid Extractable metals in soil						
Our Reference		187888-14	187888-15	187888-18	187888-19	187888-21
Your Reference	UNITS	TP04	TP04	TP07	TP07	TP10
Depth		0.0-0.2	0.7-1.0	0.0-0.2	1.0-1.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	25/03/2018	25/03/2018	25/03/2018	25/03/2018	25/03/2018
Arsenic	mg/kg	4	5	7	17	8
Cadmium	mg/kg	<0.4	0.7	<0.4	<0.4	<0.4
Chromium	mg/kg	15	15	40	21	34
Copper	mg/kg	42	27	31	36	120
Lead	mg/kg	36	30	50	66	190
Mercury	mg/kg	<0.1	<0.1	<0.1	0.1	0.2
Nickel	mg/kg	36	15	37	19	29
Zinc	mg/kg	65	33	75	71	120

Acid Extractable metals in soil						
Our Reference		187888-24	187888-25	187888-28	187888-29	187888-31
Your Reference	UNITS	TP10	TP12	TP12	TP14	TP14
Depth		2.5-2.7	0.0-0.2	2.3-2.6	0.0-0.2	2.0-2.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	25/03/2018	25/03/2018	25/03/2018	25/03/2018	25/03/2018
Arsenic	mg/kg	<4	6	5	9	8
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	2	21	5	26	10
Copper	mg/kg	1	38	4	41	12
Lead	mg/kg	3	86	10	110	17
Mercury	mg/kg	<0.1	0.2	<0.1	0.1	<0.1
Nickel	mg/kg	<1	18	2	21	8
Zinc	mg/kg	1	75	9	96	19

Acid Extractable metals in soil						
Our Reference		187888-32	187888-33	187888-34	187888-37	187888-38
Your Reference	UNITS	TP15	TP15	TP17	TP17	TP19
Depth		0.0-0.2	1.2-1.4	0.0-0.2	2.3-2.5	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	25/03/2018	25/03/2018	25/03/2018	25/03/2018	25/03/2018
Arsenic	mg/kg	5	7	6	<4	5
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	14	11	23	2	25
Copper	mg/kg	43	13	38	2	76
Lead	mg/kg	47	19	97	4	120
Mercury	mg/kg	<0.1	<0.1	0.2	<0.1	<0.1
Nickel	mg/kg	11	9	18	1	25
Zinc	mg/kg	86	27	110	4	120

Acid Extractable metals in soil						
Our Reference		187888-40	187888-41	187888-42	187888-44	187888-45
Your Reference	UNITS	TP19	TP22	TP22	TP24	TP24
Depth		2.0-2.2	0.0-0.2	0.5-0.7	0.0-0.2	0.5-0.7
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	25/03/2018	25/03/2018	25/03/2018	25/03/2018	25/03/2018
Arsenic	mg/kg	5	<4	5	7	13
Cadmium	mg/kg	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium	mg/kg	23	8	62	20	25
Copper	mg/kg	11	38	29	51	39
Lead	mg/kg	26	12	43	70	85
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	8	23	44	15	21
Zinc	mg/kg	28	30	63	79	110

Acid Extractable metals in soil			
Our Reference		187888-47	187888-48
Your Reference	UNITS	TP26	TP26
Depth		0.0-0.2	0.5-0.7
Date Sampled		20/03/2018	20/03/2018
Type of sample		Soil	Soil
Date prepared	-	23/03/2018	23/03/2018
Date analysed	-	25/03/2018	25/03/2018
Arsenic	mg/kg	<4	5
Cadmium	mg/kg	<0.4	<0.4
Chromium	mg/kg	15	15
Copper	mg/kg	56	47
Lead	mg/kg	23	74
Mercury	mg/kg	<0.1	0.2
Nickel	mg/kg	37	19
Zinc	mg/kg	46	140

Moisture						
Our Reference		187888-3	187888-6	187888-9	187888-10	187888-13
Your Reference	UNITS	DUPKT1	BH01	BH01	BH02	BH02
Depth		-	0.0-0.1	3.2-3.45	0.0-0.1	3.2-3.45
Date Sampled		20/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	26/03/2018	26/03/2018	26/03/2018	26/03/2018	26/03/2018
Moisture	%	12	6.5	15	7.2	18

Moisture						
Our Reference		187888-14	187888-15	187888-18	187888-19	187888-21
Your Reference	UNITS	TP04	TP04	TP07	TP07	TP10
Depth		0.0-0.2	0.7-1.0	0.0-0.2	1.0-1.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	26/03/2018	26/03/2018	26/03/2018	26/03/2018	26/03/2018
Moisture	%	8.7	5.9	6.8	10	5.4

Moisture						
Our Reference		187888-24	187888-25	187888-28	187888-29	187888-31
Your Reference	UNITS	TP10	TP12	TP12	TP14	TP14
Depth		2.5-2.7	0.0-0.2	2.3-2.6	0.0-0.2	2.0-2.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	26/03/2018	26/03/2018	26/03/2018	26/03/2018	26/03/2018
Moisture	%	16	8.9	15	8.0	14

Moisture						
Our Reference		187888-32	187888-33	187888-34	187888-37	187888-38
Your Reference	UNITS	TP15	TP15	TP17	TP17	TP19
Depth		0.0-0.2	1.2-1.4	0.0-0.2	2.3-2.5	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	26/03/2018	26/03/2018	26/03/2018	26/03/2018	26/03/2018
Moisture	%	12	17	7.6	12	11

Moisture						
Our Reference		187888-40	187888-41	187888-42	187888-44	187888-45
Your Reference	UNITS	TP19	TP22	TP22	TP24	TP24
Depth		2.0-2.2	0.0-0.2	0.5-0.7	0.0-0.2	0.5-0.7
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	23/03/2018	23/03/2018	23/03/2018	23/03/2018	23/03/2018
Date analysed	-	26/03/2018	26/03/2018	26/03/2018	26/03/2018	26/03/2018
Moisture	%	16	12	9.5	8.3	11

Moisture			
Our Reference		187888-47	187888-48
Your Reference	UNITS	TP26	TP26
Depth		0.0-0.2	0.5-0.7
Date Sampled		20/03/2018	20/03/2018
Type of sample		Soil	Soil
Date prepared	-	23/03/2018	23/03/2018
Date analysed	-	26/03/2018	26/03/2018
Moisture	%	4.2	8.8

Asbestos ID - soils						
Our Reference		187888-6	187888-10	187888-14	187888-18	187888-21
Your Reference	UNITS	BH01	BH02	TP04	TP07	TP10
Depth		0.0-0.1	0.0-0.1	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	19/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	28/03/2018	28/03/2018	28/03/2018	28/03/2018	28/03/2018
Sample mass tested	g	Approx. 50g	Approx. 30g	Approx. 30g	33.80g	Approx. 30g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	Chrysotile asbestos detected Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils						
Our Reference		187888-25	187888-29	187888-32	187888-34	187888-38
Your Reference	UNITS	TP12	TP14	TP15	TP17	TP19
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	28/03/2018	28/03/2018	28/03/2018	28/03/2018	28/03/2018
Sample mass tested	g	Approx. 40g	Approx. 50g	Approx. 25g	Approx. 30g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - soils				
Our Reference		187888-41	187888-44	187888-47
Your Reference	UNITS	TP22	TP24	TP26
Depth		0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil
Date analysed	-	28/03/2018	28/03/2018	28/03/2018
Sample mass tested	g	Approx. 35g	Approx. 25g	Approx. 40g
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Black bituminous soil & rocks
Asbestos ID in soil	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected

Asbestos ID - materials			
Our Reference		187888-4	187888-5
Your Reference	UNITS	SF1	SF2
Depth		Surface	Surface
Date Sampled		19/03/2018	19/03/2018
Type of sample		Material	Material
Date analysed	-	26/03/2018	26/03/2018
Mass / Dimension of Sample	-	28x20x4mm	20x15x4mm
Sample Description	-	Grey compressed fibre cement material	Beige compressed fibre cement material
Asbestos ID in materials	-	Chrysotile asbestos detected Amosite asbestos detected Crocidolite asbestos detected	Chrysotile asbestos detected

Asbestos ID - soils NEPM - ASB-001						
Our Reference		187888-51	187888-52	187888-53	187888-54	187888-55
Your Reference	UNITS	TP03	TP08	TP09	TP11	TP13
Depth		0.3-0.5	1.3-1.5	0.0-0.2	0.0-0.2	0.0-0.2
Date Sampled		19/03/2018	19/03/2018	19/03/2018	19/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	28/03/2018	28/03/2018	28/03/2018	28/03/2018	28/03/2018
Sample mass tested	g	876.5	688.6	803.3	760.5	764.3
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos[#1]	g/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected	No visible asbestos detected
ACM >7mm Estimation*	g	–	–	–	–	–
FA and AF Estimation*	g	–	–	–	–	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	<0.01
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	<0.001	<0.001

Asbestos ID - soils NEPM - ASB-001						
Our Reference		187888-56	187888-57	187888-58	187888-59	187888-60
Your Reference	UNITS	TP16	TP18	TP20	TP21	TP23
Depth		0.0-0.2	0.0-0.2	0.0-0.2	0.0-0.2	0.5-0.7
Date Sampled		20/03/2018	20/03/2018	20/03/2018	20/03/2018	20/03/2018
Type of sample		Soil	Soil	Soil	Soil	Soil
Date analysed	-	28/03/2018	28/03/2018	28/03/2018	28/03/2018	28/03/2018
Sample mass tested	g	801.1	809.7	807.6	885.3	688.1
Sample Description	-	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks	Brown coarse-grained soil & rocks
Asbestos ID in soil (AS4964) >0.1g/kg	-	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	No asbestos detected at reporting limit of 0.1g/kg Organic fibres detected	Chrysotile asbestos detected Amosite asbestos detected Organic fibres detected
Trace Analysis	-	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected	No asbestos detected
Total Asbestos#1	g/kg	<0.1	<0.1	<0.1	<0.1	4.1225
Asbestos ID in soil <0.1g/kg*	-	No visible asbestos detected	Chrysotile	No visible asbestos detected	Chrysotile	See Above
ACM >7mm Estimation*	g	–	–	–	–	2.8367
FA and AF Estimation*	g	–	0.0025	–	0.0390	–
ACM >7mm Estimation*	%(w/w)	<0.01	<0.01	<0.01	<0.01	0.4122
FA and AF Estimation*#2	%(w/w)	<0.001	<0.001	<0.001	0.0044	<0.001

Misc Inorg - Soil			
Our Reference		187888-6	187888-10
Your Reference	UNITS	BH01	BH02
Depth		0.0-0.1	0.0-0.1
Date Sampled		19/03/2018	19/03/2018
Type of sample		Soil	Soil
Date prepared	-	26/03/2018	26/03/2018
Date analysed	-	26/03/2018	26/03/2018
pH 1:5 soil:water	pH Units	7.7	8.0

CEC			
Our Reference		187888-6	187888-10
Your Reference	UNITS	BH01	BH02
Depth		0.0-0.1	0.0-0.1
Date Sampled		19/03/2018	19/03/2018
Type of sample		Soil	Soil
Date prepared	-	26/03/2018	26/03/2018
Date analysed	-	26/03/2018	26/03/2018
Exchangeable Ca	meq/100g	19	17
Exchangeable K	meq/100g	0.9	0.4
Exchangeable Mg	meq/100g	3.2	2.9
Exchangeable Na	meq/100g	0.15	0.19
Cation Exchange Capacity	meq/100g	23	20

Clay 50-120g			
Our Reference		187888-6	187888-10
Your Reference	UNITS	BH01	BH02
Depth		0.0-0.1	0.0-0.1
Date Sampled		19/03/2018	19/03/2018
Type of sample		Soil	Soil
Date prepared	-	23/03/2018	23/03/2018
Date analysed	-	26/03/2018	26/03/2018
Clay in soils <2µm	% (w/w)	14	20

Method ID	Methodology Summary
AS1289.3.6.3	Determination Particle Size Analysis using AS1289.3.6.3 and AS1289.3.6.1 and in house method INORG-107. Clay fraction at <2µm reported.
ASB-001	Asbestos ID - Qualitative identification of asbestos in bulk samples using Polarised Light Microscopy and Dispersion Staining Techniques including Synthetic Mineral Fibre and Organic Fibre as per Australian Standard 4964-2004.
ASB-001	Asbestos ID - Identification of asbestos in soil samples using Polarised Light Microscopy and Dispersion Staining Techniques. Minimum 500mL soil sample was analysed as recommended by "National Environment Protection (Assessment of site contamination) Measure, Schedule B1 and "The Guidelines from the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia - May 2009" with a reporting limit of 0.1g/kg (0.01% w/w) as per Australian Standard AS4964-2004. Results reported denoted with * are outside our scope of NATA accreditation. **NOTE** #1 Total Asbestos g/kg was analysed and reported as per Australian Standard AS4964 (This is the sum of ACM >7mm, <7mm and FA/AF) **NOTE** #2 The screening level of 0.001% w/w asbestos in soil for FA and AF only applies where the FA and AF are able to be quantified by gravimetric procedures. This screening level is not applicable to free fibres. Estimation = Estimated asbestos weight Results reported with "--" is equivalent to no visible asbestos identified using Polarised Light microscopy and Dispersion Staining Techniques.
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-008	Moisture content determined by heating at 105+/-5 °C for a minimum of 12 hours.
Metals-009	Determination of exchangeable cations and cation exchange capacity in soils using 1M Ammonium Chloride exchange and ICP-AES analytical finish.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.

Method ID	Methodology Summary
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis. Note, the Total +ve TRH PQL is reflective of the lowest individual PQL and is therefore "Total +ve TRH" is simply a sum of the positive individual TRH fractions (>C10-C40).
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-005	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's. Note, the Total +ve reported DDD+DDE+DDT PQL is reflective of the lowest individual PQL and is therefore simply a sum of the positive individually report DDD+DDE+DDT.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD.
Org-006	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC-ECD. Note, the Total +ve PCBs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PCBs" is simply a sum of the positive individual PCBs.
Org-008	Soil samples are extracted with dichloromethane/acetone and waters with dichloromethane and analysed by GC with dual ECD's.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013. For soil results:- 1. 'EQ PQL'values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero'values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL'values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore "Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-014	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater. Note, the Total +ve Xylene PQL is reflective of the lowest individual PQL and is therefore "Total +ve Xylenes" is simply a sum of the positive individual Xylenes.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	187888-10
Date extracted	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Date analysed	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
TRH C_6 - C_9	mg/kg	25	Org-016	<25	6	<25	<25	0	108	110
TRH C_6 - C_{10}	mg/kg	25	Org-016	<25	6	<25	<25	0	108	110
Benzene	mg/kg	0.2	Org-016	<0.2	6	<0.2	<0.2	0	112	114
Toluene	mg/kg	0.5	Org-016	<0.5	6	<0.5	<0.5	0	111	113
Ethylbenzene	mg/kg	1	Org-016	<1	6	<1	<1	0	112	115
m+p-xylene	mg/kg	2	Org-016	<2	6	<2	<2	0	102	103
o-Xylene	mg/kg	1	Org-016	<1	6	<1	<1	0	114	116
naphthalene	mg/kg	1	Org-014	<1	6	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	79	6	78	79	1	82	81

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			[NT]	31	23/03/2018	23/03/2018		23/03/2018	[NT]
Date analysed	-			[NT]	31	23/03/2018	23/03/2018		23/03/2018	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	31	<25	<25	0	106	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	31	<25	<25	0	106	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	31	<0.2	<0.2	0	110	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	31	<0.5	<0.5	0	110	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	31	<1	<1	0	110	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	31	<2	<2	0	100	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	31	<1	<1	0	111	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	31	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	31	76	73	4	80	[NT]

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Date analysed	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
TRH C_6 - C_9	mg/kg	25	Org-016	[NT]	44	<25	<25	0	[NT]	[NT]
TRH C_6 - C_{10}	mg/kg	25	Org-016	[NT]	44	<25	<25	0	[NT]	[NT]
Benzene	mg/kg	0.2	Org-016	[NT]	44	<0.2	<0.2	0	[NT]	[NT]
Toluene	mg/kg	0.5	Org-016	[NT]	44	<0.5	<0.5	0	[NT]	[NT]
Ethylbenzene	mg/kg	1	Org-016	[NT]	44	<1	<1	0	[NT]	[NT]
m+p-xylene	mg/kg	2	Org-016	[NT]	44	<2	<2	0	[NT]	[NT]
o-Xylene	mg/kg	1	Org-016	[NT]	44	<1	<1	0	[NT]	[NT]
naphthalene	mg/kg	1	Org-014	[NT]	44	<1	<1	0	[NT]	[NT]
Surrogate aaa-Trifluorotoluene	%		Org-016	[NT]	44	75	75	0	[NT]	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	187888-10
Date extracted	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Date analysed	-			24/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
TRH C_{10} - C_{14}	mg/kg	50	Org-003	<50	6	<50	<50	0	100	102
TRH C_{15} - C_{28}	mg/kg	100	Org-003	<100	6	<100	<100	0	89	93
TRH C_{29} - C_{36}	mg/kg	100	Org-003	<100	6	200	200	0	92	89
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	<50	6	<50	<50	0	100	102
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	<100	6	160	130	21	89	93
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	<100	6	250	280	11	92	89
Surrogate o-Terphenyl	%		Org-003	89	6	93	95	2	87	93

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			[NT]	31	23/03/2018	23/03/2018		23/03/2018	[NT]
Date analysed	-			[NT]	31	23/03/2018	23/03/2018		24/03/2018	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	31	<50	<50	0	109	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	31	<100	<100	0	101	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	31	<100	<100	0	92	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	31	<50	<50	0	109	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	31	<100	<100	0	101	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	31	<100	<100	0	92	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	31	95	88	8	89	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Date analysed	-			[NT]	44	24/03/2018	24/03/2018		[NT]	[NT]
TRH C_{10} - C_{14}	mg/kg	50	Org-003	[NT]	44	<50	<50	0	[NT]	[NT]
TRH C_{15} - C_{28}	mg/kg	100	Org-003	[NT]	44	<100	<100	0	[NT]	[NT]
TRH C_{29} - C_{36}	mg/kg	100	Org-003	[NT]	44	<100	<100	0	[NT]	[NT]
TRH >C_{10} -C_{16}	mg/kg	50	Org-003	[NT]	44	<50	<50	0	[NT]	[NT]
TRH >C_{16} -C_{34}	mg/kg	100	Org-003	[NT]	44	<100	<100	0	[NT]	[NT]
TRH >C_{34} -C_{40}	mg/kg	100	Org-003	[NT]	44	<100	<100	0	[NT]	[NT]
Surrogate o-Terphenyl	%		Org-003	[NT]	44	89	87	2	[NT]	[NT]

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	187888-10
Date extracted	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Date analysed	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Naphthalene	mg/kg	0.1	Org-012	<0.1	6	<0.1	<0.1	0	94	91
Acenaphthylene	mg/kg	0.1	Org-012	<0.1	6	0.3	0.2	40	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	<0.1	6	<0.1	<0.1	0	99	98
Phenanthrene	mg/kg	0.1	Org-012	<0.1	6	0.1	<0.1	0	96	90
Anthracene	mg/kg	0.1	Org-012	<0.1	6	0.2	0.1	67	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	<0.1	6	0.2	0.1	67	96	90
Pyrene	mg/kg	0.1	Org-012	<0.1	6	0.2	0.2	0	83	78
Benzo(a)anthracene	mg/kg	0.1	Org-012	<0.1	6	0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	<0.1	6	0.2	0.1	67	126	120
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	<0.2	6	0.3	<0.2	40	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	<0.05	6	0.2	0.1	67	101	87
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	<0.1	6	0.2	0.1	67	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	<0.1	6	0.6	0.4	40	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	107	6	100	101	1	98	94

QUALITY CONTROL: PAHs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date extracted	-			[NT]	31	23/03/2018	23/03/2018		23/03/2018	[NT]
Date analysed	-			[NT]	31	23/03/2018	23/03/2018		23/03/2018	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	98	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	103	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	102	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	31	0.2	0.1	67	99	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	31	0.2	0.1	67	105	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	31	0.1	<0.1	0	118	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	31	<0.2	<0.2	0	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	31	0.09	0.06	40	102	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	31	<0.1	<0.1	0	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	31	98	98	0	98	[NT]

QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Date analysed	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Naphthalene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Acenaphthylene	mg/kg	0.1	Org-012	[NT]	44	0.2	0.2	0	[NT]	[NT]
Acenaphthene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Fluorene	mg/kg	0.1	Org-012	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Phenanthrene	mg/kg	0.1	Org-012	[NT]	44	1.2	1.0	18	[NT]	[NT]
Anthracene	mg/kg	0.1	Org-012	[NT]	44	0.4	0.4	0	[NT]	[NT]
Fluoranthene	mg/kg	0.1	Org-012	[NT]	44	2.5	2.6	4	[NT]	[NT]
Pyrene	mg/kg	0.1	Org-012	[NT]	44	2.3	2.7	16	[NT]	[NT]
Benzo(a)anthracene	mg/kg	0.1	Org-012	[NT]	44	0.9	1.2	29	[NT]	[NT]
Chrysene	mg/kg	0.1	Org-012	[NT]	44	1.3	1.6	21	[NT]	[NT]
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-012	[NT]	44	2	2.3	14	[NT]	[NT]
Benzo(a)pyrene	mg/kg	0.05	Org-012	[NT]	44	1.2	1.4	15	[NT]	[NT]
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-012	[NT]	44	0.8	1	22	[NT]	[NT]
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-012	[NT]	44	0.2	0.2	0	[NT]	[NT]
Benzo(g,h,i)perylene	mg/kg	0.1	Org-012	[NT]	44	0.8	1	22	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	[NT]	44	101	105	4	[NT]	[NT]

QUALITY CONTROL: Organochlorine Pesticides in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	187888-10
Date extracted	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Date analysed	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
HCB	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	88	96
gamma-BHC	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	85	90
Heptachlor	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	93	91
delta-BHC	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	82	75
Heptachlor Epoxide	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	84	81
gamma-Chlordane	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	99	95
Dieldrin	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	100	96
Endrin	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	100	98
pp-DDD	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	83	80
Endosulfan II	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	76	86
Methoxychlor	mg/kg	0.1	Org-005	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	116	6	110	110	0	92	105

QUALITY CONTROL: Organochlorine Pesticides in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Date analysed	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
HCB	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
alpha-BHC	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
gamma-BHC	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
beta-BHC	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Heptachlor	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
delta-BHC	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Aldrin	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Heptachlor Epoxide	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
gamma-Chlordane	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
alpha-chlordane	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Endosulfan I	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
pp-DDE	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Dieldrin	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Endrin	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
pp-DDD	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Endosulfan II	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
pp-DDT	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Endrin Aldehyde	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Endosulfan Sulphate	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Methoxychlor	mg/kg	0.1	Org-005	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-005	[NT]	44	114	112	2	[NT]	[NT]

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	187888-10
Date extracted	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Date analysed	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	91	99
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	80	90
Dimethoate	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	91	95
Fenitrothion	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	70	81
Malathion	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	90	102
Parathion	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	82	87
Ronnel	mg/kg	0.1	Org-008	<0.1	6	<0.1	<0.1	0	89	95
Surrogate TCMX	%		Org-008	116	6	110	110	0	108	108

QUALITY CONTROL: Organophosphorus Pesticides						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Date analysed	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Azinphos-methyl (Guthion)	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Bromophos-ethyl	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Chlorpyriphos-methyl	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Diazinon	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Dichlorvos	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Dimethoate	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Ethion	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Fenitrothion	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Malathion	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Parathion	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Ronnel	mg/kg	0.1	Org-008	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCMX	%		Org-008	[NT]	44	114	112	2	[NT]	[NT]

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	187888-10
Date extracted	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Date analysed	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Aroclor 1016	mg/kg	0.1	Org-006	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	<0.1	6	<0.1	<0.1	0	96	96
Aroclor 1260	mg/kg	0.1	Org-006	<0.1	6	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	116	6	110	110	0	108	108

QUALITY CONTROL: PCBs in Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date extracted	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Date analysed	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Aroclor 1016	mg/kg	0.1	Org-006	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1221	mg/kg	0.1	Org-006	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1232	mg/kg	0.1	Org-006	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1242	mg/kg	0.1	Org-006	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1248	mg/kg	0.1	Org-006	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1254	mg/kg	0.1	Org-006	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Aroclor 1260	mg/kg	0.1	Org-006	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Surrogate TCLMX	%		Org-006	[NT]	44	114	112	2	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	187888-10
Date prepared	-			23/03/2018	6	23/03/2018	23/03/2018		23/03/2018	23/03/2018
Date analysed	-			25/03/2018	6	25/03/2018	25/03/2018		25/03/2018	25/03/2018
Arsenic	mg/kg	4	Metals-020	<4	6	<4	<4	0	120	93
Cadmium	mg/kg	0.4	Metals-020	<0.4	6	<0.4	<0.4	0	111	88
Chromium	mg/kg	1	Metals-020	<1	6	39	37	5	119	90
Copper	mg/kg	1	Metals-020	<1	6	48	48	0	124	#
Lead	mg/kg	1	Metals-020	<1	6	23	23	0	116	126
Mercury	mg/kg	0.1	Metals-021	<0.1	6	<0.1	<0.1	0	100	98
Nickel	mg/kg	1	Metals-020	<1	6	55	51	8	117	83
Zinc	mg/kg	1	Metals-020	<1	6	50	49	2	118	#

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-8	[NT]
Date prepared	-			[NT]	31	23/03/2018	23/03/2018		23/03/2018	[NT]
Date analysed	-			[NT]	31	25/03/2018	25/03/2018		25/03/2018	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	31	8	8	0	118	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	31	<0.4	<0.4	0	109	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	31	10	10	0	117	[NT]
Copper	mg/kg	1	Metals-020	[NT]	31	12	12	0	122	[NT]
Lead	mg/kg	1	Metals-020	[NT]	31	17	19	11	114	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	31	<0.1	<0.1	0	100	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	31	8	8	0	115	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	31	19	22	15	116	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	44	23/03/2018	23/03/2018		[NT]	[NT]
Date analysed	-			[NT]	44	25/03/2018	25/03/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	44	7	5	33	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	44	<0.4	<0.4	0	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	44	20	17	16	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	44	51	46	10	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	44	70	58	19	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	44	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	44	15	15	0	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	44	79	78	1	[NT]	[NT]

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	15	23/03/2018	23/03/2018		[NT]	[NT]
Date analysed	-			[NT]	15	25/03/2018	25/03/2018		[NT]	[NT]
Arsenic	mg/kg	4	Metals-020	[NT]	15	5	5	0	[NT]	[NT]
Cadmium	mg/kg	0.4	Metals-020	[NT]	15	0.7	1	35	[NT]	[NT]
Chromium	mg/kg	1	Metals-020	[NT]	15	15	16	6	[NT]	[NT]
Copper	mg/kg	1	Metals-020	[NT]	15	27	32	17	[NT]	[NT]
Lead	mg/kg	1	Metals-020	[NT]	15	30	30	0	[NT]	[NT]
Mercury	mg/kg	0.1	Metals-021	[NT]	15	<0.1	<0.1	0	[NT]	[NT]
Nickel	mg/kg	1	Metals-020	[NT]	15	15	18	18	[NT]	[NT]
Zinc	mg/kg	1	Metals-020	[NT]	15	33	46	33	[NT]	[NT]

QUALITY CONTROL: Misc Inorg - Soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date prepared	-			26/03/2018	[NT]	[NT]	[NT]	[NT]	26/03/2018	[NT]
Date analysed	-			26/03/2018	[NT]	[NT]	[NT]	[NT]	26/03/2018	[NT]
pH 1:5 soil:water	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	103	[NT]

QUALITY CONTROL: CEC						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-7	[NT]
Date prepared	-			26/03/2018	[NT]	[NT]	[NT]	[NT]	26/03/2018	[NT]
Date analysed	-			26/03/2018	[NT]	[NT]	[NT]	[NT]	26/03/2018	[NT]
Exchangeable Ca	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Exchangeable K	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Exchangeable Mg	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Exchangeable Na	meq/100g	0.1	Metals-009	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

Acid Extractable metals in soil - # Percent recovery is not possible to report due to the inhomogeneous nature of the element/s in the sample/s. However an acceptable recovery was obtained for the LCS.

PCBs in Soil (sample 21) - PQL has been raised due to interference from analytes(other than those being tested) in the sample/s.

Sample 187888-18; Chrysotile asbestos identified in matted material, it is estimated to be 0.49g/kg in 33.80g of soil (i.e. > reporting limit for the method of 0.1g/kg).

Asbestos-ID in soil: NEPM
This report is consistent with the reporting recommendations in the National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1, May 2013.
This is reported outside our scope of NATA accreditation.

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Environmental Investigation Services
Attention	Katrina Taylor

Sample Login Details

Your reference	E31269K, Parramatta
Envirolab Reference	187888
Date Sample Received	22/03/2018
Date Instructions Received	22/03/2018
Date Results Expected to be Reported	29/03/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	59 Soil, 2 Material
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	11.9
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	Asbestos ID - soils	Asbestos ID - materials	Asbestos ID - soils NEPM - ASB-001	pH1:5 soil:water	CEC	Clay 50-120g	On Hold
TS	✓													
TB	✓													
DUPKT1							✓							
SF1-Surface									✓					
SF2-Surface									✓					
BH01-0.0-0.1	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	
BH01-0.7-0.95														✓
BH01-1.7-1.95														✓
BH01-3.2-3.45	✓	✓	✓				✓							
BH02-0.0-0.1	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	
BH02-0.7-0.9														✓
BH02-1.7-1.95														✓
BH02-3.2-3.45	✓	✓	✓				✓							
TP04-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP04-0.7-1.0	✓	✓	✓				✓							
TP04-1.5-1.7														✓
TP04-2.2-2.5														✓
TP07-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP07-1.0-1.2	✓	✓	✓				✓							
TP08-2.3-2.5														✓
TP10-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP10-1.0-1.2														✓
TP10-2.0-2.2														✓
TP10-2.5-2.7	✓	✓	✓				✓							
TP12-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP12-1.0-1.2														✓
TP12-2.0-2.2														✓
TP12-2.3-2.6	✓	✓	✓				✓							
TP14-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP14-1.0-1.2														✓
TP14-2.0-2.2	✓	✓	✓				✓							
TP15-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						

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Sample ID	vTRH(C6-C10)/BTEXN in Soil	svTRH (C10-C40) in Soil	PAHs in Soil	Organochlorine Pesticidesin soil	Organophosphorus Pesticides	PCBsin Soil	Acid Extractable metalsin soil	Asbestos ID - soils	Asbestos ID - materials	Asbestos ID - soils NEPM - ASB-001	pH1:5 soil:water	CEC	Clay 50-120g	On Hold
TP15-1.2-1.4	✓	✓	✓				✓							
TP17-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP17-1.3-1.5														✓
TP17-1.8-2.0														✓
TP17-2.3-2.5	✓	✓	✓				✓							
TP19-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP19-1.2-1.4														✓
TP19-2.0-2.2	✓	✓	✓				✓							
TP22-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP22-0.5-0.7	✓	✓	✓				✓							
TP22-1.3-1.5														✓
TP24-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP24-0.5-0.7	✓	✓	✓				✓							
TP24-2.0-2.2														✓
TP26-0.0-0.2	✓	✓	✓	✓	✓	✓	✓	✓						
TP26-0.5-0.7	✓	✓	✓				✓							
TP26-1.5-1.7														✓
TP26-2.0-2.2														✓
TP03-0.3-0.5										✓				
TP08-1.3-1.5										✓				
TP09-0.0-0.2										✓				
TP11-0.0-0.2										✓				
TP13-0.0-0.2										✓				
TP16-0.0-0.2										✓				
TP18-0.0-0.2										✓				
TP20-0.0-0.2										✓				
TP21-0.0-0.2										✓				
TP23-0.5-0.7										✓				
TP14-1.8-2.0														✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E31269K	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067		MACQUARIE PARK, NSW 2113
P: (02) 99106200	Date Results Required: STANDARD	P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		Attention: ktaylor@jkgroup.net.au
Attention: Alice	Page: 1 of 3	

Location: Parramatta

Sampler: JH / KT

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo #6a	Combo 3	Asbestos (detection)	Asbestos (WA 500mL	pH / CEC / Clay Content	8 Metals	BTEX					
20/03/2018		TS	-	G	-	Sand							X					
20/03/2018		TB	-	G	-	Sand							X					
20/03/2018		DUPKT1	-	G	-	Fill						X						
20/03/2018		DUPKT2	-	G	-	Fill						X						
19/03/2018		SF1	Surface	P	-	Material			X									
19/03/2018		SF2	Surface	P	-	Material			X									
19/03/2018		BH01	0.0-0.1	G,A	0	Fill	X				X							
19/03/2018		BH01	0.7-0.95	G,A	0.2	Fill												
19/03/2018		BH01	1.7-1.95	G,A	0.1	Fill												
19/03/2018		BH01	3.2-3.45	G	0	Natural		X										
19/03/2018		BH02	0.0-0.1	G,A	0	Fill	X				X							
19/03/2018		BH02	0.7-0.9	G,A	0.2	Fill												
19/03/2018		BH02	1.7-1.95	G,A	0.2	Fill												
19/03/2018		BH02	3.2-3.45	G	0.1	Natural		X										
19/03/2018		TP04	0.0-0.2	G,A	0.2	Fill	X											
19/03/2018		TP04	0.7-1.0	G,A	0.1	Fill		X										
19/03/2018		TP04	1.5-1.7	G,A	0.2	Fill												
19/03/2018		TP04	2.2-2.5	G,A	0.3	Fill												
19/03/2018		TP07	0.0-0.2	G,A	0	Fill	X											
19/03/2018		TP07	1.0-1.2	G,A	1	Fill		X										
19/03/2018		TP08	2.3-2.5	G	0.1	Fill												
19/03/2018		TP10	0.0-0.2	G,A	0	Fill	X											
19/03/2018		TP10	1.0-1.2	G,A	0.1	Fill												
19/03/2018		TP10	2.0-2.2	G,A	0	Fill												
19/03/2018		TP10	2.5-2.7	G	0	Natural		X										

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 187883

Date Received: 22/3/18

Time Received: 15:45

Received by: JE

Temp: Cool/Ambient 11.9°C

Cooling: Ice/Ice pack

Security: Intact/Broken/None

Remarks (comments/detection limits required):

Please send DUPKT2 to Melbourne Envirolab

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag

Relinquished By:	Date:	Time:	Received By:	Date:
	22/3		ELS JE	22/3/18

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD 12 ASHLEY STREET CHATSWOOD NSW 2067 P: (02) 99106200 F: (02) 99106201 Attention: Aileen 187888	EIS Job Number: E31269K Date Results Required: STANDARD Page: 2 of 3	ENVIRONMENTAL INVESTIGATION SERVICES REAR OF 115 WICKS ROAD MACQUARIE PARK, NSW 2113 P: 02-9888 5000 F: 02-9888 5001 Attention: ktaylor@jkgroup.net.au

Location: Parramatta
Sampler: JH/ KT

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo #6a	Combo 3	Asbestos (detection)	Asbestos (WA 500mL	pH / CEC / Clay Content	8 Metals	BTEX					
19/03/2018	25	TP12	0.0-0.2	G,A	0	FILL	X											
19/03/2018	26	TP12	1.0-1.2	G,A	0	FILL												
19/03/2018	27	TP12	2.0-2.2	G,A	0	FILL												
19/03/2018	28	TP12	2.3-2.6	G	0	NATURAL		X										
20/03/2018	29	TP14	0.0-0.2	G,A	0	FILL	X											
20/03/2018	30	TP14	1.0-1.2	G,A	0.1	FILL												
20/03/2018	31	TP14	2.0-2.2	G	0	NATURAL		X										
20/03/2018	32	TP15	0.0-0.2	G,A	0	FILL	X											
20/03/2018	33	TP15	1.0-1.2	G,A	0	FILL												
20/03/2018	34	TP15	1.2-1.4	G	0	NATURAL		X										
20/03/2018	35	TP17	0.0-0.2	G,A	0	FILL	X											
20/03/2018	36	TP17	1.3-1.5	G,A	0.1	FILL												
20/03/2018	37	TP17	1.8-2.0	G,A	0	FILL												
20/03/2018	38	TP17	2.3-2.5	G	0	NATURAL		X										
20/03/2018	39	TP19	0.0-0.2	G,A	0	FILL	X											
20/03/2018	40	TP19	1.2-1.4	G,A	0	FILL												
20/03/2018	41	TP19	2.0-2.2	G	0	NATURAL		X										
20/03/2018	42	TP22	0.0-0.2	G,A	0	FILL	X											
20/03/2018	43	TP22	0.5-0.7	G,A	0	FILL		X										
20/03/2018	44	TP22	1.3-1.5	G,A	0	FILL												
20/03/2018	45	TP24	0.0-0.2	G,A	0	FILL	X											
20/03/2018	46	TP24	0.5-0.7	G,A	0	FILL		X										
20/03/2018	47	TP24	1.3-1.5	G,A	0	FILL												
20/03/2018	48	TP24	2.0-2.2	G,A	0	FILL												

Remarks (comments/detection limits required):
Please send DUP KT2 to Melbourne Envirolab

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag

Relinquished By:	Date:	Time:	Received By:	Date:
	22/3		JE	22/3

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E31269K	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067		MACQUARIE PARK, NSW 2113
P: (02) 99106200	Date Results Required: STANDARD	P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		Attention: ktaylor@ikgroup.net.au
Attention: Aileen 187888	Page: 3 of 3	

Location:	Parramatta	Sample Preserved in Esky on Ice
Sampler:	JK / KT	Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo #6a	Combo 3	Asbestos (detection)	Asbestos (WA 500mL	pH / CEC / Clay Content	8 Metals	BTEX						
20/03/2018	47	TP26	0.0-0.2	G,A	0	FILL	X												
20/03/2018	48	TP26	0.5-0.7	G,A	0	FILL		X											
20/03/2018	5049	TP26	1.5-1.7	G,A	0	FILL													
20/03/2018	50	TP26	2.0-2.2	G,A	0	FILL													
19/03/2018	51	TP03	0.3-0.5	P	-	FILL				X									
19/03/2018	52	TP08	1.3-1.5	P	-	FILL				X									
19/03/2018	53	TP09	0.0-0.2	P	-	FILL				X									
19/03/2018	54	TP11	0.0-0.2	P	-	FILL				X									
20/03/2018	55	TP13	0.0-0.2	P	-	FILL				X									
20/03/2018	56	TP16	0.0-0.2	P	-	FILL				X									
20/03/2018	57	TP18	0.0-0.2	P	-	FILL				X									
20/03/2018	58	TP20	0.0-0.2	P	-	FILL				X									
20/03/2018	5059	TP21	0.0-0.2	P	-	FILL				X									
20/03/2018	60	TP23	0.5-0.7	P	-	FILL				X									
Extra J.E	61	TP14	1.8-2.0	G,A															

Remarks (comments/detection limits required):	Sample Containers:
Please send DUP/T2 to Melbourne Envirolab	G - 250mg Glass Jar A - Ziplock Asbestos Bag P - Plastic Bag

Relinquished By:	Date:	Time:	Received By:	Date:
	22/3		JE	22/3

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
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melbourne@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 13400

Client Details

Client	Environmental Investigation Services
Attention	Katrina Taylor
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E31269K - Parramatta**
Number of Samples	1 Soil
Date samples received	27/03/2018
Date completed instructions received	27/03/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	06/04/2018
Date of Issue	04/04/2018

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Results Approved By
Chris De Luca, Senior Chemist

Authorised By

Pamela Adams, Laboratory Manager

Acid Extractable metals in soil		
Our Reference		13400-1
Your Reference	UNITS	DUPKT2
Date Sampled		20/03/2018
Type of sample		Soil
Date digested	-	04/04/2018
Date analysed	-	04/04/2018
Arsenic	mg/kg	5
Cadmium	mg/kg	<0.4
Chromium	mg/kg	15
Copper	mg/kg	33
Lead	mg/kg	71
Mercury	mg/kg	<0.1
Nickel	mg/kg	14
Zinc	mg/kg	86

Moisture		
Our Reference		13400-1
Your Reference	UNITS	DUPKT2
Date Sampled		20/03/2018
Type of sample		Soil
Date prepared	-	03/04/2018
Date analysed	-	04/04/2018
Moisture	%	14

Method ID	Methodology Summary
Inorg-008	Moisture content determined by heating at 105 deg C for a minimum of 12 hours.
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.

QUALITY CONTROL: Acid Extractable metals in soil						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date digested	-			04/04/2018	[NT]	[NT]	[NT]	[NT]	04/04/2018	[NT]
Date analysed	-			04/04/2018	[NT]	[NT]	[NT]	[NT]	04/04/2018	[NT]
Arsenic	mg/kg	4	Metals-020 ICP-AES	<4	[NT]	[NT]	[NT]	[NT]	84	[NT]
Cadmium	mg/kg	0.4	Metals-020 ICP-AES	<0.4	[NT]	[NT]	[NT]	[NT]	93	[NT]
Chromium	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Copper	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Lead	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Mercury	mg/kg	0.1	Metals-021 CV-AAS	<0.1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Nickel	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Zinc	mg/kg	1	Metals-020 ICP-AES	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Envirolab Services Pty Ltd
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melbourne@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Environmental Investigation Services
Attention	Katrina Taylor

Sample Login Details

Your reference	E31269K - Parramatta
Envirolab Reference	13400
Date Sample Received	27/03/2018
Date Instructions Received	27/03/2018
Date Results Expected to be Reported	06/04/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	1 Soil
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	14
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Pamela Adams	Analisa Mathrick
Phone: 03 9763 2500	**Phone: 03 9763 2500**
Fax: 03 9763 2633	**Fax: 03 9763 2633**
Email: padams@envirolab.com.au	**Email: amathrick@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645 - 002
1 Dalmore Drive Scoresby VIC 3179
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melbourne@envirolab.com.au
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Sample ID	Acid Extractable metalsin soil
DUPKT2	✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info
Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:
ENVIROLAB SERVICES PTY LTD
12 ASHLEY STREET
CHATSWOOD NSW 2067
P: (02) 99106200
F: (02) 99106201

Attention: Aileen

EIS Job Number: E31269K

Date Results Required: STANDARD

Page: 1 of 3

FROM:
ENVIRONMENTAL INVESTIGATION SERVICES
REAR OF 115 WICKS ROAD
MACQUARIE PARK, NSW 2113
P: 02-9888 5000 F: 02-9888 5001
Attention: ktaylor@jkgroup.net.au

Location: Parramatta
Sampler: JH / KT

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Depth (m)	Sample Container	PID	Sample Description	Combo #6a	Combo 3	Asbestos (detection)	Asbestos (WA 500mL	pH / CEC / Clay Content	8 Metals	BTEX					
20/03/2018	1	TS	-	G	-	Sand							X					
20/03/2018	2	TB	-	G	-	Sand							X					
20/03/2018	3	DUPKT1	-	G	-	Fill						X						
20/03/2018	–	DUPKT2	-	G	-	Fill						X						
19/03/2018	4	SF1	Surface	P	-	Material			X									
19/03/2018	5	SF2	Surface	P	-	Material			X									
19/03/2018	6	BH01	0.0-0.1	G,A	0	Fill	X				X							
19/03/2018	7	BH01	0.7-0.95	G,A	0.2	Fill												
19/03/2018	8	BH01	1.7-1.95	G,A	0.1	Fill												
19/03/2018	9	BH01	3.2-3.45	G	0	Natural		X										
19/03/2018	10	BH02	0.0-0.1	G,A	0	Fill	X				X							
19/03/2018	11	BH02	0.7-0.9	G,A	0.2	Fill												
19/03/2018	12	BH02	1.7-1.95	G,A	0.2	Fill												
19/03/2018	13	BH02	3.2-3.45	G	0.1	Natural		X										
19/03/2018	14	TP04	0.0-0.2	G,A	0.2	Fill	X											
19/03/2018	15	TP04	0.7-1.0	G,A	0.1	Fill		X										
19/03/2018	16	TP04	1.5-1.7	G,A	0.2	Fill												
19/03/2018	17	TP04	2.2-2.5	G,A	0.3	Fill												
19/03/2018	18	TP07	0.0-0.2	G,A	0	Fill	X											
19/03/2018	19	TP07	1.0-1.2	G,A	1	Fill		X										
19/03/2018	20	TP08	2.3-2.5	G	0.1	Fill												
19/03/2018	21	TP10	0.0-0.2	G,A	0	Fill	X											
19/03/2018	22	TP10	1.0-1.2	G,A	0.1	Fill												
19/03/2018	23	TP10	2.0-2.2	G,A	0	Fill												
19/03/2018	24	TP10	2.5-2.7	G	0	Natural		X										

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 187888
Date Received: 22/3/18
Time Received: 15:45
Received by: JE
Temp: Cool/Ambient 11.9°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 13400
Date Received: 22/3/18
Time Received: 11:05
Received by: JE
Temp: Cool/Ambient 14°C
Cooling: Ice/Icepack
Security: Intact/Broken/None

Remarks (comments/detection limits required):
Please send DUPKT2 to Melbourne Envirolab

Sample Containers:
G - 250mg Glass Jar
A - Ziplock Asbestos Bag
P - Plastic Bag

Relinquished By:	Date:	Time:	Received By:	Date:
	22/3		ELS JE	22/3/18

Relinquished by: Kevin Wang
26/3/18

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 188103

Client Details

Client	Environmental Investigation Services
Attention	Katrina Taylor
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details

Your Reference	**E31269K, Parramatta**
Number of Samples	5 Water
Date samples received	26/03/2018
Date completed instructions received	26/03/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	04/04/2018
Date of Issue	03/04/2018

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Results Approved By
Jeremy Faircloth, Organics Supervisor
Long Pham, Team Leader, Metals
Priya Samarawickrama, Senior Chemist

Authorised By

Jacinta Hurst, Laboratory Manager

vTRH(C6-C10)/BTEXN in Water				
Our Reference		188103-1	188103-2	188103-4
Your Reference	UNITS	MW1	MW2	TS
Date Sampled		26/03/2018	26/03/2018	26/03/2018
Type of sample		Water	Water	Water
Date extracted	-	29/03/2018	29/03/2018	29/03/2018
Date analysed	-	29/03/2018	29/03/2018	29/03/2018
TRH C_6 - C_9	µg/L	<10	<10	[NA]
TRH C_6 - C_{10}	µg/L	<10	<10	[NA]
TRH C_6 - C_{10} less BTEX (F1)	µg/L	<10	<10	[NA]
Benzene	µg/L	<1	<1	110%
Toluene	µg/L	<1	<1	110%
Ethylbenzene	µg/L	<1	<1	110%
m+p-xylene	µg/L	<2	<2	120%
o-xylene	µg/L	<1	<1	110%
Naphthalene	µg/L	<1	<1	[NA]
Surrogate Dibromofluoromethane	%	115	115	114
Surrogate toluene-d8	%	115	115	123
Surrogate 4-BFB	%	106	107	118

svTRH (C10-C40) in Water			
Our Reference		188103-1	188103-2
Your Reference	UNITS	MW1	MW2
Date Sampled		26/03/2018	26/03/2018
Type of sample		Water	Water
Date extracted	-	28/03/2018	28/03/2018
Date analysed	-	29/03/2018	29/03/2018
TRH C_{10} - C_{14}	µg/L	<50	<50
TRH C_{15} - C_{28}	µg/L	<100	<100
TRH C_{29} - C_{36}	µg/L	<100	<100
TRH >C_{10} - C_{16}	µg/L	<50	<50
TRH >C_{10} - C_{16} less Naphthalene (F2)	µg/L	<50	<50
TRH >C_{16} - C_{34}	µg/L	<100	<100
TRH >C_{34} - C_{40}	µg/L	<100	<100
Surrogate o-Terphenyl	%	98	95

PAHs in Water - Low Level			
Our Reference	UNITS	188103-1	188103-2
Your Reference		MW1	MW2
Date Sampled		26/03/2018	26/03/2018
Type of sample		Water	Water
Date extracted	-	28/03/2018	28/03/2018
Date analysed	-	28/03/2018	28/03/2018
Naphthalene	µg/L	<0.2	<0.2
Acenaphthylene	µg/L	<0.1	<0.1
Acenaphthene	µg/L	<0.1	<0.1
Fluorene	µg/L	<0.1	<0.1
Phenanthrene	µg/L	<0.1	<0.1
Anthracene	µg/L	<0.1	<0.1
Fluoranthene	µg/L	<0.1	<0.1
Pyrene	µg/L	<0.1	<0.1
Benzo(a)anthracene	µg/L	<0.1	<0.1
Chrysene	µg/L	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	<0.2	<0.2
Benzo(a)pyrene	µg/L	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	<0.5	<0.5
Total +ve PAH's	µg/L	NIL (+)VE	NIL (+)VE
Surrogate p-Terphenyl-d14	%	111	114

HM in water - dissolved				
Our Reference		188103-1	188103-2	188103-3
Your Reference	UNITS	MW1	MW2	JHDUP1
Date Sampled		26/03/2018	26/03/2018	26/03/2018
Type of sample		Water	Water	Water
Date prepared	-	29/03/2018	29/03/2018	29/03/2018
Date analysed	-	29/03/2018	29/03/2018	29/03/2018
Arsenic-Dissolved	µg/L	2	3	3
Cadmium-Dissolved	µg/L	<0.1	0.1	0.1
Chromium-Dissolved	µg/L	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05
Nickel-Dissolved	µg/L	1	2	2
Zinc-Dissolved	µg/L	<1	12	11

Miscellaneous Inorganics			
Our Reference		188103-1	188103-2
Your Reference	UNITS	MW1	MW2
Date Sampled		26/03/2018	26/03/2018
Type of sample		Water	Water
Date prepared	-	26/03/2018	26/03/2018
Date analysed	-	26/03/2018	26/03/2018
pH	pH Units	6.9	6.7
Electrical Conductivity	µS/cm	1,400	1,700

Method ID	Methodology Summary
Inorg-001	pH - Measured using pH meter and electrode in accordance with APHA latest edition, 4500-H+. Please note that the results for water analyses are indicative only, as analysis outside of the APHA storage times.
Inorg-002	Conductivity and Salinity - measured using a conductivity cell at 25°C in accordance with APHA latest edition 2510 and Rayment & Lyons.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.
Org-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater - 2013.
Org-013	Water samples are analysed directly by purge and trap GC-MS.
Org-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: vTRH(C6-C10)/BTEXN in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			29/03/2018	[NT]	[NT]	[NT]	[NT]	29/03/2018	[NT]
Date analysed	-			29/03/2018	[NT]	[NT]	[NT]	[NT]	29/03/2018	[NT]
TRH C_6 - C_9	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	101	[NT]
TRH C_6 - C_{10}	µg/L	10	Org-016	<10	[NT]	[NT]	[NT]	[NT]	101	[NT]
Benzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Toluene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Ethylbenzene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
m+p-xylene	µg/L	2	Org-016	<2	[NT]	[NT]	[NT]	[NT]	103	[NT]
o-xylene	µg/L	1	Org-016	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Naphthalene	µg/L	1	Org-013	<1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate Dibromofluoromethane	%		Org-016	117	[NT]	[NT]	[NT]	[NT]	117	[NT]
Surrogate toluene-d8	%		Org-016	113	[NT]	[NT]	[NT]	[NT]	120	[NT]
Surrogate 4-BFB	%		Org-016	103	[NT]	[NT]	[NT]	[NT]	115	[NT]

QUALITY CONTROL: svTRH (C10-C40) in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date extracted	-			28/03/2018	[NT]	[NT]	[NT]	[NT]	28/03/2018	[NT]
Date analysed	-			28/03/2018	[NT]	[NT]	[NT]	[NT]	28/03/2018	[NT]
TRH C_{10} - C_{14}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	130	[NT]
TRH C_{15} - C_{28}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	132	[NT]
TRH C_{29} - C_{36}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	121	[NT]
TRH >C_{10} - C_{16}	µg/L	50	Org-003	<50	[NT]	[NT]	[NT]	[NT]	130	[NT]
TRH >C_{16} - C_{34}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	132	[NT]
TRH >C_{34} - C_{40}	µg/L	100	Org-003	<100	[NT]	[NT]	[NT]	[NT]	121	[NT]
Surrogate o-Terphenyl	%		Org-003	81	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: PAHs in Water - Low Level						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date extracted	-			28/03/2018	[NT]	[NT]	[NT]	[NT]	28/03/2018	[NT]
Date analysed	-			28/03/2018	[NT]	[NT]	[NT]	[NT]	28/03/2018	[NT]
Naphthalene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	77	[NT]
Acenaphthylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Acenaphthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluorene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Phenanthrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Fluoranthene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Benzo(a)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Chrysene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	89	[NT]
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-012	<0.2	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(a)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	104	[NT]
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Dibenzo(a,h)anthracene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Benzo(g,h,i)perylene	µg/L	0.1	Org-012	<0.1	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Surrogate p-Terphenyl-d14	%		Org-012	108	[NT]	[NT]	[NT]	[NT]	128	[NT]

QUALITY CONTROL: HM in water - dissolved						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			29/03/2018	1	29/03/2018	29/03/2018		29/03/2018	[NT]
Date analysed	-			29/03/2018	1	29/03/2018	29/03/2018		29/03/2018	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	1	2	[NT]		100	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	1	<0.1	[NT]		101	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		99	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		97	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		100	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	1	<0.05	<0.05	0	88	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	1	1	[NT]		97	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	1	<1	[NT]		98	[NT]

QUALITY CONTROL: Miscellaneous Inorganics						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			26/03/2018	[NT]	[NT]	[NT]	[NT]	26/03/2018	[NT]
Date analysed	-			26/03/2018	[NT]	[NT]	[NT]	[NT]	26/03/2018	[NT]
pH	pH Units		Inorg-001	[NT]	[NT]	[NT]	[NT]	[NT]	103	[NT]
Electrical Conductivity	µS/cm	1	Inorg-002	<1	[NT]	[NT]	[NT]	[NT]	96	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

HM in water - dissolved:
For the determination of dissolved metals in sample 1, the unpreserved sample was filtered through 0.45 µm filter at the lab due to the appearance of colloids and/or sediment in the supplied HNO3 bottle.

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details

Client	Environmental Investigation Services
Attention	Katrina Taylor

Sample Login Details

Your reference	E31269K, Parramatta
Envirolab Reference	188103
Date Sample Received	26/03/2018
Date Instructions Received	26/03/2018
Date Results Expected to be Reported	04/04/2018

Sample Condition

Samples received in appropriate condition for analysis	YES
No. of Samples Provided	5 Water
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	21.9
Cooling Method	Ice Pack
Sampling Date Provided	YES

Comments

Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst
Phone: 02 9910 6200	**Phone: 02 9910 6200**
Fax: 02 9910 6201	**Fax: 02 9910 6201**
Email: ahie@envirolab.com.au	**Email: jhurst@envirolab.com.au**

Analysis Underway, details on the following page:

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

Sample ID	vTRH(C6-C10)/BTEXN in Water	svTRH (C10-C40) in Water	PAHs in Water - Low Level	HM in water - dissolved	pH	Electrical Conductivity	On Hold
MW1	✓	✓	✓	✓	✓	✓	
MW2	✓	✓	✓	✓	✓	✓	
JHDUP1				✓			
TS	✓						
TB							✓

The '✓' indicates the testing you have requested. **THIS IS NOT A REPORT OF THE RESULTS.**

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.
Requests for longer term sample storage must be received in writing.

SAMPLE AND CHAIN OF CUSTODY FORM

TO:		FROM:
ENVIROLAB SERVICES PTY LTD	EIS Job Number: E31269K	ENVIRONMENTAL INVESTIGATION SERVICES
12 ASHLEY STREET		REAR OF 115 WICKS ROAD
CHATSWOOD NSW 2067		MACQUARIE PARK, NSW 2113
P: (02) 99106200	Date Results Required: STANDARD	P: 02-9888 5000 F: 02-9888 5001
F: (02) 99106201		
Attention: Aileet	Page: 1 of 1	Attention: ktaylor@jkgroup.net.au

Location: Parramatta

Sampler: JHinwood

Sample Preserved in Esky on Ice

Tests Required

Date Sampled	Lab Ref:	Sample Number	Sample Containers	PID	Sample Description	Combo 3L	8 Metals	BTEX	pH / EC / ~~Hardness~~								
26/3/18	1	MW1	G1x2, Vx4 H		water	X			X								
	2	MW2	G1x2, Vx4 H		water	X			X								
	3	JHDUP1	H		water		X										
	4	TS	V		water			X									
	5	TB	V		water												

ENVIROLAB GROUP

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 188103

Date Received: 15:30

Time Received: 26/3/18

Received by: JE

Temp: Cool/Ambient 21.9°C

Cooling: Ice/Icepack

Security: Intact/Broken/None

Remarks (comments/detection limits required):	Sample Containers:
All analysis PQLs to ANZECC (2000) Detection Limits Please	G1 - 500mL Amber Glass Bottle G2 - 1L Amber Glass Bottle V - BTEX Vial H - HNO3 Wash PVC PVC - HDPE Plastic Bottles

Relinquished by:	Date:	Time:	Received By:	Date:
JH	26/3/18		ECS JE	26/3/18

HIBBS & ASSOCIATES PTY.LTD.

Occupational Health and Safety Consultants
Environmental Management Consultants

A.B.N. 12 608 093 134

48 / 378 Parramatta Road,
Homebush NSW 2140

P.O. Box 4266,
Homebush NSW 2140

Phone: **(02) 9746 3244**
Fax: **(02) 9746 3266**
Email: info@hibbs.com.au
Web: www.hibbs.com.au

Our Reference: S10201-AMR01

19 March 2018

Environmental Investigation Services
115 Wicks Road PO Box 976, North Ryde BC 1670
Macquarie Park, NSW 2113

Attention: Katrina Taylor
Environmental Scientist

NATA Accredited Laboratory Number: 14911

Accredited for compliance with ISO/IEC 17025 - Testing

Dear Ms Taylor,

re: ASBESTOS FIBRE AIR MONITORING REPORT
1C & 1D Morton Street, Parramatta 2150 - Rangihou Reserve

This letter presents the results of asbestos fibre air monitoring carried out at Rangihou Reserve, 1C & 1D Morton Street Parramatta, 2150 (EIS reference: E31269K), on Monday, 19 March 2018. The samples were collected over the time period 07:30 – 14:40 hrs during investigative excavations involving test pitting and boring.

The samples were collected from the following locations:

- Area 1 – North-east perimeter fence; adjacent to site sheds
- Area 2 – North-west perimeter fence; adjacent to unsealed road leading to Rangihou Crescent
- Area 3 – South-west perimeter fence; adjacent to public walkway
- Area 4 – South-east perimeter fence; adjacent to public walkway
- Area 5 – Inside excavator cabin

The sample collection and analysis for airborne respirable asbestos fibres were performed in accordance with the National Occupational Health and Safety Commission 'Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)]' April 2005 and Hibbs & Associates Pty Ltd Test Method 1.

The results are contained in the following table:

SAMPLE LOCATION (1)	FILTER No.	SAMPLING DURATION (min)			AVE. FLOW RATE (ml/min)	FIBRE COUNT (fibres/fields)	RESULT (fibres/ml)
		On	Off	Total			
Area 1	565	07:30	14:30	420	1500	0/100	<0.01
Area 2	519	07:30	14:30	420	1500	1/100	<0.01
Area 3	F199	07:35	14:35	420	1500	0/100	<0.01
Area 4	F107	07:40	14:40	420	1500	0/100	<0.01
Area 5	790	08:00	14:40	400	1500	0/100	<0.01
Blank	F50	NA	NA	NA	NA	0/100	NA

(1) Sample strategy not covered by scope of accreditation.

The results show the levels of airborne respirable fibres were all below the detection limit of the method of 0.01 fibres/ml.

This document must be read in its entirety and must not be copied, distributed or referred to in part only. The document must not be reproduced without the written approval of Hibbs & Associates Pty Ltd.

Should you have any queries regarding this report, please do not hesitate to contact Samantha O'Callaghan on (02) 9746 3244.

Yours sincerely,
HIBBS & ASSOCIATES PTY LTD

George Zantey
Authorised Counter and Signatory

NATA Accredited Laboratory Number: 14911

Accredited for compliance with ISO/IEC 17025 - Testing

HIBBS & ASSOCIATES PTY.LTD.

Occupational Health and Safety Consultants
Environmental Management Consultants

A.B.N. 12 608 093 134

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Homebush NSW 2140

P.O. Box 4266,
Homebush NSW 2140

Phone: **(02) 9746 3244**
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Email: info@hibbs.com.au
Web: www.hibbs.com.au

Our Reference: S10201-AMR02

20 March 2018

Environmental Investigation Services
115 Wicks Road PO Box 976, North Ryde BC 1670
Macquarie Park, NSW 2113

Attention: Katrina Taylor
Environmental Scientist

NATA Accredited Laboratory Number: 14911

Accredited for compliance with ISO/IEC 17025 - Testing

Dear Ms Taylor,

re: ASBESTOS FIBRE AIR MONITORING REPORT
1C & 1D Morton Street, Parramatta 2150 - Rangihou Reserve

This letter presents the results of asbestos fibre air monitoring carried out at Rangihou Reserve, 1C & 1D Morton Street Parramatta, 2150 (EIS reference: E31269K), on Tuesday, 20 March 2018. The samples were collected over the time period 08:05 – 13:35 hrs during investigative excavations involving test pitting.

The samples were collected from the following locations:

- Area 1 – North-east perimeter fence; adjacent to site sheds
- Area 2 – North-west perimeter fence; adjacent to unsealed road leading to Rangihou Crescent
- Area 3 – South-east perimeter fence; adjacent to public walkway
- Area 4 – South-west perimeter fence; adjacent to public walkway
- Area 5 – Inside excavator cabin

The sample collection and analysis for airborne respirable asbestos fibres were performed in accordance with the National Occupational Health and Safety Commission 'Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)]' April 2005 and Hibbs & Associates Pty Ltd Test Method 1.

The results are contained in the following table:

SAMPLE LOCATION (1)	FILTER No.	SAMPLING DURATION (min)			AVE. FLOW RATE (ml/min)	FIBRE COUNT (fibres/fields)	RESULT (fibres/ml)
		On	Off	Total			
Area 1	F08	08:05	13:25	320	1500	0/100	<0.01
Area 2	615	08:05	13:25	320	1500	0/100	<0.01
Area 3	F134	08:10	13:30	320	1500	1/100	<0.01
Area 4	724	08:10	13:30	320	1500	0/100	<0.01
Area 5	1530	08:15	13:35	320	1500	0/100	<0.01
Blank	F17	NA	NA	NA	NA	0/100	NA

(1) Sample strategy not covered by scope of accreditation.

The results show the levels of airborne respirable fibres were all below the detection limit of the method of 0.01 fibres/ml.

Should you have any queries regarding this report, please do not hesitate to contact Samantha O'Callaghan on (02) 9746 3244.

Yours sincerely,
HIBBS & ASSOCIATES PTY LTD

George Zantey
Authorised Counter and Signatory

NATA Accredited Laboratory Number: 14911

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Appendix C: Report Explanatory Notes

STANDARD SAMPLING PROCEDURE

These protocols specify the basic procedures to be used when sampling soils or groundwater for environmental site assessments undertaken by EIS. The purpose of these protocols is to provide standard methods for: sampling, decontamination procedures for sampling equipment, sample preservation, sample storage and sample handling. Deviations from these procedures must be recorded.

Soil Sampling

- Prepare a borehole/test pit log or made a note of the sample description for stockpiles.
- Layout sampling equipment on clean plastic sheeting to prevent direct contact with ground surface. The work area should be at a distance from the drill rig/excavator such that the machine can operate in a safe manner.
- Ensure all sampling equipment has been decontaminated prior to use.
- Remove any surface debris from the immediate area of the sampling location.
- Collect samples and place in glass jar with a Teflon seal. This should be undertaken as quickly as possible to prevent the loss of any volatiles. If possible, fill the glass jars completely.
- Collect samples for asbestos analysis and place in a zip-lock plastic bag.
- Label the sampling containers with the EIS job number, sample location (eg. BH1), sampling depth interval and date. If more than one sample container is used, this should also be indicated (eg. 2 = Sample jar 1 of 2 jars).
- Photoionisation detector (PID) screening of volatile organic compounds (VOCs) should be undertaken on samples using the soil sample headspace method. Headspace measurements are taken following equilibration of the headspace gasses in partly filled zip-lock plastic bags. PID headspace data is recorded on the borehole/test pit log and the chain of custody forms.
- Record the lithology of the sample and sample depth on the borehole/test pit log generally in accordance with AS1726-1993[23].
- Store the sample in a sample container cooled with ice or chill packs. On completion of the sampling the sample container should be delivered to the lab immediately or stored in the refrigerator prior to delivery to the lab. All samples are preserved in accordance with the standards outlined in the report.
- Check for the presence of groundwater after completion of each borehole using an electronic dip metre or water whistle. Boreholes should be left open until the end of fieldwork where it is safe to do so. All groundwater levels in the boreholes should be rechecked on the completion of the fieldwork.
- Backfill the boreholes/test pits with the excavation cuttings or clean sand prior to leaving the site.

Decontamination Procedures for Soil Sampling Equipment

- All sampling equipment should be decontaminated between every sampling location. This excludes single use PVC tubing used for push tubes etc. Equipment and materials required for the decontamination include:
  - Phosphate free detergent (Decon 90);
  - Potable water;
  - Stiff brushes; and
  - Plastic sheets.
- Ensure the decontamination materials are clean prior to proceeding with the decontamination.
- Fill both buckets with clean potable water and add phosphate free detergent to one bucket.

[23] Standards Australia, (1993), *Geotechnical Site Investigations.* (AS1726-1993)

- In the bucket containing the detergent, scrub the sampling equipment until all the material attached to the equipment has been removed.
- Rinse sampling equipment in the bucket containing potable water.
- Place cleaned equipment on clean plastic sheets.

If all materials are not removed by this procedure, high-pressure water cleaning is recommended. If any equipment is not completely decontaminated by both these processes, then the equipment should not be used until it has been thoroughly cleaned.

Groundwater Sampling

Groundwater samples are more sensitive to contamination than soil samples and therefore adhesion to this protocol is particularly important to obtain reliable, reproducible results. The recommendations detailed in AS/NZS 5667.1:1998 are considered to form a minimum standard.

The basis of this protocol is to maintain the security of the borehole and obtain accurate and representative groundwater samples. The following procedure should be used for collection of groundwater samples from previously installed groundwater monitoring wells.

- After monitoring well installation, at least three bore volumes should be pumped from the monitoring wells (well development) to remove any water introduced during the drilling process and/or the water that is disturbed during installation of the monitoring well. This should be completed prior to purging and sampling.
- Groundwater monitoring wells should then be left to recharge for at least three days before purging and sampling. Prior to purging or sampling, the condition of each well should observed and any anomalies recorded on the field data sheets. The following information should be noted: the condition of the well, noting any signs of damage, tampering or complete destruction; the condition and operation of the well lock; the condition of the protective casing and the cement footing (raised or cracked); and, the presence of water between protective casing and well.
- Measure the groundwater level from the collar of the piezometer/monitoring well using an electronic dip meter. The collar level should be taken (if required) during the site visit using a dumpy level and staff.
- Purging and sampling of piezometers/monitoring wells is done on the same site visit when using micro-purge (or other low flow) techniques.
- Layout and organize all equipment associated with groundwater sampling in a location where they will not interfere with the sampling procedure and will not pose a risk of contaminating samples. Equipment generally required includes:
  - Stericup single-use filters (for heavy metals samples);
  - Bucket with volume increments;
  - Sample containers: teflon bottles with 1 ml nitric acid, 75mL glass vials with 1 mL hydrochloric acid, 1 L amber glass bottles;
  - Bucket with volume increments;
  - Flow cell;
  - pH/EC/Eh/Temperature meters;
  - Plastic drums used for transportation of purged water;
  - Esky and ice;
  - Nitrile gloves;
  - Distilled water (for cleaning);
  - Electronic dip meter;
  - Low flow peristaltic pump and associated tubing; and
  - Groundwater sampling forms.

- Ensure all non-disposable sampling equipment is decontaminated or that new disposable equipment is available prior to any work commencing at a new location. The procedure for decontamination of groundwater equipment is outlined at the end of this section.
- Disposable gloves should be used whenever samples are taken to protect the sampler and to assist in avoidance of contamination.
- Groundwater samples are obtained from the monitoring wells using low flow sampling equipment to reduce the disturbance of the water column and loss of volatiles.
- During pumping to purge the well, the pH, temperature, conductivity, dissolved oxygen, redox potential and groundwater levels are monitored (where possible) using calibrated field instruments to assess the development of steady state conditions. Steady state conditions are generally considered to have been achieved when the difference in the pH measurements was less than 0.2 units and the difference in conductivity was less than 10%.
- All measurements are recorded on specific data sheets.
- Once steady state conditions are considered to have been achieved, groundwater samples are obtained directly from the pump tubing and placed in appropriate glass bottles, BTEX vials or plastic bottles.
- All samples are preserved in accordance with water sampling requirements specified by the laboratory and placed in an insulated container with ice. Groundwater samples are preserved by immediate storage in an insulated sample container with ice.
- At the end of each water sampling complete a chain of custody form for samples being sent to the laboratory.

Decontamination Procedures for Groundwater Sampling Equipment

- All equipment associated with the groundwater sampling procedure (other than single-use items) should be decontaminated between every sampling location.
- The following equipment and materials are required for the decontamination procedure:
  - Phosphate free detergent;
  - Potable water;
  - Distilled water; and
  - Plastic Sheets or bulk bags (plastic bags).
- Fill one bucket with clean potable water and phosphate free detergent, and one bucket with distilled water.
- Flush potable water and detergent through pump head. Wash sampling equipment and pump head using brushes in the bucket containing detergent until all materials attached to the equipment are removed.
- Flush pump head with distilled water.
- Change water and detergent solution after each sampling location.
- Rinse sampling equipment in the bucket containing distilled water.
- Place cleaned equipment on clean plastic sheets.
- If all materials are not removed by this procedure that equipment should not be used until it has been thoroughly cleaned

QA/QC DEFINITIONS

The QA/QC terms used in this report are defined below. The definitions are in accordance with US EPA publication SW-846, entitled *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (1994)[24] methods and those described in *Environmental Sampling and Analysis, A Practical Guide,* (1991)[25].

Practical Quantitation Limit (PQL), Limit of Reporting (LOR) & Estimated Quantitation Limit (EQL)

These terms all refer to the concentration above which results can be expressed with a minimum 95% confidence level. The laboratory reporting limits are generally set at ten times the standard deviation for the Method Detection Limit for each specific analyte. For the purposes of this report the LOR, PQL, and EQL are considered to be equivalent.

When assessing laboratory data it should be borne in mind that values at or near the PQL have two important limitations: *"The uncertainty of the measurement value can approach, and even equal, the reported value. Secondly, confirmation of the analytes reported is virtually impossible unless identification uses highly selective methods. These issues diminish when reliably measurable amounts of analytes are present. Accordingly, legal and regulatory actions should be limited to data at or above the reliable detection limit*" (Keith, 1991).

Precision

The degree to which data generated from repeated measurements differ from one another due to random errors. Precision is measured using the standard deviation or Relative Percent Difference (RPD).

Accuracy

Accuracy is a measure of the agreement between an experimental result and the true value of the parameter being measured (i.e. the proximity of an averaged result to the true value, where all random errors have been statistically removed). The assessment of accuracy for an analysis can be achieved through the analysis of known reference materials or assessed by the analysis of surrogates, field blanks, trip spikes and matrix spikes. Accuracy is typically reported as percent recovery.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is primarily dependent upon the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handing and analysis protocols and use of proper chain-of-custody and documentation procedures.

Completeness

Completeness is a measure of the number of valid measurements in a data set compared to the total number of measurements made and overall performance against DQIs. The following information is assessed for completeness:

- Chain-of-custody forms;
- Sample receipt form;
- All sample results reported;

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[24] US EPA, (1994). *SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* (US EPA SW-846)

[25] Keith., H, (1991). *Environmental Sampling and Analysis, A Practical Guide.*

- All blank data reported;
- All laboratory duplicate and RPDs calculated;
- All surrogate spike data reported;
- All matrix spike and lab control spike (LCS) data reported and RPDs calculated;
- Spike recovery acceptable limits reported; and
- NATA stamp on reports.

Comparability

Comparability is the evaluation of the similarity of conditions (e.g. sample depth, sample homogeneity) under which separate sets of data are produced. Data comparability checks include a bias assessment that may arise from the following sources:

- Collection and analysis of samples by different personnel; Use of different techniques;
- Collection and analysis by the same personnel using the same methods but at different times; and
- Spatial and temporal changes (due to environmental dynamics).

Blanks

The purpose of laboratory and field blanks is to check for artefacts and interferences that may arise during sampling, transport and analysis.

Matrix Spikes

Samples are spiked with laboratory grade standards to detect interactive effects between the sample matrix and the analytes being measured. Matrix Spikes are reported as a percent recovery and are prepared for 1 in every 20 samples. Sample batches that contain less than 20 samples may be reported with a Matrix Spike from another batch. The percent recovery is calculated using the formula below. Acceptable recovery limits are 70% to 130%.

$$\frac{\text{(Spike Sample Result – Sample Result) x 100}}{\text{Concentration of Spike Added}}$$

Surrogate Spikes

Samples are spiked with a known concentration of compounds that are chemically related to the analyte being investigated but unlikely to be detected in the environment. The purpose of the Surrogate Spikes is to check the accuracy of the analytical technique. Surrogate Spikes are reported as percent recovery.

Duplicates

Laboratory duplicates measure precision, expressed as Relative Percent Difference. Duplicates are prepared from a single field sample and analysed as two separate extraction procedures in the laboratory. The RPD is calculated using the formula where D1 is the sample concentration and D2 is the duplicate sample concentration:

$$\frac{(D1 - D2) \times 100}{\{(D1 + D2)/2\}}$$

SCREENING CRITERIA DEFINITIONS

The following definitions have been adopted based on Schedule B(1) of NEPM (2013) and are relevant to Tier 1 screening criteria adopted for contamination assessments.

Health investigation levels (HILs) have been developed for a broad range of metals and organic substances. The HILs are applicable for assessing human health risk via all relevant pathways of exposure. The HILs are generic to all soil types and apply generally to a depth of 3 m below the surface for residential use. Site-specific conditions should determine the depth to which HILs apply for other land uses.

Health screening levels (HSLs) have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation and direct contact pathways. The HSLs depend on specific soil physicochemical properties, land use scenarios, and the characteristics of building structures. They apply to different soil types, and depths below surface to >4 m. HSLs have also been developed for asbestos and apply to the top 3m of soil.

Ecological investigation levels (EILs) have been developed for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems. EILs depend on specific soil physicochemical properties and land use scenarios and generally apply to the top 2 m of soil.

Ecological screening levels (ESLs) have been developed for selected petroleum hydrocarbon compounds and total petroleum/recoverable hydrocarbon (TPH/TRH) fractions and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse- and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil.

Groundwater investigation levels (GILs) are the concentrations of a contaminant in groundwater above which further investigation (point of extraction) or a response (point of use) is required. GILs are based on Australian water quality guidelines and drinking water guidelines and are applicable for assessing human health risk and ecological risk from direct contact (including consumption) with groundwater.

Management Limits for Petroleum hydrocarbons are applicable to petroleum hydrocarbon compounds only. They are applicable as screening levels following evaluation of human health and ecological risks and risks to groundwater resources. They are relevant for operating sites where significant sub-surface leakage of petroleum compounds has occurred and when decommissioning industrial and commercial sites.

Interim soil vapour health investigation levels (interim HILs) have been developed for selected volatile organic chlorinated compounds (VOCCs) and are applicable to assessing human health risk by the inhalational pathway. They have interim status pending further scientific work on volatile gas modelling from the sub-surface to building interiors for chlorinated compounds.

Appendix D: Data (QA/QC) Evaluation

DATA (QA/QC) EVALUATION

INTRODUCTION

This Data (QA/QC) Evaluation forms part of the validation process for the DQOs documented in Section 6.1 of this report. Checks were made to assess the data in terms of precision, accuracy, representativeness, comparability and completeness. These 'PARCC' parameters are referred to collectively as DQIs and are defined in the Report Explanatory Notes attached in the report appendices.

Field and Laboratory Considerations

The quality of the analytical data produced for this project has been considered in relation to the following:

- Sample collection, storage, transport and analysis;
- Laboratory PQLs;
- Field QA/QC results; and
- Laboratory QA/QC results.

Field QA/QC Samples and Analysis

A summary of the field QA/QC samples collected and analysed for this assessment is provided in the following table:

Sample Type	Sample Identification	Frequency (of Sample Type)	Analysis Performed
Intra-laboratory duplicate (soil)	DUPKT1 (primary sample TP14 0.0-0.2m)	Approximately 8% of primary samples	Heavy metals
Inter-laboratory duplicate (soil)	DUPKT2 (primary sample TP15 0.0-0.2m)	Approximately 8% of primary samples	Heavy metals
Trip spike (soil)	TS (20/3/2018)	One for the assessment to demonstrate adequacy of preservation, storage and transport methods	BTEX
Trip blank (soil)	TB (20/3/2018)	One for the assessment to demonstrate adequacy of storage and transport methods	BTEX
Intra-laboratory duplicate (water)	JHDUP1 (primary sample MW01)	Approximately 50% of primary samples	Heavy metals
Trip spike (water)	TS (26/3/2018)	One per day of water sampling	BTEX

The results for the field QA/QC samples are detailed in the laboratory summary tables (Table I to Table L inclusive) attached to the assessment report and are discussed in the subsequent sections of this Data (QA/QC) Evaluation report.

Data Assessment Criteria

EIS adopted the following criteria for assessing the field and laboratory QA/QC analytical results:

Field Duplicates

Acceptable targets for precision of field duplicates in this report will be less than 50% RPD for concentrations greater than 10 times the PQL, less than 75% RPD for concentrations between five and 10 times the PQL and less than 100% RPD for concentrations that are less than five times the PQL. RPD failures will be considered qualitatively on a case-by-case basis taking into account factors such as the sample type, collection methods and the specific analyte where the RPD exceedance was reported.

Field Blanks

Acceptable targets for field blank samples in this report will be less than the PQL for organic analytes. Metals will be considered on a case-by-case basis with regards to typical background concentrations in soils and published drinking water guidelines for waters.

Trip Spikes

Acceptable targets for trip spike samples in this report will be 70% to 130%. This is in line with spike recovery limits adopted by the laboratory for organic analysis.

Laboratory QA/QC

The suitability of the laboratory data is assessed against the laboratory QA/QC criteria which is outlined in the laboratory reports. These criteria were developed and implemented in accordance with the laboratory's NATA accreditation and align with the acceptable limits for QA/QC samples as outlined in NEPM (2013) and other relevant guidelines.

A summary of the acceptable limits adopted by the primary laboratory (Envirolab) is provided below:

RPDs

- Results that are <5 times the PQL, any RPD is acceptable; and
- Results >5 times the PQL, RPDs between 0-50% are acceptable.

Laboratory Control Samples (LCS) and Matrix Spikes

- 70-130% recovery acceptable for metals and inorganics;
- 60-140% recovery acceptable for organics; and
- 10-140% recovery acceptable for VOCs.

Surrogate Spikes

- 60-140% recovery acceptable for general organics; and
- 10-140% recovery acceptable for VOCs.

Method Blanks

- All results less than PQL.

DATA EVALUATION

Sample Collection, Storage, Transport and Analysis

Samples were collected by trained field staff in accordance with the EIS SSP. The SSP was developed to be consistent with relevant guidelines, including NEPM (2013) and other guidelines made under the CLM Act 1997.

Appropriate sample preservation, handling and storage procedures were adopted. Laboratory analysis was undertaken within specified holding times generally in accordance with Schedule B(3) of NEPM (2013) and the laboratory NATA accredited methodologies.

Envirolab noted that the asbestos results were reported to be consistent with the recommendations in NEPM (2013), however this level of reporting is outside the scope of their NATA accreditation. In the absence of other available analytical methods for asbestos, this was found to be acceptable for the purpose of this assessment.

Review of the project data also indicated that:

- COC documentation was adequately maintained;
- Sample receipt advice documentation was provided for all sample batches;
- All analytical results were reported; and
- Consistent units were used to report the analysis results.

Laboratory PQLs

Appropriate PQLs were adopted for the analysis and all PQLs were below the SAC.

Field QA/QC Sample Results

Field Duplicates

The results indicated that field precision was acceptable.

Field Blanks

During the investigation, one soil trip blank was placed in the esky during sampling and transported back to the laboratory. The results were all less than the PQLs, therefore cross contamination between samples that may have significance for data validity did not occur.

Trip Spikes

The results ranged from 95% to 100% in the soil Trip Spike and 110% to 120% in the water Trip spike and indicated that field preservation methods were appropriate.

Laboratory QA/QC

The analytical methods implemented by the laboratory were performed in accordance with their NATA accreditation and were consistent with Schedule B(3) of NEPM (2013). The frequency of data reported for the laboratory QA/QC (i.e. duplicates, spikes, blanks, LCS) was considered to be acceptable for the purpose of this assessment.

A review of the laboratory QA/QC data identified the following minor non-conformances:

- Acid extractable metals in soil, percent recovery was not possible to report due to the homogeneous nature of the elements in the samples, however an acceptable recovery was obtained for the laboratory control sample; and
- PCBs in soil in one sample, the PQL was raised due to interference from analytes (other than those being tested) in the sample.

DATA QUALITY SUMMARY

EIS are of the opinion that the data are adequately precise, accurate, representative, comparable and complete to serve as a basis for interpretation to achieve the investigation objectives.

Appendix E: Field Work Documents

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	City of Parramatta Council	**Job No.:**	E31269K
Project:	Proposed Passive Open Space Development	**Well No.:**	MW01
Location:	RANGIHUU RESERVE, TC & TD MORTON STREET, PARRAMATTA, NSW	**Depth (m):**	5.81

WELL FINISH DETAILS

	Gatic Cover ☒	**Standpipe** ☐	**Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Slechic	**SWL – Before (m):**	2.81
Date:	20/3/18	**Time – Before:**	
Undertaken By:	JH	**SWL – After (m):**	
Total Vol. Removed:	—	**Time – After:**	
PID Reading (ppm):	—		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/m)	pH	Eh (mV)
MW Could not be developed due to silty conditions					

Comments:Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

Tested By:	JH
Date Tested:	20.3.18
Checked By:	
Date:	23/3/18

Remarks:

- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	City of Parramatta Council	**Job No.:**	E31269K
Project:	Proposed Passive Open Space Development	**Well No.:**	MW02
Location:	RANGIHOU RESERVE, 7C & 7D MORTON STREET, PARRAMATTA, NSW	**Depth (m):**	6.2m

WELL FINISH DETAILS

	Gatic Cover ☒	**Standpipe** ☐	**Other (describe)** ☐

WELL DEVELOPMENT DETAILS

Method:	Electric	**SWL – Before (m):**	3.15m
Date:	20/3/18	**Time – Before:**	9:00am
Undertaken By:	JH	**SWL – After (m):**	5.83m
Total Vol. Removed:	16 L.	**Time – After:**	10:00am.
PID Reading (ppm):	—		

Comments:

DEVELOPMENT MEASUREMENTS

Volume Removed (L)	Temp (°C)	DO (mg/L)	EC (µS/m)	pH	Eh (mV)
10	—	—	—	—	—
16	—	—	—	—	—

Comments:Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

Slow recharge rate from 12 L.

WQM playing up – no parameters recorded.

Tested By:	JH.
Date Tested:	20/3/18
Checked By:	KRS.
Date:	27/3/18.

Remarks:

- All measurements are corrected to ground level
- All stated Volumes are in Litres
- SWL is an abbreviation for standing water level
- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%
- Minimum 3 monitoring well volumes are purged

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	City of Parramatta Council	**Job No.:**	E31269K
Project:	Proposed Passive Open Space Development	**Well No.:**	MW1
Location:	~~RANGIHOU RESERVE, TC & TD MORTON STREET,~~ PARRAMATTA, NSW	**Depth (m):**	3.65?

WELL FINISH

	Gatic Cover	X		**Standpipe**	**Other (describe)**

WELL PURGE DETAILS:

Method:	Peristaltic	**SWL – Before:**	2.56
Date:	26/3/18	**Time – Before:**	1011O
Undertaken By:	JH	**Total Vol Removed:**	3.5L+
Pump Program No:	—	**PID (ppm):**	2

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
4	3.03	1		24.3	1.8	1256	6.14	-16.7
8	3.17	2		24.3	0.8	1575	6.41	-32.9
12	3.35	3		24.2	1.4	1589	6.38	-37.3

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

very silty

Sampling Containers Used: 2 x glass amber, 4 x BTEX vials, 1 x H2NO3 plastic, x H2SO4 plastic, x unpreserved plastic

Tested By: ~~Katrina Taylor~~ JH	**Remarks:**
Date Tested: 26.3.18	- All measurements are corrected to ground level
Checked By: [illegible]	- SWL is an abbreviation for standing water level
Date: 27/3/18	- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

ENVIRONMENTAL INVESTIGATION SERVICES

CONSULTING ENVIRONMENTAL ENGINEERS

EIS

Client:	City of Parramatta Council	**Job No.:**	E31269K
Project:	Proposed Passive Open Space Development	**Well No.:**	MW2
Location:	RANGIHOU RESERVE, TC & TD MORTON STREET, PARRAMATTA NSW	**Depth (m):**	6.2m

WELL FINISH

	Gatic Cover	X		**Standpipe**	**Other (describe)**

WELL PURGE DETAILS:

Method:	Peristaltic	**SWL – Before:**	2.93m
Date:	26/3/18	**Time – Before:**	12:05
Undertaken By:	JH	**Total Vol Removed:**	104
Pump Program No:		**PID (ppm):**	2

PURGING / SAMPLING MEASUREMENTS

Time (min)	SWL (m)	Vol (L)	Notes	Temp (°C)	DO (mg/L)	EC (µS/cm)	pH	Eh (mV)
5	3.42m	1		24.6	0.9	1675	6.23	10.8
11	3.67m	2		24.7	0.6	1660	6.20	-1.0
14	4.02m	3		24.8	0.4	1622	6.20	-13.4
16	4.13	4		24.9	0.4	1588	6.23	-24.3
18	4.38	5		25.0	0.4	1578	6.23	-30.8
20	4.49	6		24.9	0.3	1599	6.26	-32.9
26	4.78	8		24.8	0.3	1624	6.25	-27.5
32	5.40	10		24.2	0.3	1690	6.24	-1.1

Comments: Odours (YES / NO), NAPL/PSH (YES / NO), Sheen (YES / NO), Steady State Achieved (YES / NO)

Sampling Containers Used: 2x glass amber, 4 x BTEX vials, 2 x H2NO3 plastic, x H2SO4 plastic, x unpreserved plastic

Dup taken.

Tested By: ~~Katrina Taylor~~ JH	**Remarks:**
Date Tested: 26.3.18	- All measurements are corrected to ground level
Checked By:	- SWL is an abbreviation for standing water level
Date: 27/3/18	- Steady state conditions - difference in the pH less than 0.2 units and difference in conductivity less than 10%

Appendix F: Calculation Sheets

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.15/04/2018 11:19:13 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Lead

General Statistics

Total Number of Observations	18	Number of Distinct Observations	17
		Number of Missing Observations	0
Minimum	12	Mean	65.72
Maximum	190	Median	58
SD	44.73	Std. Error of Mean	10.54
Coefficient of Variation	0.681	Skewness	1.271

Normal GOF Test

Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.897	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.202	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	84.06	95% Adjusted-CLT UCL (Chen-1995)	86.44
		95% Modified-t UCL (Johnson-1978)	84.59

Gamma GOF Test

A-D Test Statistic	0.172	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.75	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0952	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.206	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.359	k star (bias corrected MLE)	2.003
Theta hat (MLE)	27.86	Theta star (bias corrected MLE)	32.82
nu hat (MLE)	84.92	nu star (bias corrected)	72.1
MLE Mean (bias corrected)	65.72	MLE Sd (bias corrected)	46.44
		Approximate Chi Square Value (0.05)	53.55
Adjusted Level of Significance	0.0357	Adjusted Chi Square Value	52.01

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	88.49	95% Adjusted Gamma UCL (use when n<50)	91.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.897	Data appear Lognormal at 5% Significance Level

54	Lilliefors Test Statistic					0.125	**Lilliefors Lognormal GOF Test**					
55	5% Lilliefors Critical Value					0.202	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					2.485	Mean of logged Data					3.959
60	Maximum of Logged Data					5.247	SD of logged Data					0.723
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					101.2	90% Chebyshev (MVUE) UCL					103.3
64	95% Chebyshev (MVUE) UCL					119.8	97.5% Chebyshev (MVUE) UCL					142.6
65	99% Chebyshev (MVUE) UCL					187.6						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					83.06	95% Jackknife UCL					84.06
72	95% Standard Bootstrap UCL					81.96	95% Bootstrap-t UCL					88.28
73	95% Hall's Bootstrap UCL					93.1	95% Percentile Bootstrap UCL					84.06
74	95% BCA Bootstrap UCL					86.56						
75	90% Chebyshev(Mean, Sd) UCL					97.35	95% Chebyshev(Mean, Sd) UCL					111.7
76	97.5% Chebyshev(Mean, Sd) UCL					131.6	99% Chebyshev(Mean, Sd) UCL					170.6
77												
78	**Suggested UCL to Use**											
79	95% Student's-t UCL					84.06						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

1	**UCL Statistics for Data Sets with Non-Detects**										
2											
3	User Selected Options										
4	Date/Time of Computation	ProUCL 5.15/04/2018 11:23:12 AM									
5	From File	WorkSheet_a.xls									
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Number of Bootstrap Operations	2000									
9											
10											
11	**Nickel**										
12											
13	**General Statistics**										
14	Total Number of Observations	18				Number of Distinct Observations	12				
15						Number of Missing Observations	0				
16	Minimum	11				Mean	26.22				
17	Maximum	55				Median	22				
18	SD	11.57				Std. Error of Mean	2.728				
19	Coefficient of Variation	0.441				Skewness	1.041				
20											
21	**Normal GOF Test**										
22	Shapiro Wilk Test Statistic	0.91				**Shapiro Wilk GOF Test**					
23	5% Shapiro Wilk Critical Value	0.897				Data appear Normal at 5% Significance Level					
24	Lilliefors Test Statistic	0.174				**Lilliefors GOF Test**					
25	5% Lilliefors Critical Value	0.202				Data appear Normal at 5% Significance Level					
26	**Data appear Normal at 5% Significance Level**										
27											
28	**Assuming Normal Distribution**										
29	**95% Normal UCL**					**95% UCLs (Adjusted for Skewness)**					
30	95% Student's-t UCL	30.97				95% Adjusted-CLT UCL (Chen-1995)	31.42				
31						95% Modified-t UCL (Johnson-1978)	31.08				
32											
33	**Gamma GOF Test**										
34	A-D Test Statistic	0.358				**Anderson-Darling Gamma GOF Test**					
35	5% A-D Critical Value	0.742				Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic	0.15				**Kolmogorov-Smirnov Gamma GOF Test**					
37	5% K-S Critical Value	0.204				Detected data appear Gamma Distributed at 5% Significance Level					
38	**Detected data appear Gamma Distributed at 5% Significance Level**										
39											
40	**Gamma Statistics**										
41	k hat (MLE)	6.004				k star (bias corrected MLE)	5.041				
42	Theta hat (MLE)	4.367				Theta star (bias corrected MLE)	5.202				
43	nu hat (MLE)	216.2				nu star (bias corrected)	181.5				
44	MLE Mean (bias corrected)	26.22				MLE Sd (bias corrected)	11.68				
45						Approximate Chi Square Value (0.05)	151.3				
46	Adjusted Level of Significance	0.0357				Adjusted Chi Square Value	148.7				
47											
48	**Assuming Gamma Distribution**										
49	95% Approximate Gamma UCL (use when n>=50))	31.45				95% Adjusted Gamma UCL (use when n<50)	32.01				
50											
51	**Lognormal GOF Test**										
52	Shapiro Wilk Test Statistic	0.975				**Shapiro Wilk Lognormal GOF Test**					
53	5% Shapiro Wilk Critical Value	0.897				Data appear Lognormal at 5% Significance Level					

54					Lilliefors Test Statistic	0.127	**Lilliefors Lognormal GOF Test**					
55					5% Lilliefors Critical Value	0.202	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59					Minimum of Logged Data	2.398	Mean of logged Data	3.181				
60					Maximum of Logged Data	4.007	SD of logged Data	0.422				
61												
62	**Assuming Lognormal Distribution**											
63					95% H-UCL	32.13	90% Chebyshev (MVUE) UCL	34.19				
64					95% Chebyshev (MVUE) UCL	37.81	97.5% Chebyshev (MVUE) UCL	42.85				
65					99% Chebyshev (MVUE) UCL	52.74						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71					95% CLT UCL	30.71	95% Jackknife UCL	30.97				
72					95% Standard Bootstrap UCL	30.57	95% Bootstrap-t UCL	32.28				
73					95% Hall's Bootstrap UCL	31.77	95% Percentile Bootstrap UCL	30.94				
74					95% BCA Bootstrap UCL	31.33						
75					90% Chebyshev(Mean, Sd) UCL	34.41	95% Chebyshev(Mean, Sd) UCL	38.11				
76					97.5% Chebyshev(Mean, Sd) UCL	43.26	99% Chebyshev(Mean, Sd) UCL	53.36				
77												
78	**Suggested UCL to Use**											
79					95% Student's-t UCL	30.97						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												

Appendix G: Guidelines and Reference Documents

Australian and New Zealand Environment Conservation Council (ANZECC), (2000). Australian and New Zealand Guidelines for Fresh and Marine Water Quality

CRC Care, (2011). Technical Report No. 10 – Health screening levels for hydrocarbons in soil and groundwater Part 1: Technical development document

CRC Care, (2017). Technical Report No. 39 – Risk-based management and guidance for benzo(a)pyrene

Contaminated Land Management Act 1997 (NSW)

Department of Land and Water Conservation, (1997). 1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2)

Managing Land Contamination, Planning Guidelines SEPP55 – Remediation of Land (1998)

National Health and Medical Research Council (NHMRC), (2011). National Water Quality Management Strategy, Australian Drinking Water Guidelines

NSW Department of Environment and Conservation, (2007). Guidelines for the Assessment and Management of Groundwater Contamination

NSW EPA, (1995). Contaminated Sites Sampling Design Guidelines

NSW EPA, (2014). Waste Classification Guidelines - Part 1: Classifying Waste

NSW EPA, (2015). Guidelines on the Duty to Report Contamination under Section 60 of the CLM Act 1997

NSW EPA, (2017). Guidelines for the NSW Site Auditor Scheme, 3rd Edition

National Environmental Protection (Assessment of Site Contamination) Measure 1999 as amended (2013)

Olszowy, H., Torr, P., and Imray, P., (1995). Trace Element Concentrations in Soils from Rural and Urban Areas of Australia. Contaminated Sites Monograph Series No. 4. Department of Human Services and Health, Environment Protection Agency, and South Australian Health Commission

Protection of the Environment Operations Act 1997 (NSW)

State Environmental Planning Policy No.55 – Remediation of Land 1998 (NSW)

World Health Organisation (WHO), (2008). Petroleum Products in Drinking-water, Background document for the development of WHO Guidelines for Drinking Water Quality

NSW Site Auditor Scheme

Site Audit Statement

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the *Contaminated Land Management Act 1997* on 12 October 2017.

For information about completing this form, go to Part IV.

Part I: Site audit identification

Site audit statement no. SAS119

This site audit is a:

☑ statutory audit

~~☐ non-statutory audit~~

within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details

(As accredited under the *Contaminated Land Management Act 1997*)

Name	Rebeka Hall
Company	Zoic Environmental Pty Ltd
Address	Suite 1, Level 9, 189 Kent St SYDNEY NSW
	Postcode 2000
Phone	02 9251 8070
Email	rebeka.hall@zoic.com.au

Site details

Address	2 Morton Street, Parramatta NSW
	Postcode 2150

Property description

(Attach a separate list if several properties are included in the site audit.)

Lot 301 (part of future subdivision of Part Lot 2 in DP1215559) land to be dedicated to Council as Public Open Space. See attached survey plan.

Local government area: Parramatta City Council

Area of site (include units, e.g. hectares) 1740m2

Current zoning R4 High Density Residential and B4 Mixed Use (along Morton Street and Southern Portion of the Lot)

Regulation and notification

To the best of my knowledge:

☐ ~~**the site is** the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*, as follows: (provide the no. if applicable)~~

~~☐ Declaration no.~~

~~☐ Order no.~~

~~☐ Proposal no.~~

~~☐ Notice no.~~

☑ **the site is not** the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

To the best of my knowledge:

☐ ~~the site **has** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*~~

☑ the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.

Site audit commissioned by

Name	Kevin Miksch
Company	PDS Group on behalf of Starryland Sydney Pty Ltd
Address	Level 1, 63 York Street, Sydney
	Postcode 2000
Phone	02 8279 2600
Email	kevin.miksch@pdsgroup.com.au

Contact details for contact person (if different from above)

Name	Vivien Lin, Project Coordinator PDS
Phone	02 8279 2600
Email	Vivien.Lin@pdsgroup.com.au

Nature of statutory requirements (not applicable for non-statutory audits)

☐ ~~Requirements under the *Contaminated Land Management Act* 1997 (e.g. management order; please specify, including date of issue)~~

☐ ~~Requirements imposed by an environmental planning instrument (please specify, including date of issue)~~

☑ Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)

Condition 9 in Development Application Notice of Determination DA164/2015 (21 December 2015) and DA164/2015/A (22 March 2017)

☐ ~~Requirements under other legislation (please specify, including date of issue)~~

Purpose of site audit

~~☐ **A1** To determine land use suitability~~

~~Intended uses of the land:~~

OR

☑ **A2** To determine land use suitability subject to compliance with either an active or passive environmental management plan

Intended uses of the land: Public Open Space

~~OR~~

~~(Tick all that apply)~~

~~☐ **B1** To determine the nature and extent of contamination~~

~~☐ **B2** To determine the appropriateness of:~~

~~☐ an investigation plan~~

~~☐ a remediation plan~~

~~☐ a management plan~~

~~☐ **B3** To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*~~

~~☐ **B4** To determine the compliance with an approved:~~

~~☐ **voluntary management proposal** or~~

~~☐ **management order** under the *Contaminated Land Management Act 1997*~~

~~☐ **B5** To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.~~

~~Intended uses of the land:~~

Information sources for site audit

Titles of reports reviewed:

- Golder (2018). Combined Phase 1 and Phase 2 Environmental Site Assessment, Proposed Lot 301, 2 Morton Street, Parramatta NSW (Ref: 17921777-003-R-Rev0).
- Golder (2018). Remedial Action Plan, Proposed Lot 301, 2 Morton Street, Parramatta NSW (Ref: 17921777-004-R-Rev0).
- Prensa (June 2018). Remediation Action Plan, Lot 301 Morton Street, Parramatta NSW 2150 (Ref: P0012:JGPB:58165_RAP_301 Morton St Parramatta).
- Prensa (May 2019) Validation of Remediation Works, Lot 301 Morton Street Parramatta, NSW 2150 (Ref: JGPB: 58165_Validation_V4).

- Prensa (May 2019) Environmental Management Plan, Lot 301 Morton Street, Parramatta NSW (Ref: P0012:JXB:58165_Lot 301 Morton St EMP_V5).

Other information reviewed, including previous site audit reports and statements relating to the site:

The Site Auditor, Rebeka Hall from Zoic Environmental Pty Ltd, has issued Site Audit Reports and Statements for the Starryland Pinnacle Stage 1 to 3 mixed use residential developments located at 2 Morton Street Parramatta. Stage 1 comprising the eastern residential development was signed off with SAS36 and SAR36 (29 February 2016), with Stages 2 and 3 comprising the western residential development was signed off with SAS69 and SAR69 (16 May 2016) certifying the development suitable for high density residential and open space.

A previous Site Audit had been completed in 2001 by Ian Swane, of SKM, which covered the entire 4.92ha development site (entire lot formerly registered as Lot 1 DP817709). The Audit was commissioned by Dalrympl-Hay & Co to meet DA Condition 2 (IT/0136/00, 12 February 2001) “A site audit statement by an accredited auditor by the NSW EPA verifying that the primary consultants’ contamination report demonstrate that the land is suitable for its intended land uses including the land to be dedicated in open space”.

Site audit report details

Title: Site Audit Report Future Lot 301, 2 Morton Street Parramatta NSW 2150

Report no.17173SAR_119 Date 21 June 2019

Part II: Auditor's findings

Please complete either Section A1, Section A2 or Section B, not more than one section. (Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.
- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.
- Use **Section B** where the audit is to determine:
  - (B1) the nature and extent of contamination, and/or
  - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
  - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
  - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
  - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

[1] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

Section A1

I certify that, in my opinion:

The **site is suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

OR

☐ I certify that, in my opinion, the **site is not suitable** for any use due to the risk of harm from contamination.

Overall comments:

_____

_____

_____

_____

_____

Section A2

I certify that, in my opinion:

Subject to compliance with the **attached** environmental management plan[2] (EMP), the site is suitable for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ ~~Residential, including substantial vegetable garden and poultry~~

☐ ~~Residential, including substantial vegetable garden, excluding poultry~~

☐ ~~Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

☐ ~~Day care centre, preschool, primary school~~

☐ ~~Residential with minimal opportunity for soil access, including units~~

☐ ~~Secondary school~~

☑ Park, recreational open space, playing field

☐ ~~Commercial/industrial~~

☐ ~~Other (please specify):~~

EMP details

Title Environmental Management Plan, Lot 301 Morton Street, Parramatta NSW (Ref: P0012:JXB:58165_Lot 301 Morton St EMP_V5).

Author: Prensa

Date: May 2019 No. of pages 37

EMP summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

☐ ~~requires operation and/or maintenance of **active** control systems~~[3]

☑ requires maintenance of **passive** control systems only[3].

[2] Refer to Part IV for an explanation of an environmental management plan.
[3] Refer to Part IV for definitions of active and passive control systems.

Purpose of the EMP:

The purpose of the EMP is to outline management procedures and risk mitigation measures to be implemented by future owners/maintenance workers when conducting works at the site or as part of maintaining the open space. The EMP outlines corrective actions to restore the cap if breached to ensure the site continues to be safe for public use.

Description of the nature of the residual contamination:

Asbestos impacted fill material, of variable thickness (typically greater than 1.5 to 2m in thickness) remains across the site. A high visibility geofabric was placed over the fill to act as a marker layer. Virgin excavated natural material and certified topsoil was placed over the marker to act as a cap. The open space has been vegetated.

Summary of the actions required by the EMP:

The EMP outlines induction and health and safety requirements prior to site works commencing. In section 9, the EMP includes actions and procedures related to fencing and signage, erosion, sediment and dust control, PPE requirements, monitoring, excavation procedures and stockpile management. Section 10 provides detail on routine inspections, record keeping and revisions to the EMP. Section 11 provides guidance in the event that an unexpected find is identified during maintenance works or during routine inspections. The overall aim is to ensure the cap integrity is maintained.

How the EMP can reasonably be made to be legally enforceable:

A positive covenant will be placed on the land Title as confirmed by Parramatta Council (31 May 2019).

How there will be appropriate public notification:

The EMP states that the EMP will be noted on Council's records management system. Notation of the presence of a conditional SAS should be made on the Section 10.7 planning certificate.

Overall comments:

The EMP is to be implemented by Parramatta City Council as future owners of the site.

Section B

Purpose of the plan[4] which is the subject of this audit:

I certify that, in my opinion:

(B1)

☐ The nature and extent of the contamination **has** been appropriately determined

☐ The nature and extent of the contamination **has not** been appropriately determined

AND/OR (B2)

☐ The investigation, remediation or management plan **is** appropriate for the purpose stated above

☐ The investigation, remediation or management plan **is not** appropriate for the purpose stated above

AND/OR (B3)

☐ The site testing plan:

☐ **is** appropriate to determine

☐ **is not** appropriate to determine

if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

AND/OR (B4)

☐ The terms of the approved voluntary management proposal* or management order** (strike out as appropriate):

☐ **have** been complied with

☐ **have not** been complied with.

*voluntary management proposal no.

**management order no.

AND/OR (B5)

☐ The site **can be made suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

[4] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

~~☐ Residential, including substantial vegetable garden and poultry~~

~~☐ Residential, including substantial vegetable garden, excluding poultry~~

~~☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

~~☐ Day care centre, preschool, primary school~~

~~☐ Residential with minimal opportunity for soil access, including units~~

~~☐ Secondary school~~

~~☐ Park, recreational open space, playing field~~

~~☐ Commercial/industrial~~

~~☐ Other (please specify):~~

~~IF the site is remediated/managed* in accordance with the following plan (**attached**):~~

~~*Strike out as appropriate~~

~~Plan title~~

~~Plan author~~

~~Plan date~~ ~~No. of pages~~

~~SUBJECT to compliance with the following condition(s):~~

~~Overall comments:~~

Part III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997.*

Accreditation no. 0802

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed 

Date 21 June 2019

Part IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remediation plan or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use or uses of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **Conditions must not be** imposed on a Section A1 site audit statement. Auditors may include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information satisfying guidelines made or approved under the *Contaminated Land Management Act 1997*

(CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the CLM Act or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of *the Environmental Planning and Assessment Act 1979*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section B

In Section B the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement. The condition must not specify an individual auditor, only that further audits are required.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

Part III

In **Part III** the auditor certifies their standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to

- the **NSW Environment Protection Authority**: nswauditors@epa.nsw.gov.au or as specified by the EPA

  AND

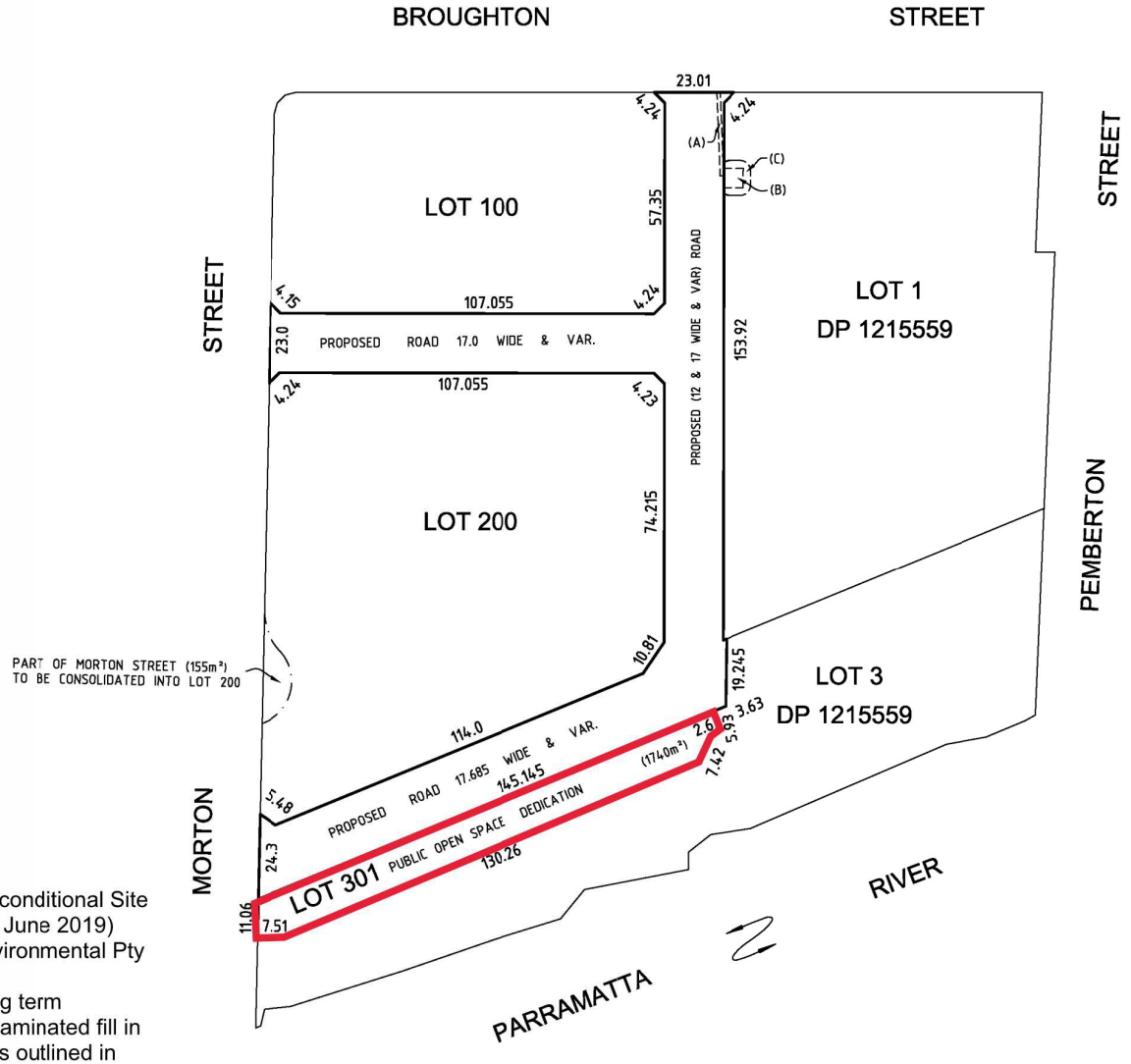
- the **local council** for the land which is the subject of the audit.

CITY OF PARRAMATTA

DEVELOPMENT CONSENT APPROVED
DA/164/2015/A
22/03/2017
RESPONSIBLE OFFICER: Alex McDougall

PROPOSED STAGE 3

DEDICATION OF PUBLIC ROADS AND PUBLIC OPEN SPACE AND REMOVAL OF TEMPORARY EASEMENTS



EXISTING EASEMENTS:-
(A) EASEMENT FOR UNDERGROUND CABLES 1.0 WIDE (DP1215559)
(B) EASEMENT FOR PADMOUNT SUBSTATION 5.5 WIDE (DP1215559)
(C) RESTRICTION ON THE USE OF LAND (DP1215559)

Boundary of Site covered by conditional Site Audit Statement SAS119 (21 June 2019) prepared by R. Hall, Zoic Environmental Pty Ltd.
This land is subject to the long term management of residual contaminated fill in accordance with requirements outlined in Prensa (May 2019) Environmental Management Plan Lot301, Morton St Parramatta NSW.

Surveyor: DAMIAN JOSEPH MAGUIRE Date of Survey: 11 NOV, 2016 Surveyor's Reference: 43119-DDP-3 Stages	PLAN OF PROPOSED SUBDIVISION LOT 201 (PART LOT 2 IN DP1215559)	LGA: PARRAMATTA Locality : PARRAMATTA Subdivision No: Lengths are in metres. Reduction Ratio 1:1000	Registered DP

Environmental Management Plan, Lot 301, Morton St Parramatta NSW

Probuild Pty Ltd

May 2019

This EMP is a working document. The site owner is required to update the EMP to ensure information within the EMP is current and up to date in regards to modifications to the site and legislative requirements. The EMP should be reviewed and updated every year by a suitably qualified environmental consultant or site auditor.

Level 1, 71 Longueville Road
Lane Cove NSW 2066
T: 02 8968 2500
E: admin@prensa.com.au
ABN: 12 142 106 581
Job No: 58165: Client No: P0012

Table of Contents

Table 1: Key Site Contact Details			
Company	**Position**	**Phone**	**Email**
City of Parramatta Council	Manager Open Space and Natural Resources	9806 5000	Council@cityofparramatta.nsw.gov.au
City of Parramatta Council	Manager Parks Services	9806 5000	Council@cityofparramatta.nsw.gov.au

Table 2: Emergency/Incident Contacts	
Department	**Phone**
Emergency	000
NSW EPA Environment Line	131 555
City of Parramatta Council	1300 617 058
Local Gas Authority – Jemena	13 29 03
Local Water Authority – Sydney Water	13 20 90
Local Power Authority – Ausgrid	13 13 88

1 Introduction

Prensa Pty Ltd was engaged by Probuild Pty Ltd (Probuild) to develop an Environmental Management Plan (EMP) for Lot 301 Morton St, Parramatta, NSW ("the site", Figure 1). This EMP will be used for the management of asbestos related health and environmental risks associated with buried asbestos-containing materials (ACM) on site.

This EMP has been developed in accordance with current New South Wales state legislation, industry standards, codes of practice and guidance documents for the management of ACM in workplaces.

Pending its approval by a NSW Site Auditor (Contaminated Land) and the City of Parramatta Council (Council), the implementation and upkeep of this EMP is the responsibility of Council.

2 Summary of Contamination

The site, which is approximately 1,740 m^2 in area, is to be used as Open Space. Previous works identified asbestos in soil in the form of bonded fibre cement and asbestos fines in fill material across the extent of the site (Figure 2). As a result, a decision was made to remediate the site, which was completed in October 2018.

The remediation consisted of removing asbestos-impacted material to a depth of 300 mm below the final surface. The "remediation excavation surface" was covered with a high visibility geofabric marker layer, and 300 mm of virgin excavated natural material (VENM). A condition of this remediation methodology was the creation of this Environmental Management Plan, which has been designed to manage ongoing health risks to construction workers associated with the remaining capped asbestos-impacted material on site.

3 Objective

The objective of this EMP is to act as a detailed environmental management framework to inform future owners/maintenance workers on precautions and risk mitigation requirements to ensure maintenance workers are protected if exposed to residual contamination and/or corrective action to restore the cap to allow the continued safe use of the land by the general public.

The EMP will:

- Summarise the identified asbestos issues at the site requiring ongoing management;
- Outline the legislative and regulatory guidelines relevant to this EMP;
- Identify the roles and responsibilities of persons responsible for the implementation of this EMP;
- Outline a framework for the ongoing management of the site, including periodic inspections and associated record keeping; and
- Outline procedures for investigation of non-conformances.

Site personnel including subcontractors are to be inducted and to understand their responsibilities with regards to this EMP in the event of conducting works that may disturb asbestos impacted soils.

The EMP is to be a "live" document that is revised and updated where necessary to reflect any changes to the work environment that result in a change to asbestos exposure risk factors and associated asbestos controls. As soon as reasonably practicable, after such a change is identified, the EMP must be revised by a competent person, asbestos hygienist or licensed asbestos assessor as nominated by Council.

4 Legislation

The EMP has been developed in accordance with the following legislation, industry standards, codes of practice and guidance documents, other reference documents are stated throughout the EMP:

- NSW *Work Health and Safety Act,* 2011;
- NSW *Work Health and Safety Regulation,* 2017;
- NSW *Code of Practice: How to Manage and Control Asbestos in the Workplace,* 2016;
- NSW *Code of Practice: How to Safely Remove Asbestos,* 2016;
- Australian Standard (AS) 2601-2001 *The demolition of structures*;
- *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition* [NOHSC:3003(2005)];
- AS 4964-2004 *Method for the qualitative identification of asbestos in bulk samples*;
- AS 2985-2009 *Workplace atmospheres - Method for sampling and gravimetric determination of respirable dust;*
- AS 3640-2009 *Workplace atmospheres - Method for sampling and gravimetric determination of inhalable dust;*
- *Protection of the Environment Operations Act,* 1997;
- *Protection of the Environment Operations (Waste) Regulation* 2014;
- National Environment Protection Council (NEPC) – *National Protection (Assessment of Site Contamination) Amendment Measure No.1 2013* (NEPAM, 2013);
- NSW *Code of Practice for the Control of Workplace Hazardous Substances,* 2006;
- Australia/New Zealand Standard (A/NZ) 4360:2004 *Risk Management*;
- AS 1319-1994 *Safety signs for the Occupational Environment;*
- AS/NZS 1716 2012 Respiratory Protective Devices; and
- AS/NZS 1715 2009 Selection, use and maintenance of respiratory equipment.

5 Asbestos in Soil Exposure Pathway

Based on the physical and toxicological properties of asbestos, the primary route of exposure to asbestos by humans is through the inhalation of airborne asbestos fibres. Given the Sites proximity to Parramatta River there is potential for offsite migration of soils as a result of flooding which could result in an additional offsite exposure risk. The management techniques outlined in this EMP must be adopted to minimise the exposure of site users and site workers to the identified ACM, via the inhalation pathway. The management techniques should also minimise the chance of offsite migration occurring.

Full implementation of the EMP will also ensure the residual risk of off-site migration of asbestos airborne fibres, or asbestos impacted soil, remains low.

Similarly, the nature of residual asbestos contamination in soil does not pose a risk to groundwater.

6 Environmental Management Framework

This section outlines the management framework and procedures required to implement this EMP at the site.

This EMP is a long term EMP. The site is expected to be kept in its current state for the foreseeable future, or until land use changes enforce additional changes, or until further remediation occurs. The EMP is legally enforceable under the Environmental Planning and Assessment Act 1979 and the Contaminated Land Management Act 1997.

6.1 Roles and Responsibilities

The EMP must be maintained and implemented by all current and future landowners as required. Major roles and responsibilities for implementing the EMP are presented in **Table 3**.

Table 3: Roles and Responsibilities

Role	Responsible Person	Responsibilities
Environmental Site Manager[1]	To be nominated by Land Owner[2], but likely to be the Property & Environment Manager (or its equivalent) at City of Parramatta Council .	Responsible for the implementation of the EMP, including updating if required. Responsible for inductions.
Principal Contractor/ Contractors / maintenance workers	Contractors engaged by Council to undertake works at the Site.	Undertake works in accordance with this EMP. In the event the geofabric marker layer is compromised, a NSW Class A licensed asbestos removalist must be engaged to fulfill the role of Principal Contractor
Environmental Consultant or Competent Person[3]	Environmental Consultant/ Competent Person engaged by the Land Owner to undertake works e.g. sampling, site inspections etc.	Assist with the implementation of the EMP and undertake works in accordance with this EMP.

[1] The Environmental Site Manager should be suitably qualified, aware of the existing conditions at the Site, capable of identifying potential ACM and able to implement appropriate contingency actions (if required).

[2] The Land Owner will be ultimately responsible for the implementation of the EMP and management of asbestos at the Site.

[3]The Competent Person is asbestos trained, is capable of identifying potential ACM and can assist with the implementation of the EMP. They should be qualified as a licensed asbestos assessor.

6.1.1 Site Induction

Responsible Party: Environmental Site Manager

It is recommended that an Environmental Site Manager is appointed by the Council to enforce the proposed management controls. The Environmental Site Manager will be responsible for ensuring that all site workers, including maintenance staff, contractors and sub-contractors are inducted into the requirements of this EMP and that adequate controls are in place.

6.1.2 Document and Reporting

Responsible Party: Environmental Site Manager

Relevant documentation regarding the implementation of this EMP should be maintained by the Environmental Site Manager. The documentation may include (but is not limited to):

- Site plans, identifying the location of the designated asbestos-impacted soil areas;
- Air monitoring and clearance certifications;
- Revisions of the EMP and asbestos register for the site;
- Asbestos-related incident reports;
- Staff and contractor inductions and training records;
- Relevant environmental reports;

6.1.3 Unexpected ACM finds, including:

  - Location and quantity of ACM;
  - Condition of ACM;
  - Amount of soil segregated with ACM;
  - Where ACM and ACM-impacted soil has been stockpiled; and
  - Details of disposal along with tipping dockets;

- Movements of asbestos-impacted soil across the site; and
- Photographic evidence.

It will be the responsibility of the Environmental Site Manager to review and update the records as required and to implement corrective action where necessary.

6.1.4 Site Plans

Responsible Party: Land Owner and Environmental Site Manager

The location areas of identified ACM should be clearly marked out on site plans. The plans should be included in site inductions and used during quarterly inspections to ensure appropriate areas of the Site are covered.

Figure 1 in the 'Figures' Section of this EMP outlies the approximate location of the asbestos impacted soils, based on information known at the site.

6.2 Public Notification

Responsible Party: Council

The EMP is required to be added to Council's records management system, which is made publically available in accordance with the Government Information (Public Access) Act 2009.

While services are present on site, no services were installed during remediation works on site. Council should ensure they are notified of Dial Before You Dig (DBYD) searches associated with the existing services on site.

Should major earthworks occur below the capping layer, SafeWork NSW will also require notification, given the underlying soil is assumed to be impacted by friable asbestos.

7 Capping of Impacted Areas

A capping layer has been installed over the asbestos-impacted soils. It is imperative this capping layer is maintained. The capping layer consists of:

- A water permeable, high visibility marker layer;
- A 300 mm thick cap consisting of certified Virgin Excavated Natural Material (VENM);
- An Enkamat layer designed to promote soil stabilisation and vegetation growth; and
- Overlying grassed surface.

No vegetation was retained on site during or after the remediation works on site. This EMP provides basic advice only, regarding capping of asbestos impacted soils. Detailed specifications were outlined in the remediation action plan (Prensa report reference 58165_RAP_301 Morton St Parramatta_V2) and existing conditions at the conclusion of remediation activities have been presented in the validation of remediation (Prensa report reference 58165_Validation_V1).

8 Planning for Future Works

8.1 General landscaping activities

Works associated with general landscaping activities, such as mowing and minor earthworks that do not breach the capping layer, must ensure that at the conclusion of activities, the 300 mm cap across the site is retained. Where erosion or deterioration of the cap is expected, the relevant contractors must contact Council.

8.2 Works Associated with Tree Management

Several trees were imported onto site as part of landscaping works, which will require management for the foreseeable future. Primarily, soil surrounding the tree roots needs to be managed. The capping layer above the tree roots must not break through the soil surface. Where this occurs, pruning of the relevant tree, and associated root-mass, will be necessary to ensure the ongoing integrity of the cap. Where damage to the geofabric in the event of a treefall or “root breakthrough” is identified, the cap must be repaired.

8.3 Works Associated with the Footpath;

Two footpaths cross the site, near the eastern boundary of the site, and across the swale towards the west of the site. Because both footpaths were constructed prior to remediation works commencing, it is possible they were placed directly on top of asbestos impacted soils. Therefore, the condition of the cement path must be included and noted as part of ongoing site inspections. Any works that break the integrity of the concrete footpaths must be undertaken with reference to guidance provided in Section 8 and the Prensa (2018) RAP. If the concrete footpaths are damaged, they must be restored to their original condition at the completion of works.

8.4 Works Associated with Services

A drainage pipe riser was noted on site, indicating a drainage line is likely present beneath the site. It is unclear whether the drainage pipe was laid into clean soils on site. As a result, planning for future works associated with the drainage services on site must assume the potential to encounter asbestos impacted soils on site, and must implement the controls detailed in Section 9.

If excavation works associated with drainage services occur, asbestos impacted soils must be classified and disposed of off-site. Asbestos impacted soils may not be re-instated around services. Where possible, a geofabric marker layer should separate the services from impacted soils, and the void backfilled with VENM. The capping layer must also be restored at the completion of works.

Similar works associated with digging trenches on site, or other maintenance works on the site (including maintenance of the cap itself) must ensure the integrity of the cap is intact at the conclusion of works.

9 Planning for Future Works

In the event that future works are undertaken at the site in areas where asbestos-impacted soils have been identified and are likely to be disturbed (i.e. below the geofabric marker layer), the following protocols must be implemented.

9.1 Site Setup

9.1.1 Health and Safety

Responsible Party: Environmental Site Manager

Prior to commencement of works at the Site, workers undertaking earthworks must be inducted in accordance with this EMP and all works must be undertaken in line with this EMP.

The minimum health and safety requirements for the site include the following:

- Workers and staff, undertaking earthworks, must have an understanding of the asbestos in soil contamination issues at the site;
- Subcontractors must provide safe work method statements (SWMS) to Council nominated Environmental Site Manager for review prior to the commencement of works ensuring control measures associated with the asbestos is included;
- In the event that the geo-textile layer of the cap is likely to be breached due to works (approximately 300 mm below ground level) a five day notification to SafeWork NSW is required;
- An appropriately licensed asbestos removalist contractor may be required for works (Class B – non-friable asbestos removalist) and a Licensed Asbestos Assessor. Should friable asbestos be identified on site, a Class A licence (friable asbestos) will be required by the removalist;
- Workers and staff, undertaking soil related activities where asbestos was identified or suspected, must wear the appropriate personal protective equipment (PPE) as outlined in **Appendix B** of this EMP;
- The asbestos work areas must be barricaded and signed to prevent public access;
- Dust suppression techniques described in **Section 8.3** of this EMP must be employed;
- Designated smoking, eating and amenities areas must be established away from the work area. Care should be taken to ensure the amenities area are generally located upwind of the work area;
- Good hygiene practice, including washing of hands before eating, smoking or going to the toilet must be adopted by site workers; and
- Decontamination of personnel, equipment and plant (as required prior to leaving an asbestos work area).

9.1.2 Fencing and Signage

Responsible Party: Principal Contractor

The asbestos work zones must be secure and signed appropriately (e.g. 'Authorised Persons Only' or 'Specialised Work Zone') this must include the establishment of a physical barrier and an exclusion zone around the work zone.

For the purposes of this EMP an asbestos work zone is designated as an area where:

- Asbestos has previously been identified or there is the potential for asbestos contamination;
- Asbestos has been identified during excavation of fill material;
- Asbestos has been identified and is waiting to be removed by licensed asbestos removal contractor (including for waste disposal);
- The asbestos removal contractor is in the process of removing the asbestos from the soil; and
- An area where asbestos has been removed, but has not been cleared by the on-site hygienist/asbestos assessor.

This boundary must be maintained throughout the duration of the works. Contractors and site workers undertaking soil related activities and working in an asbestos work zone must be inducted into the EMP.

9.2 Erosion and Sediment Control

Responsible Party: Council

Erosion and sediment controls must be in place prior to commencement of work, especially in areas of highly erodible soil. This includes but is not limited to the following:

- Works are to be undertaken in line with Landcom (2004) *Managing Urban Stormwater – Soils and Construction* ("the blue book");
- Diversion of stormwater runoff on site where practicable;
- Sediment fences to be installed along boundaries or where works are to commence; and
- Appropriate stockpile management as outlined in Section 8.4.

The site surface must also be inspected immediately after inundation (i.e. flood events) to ensure the cap has not been compromised by scouring. This is further discussed in Section 9.9.

9.3 Excavation Procedure

Responsible Party: Principal Contractor

The following procedure should be employed should excavation be required on site:

- An environmental consultant should be engaged to guide the process;
- The excavation area should be minimised, and clearly defined, prior to works commencing (e.g. by spray paint of the boundaries of the proposed excavation);
- Turf and enkamat layer should be excavated and placed to one side of the excavation. Underlying VENM should also be excavated and placed to one side. Because of the risk of airborne asbestos fibres contaminating the turf and VENM, the material should be covered with HDPE plastic for the duration of excavation works;
- Black HDPE plastic should then be laid out on the other side of the trench, which the geofabric and excavated asbestos-impacted soil may be placed on;

- The geofabric should be manually cut, **not ripped out by the excavator**, and disposed of immediately and appropriately;
- Excavation may commence using a narrow bucket. The bucket be half-filled only, in order to minimise the risk of cross-contamination;
- Excavated soil must be placed on the HDPE;
- Excavated soil that is replaced must be replaced in the order in which it was excavated;
- Any asbestos-impacted soil that cannot be replaced into the excavation, must be disposed of off-site in accordance with the NSW EPA (2014) Waste classification guidelines: Part 1 – Classifying waste;
- The Geofabric layer must be re-instated. This will required new material to be stapled onto existing material;
- The 300 mm cap over the asbestos impacted soil must be re-instated, either with re-worked capping material already onsite, or imported VENM, which should be overlain with enkamat and turf. The soil should be compacted as appropriate in order to minimse the risk erosion, including consideration of the risk of scouring by future flood events;
- The health of the replaced turf layer must be monitored for at least six months after the completion of maintenance works. Unless otherwise agreed upon, responsibility for monitoring and implementing the EMP will thereafter return to Council.

9.4 Dust Suppression

Responsible Party: Principal Contractor

Dust suppression techniques will be used on site wherever dust may be generated. If possible, dust generating works should be suspended during windy days. Dust suppression techniques include the following:

- On large sites a water truck can be utilised to keep the soil surface moist prior to, and during, earthwork activities. Fine water mist spraying should be used to wet the soil. Direct flow or high pressure spraying of the soil must be avoided;
- The amount of traffic across the asbestos impacted soils must be minimised;
- When excavators are being used on site, the bucket should only be three quarter filled, ensuring soil does not fall out of the bucket, particularly when loading trucks;
- The excavator bucket should be emptied within the trucks tray (i.e. not allowing the soil to fall from height into the tray);
- If trucks are used to shift soil on site, these should be lined and covered with high-density polyethylene barriers;
- Shade cloth should erected along boundary fences to act as a wind break; and
- Any soil to be stockpiled, should be stockpiled on an impermeable surface and covered with high—density polyethylene plastic. Soil should be stockpiled away from any sensitive receptors including residents and stormwater drains.

9.5 Stockpile Management

Responsible Party: Principal Contractor

The following is required in the event that stockpiling of soil is required:

- Stockpiles must be established on 200 µm thick polythene sheeting on the ground surface;

- Dust suppression must be in place in accordance with Section 8.3 of this EMP;
- Stockpiles must not exceed two metres in height and shall be of the lowest height reasonably practicable;
- Stockpiles must be suitably barricaded or otherwise fenced off to prevent access; and
- At the conclusion of each day's work, stockpiles must be covered with 200 µm thick polythene sheeting.

9.6 Personal Protective and Respiratory Protective Equipment

Responsible Party: All workers entering work area

All personnel onsite are required to be wearing appropriate PPE in line with Council requirements. For workers within the asbestos work zone, the following PPE is also mandatory:

- Type 5 & 6 disposable coveralls (at the direction of the asbestos hygienist);
- Minimum P2 disposable mask, half face respirator with P2 particulate filter or P3 particulate filter (at the direction of the asbestos hygienist);
- Nitrile gloves; and
- Footwear that can be easily decontaminated (i.e. gumboots).

See **Appendix B** for further information on asbestos mandatory PPE.

9.7 Decontamination

Responsible Party: All workers entering asbestos work area

Where works are to occur in an area which has been identified as having non-friable asbestos, additional decontamination procedures are required. As non-friable asbestos has been identified on site, it is recommended that decontamination be undertaken using wet decontamination techniques where non-friable material is disturbed. This must include:

- A minimum three stage wet decontamination unit must be set up at the entrance to the work area;
- Workers must don disposable coveralls prior to entering the work area (at the direction of the asbestos hygienist);
- When leaving the work area all workers must make their way to the wet decontamination unit, and use as directed, in accordance with the NSW Code of Practice (2016) *How to Safely Remove Asbestos*;
- All tools and equipment used during the removal task must be decontaminated, before they are removed from the asbestos work area;
- Tools and equipment which cannot be decontaminated in the asbestos work area must be dedicated to asbestos removal work and double bagged in asbestos waste bags before being removed from the asbestos work area; and
- PPE including respirators must be inspected and wet wiped prior to removing these items from the work area.

9.8 Air Monitoring

Responsible Party: Competent Person

Asbestos fibre air monitoring must be undertaken during earth works by a licensed asbestos assessor. Air monitoring must be undertaken in accordance with the *Guidance Note on the Membrane Filter*

Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC: 3003 (2005); and AS ISO/IEC 17025 – 2005, *General requirements for the competence of testing* and calibration laboratories.

Air monitoring reports must be issued by a NATA accredited laboratory.

Works must cease if the air monitoring results are found to be above the laboratory limit of detection of 0.01 f/ml of air. Emergency procedures must be followed when air monitoring control levels are exceeded as outlined in **Appendix C**.

9.9 Clearances

Responsible Party: Competent Person

A site walkover must be undertaken by the asbestos hygienist at the end of each working day to confirm that no visible asbestos-containing soil remains on the capped surface of the site and any stockpiles have been wetted down, bunded and covered with polythene sheeting.

A clearance certificate must be prepared by the licensed asbestos assessor stating the capped layer has been re-instated to a practicable standard at the end of the project and provided to Council.

The site also requires inspection after inundation (flood) and heavy rain events, which present a risk of erosion from scouring. Advice has been received from a geotechnical engineer that the site surface would survive a one-in-one-hundred-year flood event. However, an inspection must confirm the cap is intact. Any erosion or degradation of the cap must be remediated at the earliest opportunity.

9.10 Disposal to Landfill – ACM Containing Soil

Responsible Party: Principal Contractor

Where material is to be removed off site, works are to be undertaken in accordance with NSW EPA 2014 Waste Classification Guidelines.

9.11 Stormwater Management

Responsible Party: Principal Contractor

Stormwater management is required to ensure stormwater and local water courses are not impacted by sediment or contaminated surface water runoff. Stormwater management techniques include the following:

- Ensure stormwater drains are covered/blocked with an impermeable barrier (hay bales, sand bags, geofabric liners) or fitted with a sediment filter; and
- Local water courses, such as creeks, lakes or open drains should also be protected from runoff with impermeable barriers, such as hay bales, sand bags and/or geofabric liners.

9.12 Noise

Noise should be kept to a minimum during site works. Works that involve noise should be only undertaken between the hours of 7 am and 5 pm, Monday to Saturday.

9.13 Housekeeping

Regular inspection of the site should be undertaken to ensure on-site contamination is not being spread off-site. Trucks entering and leaving the Site can transport contaminated soil and dust onto the surrounding roads, which in turn can be washed into the stormwater network. If trucks are used on site, truck wheel wash bays should be installed. Street cleaning trucks should also be utilised to clean the road surfaces if soil continues to migrate off-site.

Housekeeping is an important part of daily site work operations. Each sampling point should be reinstated at the completion of each location. The areas should be reinstated as soon as practicable to maintain the safe state and function of the Site. This will ensure dust levels are kept to a minimum, stormwater runoff is free of contaminated soil or sediment and contaminated soil or groundwater does not migrate off-site. Where possible the surface should be returned to its original state, i.e reinstatement with a health grass cover.

10 Monitoring & Perpetual Care

Responsibility: Environmental Site Manager and NSW EPA

A key component for ensuring that harm to the environment and site users is minimised / mitigated is to conduct routine inspections of the work area, to report any non-conformances and implement associated corrective actions (where required).

10.1 Routine site inspections

It is recommended that Council facilitate the implementation of routine site inspections (e.g. annually), to be carried out by an appropriately qualified person. As part of the conditions of handing the site over to Council for ongoing management, the implementation of routine and special event monitoring is to be undertaken by the Council. This will ensure that environmental controls recommended in the EMP are being correctly implemented and that if there are non-conformances or incidents they are promptly reported so that corrective actions may take place. The site inspection should be carried out by a competent person from Council or on behalf of Council, and will assess for the following:

- Asbestos presence/absence across the surface of the impacted areas;
- Whether the visual marker layer has been exposed; and
- Whether any unauthorised excavation activities have been conducted within the impacted area.

Records of routine site inspections should be kept by the Environmental Site Manager and be made available for inspection by the NSW EPA upon request.

The inspection is to be carried out on a quarterly basis for the first twelve months after the completion of remediation works, and annually thereafter.

The inspection shall include the following details as a minimum:

- Date;
- Authorised personnel conductions the inspection;
- Specific activities being undertaken;
- Level of compliance with the EMP. Assessments of any works not being undertaken in accordance with the EMP (i.e. non-conformances);
- Condition of all environmental controls, which should also be recorded by photographs;
- Any incidents identified; and
- Specific site observations should include:
    - Identification of Potentially Asbestos Containing Materials, documenting and recording any fragments noted on the surface; and
    - Assessment of current ground conditions in locations identified as containing asbestos. Special attention should be given to groundcover i.e. disturbed, dry, dusty etc. Any notable erosion in the area should be noted.

When observing the final surface, the assessor should note:

- Whether cap integrity is maintained, and whether erosion is present;
- Whether the overlying turf layer is healthy;
- Whether any geofabric is showing through or exposed to the surface;
- Whether any works have been undertaken within the area, and if so whether all requirements set out in this EMP have been followed; and
- Whether additional controls are required on site.

Observations should be made during the regular maintenance of the grounds. Should any of the previously discussed assessment items be identified i.e. damage to cap or asbestos noted on the surface, an inspection by a competent person from Council or on behalf of council should be undertaken.

Maintenance of vegetation on site, including the turf layer, should be undertaken by a suitably qualified landscaper.

Should additional capping material be required to maintain the capping layer on site, imported material must meet be Virgin Excavated Natural Material (VENM), and maintenance works must ensure the site meets the remediation goals detailed in the Remediation Action Plan.

Additional monitoring may be required in the instance that infrastructure on site (e.g. footpaths, drains) require replacement as a result of a catastrophic event such as a major flood.

Additional inspections will also be deemed necessary after inundation (see Section 9.9), after "extremely wet days" and upon the completion of earthworks on site. "Extremely wet days" are defined by the Bureau of Meteorology as "Annual total precipitation when daily precipitation >99th percentile". Due to the summer dominance of rainfall at this location, determination of heavy rain should be against the monthly averages, not yearly. The nearest Bureau of Meteorology weather station to the site is at Homebush Bay (site 06195), and it is assumed that rainfall at this location is representative of rainfall on site.

The site is adjacent the Parramatta River. In order for a flooding event to occur, the water level would be required to rise to approximately 5.2 m AHD from its regular height of 4.0 m AHD to breach the riparian vegetation and inundate the site. Should water height reach these levels an inspection would be required once water levels have receded.

10.2 Environmental Records

Environmental records which will be collated shall include the following;

- EMP distribution records;
- Training and induction records;
- Environmental incident reports;
- Environmental complaint records;
- Non-conformances and corrective and preventative action reports;
- Environmental site inspection, quarterly and unscheduled checklists; and
- Environmental monitoring data and reports (e.g. any air monitoring results, waste classification reports, site investigation reports etc.).

The site inspection observations and action record sheet is included in **Appendix B** of this EMP.

10.3 Revision of EMP

This EMP is a working document. The site owner is required to update the EMP to ensure information within the EMP is current and up to date in regards to modifications to the site and legislative requirements. The EMP should be reviewed and updated every year by a suitably qualified environmental consultant or site auditor to reflect the following:

- Updates to legislation;
- Physical changes to the site;
- Changes to the site use;
- In the event the site owner changes.

11 Unexpected Finds Protocol (UFP)

Responsible Party: Environmental Site Manager and Environmental Consultant/Competent Person

This UFP has been developed for the purpose of providing guidance to site workers and users in relation to unexpected contamination being identified within the impacted areas at the site to ensure the health and safety of staff, contractors and visitors.

Any material that is uncovered deemed to be foreign, be that imported fill material or building waste, should be scrutinised further to determine if asbestos or other contaminants are present. The main features to look for are:

- Soil or fill material that differs from the previously identified materials onsite;
- Material containing anthropogenic artefacts such as rubble, plastics, metal etc;
- Asbestos or suspected asbestos containing material, although this is expected *below* the geofabric marker layer only;
- Material with fibres visible;
- Material with an obvious unnatural odour i.e. fuel, solvent, burnt odour;
- Material that is noticeably stained in colour;
- Archaeological artefacts; and
- Any material that has evidently been dumped on site.

These materials may require additional assessment or management. Prior to the commencement of works onsite a WH&S induction should be undertaken. The requirements of the EMP should be discussed at this point with additional consideration placed on the UFP.

If a UFP is triggered during works, the following protocol is to be followed:

- Cease disturbance of the affected area and assess the risk of the unexpected find using the UFP Proforma in **Attachment D**;
- Erect barricades / minimise access to the area;
- Contact the Environmental Consultant (if required);
- Further investigation and management may be required; and
- Following clearance of the unexpected findings, areas can be reopened for work.

Investigation of suspected contamination identified as a UFP should be undertaken in accordance with the following guidelines:

- NSW Office of Environment and Heritage (OEH) (2011) – Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011);
- NSW EPA (1995) – Sampling Design Guidelines;

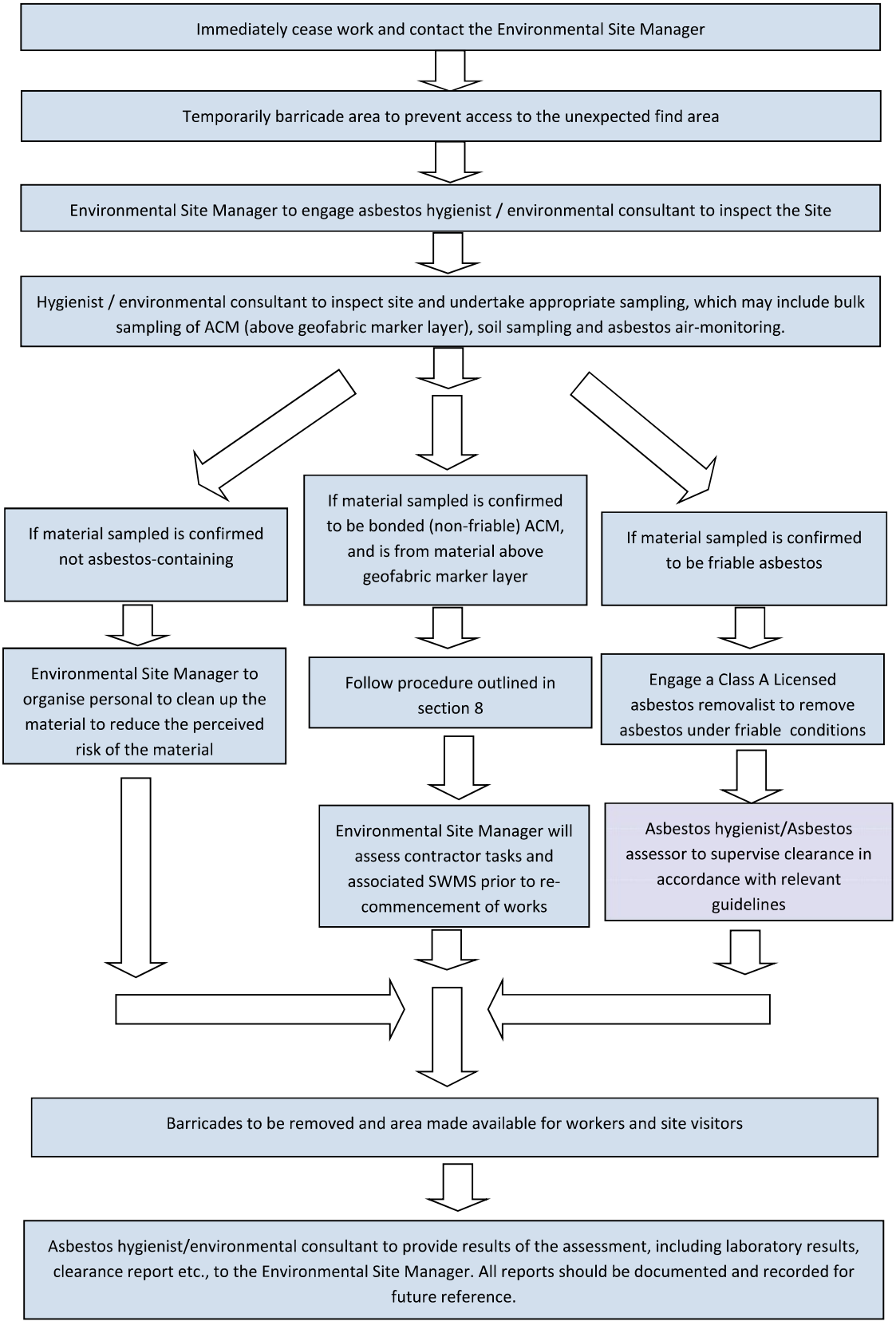
- NEPAM (2013):
    - Schedule B1 – Investigation Levels for Soil and Groundwater;
    - Schedule B2 – Site Characterisation; and
    - Schedule B6 – Framework for Assessment of Groundwater Contamination.

If suspected contamination and/or hazardous material is encountered the "Unexpected Findings Protocol Proforma" should be completed, with a brief description of the material reported and the location of the material identified with a sketch. An example UFP proforma has been provided in Appendix D.

In the event that suspected non-friable *or* friable* asbestos is identified outside areas on site already identified as asbestos impacted, the flow chart procedures outlined below should be undertaken.

*Friable asbestos is usually in the form of loose asbestos that is not bound together. The most common forms of friable asbestos are thermal lagging used on steampipes, boilers, as fire protection, ceiling insulation and the like, and raw asbestos waste from asbestos products manufacturing. Friable asbestos can usually be broken up or crumbled using hand pressure to generate free fibres. If it is disturbed, friable asbestos has the potential to generate significant quantities of airborne fibres, and because of this requires a high level of control.

Unexpected Finds Protocol



12 Emergency Response

Responsible Party: Site Workers/Contractors

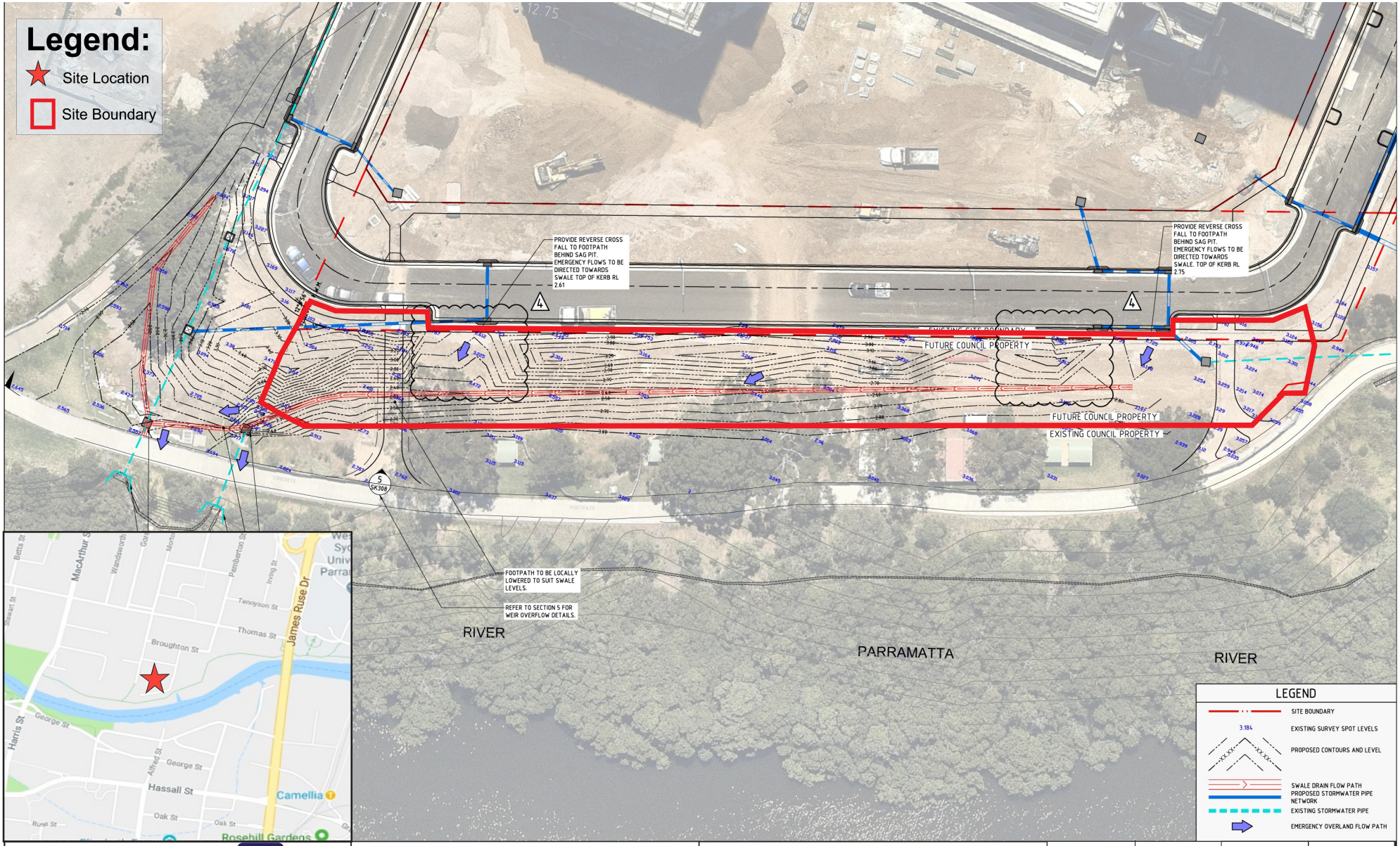
Emergency contact details are outlined in **Table 2** in the 'Contact Details' section of this EMP.

In the event of an emergency arising on the site, appropriate action should be taken. Site evacuation procedures should be followed, as necessary.

13 Conclusion

This EMP has been developed to manage potential risks associated with asbestos impacted soils being uncovered during works on site. Implementation of the control measures outlined in this EMP will assist in minimising the potential health risks to site users, and manage the pre-existing ACM contamination at the Site.

Figures



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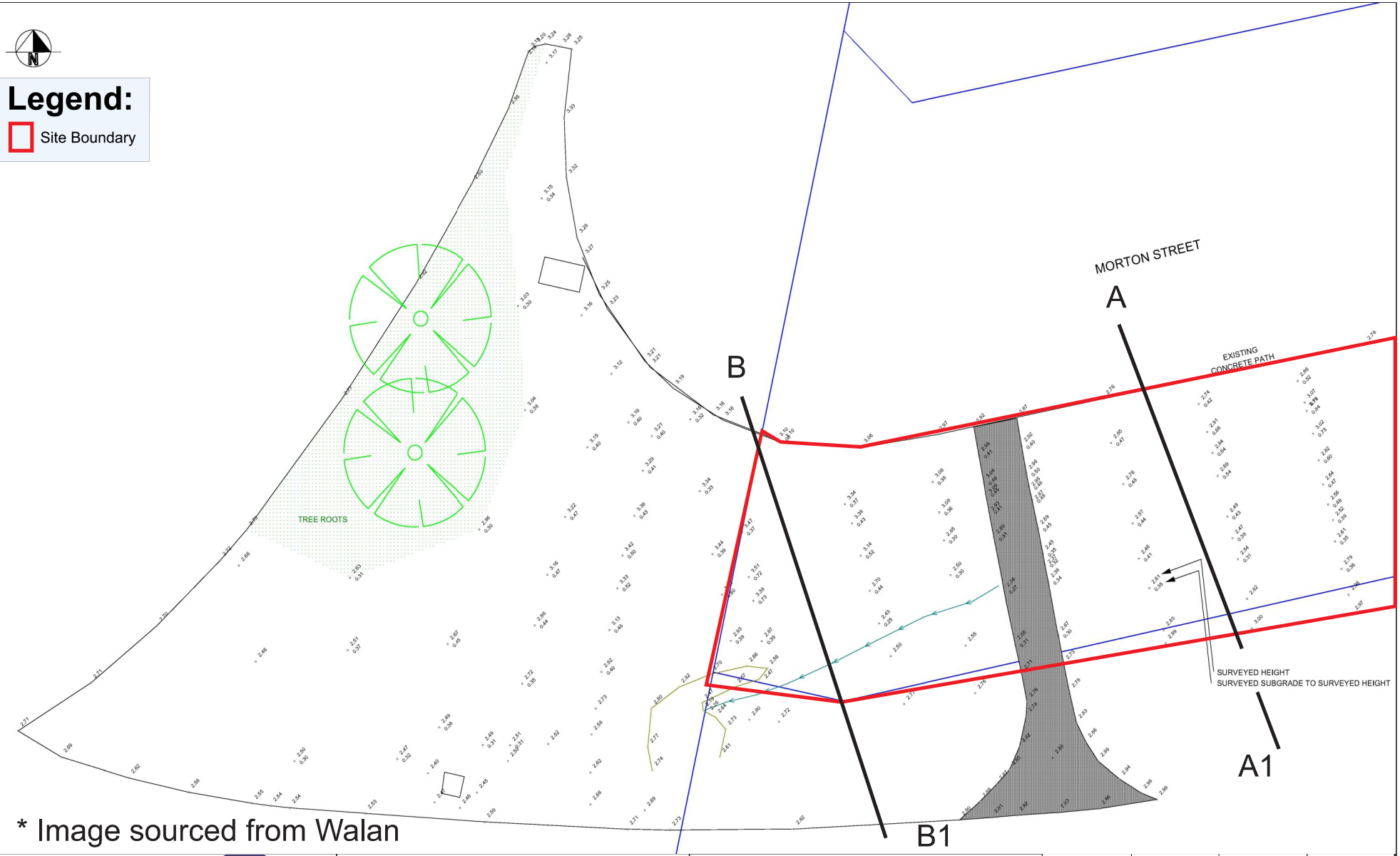
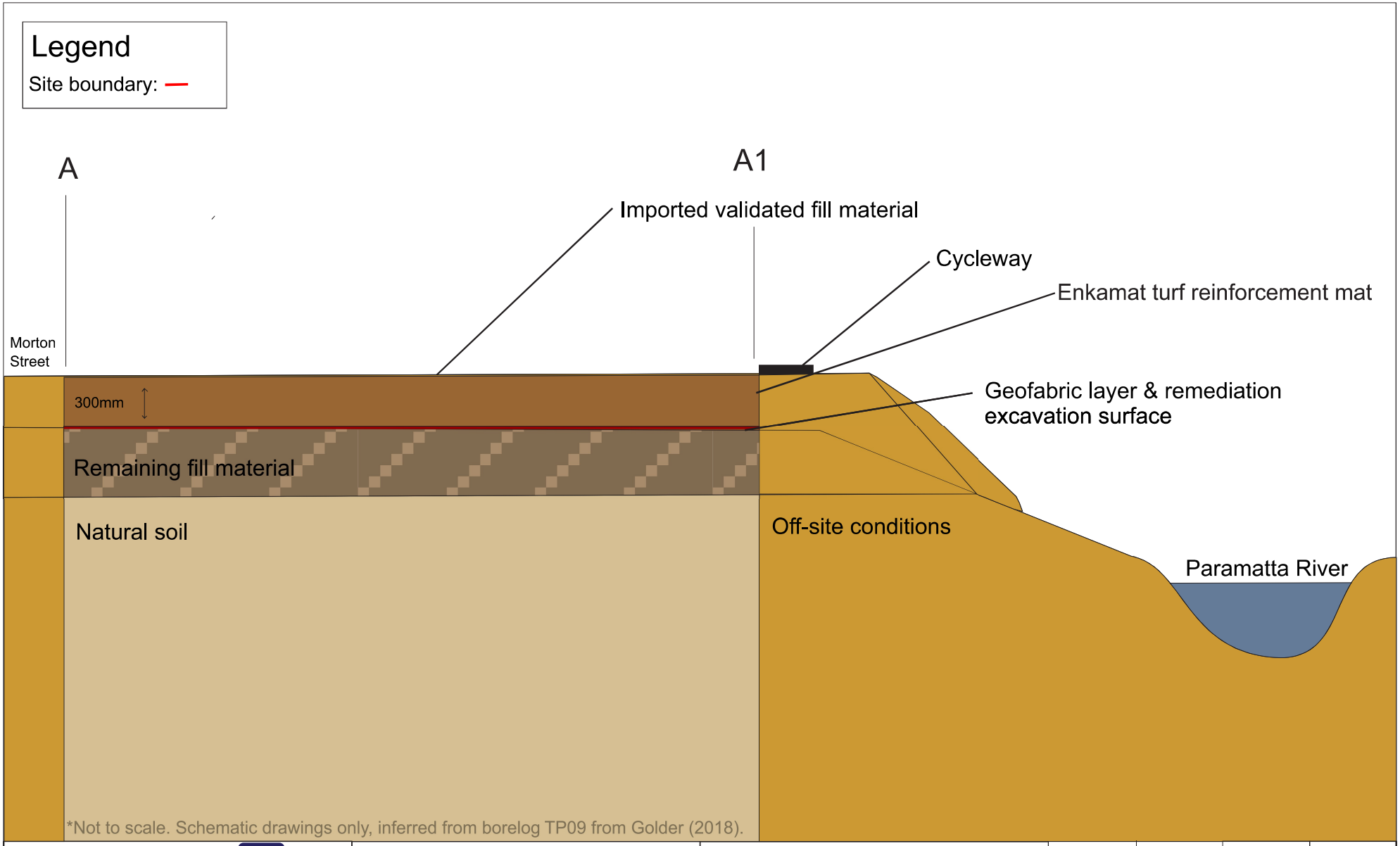
Level 1, 71 Longueville Road, Lane Cove NSW 2066 sydneyadmin@prensa.com.au P: (02) 8968 2500 F: (02) 8968 2599 www.prensa.com.au	Project: Morton Street EMP Job No.: 58165	Drawing Title: SITE LOCATION FIGURE	File name: 58165 EMP Figures V4		Figure number: 1	Revision: A

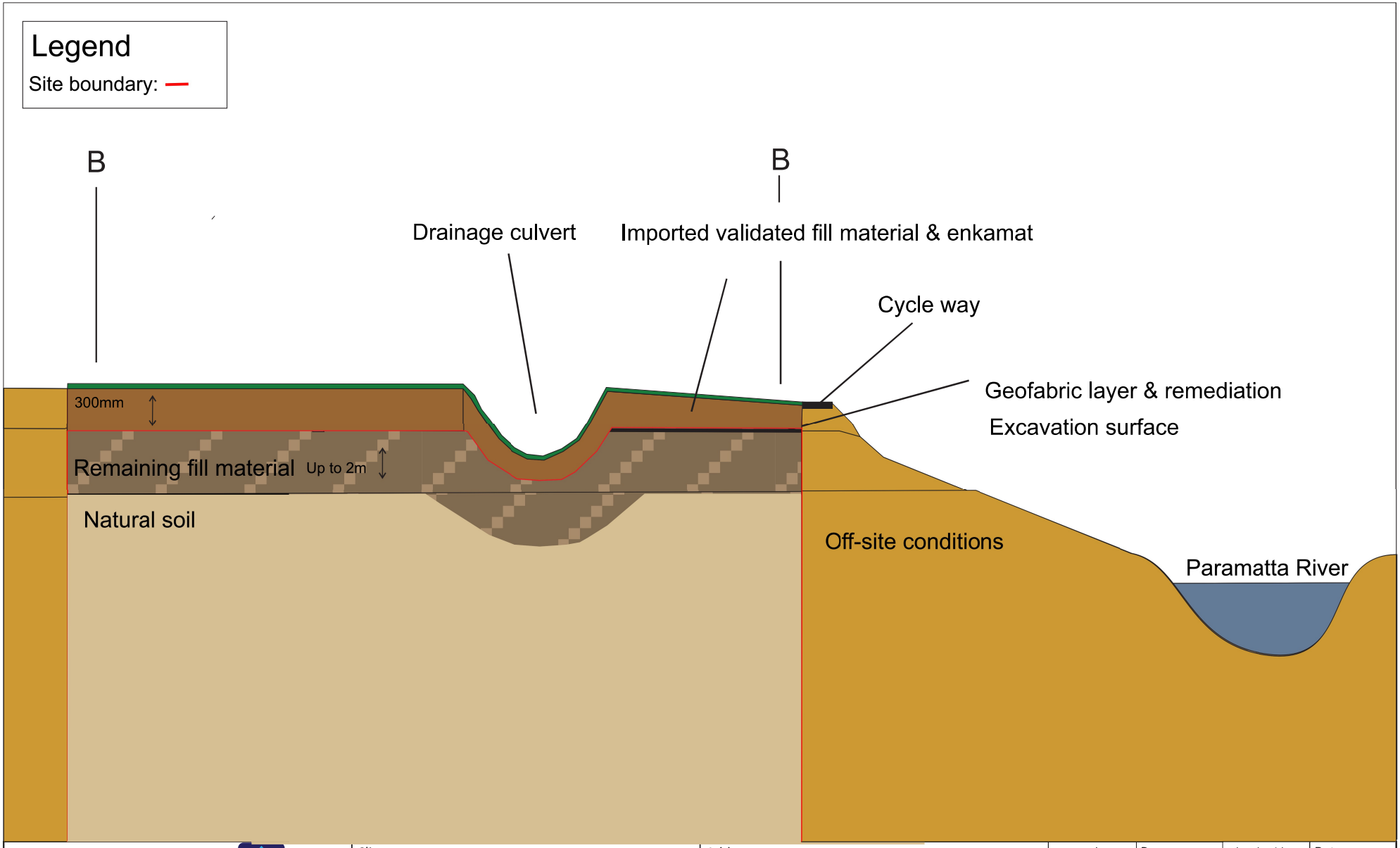


* Image sourced from Walan

prensa	Client: Probuild Client No.: P0012	Address: 2 Morton Street, Parramatta	Drawn by: MXP	Date: 25/01/2019	Checked by: JXB	Date: 25/01/2019
Level 1, 71 Longueville Road, Lane Cove NSW 2066 sydneyadmin@prensa.com.au P: (02) 8968 2500 F: (02) 8968 2599 www.prensa.com.au	Project: Morton Street EMP Job No.: 58165	Drawing Title: Site Survey	File name: 58165 EMP Figures V4		Figure number: 2	Revision: A



prensa	Client: Probuild Client No.: P0012	Address: 2 Morton Street, Parramatta	Drawn by: MXP	Date: 11/02/2019	Checked by: DMF	Date: 11/02/2019
Level 1, 71 Longueville Road, Lane Cove NSW 2066 sydneyadmin@prensa.com.au P: (02) 8968 2500 F: (02) 8968 2599 www.prensa.com.au	Project: Morton Street EMP Job No.: 58165	Drawing Title: Capping Stage 3A: Imported Fill Material	File name: 58165 EMP Figures V4		Figure number: 3	Revision: A



prensa	Client: Probuild Client No.: P0012	Address: 2 Morton Street, Parramatta	Drawn by: MXJ	Date: 25/01/2019	Checked by: JXB	Date: 25/01/2019
Level 1, 71 Longueville Road, Lane Cove NSW 2066 sydneyadmin@prensa.com.au P: (02) 8968 2500 F: (02) 8968 2599 www.prensa.com.au	Project: Morton Street EMP Job No.: 58165	Drawing Title: Stage 3B: Site Capping	File name: 58165 EMP Figures V4		Figure number: 4	Revision: A

Appendix A: Statement of Limitations

This document has been prepared in response to specific instructions from Probuild Pty Ltd to whom the report has been addressed. The work has been undertaken with the usual care and thoroughness of the consulting profession. The work is based on generally accepted standards, practices of the time the work was undertaken. No other warranty, expressed or implied, is made as to the professional advice included in this report.

The report has been prepared for the use by Probuild Pty Ltd and the use of this report by other parties may lead to misinterpretation of the issues contained in this report. To avoid misuse of this report, Prensa advise that the report should only be relied upon by Probuild Pty Ltd and those parties expressly referred to in the introduction of the report. The report should not be separated or reproduced in part and Prensa should be retained to assist other professionals who may be affected by the issues addressed in this report to ensure the report is not misused in any way.

Prensa is not a professional quantity surveyor (QS) organisation. Any areas, volumes, tonnages or any other quantities noted in this report are indicative estimates only. The services of a professional QS organisation should be engaged if quantities are to be relied upon.

Sampling Risks

Prensa acknowledges that any scientifically designed sampling program cannot guarantee all sub-surface contamination will be detected. Sampling programs are designed based on known or suspected site conditions and the extent and nature of the sampling and analytical programs will be designed to achieve a level of confidence in the detection of known or suspected subsurface contamination. The sampling and analytical programs adopted will be those that maximises the probability of identifying contaminants. Probuild Pty Ltd must therefore accept a level of risk associated with the possible failure to detect certain sub-surface contamination where the sampling and analytical program misses such contamination. Prensa will detail the nature and extent of the sampling and analytical program used in the investigation in the investigation report provided.

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Soil contamination can be expected to be non-homogeneous across the stratified soils where present on site, and the concentrations of contaminants may vary significantly within areas where contamination has occurred. In addition, the migration of contaminants through groundwater and soils may follow preferential pathways, such as areas of higher permeability, which may not be intersected by sampling events. Subsurface conditions including contaminant concentrations can also change over time. For this reason, the results should be regarded as representative only.

Probuild Pty Ltd recognises that sampling of subsurface conditions may result in some cross contamination. All care will be taken and the industry standards used to minimise the risk of such cross contamination occurring, however, Probuild Pty Ltd recognises this risk and waives any claims against Prensa and agrees to defend, indemnify and hold Prensa harmless from any claims or liability for injury or loss which may arise as a result of alleged cross contamination caused by sampling.

Reliance on Information Provided by Others

Prensa notes that where information has been provided by other parties in order for the works to be undertaken, Prensa cannot guarantee the accuracy or completeness of this information. Probuild Pty Ltd therefore waives any claim against the company and agrees to indemnify Prensa for any loss, claim or liability arising from inaccuracies or omissions in information provided to Prensa by third parties. No indications were found during our investigations that information contained in this report, as provided to Prensa, is false.

Recommendations for Further Study

The industry recognised methods used in undertaking the works may dictate a staged approach to specific investigations. The findings therefore of this report may represent preliminary findings in accordance with these industry recognised methodologies. In accordance with these methodologies, recommendations contained in this report may include a need for further investigation or analytical analysis. The decision to accept these recommendations and incur additional costs in doing so will be at the sole discretion of Probuild Pty Ltd and Prensa recognises that that Probuild Pty Ltd will consider their specific needs and the business risks involved. Prensa does not accept any liability for losses incurred as a result of Probuild Pty Ltd not accepting the recommendations made within this report.

Appendix B: Site Records

SITE INDUCTIONS

Name	Company	Date	Signature	Inducted by

SITE OBSERVATIONS

Date	Zone	Observation	Action

SITE OBSERVATIONS

Date	Zone	Observation	Action

SITE INVESTIGATION

Date	Zone	Authorised personnel conducting investigation	Specific activities being undertaken	Level of compliance with the EMP.	Condition of all environmental controls	Any incidents identified	Specific site observations

Appendix C: Asbestos Materials Personal Protective Equipment (PPE)

Asbestos Materials Personal Protective Equipment (PPE)

During ACM impacted soil abatement works, PPE must be worn by the licensed contractor, the hygienist/asbestos assessor and other personnel who are required to enter the asbestos impacted removal area.

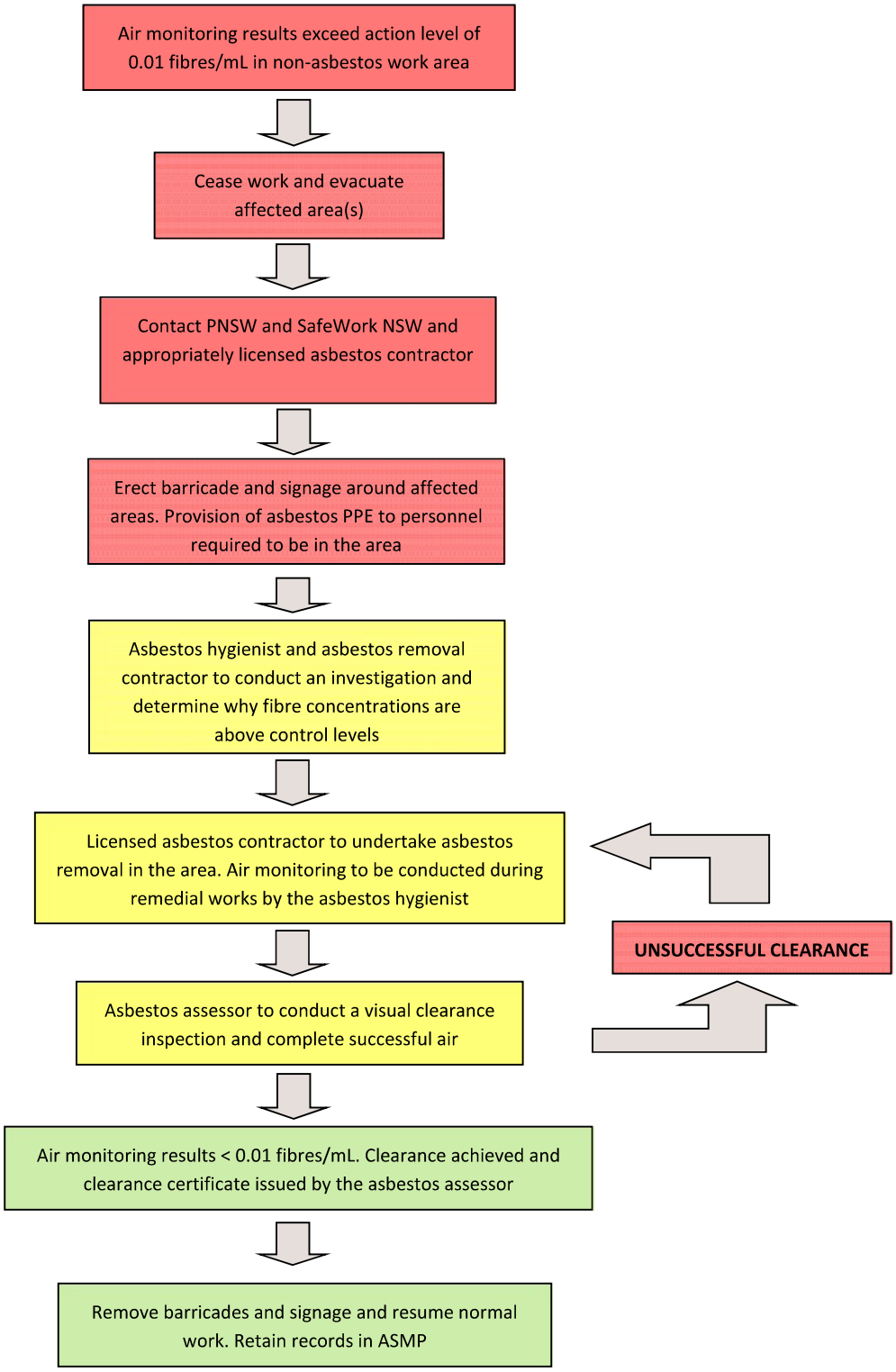
The following PPE must be considered based upon a risk approach:

Types of Asbestos Materials PPE	
PPE	**Picture**
Half faced disposable P2 respirator to be used for non-friable/bonded asbestos in soil removal works. Respirators must comply with AS/NZS 1715 – 2009 Selection, use and maintenance of respiratory equipment.	
Half faced respirator with a P2 particulate filter cartridge to be used for non-friable/bonded asbestos removal works. Respirators must comply with AS/NZS 1715 – 2009 Selection, use and maintenance of respiratory equipment.	
Full faced respirator with a P2/P3 particulate filter cartridge to be used for friable asbestos removal works. Respirators must comply with AS/NZS 1715 – 2009 Selection, use and maintenance of respiratory equipment.	
Disposable coveralls rated Type 5 or equivalent e.g. Tyvek	
Appropriate glasses or goggles.	
Appropriate gloves i.e. cut resistant gloves for working with soil. Occupational protective gloves shall comply with EN 420:1994 (AS/NZS 2161.2:1998) – Occupational Protective Gloves, Part 2 General Requirements.	

Appendix D: Emergency procedure when air monitoring control levels are exceeded for an ACM

Emergency procedure when air monitoring control levels are exceeded

The following procedure shall be followed if elevated asbestos air monitoring results are obtained during remediation works



Appendix E: Unexpected Findings Protocol Proforma

UNEXPECTED FINDINGS PROTOCOL REPORT

Date: **Reporters Name:**

1. Suspect material encountered during activities? (circle): YES / NO

2. Has area been barricaded and appropriate signage installed YES / NO

3. Environmental Consultant contacted? (circle): YES / NO

4. Location of foreign material (label occurrences sequentially 1, 2, 3, etc and mark on a site plan)

Description of material encountered:

5. Odour present: _____

6. Visible staining: _____

7. Asbestos or suspected asbestos containing material present? (circle): YES / NO

8. Brief written description and/or sketch:

9. Material quarantined? (circle): YES / NO

10. Photograph taken? (circle): YES / NO

Reported Name: Signature:

Western Australia Department of Health, (2009). Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia

Appendix C3

Site Photographs

Photo 1: Parramatta River south of the site

Photo 2: Open grassed-area and alignment concrete footpath on site

Douglas PARTNERS	**Site Photographs**	PROJECT:	231248.01
	Rangihou Reserve – Proposed Pedestrian and Cycleway	PLATE No:	1
	Rangihou Reserve, Parramatta NSW	REV:	0
	CLIENT	Cit of Paramatta Council	

Photo 3: Grass mounds in east portion of site

Douglas PARTNERS	**Site Photographs**	PROJECT:	231248.01
	Rangihou Reserve – Proposed Pedestrian and Cycleway	PLATE No:	2
	Rangihou Reserve, Parramatta NSW	REV:	0
	CLIENT	Cit of Paramatta Council	

Appendix D

Data Quality Objectives

1. Data quality objectives

The DSI has been devised broadly in accordance with the seven-step data quality objectives (DQO) process which is provided in Appendix B, Schedule B2 of NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).

Table 1: Data quality objectives

Step	Summary
1: State the problem	In accordance with the project brief, the objective of the DSI is to inform the design development of the potential works (Civil, Structural and Electrical) and determine the presence, type and extent of ground contamination (if any) to inform preparation of a RAP, WHS contamination site management procedures and to inform costs associated with bulk earthworks including the disposal off site of any contaminated site material during construction works. A preliminary CSM has been prepared (Section 9) and was used to inform the intrusive investigation design to address the objective. The project team consisted of experienced environmental engineers and scientists working in the roles of Project Principal, Project Reviewer, Project Manager and field staff.
2: Identify the decisions / goal of the study	The site history has identified possible contaminating previous uses and features which are identified in the CSM (Section 9). The CSM identifies the associated CoPC and the likely impacted media. The site assessment criteria (SAC) for each of the CoPC are detailed in Appendix F. The decision is to establish whether or not the results fall below the SAC. On this basis, an assessment of the site's contamination status and exposure risk will be derived and a decision made on whether (or not) further assessment and / or remediation will be required.
3: Identify the information inputs	Inputs will be the analytical results for the CoPC (identified in the CSM, Section 9) from NATA accredited laboratories and methods, where possible. The SAC for each of the CoPC are detailed in Appendix F. A photo-ionisation detector (PID) will be used on-site to screen soils for VOC. PID readings will be used to inform sample selection for laboratory analysis.
4: Define the study boundaries	The lateral boundaries of the investigation area are shown on Drawing 1, Appendix A. The vertical boundaries are to the extent of contamination impact as determined from the site history assessment and site observations. The assessment is limited to the timeframe over which the field works were undertaken. Constraints to the assessment are identified and discussed in the conclusions of the report, Sections 13 and 15.
5: Develop the analytical approach (or decision rule)	The decision rule is to compare all analytical results with the SAC (Appendix F, based on NEPC (2013)). Where guideline values are absent, other sources of guideline values accepted by NEPC (2013) shall be adopted where possible.

Step	Summary
	Where a sample result exceeds the adopted criterion, a further site-specific assessment will be made as to the risk posed by the presence of that contaminant(s). Initial comparisons will be with individual results then, where required, summary statistics (including mean, standard deviation and 95% upper confidence limit (UCL) of the arithmetic mean (95% UCL)) to assess potential risks posed by the site contamination. Quality control results are to be assessed according to their relative percent difference (RPD) values. For field duplicates, triplicates and laboratory results, RPD values should generally be below 30%; for field blanks and rinsates, results should be at or less than the limits of reporting (NEPC, 2013). The field and laboratory quality assurance assessment is included in Appendix J.
6: Specify the performance or acceptance criteria	Baseline condition: Contaminants at the site exceed the human health and environmental SAC and pose a potentially unacceptable risk to receptors (null hypothesis). Alternative condition: Contaminants at the site comply with the human health and environmental SAC and as such, do not pose a potentially unacceptable risk to receptors (alternative hypothesis). Unless conclusive information from the collected data is sufficient to reject the null hypothesis, it is assumed that the baseline condition is true. Uncertainty that may exist due to the above potential decision errors shall be mitigated as follows: • The statistical assessment, where appropriate and required. • Consideration of data gaps and qualitative data in conjunction with quantitative data in assessing contamination risk at the site.
7: Optimise the design for obtaining data	As the purpose of the investigation is to assess the contamination status of the site, the sampling program is reliant on professional judgement to identify and sample the potentially affected areas. Further details regarding the proposed sampling plan are presented in Section 10.

2. References

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

Appendix E

Sampling Methodology

1. Guidelines

The following key guidelines were consulted for the field work methodology:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- HEPA *PFAS National Environmental Management Plan (NEMP)* (HEPA, 2020).

2. Soil sampling

Soil sampling is carried out in accordance with Douglas' standard operating procedures. The general sampling and sample management procedures comprise:

- Collect soil samples directly from the solid flight auger;
- Place samples into laboratory-prepared glass jars with Teflon lined lids, capping immediately and minimising headspace within the sample jar;
- Collect replicate samples in zip-lock bags for photoionisation detector (PID) screening;
- Collect ~500 ml samples in zip-lock bags for fibrous asbestos and asbestos fines (FA and AF) analysis;
- Wear a new disposable nitrile glove for each sample point thereby minimising potential for cross-contamination;
- Collect 10% replicate samples for quality control (QC) purposes;
- Label sample containers with individual and unique identification details, including project number, sample location and sample depth (where applicable);
- Collect soil samples for acid sulfate soils analysis at every 0.5 m depth interval and at least one sample for every change in strata observed. Place immediately into zip-lock plastic bags after minimising air content and potential for moisture loss and immediately place on ice in a cooled, insulated and sealed container for transport to the laboratory. Once in the laboratory place the samples in a freezer;
- Place samples into a cooled, insulated and sealed container for transport to the laboratory; and
- Use chain of custody documentation.

2.1 Field testing

Field testing is carried out in accordance with Douglas' standard operating procedures. The general sampling and sample management procedures comprise:

PID field test

- Calibrate the PID with isobutylene gas at 100 ppm and with fresh air prior to commencement of each successive day's field work;
- Allow the headspace in the PID zip-lock bag samples to equilibrate; and

- Screen using the PID.

3. References

HEPA. (2020). *PFAS National Environmental Management Plan (NEMP)*. Version 2.0: Heads of EPAs Australia and New Zealand and Australian Government Department of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

Appendix F

Site Assessment Criteria

1. Introduction

1.1 Guidelines

The following key guidelines were consulted for deriving the site assessment criteria (SAC):

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013).
- CRC CARE *Health screening levels for petroleum hydrocarbons in soil and groundwater* (CRC CARE, 2011).

1.2 General

The SAC applied in the current investigation are informed by the CSM which identified human and environmental receptors to potential contamination at the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The following inputs are relevant to the selection and / or derivation of the SAC:

- Land use: recreational.
    - Corresponding to land use category 'C', public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate.
- Soil type: sand.

2. Soils

2.1 Health investigation and screening levels

The generic health investigation levels (HIL) and health screening levels (HSL) are considered to be appropriate for the assessment of human health risk via all relevant pathways of exposure associated with contamination at the site. The adopted soil HIL and HSL for the contaminants of concern are in Table 1 and Table 2

Table 1: Health investigation levels (mg/kg)

Contaminant	HIL-C
Metals	
Arsenic	300
Cadmium	90
Chromium (VI)	300
Copper	17 000

Contaminant	HIL-C
Lead	600
Mercury (inorganic)	80
Nickel	1200
Zinc	30 000
PAH	
B(a)P TEQ	3
Total PAH	300
Phenols	
Phenol	40 000
Pentachlorophenol	120
OCP	
DDT+DDE+DDD	400
Aldrin and dieldrin	10
Chlordane	70
Endosulfan	340
Endrin	20
Heptachlor	10
HCB	10
Methoxychlor	400
OPP	
Chlorpyrifos	250
PCB	
PCB	1

Table 2: Health screening levels (mg/kg)

Contaminant	HSL-C	HSL-C	HSL-C
SAND	**0 m to <1 m**	**1 m to <2 m**	**2 m to <4 m**
Benzene	NL	NL	NL
Toluene	NL	NL	NL
Ethylbenzene	NL	NL	NL
Xylenes	NL	NL	NL
Naphthalene	NL	NL	NL
TRH F1	NL	NL	NL

Contaminant	HSL-C	HSL-C	HSL-C
TRH F2	NL	NL	NL

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
The soil saturation concentration (Csat) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds Csat, a soil vapour source concentration for a petroleum mixture could not exceed a level that would results in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or 'NL'

The HSL for direct contact derived from CRC CARE (2011) are in Table 3.

Table 3: Health screening levels for direct contact (mg/kg)

Contaminant	DC HSL-C	DC HSL-IMW
Benzene	120	1100
Toluene	18 000	120 000
Ethylbenzene	5300	85 000
Xylenes	15 000	130 000
Naphthalene	1900	29 000
TRH F1	5100	82 000
TRH F2	3800	62 000
TRH F3	5300	85 000
TRH F4	7400	120 000

Notes: TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} minus naphthalene
IMW intrusive maintenance worker

2.2 Asbestos in soil

The HSL for asbestos in soil are based on likely exposure levels for different scenarios published in NEPC (2013) for the following forms of asbestos:

- Bonded asbestos containing material (ACM); and
- Fibrous asbestos and asbestos fines (FA and AF).

The HSL are in Table 4.

Table 4: Health screening levels for asbestos

Form of asbestos	HSL-C
ACM	0.02%
FA and AF	0.001%
FA and AF and ACM	No visible asbestos for surface soil *

Notes: Surface soils defined as top 10 cm.
* Based on site observations at the sampling points and the analytical results of surface samples.

2.3 Ecological investigation levels

Ecological investigation levels (EIL) and added contaminant limits (ACL), where appropriate, have been derived in NEPC (2013) for arsenic, copper, chromium (III), nickel, lead, zinc, DDT and naphthalene. The adopted EIL, derived using the interactive (excel) calculation spreadsheet on the NEPM toolbox website are shown in Table 6, with inputs into their derivation shown in Table 5.

Table 5: Inputs to the derivation of the ecological investigation levels

Variable	Input	Rationale
Age of contaminants	"Aged" (>2 years)	No recent development onsite
pH	6.7	Average calculated from laboratory results
CEC	10.90 $cmol_c/kg$	Average calculated from laboratory results
Clay content	10%	Assumed as a conservative measure
Traffic volumes	High	-
State / Territory	NSW	-

Table 6: Ecological investigation levels (mg/kg)

Contaminant	EIL-A-B-C
Metals	
Arsenic	100
Copper	220
Nickel	180
Chromium III	410
Lead	1100
Zinc	550
PAH	
Naphthalene	170
OCP	
DDT	180

Notes: EIL-A-B-C urban residential and public open space

2.4 Ecological screening levels

Ecological screening levels (ESL) are used to assess the risk of selected petroleum hydrocarbon compounds, BTEX and benzo(a)pyrene to terrestrial ecosystems. The adopted ESL are shown in Table 7.

Table 7: Ecological screening levels (mg/kg)

Contaminant	Soil Type	ESL-A-B-C
Benzene	Coarse	50
Toluene	Coarse	85
Ethylbenzene	Coarse	70
Xylenes	Coarse	105
TRH F1	Coarse/ Fine	180*
TRH F2	Coarse/ Fine	120*
TRH F3	Coarse	300
TRH F4	Coarse	2800
B(a)P	Coarse	0.7

Notes: ESL are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability
TRH F1 is TRH C_6-C_{10} minus BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ESL-A-B-C urban residential and public open space

2.5 Management limits

In addition to appropriate consideration and application of the HSL and ESL, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids (LNAPL);
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

The adopted management limits are in Table 8.

Table 8: Management limits (mg/kg)

Contaminant	Soil type	ML-A-B-C
TRH F1	Coarse	700
TRH F2	Coarse	1000
TRH F3	Coarse	2500
TRH F4	Coarse	10 000

Notes: TRH F1 is TRH C_6-C_{10} including BTEX
TRH F2 is TRH >C_{10}-C_{16} including naphthalene
ML-A-B-C residential, parkland and public open space

3. References

CRC CARE. (2011). *Health screening levels for petroleum hydrocarbons in soil and groundwater.* Parts 1 to 3, Technical Report No. 10: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

Appendix G

Borehole Logs

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 1.6 AHD
COORDINATE: E:316190.5, N:6256581.7
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH101
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL						
			FILL / Silty CLAY, with sand: dark brown; low plasticity; fine sand.		FILL	MC to WC	w<PL	0.2-0.9m: B sample	A/ES B		0.10 0.20	PID	1ppm
									ASS A/ES		0.40 0.50	PID	1.8ppm
		1.00	Silty SAND (SM): dark grey; fine; non plastic silt.			L	M		ASS A/ES		0.90 1.00	PID	2.5ppm
▼ 21/11/24					ALV	VL to L	W		ASS A/ES		1.40 1.50	PID	3.3ppm
									D		1.70 1.80		
		2	Borehole discontinued at 2.00m depth. Target depth reached.						ASS A/ES		1.90 2.00	PID	2.4ppm

DCP9/150

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (300mmØ) to 1.0m, AD (100mmØ) to 2.0m
REMARKS: *Blind replicate BD1/20241121 sampled at 1.4 to 1.5 m

OPERATOR: Groundtest (TK)

LOGGED: I. Howsam
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 1.7 AHD
COORDINATE: E:316227.5, N:6256559.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH102
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	RESULTS AND REMARKS
		0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w≈PL						
			FILL / Silty CLAY, with sand: dark brown; low plasticity; fine sand.			WC			A/ES		0.10	PID	2.5ppm
											0.20		
									A/D/ES		0.40	PID	1.8ppm
					FILL		w<PL				0.50	DCP9/150	
						VC							
									A/ES		0.90	PID	2.5ppm
		1.10									1.00		
			Silty SAND (SM): dark grey; fine; non plastic silt.										
						L	M		D		1.30		
											1.40	PID	2.4ppm
▼					ALV				A/ES		1.50	DCP9/150	
21/11/24						VL to L	W						
									A/ES		1.90	PID	2.3ppm
		2									2.00		
			Borehole discontinued at 2.00m depth. Target depth reached.										

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (100mmØ) to 2.0m
REMARKS:

OPERATOR: Groundtest (TK)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 1.6 AHD
COORDINATE: E:316236.6, N:6256563.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH103
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w≈PL						
			FILL / Silty CLAY, with sand: dark brown; low to medium plasticity; fine sand.						A/ES		0.10	PID	3.5ppm
											0.20		
			0.40m-0.50m: decomposing organic odour					ASS	A/ES		0.40	PID	17.1ppm
					FILL	MC	w<PL				0.50		
			From 0.90m: fine to medium sand						A/ES		0.90	PID	4.0ppm
▼ 21/11/24		1									1.00		
		1.10	SAND (SM), with silt: dark grey, mottled orange-brown; medium; non plastic silt.		ALV	L	W	ASS	A/ES		1.40		
											1.50		
									D		1.70		
											1.80		
								ASS	A/ES		1.90	PID	1.0ppm
		2	Borehole discontinued at 2.00m depth. Target depth reached.								2.00		

DCP9/150 (0 – 5 – 10 – 15)

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (100mmØ) to 2.0m
REMARKS:

OPERATOR: Groundtest (TK)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 1.7 AHD
COORDINATE: E:316253.6, N:6256553.6
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH104
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL						
			FILL / Silty CLAY, with sand: dark brown; low to medium plasticity; fine sand.		FILL	MC to WC	w<PL		A/ES		0.10	PID	1.5ppm
											0.20		
									D		0.30		
									A/ES		0.40	PID	5.3ppm
											0.50		
											0.90	PID	2.5ppm
		1							A/ES		1.00		
		1.10	SAND (SM), with silt: dak grey; fine; non plastic silt.		ALV	L to MD	M						
▼ 21/11/24	-0								A/ES		1.40	PID	2.9ppm
											1.50		
						L	W		D		1.70		
											1.80		
									A/ES		1.90	PID	1.3ppm
		2									2.00		
			Borehole discontinued at 2.00m depth. Target depth reached.										
	-1												

DCP9/150

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (100mmØ) to 2.0m
REMARKS:

OPERATOR: Groundtest (TK/GM)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 1.8 AHD
COORDINATE: E:316264.8, N:6256547.4
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH105
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL						
			FILL / Silty CLAY, with sand: dark brown; low to medium plasticity; fine sand.			MC			A/ES		0.10	PID	<1ppm
											0.20		
									ASS A/ES		0.40	PID	5.3ppm
					FILL		w<PL				0.50		
						WC			D		0.70		
											0.80		
									ASS A/ES		0.90	PID	2.0ppm
		1									1.00		
		1.20	SAND (SM), with silt: dark grey; fine; non plastic silt.			L to MD	M						
					ALV				ASS A/ES		1.40	PID	2.9ppm
											1.50		
									D		1.60		
▼ 21/11/24						VL to L	W				1.70		
									ASS A/ES		1.90	PID	1.0ppm
		2	Borehole discontinued at 2.00m depth. Target depth reached.								2.00		

DCP9/150 (0.00–1.00)
DCP9/150 (1.00–2.00)

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (100mmØ) to 2.0m
REMARKS:

OPERATOR: Groundtest (TK/GM)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Generated with CORE-GS by Geroc - Soil Log

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:316297.3, N:6256541.2
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH106
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	RESULTS AND REMARKS
21/11/24 No free groundwater observed whilst augering	2	0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL						
			FILL / Silty CLAY, with sand: dark brown; low to medium plasticity; fine sand.						A/ES		0.10	PID	<1ppm
			0.10m: coarse siltstone gravel and cobbles								0.20		
									A/ES		0.40	PID	2.2ppm
						WC					0.50	DCP9/150	
					FILL		w<PL		D		0.70		
											0.80		
									A/ES		0.90	PID	<1ppm
	1	1									1.00		
						VC						DCP9/150	
		1.50	SAND (SM), with silt: dark grey; fine; non plastic silt.				M		A/ES		1.40	PID	<1ppm
					ALV	L to MD					1.50		
							W		D		1.70		
											1.80		
									A/ES		1.90	PID	<1ppm
	2	2									2.00		
	-0		Borehole discontinued at 2.00m depth. Target depth reached.										

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (100mmØ) to 2.0m
REMARKS:

OPERATOR: Groundtest (TK)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

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BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 2.1 AHD
COORDINATE: E:316326.7, N:6256538.3
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH107
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	RESULTS AND REMARKS
21/11/24 No free groundwater observed whilst augering	2	0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL						
			FILL / Gravelly SAND, with silt: dark brown; fine; coarse gravel; brick and pavers. 0.10m: asphalt cobble		FILL	WC	D		A/ES		0.10 0.20	PID	<1ppm
		0.30	FILL / Silty CLAY, with sand: dark brown; low plasticity; fine sand.		FILL	MC to WC	w<PL	ASS	A/ES		0.40 0.50	PID	<1ppm
	1							ASS	A/ES		0.90 1.00	PID	<1ppm
		1.60	Silty SAND (SM), trace gravel; fine; ironstone gravel.		ALV	L to MD	M	ASS	A/ES		1.40 1.50	PID	<1ppm
									D		1.70 1.80		
	2							ASS	A/ES		1.90 2.00	PID	<1ppm
	0		Borehole discontinued at 2.00m depth. Target depth reached.										

DCP9/150 (0–1.00 m)

DCP9/150 (1.00–2.00 m)

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (100mmØ) to 2.0m
REMARKS: Borehole undertaken approximately 3m away from CPT107A.
*Blind replicate BD02/20241121 sampled at 1.9 to 2.0 m

OPERATOR: Groundtest (TK)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 2.6 AHD
COORDINATE: E:316360.5, N:6256530.5
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH108
PROJECT No: 231248.00
DATE: 26/11/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
26/11/24 No free groundwater observed whilst augering			FILL / Gravelly SAND: brown; fine to medium; medium to coarse gravel; with fragments of building rubble.		FILL	WC	D	PACM	A/ES		0.10		
			Borehole discontinued at 0.20m depth. Due to potential asbestos containing material.								0.20	DCP9/150	5 10 15

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 2.5t Excavator
METHOD: AD (150mmØ) to 0.2m
REMARKS: PACM = Potential Asbestos Containing Material

OPERATOR: Cirillo (LD)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 2.6 AHD
COORDINATE: E:316406.2, N:6256530.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH109
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
21/11/24 No free groundwater observed whilst augering		0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL				0.10	PID	<1ppm
			FILL / Gravelly SAND, with silt: grey; fine to medium; medium to coarse gravel; non plastic silt.		FILL	MC to WC	D		A/ES		0.20		
			0.60m: geofabric								0.40	PID	<1ppm
		0.60	FILL / Gravelly SAND, with silt: grey; fine to medium; medium gravel; non plastic silt; with fragments of bricks, tiles and concrete.		FILL				A/ES		0.50	DCP9/150	21
			0.90m: organic material								0.90	PID	<1ppm
		1	Borehole discontinued at 1.00m depth. Terminated due to geofabric (possible capping).						A/ES		1.00		

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (100mmØ) to 1.0m
REMARKS:

OPERATOR: Groundtest (TK)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 2.6 AHD
COORDINATE: E:316446.1, N:6256528.9
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH110
PROJECT No: 231248.00
DATE: 21/11/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
21/11/24 No free groundwater observed whilst augering	0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL						
		FILL / SAND, trace silt: grey-brown; fine; non plastic silt.		FILL	ND	D		A/ES		0.10 0.20		
								A/ES		0.40 0.50		
	2	Borehole discontinued at 0.50m depth. Terminated due to geofabric (possible capping).										
	1											
	0											
	1											
	2											

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: GT10 Truck Rig
METHOD: AD (100mmØ) to 0.5m
REMARKS:

OPERATOR: Groundtest (TK)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 2.8 AHD
COORDINATE: E:316482.0, N:6256538.1
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH111
PROJECT No: 231248.00
DATE: 26/11/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
26/11/24 No free groundwater observed whilst augering	0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL				0.10	DCP9/150	5 10 15
		FILL / Gravelly SAND, trace clay: yellow; medium; medium gravel; non plastic clay; inferred ripped sandstone.		FILL	MC to WC	D		A/ES		0.20		
		Borehole discontinued at 0.20m depth. Terminated at client request (marker layer found).										

NOTES: [#] Soil origin is "probable" unless otherwise stated. [*] Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 2.5t Excavator
METHOD: AD (150mmØ) to 0.2m
REMARKS:

OPERATOR: Cirillo (LD)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

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Douglas PARTNERS

BOREHOLE LOG

CLIENT: City of Parramatta Council
PROJECT: Proposed Pedestrian and Cycleway
LOCATION: Rangihou Reserve, Parramatta, NSW

SURFACE LEVEL: 2.9 AHD
COORDINATE: E:316529.4, N:6256543.8
DATUM/GRID: MGA2020 Zone 56
DIP/AZIMUTH: 90°/---°

LOCATION ID: BH112
PROJECT No: 231248.00
DATE: 26/11/24
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
26/11/24 No free groundwater observed whilst augering	0.05	FILL / TOPSOIL / SILTY CLAY: dark brown; with rootlets.		FILL	NA	w=PL	0.1-0.4m: B sample	B		0.10	DCP3/150	5 HB 15/50mm 15
		FILL / Gravelly SAND, trace clay: yellow; medium; medium, inferred ripped sandstone gravel; non plastic clay.		FILL	ND	D		A/ES		0.20		
		0.30m: becoming grey-brown										
								A/ES		0.40		
		Borehole discontinued at 0.50m depth. Terminated at client request (marker layer found).								0.50	DCP3/150	5 HB 15/16mm 15

NOTES: (#) Soil origin is "probable" unless otherwise stated. (*) Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 2.5t Excavator
METHOD: AD (150mmØ) to 0.5m
REMARKS:

OPERATOR: Cirillo (LD)

LOGGED: I.Howsam/D.Pham
CASING: Uncased

Refer to explanatory notes for symbol and abbreviation definitions

Douglas PARTNERS

Terminology, Symbols and Abbreviations

November 2023

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style XW. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	KL
Unknown	Information was not available to allow classification of the property. For example, when auguring in loose, saturated sand auger cuttings may not be returned.	UK
No data	Information required to allow classification of the property was not available. For example if drilling is commenced from the base of a hole predrilled by others	ND
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example providing a description of the strength of a concrete pavement	NA

Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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Soil Descriptions

Terminology
Symbols
Abbreviations

March 2024

Introduction

All materials which are not considered to be "in-situ rock" are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:

The "classification" comprises a two character "group symbol" providing a general summary of dominant soil characteristics. The "name" summarises the particle sizes within the soil which most influence its behaviour. The detailed description presents more information about composition, condition, structure, and origin of the soil.

Classification, naming and description of soils require the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either "fine grained" (also known as "cohesive" behaviour) or "coarse grained" ("non cohesive" behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Designation	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as "oversize"	
Cobble	63 - 200		
Gravel[1]	2.36 - 63	Coarse	>65%
Sand[1]	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

[1] – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer "component proportions" below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a "Sandy CLAY", this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a "primary", "secondary", or "minor" component of the soil mixture, depending on its influence over the soil behaviour.

Component Proportion Designation	Definition[1]	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor[2]	Present in the soil, but not significant to its engineering properties	All other components	All other components

[1] As defined in AS1726-2017 6.1.4.4

[2] In the detailed material description, minor components are split into two further sub-categories. Refer "identification of minor components" below.

Composite Materials

In certain situations, a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example, "INTERBEDDED Silty CLAY AND SAND".

Soil Descriptions

Classification

The soil classification comprises a two character group symbol. The first character identifies the primary component. The second character identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils, the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way, the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component [1]	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

[1] – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Materials of "fill" or "topsoil" origin are generally assigned a name derived from the primary/secondary component (where appropriate). In log descriptions this is preceded by uppercase "FILL" or "TOPSOIL". Origin uncertainty is indicated in the description by the characters (?), with the degree of uncertainty described (using the terms "probably" or "possibly" in the origin column, or at the end of the description).

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	Clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	Clay/silt: 0-5% sand/gravel: 0-15%

The terms "with" and "trace" generally apply only to gravel or fine particle fractions. Where cobbles/boulders are encountered in minor proportions (generally less than about 12%) the term "occasional" may be used. This term describes the sporadic distribution of the material within the confines of the investigation excavation only, and there may be considerable variation in proportion over a wider area which is difficult to factually characterise due to the relative size of the particles and the investigation methods.

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type		Particle size (mm)
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 – 6.7
Sand	Coarse	0.6 - 2.36
	Medium	0.21 - 0.6
	Fine	0.075 - 0.21

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular size or size range within the total range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	w<PL
	Near plastic limit	Can be moulded	w=PL
	Wet of plastic limit	Water residue remains on hands when handling	w>PL
	Near liquid limit	"oozes" when agitated	w=LL
	Wet of liquid limit	"oozes"	w>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code NDF, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Material

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials, the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered material origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description.

Quantitative engineering performance of these materials may be determined by laboratory testing or estimated by correlated field tests (for example penetration or shear vane testing). In some cases, performance may be assessed by tactile or other subjective methods, in which case investigation logs will show the estimated value enclosed in round brackets, for example (VS).

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	St
Very stiff	Indented by thumbnail	>100 - ≤200	VSt
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	Fr

Relative Density (coarse grained soils)

Relative Density Term	Density Index	Abbreviation Code
Very loose	<15	VL
Loose	>15 - ≤35	L
Medium dense	>35 - ≤65	MD
Dense	>65 - ≤85	D
Very dense	>85	VD

Note, tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided.

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MOD
Weakly cemented	WEK

Extremely Weathered Material

AS1726-2017 considers weathered material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. less than very low strength rock). These materials may be identified as "extremely weathered material" in reports and by the abbreviation code XWM on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RS
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than 'very low' as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Fluvial	Deposited by channel fill and overbank (natural levee, crevasse splay or flood basin)	FLV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LAC
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Slopewash	Thin layers of soil and rock debris gradually and slowly deposited by gravity and possibly water	SW
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or seashore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

The presence of particles considered to be "oversize" may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with "MIXTURE OF".

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Rock Strength

Rock strength is defined by the unconfined compressive strength, and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $I_{s(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Unconfined Compressive Strength (MPa)	Point Load Index[1] $I_{s(50)}$ MPa	Abbreviation Code
Very low	0.6 - 2	0.03 - 0.1	VL
Low	2 - 6	0.1 - 0.3	L
Medium	6 - 20	0.3 - 1.0	M
High	20 - 60	1 - 3	H
Very high	60 - 200	3 - 10	VH
Extremely high	>200	>10	EH

[1] Rock strength classification is based on UCS. The UCS to $I_{s(50)}$ ratio varies significantly for different rock types and specific ratios may be required for each site. The point load Index ranges shown above are as suggested in AS1726 and should not be relied upon without supporting evidence.

The following abbreviation codes are used for soil layers or seams of material "within rock" but for which the equivalent UCS strength is less than 0.6 MPa.

Scenario	Abbreviation Code
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The properties of the material encountered over this interval are described in the "Description of Strata" and soil properties columns.	SOIL
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The prominence of the material is such that it can be considered to be a seam (as defined in Table 22 of AS1726-2017) and the properties of the material are described in the defect column.	SEAM

Degree of Weathering

The degree of weathering of rock is classified as follows:

Weathering Term	Description	Abbreviation Code
Residual Soil[1]	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.	RS
Extremely weathered[1]	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible	XW
Highly weathered	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores.	HW
Moderately weathered	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MW
Slightly weathered	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.	SW
Fresh	No signs of decomposition or staining.	FR
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.	DW

[1] The parent rock type, of which the residual/extremely weathered material is a derivative, will be stated in the description (where discernible).

Degree of Alteration

The degree of alteration of the rock material (physical or chemical changes caused by hot gasses or liquids at depth) is classified as follows:

Term	Description	Abbreviation Code
Extremely altered	Material is altered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.	XA
Highly altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is changed by alteration. Some primary minerals are altered to clay minerals. Porosity may be increased by leaching or may be decreased due to precipitation of secondary materials in pores.	HA
Moderately altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MA
Slightly altered	Rock is slightly discoloured but shows little or no change of strength from fresh rock	SA
Note: If HA and MA cannot be differentiated use DA (see below)		
Distinctly altered	Rock strength usually changed by alteration. The rock may be highly discoloured, usually by staining or bleaching. Porosity may be increased by leaching or may be decreased due to precipitation of secondary minerals in pores.	DA

Degree of Fracturing

The following descriptive classification apply to the spacing of natural occurring fractures in the rock mass. It includes bedding plane partings, joints and other defects, but excludes drilling breaks. These terms are generally not required on investigation logs where fracture spacing is presented as a histogram, and where used are presented in an unabbreviated format.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e., drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

These terms may be used to describe the spacing of bedding partings in sedimentary rocks. Where used, these terms are generally presented in an unabbreviated format

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Defect Descriptions

Defect Type

Term	Abbreviation Code
Bedding plane	B
Cleavage	CL
Crushed seam	CS
Crushed zone	CZ
Drilling break	DB
Decomposed seam	DS
Drill lift	DL
Extremely Weathered seam	EW
Fault	F
Fracture	FC
Fragmented	FG
Handling break	HB
Infilled seam	IS
Joint	JT
Lamination	LAM
Shear seam	SS
Shear zone	SZ
Vein	VN
Mechanical break	MB
Parting	P
Sheared Surface	S

Rock Defect Orientation

Term	Abbreviation Code
Horizontal	H
Vertical	V
Sub-horizontal	SH
Sub-vertical	SV

Rock Defect Coating

Term	Abbreviation Code
Clean	CN
Coating	CT
Healed	HE
Infilled	INF
Stained	SN
Tight	TI
Veneer	VNR

Rock Defect Infill

Term	Abbreviation Code
Calcite	CA
Carbonaceous	CBS
Clay	CLAY
Iron oxide	FE
Manganese	MN
Pyrite	Py
Secondary material	MS
Silt	M
Quartz	Qz
Unidentified material	MU

Rock Defect Shape/Planarity

Term	Abbreviation Code
Curved	CU
Discontinuous	DIS
Irregular	IR
Planar	PR
Stepped	ST
Undulating	UN

Rock Defect Roughness

Term	Abbreviation Code
Polished	PO
Rough	RF
Smooth	SM
Slickensided	SL
Very rough	VR

Defect Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

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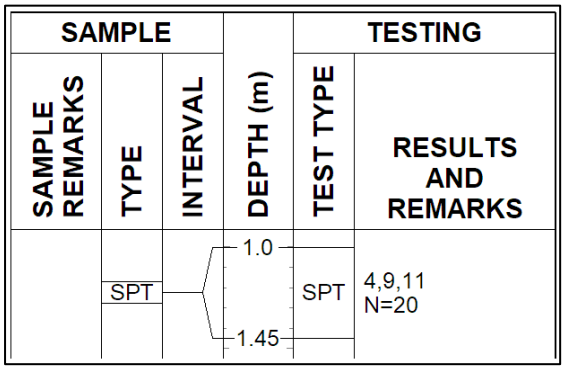
Sampling, Testing and Excavation Methodology

Terminology
Symbols
Abbreviations

March 2024

Sampling and Testing

A record of samples retained, and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:



Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Acid Sulfate sample	ASS
Bulk sample	B
Core sample	C
Disturbed sample	D
Environmental sample	ES
Gas sample	G
Piston sample	P
Sample from SPT test	SPT
Undisturbed tube sample	U[1]
Water sample	W
Material Sample	MT
Core sample for unconfined compressive strength testing	UCS

[1] – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kPa)	PP
Photo ionisation detector (ppm)	PID
Standard Penetration Test x/y =x blows for y mm penetration HB = hammer bouncing HW = fell under weight of hammer	SPT
Shear vane (kPa)	V
Unconfined compressive strength, (MPa)	UCS

Field and laboratory testing (continued)

Test Type	Code
Point load test, (MPa), axial (A), diametric (D), irregular (I)	PLT(_)
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150

Groundwater Observations

▷	seepage/inflow
▽	standing or observed water level
NFGWO	no free groundwater observed
OBS	observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left-hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Direct Push	DP
Solid flight auger. Suffixes: /T = tungsten carbide tip, /V = v-shaped tip	AD[1]
Air Track	AT
Diatube	DT[1]
Hand auger	HA[1]
Hand tools (unspecified)	HAND
Existing exposure	X
Hollow flight auger	HSA[1]
HQ coring	HQ3
HMLC series coring	HMLC
NMLC series coring	NMLC
NQ coring	NQ3
PQ coring	PQ3
Predrilled	PD
Push tube	PT[1]
Ripping tyne/ripper	R
Rock roller	RR[1]
Rock breaker/hydraulic hammer	EH
Sonic drilling	SON[1]
Mud/blade bucket	MB[1]
Toothed bucket	TB[1]
Vibrocore	VC[1]
Vacuum excavation	VE
Wash bore (unspecified bit type)	WB[1]

[1] – numeric suffixes indicate tool diameter/width in mm

Douglas PARTNERS

Appendix H

Summary Results Table

Douglas PARTNERS

Table A1: Summary of results of soil analysis

				Priority metals								Priority PAH				Priority TRH						BTEX			
				Total Arsenic	Cadmium	Total Chromium	Copper	Lead	Mercury (inorganic)	Nickel	Zinc	Naphthalene [b]	Benzo(a)pyrene (B(a)P)	Benzo(a)pyrene TEQ (B(a)P TEQ)	Total PAH	TRH C6 - C10	TRH >C10-C16	F1 ((C6-C10)-BTEX)	F2 (>C10-C16 less Naphthalene)	F3 (>C16-C34)	F4 (>C34-C40)	Benzene	Toluene	Ethylbenzene	Total Xylenes
			PQL	4	0.4	1	1	1	0.1	1	1	1	0.05	0.5	0.05	25	50	25	50	100	100	0.2	0.5	1	1
Sample ID	Depth	Soil Matrix	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
BH101	0.1 - 0.2 m	FILL	21/11/24	5	<0.4	14	28	51	0.2	13	110	<1	0.2	<0.5	1.3	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH101	0.9 - 1 m	FILL	21/11/24	5	<0.4	5	6	10	<0.1	3	36	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH101	1.4 - 1.5 m	SAND	21/11/24	6	<0.4	4	6	5	<0.1	<1	3	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BD01/20241121	0 m	SAND	21/11/24	7	<0.4	19	28	96	0.2	12	200	<1	0.2	<0.5	2.3	<25	<50	<25	<50	110	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH102	0.1 - 0.2 m	FILL	21/11/24	8	<0.4	15	25	110	0.2	10	160	<1	4.9	6.9	64	<25	<50	<25	<50	180	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH102	0.4 - 0.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH103	0.1 - 0.2 m	FILL	21/11/24	7	0.4	19	28	95	0.2	12	200	<1	0.4	0.6	3.3	<25	<50	<25	<50	100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH103	0.4 - 0.5 m	FILL	21/11/24	7	<0.4	12	14	36	0.2	8	35	<1	0.2	<0.5	1.8	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH103	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH104	0.1 - 0.2 m	FILL	21/11/24	7	<0.4	15	19	64	0.1	9	100	<1	0.4	<0.5	2.7	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH104	0.9 - 1 m	FILL	21/11/24	9	<0.4	6	5	12	0.1	4	11	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH104	1.4 - 1.5 m	SAND	21/11/24	<4	<0.4	2	2	3	<0.1	1	4	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH105	0.1 - 0.2 m	FILL	21/11/24	7	<0.4	19	27	82	0.2	11	160	<1	0.3	<0.5	2.4	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH105	0.9 - 1 m	FILL	21/11/24	13	<0.4	12	15	19	<0.1	9	22	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH106	0.1 - 0.2 m	FILL	21/11/24	<4	<0.4	8	120	40	<0.1	7	73	<1	0.07	<0.5	0.5	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH106	0.9 - 1 m	FILL	21/11/24	8	<0.4	9	10	14	<0.1	7	19	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH106	1.4 - 1.5 m	FILL	21/11/24	<4	<0.4	3	4	5	<0.1	2	9	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH107	0.1 - 0.2 m	FILL	21/11/24	<4	<0.4	15	43	20	<0.1	55	56	<1	0.06	<0.5	0.4	<25	<50	<25	<50	180	230	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH107	0.4 - 0.5 m	FILL	21/11/24	6	<0.4	18	22	73	0.1	12	84	<1	0.73	1.1	8.8	<25	<50	<25	<50	140	150	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH107	1.4 - 1.5 m	FILL	21/11/24	5	<0.4	5	6	8	<0.1	4	9	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH107	1.9 - 2 m	CLAYEY SAND	21/11/24	8	<0.4	12	26	28	<0.1	14	56	<1	<0.05	<0.5	0.1	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BD02/20241121	0 m	CLAYEY SAND	21/11/24	7	<0.4	10	14	14	<0.1	6	33	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH108	0.1 - 0.2 m	FILL	26/11/24	<4	<0.4	7	34	31	<0.1	9	41	<1	0.2	<0.5	1.9	<25	<50	<25	<50	140	200	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH109	0.1 - 0.2 m	FILL	21/11/24	8	<0.4	8	53	23	<0.1	29	200	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH109	0.4 - 0.5 m	FILL	21/11/24	7	<0.4	12	26	26	0.1	19	93	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH109	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
BH110	0.1 - 0.2 m	FILL	21/11/24	<4	<0.4	5	9	22	<0.1	3	34	<1	0.08	<0.5	0.08	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH110	0.4 - 0.5 m	FILL	21/11/24	4	<0.4	13	11	34	<0.1	9	110	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH111	0.1 - 0.2 m	FILL	26/11/24	<4	<0.4	11	3	15	<0.1	7	31	<1	<0.05	<0.5	<0.05	<25	<50	<25	<50	<100	<100	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105
BH112	0.1 - 0.2 m	FILL	26/11/24	5	<0.4	14	18	22	<0.1	8	58	<1	0.1	<0.5	0.5	<25	<50	<25	<50	260	230	<0.2	<0.5	<1	<1
				300 100	90 -	300 410	17,000 220	600 1,100	80 -	1,200 180	30,000 550	NL 170	- 0.7	3 -	300 -	- -	- 120	NL 180	NL -	- 300	- 2,800	NL 50	NL 85	NL 70	NL 105

Lab result

HIL/HSL value EIL/ESL/EGV value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

Indicates that asbestos has been detected by the lab, refer to the lab report **Blue** = DC exceedance **Red** = EGV-indirect exceedance HSL 0-<1 Exceedance

Bold = Lab detections - = Not tested or No HIL/HSL/EIL/ESL (as applicable) or Not applicable NL = Not limiting NAD = No Asbestos detected

HIL = Health investigation level HSL = Health screening level (excluding DC) EIL = Ecological investigation level ESL = Ecological screening level EGV = Environmental Guideline Value ML = Management Limit DC = Direct Contact HSL

Notes:

a QA/QC replicate of sample listed directly below the primary sample

b Naphthalene reported as highest detection from the BTEXN or PAH suite, or if both results <PQL as lowest PQL

c EIL criteria applies to DDT only

Site Assessment Criteria (SAC):

SAC based on generic land use thresholds for Recreational C including public open space

Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

HIL	HIL-C (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-C (NEPC, 2013)	ESL	Urban Residential and Public Open Space (NEPC, 2013)
DC	Direct contact HSL C Recreational /Open space (CRC CARE, 2011)	ML	Residential, Parkland and Public Open Space (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

Table A1: Summary of results of soil analysis

				Priority phenols	Priority OCP										Priority OPP	PCB	Asbestos (FA/AF)				Asbestos, Other							pH, EC and CEC	
				Total Phenolics	DDT+DDE+DDD [c]	Aldrin + Dieldrin	Total Chlordane	Total Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	Mirex		Chlorpyriphos	Total PCB	Asb_Sample_mass	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Trace Analysis (AS)	Asbestos ID in soil >0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis (NEPC)	Total Asbestos#1	Asbestos ID in materials	Asbestos Summary	pH 1:5 soliwater	Cation Exchange Capacity
			PQL	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1				0.001					0.1		0.1		1
Sample ID	Depth	Soil Matrix	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	g	g	g	%(w/w)	-	-	-	-	g/kg	-		pH Units	cmol/kg
BH101	0.1 - 0.2 m	FILL	21/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	644.59	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	7.3	28
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH101	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	738.83	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH101	1.4 - 1.5 m	SAND	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	6.6	6
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-								-	-
BD01/20241121	0 m	SAND	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-								-	-
BH102	0.1 - 0.2 m	FILL	21/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	526.81	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH102	0.4 - 0.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	554.58	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH103	0.1 - 0.2 m	FILL	21/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	482.65	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH103	0.4 - 0.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	615.51	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH103	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	568.97	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH104	0.1 - 0.2 m	FILL	21/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	545.75	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH104	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	666.86	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH104	1.4 - 1.5 m	SAND	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-								-	-
BH105	0.1 - 0.2 m	FILL	21/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	575.22	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH105	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	632.41	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH106	0.1 - 0.2 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	698.74	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	6.3	6.2
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH106	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	439.02	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH106	1.4 - 1.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	6.6	3.4
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-								-	-
BH107	0.1 - 0.2 m	FILL	21/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	863.1	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH107	0.4 - 0.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	517.11	0.1048	-	<0.001	-	Detected	Detected	NAD	0.2026	-	Detected	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH107	1.4 - 1.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	551.79	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH107	1.9 - 2 m	CLAYEY SAND	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-								-	-
BD02/20241121	0 m	CLAYEY SAND	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-								-	-
BH108	0.1 - 0.2 m	FILL	26/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	609.22	-	-	<0.001	NAD	NAD	NAD	NAD	<0.1	Detected	Detected	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH109	0.1 - 0.2 m	FILL	21/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	581.38	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH109	0.4 - 0.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	488.13	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH109	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	617.75	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH110	0.1 - 0.2 m	FILL	21/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	898.13	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH110	0.4 - 0.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-		-	-	862.04	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	0.001								-	-
BH111	0.1 - 0.2 m	FILL	26/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	837.35	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-
BH112	0.1 - 0.2 m	FILL	26/11/24	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	576.41	-	-	<0.001	-	NAD	NAD	NAD	<0.1	-	-	-	-
				120	400 180	10	70	340	20	10	10	400	20		250	1	-	-	-	0.001								-	-

Lab result

HIL/HSL value EIL/ESL/EGV value

HIL/HSL exceedance EIL/ESL exceedance HIL/HSL and EIL/ESL exceedance ML exceedance ML and HIL/HSL or EIL/ESL exceedance

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Refer to the SAC section of report for information of SAC sources and rationale. Summary information as follows:

HIL	HIL-C (NEPC, 2013 or HEPA, 2020 (PFAS only))	EGV	EGV, all land uses, direct exposure (HEPA, 2020)
HSL (vapour intrusion)	HSL-C (NEPC, 2013)	ESL	Urban Residential and Public Open Space (NEPC, 2013)
DC	Direct contact HSL C Recreational /Open space (CRC CARE, 2011)	ML	Residential, Parkland and Public Open Space (NEPC, 2013)
		EGV-Indir	EGV, all land uses, Indirect exposure (HEPA, 2020)

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Table A2 : Summary of results of preliminary waste classification

				Metals								TRH		BTEX				PAH			Phenols	OCP				OPP	PCB	Asbestos									
				Total Arsenic	Cadmium	Total Chromium	Lead	TCLP Lead	Mercury (inorganic)	Nickel	TCLP Nickel	TRH C6 - C9	TRH C10-C36	Benzene	Toluene	Ethylbenzene	Total Xylenes	Benzo(a)pyrene (B(a)P)	TCLP Benzo(a)pyrene (B(a)P)	Total PAH	Total Phenolics	Scheduled Chemical Waste (standard)	Total Endosulfan	Total Analysed OCP	Mirex	Total Analysed OPP	Total PCB	Asbestos ID in materials	Trace Analysis (AS)	Asbestos ID in soil >0.1g/kg	Asbestos ID in soil <0.1g/kg	Trace Analysis (NEPC)	ACM >7mm Estimation	FA and AF Estimation	FA and AF Estimation	Total Asbestos#1	Asbestos Comment	Asbestos Summary
			PQL	4	0.4	1	1	0.03	0.1	1	0.02	25	50	0.2	0.5	1	1	0.05	0.0001	0.05	5	0.1	0.1	0.1	0.1	0.1	0.1								0.001	0.1		0.001
Sample ID	Depth	Soil Matrix	Sample Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	-	-	-	-	-	g	g	%(w/w)	g/kg	-	
BH101	0.1 - 0.2 m	FILL	21/11/24	**5**	<0.4	**14**	**51**	-	**0.2**	**13**	-	<25	<50	<0.2	<0.5	<1	<1	**0.2**	-	**1.3**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH101	0.9 - 1 m	FILL	21/11/24	**5**	<0.4	**5**	**10**	-	<0.1	**3**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH101	1.4 - 1.5 m	SAND	21/11/24	**6**	<0.4	**4**	**5**	-	<0.1	<1	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD01/20241121	0 m	SAND	21/11/24	**7**	<0.4	**19**	**96**	-	**0.2**	**12**	-	<25	**110**	<0.2	<0.5	<1	<1	**0.2**	-	**2.3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH102	0.1 - 0.2 m	FILL	21/11/24	**8**	<0.4	**15**	**110**	<0.03	**0.2**	**10**	-	<25	**110**	<0.2	<0.5	<1	<1	**4.9**	<0.0001	**64**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH102	0.4 - 0.5 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH103	0.1 - 0.2 m	FILL	21/11/24	**7**	**0.4**	**19**	**95**	-	**0.2**	**12**	-	<25	<50	<0.2	<0.5	<1	<1	**0.4**	-	**3.3**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH103	0.4 - 0.5 m	FILL	21/11/24	**7**	<0.4	**12**	**36**	-	**0.2**	**8**	-	<25	<50	<0.2	<0.5	<1	<1	**0.2**	-	**1.8**	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH103	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH104	0.1 - 0.2 m	FILL	21/11/24	**7**	<0.4	**15**	**64**	-	**0.1**	**9**	-	<25	<50	<0.2	<0.5	<1	<1	**0.4**	-	**2.7**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH104	0.9 - 1 m	FILL	21/11/24	**9**	<0.4	**6**	**12**	-	**0.1**	**4**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH104	1.4 - 1.5 m	SAND	21/11/24	<4	<0.4	**2**	**3**	-	<0.1	**1**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH105	0.1 - 0.2 m	FILL	21/11/24	**7**	<0.4	**19**	**82**	-	**0.2**	**11**	-	<25	<50	<0.2	<0.5	<1	<1	**0.3**	-	**2.4**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH105	0.9 - 1 m	FILL	21/11/24	**13**	<0.4	**12**	**19**	-	<0.1	**9**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH106	0.1 - 0.2 m	FILL	21/11/24	<4	<0.4	**8**	**40**	-	<0.1	**7**	-	<25	<50	<0.2	<0.5	<1	<1	**0.07**	-	**0.5**	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH106	0.9 - 1 m	FILL	21/11/24	**8**	<0.4	**9**	**14**	-	<0.1	**7**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH106	1.4 - 1.5 m	FILL	21/11/24	<4	<0.4	**3**	**5**	-	<0.1	**2**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH107	0.1 - 0.2 m	FILL	21/11/24	<4	<0.4	**15**	**20**	-	<0.1	**55**	**0.05**	<25	**180**	<0.2	<0.5	<1	<1	**0.06**	-	**0.4**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH107	0.4 - 0.5 m	FILL	21/11/24	**6**	<0.4	**18**	**73**	-	**0.1**	**12**	-	<25	**120**	<0.2	<0.5	<1	<1	**0.73**	-	**8.8**	-	-	-	-	-	-	-	-	-	**Detected**	**Detected**	NAD	**0.1048**	–	<0.001	**0.2026**	**YES**	**Detected**
BH107	1.4 - 1.5 m	FILL	21/11/24	**5**	<0.4	**5**	**8**	-	<0.1	**4**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH107	1.9 - 2 m	CLAYEY SAND	21/11/24	**8**	<0.4	**12**	**28**	-	<0.1	**14**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	**0.1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BD02/20241121	0 m	CLAYEY SAND	21/11/24	**7**	<0.4	**10**	**14**	-	<0.1	**6**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH108	0.1 - 0.2 m	FILL	26/11/24	<4	<0.4	**7**	**31**	-	<0.1	**9**	-	<25	**130**	<0.2	<0.5	<1	<1	**0.2**	-	**1.9**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**Detected**	NAD	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	**Detected**
BH109	0.1 - 0.2 m	FILL	21/11/24	**8**	<0.4	**8**	**23**	-	<0.1	**29**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH109	0.4 - 0.5 m	FILL	21/11/24	**7**	<0.4	**12**	**26**	-	**0.1**	**19**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH109	0.9 - 1 m	FILL	21/11/24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH110	0.1 - 0.2 m	FILL	21/11/24	<4	<0.4	**5**	**22**	-	<0.1	**3**	-	<25	<50	<0.2	<0.5	<1	<1	**0.08**	-	**0.08**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH110	0.4 - 0.5 m	FILL	21/11/24	**4**	<0.4	**13**	**34**	-	<0.1	**9**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	-	-	-	-	-	-	-	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH111	0.1 - 0.2 m	FILL	26/11/24	<4	<0.4	**11**	**15**	-	<0.1	**7**	-	<25	<50	<0.2	<0.5	<1	<1	<0.05	-	<0.05	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
BH112	0.1 - 0.2 m	FILL	26/11/24	**5**	<0.4	**14**	**22**	-	<0.1	**8**	-	<25	**330**	<0.2	<0.5	<1	<1	**0.1**	-	**0.5**	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	NAD	NAD	NAD	–	–	<0.001	<0.1	**Nil**	-
Waste Classification Criteria [f]																																						
CT1				100	20	100	100	**-**	4	40	**-**	-	10,000	10	288	600	1000	0.8	**-**	200	288	<50	60	-	-	4	<50	-	-	-	-	-	-	-	-	-	-	-
SCC1				500	100	1,900	1,500	**-**	50	1,050	**-**	-	10,000	18	518	1,080	1,800	10	**-**	200	518	<50	108	-	-	7.5	<50	-	-	-	-	-	-	-	-	-	-	-
TCLP1				-	-	-	-	5	-	-	2	-	-	-	-	-	-	-	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CT2				400	80	400	400	**-**	16	160	**-**	-	40,000	40	1,152	2,400	4,000	3.2	**-**	800	1,152	<50	240	-	-	16	<50	-	-	-	-	-	-	-	-	-	-	-
SCC2				2,000	400	7,600	6,000	**-**	200	4,200	**-**	-	40,000	72	2,073	4,320	7,200	23	**-**	800	2,073	<50	432	-	-	30	<50	-	-	-	-	-	-	-	-	-	-	-
TCLP2				-	-	-	-	20	-	-	8	-	-	-	-	-	-	-	0.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CT1 exceedance TCLP1 and/or SCC1 exceedance CT2 exceedance TCLP2 and/or SCC2 exceedance Asbestos detection

- = Not tested, no criteria or not applicable NAD = no asbestos detected

Notes:

a	QA/QC replicate of sample listed directly below the primary sample
b	Total chromium used as initial screen for chromium(VI).
c	Total recoverable hydrocarbons (TRH) used as an initial screen for total petroleum hydrocarbons (TPH)
d	Criteria for scheduled chemicals used as an initial screen
e	Criteria for Chlorpyrifos used as initial screen
f	NSW EPA, 2014, Waste Classification Guidelines Part 1; Classifying Waste
PQL	Practical quantitation limit
CT1	Maximum values of specific contaminant concentration (SCC) for classification without TCLP: General solid waste
SCC1	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
TCLP1	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: General solid waste
CT2	Maximum values of specific contaminant concentration (SCC) for classification without TCLP: Restricted solid waste
SCC2	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste
TCLP2	Maximum values for leachable concentration (TCLP) and specific contaminant concentration (SCC) when used together: Restricted solid waste

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.118/12/2024 1:26:53 AM
From File	UCL data entry (without hotspot for b(a)p.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

B(a)P

General Statistics

Total Number of Observations	21	Number of Distinct Observations	9
Number of Detects	12	Number of Non-Detects	9
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	0.05	Minimum Non-Detect	0.05
Maximum Detect	0.73	Maximum Non-Detect	0.05
Variance Detects	0.0401	Percent Non-Detects	42.86%
Mean Detects	0.233	SD Detects	0.2
Median Detects	0.2	CV Detects	0.862
Skewness Detects	1.51	Kurtosis Detects	2.458
Mean of Logged Detects	-1.79	SD of Logged Detects	0.864

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.231	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.243	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.154	KM Standard Error of Mean	0.0389
KM SD	0.171	95% KM (BCA) UCL	0.222
95% KM (t) UCL	0.221	95% KM (Percentile Bootstrap) UCL	0.219
95% KM (z) UCL	0.218	95% KM Bootstrap t UCL	0.262
90% KM Chebyshev UCL	0.271	95% KM Chebyshev UCL	0.324
97.5% KM Chebyshev UCL	0.397	99% KM Chebyshev UCL	0.542

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.376	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.168	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.249	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.658	k star (bias corrected MLE)	1.299
Theta hat (MLE)	0.14	Theta star (bias corrected MLE)	0.179
nu hat (MLE)	39.8	nu star (bias corrected)	31.19
Mean (detects)	0.233		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

55	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
56	This is especially true when the sample size is small.											
57	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
58					Minimum	0.01				Mean	0.137	
59					Maximum	0.73				Median	0.06	
60					SD	0.187				CV	1.36	
61					k hat (MLE)	0.61				k star (bias corrected MLE)	0.555	
62					Theta hat (MLE)	0.225				Theta star (bias corrected MLE)	0.247	
63					nu hat (MLE)	25.64				nu star (bias corrected)	23.31	
64					Adjusted Level of Significance (β)	0.0383						
65					Approximate Chi Square Value (23.31, α)	13.32				Adjusted Chi Square Value (23.31, β)	12.75	
66					95% Gamma Approximate UCL (use when n>=50)	0.24				95% Gamma Adjusted UCL (use when n<50)	0.251	
67												
68	**Estimates of Gamma Parameters using KM Estimates**											
69					Mean (KM)	0.154				SD (KM)	0.171	
70					Variance (KM)	0.0292				SE of Mean (KM)	0.0389	
71					k hat (KM)	0.816				k star (KM)	0.731	
72					nu hat (KM)	34.25				nu star (KM)	30.69	
73					theta hat (KM)	0.189				theta star (KM)	0.211	
74					80% gamma percentile (KM)	0.253				90% gamma percentile (KM)	0.383	
75					95% gamma percentile (KM)	0.517				99% gamma percentile (KM)	0.835	
76												
77	**Gamma Kaplan-Meier (KM) Statistics**											
78					Approximate Chi Square Value (30.69, α)	19.04				Adjusted Chi Square Value (30.69, β)	18.33	
79					95% Gamma Approximate KM-UCL (use when n>=50)	0.249				95% Gamma Adjusted KM-UCL (use when n<50)	0.258	
80												
81	**Lognormal GOF Test on Detected Observations Only**											
82					Shapiro Wilk Test Statistic	0.943				**Shapiro Wilk GOF Test**		
83					5% Shapiro Wilk Critical Value	0.859				Detected Data appear Lognormal at 5% Significance Level		
84					Lilliefors Test Statistic	0.166				**Lilliefors GOF Test**		
85					5% Lilliefors Critical Value	0.243				Detected Data appear Lognormal at 5% Significance Level		
86	**Detected Data appear Lognormal at 5% Significance Level**											
87												
88	**Lognormal ROS Statistics Using Imputed Non-Detects**											
89					Mean in Original Scale	0.141				Mean in Log Scale	-2.792	
90					SD in Original Scale	0.184				SD in Log Scale	1.423	
91					95% t UCL (assumes normality of ROS data)	0.21				95% Percentile Bootstrap UCL	0.207	
92					95% BCA Bootstrap UCL	0.229				95% Bootstrap t UCL	0.251	
93					95% H-UCL (Log ROS)	0.466						
94												
95	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
96					KM Mean (logged)	-2.307				KM Geo Mean	0.0996	
97					KM SD (logged)	0.864				95% Critical H Value (KM-Log)	2.386	
98					KM Standard Error of Mean (logged)	0.197				95% H-UCL (KM -Log)	0.229	
99					KM SD (logged)	0.864				95% Critical H Value (KM-Log)	2.386	
100					KM Standard Error of Mean (logged)	0.197						
101												
102	**DL/2 Statistics**											
103	**DL/2 Normal**									**DL/2 Log-Transformed**		
104					Mean in Original Scale	0.144				Mean in Log Scale	-2.604	
105					SD in Original Scale	0.182				SD in Log Scale	1.157	
106					95% t UCL (Assumes normality)	0.212				95% H-Stat UCL	0.297	
107	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
108												

109	**Nonparametric Distribution Free UCL Statistics**											
110	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
111												
112	**Suggested UCL to Use**											
113	95% KM (t) UCL					0.221						
114												
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
117												
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
119	Recommendations are based upon data size, data distribution, and skewness.											
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
122												
123	**B(a)P TEQ**											
124												
125	**General Statistics**											
126	Total Number of Observations					22			Number of Distinct Observations			4
127	Number of Detects					3			Number of Non-Detects			19
128	Number of Distinct Detects					3			Number of Distinct Non-Detects			1
129	Minimum Detect					0.6			Minimum Non-Detect			0.5
130	Maximum Detect					6.9			Maximum Non-Detect			0.5
131	Variance Detects					12.26			Percent Non-Detects			86.36%
132	Mean Detects					2.867			SD Detects			3.502
133	Median Detects					1.1			CV Detects			1.222
134	Skewness Detects					1.692			Kurtosis Detects			N/A
135	Mean of Logged Detects					0.505			SD of Logged Detects			1.272
136												
137	**Warning: Data set has only 3 Detected Values.**											
138	**This is not enough to compute meaningful or reliable statistics and estimates.**											
139												
140												
141	**Normal GOF Test on Detects Only**											
142	Shapiro Wilk Test Statistic					0.809			**Shapiro Wilk GOF Test**			
143	5% Shapiro Wilk Critical Value					0.767			Detected Data appear Normal at 5% Significance Level			
144	Lilliefors Test Statistic					0.36			**Lilliefors GOF Test**			
145	5% Lilliefors Critical Value					0.425			Detected Data appear Normal at 5% Significance Level			
146	**Detected Data appear Normal at 5% Significance Level**											
147												
148	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
149	KM Mean					0.823			KM Standard Error of Mean			0.348
150	KM SD					1.332			95% KM (BCA) UCL			N/A
151	95% KM (t) UCL					1.421			95% KM (Percentile Bootstrap) UCL			N/A
152	95% KM (z) UCL					1.395			95% KM Bootstrap t UCL			N/A
153	90% KM Chebyshev UCL					1.866			95% KM Chebyshev UCL			2.339
154	97.5% KM Chebyshev UCL					2.995			99% KM Chebyshev UCL			4.284
155												
156	**Gamma GOF Tests on Detected Observations Only**											
157	**Not Enough Data to Perform GOF Test**											
158												
159	**Gamma Statistics on Detected Data Only**											
160	k hat (MLE)					1.048			k star (bias corrected MLE)			N/A
161	Theta hat (MLE)					2.735			Theta star (bias corrected MLE)			N/A
162	nu hat (MLE)					6.288			nu star (bias corrected)			N/A

163					Mean (detects)	2.867						
164												
165	**Gamma ROS Statistics using Imputed Non-Detects**											
166	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
167	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
168	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
169	This is especially true when the sample size is small.											
170	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
171					Minimum	0.01				Mean	0.4	
172					Maximum	6.9				Median	0.01	
173					SD	1.475				CV	3.691	
174					k hat (MLE)	0.239				k star (bias corrected MLE)	0.237	
175					Theta hat (MLE)	1.67				Theta star (bias corrected MLE)	1.687	
176					nu hat (MLE)	10.52				nu star (bias corrected)	10.42	
177					Adjusted Level of Significance (β)	0.0386						
178					Approximate Chi Square Value (10.42, α)	4.207				Adjusted Chi Square Value (10.42, β)	3.916	
179					95% Gamma Approximate UCL (use when n>=50)	0.99				95% Gamma Adjusted UCL (use when n<50)	N/A	
180												
181	**Estimates of Gamma Parameters using KM Estimates**											
182					Mean (KM)	0.823				SD (KM)	1.332	
183					Variance (KM)	1.774				SE of Mean (KM)	0.348	
184					k hat (KM)	0.381				k star (KM)	0.36	
185					nu hat (KM)	16.78				nu star (KM)	15.83	
186					theta hat (KM)	2.157				theta star (KM)	2.287	
187					80% gamma percentile (KM)	1.309				90% gamma percentile (KM)	2.366	
188					95% gamma percentile (KM)	3.545				99% gamma percentile (KM)	6.544	
189												
190	**Gamma Kaplan-Meier (KM) Statistics**											
191					Approximate Chi Square Value (15.83, α)	7.841				Adjusted Chi Square Value (15.83, β)	7.423	
192					95% Gamma Approximate KM-UCL (use when n>=50)	1.661				95% Gamma Adjusted KM-UCL (use when n<50)	1.754	
193												
194	**Lognormal GOF Test on Detected Observations Only**											
195					Shapiro Wilk Test Statistic	0.922				**Shapiro Wilk GOF Test**		
196					5% Shapiro Wilk Critical Value	0.767				Detected Data appear Lognormal at 5% Significance Level		
197					Lilliefors Test Statistic	0.293				**Lilliefors GOF Test**		
198					5% Lilliefors Critical Value	0.425				Detected Data appear Lognormal at 5% Significance Level		
199	**Detected Data appear Lognormal at 5% Significance Level**											
200												
201	**Lognormal ROS Statistics Using Imputed Non-Detects**											
202					Mean in Original Scale	0.401				Mean in Log Scale	-6.306	
203					SD in Original Scale	1.474				SD in Log Scale	4.155	
204					95% t UCL (assumes normality of ROS data)	0.942				95% Percentile Bootstrap UCL	0.998	
205					95% BCA Bootstrap UCL	1.394				95% Bootstrap t UCL	4.678	
206					95% H-UCL (Log ROS)	16083						
207												
208	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
209					KM Mean (logged)	-0.53				KM Geo Mean	0.589	
210					KM SD (logged)	0.562				95% Critical H Value (KM-Log)	2.057	
211					KM Standard Error of Mean (logged)	0.147				95% H-UCL (KM -Log)	0.888	
212					KM SD (logged)	0.562				95% Critical H Value (KM-Log)	2.057	
213					KM Standard Error of Mean (logged)	0.147						
214												
215	**DL/2 Statistics**											
216	**DL/2 Normal**									**DL/2 Log-Transformed**		

	A	B	C	D	E	F	G	H	I	J	K	L
217					Mean in Original Scale	0.607					Mean in Log Scale	-1.128
218					SD in Original Scale	1.419					SD in Log Scale	0.772
219					95% t UCL (Assumes normality)	1.127					95% H-Stat UCL	0.64
220	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
221												
222	**Nonparametric Distribution Free UCL Statistics**											
223	**Detected Data appear Normal Distributed at 5% Significance Level**											
224												
225	**Suggested UCL to Use**											
226					95% KM (t) UCL	1.421						
227												
228	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
229	Recommendations are based upon data size, data distribution, and skewness.											
230	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
231	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
232												

Appendix I

Laboratory Reports and Chain of Custody

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CERTIFICATE OF ANALYSIS 367555

Client Details

Client	Douglas Partners Pty Ltd
Attention	Cathy Li
Address	96 Hermitage Rd, West Ryde, NSW, 2114

Sample Details

Your Reference	**231248.01, Rangihou Reserve Parramatta**
Number of Samples	48 Soil, 1 Material
Date samples received	27/11/2024
Date completed instructions received	27/11/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	04/12/2024
Date of Issue	04/12/2024

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Analysed by Asbestos Approved Analyst: Lucy Zhu
Authorised by Asbestos Approved Signatory: Lucy Zhu

Results Approved By
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Dragana Tomas, Senior Chemist
Giovanni Agosti, Group Technical Manager
Liam Timmins, Organics Supervisor
Lucy Zhu, Asbestos Supervisor
Steven Luong, Senior Chemist

Authorised By
Nancy Zhang, Laboratory Manager

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		367555-1	367555-3	367555-4	367555-6	367555-11
Your Reference	UNITS	BH101	BH101	BH101	BH102	BH103
Depth		0.1-0.2	0.9-1	1.4-1.5	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	02/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	97	98	94	86	100

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		367555-12	367555-16	367555-18	367555-19	367555-21
Your Reference	UNITS	BH103	BH104	BH104	BH104	BH105
Depth		0.4-0.5	0.1-0.2	0.9-1	1.4-1.5	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	02/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	98	87	101	100	95

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		367555-23	367555-26	367555-28	367555-29	367555-31
Your Reference	UNITS	BH105	BH106	BH106	BH106	BH107
Depth		0.9-1	0.1-0.2	0.9-1	1.4-1.5	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	02/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	101	100	102	97	101

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		367555-32	367555-34	367555-35	367555-36	367555-37
Your Reference	UNITS	BH107	BH107	BH107	BH108	BH109
Depth		0.4-0.5	1.4-1.5	1.9-2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	26/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	02/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	98	101	97	102	103

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		367555-38	367555-40	367555-41	367555-42	367555-43
Your Reference	UNITS	BH109	BH110	BH110	BH111	BH112
Depth		0.4-0.5	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	26/11/2024	26/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	02/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	<25
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	<25
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1	<1
Naphthalene	mg/kg	<1	<1	<1	<1	<1
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	99	104	105	103	102

vTRH(C6-C10)/BTEXN in Soil						
Our Reference		367555-44	367555-45	367555-46	367555-47	367555-48
Your Reference	UNITS	BH112	BD01/20241121	BD02/20241121	TB1	TS1
Depth		0.1-0.2	-	-	-	-
Date Sampled		26/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	02/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
TRH C_6 - C_9	mg/kg	<25	<25	<25	<25	[NA]
TRH C_6 - C_{10}	mg/kg	<25	<25	<25	<25	[NA]
vTRH C_6 - C_{10} less BTEX (F1)	mg/kg	<25	<25	<25	<25	[NA]
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2	97%
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5	97%
Ethylbenzene	mg/kg	<1	<1	<1	<1	95%
m+p-xylene	mg/kg	<2	<2	<2	<2	95%
o-Xylene	mg/kg	<1	<1	<1	<1	96%
Naphthalene	mg/kg	<1	<1	<1	<1	[NA]
Total +ve Xylenes	mg/kg	<1	<1	<1	<1	[NA]
Surrogate aaa-Trifluorotoluene	%	101	101	102	102	96

svTRH (C10-C40) in Soil						
Our Reference		367555-1	367555-3	367555-4	367555-6	367555-11
Your Reference	UNITS	BH101	BH101	BH101	BH102	BH103
Depth		0.1-0.2	0.9-1	1.4-1.5	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	30/11/2024	30/11/2024	30/11/2024	01/12/2024	30/11/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	110	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	110	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	180	100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	180	100
Surrogate o-Terphenyl	%	98	92	95	97	95

svTRH (C10-C40) in Soil						
Our Reference		367555-12	367555-16	367555-18	367555-19	367555-21
Your Reference	UNITS	BH103	BH104	BH104	BH104	BH105
Depth		0.4-0.5	0.1-0.2	0.9-1	1.4-1.5	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	30/11/2024	01/12/2024	30/11/2024	30/11/2024	30/11/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	<50
Surrogate o-Terphenyl	%	102	93	93	93	93

svTRH (C10-C40) in Soil						
Our Reference		367555-23	367555-26	367555-28	367555-29	367555-31
Your Reference	UNITS	BH105	BH106	BH106	BH106	BH107
Depth		0.9-1	0.1-0.2	0.9-1	1.4-1.5	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	30/11/2024	01/12/2024	30/11/2024	30/11/2024	01/12/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	180
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	180
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	180
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	230
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	410
Surrogate o-Terphenyl	%	91	91	92	94	98

svTRH (C10-C40) in Soil						
Our Reference		367555-32	367555-34	367555-35	367555-36	367555-37
Your Reference	UNITS	BH107	BH107	BH107	BH108	BH109
Depth		0.4-0.5	1.4-1.5	1.9-2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	26/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	01/12/2024	30/11/2024	30/11/2024	01/12/2024	30/11/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	120	<100	<100	130	<100
Total +ve TRH (C10-C36)	mg/kg	120	<50	<50	130	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	140	<100	<100	140	<100
TRH >C_{34} -C_{40}	mg/kg	150	<100	<100	200	<100
Total +ve TRH (>C10-C40)	mg/kg	290	<50	<50	330	<50
Surrogate o-Terphenyl	%	94	91	100	100	91

svTRH (C10-C40) in Soil						
Our Reference		367555-38	367555-40	367555-41	367555-42	367555-43
Your Reference	UNITS	BH109	BH110	BH110	BH111	BH112
Depth		0.4-0.5	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	26/11/2024	26/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	01/12/2024	01/12/2024	01/12/2024	01/12/2024	01/12/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100	<100	120
TRH C_{29} - C_{36}	mg/kg	<100	<100	<100	<100	210
Total +ve TRH (C10-C36)	mg/kg	<50	<50	<50	<50	330
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	<100	<100	<100	260
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100	<100	230
Total +ve TRH (>C10-C40)	mg/kg	<50	<50	<50	<50	490
Surrogate o-Terphenyl	%	91	95	91	92	96

svTRH (C10-C40) in Soil				
Our Reference		367555-44	367555-45	367555-46
Your Reference	UNITS	BH112	BD01/20241121	BD02/20241121
Depth		0.1-0.2	-	-
Date Sampled		26/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	01/12/2024	01/12/2024	01/12/2024
TRH C_{10} - C_{14}	mg/kg	<50	<50	<50
TRH C_{15} - C_{28}	mg/kg	<100	<100	<100
TRH C_{29} - C_{36}	mg/kg	<100	110	<100
Total +ve TRH (C10-C36)	mg/kg	<50	110	<50
TRH >C_{10} -C_{16}	mg/kg	<50	<50	<50
TRH >C_{10} -C_{16} less Naphthalene (F2)	mg/kg	<50	<50	<50
TRH >C_{16} -C_{34}	mg/kg	<100	110	<100
TRH >C_{34} -C_{40}	mg/kg	<100	<100	<100
Total +ve TRH (>C10-C40)	mg/kg	<50	110	<50
Surrogate o-Terphenyl	%	96	92	90

PAHs in Soil						
Our Reference		367555-1	367555-3	367555-4	367555-6	367555-11
Your Reference	UNITS	BH101	BH101	BH101	BH102	BH103
Depth		0.1-0.2	0.9-1	1.4-1.5	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	03/12/2024	02/12/2024	29/11/2024	02/12/2024	02/12/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1	<0.1	8.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	1.8	<0.1
Fluoranthene	mg/kg	0.2	<0.1	<0.1	14	0.6
Pyrene	mg/kg	0.2	<0.1	<0.1	12	0.5
Benzo(a)anthracene	mg/kg	0.1	<0.1	<0.1	4.4	0.2
Chrysene	mg/kg	0.2	<0.1	<0.1	3.9	0.2
Benzo(b,j+k)fluoranthene	mg/kg	0.2	<0.2	<0.2	7.5	0.6
Benzo(a)pyrene	mg/kg	0.2	<0.05	<0.05	4.9	0.4
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	3.7	0.3
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	0.4	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1	<0.1	3.2	0.2
Total +ve PAH's	mg/kg	1.3	<0.05	<0.05	64	3.3
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	6.9	0.6
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	6.9	0.6
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	6.9	0.7
Surrogate p-Terphenyl-d14	%	102	107	97	110	110

PAHs in Soil						
Our Reference		367555-12	367555-16	367555-18	367555-19	367555-21
Your Reference	UNITS	BH103	BH104	BH104	BH104	BH105
Depth		0.4-0.5	0.1-0.2	0.9-1	1.4-1.5	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	02/12/2024	02/12/2024	29/11/2024	29/11/2024	02/12/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	0.1	<0.1	<0.1	0.2
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.3	0.4	<0.1	<0.1	0.4
Pyrene	mg/kg	0.3	0.4	<0.1	<0.1	0.4
Benzo(a)anthracene	mg/kg	0.1	0.2	<0.1	<0.1	0.2
Chrysene	mg/kg	0.1	0.2	<0.1	<0.1	0.2
Benzo(b,j+k)fluoranthene	mg/kg	0.3	0.5	<0.2	<0.2	0.4
Benzo(a)pyrene	mg/kg	0.2	0.4	<0.05	<0.05	0.3
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	0.3	<0.1	<0.1	0.2
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	0.2	<0.1	<0.1	0.2
Total +ve PAH's	mg/kg	1.8	2.7	<0.05	<0.05	2.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	0.6	<0.5	<0.5	0.5
Surrogate p-Terphenyl-d14	%	110	114	91	97	108

PAHs in Soil						
Our Reference		367555-23	367555-26	367555-28	367555-29	367555-31
Your Reference	UNITS	BH105	BH106	BH106	BH106	BH107
Depth		0.9-1	0.1-0.2	0.9-1	1.4-1.5	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	29/11/2024	29/11/2024	29/11/2024	29/11/2024	03/12/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.2	<0.1	<0.1	0.1
Pyrene	mg/kg	<0.1	0.1	<0.1	<0.1	0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.07	<0.05	<0.05	0.06
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Total +ve PAH's	mg/kg	<0.05	0.5	<0.05	<0.05	0.4
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	93	92	97	97	107

PAHs in Soil						
Our Reference		367555-32	367555-34	367555-35	367555-36	367555-37
Your Reference	UNITS	BH107	BH107	BH107	BH108	BH109
Depth		0.4-0.5	1.4-1.5	1.9-2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	26/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	29/11/2024	29/11/2024	29/11/2024	02/12/2024	02/12/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.9	<0.1	<0.1	0.2	<0.1
Anthracene	mg/kg	0.3	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	1.6	<0.1	0.1	0.3	<0.1
Pyrene	mg/kg	1.5	<0.1	<0.1	0.3	<0.1
Benzo(a)anthracene	mg/kg	0.7	<0.1	<0.1	0.1	<0.1
Chrysene	mg/kg	0.8	<0.1	<0.1	0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	1	<0.2	<0.2	0.3	<0.2
Benzo(a)pyrene	mg/kg	0.73	<0.05	<0.05	0.2	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.4	<0.1	<0.1	0.2	<0.1
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.4	<0.1	<0.1	0.2	<0.1
Total +ve PAH's	mg/kg	8.8	<0.05	0.1	1.9	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	1.1	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	1.1	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	1.1	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	91	94	92	111	110

PAHs in Soil						
Our Reference		367555-38	367555-40	367555-41	367555-42	367555-43
Your Reference	UNITS	BH109	BH110	BH110	BH111	BH112
Depth		0.4-0.5	0.1-0.2	0.4-0.5	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	26/11/2024	26/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	29/11/2024	02/12/2024	29/11/2024	02/12/2024	02/12/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.08	<0.05	<0.05	0.1
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Total +ve PAH's	mg/kg	<0.05	0.08	<0.05	<0.05	0.50
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	92	109	95	110	113

PAHs in Soil				
Our Reference		367555-44	367555-45	367555-46
Your Reference	UNITS	BH112	BD01/20241121	BD02/20241121
Depth		0.1-0.2	-	-
Date Sampled		26/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	29/11/2024	29/11/2024	29/11/2024
Naphthalene	mg/kg	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	0.2	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	0.4	<0.1
Pyrene	mg/kg	<0.1	0.4	<0.1
Benzo(a)anthracene	mg/kg	<0.1	0.2	<0.1
Chrysene	mg/kg	<0.1	0.2	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	<0.2	0.4	<0.2
Benzo(a)pyrene	mg/kg	<0.05	0.2	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	0.1	<0.1
Total +ve PAH's	mg/kg	<0.05	2.3	<0.05
Benzo(a)pyrene TEQ calc (zero)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	<0.5	<0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	<0.5	<0.5	<0.5
Surrogate p-Terphenyl-d14	%	91	93	92

Organochlorine Pesticides in soil						
Our Reference		367555-1	367555-6	367555-11	367555-16	367555-21
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	03/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive Aldrin+Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	104	113	115	116	111

Organochlorine Pesticides in soil						
Our Reference		367555-31	367555-36	367555-37	367555-40	367555-42
Your Reference	UNITS	BH107	BH108	BH109	BH110	BH111
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	26/11/2024	21/11/2024	21/11/2024	26/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	03/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mirex	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total Positive Aldrin+Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	108	115	114	115	112

Organochlorine Pesticides in soil		
Our Reference		367555-43
Your Reference	UNITS	BH112
Depth		0.1-0.2
Date Sampled		26/11/2024
Type of sample		Soil
Date extracted	-	28/11/2024
Date analysed	-	02/12/2024
alpha-BHC	mg/kg	<0.1
HCB	mg/kg	<0.1
beta-BHC	mg/kg	<0.1
gamma-BHC	mg/kg	<0.1
Heptachlor	mg/kg	<0.1
delta-BHC	mg/kg	<0.1
Aldrin	mg/kg	<0.1
Heptachlor Epoxide	mg/kg	<0.1
gamma-Chlordane	mg/kg	<0.1
alpha-chlordane	mg/kg	<0.1
Endosulfan I	mg/kg	<0.1
pp-DDE	mg/kg	<0.1
Dieldrin	mg/kg	<0.1
Endrin	mg/kg	<0.1
Endosulfan II	mg/kg	<0.1
pp-DDD	mg/kg	<0.1
Endrin Aldehyde	mg/kg	<0.1
pp-DDT	mg/kg	<0.1
Endosulfan Sulphate	mg/kg	<0.1
Methoxychlor	mg/kg	<0.1
Mirex	mg/kg	<0.1
Total +ve DDT+DDD+DDE	mg/kg	<0.1
Total Positive Aldrin+Dieldrin	mg/kg	<0.1
Surrogate 4-Chloro-3-NBTF	%	112

Organophosphorus Pesticides in Soil						
Our Reference		367555-1	367555-6	367555-11	367555-16	367555-21
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	03/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phorate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Disulfoton	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion-Methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenthion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methidathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenamiphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phosalone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Coumaphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	104	113	115	116	111

Organophosphorus Pesticides in Soil						
Our Reference		367555-31	367555-36	367555-37	367555-40	367555-42
Your Reference	UNITS	BH107	BH108	BH109	BH110	BH111
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	26/11/2024	21/11/2024	21/11/2024	26/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	03/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
Dichlorvos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Mevinphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phorate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Disulfoton	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion-Methyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Malathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenthion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Parathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Methidathion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fenamiphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Phosalone	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Coumaphos	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 4-Chloro-3-NBTF	%	108	115	114	115	112

Organophosphorus Pesticides in Soil		
Our Reference		367555-43
Your Reference	UNITS	BH112
Depth		0.1-0.2
Date Sampled		26/11/2024
Type of sample		Soil
Date extracted	-	28/11/2024
Date analysed	-	02/12/2024
Dichlorvos	mg/kg	<0.1
Mevinphos	mg/kg	<0.1
Phorate	mg/kg	<0.1
Dimethoate	mg/kg	<0.1
Diazinon	mg/kg	<0.1
Disulfoton	mg/kg	<0.1
Chlorpyrifos-methyl	mg/kg	<0.1
Parathion-Methyl	mg/kg	<0.1
Ronnel	mg/kg	<0.1
Fenitrothion	mg/kg	<0.1
Malathion	mg/kg	<0.1
Chlorpyriphos	mg/kg	<0.1
Fenthion	mg/kg	<0.1
Parathion	mg/kg	<0.1
Bromophos-ethyl	mg/kg	<0.1
Methidathion	mg/kg	<0.1
Fenamiphos	mg/kg	<0.1
Ethion	mg/kg	<0.1
Phosalone	mg/kg	<0.1
Azinphos-methyl (Guthion)	mg/kg	<0.1
Coumaphos	mg/kg	<0.1
Surrogate 4-Chloro-3-NBTF	%	112

PCBs in Soil						
Our Reference		367555-1	367555-6	367555-11	367555-16	367555-21
Your Reference	UNITS	BH101	BH102	BH103	BH104	BH105
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	21/11/2024	21/11/2024	21/11/2024	21/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	03/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 2-Fluorobiphenyl	%	99	107	107	108	105

PCBs in Soil						
Our Reference		367555-31	367555-36	367555-37	367555-40	367555-42
Your Reference	UNITS	BH107	BH108	BH109	BH110	BH111
Depth		0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Date Sampled		21/11/2024	26/11/2024	21/11/2024	21/11/2024	26/11/2024
Type of sample		Soil	Soil	Soil	Soil	Soil
Date extracted	-	28/11/2024	28/11/2024	28/11/2024	28/11/2024	28/11/2024
Date analysed	-	03/12/2024	02/12/2024	02/12/2024	02/12/2024	02/12/2024
Aroclor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1221	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Aroclor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Total +ve PCBs (1016-1260)	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate 2-Fluorobiphenyl	%	102	108	108	108	106