Appendix J

Geological Logs

EXCAVATION - GEOLOGICAL LOG

MACQUARIE GEOTECH

CLIENT : Wood and Grieve Engineers PROJECT : St Aloysius College
LOCATION : Junior School Basketball Court

PIT NO : TP01
FILE / JOB NO : B17550
SHEET : 1 OF 3

POSITION : E: 334792.0, N: 6253247.0 (MGA94 Zone 56) SURFACE ELEVATION :
EQUIPMENT TYPE : METHOD : Hand Dug
DATE EXCAVATED : 07-12-2017 LOGGED BY : DP CHECKED BY : JB
EXCAVATION DIMENSIONS : 1.62 m LONG 0.63 m WIDE

EXCAVATION INFORMATION | MATERIAL

VE / PENETRATION / E / F / H	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) DEPTH (M)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP Blows/100mm 5 10 15 20	POCKET PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		0.05m D	0.0			Red brown Bricks (PAVING)	D	VD			FILL
		0.10m D ES			0.05m	SAND: fine to coarse grained sand, dark grey, with low plasticity clay, trace roots <2mm diameter		L			TP01_0.1 PID 46.7ppm
					0.10m	GRAVELLY SAND: fine to coarse grained sand, dark grey, fine to coarse, sub-rounded to sub-angular gravel, trace low plasticity clay		MD			
					0.15m	GRAVELLY SAND: fine to coarse grained sand, pale orange brown, fine to coarse, sub-angular gravel, with low plasticity clay, trace cobbles and boulders upto 300mm diameter					
			0.2								
		0.30m ES									TP01_0.3 PID 2.0ppm
		0.40m D			0.40m		SM				
	Not Observed	0.50m ES	0.4			GRAVELLY CLAYEY SAND: fine to coarse grained sand, pale brown and pale grey brown, low plasticity clay, fine to coarse, sub-angular gravel, with cobbles, trace sub-angular boulders upto 300mm diameter		D - VD			TP01_0.5 PID 1.7ppm
			0.6								
		0.75m ES			0.75m	0.75m: geofabric cloth					TP01_0.75 PID 2.1ppm
		0.80m	0.8			GRAVEL: medium to coarse gravel, sub-angular, grey, (DRAINAGE LAYER)					
						0.93m: concrete footing	D / SM	VD			
			1.0			0.96m: 1 no of 100mm diameter pipe , 1.10m from wall 1 no of white plastic pipe , 1.20m from wall (foundation level at pipe is 1.04m deep)					
					1.10m	Hole Terminated at 1.10 m					
			1.2								
			1.4								

PHOTOGRAPHS NOTES [Y] Excavated perpendicular to external wall.

METHOD
N Natural Exposure
X Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
PP - Pocket Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY
VS - Very Soft
S - Soft
F - Firm
St - Stiff
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

EXCAVATION - GEOLOGICAL LOG

MACQUARIE GEOTECH

CLIENT : Wood and Grieve Engineers PROJECT : St Aloysius College
LOCATION : Junior School Basketball Court

PIT NO : TP01
FILE / JOB NO : B17550
SHEET : 2 OF 3

POSITION : E: 334792.0, N: 6253247.0 (MGA94 Zone 56)	SURFACE ELEVATION :	
EQUIPMENT TYPE :	METHOD : Hand Dug	
DATE EXCAVATED : 07-12-2017	LOGGED BY : DP	CHECKED BY : JB
EXCAVATION DIMENSIONS : 1.62 m LONG 0.63 m WIDE		

TP01 - 1 Depth Range: 0.00 - 0.93 m

TP01 - 2 Depth Range: 0.00 - 0.93 m

EXCAVATION - GEOLOGICAL LOG

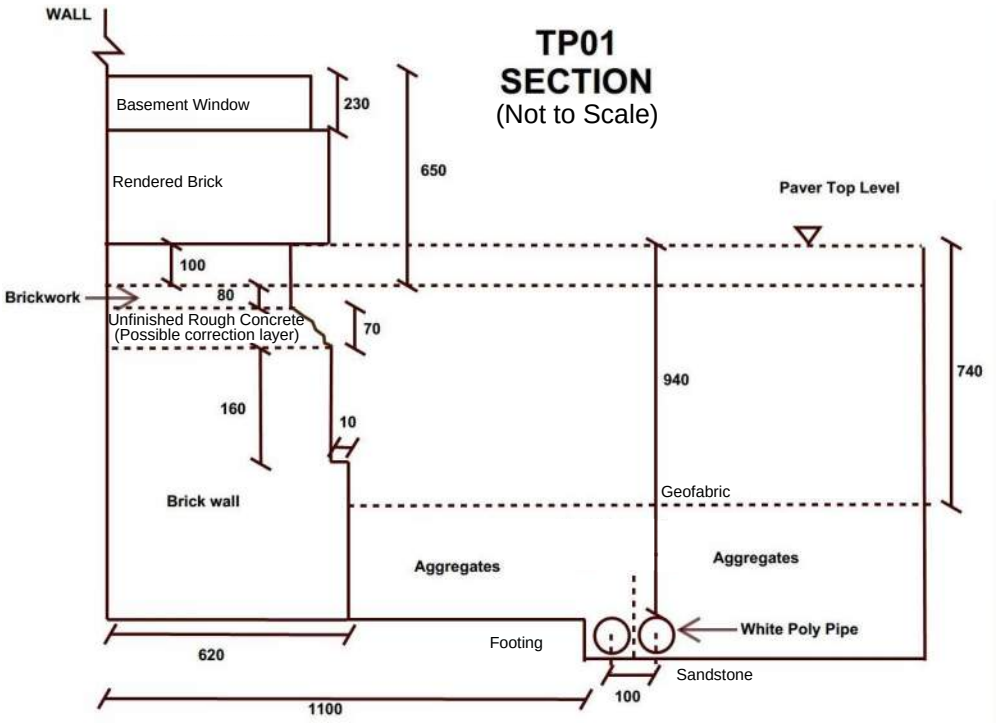
MACQUARIE GEOTECH

CLIENT : Wood and Grieve Engineers PROJECT : St Aloysius College
LOCATION : Junior School Basketball Court

PIT NO : TP01
FILE / JOB NO : B17550
SHEET : 3 OF 3

POSITION : E: 334792.0, N: 6253247.0 (MGA94 Zone 56)	SURFACE ELEVATION :	
EQUIPMENT TYPE :	METHOD : Hand Dug	
DATE EXCAVATED : 07-12-2017	LOGGED BY : DP	CHECKED BY : JB
EXCAVATION DIMENSIONS : 1.62 m LONG 0.63 m WIDE		

TP01 - 3 Depth Range: 0.00 - 0.93 m



TP01 - 4 Depth Range: 0.00 - 0.93 m

EXCAVATION - GEOLOGICAL LOG

MACQUARIE GEOTECH

CLIENT : Wood and Grieve Engineers PROJECT : St Aloysius College
LOCATION : Junior School Basketball Court

PIT NO : TP02
FILE / JOB NO : B17550
SHEET : 1 OF 3

POSITION : E: 334798.0, N: 6253256.0 (MGA94 Zone 56) SURFACE ELEVATION :
EQUIPMENT TYPE : METHOD : Hand Dug
DATE EXCAVATED : 08-12-2017 LOGGED BY : DP CHECKED BY : JB
EXCAVATION DIMENSIONS : 1.10 m LONG 0.68 m WIDE

EXCAVATION INFORMATION | MATERIAL

VE E PENETRATION F H	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION (RL) DEPTH (M)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Type, Colour, Plasticity or Particle Characteristic Secondary and Minor Components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	DCP Blows/100mm 5 10 15 20	POCKET PENETRO-METER kPa 100 200 300 400	STRUCTURE & Other Observations
		0.05m D	0.0			0.05m Brown brick (PAVING)		VD			FILL
		0.08m ES				SAND: fine to coarse grained sand, dark grey, with clay		L			
		0.10m D				0.10m GRAVELLY SAND: fine to coarse grained sand, dark grey, fine to coarse, sub-rounded to sub-angular gravel, trace low plasticity clay					TP02_0.08 PID 4.8ppm
		0.15m ES				0.15m		MD - D			
		0.20m D	0.2			0.18m GRAVELLY SAND: fine to coarse grained sand, orange brown, fine to coarse, sub-rounded gravel, with low plasticity clay					TP02_0.15 PID 8.5ppm
						CLAYEY SAND: fine to coarse grained sand, brown and grey, brown mottled pale grey, low plasticity clay, with fine to coarse, angular to sub-angular gravel, with sub-angular cobbles, trace sandy clay pockets <50mm, gravel - mixture of sandstone, glass, plastic fragments, brick 0.25-0.40m: 3 nos of sub-angular boulders up to 300mm diameter	SM				
		0.30m ES									TP02_0.30 PID 11.9ppm
	Not Observed	0.40m D	0.4			Becoming sandy GRAVEL with depth		D - VD			
						0.55m 0.55m: black geofabric					FILL
		0.60m D	0.6			GRAVEL: medium to coarse gravel, sub-angular, grey, trace fine to coarse sand					
							SM - W	VD			
		0.80m	0.8			0.75m: top of footing 2 nos pipes beside footing					
						0.85m 0.85m: top of sandstone Hole Terminated at 0.85 m					
			1.0								
			1.2								
			1.4								

PHOTOGRAPHS NOTES [Y] Excavated perpendicular to external wall.

METHOD
N Natural Exposure
X Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
PP - Pocket Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

EXCAVATION - GEOLOGICAL LOG

MACQUARIE GEOTECH

CLIENT : Wood and Grieve Engineers PROJECT : St Aloysius College
LOCATION : Junior School Basketball Court

PIT NO : TP02
FILE / JOB NO : B17550
SHEET : 2 OF 3

POSITION : E: 334798.0, N: 6253256.0 (MGA94 Zone 56)	SURFACE ELEVATION :	
EQUIPMENT TYPE :	METHOD : Hand Dug	
DATE EXCAVATED : 08-12-2017	LOGGED BY : DP	CHECKED BY : JB
EXCAVATION DIMENSIONS : 1.10 m LONG 0.68 m WIDE		

TP02 - 1 Depth Range: 0.00 - 0.85 m

TP02 - 2 Depth Range: 0.00 - 0.85 m

EXCAVATION - GEOLOGICAL LOG

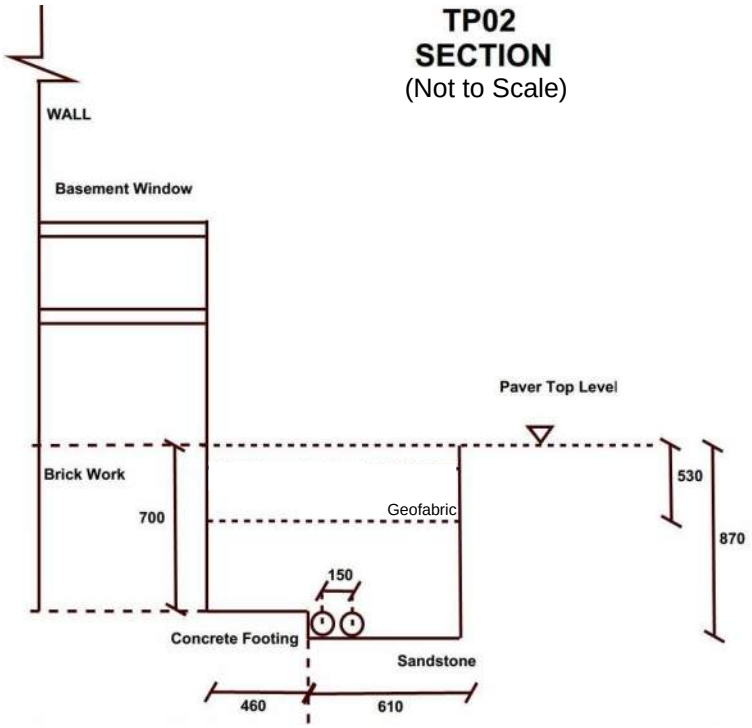
MACQUARIE GEOTECH

CLIENT : Wood and Grieve Engineers PROJECT : St Aloysius College
LOCATION : Junior School Basketball Court

PIT NO : TP02
FILE / JOB NO : B17550
SHEET : 3 OF 3

POSITION : E: 334798.0, N: 6253256.0 (MGA94 Zone 56)	SURFACE ELEVATION :	
EQUIPMENT TYPE :	METHOD : Hand Dug	
DATE EXCAVATED : 08-12-2017	LOGGED BY : DP	CHECKED BY : JB
EXCAVATION DIMENSIONS : 1.10 m LONG 0.68 m WIDE		

TP02 - 3 Depth Range: 0.00 - 0.85 m



TP02 - 4 Depth Range: 0.00 - 0.85 m

MACQUARIE GEOTECH

Borehole No.
BH01
Page 1 of 5

Engineering Log - Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	07-12-2017
Project Name:	St Aloysius College	Completed:	07-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334779.0 m E 6253417.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	115 mm	Bearing:		Datum:	AHD	Operator:	CD

Drilling Information									Soil Description				Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	Moisture Condition	Consistency Relative Density	DCP Blows/100mm 5 10 15 20	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T				ES 0.40-0.50 m D 0.50-1.00 m			1		SP	CONCRETE: grey and brown SANDY GRAVEL: fine to medium gravel, sub-angular, brown and red, fine to coarse sand, trace low plasticity clay GRAVELLY SAND: fine to coarse grained sand, orange brown, fine to medium, sub-angular gravel, trace low plasticity clay (Extremely Weathered Sandstone)	D D	MD MD			ROAD SURFACE FILL EXTREMELY WEATHERED MATERIAL BH01_0.4_0.5 PID 2.5ppm
										Continued on cored borehole sheet					

Method
AS - Auger Screwing
RR - Rock Roller
WB - Washbore

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Support
C - Casing

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

MG LIB 3.05.GLB Log MG BOREHOLE MG LOGS 3.05.GPJ <<DrawingFile>> 21-01-2018 06:17 10.0.000 Datgel Photo Tool

MACQUARIE GEOTECH

Cored Borehole No.
BH01
Page 2 of 5

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	07-12-2017
Project Name:	St Aloysius College	Completed:	07-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334779.0 m E 6253417.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	NMLC 1.5 m	Bearing:		Datum:	AHD	Operator:	CD

Drilling Information								Rock Substance			Rock Mass Defects		
Method	Support	Water	TCR (%)	SCR (%)	RQD (%)	RL (m)	Depth (m)	Graphic Log	Material Description rock type: grain characteristics, colour, structure, minor components	Weathering	Strength Is(50) ● - Axial ○ - Diametral EL VL L M H VH EH	Defect Spacing (mm) 30 100 300 1000 3000	Defect Description thickness, type, inclination, planarity, roughness, coating/infilling Particular	General
							1		Continued from non-cored borehole sheet					
NMLC			100		100		2		SANDSTONE: fine to coarse grained, layered, brown	SW				
			100		52				SILTSTONE: layered, red and brown 1.96-2.07m: Sandstone; fine to medium grained	MW				
							3		SANDSTONE: fine to medium grained, brown and grey 3.14-4.00m: brownish grey	SW				
		▶	100		99		4		3.79m: rootlets observed in the joint 4.00-5.22m: Golden brown and grey 4.01-5.22m: Beddings between every 10-30mm at 0 to 10 degrees					
			100		99		5		5.22-7.40m: Beddings between every 10-40mm at 0 to 10 degrees 5.23-10.64m: browinsh grey					
			100		100					SW				

JT, 0°, Clay SN, PR, S, greysih brown
JT, 0°, Clay SN, PR, S, orange brown
JT, 0°, Clay SN, PR, S, orange brown
JT, 5°, Clay SN, PR, S, orange brown
JT, 0°, Clay SN, PR, S, orange brown
JT, 0°, Clay SN, PR, S, orange brown
HB
JT, 0°, Clay SN, PR, S, orange brown
JT, 0°, Clay SN, UN, RF, orange brown
JT, 0°, Clay SN, UN, RF, orange brown
JT, 0°, Clay SN, UN, RF, orange brown
JT, 0°, Clay SN, UN, RF, grey brown
HB
JT, 35°, Clay SN, UN, RF, orange brown
JT, 0°, Clay SN, UN, RF, orange brown
JT, 0°, Clay SN, UN, RF, orange brown
HB
HB
JT, 0°, UN, RF, orange brown rootlets observed
HB
JT, 0°, Clay SN, UN, RF, orange brown
HB
HB
HB

Method
AS - Auger Screwing
WB - Washbore
HQ3 - HQ3 Core Barrel
NQ3 - NQ3 Core Barrel

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Support
T - Timbering

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Weathering
FR - Fresh
SW - Slightly Weathered
DW - Distinctly Weathered
XW - Extremely Weathered
RS - Residual Soil

Strength (indirect tensile strength)
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

MACQUARIE GEOTECH

Cored Borehole No.
BH01
Page 3 of 5

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	07-12-2017
Project Name:	St Aloysius College	Completed:	07-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334779.0 m E 6253417.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	NMLC 1.5 m	Bearing:		Datum:	AHD	Operator:	CD

Drilling Information								***Rock Substance***				***Rock Mass Defects***		
Method	Support	Water	TCR (%)	SCR (%)	RQD (%)	RL (m)	Depth (m)	Graphic Log	Material Description rock type: grain characteristics, colour, structure, minor components	Weathering	Strength Is(50) ● - Axial ○ - Diametral (EL VL L M H VH EH)	Defect Spacing (mm) (30 100 300 1000 3000)	Defect Description thickness, type, inclination, planarity, roughness, coating/infilling Particular	General
NMLC			100		100		7		SANDSTONE: fine to medium grained, brown and grey*(continued)*	SW			HB	
			100		100		8		7.64-9.00m: Beddings between every 10-30mm at 0 to 15 degrees				DB HB HB HB HB HB	
			100		100		9		9.60-10.60m: Beddings between every 10-30mm at 0 to 10 degrees				HB HB HB HB	
			100		71		10						JT, 0°, CA SN, UN, RF, grey brown	
							11		Hole Terminated at 10.64 m Target depth					

Method
AS - Auger Screwing
WB - Washbore
HQ3 - HQ3 Core Barrel
NQ3 - NQ3 Core Barrel

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Support
T - Timbering

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Weathering
FR - Fresh
SW - Slightly Weathered
DW - Distinctly Weathered
XW - Extremely Weathered
RS - Residual Soil

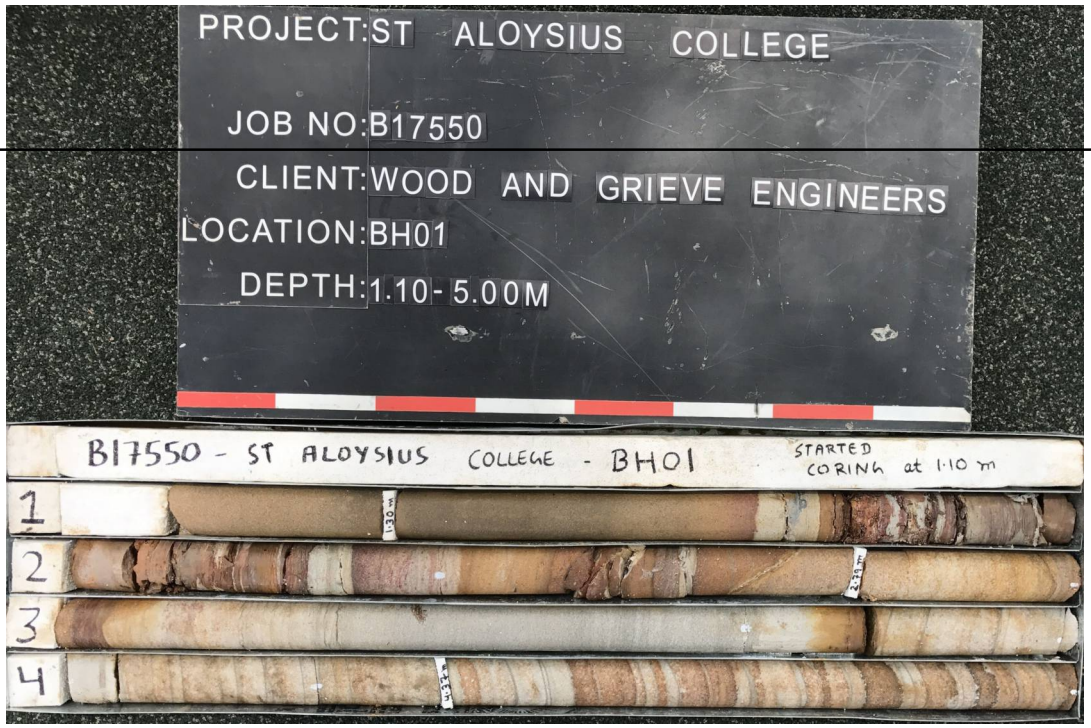
Strength
(indirect tensile strength)
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	07-12-2017
Project Name:	St Aloysius College	Completed:	07-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334779.0 m E 6253417.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	NMLC 1.5 m	Bearing:		Datum:	AHD	Operator:	CD



PointID : BH01 Depth Range: 1.10 - 5.00 m

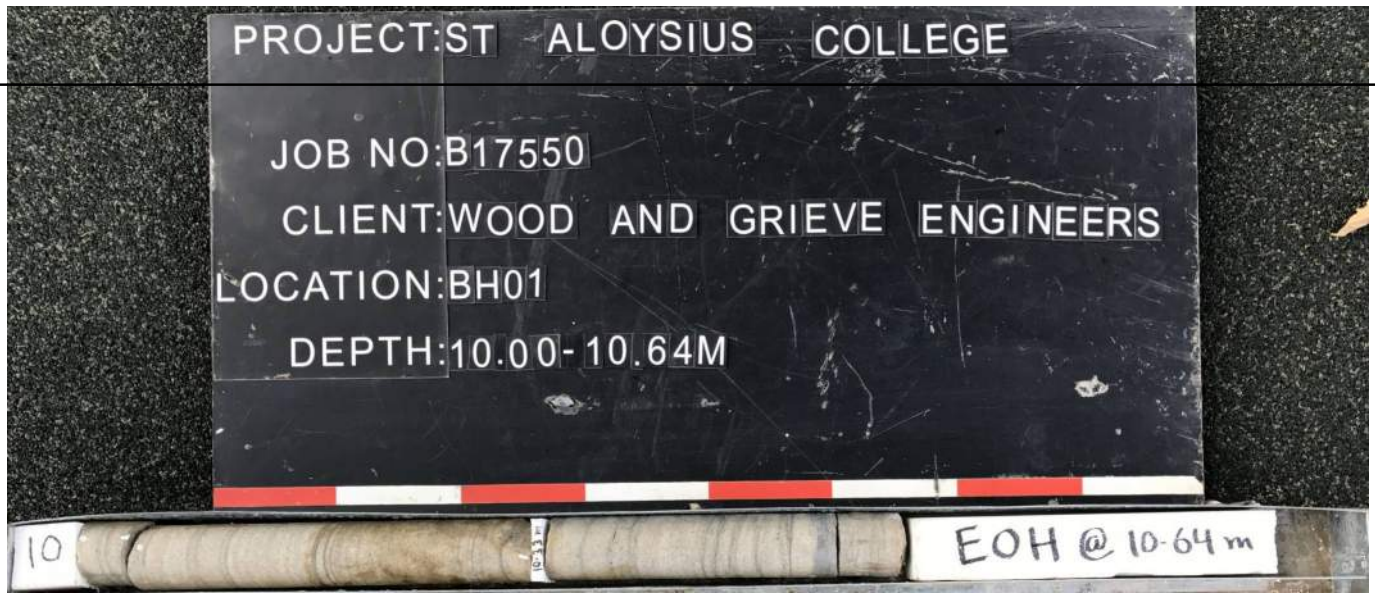
PointID : BH01 Depth Range: 5.00 - 10.00 m

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	07-12-2017
Project Name:	St Aloysius College	Completed:	07-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334779.0 m E 6253417.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	NMLC 1.5 m	Bearing:		Datum:	AHD	Operator:	CD



PointID : BH01 Depth Range: 10.00 - 10.64 m

MACQUARIE GEOTECH

Engineering Log - Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	08-12-2017
Project Name:	St Aloysius College	Completed:	08-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334746.0 m E 6253422.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	115 mm	Bearing:		Datum:	AHD	Operator:	CD

Drilling Information | **Soil Description** | **Observations**

Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	Moisture Condition	Consistency Relative Density	DCP Blows/100mm	Pocket Penetrometer UCS (kPa)	Structure and Additional Observations
AD/T							0.00			CONCRETE: grey and brown					ROAD SURFACE
				D 0.10-0.50 m ES 0.20 m ES 0.40 m						SANDY GRAVEL: fine to coarse gravel, sub-angular, brown and grey, fine to coarse sand	M	MD			FILL BH01_0.2 PID 5.8ppm BH01_0.4 PID 7.1ppm
				D 0.50-1.00 m ES 0.55 m D 1.00-1.50 m ES 1.00 m D 1.50-2.00 m ES 1.50 m			1			GRAVELLY SAND: fine to coarse grained sand, grey and brown, fine to coarse, sub-angular gravel	M	MD			BH01_0.55 PID 1.7pm BH01_1.0 PID 5.8ppm BH01_1.5 PID 11.5ppm
				SPT 1.50-1.95 m 3,6,10 N=16					CL	GRAVELLY CLAY: low plasticity, red and brown, fine to medium, sub-angular gravel	M	St			RESIDUAL SOIL
			Inflow	ES 1.90 m D 2.00-2.60 m			2		SP	SAND: fine to coarse grained sand, orange brown and grey, with fine to course, sub-angular gravel (Extremely Weathered Sandstone)	D	MD			EXTREMELY WEATHERED MATERIAL
							3, 4, 5			Continued on cored borehole sheet					

DCP scale: 5 10 15 20. Pocket Penetrometer scale: 100 200 300 400 500.

Method	Penetration	Water	Samples and Tests	Moisture Condition	Consistency/Relative Density
AS - Auger Screwing RR - Rock Roller WB - Washbore	No resistance ranging to refusal	Level (Date) Inflow Partial Loss Complete Loss	U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test	D - Dry M - Moist W - Wet	VS - Very Soft S - Soft F - Firm VSt - Very Stiff H - Hard VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense

Support	Graphic Log/Core Loss	Classification Symbols and Soil Descriptions	Plastic Limit
C - Casing	Core recovered (hatching indicates material) Core loss	Based on Unified Soil Classification System	< PL = PL < PL

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	08-12-2017
Project Name:	St Aloysius College	Completed:	08-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334746.0 m E 6253422.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD	Operator:	CD

Drilling Information								Rock Substance				Rock Mass Defects		
Method	Support	Water	TCR (%)	SCR (%)	RQD (%)	RL (m)	Depth (m)	Graphic Log	Material Description rock type: grain characteristics, colour, structure, minor components	Weathering	Strength Is(50) ● - Axial ○ - Diametral EL VL L M H VH EH	Defect Spacing (mm) 30 100 300 1000 3000	Defect Description thickness, type, inclination, planarity, roughness, coating/infilling Particular	General
							1							
							2		Continued from non-cored borehole sheet					
NMLC		▶	100		83		3		Recovered as Sandy CLAY with gravel: medium plasticity clay, brown and red, fine to coarse sand, fine to medium, sub-angular gravel.	MW			DB	
									SANDSTONE: medium to coarse grained, layered, orange brown and grey 2.85-3.84m: Beddings between every 10-30mm at 0 to 10 degrees	SW			JT, 0°, PR, RF, stained orange brown JT, 5°, PR, RF, stained grey brown	
		▶					4		Water strike between 3.91-3.93m 4.00-4.22m: Red brown 4.00-5.00m: Beddings between every 10-25mm at 0 to 15 degrees 4.22-6.40m: Orange brown and grey				JT, 0°, Clay FILLED, PR, S, orange brown JT, 0°, Fe SN, PR, RF, orange brown JT, 0°, Fe SN, UN, RF, orange brown JT, 0°, PR, RF, stained red brown JT, 10°, Clay SN, PR, RF, grey brown HB HB	
			100		100		5		5.00-5.55m: Beddings between every 10-30mm at 0 to 10 degrees	SW			HB HB JT, 0°, Clay SN, PR, RF, orange brown	
			100		89									

Method
AS - Auger Screwing
WB - Washbore
HQ3 - HQ3 Core Barrel
NQ3 - NQ3 Core Barrel

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Weathering
FR - Fresh
SW - Slightly Weathered
DW - Distinctly Weathered
XW - Extremely Weathered
RS - Residual Soil

Strength
(indirect tensile strength)
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

MACQUARIE GEOTECH

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	08-12-2017
Project Name:	St Aloysius College	Completed:	08-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334746.0 m E 6253422.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD	Operator:	CD

Drilling Information								***Rock Substance***				***Rock Mass Defects***		
Method	Support	Water	TCR (%)	SCR (%)	RQD (%)	RL (m)	Depth (m)	Graphic Log	Material Description rock type: grain characteristics, colour, structure, minor components	Weathering	Strength Is(50) ● - Axial ○ - Diametral (EL VL L M H VH EH)	Defect Spacing (mm) (30 100 300 1000 3000)	Defect Description thickness, type, inclination, planarity, roughness, coating/infilling — Particular	General
NMLC			100		89		7		SANDSTONE: medium to coarse grained, layered, orange brown and grey*(continued)* 6.00-6.60m: Beddings between every 10-20mm at 0 to 10 degrees 6.40-8.92m: Grey and black brown 7.05-7.25m: Beddings between every 20-30mm at 0 to 10 degrees 7.25-8.00m: Beddings between every 10-30mm at 0 to 15 degrees	SW		HB JT, 0°, Clay SN, PR, S, orange brown HB HB HB HB HB JT, 0°, Clay SN, PR, S, grey brown JT, 5°, Clay SN, PR, S, grey brown JT, 5°, Clay SN, PR, S, grey brown	
			100		100		8		8.00-8.50m: Beddings between every 10-30mm at 0 to 15 degrees 8.50-9.00m: Beddings between every 10-25mm at 0 to 10 degrees				JT, 5°, Clay SN, PR, RF, grey brown JT, 5°, Clay SN, PR, RF, grey brown JT, 0°, Clay SN, PR, RF, grey brown DB HB JT, 0°, Clay SN, PR, RF, grey brown	
			100		100		9		9.00-9.24m: Beddings between every 10-30mm at 0 to 5 degrees				HB HB HB JT	
			100		100		10		10.00-10.18m: Beddings between every 20-30mm at 0 to 10 degrees	SW			HB HB HB	
			100		100		11		11.05-12.00m: Beddings between every 20-40mm at 0 to 10 degrees				HB	

Method
AS - Auger Screwing
WB - Washbore
HQ3 - HQ3 Core Barrel
NQ3 - NQ3 Core Barrel

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Weathering
FR - Fresh
SW - Slightly Weathered
DW - Distinctly Weathered
XW - Extremely Weathered
RS - Residual Soil

Strength
(indirect tensile strength)
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

MACQUARIE GEOTECH

Cored Borehole No.
BH02
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Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	08-12-2017
Project Name:	St Aloysius College	Completed:	08-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334746.0 m E 6253422.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD	Operator:	CD

Drilling Information								***Rock Substance***				***Rock Mass Defects***		
Method	Support	Water	TCR (%)	SCR (%)	RQD (%)	RL (m)	Depth (m)	Graphic Log	Material Description rock type: grain characteristics, colour, structure, minor components	Weathering	Strength Is(50) ● - Axial ○ - Diametral EL VL L M H VH EH	Defect Spacing (mm) 30 100 300 1000 3000	Defect Description thickness, type, inclination, planarity, roughness, coating/infilling Particular	General
NMLC			100		85		13		SANDSTONE: medium to coarse grained, layered, orange brown and grey*(continued)* 12.00-12.37m: Beddings between every 10-30mm at 0 to 30 degrees 12.37m: 1 number coal infilled <2mm thick	SW			HB JT, 0°, Coal FILLED, PR, RF, black JT HB HB HB	
			100		100		14		13.68-14.52m: Beddigs between every 10-30mm at 0 to 25 degrees				HB HB	
			100		100		15		15.00-15.15m: Beddings between every 10-30mm at 0 to 25 degrees				HB	
									Hole Terminated at 15.15 m Target depth					
							16							
							17							

Method
AS - Auger Screwing
WB - Washbore
HQ3 - HQ3 Core Barrel
NQ3 - NQ3 Core Barrel

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Weathering
FR - Fresh
SW - Slightly Weathered
DW - Distinctly Weathered
XW - Extremely Weathered
RS - Residual Soil

Strength
(indirect tensile strength)
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	08-12-2017
Project Name:	St Aloysius College	Completed:	08-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334746.0 m E 6253422.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD	Operator:	CD

PointID : BH02 Depth Range: 2.60 - 7.00 m

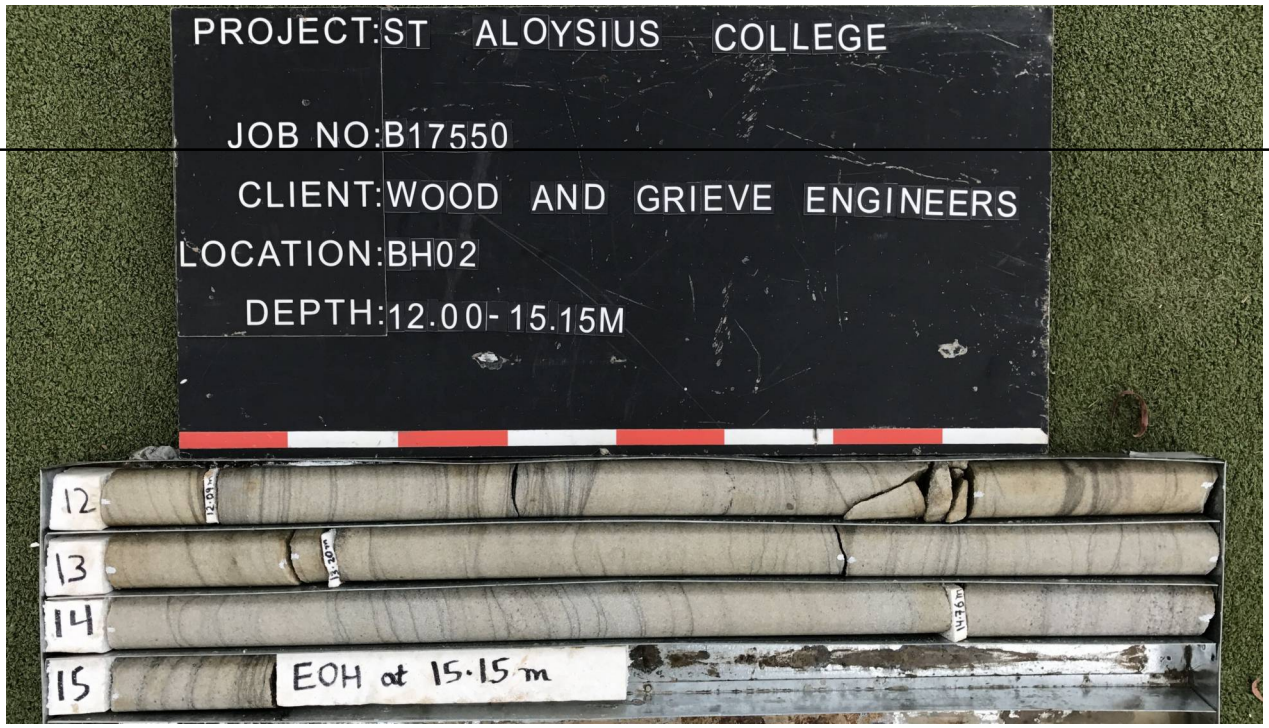
PointID : BH02 Depth Range: 7.00 - 12.00 m

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	08-12-2017
Project Name:	St Aloysius College	Completed:	08-12-2017
Hole Location:	Junior School Basketball Court	Logged By:	GC
Hole Position:	334746.0 m E 6253422.0 m N MGA94 Zone 56	Checked By:	JB

Drill Model and Mounting:	Drill Rig E50	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD	Operator:	CD



PointID : BH02 Depth Range: 12.00 - 15.15 m

MACQUARIE GEOTECH

Borehole No.
BH03
Page 1 of 6

Engineering Log - Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	09-01-2018
Project Name:	St Aloysius College	Completed:	09-01-2018
Hole Location:	Junior School Basketball Court	Logged By:	JB
Hole Position:		Checked By:	JB

Drill Model and Mounting:	Drill Rig	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:		Datum:	AHD	Operator:	BG Drilling

Drilling Information										Soil Description			Observations
Method	Penetration	Support	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	Moisture Condition	Consistency Relative Density	DCP Blows/100mm 5 10 15 20	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T			Not Observed	ES 0.25 m ES 0.45 m ES 1.00 m ES 1.20 m			1		SP	CONCRETE: fine to medium, rounded to sub-angular, grey, matrix supported 1 No. 6mm reinforcement 2 No. 14mm reinforcement 1 No. 6mm reinforcement CLAYEY SAND: fine to coarse grained sand, yellow brown, low plasticty clay CLAYEY SAND: fine to coarse grained sand, grey brown and orange, low plasticty clay, (Slight hydrocarbon odour) SAND: yellow brown, with low plasticity clay Continued on cored borehole sheet	M W	MD			FILL EXTREMELY WEATHERED MATERIAL

Method
AS - Auger Screwing
RR - Rock Roller
WB - Washbore

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Support
C - Casing

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

MACQUARIE GEOTECH

Cored Borehole No.
BH03
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Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	09/01/2018
Project Name:	St Aloysius College	Completed:	09/01/2018
Hole Location:	Junior School Basketball Court	Logged By:	JB
Hole Position:		Checked By:	JB

Drill Model and Mounting: Drill Rig | Inclination: -90° | RL Surface: No survey
Barrel Type and Length: 1.5 m | Bearing: | Datum: AHD | Operator: BG Drilling

Drilling Information								Rock Substance				Rock Mass Defects		
Method	Support	Water	TCR (%)	SCR (%)	RQD (%)	RL (m)	Depth (m)	Graphic Log	Material Description rock type: grain characteristics, colour, structure, minor components	Weathering	Strength Is(50) ● - Axial ○ - Diametral EL VL L M H VH EH	Defect Spacing (mm) 30 100 300 1000 3000	Defect Description thickness, type, inclination, planarity, roughness, coating/infilling Particular	General
							1		Continued from non-cored borehole sheet					
NMLC		Not Observed	100		65		2		SANDSTONE: medium to coarse grained, grey and orange	SW to MW			5°, Fe, PR, S 5°, Fe, PR, S 5°, Fe, PR, S 5°, Fe, UN, S	
			100		100		3						5°, Fe, UN, S	
			100		100		4		SANDSTONE: medium to coarse grained, grey, with dark grey laminations closely spaced	SW			5°, X, UN, S	
			100		100		5							

Method
AS - Auger Screwing
WB - Washbore
HQ3 - HQ3 Core Barrel
NQ3 - NQ3 Core Barrel

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Weathering
FR - Fresh
SW - Slightly Weathered
DW - Distinctly Weathered
XW - Extremely Weathered
RS - Residual Soil

Strength
(indirect tensile strength)
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

MACQUARIE GEOTECH

Cored Borehole No.
BH03
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Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	09/01/2018
Project Name:	St Aloysius College	Completed:	09/01/2018
Hole Location:	Junior School Basketball Court	Logged By:	JB
Hole Position:		Checked By:	JB

Drill Model and Mounting:	Drill Rig	Inclination:	-90°	RL Surface:	No survey
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD

Operator: BG Drilling

Drilling Information								Rock Substance				Rock Mass Defects		
Method	Support	Water	TCR (%)	SCR (%)	RQD (%)	RL (m)	Depth (m)	Graphic Log	Material Description rock type: grain characteristics, colour, structure, minor components	Weathering	Strength Is(50) ● - Axial ○ - Diametral EL VL L M H VH EH	Defect Spacing (mm) 30 100 300 1000 3000	Defect Description thickness, type, inclination, planarity, roughness, coating/infilling Particular	General
NMLC		Not Observed	100		100		7		SANDSTONE: medium to coarse grained, grey, with dark grey laminations closely spaced *(continued)*	SW			5°, UN, S	
			100		100		8							
			100		100		9							
			100		100		10							
			100		100		11						5°, UN, S	

Method
AS - Auger Screwing
WB - Washbore
HQ3 - HQ3 Core Barrel
NQ3 - NQ3 Core Barrel

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Weathering
FR - Fresh
SW - Slightly Weathered
DW - Distinctly Weathered
XW - Extremely Weathered
RS - Residual Soil

Strength
(indirect tensile strength)
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

MACQUARIE GEOTECH

Cored Borehole No.
BH03
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Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	09/01/2018
Project Name:	St Aloysius College	Completed:	09/01/2018
Hole Location:	Junior School Basketball Court	Logged By:	JB
Hole Position:		Checked By:	JB

Drill Model and Mounting:	Drill Rig	Inclination:	-90°	RL Surface:	No survey
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD Operator: BG Drilling

Drilling Information								Rock Substance				Rock Mass Defects		
Method	Support	Water	TCR (%)	SCR (%)	RQD (%)	RL (m)	Depth (m)	Graphic Log	Material Description rock type: grain characteristics, colour, structure, minor components	Weathering	Strength Is(50) ● - Axial ○ - Diametral EL VL L M H VH EH	Defect Spacing (mm) 30 100 300 1000 3000	Defect Description thickness, type, inclination, planarity, roughness, coating/infilling Particular	General
NMLC		Not Observed	100		100		13		SANDSTONE: medium to coarse grained, grey, with dark grey laminations closely spaced *(continued)*	SW				
			100		100		14		From 13.61m to 13.66 3 No. thin beds of red brown claystone From 13.85m to 13.81 1 No. thin beds of red brown claystone				5°, Clay, UN, S 15°, UN, S	
			100		100		15						5°, UN, S	
							16		Hole Terminated at 15.10 m Target depth					
							17							

Method
AS - Auger Screwing
WB - Washbore
HQ3 - HQ3 Core Barrel
NQ3 - NQ3 Core Barrel

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Weathering
FR - Fresh
SW - Slightly Weathered
DW - Distinctly Weathered
XW - Extremely Weathered
RS - Residual Soil

Strength
(indirect tensile strength)
EL - Extremely Low
VL - Very Low
L - Low
M - Medium
H - High
VH - Very High
EH - Extremely High

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	09/01/2018
Project Name:	St Aloysius College	Completed:	09/01/2018
Hole Location:	Junior School Basketball Court	Logged By:	JB
Hole Position:		Checked By:	JB

Drill Model and Mounting:	Drill Rig	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD	Operator:	BG Drilling

PointID : BH03 Depth Range: 1.30 - 6.00 m

PointID : BH03 Depth Range: 6.00 - 11.00 m

Engineering Log - Cored Borehole

Project No.: B17550

Client:	Wood and Grieve Engineers	Commenced:	09/01/2018
Project Name:	St Aloysius College	Completed:	09/01/2018
Hole Location:	Junior School Basketball Court	Logged By:	JB
Hole Position:		Checked By:	JB

Drill Model and Mounting:	Drill Rig	Inclination:	-90°	RL Surface:	No survey		
Barrel Type and Length:	1.5 m	Bearing:		Datum:	AHD	Operator:	BG Drilling

PointID : BH03 Depth Range: 11.00 - 15.10 m

Appendix K

Groundwater Sampling Field Sheets

CAVVANBA consulting

Ground Water Sampling Sheet

Job Name: St Aloysius.	Well No: BH01/MW01
Job Number: 17066	Well Type: ☑ Monitor ☐ Extractor ☐ Other
Recorded By: DW.	Well Material: ☑ PVC ☐ SS ☐ Other
Date: 15/1/18.	Sample by: Drew Wood.

PURGING

PURGE VOLUME

Well Diameter (D in mm): ☑ 50 ☐ 100 ☐ Other

Total Depth of Well (TD in m BTOC): 4.929

Water Level Depth WL in m BTOC): 3.543

Number of well volumes to be purged (# VOLS)

☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ~9L

PURGE METHOD

☑ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

☐ Pump – Type: ☐ Submersible ☐ Peristaltic ☐ Other

PUMP INTAKE SETTING

Depth (m BTOC) /

Screen Interval (m BTOC) – Top : Bottom:

PURGE TIME

PURGE TIME 1135. PURGE RATE / ACTUAL PURGE VOLUME ~3L.

Start: 1135 Stop: 1140 Elapsed: / Initial: / Final: /

FIELD PARAMETER MEASUREMENTS

Min since purge began	Volume Purged (L)	pH	Cond. (µS/cm)	Temp (°C)	DO (mg/L)	Redox (mV)	SWL (mBTOC)	Other (e.g. observations)	
~1-3L	1140	11.04	1806	22.3	3.77	-80.3	/	Silty,	NO.
Sampled after ~3L. Purged dry @ 1145.									

Observations during purging (well condition, tubidity, colour, odour, sheen):

Turbid, purged dry after ~3L. No odour/sheen.

Discharge water disposal: ☐ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☑ Other Evaporation.

SAMPLING

SAMPLING METHOD

☑ Same as purge method

☑ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

☐ Pump – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

SAMPLE DISTRIBUTION Sample Name:

Bottles:	Vol/Cont.	Analysis	Preservatives	Lab	Comments
1	ml Amber	Semi-Vols 46	unpreserved	/	
1	ml plastic	Metals (8)	HNO_3	/	field filtered? (Y) / N
2	ml VOA vials	Volatiles.	HCl	/	

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original No	Duplicate No	Type	Sample No	Type	Sample No

CAVVANBA consulting

Ground Water Sampling Sheet

Job Name: St Aloysius	Well No: BH02/MW02
Job Number: 17066	Well Type: ☑ Monitor ☐ Extractor ☐ Other
Recorded By: DD.	Well Material: ☑ PVC ☐ SS ☑ Other
Date: 15/1/18.	Sample by: Drew Wood.

PURGING

PURGE VOLUME

Well Diameter (D in mm): ☑ 50 ☐ 100 ☐ Other

Total Depth of Well (TD in m BTOC): 14.409

Water Level Depth WL in m BTOC): 5.195

Number of well volumes to be purged (# VOLS)

☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ~60L.

PURGE METHOD

☑ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

☐ Pump – Type: ☐ Submersible ☐ Peristaltic ☐ Other

PUMP INTAKE SETTING

Depth (m BTOC) /

Screen Interval (m BTOC) – Top : Bottom:

PURGE TIME

PURGE TIME 1015 PURGE RATE / ACTUAL PURGE VOLUME 67L. Tues.

Start: 1025 Stop: 1055 Elapsed: / Initial: / Final: /

FIELD PARAMETER MEASUREMENTS

Min since purge began	Volume Purged (L)	pH	Cond. (µS/cm)	Temp (°C)	DO (mg/L)	Redox (mV)	SWL (mBTOC)	Other (e.g. observations)	
1025	12	7.17	688	22.4	0.22	-86.0		Clear.	NO.
1030	22	5.94	658	22.6	0.52	-71.0		Slightly	Cloudy, NO
1035	31	5.87	674	22.3	1.28	-66.1		"	" "
1040	41	5.88	648	22.5	1.14	-41.5		Cloudy	NO.
1045	51	5.89	707	21.9	0.34	-86.9		Slightly	Cloudy, NO
1050	61	5.99	684	21.9	1.71	-48.4	9.890	"	" "
1051	62	5.88	649	22.1	3.14	-28.7		"	" "
1052	63	5.81	656	22.0	3.01	-39.0		"	" "

Observations during purging (well condition, tubidity, colour, odour, sheen):

Discharge water disposal: ☐ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☑ Other Evaporation.

SAMPLING

SAMPLING METHOD

☑ Same as purge method

☑ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

☐ Pump – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

SAMPLE DISTRIBUTION Sample Name:

Bottles:	Vol/Cont.	Analysis	Preservatives	Lab	Comments
1	ml Amber	Semi. Vol	unpreserved	/	
1	ml plastic	Metals (8)	HNO_3	/	field filtered? Y / N
2	ml VOA vials	Volatile.	HCl	/	

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original No	Duplicate No	Type	Sample No	Type	Sample No
MW03	QS01	/	/	/	/

CAVVANBA consulting

Ground Water Sampling Sheet

Job Name:	St Aloysius	Well No:	BH03/MW03.
Job Number:	17066	Well Type:	☑ Monitor ☐ Extractor ☐ Other
Recorded By:	DW	Well Material:	☑ PVC ☐ SS ☐ Other
Date:	15.1.18.	Sample by:	DW.

PURGING

PURGE VOLUME

Well Diameter (D in mm): ☑ 50 ☐ 100 ☐ Other

Total Depth of Well (TD in m BTOC): 10.798

Water Level Depth WL in m BTOC): 1.914

Number of well volumes to be purged (# VOLS)

☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ~58L.

PURGE METHOD

☑ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

☐ Pump – Type: ☐ Submersible ☐ Peristaltic ☐ Other

PUMP INTAKE SETTING

Depth (m BTOC) /

Screen Interval (m BTOC) – Top : Bottom:

PURGE TIME

PURGE TIME 1205. PURGE RATE / ACTUAL PURGE VOLUME 46L.

Start: 1205 Stop: 1240 Elapsed: / Initial: / Final: /

FIELD PARAMETER MEASUREMENTS

Min since purge began	Volume Purged (L)	pH	Cond. (µS/cm)	Temp (°C)	DO (mg/L)	Redox (mV)	SWL (mBTOC)	Other (e.g. observations)	
1215	21	8.51	575	19.8	0.31	-143.1	/	Silty,	NO.
1220	31	7.74	546	20.1	0.70	-30.5	/	"	"
1230	41	7.47	559	20.1	1.02	-12.4	8.733	Turbid,	NO
1240	47		Sample collected.				10.769	" ,	NO.
			Purged dry @ ~47L.						

Observations during purging (well condition, tubidity, colour, odour, sheen):

Very silty bottom, extremely turbid from ~35L.

Discharge water disposal: ☐ Drums ☐ Sanitary sewer ☐ Storm sewer ☐ Surface ☑ Other evaporation.

SAMPLING

SAMPLING METHOD

☑ Same as purge method

☑ Bailer – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

☐ Pump – Type: ☐ PVC ☐ SS ☐ Teflon ☐ Other

SAMPLE DISTRIBUTION

Sample Name:

Bottles:	Vol/Cont.	Analysis	Preservatives	Lab	Comments
1	ml Amber	Sem. Volatile	unpreserved	/	
1	ml plastic	Metals (8)	HNO_3	/	field filtered? (Y) / N
2	ml VOA vials	Volatile.	HCl	/	

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original No	Duplicate No	Type	Sample No	Type	Sample No

Appendix L

Data usability and an introduction to data usability

Data Usability Summary Assessment

A background to data usability is provided in this appendices. All site work was completed in accordance with standard Cavvanba sampling protocols, including a quality assurance/quality control (QA/QC) programme and standard operating procedures.

A data usability assessment was performed for the soil data collected by Cavvanba, as summarised in the following tables:
- Table 1: Field quality control samples summary,
- Table 2: Summary of field QA/QC, and
- Table 3: Summary of laboratory QA/QC.

Table 1: Field quality control samples summary

	Total samples	Field duplicates [1]	Inter-laboratory duplicates [1]	Trip spike	Trip blank
Soil					
BTEXN	11	2 (18.10%)	0 (0%)	1	1
TRH (C6-C10	11	2 (18.10%)	0 (0%)	1	1
TRH (C6-C40)	11	2 (18.10%)	0 (0%)	-	-
PAHs	11	2 (18.10%)	0 (0%)	-	-
8 Metals	11	2 (18.10%)	0 (0%)	-	-
VOCs	1	0 (0%)	-	-	-
Asbestos	5	0 (0%)	-	-	-
Groundwater					
BTEXN	3	1 (33.33%)	0 (0%)	1	1
TRH (C6-C10)	3	1 (33.33%)	0 (0%)	1	1
TRH (C6-C40)	3	1 (33.33%)	0 (0%)	-	-
PAHs	3	1 (33.33%)	0 (0%)	-	-
8 Metals	3	1 (33.33%)	0 (0%)	-	-
Phenols	3	0 (0%)	0 (0%)	-	-
OCs	3	0 (0%)	0 (0%)	-	-
Ops	3	0 (0%)	0 (0%)	-	-
PCBs	3	0 (0%)	0 (0%)	-	-

Notes:
1. Shows number of duplicate samples collected and the percentage of total samples analysed.
   – = not applicable, as trip spike/blank analysed for volatile compounds only.

Table 2: Summary of field QA/QC

Parameter	Complies	Comments [1]
Precision		
Standard operating procedures (SOPs) appropriate and complied with	Yes	All sampling was conducted under standard Cavvanba operating procedures.

Parameter	Complies	Comments [1]
Field duplicates	Partial	≥ 5%. RPD[2] criteria < 30% – 50%. *Soil:* The frequency of field duplicate was within the acceptable range. RPD exceedances were recorded for zinc.
	Partial	*Groundwater:* The frequency of field duplicates was within the acceptable range. RPD exceedances were recorded for TRHs C10-C16 and TRHs C10-C40.
Inter-laboratory duplicates	No	≥ 5%. RPD[2] criteria < 30% – 50%. No field inter-laboratory duplicates samples were taken for soil and groundwater.
Accuracy		
Matrix spikes samples appropriate	Yes	≥ 1/media type.
Representativeness		
Sample collection - preservation	Yes	All samples were collected directly into laboratory supplied jars with no headspace or provided bags. All samples to be analysed for volatiles were placed immediately into eskies containing ice.
Sample collection - sample splitting	Yes	Duplicate samples were split in the field by filling each jar collectively (i.e. co-collected).
Field equipment calibrated	Yes	Field equipment was calibrated at the beginning of each day prior to use on the 07/12/2017, 08/12/2017 and 09/01/2018.
Decontamination procedures	Yes	*Soil:* Soil samples were collected directly from hand tools or the auger, ensuring that the soil sampled had not been in direct contact with the hand tools or auger itself. A new pair of disposable gloves was worn for each sample collected.
	Yes	*Groundwater:* Decontamination of the interface probe was conducted between each monitoring well. No other re-usable sampling equipment was used.
Rinsate samples	n/a	Required ≥ 1/field batch, < LORs. No rinsate samples were collected.
Trip blanks	Yes	≥ 1/field batch (volatiles), < LORs. *Soil:* One trip blank was collected. No RPD exceedances were recorded. *Groundwater:* One trip blank was collected. No RPD exceedances were recorded.

Parameter	Complies	Comments [1]
Trip spikes	Yes	≥ 1/field batch (volatiles), 70 - 130%, (recovery) or ≤ 30 - 50% (RPDs). *Soil:* One trip spike was collected. No RPD exceedances were recorded. *Groundwater:* One trip spike was collected. No RPD exceedances were recorded.
Comparability		
Consistent sampling staff	Yes	All field work was conducted by Mr Drew Wood of Cavvanba.
Consistent weather/field conditions	Yes	No extreme weather conditions occurred during or before/after the investigation.
Completeness		
Sample logs and field data	Yes	-
Chain of Custody	Yes	-

Notes:
1. For QC samples, specified frequency and acceptance criteria shown.
2. RPD = relative percentage difference.

Table 3: Summary of laboratory QA/QC

Parameter	Complies	Notes [1]
Precision		
Laboratory duplicates	Partial	≥ 10%, laboratory specified. *Soil:* No RPD exceedances were reported for laboratory duplicates. Laboratory duplicate frequency outliers occurred for sum of PAHs. *Groundwater:* No RPD exceedances were reported for laboratory duplicates. Laboratory duplicate frequency outliers occurred for PAH/phenols, pesticides, PCBs and TRH – Semi volatile fraction.
Accuracy		
Surrogate spikes	Yes	Organics by GC, 70% - 130%. *Soil:* No RPD exceedances were reported for surrogate spikes. The frequency of surrogate spikes was within the acceptable range.

Parameter	Complies	Notes [1]
	Partial	*Groundwater:* Surrogate spike outliers were recorded for OPs. The frequency of surrogate spikes was within the acceptable range.
Matrix spikes analysis appropriate	Yes	≥ 70% - 130%. *Soil:* No RPD exceedances were reported for matrix spikes. The frequency of matrix spike analysis was within the acceptable range.
	Partial	*Groundwater:* No RPD exceedances were reported for matrix spikes. Matrix spike frequency outliers were recorded for PAH/phenols, pesticides, PCBs and TRH – semivolatile fraction.
Laboratory control samples (LCSs)	Yes	≥ 1/lab batch, 70% - 130%. *Soil:* No RPD exceedances were reported for laboratory control samples. The frequency of laboratory control samples was within the acceptable range. *Groundwater:* No RPD exceedances were reported for laboratory control samples. The frequency of laboratory control samples was within the acceptable range.
Certified reference material (CRM)	n/a	-
Representativeness		
Sample condition	Yes	-
Holding times	Yes	No analysis holding time outliers occur.
Laboratory blanks	Yes	≥ 1/lab batch, < LORs.
Comparability		
NATA accredited laboratory	Yes	ALS is a NATA accredited laboratory (accreditation number 825).
NEPM methods or similar	Yes	ALS describe their in-house laboratory methods are referenced from NEPC, ASTM and modified USEPA/APHA documents.
Limits of reporting (LORs) consistent and appropriate	Yes	LORs were consistent and appropriate.

Parameter	Complies	Notes [1]
Completeness		
Sample receipt	Yes	-
Laboratory Reports	Yes	-

Notes:
1. For QC samples, acceptance criteria shown. Acceptance criteria can vary based on analyte, statistical data and laboratory specific methods. Laboratory specified relates to detected concentrations based on LORs, e.g. result < 10 x LOR = no limit, 10 – 20 x LOR = 0 - 50%, > 20 x LOR = 0 - 20%. See laboratory reports for specific details.

Summary and discussion

The following issues were identified with the data:

Precision

Soil: Outliers were reported for duplicate RPD recoveries for zinc. This is likely due to the inherent variability associated with metal concentrations in the soil matrix and is not considered to significantly detract from the data sets precision.

Groundwater: Outliers were reported in laboratory duplicate frequencies for PAH/phenols, pesticides, PCBs and TRH – Semi volatile fraction. As none of the laboratory duplicate analysis conducted exceeded the RPDs, the frequency outliers are considered insignificant and do not detract from the data sets precision.

Accuracy

Soil: The accuracy of the analysis is confirmed by matrix spike, surrogate and laboratory control sample recoveries within the acceptance criteria.

Groundwater: The accuracy of the analysis is confirmed by laboratory control sample recoveries within the acceptance criteria. Surrogate spike outliers were recorded for OPs. Due to no detections of OPs in the primary samples, this is considered acceptable.

Matrix spike frequency outliers were recorded for PAH/phenols, pesticides, PCBs and TRH – Semivolatile fraction. As the matrix spike analysis conducted for these analytes was within the acceptance criteria, the frequency outliers are considered insignificant and do not detract from the data sets accuracy.

Representativeness

Soil: No outliers have been reported for QC samples collected to assist in the qualification of representativeness. Trip spike recoveries were within the specified RPDs and trip blank recoveries were below the laboratory LORs.

Groundwater: No outliers have been reported for QC samples collected to assist in the qualification of representativeness. Trip spike recoveries were within the specified RPDs and trip blank recoveries were below the laboratory LORs.

Comparability

The data is considered to be acceptable, with consistent sampling staff and NATA accredited laboratories utilised.

Completeness

Laboratory and field documentation is considered to be complete.

Background to Data Usability

1.0 Introduction

Information generated from environmental investigations requires some statement in regard to the usability of the data[1], and therefore quality assurance (QA) and quality control (QC) are an integral part of the analysis and interpretation of environmental data. QA/QC used in contaminated sites investigations is briefly reviewed in this section.

Quality assurance involves all of the actions, procedures, checks and decisions undertaken to ensure the representativeness and integrity of samples, and accuracy and reliability of analytical results (NEPC 1999). Quality control is the component of QA which monitors and measures the effectiveness of other procedures by the comparison of these measures to previously decided objectives.

There are various components of QA/QC which address the operation of the laboratories and the routine procedures conducted to achieve a minimum level of quality. Examples of QA components include sample control, data transfer, instrument calibration, staff training, etc. Examples of QC components include the measurement of samples to access the quality of reagents and standards, cleanliness of apparatus, accuracy and precision of methods and instruments, etc. Generally, the management of laboratory QA issues is addressed through accreditation by the National Association of Testing Authorities (NATA), or similar, and monitoring of these issues is not addressed on a project by project basis.

On a project specific basis, those involved in collecting, assessing or reviewing the relevant data should ensure the minimum level of QA is conducted. Appropriate numbers and types of QC samples should be collected and analysed, both field QC samples and laboratory QC samples. While minimum levels of QA/QC are specified in some guidelines, e.g. NSW EPA 1994, AS 4482.1-1997, NEPC 1999, the minimum level required may vary between projects, based on site and project specific aspects. This means that the minimum specified requirements may not be sufficient for a particular project. As described in the NEPM (NEPC 1999):

> *As a general rule, the level of required QC is that which adequately measures the effects of all possible influences upon sample integrity, accuracy and precision, and is capable of predicting their variation with a high degree of confidence.*

2.0 PARCC parameters

Following receipt of laboratory analytical results, data validation is conducted to determine if the specified acceptance criteria have been met. This is conducted to ensure that all data, and subsequent decisions based on that data, are technically sound. Data quality is typically discussed in terms of precision, accuracy, representativeness, comparability and completeness. These are referred to as the PARCC parameters[2]. Field QA/QC and laboratory QC is described below within the PARCC framework.

[1] To avoid confusion with the data quality objectives (DQOs) process, the term data usability is used rather than data quality.

[2] The PARCC parameters are sometimes referred to as data quality indicators (DQIs).

2.1 Precision

2.1.1 Duplicates

Precision is a measure of the reproducibility of results under a given set of conditions and is assessed on the basis of agreement between a set of duplicate results obtained from duplicate analyses. The precision of a duplicate determination is measured by comparing the difference between the two samples to the average of the two samples, expressed as a relative percentage difference (RPD).

The determination is:

$$RPD = (P-D)/(P+D/2) \times 100$$

P = primary sample

D = duplicate sample

Three types of duplicates are commonly used:
- field duplicates are used to measure the precision of the sampling and analytical process;
- inter-laboratory duplicates are used to check on the analytical performance of the primary laboratory; and
- laboratory duplicates are used to measure the precision of the analytical process.

2.1.2 Field Duplicates

Field duplicates (or blind replicates) are collected from the same location and submitted to the laboratory for analyses, as a primary sample. The sample nomenclature is such that the laboratory is not aware which sample is a duplicate. The RPD is calculated to determine the degree of repeatability (precision) of results obtained from the duplicate analysis. Where results are below the practical quantification limit (PQLs) or limits of reporting (LORs), i.e. non-detects, RPDs cannot be calculated. Where one result is detected, the results are considered to conform when the detected result is less than five times the PQL/LOR.

The PQL/LOR is the lowest concentration of an analyte that can be determined with acceptable precision (repeatability) and accuracy under the test conditions. The PQL/LOR is usually calculated as five times the lower limit of detection (or method detection limit). However, adjustments in PQLs/LORs may be required due to interference from high contaminant concentrations.

As environmental samples can exhibit a high degree of heterogeneity, field duplicates often exceed the acceptance criterion, particularly if the samples are co-collected, for example, because of the potential for losing volatiles during sample splitting. It is generally accepted that before results which fail the acceptance criterion are described as due to low concentrations or sample heterogeneity, the sample should be re-analysed. This may not be necessary when the analytical results are significantly less than the landuse criteria.

2.1.3 Inter-laboratory duplicates

Inter-laboratory duplicates (or split samples) are field duplicates which are sent to a second laboratory and analysed for the same analytes and, as far as possible, by the same methods. These provide a check on the analytical performance of the primary laboratory.

2.1.4 Laboratory Duplicates

Laboratory duplicates (or check samples) are field samples which are split by the laboratory and thereafter treated as separate samples. The RPD is calculated to determine the degree of repeatability (precision) of results obtained from the duplicate analysis.

USEPA (1994) specifies that for inorganics, if the results for laboratory duplicates fall outside of the recommended control limits for a particular analyte, all results for that analyte, in all associated samples of the same matrix, should be qualified as an estimated quantity. For organics, USEPA (1999) does not specify recommended actions for laboratory duplicates.

2.2 Accuracy

Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. Inasmuch as the true sample concentrations are not known, the determination of accuracy is achieved through the analysis of known reference materials or assessed by the analysis of matrix spikes. Spiking of reference material into the actual sample matrix is the preferred technique because it provides a measure of the matrix effects on the analytical recovery.

Accuracy is measured in terms of percentage recovery as defined by:

$$\%R = ((SSR - SR) / SA) \times 100$$

%R = percentage recovery spike
SSR = spiked sample result
SR = sample result
SA = spike added

2.2.1 Matrix spikes/matrix spike duplicates

These are samples prepared in the laboratory by dividing a sample into two aliquots and then spiking each with identical concentrations of specific analytes. The matrix spike (MS) and matrix spike duplicate (MSD) are then analysed separately and the results compared to determine the accuracy and precision of the analytes.

2.2.2 Surrogate spikes

Surrogate spikes provide an indication of analytical accuracy. They are used only for analyses which use gas chromatography and are compounds which are similar to the organic analytes of interest in chemical composition, extraction and chromatography, but which are not normally found in field samples. Surrogates are generally spiked into all sample aliquots prior to preparation and analysis. If the surrogate spike recovery does not meet the prescribed acceptance criteria, the samples should be re-analysed.

2.2.3 Laboratory control samples

Laboratory control samples (quality control check samples) are laboratory prepared samples of an appropriate clean matrix (i.e. sand or distilled water) which are spiked with known concentrations of specific analytes. The laboratory control sample (LCS) is then analysed and the results are used to assess sample preparation and analytical accuracy, free of matrix effects. Certified reference material (CRM) is another form of LCS, and involves the analysis of a known standard as part of the laboratory batch, e.g. British Columbia sediment samples for analysis of metals.

2.3 Representativeness

Representativeness refers to the degree to which the samples reflect the site specific conditions. It is primarily dependent on the design and implementation of the sampling program, with representativeness of the data being partially ensured by the avoidance of cross-contamination, adherence to sample handling and analytical methods, use of field duplicates, ensuring that samples do not exceed holding times prior to analysis, use of chain-of-custody forms and other appropriate documentation.

There are a number of QC samples which can be collected to assist in the qualification of representativeness, including:

2.3.1 Rinsate blanks

Used to determine if sampling equipment has been adequately decontaminated to ensure that cross-contamination between samples has not occurred. The frequency for rinsate blanks is one per piece of equipment per day (AS 4482.1-1997), however it should be noted that cross-contamination will bias samples upwards, and the frequency should therefore be at the investigators discretion.

2.3.2 Trip blanks

Used only when volatile organics are sampled to determine if transport in motor vehicles or similar has resulted in contamination of the samples. For trip blanks, a sufficient number should be analysed to allow the representativeness of the sampling to be determined. However, it should be noted that cross-contamination will bias samples upwards, and the frequency should therefore be at the investigators discretion.

2.3.3 Trip spikes

Used only when volatile organics are sampled to attempt to quantify loss of volatiles during the analytical process. For trip spikes, a sufficient number of samples should be analysed to allow qualification of the likely loss of volatiles during the field sampling.

2.3.4 Laboratory blanks

Laboratory blanks (or method blanks, or analysis blanks) are used to verify that contaminants are not introduced into the samples during sample preparation and analysis. The NEPM (NEPC 1999) specifies that laboratory blanks should be conducted at a frequency of "at least one per process batch". The acceptance criterion for laboratory blanks is non-detect at the PQL/LOR.

2.4 Comparability

Comparability is a qualitative parameter designed to express the confidence with which one data set may be compared with another, including established criteria. Comparability is maintained by using consistent methods and ensuring that PQLs/LORs are below the relevant criteria.

2.5 Completeness

Quality control sample completeness is defined as the number of QC samples which should have been analysed, compared to the actual number analysed. If the appropriate number of QC samples are not analysed with each matrix or sample batch, then the data reviewer should use professional judgement to determine if the associated sample data should be qualified.

Completeness also refers to the complete and correct inclusion of field/sample documentation and laboratory documentation.

2.5.1 QC sample frequency and criteria

Based on EPA made or approved guidelines, the following QC samples are required for all contaminated site investigations, unless otherwise specified as part of the data quality objectives (DQOs) process review. All data to be used for validation should conform as a minimum to the requirements specified, regardless of minimum sample size.

Quality control sample	Frequency	Results [1]
Precision		
Field duplicates.	≥ 5%	≤ 30 - 50% [2]
Inter-laboratory duplicates.	≥ 5%	≤ 30 - 50% [2]
Laboratory duplicates.	≥ 10%	Lab specified [3]
Accuracy		
Surrogate spikes.	Organics by GC	70 – 130% [4]
Matrix spikes (MSs).	≥ 1/media type	70 - 130% [5]
Laboratory control samples (LCSs).	≥ 1/lab batch	70 - 130% [6]
Certified reference material (CRM).	LCS for metals	Lab specified [7]
Representativeness		
Rinsate samples.	≥ 1/field batch	< LOR
Trip blanks.	≥ 1/field batch (volatiles)	< LOR
Trip spikes.	≥ 1/field batch (volatiles)	70 - 130%, ≤ 30 - 50% [8]
Laboratory blanks.	≥ 1/lab batch	< LOR

Notes:
1. Where results are laboratory specified, the laboratory analytical reports should be consulted for specific information.
2. Relative percentage differences (RPDs) for field duplicates from AS 4482.1 (1997).
3. RPDs for laboratory duplicates specified by the laboratory. Based on the magnitude of the results compared to the level of reporting (LOR), e.g. ALS: result < 10 x LOR = no limit, 10 – 20 x LOR = 0-50%, > 20 x LOR = 0-20%. LabMark: < 5 x LOR = 0-100%, 5 – 10 x LOR = 0-75%, > 10 x LOR = 0-50% or 0-30% for metals.
4. Surrogate recoveries specified by laboratory based on global acceptance criteria or dynamic recovery limits based on statistical evaluation of actual laboratory data.
5. MS recoveries specified by laboratory based on global acceptance criteria.
6. LCS recoveries specified by laboratory based on global acceptance criteria or dynamic recovery limits based on statistical evaluation of actual laboratory data.
7. CRM recoveries specified by laboratory based on global acceptance criteria.
8. Trip spike results are specified as either recoveries or RPDs.

3.0 References

Australian New Zealand Environment and Conservation Council (1996) Guidelines for the laboratory analysis of contaminated soils. ANZECC, Canberra, ACT.

Australian Standard AS 4482.1 (2005) Guide to the sampling and investigation of potentially contaminated soil, Part 1: Non-volatile and Semi-volatile compounds. Standards Australia, Homebush, NSW.

National Environment Protection Council (NEPC) (1999) National Environmental Protection (Assessment of Site Contamination) Measure, Schedule B(2) Guideline on Data Collection, Sample Design and Reporting. National Environment Protection Council Service Corporation. Adelaide, SA.

National Environment Protection Council (NEPC) (1999) National Environmental Protection (Assessment of Site Contamination) Measure, Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soil. National Environment Protection Council Service Corporation. Adelaide, SA.

NSW Environment Protection Authority (1994) Contaminated Sites: Guidelines for Assessing Service Station Sites. NSW EPA, Chatswood, NSW.

NSW Environment Protection Authority (1997) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites. NSW EPA, Chatswood, NSW.

United States Environmental Protection Agency, Contract Laboratory Program (1994) National Functional Guidelines for Inorganic Data Review. USEPA, Washington, DC.

United States Environment Protection Agency, Contract Laboratory Program (1999) National Functional Guidelines for Organic Data Review. USEPA, Washington, DC.

Appendix M

Laboratory Reports

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1731181**	Page	: 1 of 14
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 08-Dec-2017 15:50
Order number	: ----	Date Analysis Commenced	: 11-Dec-2017
C-O-C number	: ----	Issue Date	: 14-Dec-2017 15:24
Sampler	: DREW WOOD		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 19		
No. of samples analysed	: 13		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP071: Results of sample QS-01 have been confirmed by re-extraction and re-analysis.
- EP080: The trip spike and its control have been analysed for volatile TPH and BTEX only. The trip spike and control were prepared in the lab using reagent grade sand spiked with petrol. The spike was dispatched from the lab and the control retained.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	T/Spike	T/Blank	QS-01	QS-02	BH01_0.5-0.5
				Client sampling date / time	30-Nov-2017 00:00	05-Dec-2017 00:00	07-Dec-2017 00:00	08-Dec-2017 00:00	07-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1731181-001	ES1731181-002	ES1731181-003	ES1731181-004	ES1731181-005
					Result	Result	Result	Result	Result
Moisture Content	----	1.0	%		----	----	**11.2**	**8.8**	**20.0**
Arsenic	7440-38-2	5	mg/kg		----	----	**5**	<5	<5
Cadmium	7440-43-9	1	mg/kg		----	----	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		----	----	**11**	**12**	**14**
Copper	7440-50-8	5	mg/kg		----	----	**7**	**19**	**36**
Lead	7439-92-1	5	mg/kg		----	----	**92**	**72**	**9**
Nickel	7440-02-0	2	mg/kg		----	----	**7**	**3**	**25**
Zinc	7440-66-6	5	mg/kg		----	----	**82**	**71**	**24**
Mercury	7439-97-6	0.1	mg/kg		----	----	<0.1	<0.1	<0.1
Naphthalene	91-20-3	0.5	mg/kg		----	----	<0.5	**0.5**	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		----	----	**1.4**	**1.9**	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		----	----	<0.5	**0.9**	<0.5
Fluorene	86-73-7	0.5	mg/kg		----	----	<0.5	**2.4**	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		----	----	**5.3**	**20.3**	<0.5
Anthracene	120-12-7	0.5	mg/kg		----	----	**1.3**	**5.3**	<0.5
Fluoranthene	206-44-0	0.5	mg/kg		----	----	**12.6**	**29.8**	<0.5
Pyrene	129-00-0	0.5	mg/kg		----	----	**11.5**	**26.8**	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg		----	----	**5.4**	**13.2**	<0.5
Chrysene	218-01-9	0.5	mg/kg		----	----	**4.5**	**11.4**	<0.5
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		----	----	**5.2**	**13.6**	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		----	----	**2.1**	**4.6**	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		----	----	**4.9**	**11.7**	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		----	----	**1.5**	**4.1**	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		----	----	<0.5	**1.0**	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		----	----	**1.6**	**4.5**	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		----	----	**57.3**	**152**	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		----	----	**6.4**	**16.4**	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		----	----	**6.6**	**16.4**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		----	----	**6.9**	**16.4**	**1.2**
C6 - C9 Fraction	----	10	mg/kg		**24**	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	T/Spike	T/Blank	QS-01	QS-02	BH01_0.5-0.5
			Client sampling date / time	30-Nov-2017 00:00	05-Dec-2017 00:00	07-Dec-2017 00:00	08-Dec-2017 00:00	07-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1731181-001	ES1731181-002	ES1731181-003	ES1731181-004	ES1731181-005
				Result	Result	Result	Result	Result
C10 - C14 Fraction	----	50	mg/kg	----	----	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	----	----	110	400	<100
C29 - C36 Fraction	----	100	mg/kg	----	----	<100	250	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	110	650	<50
C6 - C10 Fraction	C6_C10	10	mg/kg	28	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	11	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	----	----	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	----	----	150	600	<100
>C34 - C40 Fraction	----	100	mg/kg	----	----	<100	130	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	150	730	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	<50	<50	<50
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	7.9	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	1.1	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	5.7	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	2.4	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	17.1	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	8.1	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
Phenol-d6	13127-88-3	0.5	%	----	----	80.1	83.0	85.2
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	85.9	89.7	91.9
2.4.6-Tribromophenol	118-79-6	0.5	%	----	----	53.1	73.3	60.9
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	93.6	99.0	99.2
Anthracene-d10	1719-06-8	0.5	%	----	----	90.4	94.4	99.5
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	86.5	91.1	104
1.2-Dichloroethane-D4	17060-07-0	0.2	%	93.7	86.8	93.1	88.1	95.4
Toluene-D8	2037-26-5	0.2	%	104	104	106	100	111

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)				Client sample ID	T/Spike	T/Blank	QS-01	QS-02	BH01_0.5-0.5
				Client sampling date / time	30-Nov-2017 00:00	05-Dec-2017 00:00	07-Dec-2017 00:00	08-Dec-2017 00:00	07-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1731181-001	ES1731181-002	ES1731181-003	ES1731181-004	ES1731181-005
					Result	Result	Result	Result	Result
4-Bromofluorobenzene	460-00-4	0.2	%		**97.3**	**94.3**	**97.7**	**92.7**	**101**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP01_0.1	TP01_0.5	TP02_0.15	TP02_0.3	BH02_0.2
			Client sampling date / time	07-Dec-2017 00:00	07-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1731181-006	ES1731181-008	ES1731181-011	ES1731181-012	ES1731181-013
				Result	Result	Result	Result	Result
Moisture Content	----	1.0	%	**9.1**	**12.1**	**8.2**	**12.6**	**8.5**
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**9**	**11**	**9**	**11**	**11**
Copper	7440-50-8	5	mg/kg	**55**	**5**	**48**	**7**	**36**
Lead	7439-92-1	5	mg/kg	**48**	**58**	**34**	**173**	**27**
Nickel	7440-02-0	2	mg/kg	**122**	**7**	**120**	**4**	**25**
Zinc	7440-66-6	5	mg/kg	**41**	**37**	**51**	**57**	**82**
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	**0.6**	<0.5	**0.9**	**1.6**
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.6**
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	**1.2**	<0.5	**2.0**	**4.3**
Pyrene	129-00-0	0.5	mg/kg	<0.5	**1.2**	<0.5	**2.0**	**4.2**
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	**0.6**	<0.5	**1.0**	**1.8**
Chrysene	218-01-9	0.5	mg/kg	<0.5	**0.5**	<0.5	**0.9**	**1.6**
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	**0.5**	<0.5	**0.9**	**1.8**
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.8**
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	**0.5**	<0.5	**0.8**	**1.8**
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.6**
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	**0.7**
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	**5.1**	<0.5	**8.5**	**19.8**
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	**0.6**	<0.5	**1.0**	**2.3**
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.9**	**0.6**	**1.3**	**2.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	**1.2**	**1.6**	**2.8**
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	TP01_0.1	TP01_0.5	TP02_0.15	TP02_0.3	BH02_0.2
			Client sampling date / time	07-Dec-2017 00:00	07-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1731181-006	ES1731181-008	ES1731181-011	ES1731181-012	ES1731181-013
				Result	Result	Result	Result	Result
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	140
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	140
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
Phenol-d6	13127-88-3	0.5	%	85.9	84.7	84.9	83.3	74.6
2-Chlorophenol-D4	93951-73-6	0.5	%	90.9	90.3	90.5	90.4	76.0
2.4.6-Tribromophenol	118-79-6	0.5	%	55.8	56.2	49.5	55.9	48.8
2-Fluorobiphenyl	321-60-8	0.5	%	98.7	98.1	97.2	97.7	84.9
Anthracene-d10	1719-06-8	0.5	%	95.2	96.0	96.4	96.2	83.1
4-Terphenyl-d14	1718-51-0	0.5	%	101	97.5	102	96.0	81.1
1.2-Dichloroethane-D4	17060-07-0	0.2	%	96.4	89.3	96.5	93.5	87.8
Toluene-D8	2037-26-5	0.2	%	116	102	103	105	110

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)				Client sample ID	TP01_0.1	TP01_0.5	TP02_0.15	TP02_0.3	BH02_0.2
				Client sampling date / time	07-Dec-2017 00:00	07-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1731181-006	ES1731181-008	ES1731181-011	ES1731181-012	ES1731181-013
					Result	Result	Result	Result	Result
4-Bromofluorobenzene	460-00-4	0.2	%		**102**	**96.2**	**98.7**	**96.5**	**101**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH02_0.4	BH02_1.5	Trip Spike Control	----	----
			Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	30-Nov-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1731181-014	ES1731181-017	ES1731181-019	--------	--------
				Result	Result	Result	----	----
Moisture Content	----	1.0	%	**9.5**	**9.0**	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	**5**	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**9**	**12**	----	----	----
Copper	7440-50-8	5	mg/kg	**35**	**16**	----	----	----
Lead	7439-92-1	5	mg/kg	**21**	**116**	----	----	----
Nickel	7440-02-0	2	mg/kg	**21**	**3**	----	----	----
Zinc	7440-66-6	5	mg/kg	**39**	**89**	----	----	----
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
Styrene	100-42-5	0.5	mg/kg	----	<0.5	----	----	----
Isopropylbenzene	98-82-8	0.5	mg/kg	----	<0.5	----	----	----
n-Propylbenzene	103-65-1	0.5	mg/kg	----	<0.5	----	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	----	<0.5	----	----	----
sec-Butylbenzene	135-98-8	0.5	mg/kg	----	<0.5	----	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	----	<0.5	----	----	----
tert-Butylbenzene	98-06-6	0.5	mg/kg	----	<0.5	----	----	----
p-Isopropyltoluene	99-87-6	0.5	mg/kg	----	<0.5	----	----	----
n-Butylbenzene	104-51-8	0.5	mg/kg	----	<0.5	----	----	----
Vinyl Acetate	108-05-4	5	mg/kg	----	<5	----	----	----
2-Butanone (MEK)	78-93-3	5	mg/kg	----	<5	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	5	mg/kg	----	<5	----	----	----
2-Hexanone (MBK)	591-78-6	5	mg/kg	----	<5	----	----	----
Carbon disulfide	75-15-0	0.5	mg/kg	----	<0.5	----	----	----
2.2-Dichloropropane	594-20-7	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dichloropropane	78-87-5	0.5	mg/kg	----	<0.5	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	----	<0.5	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	----	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH02_0.4	BH02_1.5	Trip Spike Control	----	----
			Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	30-Nov-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1731181-014	ES1731181-017	ES1731181-019	--------	--------
				Result	Result	Result	----	----
Dichlorodifluoromethane	75-71-8	5	mg/kg	----	<5	----	----	----
Chloromethane	74-87-3	5	mg/kg	----	<5	----	----	----
Vinyl chloride	75-01-4	5	mg/kg	----	<5	----	----	----
Bromomethane	74-83-9	5	mg/kg	----	<5	----	----	----
Chloroethane	75-00-3	5	mg/kg	----	<5	----	----	----
Trichlorofluoromethane	75-69-4	5	mg/kg	----	<5	----	----	----
1.1-Dichloroethene	75-35-4	0.5	mg/kg	----	<0.5	----	----	----
Iodomethane	74-88-4	0.5	mg/kg	----	<0.5	----	----	----
trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	----	<0.5	----	----	----
1.1-Dichloroethane	75-34-3	0.5	mg/kg	----	<0.5	----	----	----
cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	----	<0.5	----	----	----
1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	----	<0.5	----	----	----
1.1-Dichloropropylene	563-58-6	0.5	mg/kg	----	<0.5	----	----	----
Carbon Tetrachloride	56-23-5	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dichloroethane	107-06-2	0.5	mg/kg	----	<0.5	----	----	----
Trichloroethene	79-01-6	0.5	mg/kg	----	<0.5	----	----	----
Dibromomethane	74-95-3	0.5	mg/kg	----	<0.5	----	----	----
1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	----	<0.5	----	----	----
1.3-Dichloropropane	142-28-9	0.5	mg/kg	----	<0.5	----	----	----
Tetrachloroethene	127-18-4	0.5	mg/kg	----	<0.5	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	----	<0.5	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	----	<0.5	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	----	<0.5	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	----	<0.5	----	----	----
1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	----	<0.5	----	----	----
Pentachloroethane	76-01-7	0.5	mg/kg	----	<0.5	----	----	----
1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	----	<0.5	----	----	----
Hexachlorobutadiene	87-68-3	0.5	mg/kg	----	<0.5	----	----	----
Chlorobenzene	108-90-7	0.5	mg/kg	----	<0.5	----	----	----
Bromobenzene	108-86-1	0.5	mg/kg	----	<0.5	----	----	----
2-Chlorotoluene	95-49-8	0.5	mg/kg	----	<0.5	----	----	----
4-Chlorotoluene	106-43-4	0.5	mg/kg	----	<0.5	----	----	----
1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	----	<0.5	----	----	----
1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	----	<0.5	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02_0.4	BH02_1.5	Trip Spike Control	----	----
				Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	30-Nov-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1731181-014	ES1731181-017	ES1731181-019	--------	--------
					Result	Result	Result	----	----
1.2-Dichlorobenzene	95-50-1	0.5	mg/kg		----	<0.5	----	----	----
1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg		----	<0.5	----	----	----
1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg		----	<0.5	----	----	----
Chloroform	67-66-3	0.5	mg/kg		----	<0.5	----	----	----
Bromodichloromethane	75-27-4	0.5	mg/kg		----	<0.5	----	----	----
Dibromochloromethane	124-48-1	0.5	mg/kg		----	<0.5	----	----	----
Bromoform	75-25-2	0.5	mg/kg		----	<0.5	----	----	----
Naphthalene	91-20-3	0.5	mg/kg		<0.5	**0.6**	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	**2.2**	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	**0.9**	----	----	----
Fluorene	86-73-7	0.5	mg/kg		<0.5	**2.8**	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg		**3.2**	**19.6**	----	----	----
Anthracene	120-12-7	0.5	mg/kg		**1.2**	**5.2**	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg		**8.0**	**25.8**	----	----	----
Pyrene	129-00-0	0.5	mg/kg		**7.8**	**23.1**	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg		**3.1**	**10.3**	----	----	----
Chrysene	218-01-9	0.5	mg/kg		**3.1**	**9.1**	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		**3.7**	**11.1**	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		**1.2**	**4.0**	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg		**3.3**	**9.6**	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		**1.6**	**4.1**	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		<0.5	**1.3**	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		**1.9**	**4.5**	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		**38.1**	**134**	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		**4.3**	**14.0**	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		**4.6**	**14.0**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		**4.8**	**14.0**	----	----	----
C6 - C9 Fraction	----	10	mg/kg		<10	<10	**28**	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		**130**	**330**	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	**210**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH02_0.4	BH02_1.5	Trip Spike Control	----	----
			Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	30-Nov-2017 00:00	----	----
Compound	CAS Number	LOR	Unit	ES1731181-014	ES1731181-017	ES1731181-019	--------	--------
				Result	Result	Result	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg	130	540	----	----	----
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	33	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	14	----	----
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	190	460	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	<100	140	----	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	190	600	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	----	----	----
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	8.2	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	1.3	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	6.8	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	3.1	----	----
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	19.4	----	----
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	9.9	----	----
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----
1.2-Dichloroethane-D4	17060-07-0	0.5	%	----	116	----	----	----
Toluene-D8	2037-26-5	0.5	%	----	128	----	----	----
4-Bromofluorobenzene	460-00-4	0.5	%	----	117	----	----	----
Phenol-d6	13127-88-3	0.5	%	74.8	77.7	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	75.0	79.5	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	67.4	80.1	----	----	----
2-Fluorobiphenyl	321-60-8	0.5	%	79.5	85.5	----	----	----
Anthracene-d10	1719-06-8	0.5	%	78.7	83.7	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	71.2	77.6	----	----	----
1.2-Dichloroethane-D4	17060-07-0	0.2	%	100	109	99.5	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02_0.4	BH02_1.5	Trip Spike Control	----	----
				Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	30-Nov-2017 00:00	----	----
Compound	CAS Number	LOR	Unit		ES1731181-014	ES1731181-017	ES1731181-019	--------	--------
					Result	Result	Result	----	----
Toluene-D8	2037-26-5	0.2	%		**118**	**117**	**100**	**----**	**----**
4-Bromofluorobenzene	460-00-4	0.2	%		**106**	**102**	**96.0**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
1.2-Dichloroethane-D4	17060-07-0	64	130
Toluene-D8	2037-26-5	66	136
4-Bromofluorobenzene	460-00-4	60	122
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

True

False

Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1731181**	Page	: 1 of 15
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 08-Dec-2017
Order number	: ----	Date Analysis Commenced	: 11-Dec-2017
C-O-C number	: ----	Issue Date	: 14-Dec-2017
Sampler	: DREW WOOD		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 19		
No. of samples analysed	: 13		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ES1731178-012	Anonymous	EA055: Moisture Content	----	1	%	5.0	5.1	2.84	No Limit
ES1731181-017	BH02_1.5	EA055: Moisture Content	----	1	%	9.0	10.1	11.5	0% - 50%
ES1731181-003	QS-01	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	11	11	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	7	5	29.8	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	7	6	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	92	82	12.0	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	82	50	47.8	0% - 50%
ES1731198-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	11	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	6	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	17	10	50.1	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	12	9	27.2	No Limit
ES1731181-003	QS-01	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1731198-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1731181-017	BH02_1.5	EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Isopropylbenzene	98-82-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: n-Propylbenzene	103-65-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ES1731181-017	BH02_1.5	EP074: 1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: sec-Butylbenzene	135-98-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: tert-Butylbenzene	98-06-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: p-Isopropyltoluene	99-87-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: n-Butylbenzene	104-51-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1731181-017	BH02_1.5	EP074: Vinyl Acetate	108-05-4	5	mg/kg	<5	<5	0.00	No Limit
		EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	<5	0.00	No Limit
		EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	5	mg/kg	<5	<5	0.00	No Limit
		EP074: 2-Hexanone (MBK)	591-78-6	5	mg/kg	<5	<5	0.00	No Limit
ES1731181-017	BH02_1.5	EP074: Carbon disulfide	75-15-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1731181-017	BH02_1.5	EP074: 2.2-Dichloropropane	594-20-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichloropropane	78-87-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1731181-017	BH02_1.5	EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Iodomethane	74-88-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1-Dichloroethane	75-34-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1-Dichloropropylene	563-58-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Dibromomethane	74-95-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.3-Dichloropropane	142-28-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ES1731181-017	BH02_1.5	EP074: Pentachloroethane	76-01-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Dichlorodifluoromethane	75-71-8	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Chloromethane	74-87-3	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Vinyl chloride	75-01-4	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Bromomethane	74-83-9	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Chloroethane	75-00-3	5	mg/kg	<5	<5	0.00	No Limit
		EP074: Trichlorofluoromethane	75-69-4	5	mg/kg	<5	<5	0.00	No Limit
ES1731181-017	BH02_1.5	EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Bromobenzene	108-86-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 2-Chlorotoluene	95-49-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 4-Chlorotoluene	106-43-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: 1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1731181-017	BH02_1.5	EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Dibromochloromethane	124-48-1	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP074: Bromoform	75-25-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1731178-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ES1731178-001	Anonymous	EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1731178-011	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1731181-013	BH02_0.2	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	1.6	1.7	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	0.6	0.8	24.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	4.3	4.9	13.3	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	4.2	4.9	17.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	1.8	2.0	9.86	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	1.6	2.0	20.0	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	1.8	2.5	30.1	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	0.8	0.9	13.3	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.8	2.4	23.6	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ES1731181-013	BH02_0.2	EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	0.6	1.1	65.0	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	0.7	1.5	65.9	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	19.8	# 24.7	22.0	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	2.3	3.1	28.2	No Limit
ES1731261-015	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	1.5	1.6	7.74	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	3.1	3.4	9.16	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	0.7	0.7	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	5.4	6.5	18.6	0% - 50%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	1.2	1.5	18.3	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	5.9	6.6	11.5	0% - 50%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	14.5	15.7	8.47	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	4.8	5.6	15.4	0% - 50%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	7.2	8.0	10.7	0% - 50%
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	3.2	3.4	3.68	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	0.8	0.9	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	7.0	7.8	10.4	0% - 50%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	1.7	2.0	16.2	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	0.6	0.7	15.6	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	2.4	2.9	17.6	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	60.0	67.3	11.5	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	8.7	9.8	11.4	0% - 50%
ES1731150-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1731181-003	QS-01	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1731197-014	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1731181-017	BH02_1.5	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1731178-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1731178-011	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ES1731181-013	BH02_0.2	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1731261-015	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	930	920	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	910	1120	20.4	0% - 50%
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1731150-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1731181-003	QS-01	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1731197-014	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1731181-017	BH02_1.5	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1731178-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1731178-011	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1731181-013	BH02_0.2	EP071: >C16 - C34 Fraction	----	100	mg/kg	140	170	17.6	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1731261-015	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	1410	1730	20.4	0% - 50%
		EP071: >C34 - C40 Fraction	----	100	mg/kg	1310	1170	10.9	0% - 50%
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1731150-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1731181-003	QS-01	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ES1731181-003	QS-01	EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1731197-014	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1731181-017	BH02_1.5	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	92.6	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	94.4	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	88.8	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	92.2	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	98.6	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	98.9	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	101	80	122
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	81.6	70	105
EP074: Styrene	100-42-5	0.5	mg/kg	<0.5	1 mg/kg	79.6	67	113
EP074: Isopropylbenzene	98-82-8	0.5	mg/kg	<0.5	1 mg/kg	82.3	65	117
EP074: n-Propylbenzene	103-65-1	0.5	mg/kg	<0.5	1 mg/kg	92.4	66	122
EP074: 1.3.5-Trimethylbenzene	108-67-8	0.5	mg/kg	<0.5	1 mg/kg	90.3	68	118
EP074: sec-Butylbenzene	135-98-8	0.5	mg/kg	<0.5	1 mg/kg	92.8	69	119
EP074: 1.2.4-Trimethylbenzene	95-63-6	0.5	mg/kg	<0.5	1 mg/kg	88.1	69	117
EP074: tert-Butylbenzene	98-06-6	0.5	mg/kg	<0.5	1 mg/kg	88.5	69	115
EP074: p-Isopropyltoluene	99-87-6	0.5	mg/kg	<0.5	1 mg/kg	85.9	66	118
EP074: n-Butylbenzene	104-51-8	0.5	mg/kg	<0.5	1 mg/kg	95.2	59	125
EP074: Vinyl Acetate	108-05-4	5	mg/kg	<5	10 mg/kg	117	30	156
EP074: 2-Butanone (MEK)	78-93-3	5	mg/kg	<5	10 mg/kg	80.2	58	136
EP074: 4-Methyl-2-pentanone (MIBK)	108-10-1	5	mg/kg	<5	10 mg/kg	77.9	62	132
EP074: 2-Hexanone (MBK)	591-78-6	5	mg/kg	<5	10 mg/kg	83.8	54	136
EP074: Carbon disulfide	75-15-0	0.5	mg/kg	<0.5	1 mg/kg	77.4	54	126
EP074: 2.2-Dichloropropane	594-20-7	0.5	mg/kg	<0.5	1 mg/kg	83.3	60	126
EP074: 1.2-Dichloropropane	78-87-5	0.5	mg/kg	<0.5	1 mg/kg	86.4	68	124
EP074: cis-1.3-Dichloropropylene	10061-01-5	0.5	mg/kg	<0.5	1 mg/kg	82.0	51	119
EP074: trans-1.3-Dichloropropylene	10061-02-6	0.5	mg/kg	<0.5	1 mg/kg	76.5	52	114
EP074: 1.2-Dibromoethane (EDB)	106-93-4	0.5	mg/kg	<0.5	1 mg/kg	85.0	63	115

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP074: Dichlorodifluoromethane	75-71-8	5	mg/kg	<5	10 mg/kg	42.6	30	148
EP074: Chloromethane	74-87-3	5	mg/kg	<5	10 mg/kg	63.6	41	141
EP074: Vinyl chloride	75-01-4	5	mg/kg	<5	10 mg/kg	71.8	43	147
EP074: Bromomethane	74-83-9	5	mg/kg	<5	10 mg/kg	69.2	47	141
EP074: Chloroethane	75-00-3	5	mg/kg	<5	10 mg/kg	75.3	49	143
EP074: Trichlorofluoromethane	75-69-4	5	mg/kg	<5	10 mg/kg	75.8	49	135
EP074: 1.1-Dichloroethene	75-35-4	0.5	mg/kg	<0.5	1 mg/kg	75.4	54	126
EP074: Iodomethane	74-88-4	0.5	mg/kg	<0.5	1 mg/kg	59.0	43	129
EP074: trans-1.2-Dichloroethene	156-60-5	0.5	mg/kg	<0.5	1 mg/kg	78.9	64	120
EP074: 1.1-Dichloroethane	75-34-3	0.5	mg/kg	<0.5	1 mg/kg	82.5	67	125
EP074: cis-1.2-Dichloroethene	156-59-2	0.5	mg/kg	<0.5	1 mg/kg	80.4	69	121
EP074: 1.1.1-Trichloroethane	71-55-6	0.5	mg/kg	<0.5	1 mg/kg	82.7	65	117
EP074: 1.1-Dichloropropylene	563-58-6	0.5	mg/kg	<0.5	1 mg/kg	87.9	65	123
EP074: Carbon Tetrachloride	56-23-5	0.5	mg/kg	<0.5	1 mg/kg	79.0	59	125
EP074: 1.2-Dichloroethane	107-06-2	0.5	mg/kg	<0.5	1 mg/kg	82.8	65	125
EP074: Trichloroethene	79-01-6	0.5	mg/kg	<0.5	1 mg/kg	87.7	70	118
EP074: Dibromomethane	74-95-3	0.5	mg/kg	<0.5	1 mg/kg	75.8	68	118
EP074: 1.1.2-Trichloroethane	79-00-5	0.5	mg/kg	<0.5	1 mg/kg	93.8	64	126
EP074: 1.3-Dichloropropane	142-28-9	0.5	mg/kg	<0.5	1 mg/kg	94.4	68	122
EP074: Tetrachloroethene	127-18-4	0.5	mg/kg	<0.5	1 mg/kg	93.7	67	143
EP074: 1.1.1.2-Tetrachloroethane	630-20-6	0.5	mg/kg	<0.5	1 mg/kg	86.1	62	122
EP074: trans-1.4-Dichloro-2-butene	110-57-6	0.5	mg/kg	<0.5	1 mg/kg	89.7	54	128
EP074: cis-1.4-Dichloro-2-butene	1476-11-5	0.5	mg/kg	<0.5	1 mg/kg	75.1	55	129
EP074: 1.1.2.2-Tetrachloroethane	79-34-5	0.5	mg/kg	<0.5	1 mg/kg	87.2	65	121
EP074: 1.2.3-Trichloropropane	96-18-4	0.5	mg/kg	<0.5	1 mg/kg	85.7	61	125
EP074: Pentachloroethane	76-01-7	0.5	mg/kg	<0.5	1 mg/kg	88.0	20	134
EP074: 1.2-Dibromo-3-chloropropane	96-12-8	0.5	mg/kg	<0.5	1 mg/kg	84.3	53	129
EP074: Hexachlorobutadiene	87-68-3	0.5	mg/kg	<0.5	1 mg/kg	112	50	128
EP074: Chlorobenzene	108-90-7	0.5	mg/kg	<0.5	1 mg/kg	86.5	68	116
EP074: Bromobenzene	108-86-1	0.5	mg/kg	<0.5	1 mg/kg	91.7	70	114
EP074: 2-Chlorotoluene	95-49-8	0.5	mg/kg	<0.5	1 mg/kg	91.2	68	122
EP074: 4-Chlorotoluene	106-43-4	0.5	mg/kg	<0.5	1 mg/kg	92.4	67	123
EP074: 1.3-Dichlorobenzene	541-73-1	0.5	mg/kg	<0.5	1 mg/kg	89.6	70	116
EP074: 1.4-Dichlorobenzene	106-46-7	0.5	mg/kg	<0.5	1 mg/kg	90.8	67	117
EP074: 1.2-Dichlorobenzene	95-50-1	0.5	mg/kg	<0.5	1 mg/kg	90.7	70	114
EP074: 1.2.4-Trichlorobenzene	120-82-1	0.5	mg/kg	<0.5	1 mg/kg	106	48	122
EP074: 1.2.3-Trichlorobenzene	87-61-6	0.5	mg/kg	<0.5	1 mg/kg	99.8	52	122

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP074: Chloroform	67-66-3	0.5	mg/kg	<0.5	1 mg/kg	80.8	66	124
EP074: Bromodichloromethane	75-27-4	0.5	mg/kg	<0.5	1 mg/kg	77.7	61	121
EP074: Dibromochloromethane	124-48-1	0.5	mg/kg	<0.5	1 mg/kg	86.0	63	121
EP074: Bromoform	75-25-2	0.5	mg/kg	<0.5	1 mg/kg	79.1	60	126
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	86.6	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	83.2	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	89.8	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	85.7	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	91.2	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	92.0	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	90.7	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	90.9	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	81.3	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	91.4	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	72.5	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	74.6	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	81.5	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	61.2	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	66.4	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	70.5	63	121
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	90.8	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	89.2	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	94.3	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	89.6	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	93.9	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	93.4	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	92.3	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	92.7	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	83.8	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	92.8	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	70.5	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	76.9	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	78.3	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	64.0	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	62.4	62	118

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	72.3	63	121
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	83.6	68	128
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	84.3	68	128
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	102	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	104	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	97.8	71	129
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	108	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	109	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	99.6	71	129
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	75.8	68	128
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	84.4	68	128
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	101	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	105	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	94.1	63	131
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	108	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	106	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	88.8	63	131
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	84.8	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	82.0	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	78.2	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	79.0	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	81.4	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	92.5	63	119
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	104	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	95.6	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	113	65	117

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	101	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	112	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	113	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ES1731181-003	QS-01	EG005T: Arsenic	7440-38-2	50 mg/kg	89.5	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	93.9	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	90.2	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	93.1	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	89.6	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	96.0	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	80.4	70	130
ES1731181-003	QS-01	EG035T: Mercury	7439-97-6	5 mg/kg	96.3	70	130
ES1731181-017	BH02_1.5	EP074: 1.1-Dichloroethene	75-35-4	2.5 mg/kg	95.6	70	130
		EP074: Trichloroethene	79-01-6	2.5 mg/kg	96.4	70	130
ES1731181-017	BH02_1.5	EP074: Chlorobenzene	108-90-7	2.5 mg/kg	108	70	130
ES1731178-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	105	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	108	70	130
ES1731181-013	BH02_0.2	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	115	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	122	70	130
ES1731150-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	105	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ES1731181-017	BH02_1.5	EP080: C6 - C9 Fraction	----	32.5 mg/kg	84.6	70	130
ES1731178-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	88.9	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	98.5	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	122	52	132
ES1731181-013	BH02_0.2	EP071: C10 - C14 Fraction	----	523 mg/kg	87.9	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	119	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	124	52	132
ES1731150-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	101	70	130
ES1731181-017	BH02_1.5	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	79.3	70	130
ES1731178-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	96.3	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	124	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	95.0	52	132
ES1731181-013	BH02_0.2	EP071: >C10 - C16 Fraction	----	860 mg/kg	118	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	122	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	121	52	132
ES1731150-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	100	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	95.5	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	94.6	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	94.6	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	94.8	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	96.1	70	130
ES1731181-017	BH02_1.5	EP080: Benzene	71-43-2	2.5 mg/kg	88.0	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	88.8	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	96.6	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	84.8	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	97.1	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
ES1731181-017	BH02_1.5	EP080: Naphthalene	91-20-3	2.5 mg/kg	83.4	70	130

True

Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1731181**	Page	: 1 of 7
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 08-Dec-2017
Site	: ----	Issue Date	: 14-Dec-2017
Sampler	: DREW WOOD	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	ES1731181--013	BH02_0.2	**Sum of polycyclic aromatic hydrocarbons**	----	22.0 %	0% - 20%	**RPD exceeds LOR based limits**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
Soil Glass Jar - Unpreserved (EA055) QS-01, BH01_0.5-0.5, TP01_0.1, TP01_0.5	**07-Dec-2017**	**----**	----	----	**11-Dec-2017**	21-Dec-2017	✓
Soil Glass Jar - Unpreserved (EA055) QS-02, TP02_0.15, TP02_0.3, BH02_0.2, BH02_0.4, BH02_1.5	**08-Dec-2017**	**----**	----	----	**11-Dec-2017**	22-Dec-2017	✓
Soil Glass Jar - Unpreserved (EG005T) QS-01, BH01_0.5-0.5, TP01_0.1, TP01_0.5	**07-Dec-2017**	**13-Dec-2017**	05-Jun-2018	✓	**13-Dec-2017**	05-Jun-2018	✓
Soil Glass Jar - Unpreserved (EG005T) QS-02, TP02_0.15, TP02_0.3, BH02_0.2, BH02_0.4, BH02_1.5	**08-Dec-2017**	**13-Dec-2017**	06-Jun-2018	✓	**13-Dec-2017**	06-Jun-2018	✓
Soil Glass Jar - Unpreserved (EG035T) QS-01, BH01_0.5-0.5, TP01_0.1, TP01_0.5	**07-Dec-2017**	**13-Dec-2017**	04-Jan-2018	✓	**13-Dec-2017**	04-Jan-2018	✓
Soil Glass Jar - Unpreserved (EG035T) QS-02, TP02_0.15, TP02_0.3, BH02_0.2, BH02_0.4, BH02_1.5	**08-Dec-2017**	**13-Dec-2017**	05-Jan-2018	✓	**13-Dec-2017**	05-Jan-2018	✓

Matrix: **SOIL** Evaluation: × = Holding time breach ; ✓ = Within holding time.

	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		*Date extracted*	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
Soil Glass Jar - Unpreserved (EP074) BH02_1.5	**08-Dec-2017**	**11-Dec-2017**	15-Dec-2017	✓	**12-Dec-2017**	15-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP074) BH02_1.5	**08-Dec-2017**	**11-Dec-2017**	15-Dec-2017	✓	**12-Dec-2017**	15-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP074) BH02_1.5	**08-Dec-2017**	**11-Dec-2017**	15-Dec-2017	✓	**12-Dec-2017**	15-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP074) BH02_1.5	**08-Dec-2017**	**11-Dec-2017**	15-Dec-2017	✓	**12-Dec-2017**	15-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP074) BH02_1.5	**08-Dec-2017**	**11-Dec-2017**	15-Dec-2017	✓	**12-Dec-2017**	15-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP074) BH02_1.5	**08-Dec-2017**	**11-Dec-2017**	15-Dec-2017	✓	**12-Dec-2017**	15-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP074) BH02_1.5	**08-Dec-2017**	**11-Dec-2017**	15-Dec-2017	✓	**12-Dec-2017**	15-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) QS-01, BH01_0.5-0.5, TP01_0.1, TP01_0.5	**07-Dec-2017**	**12-Dec-2017**	21-Dec-2017	✓	**13-Dec-2017**	21-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) QS-02, TP02_0.15, TP02_0.3	**08-Dec-2017**	**12-Dec-2017**	22-Dec-2017	✓	**13-Dec-2017**	21-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) BH02_0.2, BH02_0.4, BH02_1.5	**08-Dec-2017**	**13-Dec-2017**	22-Dec-2017	✓	**13-Dec-2017**	22-Jan-2018	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Soil Glass Jar - Unpreserved (EP080)								
T/Blank		**05-Dec-2017**	**11-Dec-2017**	19-Dec-2017	✓	**12-Dec-2017**	19-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP080)								
QS-01,	BH01_0.5-0.5,	**07-Dec-2017**	**11-Dec-2017**	21-Dec-2017	✓	**12-Dec-2017**	21-Dec-2017	✓
TP01_0.1,	TP01_0.5							
Soil Glass Jar - Unpreserved (EP071)								
QS-01,	BH01_0.5-0.5,	**07-Dec-2017**	**12-Dec-2017**	21-Dec-2017	✓	**13-Dec-2017**	21-Jan-2018	✓
TP01_0.1,	TP01_0.5							
Soil Glass Jar - Unpreserved (EP080)								
QS-02,	TP02_0.15,	**08-Dec-2017**	**11-Dec-2017**	22-Dec-2017	✓	**12-Dec-2017**	22-Dec-2017	✓
TP02_0.3,	BH02_0.2,							
BH02_0.4,	BH02_1.5							
Soil Glass Jar - Unpreserved (EP071)								
QS-02,	TP02_0.15,	**08-Dec-2017**	**12-Dec-2017**	22-Dec-2017	✓	**13-Dec-2017**	21-Jan-2018	✓
TP02_0.3								
Soil Glass Jar - Unpreserved (EP071)								
BH02_0.2,	BH02_0.4,	**08-Dec-2017**	**13-Dec-2017**	22-Dec-2017	✓	**13-Dec-2017**	22-Jan-2018	✓
BH02_1.5								
Soil Glass Jar - Unpreserved (EP080)								
T/Spike,	Trip Spike Control	**30-Nov-2017**	**11-Dec-2017**	14-Dec-2017	✓	**12-Dec-2017**	14-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP080)								
T/Blank		**05-Dec-2017**	**11-Dec-2017**	19-Dec-2017	✓	**12-Dec-2017**	19-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP080)								
QS-01,	BH01_0.5-0.5,	**07-Dec-2017**	**11-Dec-2017**	21-Dec-2017	✓	**12-Dec-2017**	21-Dec-2017	✓
TP01_0.1,	TP01_0.5							
Soil Glass Jar - Unpreserved (EP071)								
QS-01,	BH01_0.5-0.5,	**07-Dec-2017**	**12-Dec-2017**	21-Dec-2017	✓	**13-Dec-2017**	21-Jan-2018	✓
TP01_0.1,	TP01_0.5							
Soil Glass Jar - Unpreserved (EP080)								
QS-02,	TP02_0.15,	**08-Dec-2017**	**11-Dec-2017**	22-Dec-2017	✓	**12-Dec-2017**	22-Dec-2017	✓
TP02_0.3,	BH02_0.2,							
BH02_0.4,	BH02_1.5							
Soil Glass Jar - Unpreserved (EP071)								
QS-02,	TP02_0.15,	**08-Dec-2017**	**12-Dec-2017**	22-Dec-2017	✓	**13-Dec-2017**	21-Jan-2018	✓
TP02_0.3								
Soil Glass Jar - Unpreserved (EP071)								
BH02_0.2,	BH02_0.4,	**08-Dec-2017**	**13-Dec-2017**	22-Dec-2017	✓	**13-Dec-2017**	22-Jan-2018	✓
BH02_1.5								
Soil Glass Jar - Unpreserved (EP080)								
T/Spike,	Trip Spike Control	**30-Nov-2017**	**11-Dec-2017**	14-Dec-2017	✓	**12-Dec-2017**	14-Dec-2017	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Soil Glass Jar - Unpreserved (EP080)								
T/Blank		**05-Dec-2017**	**11-Dec-2017**	19-Dec-2017	✓	**12-Dec-2017**	19-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP080)								
QS-01,	BH01_0.5-0.5,	**07-Dec-2017**	**11-Dec-2017**	21-Dec-2017	✓	**12-Dec-2017**	21-Dec-2017	✓
TP01_0.1,	TP01_0.5							
Soil Glass Jar - Unpreserved (EP080)								
QS-02,	TP02_0.15,	**08-Dec-2017**	**11-Dec-2017**	22-Dec-2017	✓	**12-Dec-2017**	22-Dec-2017	✓
TP02_0.3,	BH02_0.2,							
BH02_0.4,	BH02_1.5							
Soil Glass Jar - Unpreserved (EP080)								
T/Spike,	Trip Spike Control	**30-Nov-2017**	**11-Dec-2017**	14-Dec-2017	✓	**12-Dec-2017**	14-Dec-2017	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	4	34	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	4	40	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	9	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	34	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Volatile Organic Compounds	EP074	1	9	**11.11**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
Volatile Organic Compounds	EP074	SOIL	In house: Referenced to USEPA SW 846 - 8260B Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 501)
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	* ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

CHAIN OF COUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
☐PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Cavvanba.
OFFICE: Byron Bay
PROJECT: 17066 PROJECT NO.:
ORDER NUMBER: PURCHASE ORDER NO.: 17066
PROJECT MANAGER: Ross Nicolson CONTACT PH:
SAMPLER: Drew Wood. SAMPLER MOBILE: 0403689755.
COC Emailed to ALS? (YES / NO) EDD FORMAT (or default):
Email Reports to (will default to PM if no other addresses are listed): Ross Nicolson
Email Invoice to (will default to PM if no other addresses are listed): Rob McLelland.
COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g.. Ultra Trace Organics)
☑ Standard TAT (List due date):
☐ Non Standard or urgent TAT (List due date):
ALS QUOTE NO.:
COUNTRY OF ORIGIN:

COC SEQUENCE NUMBER (Circle)
COC: (1) 2 3 4 5 6 7
OF: 1 (2) 3 4 5 6 7

RELINQUISHED BY: Drew Wood DATE/TIME: 8/12/17. pm
RECEIVED BY: KH DATE/TIME: 8/12/17 15:50.
RELINQUISHED BY: DATE/TIME:
RECEIVED BY: [illegible] DATE/TIME: 8/12/17 8:3[illegible]

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No (N/A)
(Free ice) / frozen ice bricks present upon receipt? (Yes) No N/A
Random Sample Temperature on Receipt: 0.2 °C
Other comment:

Environmental Division
Sydney
Work Order Reference
ES1731181
Telephone : + 61-2-8784 8555

ALS USE ONLY: LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TRH, BTEX, Metals (8)	TRH, BTEX.	PAHs/Phenols OCPs/PCBs	TRH, BTEX PAHs, Metals (8)	Additional Information
1	T/Spike.		Soil		1		X			
2	T/Blank.		(↓)		(↓)		X			
3	QS-01	7/12/17							X	
4	QS-02	8/12/17							X	
5	BH01_0.4-0.5	7/12/17							X	
6	TP01_0.1	(↓)							X	
7	TP01_0.3.									→ HOLD.
8	TP01_0.5								X	
9	TP01_0.8.									→ HOLD.
10	TP02_0.08	8/12/17								→ HOLD
11	TP02_0.15	(↓)							X	
12	TP02_0.3								X	
				TOTAL						

ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)
Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).

Additional Information: Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com

BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com

GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com

MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com

MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com

MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com

NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com

NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com

PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Cavvanba	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)	☑ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: Byron Bay.		☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact? Yes / No / (N/A)
PROJECT: 17066 PROJECT NO.:	ALS QUOTE NO.:	COC SEQUENCE NUMBER (Circle)	Free ice / frozen ice bricks present upon receipt? (Yes) / No / N/A
ORDER NUMBER: PURCHASE ORDER NO.: 17066	COUNTRY OF ORIGIN:	COC: 1 (2) 3 4 5 6 7	Random Sample Temperature on Receipt: 0.2 °C
PROJECT MANAGER: Ross Nicolson CONTACT PH:		OF: 1 (2) 3 4 5 6 7	Other comment:
SAMPLER: Drew Wood. SAMPLER MOBILE: 0403689755	RELINQUISHED BY: Drew Wood	RECEIVED BY:	RELINQUISHED BY:
COC Emailed to ALS? (YES / NO) EDD FORMAT (or default):	DATE/TIME: 8/12/17	DATE/TIME: 8/12/17 15:50.	DATE/TIME:
Email Reports to (will default to PM if no other addresses are listed): Ross Nicolson			RECEIVED BY:
Email Invoice to (will default to PM if no other addresses are listed): Rob McLelland			DATE/TIME: 8/12/17 7:30

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TRH, BTEX, PAHs, Metals (8)	TRH, BTEX VOCs	PAHs, Metals (8)					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH02_0.2	8/12/17	Soil		1	X							
14	BH02_0.4					X							
15	BH02_0.55												HOLD.
16	BH02_1.0												HOLD
17	BH02_1.5					X	X	X					
18	BH02_1.9												HOLD
				TOTAL									

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1731181**

Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ross@cavvanba.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 6685 5083	Facsimile	: +61-2-8784 8500
Project	: 17066	Page	: 1 of 3
Order number	: ----	Quote number	: EB2017CAVCON0001 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: DREW WOOD		

Dates

Date Samples Received	: 08-Dec-2017 15:50	Issue Date	: 09-Dec-2017
Client Requested Due Date	: 14-Dec-2017	Scheduled Reporting Date	: **14-Dec-2017**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Intact.
No. of coolers/boxes	: ----	Temperature	: 0.2 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 19 / 13

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-02 8 Metals (incl. Digestion)	SOIL - S-10 TRH/VOC/PAH	SOIL - S-18 (NO MOIST) TRH(C6-C9)/BTEXN with No Moisture for TBs	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1731181-001	30-Nov-2017 00:00	T/Spike					✓	
ES1731181-002	05-Dec-2017 00:00	T/Blank					✓	
ES1731181-003	07-Dec-2017 00:00	QS-01		✓				✓
ES1731181-004	08-Dec-2017 00:00	QS-02		✓				✓
ES1731181-005	07-Dec-2017 00:00	BH01_0.5-0.5		✓				✓
ES1731181-006	07-Dec-2017 00:00	TP01_0.1		✓				✓
ES1731181-007	07-Dec-2017 00:00	TP01_0.3	✓					
ES1731181-008	07-Dec-2017 00:00	TP01_0.5		✓				✓
ES1731181-009	07-Dec-2017 00:00	TP01_0.8	✓					
ES1731181-010	08-Dec-2017 00:00	TP02_0.08	✓					
ES1731181-011	08-Dec-2017 00:00	TP02_0.15		✓				✓
ES1731181-012	08-Dec-2017 00:00	TP02_0.3		✓				✓
ES1731181-013	08-Dec-2017 00:00	BH02_0.2		✓				✓
ES1731181-014	08-Dec-2017 00:00	BH02_0.4		✓				✓
ES1731181-015	08-Dec-2017 00:00	BH02_0.55	✓					
ES1731181-016	08-Dec-2017 00:00	BH02_1.0	✓					
ES1731181-017	08-Dec-2017 00:00	BH02_1.5		✓	✓	✓		
ES1731181-018	08-Dec-2017 00:00	BH02_1.9	✓					
ES1731181-019	30-Nov-2017 00:00	Trip Spike Control					✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	inbox@cavvanba.com

ROB MCLELLAND

- *AU Certificate of Analysis - NATA (COA)	Email	rob@cavvanba.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	rob@cavvanba.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	rob@cavvanba.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	rob@cavvanba.com
- Chain of Custody (CoC) (COC)	Email	rob@cavvanba.com
- EDI Format - ENMRG (ENMRG)	Email	rob@cavvanba.com
- EDI Format - ESDAT (ESDAT)	Email	rob@cavvanba.com

ROSS NICOLSON

- *AU Certificate of Analysis - NATA (COA)	Email	ross@cavvanba.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ross@cavvanba.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ross@cavvanba.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ross@cavvanba.com
- Chain of Custody (CoC) (COC)	Email	ross@cavvanba.com
- EDI Format - ENMRG (ENMRG)	Email	ross@cavvanba.com
- EDI Format - ESDAT (ESDAT)	Email	ross@cavvanba.com

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1732592**	Page	: 1 of 7
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 21-Dec-2017 16:51
Order number	: ----	Date Analysis Commenced	: 22-Dec-2017
C-O-C number	: ----	Issue Date	: 05-Jan-2018 15:32
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH02_0.4	BH02_1.5	BH02_0.55	BH02_1.0	BH02_1.9
			Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	ES1732592-001	ES1732592-002	ES1732592-003	ES1732592-004	ES1732592-005
				Result	Result	Result	Result	Result
Moisture Content	----	1.0	%	**----**	**----**	**9.3**	**9.8**	**9.0**
Asbestos (Trace)	1332-21-4	5	Fibres	**No**	**No**	**No**	**No**	**No**
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g	**30.5**	**33.1**	**28.4**	**30.5**	**40.5**
APPROVED IDENTIFIER:	----	-	--	**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**	**C.OWLER**
Arsenic	7440-38-2	5	mg/kg	**----**	**----**	<5	**8**	**6**
Cadmium	7440-43-9	1	mg/kg	**----**	**----**	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	**----**	**----**	**12**	**13**	**16**
Copper	7440-50-8	5	mg/kg	**----**	**----**	**9**	**7**	**9**
Lead	7439-92-1	5	mg/kg	**----**	**----**	**36**	**50**	**20**
Nickel	7440-02-0	2	mg/kg	**----**	**----**	**3**	<2	**5**
Zinc	7440-66-6	5	mg/kg	**----**	**----**	**39**	**42**	**43**
Mercury	7439-97-6	0.1	mg/kg	**----**	**----**	<0.1	<0.1	<0.1
Initial pH	----	0.1	pH Unit	**9.4**	**9.0**	**----**	**----**	**----**
After HCl pH	----	0.1	pH Unit	**1.5**	**1.5**	**----**	**----**	**----**
Extraction Fluid Number	----	1	-	**1**	**1**	**----**	**----**	**----**
Final pH	----	0.1	pH Unit	**5.1**	**5.1**	**----**	**----**	**----**
Naphthalene	91-20-3	0.5	mg/kg	**----**	**----**	**0.9**	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg	**----**	**----**	**3.3**	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg	**----**	**----**	**0.7**	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	**----**	**----**	**1.6**	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	**----**	**----**	**30.8**	**1.7**	<0.5
Anthracene	120-12-7	0.5	mg/kg	**----**	**----**	**7.7**	**0.6**	<0.5
Fluoranthene	206-44-0	0.5	mg/kg	**----**	**----**	**35.0**	**3.1**	<0.5
Pyrene	129-00-0	0.5	mg/kg	**----**	**----**	**30.8**	**2.9**	<0.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	**----**	**----**	**14.7**	**1.4**	<0.5
Chrysene	218-01-9	0.5	mg/kg	**----**	**----**	**12.4**	**1.3**	<0.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02_0.4	BH02_1.5	BH02_0.55	BH02_1.0	BH02_1.9
				Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732592-001	ES1732592-002	ES1732592-003	ES1732592-004	ES1732592-005
					Result	Result	Result	Result	Result
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg		----	----	**15.3**	**1.8**	<0.5
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		----	----	**5.6**	**0.6**	<0.5
Benzo(a)pyrene	50-32-8	0.5	mg/kg		----	----	**12.1**	**1.5**	<0.5
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg		----	----	**4.8**	**0.7**	<0.5
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg		----	----	**1.6**	<0.5	<0.5
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg		----	----	**5.3**	**0.8**	<0.5
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		----	----	**183**	**16.4**	<0.5
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		----	----	**17.9**	**2.0**	<0.5
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		----	----	**17.9**	**2.2**	**0.6**
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg		----	----	**17.9**	**2.5**	**1.2**
C6 - C9 Fraction	----	10	mg/kg		----	----	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		----	----	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		----	----	**600**	<100	<100
C29 - C36 Fraction	----	100	mg/kg		----	----	**330**	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		----	----	**930**	<50	<50
C6 - C10 Fraction	C6_C10	10	mg/kg		----	----	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		----	----	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		----	----	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		----	----	**820**	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		----	----	**180**	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		----	----	**1000**	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		----	----	<50	<50	<50
Benzene	71-43-2	0.2	mg/kg		----	----	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		----	----	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		----	----	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		----	----	<1	<1	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	BH02_0.4	BH02_1.5	BH02_0.55	BH02_1.0	BH02_1.9
				Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00	08-Dec-2017 00:00
Compound	CAS Number	LOR	Unit		ES1732592-001	ES1732592-002	ES1732592-003	ES1732592-004	ES1732592-005
					Result	Result	Result	Result	Result
Phenol-d6	13127-88-3	0.5	%		----	----	83.6	87.4	85.4
2-Chlorophenol-D4	93951-73-6	0.5	%		----	----	83.4	86.7	83.9
2.4.6-Tribromophenol	118-79-6	0.5	%		----	----	80.8	73.9	75.5
2-Fluorobiphenyl	321-60-8	0.5	%		----	----	84.6	87.3	86.4
Anthracene-d10	1719-06-8	0.5	%		----	----	86.2	86.5	85.4
4-Terphenyl-d14	1718-51-0	0.5	%		----	----	82.3	85.0	84.9
1.2-Dichloroethane-D4	17060-07-0	0.2	%		----	----	92.9	98.2	100
Toluene-D8	2037-26-5	0.2	%		----	----	103	104	115
4-Bromofluorobenzene	460-00-4	0.2	%		----	----	107	109	120

Analytical Results

Sub-Matrix: **TCLP LEACHATE** (Matrix: **WATER**)			Client sample ID	**BH02_0.4**	**BH02_1.5**	**----**	**----**	**----**
			Client sampling date / time	08-Dec-2017 00:00	08-Dec-2017 00:00	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1732592-001**	**ES1732592-002**	**--------**	**--------**	**--------**
				Result	Result	----	----	----
Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	<0.5	**----**	**----**	**----**
Phenol-d6	13127-88-3	1.0	%	**30.3**	**32.7**	**----**	**----**	**----**
2-Chlorophenol-D4	93951-73-6	1.0	%	**68.4**	**71.1**	**----**	**----**	**----**
2.4.6-Tribromophenol	118-79-6	1.0	%	**62.2**	**69.4**	**----**	**----**	**----**
2-Fluorobiphenyl	321-60-8	1.0	%	**93.8**	**103**	**----**	**----**	**----**
Anthracene-d10	1719-06-8	1.0	%	**91.6**	**97.6**	**----**	**----**	**----**
4-Terphenyl-d14	1718-51-0	1.0	%	**88.9**	**97.4**	**----**	**----**	**----**

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	*Client sample ID - Client sampling date / time*	*Analytical Results*
EA200: Description	BH02_0.4 - 08-Dec-2017 00:00	Pale brown sandy soil
EA200: Description	BH02_1.5 - 08-Dec-2017 00:00	Pale brown sandy soil
EA200: Description	BH02_0.55 - 08-Dec-2017 00:00	Pale brown sandy soil
EA200: Description	BH02_1.0 - 08-Dec-2017 00:00	Pale brown sandy soil
EA200: Description	BH02_1.9 - 08-Dec-2017 00:00	Pale brown sandy soil

Surrogate Control Limits

Sub-Matrix: **SOIL**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Sub-Matrix: **TCLP LEACHATE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112

False

Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1732592**	Page	: 1 of 6
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 21-Dec-2017
Order number	: ----	Date Analysis Commenced	: 22-Dec-2017
C-O-C number	: ----	Issue Date	: 05-Jan-2018
Sampler	: ----		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 5		
No. of samples analysed	: 5		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Christopher Owler	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ES1732587-004	Anonymous	EA055: Moisture Content	----	1	%	15.3	14.4	6.41	0% - 50%
ES1732623-003	Anonymous	EA055: Moisture Content	----	1	%	9.1	9.6	5.57	No Limit
ES1732544-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	6	6	0.00	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	4	5	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	6	25.6	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	18	19	6.70	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	77	52	37.6	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	55	57	3.50	0% - 50%
ES1732544-021	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	18	20	8.88	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	12	15	23.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	95	88	7.96	0% - 50%
		EG005T: Copper	7440-50-8	5	mg/kg	34	34	0.00	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	55	64	14.2	0% - 50%
		EG005T: Zinc	7440-66-6	5	mg/kg	105	120	13.6	0% - 20%
ES1732544-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1732544-021	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1732592-003	BH02_0.55	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	0.9	0.7	24.9	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	3.3	3.4	5.50	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	0.7	1.0	44.9	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ES1732592-003	BH02_0.55	EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	1.6	2.1	29.2	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	30.8	27.8	10.4	0% - 20%
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	7.7	8.0	3.51	0% - 50%
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	35.0	37.0	5.47	0% - 20%
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	30.8	34.6	11.6	0% - 20%
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	14.7	16.6	12.0	0% - 20%
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	12.4	14.4	14.5	0% - 20%
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	15.3	17.6	14.4	0% - 20%
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	5.6	7.1	24.5	0% - 50%
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	12.1	14.3	17.2	0% - 20%
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	4.8	5.8	18.6	0% - 50%
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	1.6	1.8	15.5	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	5.3	6.5	20.2	0% - 50%
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	183	199	8.44	0% - 20%
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	17.9	21.0	15.9	0% - 20%
ES1732629-001	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1732592-003	BH02_0.55	EP071: C15 - C28 Fraction	----	100	mg/kg	600	620	2.56	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	330	400	19.7	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1732629-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1732592-003	BH02_0.55	EP071: >C16 - C34 Fraction	----	100	mg/kg	820	920	11.3	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	180	220	18.2	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1732629-001	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	97.0	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	92.7	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	86.7	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	101	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	94.6	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	95.7	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	94.1	80	122
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	75.7	70	105
EN33a: Initial pH	----	0.1	pH Unit	6.9	----	----	----	----
EN33a: After HCl pH	----	0.1	pH Unit	6.9	----	----	----	----
EN33a: Final pH	----	0.1	pH Unit	6.9	----	----	----	----
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	102	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	99.8	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	102	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	101	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	105	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	106	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	103	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	103	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	102	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	106	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	101	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	107	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	102	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	88.1	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	86.6	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	83.9	63	121
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	91.1	68	128

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	100	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	107	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	101	71	129
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	85.1	68	128
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	103	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	105	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	89.2	63	131
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	92.9	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	91.4	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	83.6	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	87.0	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	89.6	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	89.7	63	119

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	66.6	63	117

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ES1732544-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	95.7	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	95.8	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	97.2	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	102	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	83.0	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	97.2	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	96.6	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ES1732544-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	88.8	70	130
ES1732592-003	BH02_0.55	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	116	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	# Not Determined	70	130
ES1732629-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	105	70	130
ES1732592-003	BH02_0.55	EP071: C10 - C14 Fraction	----	523 mg/kg	87.1	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	94.8	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	119	52	132
ES1732629-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	98.5	70	130
ES1732592-003	BH02_0.55	EP071: >C10 - C16 Fraction	----	860 mg/kg	94.4	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	112	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	104	52	132
ES1732629-001	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	101	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	96.6	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	93.9	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	95.7	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	98.1	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	98.5	70	130

True

Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1732592**	Page	: 1 of 7
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 21-Dec-2017
Site	: ----	Issue Date	: 05-Jan-2018
Sampler	: ----	No. of samples received	: 5
Order number	: ----	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **Analysis Holding Time Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
Soil Glass Jar - Unpreserved						
BH02_0.55, BH02_1.0, BH02_1.9	----	----	----	28-Dec-2017	22-Dec-2017	**6**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
PAH/Phenols (GC/MS - SIM)	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Soil Glass Jar - Unpreserved (EA055)							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**----**	----	----	**28-Dec-2017**	22-Dec-2017	×
Snap Lock Bag - Subsampled by ALS (EA200)							
BH02_0.4, BH02_1.5, BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**----**	----	----	**28-Dec-2017**	06-Jun-2018	✓
Snap Lock Bag - Subsampled by ALS (EA200)							
BH02_0.4, BH02_1.5, BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**----**	----	----	**28-Dec-2017**	06-Jun-2018	✓

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Soil Glass Jar - Unpreserved (EG005T)							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**04-Jan-2018**	06-Jun-2018	✓	**04-Jan-2018**	06-Jun-2018	✓
Soil Glass Jar - Unpreserved (EG035T)							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**04-Jan-2018**	05-Jan-2018	✓	**04-Jan-2018**	05-Jan-2018	✓
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN33a)							
BH02_0.4, BH02_1.5	**08-Dec-2017**	**22-Dec-2017**	22-Dec-2017	✓	**----**	----	----
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**22-Dec-2017**	22-Dec-2017	✓	**29-Dec-2017**	31-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**22-Dec-2017**	22-Dec-2017	✓	**22-Dec-2017**	22-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**22-Dec-2017**	22-Dec-2017	✓	**28-Dec-2017**	31-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**22-Dec-2017**	22-Dec-2017	✓	**22-Dec-2017**	22-Dec-2017	✓
Soil Glass Jar - Unpreserved (EP071)							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**22-Dec-2017**	22-Dec-2017	✓	**28-Dec-2017**	31-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH02_0.55, BH02_1.0, BH02_1.9	**08-Dec-2017**	**22-Dec-2017**	22-Dec-2017	✓	**22-Dec-2017**	22-Dec-2017	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Amber Glass Bottle - Unpreserved (EP075(SIM))							
BH02_0.4, BH02_1.5	**22-Dec-2017**	**27-Dec-2017**	29-Dec-2017	✓	**29-Dec-2017**	05-Feb-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TCLP for Non & Semivolatile Analytes	EN33a	1	4	25.00	9.09	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	8	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	8	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

TCLP for Non & Semivolatile Analytes	EN33a	SOIL	In house QWI-EN/33 referenced to USEPA SW846-1311: The TCLP procedure is designed to determine the mobility of both organic and inorganic analytes present in wastes. The standard TCLP leach is for non-volatile and Semivolatile test parameters.
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Separatory Funnel Extraction of Liquids	ORG14	SOIL	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.

Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

05/01

Fadi Soro

FADI 20/12/17 3pm

From: Chloe Leong
Sent: Wednesday, 20 December 2017 2:16 PM
To: Fadi Soro
Subject: FW: ES1731181 - Additional analysis request

S198-199

#14, 17, 15, 16, 18

Hi Fadi, can you please arrange the below re-batch request?

Thanks!

MANAGING PROJECTS OVER THE CHRISTMAS PERIOD – CLICK FOR MORE DETAILS
Please note there are some variations to opening hours during the Christmas / New Year period.

Kind regards,

Chloe Leong

From: ross@cavvanba.com [mailto:ross@cavvanba.com]
Sent: Wednesday, 20 December 2017 2:04 PM
To: Chloe Leong <Chloe.Leong@ALSGlobal.com>
Cc: 'Drew Wood' <drew@cavvanba.com>; 'Glen Chisnall' <glen@cavvanba.com>
Subject: ES1731181 - Additional analysis request

Environmental Division
Sydney
Work Order Reference
ES1732592

Telephone : +61-2-8784 8555

Hi Chloe,

Hope the last week is going ok!

Can I please get the following analysis rebatched?:

1. BH02_0.4 – asbestos in soil, benzo(a)pyrene TCLP;
2. BH02_1.5 – asbestos in soil, benzo(a)pyrene TCLP;
3. BH02_0.55 currently on hold – TRH/BTEXN/PAHs/8 metals, asbestos in soil;
4. BH02_1.0 – currently on hold - TRH/BTEXN/PAHs/8 metals, asbestos in soil;
5. BH02_1.9 - currently on hold - TRH/BTEXN/PAHs/8 metals, asbestos in soil.

Any questions, give me a shout.

08/12

2592

Cheers

Best Regards,

Ross Nicolson
Senior Environmental Scientist – Contaminated Land
CEnvP (Certified Environmental Practitioner)

Cavvanba Consulting Pty Ltd

NSW and QLD Contaminated Land Auditing
Licensed Asbestos Assessments

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Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1801368**	Page	: 1 of 6
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 09-Jan-2018 12:43
Order number	: ----	Date Analysis Commenced	: 10-Jan-2018
C-O-C number	: ----	Issue Date	: 17-Jan-2018 13:50
Sampler	: DREW WOOD		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 4		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH03_0.25	----	----	----	----
			Client sampling date / time	09-Jan-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1801368-001	--------	--------	--------	--------
				Result	----	----	----	----
Moisture Content	----	1.0	%	**3.1**	----	----	----	----
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	----
Chromium	7440-47-3	2	mg/kg	**6**	----	----	----	----
Copper	7440-50-8	5	mg/kg	<5	----	----	----	----
Lead	7439-92-1	5	mg/kg	**91**	----	----	----	----
Nickel	7440-02-0	2	mg/kg	<2	----	----	----	----
Zinc	7440-66-6	5	mg/kg	**49**	----	----	----	----
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	----
Naphthalene	91-20-3	0.5	mg/kg	**12.2**	----	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	**33.6**	----	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	**4.8**	----	----	----	----
Fluorene	86-73-7	0.5	mg/kg	**36.3**	----	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	**294**	----	----	----	----
Anthracene	120-12-7	0.5	mg/kg	**54.5**	----	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	**204**	----	----	----	----
Pyrene	129-00-0	0.5	mg/kg	**194**	----	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	**66.4**	----	----	----	----
Chrysene	218-01-9	0.5	mg/kg	**59.3**	----	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	**58.8**	----	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	**19.8**	----	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	**54.6**	----	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	**21.9**	----	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	**6.8**	----	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	**25.8**	----	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	**1150**	----	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	**78.9**	----	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**78.9**	----	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**78.9**	----	----	----	----
C6 - C9 Fraction	----	10	mg/kg	<10	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	BH03_0.25	----	----	----	----
			Client sampling date / time	09-Jan-2018 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1801368-001	--------	--------	--------	--------
				Result	----	----	----	----
C10 - C14 Fraction	----	50	mg/kg	**80**	----	----	----	----
C15 - C28 Fraction	----	100	mg/kg	**3300**	----	----	----	----
C29 - C36 Fraction	----	100	mg/kg	**1110**	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg	**4490**	----	----	----	----
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	----	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg	<10	----	----	----	----
>C10 - C16 Fraction	----	50	mg/kg	**410**	----	----	----	----
>C16 - C34 Fraction	----	100	mg/kg	**3810**	----	----	----	----
>C34 - C40 Fraction	----	100	mg/kg	**560**	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg	**4780**	----	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg	**410**	----	----	----	----
Benzene	71-43-2	0.2	mg/kg	<0.2	----	----	----	----
Toluene	108-88-3	0.5	mg/kg	<0.5	----	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	----	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	----	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg	<0.2	----	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg	<0.5	----	----	----	----
Naphthalene	91-20-3	1	mg/kg	<1	----	----	----	----
Phenol-d6	13127-88-3	0.5	%	**84.5**	----	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%	**83.8**	----	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%	**87.9**	----	----	----	----
2-Fluorobiphenyl	321-60-8	0.5	%	**83.2**	----	----	----	----
Anthracene-d10	1719-06-8	0.5	%	**82.4**	----	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%	**84.6**	----	----	----	----
1.2-Dichloroethane-D4	17060-07-0	0.2	%	**88.2**	----	----	----	----
Toluene-D8	2037-26-5	0.2	%	**94.7**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)				Client sample ID	**BH03_0.25**	**----**	**----**	**----**	**----**
				Client sampling date / time	09-Jan-2018 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES1801368-001**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		**88.8**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

True

False

Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1801368**	Page	: 1 of 7
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 09-Jan-2018
Order number	: ----	Date Analysis Commenced	: 10-Jan-2018
C-O-C number	: ----	Issue Date	: 17-Jan-2018
Sampler	: DREW WOOD		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 4		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EB1801276-003	Anonymous	EA055: Moisture Content	----	1	%	2.2	2.3	7.06	No Limit
ES1801527-002	Anonymous	EA055: Moisture Content	----	1	%	1.6	1.2	31.1	No Limit
ES1801329-048	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	32	32	0.00	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	6	6	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	168	173	2.93	0% - 20%
		EG005T: Copper	7440-50-8	5	mg/kg	38	40	4.22	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	300	254	16.5	0% - 20%
		EG005T: Zinc	7440-66-6	5	mg/kg	359	383	6.37	0% - 20%
ES1801696-002	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	22	18	18.9	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	32	27	14.9	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	19	20	5.04	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	10	10	0.00	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	72	62	13.8	0% - 50%
ES1801329-048	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	0.5	0.3	30.4	No Limit
ES1801696-002	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1801477-002	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ES1801477-002	Anonymous	EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP1801115-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
ES1801401-041	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1801401-050	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ES1801477-002	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP1801115-001	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1801401-041	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1801401-050	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1801477-002	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP1801115-001	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
ES1801401-041	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1801401-050	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	96.8	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	93.8	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	92.3	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	99.6	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	96.4	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	98.6	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	98.9	80	122
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	88.2	70	105
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	94.9	77	125
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	91.0	72	124
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	94.4	73	127
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	92.6	72	126
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	97.0	75	127
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	98.9	77	127
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	94.9	73	127
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	95.7	74	128
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	91.1	69	123
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	96.8	75	127
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	6 mg/kg	90.3	68	116
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	95.2	74	126
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	90.6	70	126
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	89.6	61	121
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	87.4	62	118
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	91.7	63	121
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	112	68	128
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	107	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	101	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	98.8	71	129

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	112	68	128
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	102	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	102	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	150 mg/kg	96.9	63	131
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	104	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	105	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	104	65	117
EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	2 mg/kg	112	66	118
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	103	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	104	63	119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ES1801329-048	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	122	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	96.1	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	98.8	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	95.0	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	71.4	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	95.0	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	108	70	130
ES1801329-048	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	97.1	70	130
EP1801115-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	# 0.0141	70	130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	94.2	70	130
ES1801401-041	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	98.5	70	130

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP1801115-001	Anonymous	EP071: C10 - C14 Fraction	----	523 mg/kg	83.4	73	137
		EP071: C15 - C28 Fraction	----	2319 mg/kg	112	53	131
		EP071: C29 - C36 Fraction	----	1714 mg/kg	120	52	132
ES1801401-041	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	95.4	70	130
EP1801115-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	114	73	137
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	115	53	131
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	105	52	132
ES1801401-041	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	93.8	70	130
		EP080: Toluene	108-88-3	2.5 mg/kg	91.3	70	130
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	97.7	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2.5 mg/kg	96.4	70	130
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	96.0	70	130
		EP080: Naphthalene	91-20-3	2.5 mg/kg	74.9	70	130

True

Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1801368**	Page	: 1 of 4
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 09-Jan-2018
Site	: ----	Issue Date	: 17-Jan-2018
Sampler	: DREW WOOD	No. of samples received	: 4
Order number	: ----	No. of samples analysed	: 1

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **Matrix Spike outliers exist - please see following pages for full details.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons	EP1801115--001	Anonymous	**Acenaphthene**	83-32-9	0.0141 %	70-130%	**Recovery less than lower data quality objective**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
Soil Glass Jar - Unpreserved (EA055)							
BH03_0.25	**09-Jan-2018**	**----**	----	----	**12-Jan-2018**	23-Jan-2018	✓
Soil Glass Jar - Unpreserved (EG005T)							
BH03_0.25	**09-Jan-2018**	**12-Jan-2018**	08-Jul-2018	✓	**12-Jan-2018**	08-Jul-2018	✓
Soil Glass Jar - Unpreserved (EG035T)							
BH03_0.25	**09-Jan-2018**	**12-Jan-2018**	06-Feb-2018	✓	**12-Jan-2018**	06-Feb-2018	✓
Soil Glass Jar - Unpreserved (EP075(SIM))							
BH03_0.25	**09-Jan-2018**	**11-Jan-2018**	23-Jan-2018	✓	**11-Jan-2018**	20-Feb-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH03_0.25	**09-Jan-2018**	**10-Jan-2018**	23-Jan-2018	✓	**11-Jan-2018**	23-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP071)							
BH03_0.25	**09-Jan-2018**	**11-Jan-2018**	23-Jan-2018	✓	**11-Jan-2018**	20-Feb-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH03_0.25	**09-Jan-2018**	**10-Jan-2018**	23-Jan-2018	✓	**11-Jan-2018**	23-Jan-2018	✓
Soil Glass Jar - Unpreserved (EP071)							
BH03_0.25	**09-Jan-2018**	**11-Jan-2018**	23-Jan-2018	✓	**11-Jan-2018**	20-Feb-2018	✓
Soil Glass Jar - Unpreserved (EP080)							
BH03_0.25	**09-Jan-2018**	**10-Jan-2018**	23-Jan-2018	✓	**11-Jan-2018**	23-Jan-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Analytical Methods	*Method*	*Count*		*Rate (%)*			*Quality Control Specification*
		QC	*Regular*	***Actual***	***Expected***	*Evaluation*	
Moisture Content	EA055	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	2	15	**13.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	2	20	**10.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)	EP075(SIM)	1	15	**6.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

☐ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
☐BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
☐GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5500 E: gladstone@alsglobal.com
☐MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
☐MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
☐MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
☐NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
☐NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
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☐SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
☐TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townsville.environmental@alsglobal.com
☐WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT:	Cayuanba Consulting	TURNAROUND REQUIREMENTS: (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)	☑ Standard TAT (List due date):
OFFICE:	Byron Bay		☐ Non Standard or urgent TAT (List due date):
PROJECT:	17066 PROJECT NO.: 17066	ALS QUOTE NO.:	
ORDER NUMBER:	PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	
PROJECT MANAGER:	Ross Nicolson	CONTACT PH:	
SAMPLER:	Drew Wood	SAMPLER MOBILE: 0403 689 755	
COC Emailed to ALS? (YES / NO)		EDD FORMAT (or default):	
Email Reports to (will default to PM if no other addresses are listed):	Ross Nicolson		
Email Invoice to (will default to PM if no other addresses are listed):	Rob McLellan		

COC SEQUENCE NUMBER (Circle)
COC: 1 2 3 4 5 6 7
OF: 1 2 3 4 5 6 7

FOR LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment: 4.9

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Drew Wood			P Tan
DATE/TIME: 9.1.18.	DATE/TIME: 9/1/18 12:45	DATE/TIME: 9/1/18 17:00	DATE/TIME: 9/1/18 7:34

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	X TRH, BTEXN, PAHs, Metals (S)							Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	BH03_0.25	9.1.18	S			X							E-MAILED
2	BH03_0.45	↓	↓										HOLD
3	BH03_1.0												HOLD
4	BH03_1.2												HOLD
													HOLD.
				TOTAL									

Environmental Division
Sydney
Work Order Reference
ES1801368

Telephone : + 61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1801368**

Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ross@cavvanba.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 6685 5083	Facsimile	: +61-2-8784 8500
Project	: 17066	Page	: 1 of 2
Order number	: ----	Quote number	: EB2017CAVCON0001 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: DREW WOOD		

Dates

Date Samples Received	: 09-Jan-2018 12:43	Issue Date	: 09-Jan-2018
Client Requested Due Date	: 15-Jan-2018	Scheduled Reporting Date	: **15-Jan-2018**

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 4.9 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 4 / 1

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - EA055-103 Moisture Content	SOIL - S-26 8 metals/TRH/BTEXN/PAH
ES1801368-001	09-Jan-2018 00:00	BH03_0.25		✓	✓
ES1801368-002	09-Jan-2018 00:00	BH03_0.45	✓		
ES1801368-003	09-Jan-2018 00:00	BH03_1.0	✓		
ES1801368-004	09-Jan-2018 00:00	BH03_1.2	✓		

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	inbox@cavvanba.com

ROB MCLELLAND

- A4 - AU Tax Invoice (INV)	Email	rob@cavvanba.com

ROSS NICOLSON

- *AU Certificate of Analysis - NATA (COA)	Email	ross@cavvanba.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ross@cavvanba.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ross@cavvanba.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ross@cavvanba.com
- Chain of Custody (CoC) (COC)	Email	ross@cavvanba.com
- EDI Format - ENMRG (ENMRG)	Email	ross@cavvanba.com
- EDI Format - ESDAT (ESDAT)	Email	ross@cavvanba.com

Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **ES1801925**	Page	: 1 of 8
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 15-Jan-2018 14:25
Order number	:	Date Analysis Commenced	: 16-Jan-2018
C-O-C number	: ----	Issue Date	: 23-Jan-2018 11:43
Sampler	: Drew Wood		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Particular samples required dilution due to the presence of high level contaminants. LOR values have been adjusted accordingly.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	MW03	QS01	T/spike
				Client sampling date / time	15-Jan-2018 00:00	15-Jan-2018 00:00	15-Jan-2018 00:00	15-Jan-2018 00:00	12-Jan-2018 00:00
Compound	CAS Number	LOR	Unit		ES1801925-001	ES1801925-002	ES1801925-003	ES1801925-004	ES1801925-005
					Result	Result	Result	Result	Result
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.035**	<0.001	**0.034**	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Chromium	7440-47-3	0.001	mg/L		**0.564**	**0.003**	<0.001	<0.001	----
Copper	7440-50-8	0.001	mg/L		**0.026**	<0.001	<0.001	<0.001	----
Nickel	7440-02-0	0.001	mg/L		**0.002**	**0.011**	**0.020**	**0.012**	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	----
Zinc	7440-66-6	0.005	mg/L		<0.005	**0.036**	**0.031**	**0.037**	----
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	----
Total Polychlorinated biphenyls	----	1	µg/L		<1	<1	<1	----	----
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
beta-Endosulfan	33213-65-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDD	72-54-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
4.4`-DDT	50-29-3	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Endrin ketone	53494-70-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Methoxychlor	72-43-5	2.0	µg/L		<2.0	<2.0	<2.0	----	----
^ **Total Chlordane (sum)**	----	0.5	µg/L		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	MW03	QS01	T/spike
				Client sampling date / time	15-Jan-2018 00:00	15-Jan-2018 00:00	15-Jan-2018 00:00	15-Jan-2018 00:00	12-Jan-2018 00:00
Compound	CAS Number	LOR	Unit		ES1801925-001	ES1801925-002	ES1801925-003	ES1801925-004	ES1801925-005
					Result	Result	Result	Result	Result
^ **Sum of DDD + DDE + DDT**	72-54-8/72-55-9/50-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
^ **Sum of Aldrin + Dieldrin**	309-00-2/60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Dichlorvos	62-73-7	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Monocrotophos	6923-22-4	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Dimethoate	60-51-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Diazinon	333-41-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Parathion-methyl	298-00-0	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Malathion	121-75-5	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Fenthion	55-38-9	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Parathion	56-38-2	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Fenamiphos	22224-92-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Prothiofos	34643-46-4	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Ethion	563-12-2	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Carbophenothion	786-19-6	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Azinphos Methyl	86-50-0	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Phenol	108-95-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2-Chlorophenol	95-57-8	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2-Methylphenol	95-48-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
3- & 4-Methylphenol	1319-77-3	2.0	µg/L		<2.0	<2.0	<2.0	----	----
2-Nitrophenol	88-75-5	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4-Dimethylphenol	105-67-9	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4-Dichlorophenol	120-83-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.6-Dichlorophenol	87-65-0	1.0	µg/L		<1.0	<1.0	<1.0	----	----
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L		<1.0	<1.0	<1.0	----	----
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L		<1.0	<1.0	<1.0	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	MW03	QS01	T/spike
				Client sampling date / time	15-Jan-2018 00:00	15-Jan-2018 00:00	15-Jan-2018 00:00	15-Jan-2018 00:00	12-Jan-2018 00:00
Compound	CAS Number	LOR	Unit		ES1801925-001	ES1801925-002	ES1801925-003	ES1801925-004	ES1801925-005
					Result	Result	Result	Result	Result
Pentachlorophenol	87-86-5	2.0	µg/L		<2.0	<2.0	<2.0	----	----
Naphthalene	91-20-3	1.0	µg/L		<1.0	<1.0	**2.4**	<1.0	----
Acenaphthylene	208-96-8	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Acenaphthene	83-32-9	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Fluorene	86-73-7	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Phenanthrene	85-01-8	1.0	µg/L		<1.0	<1.0	**4.8**	<1.0	----
Anthracene	120-12-7	1.0	µg/L		<1.0	<1.0	**1.2**	<1.0	----
Fluoranthene	206-44-0	1.0	µg/L		<1.0	<1.0	**6.5**	<1.0	----
Pyrene	129-00-0	1.0	µg/L		<1.0	<1.0	**7.0**	<1.0	----
Benz(a)anthracene	56-55-3	1.0	µg/L		<1.0	<1.0	**3.3**	<1.0	----
Chrysene	218-01-9	1.0	µg/L		<1.0	<1.0	**2.0**	<1.0	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	1.0	µg/L		<1.0	<1.0	**2.0**	<1.0	----
Benzo(k)fluoranthene	207-08-9	1.0	µg/L		<1.0	<1.0	**1.1**	<1.0	----
Benzo(a)pyrene	50-32-8	0.5	µg/L		<0.5	<0.5	**1.0**	<0.5	----
Indeno(1.2.3.cd)pyrene	193-39-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Dibenz(a.h)anthracene	53-70-3	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
Benzo(g.h.i)perylene	191-24-2	1.0	µg/L		<1.0	<1.0	<1.0	<1.0	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	µg/L		<0.5	<0.5	**31.3**	<0.5	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	µg/L		<0.5	<0.5	**1.7**	<0.5	----
C6 - C9 Fraction	----	20	µg/L		**20**	<20	**560**	<20	**260**
C10 - C14 Fraction	----	50	µg/L		**270**	**340**	**430**	**180**	----
C15 - C28 Fraction	----	100	µg/L		<100	**810**	**1540**	**500**	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	**700**	<50	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		**270**	**1150**	**2670**	**680**	----
C6 - C10 Fraction	C6_C10	20	µg/L		**40**	<20	**940**	<20	**280**
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		**30**	<20	**820**	<20	**200**
>C10 - C16 Fraction	----	100	µg/L		**270**	**710**	**270**	**400**	----
>C16 - C34 Fraction	----	100	µg/L		<100	**450**	**2010**	**280**	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	**250**	<100	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		**270**	**1160**	**2530**	**680**	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	MW01	MW02	MW03	QS01	T/spike
				Client sampling date / time	15-Jan-2018 00:00	15-Jan-2018 00:00	15-Jan-2018 00:00	15-Jan-2018 00:00	12-Jan-2018 00:00
Compound	CAS Number	LOR	Unit		ES1801925-001	ES1801925-002	ES1801925-003	ES1801925-004	ES1801925-005
					Result	Result	Result	Result	Result
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		270	710	260	400	----
Benzene	71-43-2	1	µg/L		<1	<1	<5	<1	16
Toluene	108-88-3	2	µg/L		<2	<2	7	<2	16
Ethylbenzene	100-41-4	2	µg/L		<2	<2	8	<2	15
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		8	<2	75	<2	15
ortho-Xylene	95-47-6	2	µg/L		5	<2	27	<2	15
^ Total Xylenes	----	2	µg/L		13	<2	102	<2	30
^ Sum of BTEX	----	1	µg/L		13	<1	117	<1	77
Naphthalene	91-20-3	5	µg/L		<5	<5	5	<5	16
Decachlorobiphenyl	2051-24-3	1	%		94.0	81.0	51.0	----	----
Dibromo-DDE	21655-73-2	0.5	%		96.8	89.4	61.6	----	----
DEF	78-48-8	0.5	%		125	114	66.4	----	----
Phenol-d6	13127-88-3	1.0	%		19.6	23.2	20.4	21.8	----
2-Chlorophenol-D4	93951-73-6	1.0	%		40.2	66.6	40.0	69.3	----
2.4.6-Tribromophenol	118-79-6	1.0	%		42.8	88.0	42.3	81.7	----
2-Fluorobiphenyl	321-60-8	1.0	%		79.6	87.9	61.6	84.6	----
Anthracene-d10	1719-06-8	1.0	%		78.4	83.2	66.5	86.1	----
4-Terphenyl-d14	1718-51-0	1.0	%		92.7	88.3	68.1	96.7	----
1.2-Dichloroethane-D4	17060-07-0	2	%		93.2	96.4	91.1	95.0	96.8
Toluene-D8	2037-26-5	2	%		110	106	105	106	108
4-Bromofluorobenzene	460-00-4	2	%		103	101	99.5	100	102

Analytical Results

Sub-Matrix: **WATER** (Matrix: **WATER**)				Client sample ID	**T/blank**	**----**	**----**	**----**	**----**
				Client sampling date / time	12-Jan-2018 00:00	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES1801925-006**	**--------**	**--------**	**--------**	**--------**
					Result	----	----	----	----
C6 - C9 Fraction	----	20	µg/L		<20	**----**	**----**	**----**	**----**
C6 - C10 Fraction	C6_C10	20	µg/L		<20	**----**	**----**	**----**	**----**
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	20	µg/L		<20	**----**	**----**	**----**	**----**
Benzene	71-43-2	1	µg/L		<1	**----**	**----**	**----**	**----**
Toluene	108-88-3	2	µg/L		<2	**----**	**----**	**----**	**----**
Ethylbenzene	100-41-4	2	µg/L		<2	**----**	**----**	**----**	**----**
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	**----**	**----**	**----**	**----**
ortho-Xylene	95-47-6	2	µg/L		<2	**----**	**----**	**----**	**----**
^ **Total Xylenes**	----	2	µg/L		<2	**----**	**----**	**----**	**----**
^ **Sum of BTEX**	----	1	µg/L		<1	**----**	**----**	**----**	**----**
Naphthalene	91-20-3	5	µg/L		<5	**----**	**----**	**----**	**----**
1.2-Dichloroethane-D4	17060-07-0	2	%		**85.2**	**----**	**----**	**----**	**----**
Toluene-D8	2037-26-5	2	%		**108**	**----**	**----**	**----**	**----**
4-Bromofluorobenzene	460-00-4	2	%		**98.5**	**----**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
Decachlorobiphenyl	2051-24-3	29	129
Dibromo-DDE	21655-73-2	67	111
DEF	78-48-8	67	111
Phenol-d6	13127-88-3	10	44
2-Chlorophenol-D4	93951-73-6	14	94
2.4.6-Tribromophenol	118-79-6	17	125
2-Fluorobiphenyl	321-60-8	20	104
Anthracene-d10	1719-06-8	27	113
4-Terphenyl-d14	1718-51-0	32	112
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

True

False

Environmental

QUALITY CONTROL REPORT

Work Order	: **ES1801925**	Page	: 1 of 7
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
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Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 15-Jan-2018
Order number	:	Date Analysis Commenced	: 16-Jan-2018
C-O-C number	: ----	Issue Date	: 23-Jan-2018
Sampler	: Drew Wood		
Site	: ----		
Quote number	: EN/222/17		
No. of samples received	: 6		
No. of samples analysed	: 6		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EW1705381-003	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.102	0.100	2.12	0% - 20%
EP1801116-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.004	0.004	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
ES1801885-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1801908-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES1801861-011	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES1801925-001	MW01	EP080: C6 - C9 Fraction	----	20	µg/L	20	20	0.00	No Limit
ES1801861-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES1801925-001	MW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	40	40	0.00	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ES1801861-011	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES1801925-001	MW01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	8	8	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	5	5	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	95.5	85	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.5	84	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.9	85	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.6	81	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	95.8	83	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	97.1	82	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	93.7	81	117
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	101	83	105
EP066: Total Polychlorinated biphenyls	----	1	µg/L	<1	10 µg/L	92.0	62	107
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	82.4	65	107
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	84.9	58	111
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	94.7	69	117
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	85.0	70	112
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	84.0	69	110
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	84.5	65	108
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	84.3	66	109
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	84.0	67	107
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	83.3	64	110
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	85.8	67	112
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	83.5	63	111
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	88.1	65	113
EP068: 4.4`-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	86.7	66	112
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	85.6	65	113
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	87.4	67	114
EP068: 4.4`-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	87.6	72	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	83.1	67	109
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	80.3	65	112
EP068: 4.4`-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	80.5	65	112
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	80.8	64	110
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	81.2	61	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	99.8	66	114
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	106	64	113
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	23.1	20	48
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	84.7	70	110
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	80.7	71	110
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	79.3	77	119
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	76.4	70	124
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	85.5	68	116
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	82.7	69	112
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	84.0	75	119
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	77.0	67	121
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	82.8	69	121
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	84.0	72	110
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	81.4	68	112
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	77.2	64	116
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	84.7	68	114
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	84.2	74	120
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	77.8	66	114
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	66.2	52	128
EP075(SIM): Phenol	108-95-2	1	µg/L	<1.0	5 µg/L	39.8	25	62
EP075(SIM): 2-Chlorophenol	95-57-8	1	µg/L	<1.0	5 µg/L	69.6	52	90
EP075(SIM): 2-Methylphenol	95-48-7	1	µg/L	<1.0	5 µg/L	70.0	51	91
EP075(SIM): 3- & 4-Methylphenol	1319-77-3	2	µg/L	<2.0	10 µg/L	61.5	44	88
EP075(SIM): 2-Nitrophenol	88-75-5	1	µg/L	<1.0	5 µg/L	69.3	48	100
EP075(SIM): 2.4-Dimethylphenol	105-67-9	1	µg/L	<1.0	5 µg/L	83.5	49	99
EP075(SIM): 2.4-Dichlorophenol	120-83-2	1	µg/L	<1.0	5 µg/L	69.8	53	105
EP075(SIM): 2.6-Dichlorophenol	87-65-0	1	µg/L	<1.0	5 µg/L	83.1	57	105
EP075(SIM): 4-Chloro-3-methylphenol	59-50-7	1	µg/L	<1.0	5 µg/L	76.6	53	99
EP075(SIM): 2.4.6-Trichlorophenol	88-06-2	1	µg/L	<1.0	5 µg/L	66.4	50	106
EP075(SIM): 2.4.5-Trichlorophenol	95-95-4	1	µg/L	<1.0	5 µg/L	80.2	51	105
EP075(SIM): Pentachlorophenol	87-86-5	2	µg/L	<2.0	10 µg/L	44.7	10	95
EP075(SIM): Naphthalene	91-20-3	1	µg/L	<1.0	5 µg/L	70.2	50	94
EP075(SIM): Acenaphthylene	208-96-8	1	µg/L	<1.0	5 µg/L	68.5	64	114
EP075(SIM): Acenaphthene	83-32-9	1	µg/L	<1.0	5 µg/L	79.5	62	113
EP075(SIM): Fluorene	86-73-7	1	µg/L	<1.0	5 µg/L	79.0	64	115
EP075(SIM): Phenanthrene	85-01-8	1	µg/L	<1.0	5 µg/L	90.0	63	116
EP075(SIM): Anthracene	120-12-7	1	µg/L	<1.0	5 µg/L	74.6	64	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP075(SIM): Fluoranthene	206-44-0	1	µg/L	<1.0	5 µg/L	72.6	64	118
EP075(SIM): Pyrene	129-00-0	1	µg/L	<1.0	5 µg/L	72.4	63	118
EP075(SIM): Benz(a)anthracene	56-55-3	1	µg/L	<1.0	5 µg/L	84.4	64	117
EP075(SIM): Chrysene	218-01-9	1	µg/L	<1.0	5 µg/L	84.6	63	116
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2 205-82-3	1	µg/L	<1.0	5 µg/L	77.6	62	119
EP075(SIM): Benzo(k)fluoranthene	207-08-9	1	µg/L	<1.0	5 µg/L	88.7	63	115
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	µg/L	<0.5	5 µg/L	69.4	63	117
EP075(SIM): Indeno(1.2.3.cd)pyrene	193-39-5	1	µg/L	<1.0	5 µg/L	74.5	60	118
EP075(SIM): Dibenz(a.h)anthracene	53-70-3	1	µg/L	<1.0	5 µg/L	69.0	61	117
EP075(SIM): Benzo(g.h.i)perylene	191-24-2	1	µg/L	<1.0	5 µg/L	69.9	59	118
EP071: C10 - C14 Fraction	----	50	µg/L	<50	2000 µg/L	85.9	76	116
EP071: C15 - C28 Fraction	----	100	µg/L	<100	3000 µg/L	90.1	83	109
EP071: C29 - C36 Fraction	----	50	µg/L	<50	2000 µg/L	87.7	75	113
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	101	75	127
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	2500 µg/L	90.7	76	114
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	3500 µg/L	102	81	111
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	1500 µg/L	102	77	119
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	98.2	75	127
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	99.5	70	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	100.0	69	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	100	70	120
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	10 µg/L	99.7	69	121
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	101	72	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	97.6	70	120

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report		
Spike	SpikeRecovery(%)	Recovery Limits (%)

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ES1801885-003	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	102	70	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	97.9	70	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	97.3	70	130
		EG020A-F: Copper	7440-50-8	1 mg/L	108	70	130
		EG020A-F: Lead	7439-92-1	1 mg/L	97.1	70	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	106	70	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	106	70	130
EP1801116-001	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	105	70	130
ES1801861-011	Anonymous	EP080: C6 - C9 Fraction	----	325 µg/L	112	70	130
ES1801861-011	Anonymous	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	124	70	130
ES1801861-011	Anonymous	EP080: Benzene	71-43-2	25 µg/L	104	70	130
		EP080: Toluene	108-88-3	25 µg/L	103	70	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	103	70	130
		EP080: meta- & para-Xylene	108-38-3 106-42-3	25 µg/L	103	70	130
		EP080: ortho-Xylene	95-47-6	25 µg/L	100	70	130
		EP080: Naphthalene	91-20-3	25 µg/L	92.2	70	130

True

Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **ES1801925**	Page	: 1 of 6
Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Telephone	: +61-2-8784 8555
Project	: 17066	Date Samples Received	: 15-Jan-2018
Site	: ----	Issue Date	: 23-Jan-2018
Sampler	: Drew Wood	No. of samples received	: 6
Order number	:	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
EP068S: Organochlorine Pesticide Surrogate	ES1801925-003	MW03	**Dibromo-DDE**	21655-73-2	61.6 %	67-111 %	**Recovery less than lower data quality objective**
EP068T: Organophosphorus Pesticide Surrogate	ES1801925-001	MW01	**DEF**	78-48-8	125 %	67-111 %	**Recovery greater than upper data quality objective**
EP068T: Organophosphorus Pesticide Surrogate	ES1801925-002	MW02	**DEF**	78-48-8	114 %	67-111 %	**Recovery greater than upper data quality objective**
EP068T: Organophosphorus Pesticide Surrogate	ES1801925-003	MW03	**DEF**	78-48-8	66.4 %	67-111 %	**Recovery less than lower data quality objective**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
PAH/Phenols (GC/MS - SIM)	0	11	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	8	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	14	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	0	11	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	0	13	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	0	8	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	14	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)	*Sample Date*	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)							
MW01, MW02, MW03, QS01	**15-Jan-2018**	**----**	----	----	**20-Jan-2018**	14-Jul-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)							
MW01, MW02, MW03, QS01	**15-Jan-2018**	**----**	----	----	**22-Jan-2018**	12-Feb-2018	✓
Amber Glass Bottle - Unpreserved (EP066)							
MW01, MW02, MW03	**15-Jan-2018**	**16-Jan-2018**	22-Jan-2018	✓	**17-Jan-2018**	25-Feb-2018	✓
Amber Glass Bottle - Unpreserved (EP068)							
MW01, MW02, MW03	**15-Jan-2018**	**16-Jan-2018**	22-Jan-2018	✓	**17-Jan-2018**	25-Feb-2018	✓
Amber Glass Bottle - Unpreserved (EP068)							
MW01, MW02, MW03	**15-Jan-2018**	**16-Jan-2018**	22-Jan-2018	✓	**17-Jan-2018**	25-Feb-2018	✓
Amber Glass Bottle - Unpreserved (EP075(SIM))							
MW01, MW02, MW03	**15-Jan-2018**	**16-Jan-2018**	22-Jan-2018	✓	**17-Jan-2018**	25-Feb-2018	✓
Amber Glass Bottle - Unpreserved (EP075(SIM))							
MW01, MW02, MW03, QS01	**15-Jan-2018**	**16-Jan-2018**	22-Jan-2018	✓	**17-Jan-2018**	25-Feb-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
MW01, MW02, MW03, QS01	**15-Jan-2018**	**16-Jan-2018**	22-Jan-2018	✓	**18-Jan-2018**	25-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T/spike, T/blank	**12-Jan-2018**	**16-Jan-2018**	26-Jan-2018	✓	**16-Jan-2018**	26-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02, MW03, QS01	**15-Jan-2018**	**16-Jan-2018**	29-Jan-2018	✓	**16-Jan-2018**	29-Jan-2018	✓
Amber Glass Bottle - Unpreserved (EP071)							
MW01, MW02, MW03, QS01	**15-Jan-2018**	**16-Jan-2018**	22-Jan-2018	✓	**18-Jan-2018**	25-Feb-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
T/spike, T/blank	**12-Jan-2018**	**16-Jan-2018**	26-Jan-2018	✓	**16-Jan-2018**	26-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02, MW03, QS01	**15-Jan-2018**	**16-Jan-2018**	29-Jan-2018	✓	**16-Jan-2018**	29-Jan-2018	✓

Matrix: **WATER**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Amber VOC Vial - Sulfuric Acid (EP080)							
T/spike, T/blank	**12-Jan-2018**	**16-Jan-2018**	26-Jan-2018	✓	**16-Jan-2018**	26-Jan-2018	✓
Amber VOC Vial - Sulfuric Acid (EP080)							
MW01, MW02, MW03, QS01	**15-Jan-2018**	**16-Jan-2018**	29-Jan-2018	✓	**16-Jan-2018**	29-Jan-2018	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Dissolved Mercury by FIMS	EG035F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	11	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	11	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	11	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	13	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Polychlorinated Biphenyls (PCB)	EP066	0	8	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	14	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015A The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260B Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM (2013) Schedule B(3)

Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

CHAIN OF CUSTODY

ALS Laboratory: please tick →

ADELAIDE 21 Burma Road Pooraka SA 5095 Ph: 08 8359 0890 E: adelaide@alsglobal.com
BRISBANE 2 Byth Street Stafford QLD 4053 Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callemondah Drive Clinton QLD 4680 Ph: 07 7471 5600 E: gladstone@alsglobal.com
MACKAY 78 Harbour Road Mackay QLD 4740 Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westall Road Springvale VIC 3171 Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MUDGEE 1/29 Sydney Road Mudgee NSW 2850 Ph: 02 6372 6735 E: mudgee.mail@alsglobal.com
NEWCASTLE 5/585 Maitland Road Mayfield West NSW 2304 Ph: 02 4014 2500 E: samples.newcastle@alsglobal.com
NOWRA 4/13 Geary Place North Nowra NSW 2541 Ph: 02 4423 2063 E: nowra@alsglobal.com
PERTH 10 Hod Way Malaga WA 6090 Ph: 08 9209 7655 E: samples.perth@alsglobal.com
SYDNEY 277-289 Woodpark Road Smithfield NSW 2164 Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Desma Court Bohle QLD 4818 Ph: 07 4796 0600 E: townesville.environmental@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500 Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: Cavvanba Consulting	TURNAROUND REQUIREMENTS: ☑ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)	
OFFICE: Byron Bay	(Standard TAT may be longer for some tests e.g., Ultra Trace Organics) ☐ Non Standard or urgent TAT (List due date):	Custody Seal Intact?	Yes / No / (N/A)
PROJECT: 17066 PROJECT NO.: 17066	ALS QUOTE NO.:	Free ice / frozen ice bricks present upon receipt?	(Yes) / No / N/A
ORDER NUMBER: PURCHASE ORDER NO.:	COUNTRY OF ORIGIN:	Random Sample Temperature on Receipt:	10.3 °C
PROJECT MANAGER: Ross Nicolson	CONTACT PH:	Other comment:	
SAMPLER: Drew Wood	SAMPLER MOBILE: 0403689755		
COC Emailed to ALS? (YES / NO)	EDD FORMAT (or default):		
Email Reports to (will default to PM if no other addresses are listed):	Ross, Nicolson		
Email Invoice to (will default to PM if no other addresses are listed):	Rob McClelland		

COC SEQUENCE NUMBER (Circle): COC: (1) 2 3 4 5 6 7 — OF: (1) 2 3 4 5 6 7

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Drew Wood	NT		
DATE/TIME: 15.1.18.	DATE/TIME: 15/01/18 14:25.	DATE/TIME:	DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS (MATRIX: Solid(S) Water(W))			CONTAINER INFORMATION	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) — Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).								Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	TRH, BTEX, PAHs, Phenols, Pb	OCs, OPs, PCBs, Metals (8)		TRH, BTEX, PAHs, Metals (8)		TRH/BTEX			Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MW01	15/1/18	Water		5	X								
2	MW02				4	X								
3	MW03				5	X								
4	QS01				4				X					
5	T/Spike	12/1/18			1						X			
6	T/Blank	"			1						X			
				TOTAL										

Environmental Division Sydney
Work Order Reference
ES1801925

Telephone : +61-2-8784 8555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **ES1801925**

Client	: **CAVVANBA CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ROSS NICOLSON	Contact	: Customer Services ES
Address	: PO BOX 2191 BYRON BAY NSW 2481	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: ross@cavvanba.com	E-mail	: ALSEnviro.Sydney@alsglobal.com
Telephone	: +61 02 6685 7811	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 6685 5083	Facsimile	: +61-2-8784 8500
Project	: 17066	Page	: 1 of 2
Order number	:	Quote number	: EB2017CAVCON0001 (EN/222/17)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Drew Wood		

Dates

Date Samples Received	: 15-Jan-2018 14:25	Issue Date	: 15-Jan-2018
Client Requested Due Date	: 23-Jan-2018	Scheduled Reporting Date	: **23-Jan-2018**

Delivery Details

Mode of Delivery	: Client Drop Off	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 1.3 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Proactive Holding Time Report
  - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.

Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - W-18 TRH(C6 - C9)/BTEXN	WATER - W-19 TRH/BTEXN/PAH/Phenols/OC/OP/PCB/8 metals	WATER - W-26 TRH/BTEXN/PAH/8 Metals
ES1801925-001	15-Jan-2018 00:00	MW01		✓	
ES1801925-002	15-Jan-2018 00:00	MW02		✓	
ES1801925-003	15-Jan-2018 00:00	MW03		✓	
ES1801925-004	15-Jan-2018 00:00	QS01			✓
ES1801925-005	12-Jan-2018 00:00	T/spike	✓		
ES1801925-006	12-Jan-2018 00:00	T/blank	✓		

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	inbox@cavvanba.com

ROB MCLELLAND

- *AU Certificate of Analysis - NATA (COA)	Email	rob@cavvanba.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	rob@cavvanba.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	rob@cavvanba.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	rob@cavvanba.com
- A4 - AU Tax Invoice (INV)	Email	rob@cavvanba.com
- Chain of Custody (CoC) (COC)	Email	rob@cavvanba.com
- EDI Format - ENMRG (ENMRG)	Email	rob@cavvanba.com
- EDI Format - ESDAT (ESDAT)	Email	rob@cavvanba.com

ROSS NICOLSON

- *AU Certificate of Analysis - NATA (COA)	Email	ross@cavvanba.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	ross@cavvanba.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	ross@cavvanba.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	ross@cavvanba.com
- Chain of Custody (CoC) (COC)	Email	ross@cavvanba.com
- EDI Format - ENMRG (ENMRG)	Email	ross@cavvanba.com
- EDI Format - ESDAT (ESDAT)	Email	ross@cavvanba.com