Appendix A
Existing Monitoring Well Borelogs

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Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 μm to 2.36 mm
	medium	200 μm to 600 μm
	fine	75 μm to 200 μm

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

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Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)							USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.			GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.			GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)			GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)			GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.			SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).			SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**			
			None to Low	Quick to slow	None		ML	SILT
			Medium to High	None	Medium		CL	CLAY
			Low to medium	Slow to very slow	Low		OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium		MH	SILT
			High	None	High		CH	CLAY
			Medium to High	None	Low to medium		OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.				Pt	PEAT

• Low plasticity – Liquid Limit w_L less than 35%. • Medium plasticity – w_L between 35% and 50%. • High plasticity – w_L greater than 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

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Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance	In engineering terms roch substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.
Defect	Discontinuity or break in the continuity of a substance or substances.
Mass	Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME	Simple rock names are used rather than precise geological classification.
PARTICLE SIZE	Grain size terms for sandstone are:
Coarse grained	Mainly 0.6mm to 2mm
Medium grained	Mainly 0.2mm to 0.6mm
Fine grained	Mainly 0.06mm (just visible) to 0.2mm
FABRIC	Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:
Massive	No layering or penetrative fabric.
Indistinct	Layering or fabric just visible. Little effect on properties.
Distinct	Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	**RS**	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Material	**XW**	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	**HW**	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	**MW**	The whole of the rock substance is discoloured, usually by iron staining or bleaching , to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	**SW**	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	**FR**	Rock substance unaffected by weathering.

Notes on Weathering:

1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
2. Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

ROCK SUBSTANCE STRENGTH TERMS

Term	Abbrev-iation	Point Load Index, $I_{s(50)}$ (MPa)	Field Guide
Very Low	**VL**	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	**L**	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	**M**	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	**H**	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	**VH**	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	**EH**	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index $I_{s(50)}$. The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

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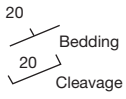
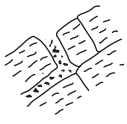
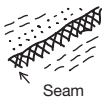
Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.			 (Note 2)
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			 (Note 2)
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.			
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.			
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.			
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.			

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

DEFECT SHAPE TERMS	
Planar	The defect does not vary in orientation
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps
Irregular	The defect has many sharp changes of orientation

Note: The assessment of defect shape is partly influenced by the scale of the observation.

ROUGHNESS TERMS	
Slickensided	Grooved or striated surface, usually polished
Polished	Shiny smooth surface
Smooth	Smooth to touch. Few or no surface irregularities
Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.

COATING TERMS	
Clean	No visible coating
Stained	No visible coating but surfaces are discoloured
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.

BLOCK SHAPE TERMS	
Blocky	Approximately equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greate than cross section

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Engineering Log - Piezometer

Borehole No. **MW 01**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***4.3.2010***

Principal:

Date completed: ***4.3.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 4 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 297731.9 | slope: -90° | R.L. Surface: 2.82

hole diameter: 150 | Northing: 6176080.12 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
HOLLOW FLIGHTS		N	12.36pm - 25/06/10			2 1 0 -1 -2 -3 -4 -5	1 2 3 4 5 6 7 8			**FILL; Sandy GRAVEL:** Fine to coarse grained, black/dark grey (coal and shale), fine to coarse grained sand.	D/M	MD	FILL/COALWASH No odour
										...Becoming Sandy GRAVEL: Medium to coarse grained, fine to coarse grained sand, with a trace of cobbles to to 100mm diameter at 1.0m to 1.9m.		D	
										...Becoming Sandy GRAVEL: Fine to coarse grained, fine to coarse grained sand at 1.9m to 2.5m.	M/W	MD/D	
									SM	**Silty SAND:** Fine to coarse grained, dark grey/grey.			ALLUVIAL/ESTUARINE? No odour
									CL	**CLAY:** Medium plasticity, dark grey, with some fine to coarse grained sand and silt.	>Wp/>Wl		ALLUVIAL/ESTUARINE? No odour
									CL	**CLAY:** Medium plasticity, grey-brown/grey, with some shells and shell fragments up to 20mm diameter (bivalve shells) and silt.	>Wp	S/F	ESTUARINE No odour
												VS/S	
										Borehole terminated at 6m			

PIEZOMETER ENVIWOLL00250AB - LOGS.GPJ COFFEY.GDT 20.7.10

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW 02**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***4.3.2010***

Principal:

Date completed: ***4.3.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 3 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 297791.28 | slope: -90° | R.L. Surface: 3.05

hole diameter: 150 | Northing: 6176388.22 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
HOLLOW FLIGHT		N	11.13am-25/06/10			2 1 0 -1 -2 -3 -4	1 2 3 4 5 6 7 8			**FILL; Sandy GRAVEL:** Fine to coarse grained, sub-angular, black (coal and shale), fine to coarse grained sand.	M	MD/D	FILL/COALWASH No odour
											M/W		
									SW	**SAND:** Fine to coarse grained, brown/grey, with a trace of silt. ...Becoming grey/pale yellow at 3.0m.	M		ALLUVIAL No odour
											W		
									SM	**Silty SAND:** Fine to medium grained, grey/pale grey.	M/W		ALLUVIAL/ESTUARINE? No odour
									CL	**CLAY:** Medium plasticity, dark grey, with some shell fragments, shells up to 20mm diameter (bivalves) and silt.	>Wp	S/F	ESTUARINE No odour
										Borehole terminated at 5.8m			

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
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classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW 03**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***3.3.2010***

Principal:

Date completed: ***3.3.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 3 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 297545.01 | slope: -90° | R.L. Surface: 3.98

hole diameter: 150 | Northing: 6176690.48 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
HOLLOW FLIGHT		N	8.35am - 25/06/10			3	1			**FILL; Gravelly SAND:** Fine to coarse grained, black, fine to coarse grained sub-angular gravel (coal and shale).	M	MD	FILL/COALWASH
										FILL; SILT: Low to medium plasticity, pale grey/grey, with a trace of fine grained sand. ...Fill behaving as liquid due to moisture at 0.3m.	W/Wl	S/F	FILL/ASH No odour
						2	2			...Clayey SILT at 1.6m to 2.4m.			
						1	3		CL	**CLAY:** Medium plasticity, brown/grey, with a trace of fine grained sand and silt.	Wp	F/St	ALLUVIAL No odour
						0	4		CL	**CLAY:** Medium plasticity, orange/brown, with some fine to medium grained sand and silt.	>Wp		RESIDUAL No odour
						-1	5		CL	**CLAY:** Medium plasticity, brown/pale yellow, with a trace of silt.	>Wp		XW SANDSTONE No odour
						-2	6		CL	**CLAY:** Medium plasticity, grey/pale green with orange/yellow patches, with a trace of fine to medium grained sand and silt.	Wp		XW/HW SANDSTONE No odour
						-3	7			Borehole terminated at 5.8m			MW 03 Terminated at 5.8m on highly weathered sandstone
						-4	8						

PIEZOMETER ENVIWOLL00250AB - LOGS.GPJ COFFEY.GDT 20.7.10

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method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
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PID	PID measurement
WS	water sample
PZ	piezometer
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classification symbols and soil description

based on unified classification system

moisture

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W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

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Engineering Log - Piezometer

Borehole No. **MW 04**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***3.3.2010***

Principal:

Date completed: ***3.3.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 3 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 297590.91 | slope: -90° | R.L. Surface: 3.33

hole diameter: 150 | Northing: 6176299.76 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
HOLLOW FLIGHT		N	9.52am - 25/06/10			3	1			**FILL; Gravelly SAND:** Fine to coarse grained, black, fine to coarse grained, sub-angular coal and shale gravel.	M / M/W / W/>Wl	L/MD / MD	FILL - COALWASH No odour FILL-ASH No odour
						2				**FILL; Clayey SILT:** Low to medium plasticity, pale grey to grey. ...Fill behaving as liquid at 0.25m.			
						1	2		CL	**CLAY:** Medium plasticity, dark grey/brown, with some silt, with a trace of fine to medium grained sand.	>Wp	S/F	ALLUVIAL/ESTUARINE? No odour
						0	3		CL	**CLAY:** Medium plasticity, grey/orange/brown, with some silt, with a trace of fine to medium grained sand.	Wp	F/St	ALLUVIAL No odour
						-1	4		CL/CH	**CLAY:** Medium to high plasticity, dark grey, wtih some silt, with some shell fragments (bivalves).	>Wp	VS/S	ESTUARINE No odour
						-2	5		CL/CH	**CLAY:** Medium to high plasticity, dark grey, with some silt, with some shell fragments (bivalves).			
						-3	6			Borehole terminated at 6.2m			
						-4	7						
							8						

PIEZOMETER ENVIWOLL00250AB - LOGS.GPJ COFFEY.GDT 20.7.10

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW 05**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***5.3.2010***

Principal:

Date completed: ***5.3.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 2 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 298381.41 | slope: -90° | R.L. Surface: 4.70

hole diameter: 100 | Northing: 6176516.39 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADT		N	2.06pm - 24/06/10			4	1			**FILL; Silty SAND:** Fine to coarse grained, dark grey/grey.	M	MD	FILL/TOPSOIL No odour
										FILL; Clayey SILT: Low plasticity, pale grey/grey, with a trace of fine to medium grained sand.	D/M	F/St	FILL/ASH No odour
										FILL; CLAY: Low to medium plasticity, pale brown/white/pale yellow mottled, with a trace of fine to medium grained sub-angular to sub-rounded gravel and silt.	Wp		FILL No odour
						3	2			**FILL; CLAY:** Medium to high plasticity, red/brown with pale orange mottling, with a trace of fine ot medium grained, sub-rounded gravel, sub-rounded sandstone gravel and silt. (Hard to distinguish as residual or fill duw to mixed up cuttings.		St/VSt	FILL/ALLUVIAL? No odour
						2	3		CL	**CLAY:** Medium plasticity, pale brown/pale yellow mottled, with some fine to medium grained sand, with a trace of fine to medium grained sub-rounded sandstone gravel and silt.		VSt	ALLUVIAL No odour
						1	4						
						0	5		CL	**CLAY:** Medium plasticity, pale brown/grey, with a trace of fine to medium grained sand and silt.	>Wp	S	ALLUVIAL/ESTUARINE? No odour
						-1	6		CL	**CLAY:** Medium plasticity, dark grey, with a trace of rootlets, shell fragments and silt.			ESTUARINE Brackish/organic odour
						-2	7		CL	**CLAY:** Medium plasticity, brown, with some medium to coarse grained sand, fine grained sub-angular gravel and shell fragments, with a trace of silt.	Wp	F	
						-3	8		CL	**CLAY;** Low to medium plasticity, dark grey, with some fine to medium grained sand, with a trace of silt.	>Wp	S/F	
										Borehole terminated at 7.5m			

PIEZOMETER ENVIWOLL00250AB - LOGS.GPJ COFFEY.GDT 20.7.10

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW 06**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***11.6.2010***

Principal:

Date completed: ***11.6.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 2 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 298481.42 | slope: -90° | R.L. Surface: 10.92

hole diameter: 50 | Northing: 6176739.28 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
PUSH TUBE		N				10	1			**FILL; Gravelly SAND:** Fine to coarse grained, dark grey/black, fine to medium grained, sub-angular to sub-rounded gravel.	D/M	L/MD	FILL - COALWASH No odour
										FILL; Clayey SILT: Low plasticity. pale grey.	M	VSt/Fb	FILL - ASH No odour
										FILL; SAND: Fine grained, grey, with some silt.	D	MD	
										FILL; SILT: Low plasticity, pale grey, with a trace of clay.	M	VL/L	
						9	2			**FILL; Clayey SILT:** Low plasticity, grey.	D/M	St/Fb	
										FILL; SILT: Low plasticity, pale grey, with a trace of clay.	D	VL/L	
										FILL; Clayey SILT: Low plasticity, grey.	D/M	F/Fb	
						8	3			**FILL; SAND:** Fine grained, grey/dark grey, with some silt.	M	MD	
										FILL; Clayey SILT: Low plasticity, grey.		VSt-H/Fb	
						7	4			**FILL; SAND:** Fine grained, grey/dark grey, with some silt.	D/M	L/MD	
										FILL; Clayey SILT: Low plasticity, grey, with a trace of fine grained sand.	M	VSt	
										...Liquification of soil from 4.4m to 4.5m.	W		
						6	5			**FILL; SAND:** Fine grained, dark grey, with some silt.	M	D	
										FILL; Sandy SILT: Low plasticity, grey, fine grained sand, with a trace of clay.		VSt	
						5	6			**FILL; SAND:** Fine to medium grained, grey, with some silt.	W	L/MD	
										FILL; Sandy SILT: Low plasticity, grey/dark grey, fine ot medium grained sand.	M/W	St	
						4	7			**FILL; SAND:** Fine to medium grained, grey, with some silt.	M	D	
										FILL; Sandy SILT: Low plasticity, grey/dark grey, fine grained sand.		VSt	
						3	8			Borehole terminated at 7.2m		St	

PIEZOMETER ENVIWOLL00250AB - LOGS.GPJ COFFEY.GDT 20.7.10

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW 07**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***5.3.2010***

Principal:

Date completed: ***5.3.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 2 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 298872.57 | slope: -90° | R.L. Surface: 8.51

hole diameter: 100 | Northing: 6176432.36 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADT		N	NO WATER OBSERVED 24/06/10			8	1		SP	**FILL; CLAY:** Low to medium plasticity, dark brown, with some fine to coarse grained sand and fine to coarse grained sub-rounded gravel (coal and shale) and silt.	<Wp	F	FILL No odour
									SP	**Gravelly SAND:** Fine to coarse grained, pale brown/yellow, fine to coare grained sub-rounded to sub-angular sandstone gravel, with a trace of silt.	D/M	MD	RESIDUAL No odour
						7				**Gravelly SAND:** Fine to coarse grained, pale brown/yellow, fine to coare grained sub-rounded to sub-angular sandstone gravel, with some low to medium plasticity clay.	D	D	XW/HW SANDSTONE No odour
							2			**SANDSTONE:** Fine grained, pale brown/pale yellow.			HW SANDSTONE (BERRY SILTSTONE) No odour
						6				...Becoming pale brown/pale grey at 2.3m.			
							3						
						5				...Becoming pale grey/white at 3.85m.			
							4						
						4				...Becoming brown/grey at 5.0m.			
							5						
						3							
							6			Borehole terminated at 6m			
						2							
							7						
						1							
							8						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW 08**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***10.3.2010***

Principal:

Date completed: ***10.3.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 2 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 298836.96 | slope: -90° | R.L. Surface: 6.51

hole diameter: 100 | Northing: 6176677.11 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADT		N	11.15am - 24/06/10			6 5 4 3	1 2 3			**FILL; Clayey SILT:** Low to medium plasticity, pale grey/grey.	D/M	F	FILL/ASH No odour
										...With some fine to medium grained sand	M D >Wl		
										...Becoming Sandy SILT: Low to medium plasticity, pale grey, fine to medium grained sand at 2.5m to 3.5m.			
										SANDSTONE: Fine grained, brown/orange/grey.	M		HW SANDSTONE No odour
						2 1 0 -1	4 5 6 7 8			Borehole terminated at 3.6m			

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

PIEZOMETER ENVIWOLL00250AB - LOGS.GPJ COFFEY.GDT 20.7.10

Form GEO 5.10 Issue 3 Rev.0

coffey environments

Engineering Log - Piezometer

Borehole No. **MW 09**

Sheet 1 of 1

Office Job No.: **ENVIWOLL00250AB**

Client: ***TRUenergy***

Date started: ***5.3.2010***

Principal:

Date completed: ***5.3.2010***

Project: ***Geotechnical, Contamination & Groundwater Invest.***

Logged by: ***DJD***

Borehole Location: ***Zone 2 (a) Tallawarra Lands, Yallah, NSW***

Checked by: ***CCQ/SM***

drill model & mounting: GEOPROBE TRACK | Easting: 298827.33 | slope: -90° | R.L. Surface: 3.07

hole diameter: 100 | Northing: 6177103.43 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADT		N	12.00pm - 24/06/10			3 / 2 / 1 / 0 / -1 / -2 / -3 / -4	1 / 2 / 3 / 4 / 5 / 6 / 7 / 8			**FILL; Silty SAND:** Fine to coarse grained, dark brown/dark grey, with some fine to coarse grained sub-rounded to sub-angular gravel (coal and sandstone).	M	MD	FILL No odour
										FILL; CLAY: Medium plasticity, black/dark grey, with some fine to medium grained sand, with a trace of rootlets and silt.	>Wp	F	FILL/ALLUVIAL No odour
									CL	**CLAY:** Medium plasticity, red-brown/orange, with some fine to coarse grained sand, with a trace of fine to medium grained sub-rounded sandstone gravel and silt.		F/St	ALLUVIAL/ESTUARINE? Brackish/organic odour
									CL	**CLAY:** Medium plasticity, pale grey/pale brown, with a trace of fine to coarse grained pale brown sand and fine to medium grained sub-rounded sandstone gravel and silt.			
									CL	**CLAY:** Medium plasticity, pale grey, with a trace of fine to coarse grained sand and silt.	Wp	F	
									CL	**CLAY:** Medium plasticity, pale grey/pale yellow mottled, with a trace of fine to coarse grained sand and fine to medium grained sub-rounded gravel (possibly jarosite?) and silt.	>Wp	F/St	
									SC	**Clayey SAND:** Fine to coarse grained, pale grey with some pale yellow mottling, low to medium plasticity clay.	W	L/MD	
										Borehole terminated at 6m			

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW10**

Sheet 1 of 2

Office Job No.: **ENAUWOLL04009AB**

Client: ***TRUenery Tallawarra***

Date started: ***17.8.2010***

Principal:

Date completed: ***17.8.2010***

Project: ***Further Assessment Of Groundwater Quality - Ash Pond***

Logged by: ***DJD***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***JMF***

drill model & mounting: Gemco 210B, Trailer | Easting: | slope: -90° | R.L. Surface: Not Measured

hole diameter: 100 | Northing: | bearing: | datum: Not Measured

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADV		N					0.0			**TOPSOIL; CLAY:** Medium plasticity, dark brown, with some silt.	Wp	F	TOPSOIL No odour
			24/08/10				0.5		CL	**CLAY:** Medium plasticity, brown/yellow, with a trace of silt.	W	F/St	ALLUVIAL No odour
									SC	**Clayey SAND:** Fine to coarse grained, pale brown, medium plasticity clay.		L/MD	
							1.0		CL	**CLAY:** Medium plasticity, orange/brown, with some silt, with a trace of fine to coarse grained sand.	Wp	F/St	
									GC	**Clayey GRAVEL:** Fine to medium grained, orange/brown, medium plasticity clay.	W	L/MD	
							1.5		SC	**Clayey SAND:** Fine to coarse grained, pale grey, medium plasticity clay. ...Becoming orange-clay at 1.65m.	M/W	MD	ALLUVIAL/ESTUARINE Slight organic/brackish odour
							2.0						
							2.5		SC	**Clayey SAND:** Fine to coarse grained, grey, medium plasticity clay.	W	L/MD	
									SC	**Clayey SAND:** Fine to coarse grained, dark grey, medium plasticity clay.			
							3.0		CL	**Sandy CLAY:** Low to medium plasticity, dark grey, fine to coarse grained sand, with a trace of rootlets. ...Note: Observations past 3.25m limited due to groundwater inflows. Auger not raised to check end of bit due to wet clayey/sandy soils in the hole.	>Wp	S/F	ESTUARINE Organic/brackish odour
							3.5						
							4.0						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix	
e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW10**

Sheet 2 of 2

Office Job No.: **ENAUWOLL04009AB**

Client: ***TRUenery Tallawarra***

Date started: ***17.8.2010***

Principal:

Date completed: ***17.8.2010***

Project: ***Further Assessment Of Groundwater Quality - Ash Pond***

Logged by: ***DJD***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***JMF***

drill model & mounting: Gemco 210B, Trailer | Easting: | slope: -90° | R.L. Surface: Not Measured

hole diameter: 100 | Northing: | bearing: | datum: Not Measured

drilling information							material substance					
method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADV		N				4.5		CL	**Sandy CLAY:** Low to medium plasticity, dark grey, fine to coarse grained sand, with a trace of rootlets. *(continued)*	>Wp	S/F	
									Borehole terminated at 4.5m			
						5.0						
						5.5						
						6.0						
						6.5						
						7.0						
						7.5						
						8.0						

PIEZOMETER ENAUWOLL04009AB - LOGS.GPJ COFFEY.GDT 13.9.10

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Appendix B
New Monitoring Well Borelogs

coffey environments

Engineering Log - Piezometer

Borehole No. **MW11**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***1.2.2011***

Principal:

Date completed: ***1.2.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***CA***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

drill model & mounting: Gemco 210B, Trailer | Easting: 298321.84 | slope: -90° | R.L. Surface: 11.10

hole diameter: 125mm | Northing: 6177203.74 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
DT		C				10	2			**FILL; Clayey SILT:** Dark grey/black, low plasticity clay.	<Wp	VSt	FILL/ASH
			▶			8	4			**FILL; Clayey SILT:** Dark grey/black, low plasticity clay.	>Wp	F	
						6	6						
						4	8						
						2	10			Borehole terminated at 10m			
						0	12						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

PIEZOMETER ENAUWOLL04009AE - LOGS.GPJ COFFEY.GDT 13.4.11

Form GEO 5.10 Issue 3 Rev.0

coffey environments

Engineering Log - Piezometer

Borehole No. **MW12**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***1.2.2011***

Principal:

Date completed: ***1.2.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***CA***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

drill model & mounting: Gemco 210B, Trailer | Easting: 298321.98 | slope: -90° | R.L. Surface: 11.15

hole diameter: 125mm | Northing: 6177206.72 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
DT		C	▼			10 8 6 4 2 0	2 4 6 8 10 12			**FILL; Clayey SILT:** Dark grey/black, low plasticity clay.	<Wp	VSt	FILL/ASH
										FILL; Clayey SILT: Dark grey/black, low plasticity clay.	>Wp	F	
										Borehole terminated at 10m			

PIEZOMETER ENAUWOLL04009AE - LOGS.GPJ COFFEY.GDT 13.4.11

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW13**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***1.2.2011***

Principal:

Date completed: ***1.2.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***CA***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

drill model & mounting: Gemco 210B, Trailer | Easting: 298319.19 | slope: -90° | R.L. Surface: 11.11

hole diameter: 125mm | Northing: 6177205.41 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
DT		C	▼			10 8 6 4 2 0 -2 -4	2 4 6 8 10 12			**FILL; Clayey SILT:** Dark grey/black, low plasticity clay.	<Wp	VSt	FILL/ASH
										Borehole terminated at 7m			

PIEZOMETER ENAUWOLL04009AE - LOGS.GPJ COFFEY.GDT 13.4.11

Form GEO 5.10 Issue 3 Rev.0

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. **MW14**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***1.2.2011***

Principal:

Date completed: ***1.2.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***CA***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

drill model & mounting: Gemco 210B, Trailer | Easting: 298093.35 | slope: -90° | R.L. Surface: 2.07

hole diameter: 125mm | Northing: 6146938.44 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
HAMMER		C	▼			0	2		CL	**Sandy CLAY:** Medium plasticity, black/dark grey, fine to medium grained sand, with some silt and shells, with trace roots.	<Wp	St/VSt	ALLUVIAL
											>Wp	S	
						-2	4			Borehole terminated at 4m			
						-4	6						
						-6	8						
						-8	10						
							12						

PIEZOMETER ENAUWOLL04009AE - LOGS.GPJ COFFEY.GDT 13.4.11

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method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Piezometer

Borehole No. ***MW15***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04009AE***

Client: ***TRUenery Tallawarra***

Date started: ***4.2.2011***

Principal:

Date completed: ***4.2.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***CA***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

drill model & mounting: HAND AUGER | Easting: 298379.07 | slope: -90° | R.L. Surface: 0.62

hole diameter: 100 | Northing: 6176480.34 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
HA		N	▼			0			CH	**FILL; Clayey SILT:** Dark grey/brown, low plasticity clay, with some roots.	<Wp	F	FILL; FLYASH
									CL	**CLAY:** High plasticity, dark grey, with some sand and roots.	>Wp		ALLUVIAL
										Sandy CLAY: Medium plasticity, dark grey/brown, fine to medium grained sand.			
						-2	2			Borehole terminated at 1.5m			
						-4	4						
						-6	6						
						-8	8						
						-10	10						
							12						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

PIEZOMETER ENAUWOLL04009AE - LOGS.GPJ COFFEY.GDT 13.4.11

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coffey environments

Engineering Log - Piezometer

Borehole No. ***MW16***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04009AE***

Client: ***TRUenery Tallawarra***

Date started: ***31.1.2011***

Principal:

Date completed: ***31.1.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***CA***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

drill model & mounting: Gemco 210B, Trailer | Easting: 297878.68 | slope: -90° | R.L. Surface: 1.30

hole diameter: 125mm | Northing: 6176242.93 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADV		C	▼			0	2		CH	**CLAY:** High plasticity, dark grey/grey, with some silt, fine grained sand and shells.	>Wp	S/F	ALLUVIAL
						-2	4						
						-4	6						Well installed to 5.50m
						-6	8			Borehole terminated at 6m			
						-8	10						
						-10	12						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex

*bit shown by suffix e.g. ADT

support

C casing N nil

penetration

1 2 3 4 no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

PIEZOMETER ENAUWOLL04009AE - LOGS.GPJ COFFEY.GDT 13.4.11

Form GEO 5.10 Issue 3 Rev.0

coffey environments

Engineering Log - Piezometer

Borehole No. ***MW17***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04009AE***

Client: ***TRUenery Tallawarra***

Date started: ***31.1.2011***

Principal:

Date completed: ***31.1.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***CA***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

drill model & mounting: Gemco 210B, Trailer | Easting: 297773.55 | slope: -90° | R.L. Surface: 1.38

hole diameter: 125mm | Northing: 6176163.14 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADV		C	▼			0	2		CL	**Sandy CLAY:** Medium plasticity, dark grey/grey, with some silt and broken shells, with trace roots.	>Wp	S	ALLUVIAL
						-2	4						
						-4	6			Borehole terminated at 5m			
						-6	8						
						-8	10						
						-10	12						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

PIEZOMETER ENAUWOLL04009AE - LOGS.GPJ COFFEY.GDT 13.4.11

Form GEO 5.10 Issue 3 Rev.0

coffey environments

Engineering Log - Piezometer

Borehole No. **MW18**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***31.1.2011***

Principal:

Date completed: ***31.1.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***CA***

Borehole Location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

drill model & mounting: Gemco 210B, Trailer | Easting: 297113.35 | slope: -90° | R.L. Surface: 4.89

hole diameter: 125mm | Northing: 6176542.02 | bearing: | datum:

drilling information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	well details	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	structure and additional observations
ADT		N				4			CL	**CLAY:** Medium plasticity, orange/brown, with some silt, roots and fine grained sand.	<Wp	VSt	RESIDUAL SOIL
							2		CL	**Sandy CLAY:** Medium plasticity, orange/brown, with some silt, with a trace of fine grained angular gravel.		H	
			▶			2					Wp	F	
							4						
						0				**SANDSTONE:** Extremely to highly weathered rock, orange/brown with grey, with some fine to coarse grained angular sandstone gravel.	D/M	H	XW/HW SANDSTONE (BERRY SILTSTONE)
							6						Well installed to 5.8m
						-2				Borehole terminated at 6m			
							8						
						-4							
							10						
						-6							
							12						

method

AS	auger screwing*
AD	auger drilling*
RR	roller/tricone
W	washbore
CT	cable tool
DT	diatube
B	blank bit
V	V bit
T	TC bit
TBX	Tubex
*bit shown by suffix	
e.g.	ADT

support

C casing N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

10/1/98 water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
D	disturbed sample
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
P	pressure meter
Bs	bulk sample
R	refusal
E	environmental sample
PID	PID measurement
WS	water sample
PZ	piezometer
ALT	air lift test

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Appendix C
Test Pit Logs

coffey environments

Engineering Log - Excavation

Excavation No. ***CTP87***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04009AE***

Client: ***TRUenery Tallawarra***

Date started: ***18.4.2011***

Principal:

Date completed: ***18.4.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***AJW***

Test pit location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

equipment type and model: BACKHOE | Pit Orientation: | Easting: 298747 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6176662 m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH		N	NONE OBSERVED	E		0.5			**FILL; GRAVEL:** Fine to coarse grained, black, sub-angular to angular gravel, with a trace of coarse grained sand and silt. ...Increasing coarse grained sand component	M	MD		COALWASH
				E		1.0			...Traces of red clay clumps observed at 1.4m - 1.6m.				
						1.5			Test pit CTP87 terminated at 1.6m				
						2.0							
						2.5							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. ***CTP88***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04009AE***

Client: ***TRUenery Tallawarra***

Date started: ***18.4.2011***

Principal:

Date completed: ***18.4.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***AJW***

Test pit location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

equipment type and model: BACKHOE | Pit Orientation: | Easting: 298549 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6126798 m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH		N				0.5			**FILL; CLAY:** Medium plasticity, orange/brown, with some organics (rootlets), with a trace of fine to medium grained sand.	>Wp	St		FILL - Grass cover No odour
											MD		COALWASH No odour
				E		1.0			**FILL; GRAVEL:** Fine to coarse grained, black, sub-angular to angular, with some coarse grained sand.	M	L/MD		ASH No odour
						1.5			**FILL; SILT:** Grey, with a trace of fine grained sand.				
						2.0							
						2.5							
						3.0							
			▶			3.5							
				E						W			...Wet ash observed at 3.5m. No odour in saturated zone
						4.0			Test pit CTP88 terminated at 3.7m				
						4.5							
						5.0							

Sketch

method

N	natural exposure
X	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper
E	excavator

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. ***CTP89***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04009AE***

Client: ***TRUenery Tallawarra***

Date started: ***18.4.2011***

Principal:

Date completed: ***18.4.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***AJW***

Test pit location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

equipment type and model: BACKHOE | Pit Orientation: | Easting: 297729 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6176086 m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH		N	NONE OBSERVED	E		0.5			**FILL; Sandy GRAVEL:** Fine to coarse grained, black, sub-angular to angular, medium to coarse grained sand, with some silt. ...Cobbles (60-150mm) observed from 0.3m - 2.0m.	M	MD		COALWASH Some grass cover and rootlets to 0.6m
						1.0							
						1.5							
				E		2.0							
						2.5			Test pit CTP89 terminated at 2m				

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. ***CTP90***

Sheet 1 of 1

Office Job No.: ***ENAUWOLL04009AE***

Client: ***TRUenery Tallawarra***

Date started: ***18.4.2011***

Principal:

Date completed: ***18.4.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***AJW***

Test pit location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

equipment type and model: BACKHOE | Pit Orientation: | Easting: 297785 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6176394 m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH		N	NONE OBSERVED			0.5			**FILL; Sandy GRAVEL:** Fine to medium grained, black, angular, fine to coarse grained sand, with some silt, and cobbles.	M	MD		COALWASH Some grass cover, rootlets to depth of 0.6m.
				E		1.0			...Increasing coarse grained gravel and cobbles (60-200mm) with depth from 1.0m.				
				E		1.5							
						2.0							
						2.5			Test pit CTP90 terminated at 2m				

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **CTP91**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***18.4.2011***

Principal:

Date completed: ***18.4.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***AJW***

Test pit location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

equipment type and model: BACKHOE | Pit Orientation: | Easting: 297591 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6176314 m | datum:

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
BH		N			0.0			**FILL; Silty GRAVEL:** Fine to medium grained, angular to sub-angular gravel, with some fine to coarse grained sand and organics (rootlets to 0.1m).	M	D		COALWASH Grassed cover
								FILL; Sandy SILT: Pale grey, fine grained sand, with some clay.		D/St		FILL/ASH
					0.5							
				E								
					1.0							
			▶		1.5				W			Saturated at 1.5m
				E								
							CL/CH	**CLAY:** Medium to high plasticity, black, with a trace of fine grained sand.	>Wp	S/F		ALLUVIAL/ESTUARINE Strong organic odour
					2.0		CL/CH	**CLAY:** Medium to high plasticity, brown/orange.				
								Test pit CTP91 terminated at 2.1m				
					2.5							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration
1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **CTP92**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***18.4.2011***

Principal:

Date completed: ***18.4.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***AJW***

Test pit location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

equipment type and model: BACKHOE | Pit Orientation: | Easting: 297541 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6176705 m | datum:

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
BH		N			0.5			**FILL; Sandy SILT:** Pale grey, fine grained sand, with some clay.	M	D		ASH No odour
				E								
			▶		1.0				W			...Saturated at 0.9m
				E								
							CL/CH	**CLAY:** Medium to high plasticity, dark grey/brown, wiht some fine to coarse grained sand.	>Wp	St		ALLUVIAL/ESTUARINE
					1.5			Test pit CTP92 terminated at 1.5m				
					2.0							
					2.5							

Sketch

method

N	natural exposure
X	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper
E	excavator

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **CTP93**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***18.4.2011***

Principal:

Date completed: ***18.4.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***AJW***

Test pit location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

equipment type and model: HAND SHOVEL | Pit Orientation: | Easting: 298371 m | R.L. Surface: NOT MEASURED

excavation dimensions: 0.5m long 0.5m wide | Northing: 6176489 m | datum:

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa (100 200 300 400)	structure and additional observations
HAND SHOVEL		N			0.0		CL	**TOPSOIL:** Mostly organic matter (leaves and rootlets)	M	L		TOPSOIL
								Sandy CLAY: Medium plasticity, dark grey/red/brown, medium to coarse grained sand, with some grey ash from 0.1-0.2m.	>Wp	F/St		ALLUVIAL/ESTUARINE Organic odour
			▶	E	0.5		SC	**Clayey SAND:** Medium to coarse grained, dark grey.	M/W W	L/MD		
					1.0			Test pit CTP93 terminated at 0.7m				
					1.5							
					2.0							
					2.5							

Sketch

method

N	natural exposure
X	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper
E	excavator

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey environments

Engineering Log - Excavation

Excavation No. **CTP94**

Sheet 1 of 1

Office Job No.: **ENAUWOLL04009AE**

Client: ***TRUenery Tallawarra***

Date started: ***18.4.2011***

Principal:

Date completed: ***18.4.2011***

Project: ***Groundwater Modelling Assessment***

Logged by: ***AJW***

Test pit location: ***Yallah Bay Road, Yallah NSW***

Checked by: ***CDC***

equipment type and model: BACKHOE | Pit Orientation: | Easting: 297776 m | R.L. Surface: NOT MEASURED

excavation dimensions: 2m long 0.45m wide | Northing: 6176176 m | datum:

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetro-meter kPa 100 200 300 400	structure and additional observations
BH		N			0.0		CL/CH	**CLAY:** Medium to high plasticity, dark brown, with some organics from 0.0-0.3m (rootlets and fibres)	>Wp	S/F		ALLUVIAL/ESTUARINE Grassed cover, rootlets to 0.3m New testpit to retrieve shallower sample (0.4-0.5m)
				E	0.5							
			▶	E	1.0		CL	**Sandy CLAY:** Low to medium plasticity, pale grey, fine to medium grained sand, with some silt.				ALLUVIAL/ESTUARINE Moderate organic odour
								Test pit CTP94 terminated at 1m				
					1.5							
					2.0							
					2.5							

Sketch

method

N	natural exposure
X	existing excavation
BH	backhoe bucket
B	bulldozer blade
R	ripper
E	excavator

support

S shoring N nil

penetration

1 2 3 4 — no resistance ranging to refusal

water

water level on date shown

water inflow

water outflow

notes, samples, tests

U_{50}	undisturbed sample 50mm diameter
U_{63}	undisturbed sample 63mm diameter
D	disturbed sample
V	vane shear (kPa)
Bs	bulk sample
E	environmental sample
R	refusal

classification symbols and soil description

based on unified classification system

moisture

D	dry
M	moist
W	wet
Wp	plastic limit
W_L	liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Appendix D
Chain of Custody Documentation

coffey

Chain of Custody

Laboratory Quotation / Order No: ENAUWOLL04009AE

Job No:

No: 27895

Sheet of

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL 16/33 Maddox Street, Alexandria 2015	Sampled by: Chris Appelkamp	Consigning Officer: Date Dispatched:
Attention: Sample Receipt	Project Manager: (report results to) Corrina Decastro	Courier Service: M+B Consignment Note No: 358438

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
			CP	16/2/11	1pm

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	Analyses Required: PAHs	TPHs	MAHs = BTEX	Metals: *	Total Nitrogen	TKN	Nitrate	Nitrite	Ammonia	Sample Condition on Receipt
	A	1 x 1L unpreserved	MW09 1	15/2/11				/	/	/	/	/	/	
		1 x Metals	QC01 2					/	/	/	/	/	/	
			MW11 3					/	/	/	/	/	/	
	water		SW7 4					/	/	/	/	/	/	
			MW14 5					/	/	/	/	/	/	
			MW15 6					/	/	/	/	/	/	
			MW05 7					/	/	/	/	/	/	

SGS
Received 16/2/11
By CP
Time
Samples intact
Cooler Pack
Temperature on Receipt 4
Storage Location W077
SE35496

Special Laboratory Instructions: * Dissolved metals (7 - As, Cd, Cr, Cu, Ni, Pb, Zn + Molybdenum (Mo))

Detection Limits:

Turnaround Required:

JOB NUMBER **MUST** BE REFERENCED ON ALL SUBSEQUENT PAGES

6422009-06

coffey

Chain of Custody

Laboratory Quotation / Order No: ENAUWOLL04009AE

Job No:

No: 27896

Sheet of

Dispatch to (Address & Phone No.): SGS 16/33 Maddox St Alexandria	Sampled by: CHRIS APPLEKAMP	Consigning Officer: / Date Dispatched:
Attention: Sample receipt	Project Manager: (report results to) Corrina Decastro	Courier Service: M+B / Consignment Note No: 367004

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Chris Applekamp	16/2/2011	5pm	[illegible]	17/2/11	230pm

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	Analyses Required: PAHs	TPHs	MAHs = BTEX	Metals: *	Total Nitrogen	TKN	Nitrate	Nitrite	Ammonia	Sample Condition on Receipt
	Water	1x1L unpreserved 1x metals	1 MW18	16/2/11				/	/	/	/	/	/	
			2 TA6M-D3					/	/	/	/	/	/	
			3 MW3					/	/	/	/	/	/	
			4 SW8					/	/	/	/	/	/	
			5 MW04					/	/	/	/	/	/	
			6 MW17					/	/	/	/	/	/	
			7 MW16					/	/	/	/	/	/	
			8 MW01					/	/	/	/	/	/	
			9 MW02					/	/	/	/	/	/	
			10 QC03					/	/	/	/	/	/	

SGS Received 17/2/11 Time 230 Samples Intact Cooler Pack Temperature on Receipt 4 Storage Location W088-089 SE-85547

Special Laboratory Instructions: * Dissolved metals (T-As, Cd, Cr, Cu, Ni, Pb, Zn + Molybdenum(Mo))

Detection Limits:

Turnaround Required:

JOB NUMBER **MUST** BE REFERENCED ON ALL SUBSEQUENT PAGES

8422009-06

Copies: **WHITE:** Sign on release. **YELLOW:** If dispatched to interstate Lab, Lab to sign on receipt and fax back to Coffey. **BLUE:** To be returned with results.

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Chain of Custody

Laboratory Quotation / Order No: ENAWOLL04009AE

Job No:

NO: 27897

Sheet of

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL 16/33 Maddox St, Alexandria NSW	Sampled by: CHRIS APPELKAMP / CORINNA DECASTRO	Consigning Officer: Date Dispatched: 24/2/2011
Attention: Sample Receipt	Project Manager: (report results to) CORINNA DECASTRO	Courier Service: M+B Consignment Note No: 359727

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
CHRIS APPELKAMP	24/2/2011	4pm	CP	25/2/11	9am

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	Analyses Required: PAHs	TPHs	MAHs = BTEX	Metals: *	Total Nitrogen	TKN	Nitrate	Nitrite	Ammonia	Sample Condition on Receipt
2 locations, NO QA	Water	1x 250ml Unpres. & 1x Nitric acid Pres.	MW06 1	24/2/2011				/	/	/	/	/	/	
	"	"	MW08 2					/	/	/	/	/	/	

SGS
Received 25/2/11
By CP
Time 9
Samples Intact
Ice/Cooler Pack
Temperature on Receipt 4°
Storage Location WH23-124
SGS REF No. SE-85743

Special Laboratory Instructions: * Dissolved Metals (7 - As, Cd, Cr, Cu, Ni, Pb, Zn & Molybdenum (Mo))

Detection Limits:

Turnaround Required:

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

Copies: WHITE: Sign on release. YELLOW: If dispatched to interstate Lab, Lab to sign on receipt and fax back to Coffey. BLUE: To be returned with results.

64220/9-06

coffey

Chain of Custody

No: 27898

Laboratory Quotation / Order No:

Job No: EN04009AE Sheet of

Dispatch to: (Address & Phone No.) SGS ENVIRONMENTAL 1633 Maddox St, Alexandria	Sampled by: CHRIS Appelkamp	Consigning Officer: / Date Dispatched:
Attention: Sample receipt	Project Manager: (report results to) Corinna Decastro	Courier Service: M and B / Consignment Note No: 367011

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
CHRIS Appelkamp	8/3/2011	2pm	CP	9/3/11	1130am

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	PAHs	TPHs	MAHs = BTEX	Metals: *	Total Nitrogen	TKN	Nitrate	Nitrite	Ammonia	Sample Condition on Receipt
	Water	1x 1L unpreserved 1x metals	MW10	8/3/2011				/	/	/	/	/	/	

SGS
Received 9/3/11
By CP
Time 1130
Samples Intact
Ice/Cooler Pack
Temperature on Receipt 5
Storage Location WH77
SGS Ref No. SE86052

Special Laboratory Instructions: * Dissolved metals ((7-As, Cd, Cr, Cu, Ni, Pb, Zn + Molybdenum (Mo)))

Detection Limits:

Turnaround Required:

JOB NUMBER **MUST** BE REFERENCED ON ALL SUBSEQUENT PAGES

64220/9-06

Copies: WHITE: Sign on release YELLOW: If dispatched to interstate Lab, Lab to sign on receipt and fax back to Coffey BLUE: To be returned with results.

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Chain of Custody

No: 28873

Laboratory Quotation / Order No:

Job No: ENAUWOLL04009AE Sheet 1 of

Dispatch to: (Address & Phone No.) SGS Laboratory 16/33 Maddox Street ALEXANDRIA NSW 2015

Sampled by: Alexander Williams

Consigning Officer: A. Williams

Date Dispatched: 19/4/11

Attention: Sample Receipt

Project Manager: (report results to) Corinna De Castro

Courier Service: M & B Couriers

Consignment Note No: 367027

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
A. Williams	7:00AM	19/4/11	[illegible]	19/4/11	11:50am

Analyses Required

Comments	Sample Matrix	Container Type and Preservative		Sample No.	Date Sampled	PAHs	TPHs	MAHs = BTEX	Metals: *	Nitrogen **	ASLP ***	Sample Condition on Receipt
	SOIL	Ice; 250ml Jar	1	CTP87/0.5-0.6	18/4/11				✓	✓	✓	
	↓	↓	2	CTP87/1.4-1.6	↓				↓	↓	↓	
			3	CTP88/0.6-0.8								
			4	CTP88/3.5-3.7								
			5	CTP89/0.5-0.6								
			6	CTP89/1.8-2.0								
			7	CTP90/0.5-0.6								
			8	CTP90/1.8-2.0								
			9	CTP91/0.6-0.8								
			10	CTP91/1.6-1.8								
			11	CTP92/0.6-0.8								
			12	CTP92/1.0-1.1								
			13	~~CTP93~~/QC2								
	↓	↓	14	QC3	↓				↓	↓	↓	

SGS stamp: Received 19/4/11; Time 11:50; Samples intact; Cooler Pack; Temperature on Receipt 4; Storage Location SE18-019; SE87114

Special Laboratory Instructions: * Metals (As, Cd, Cr, Cu, Pb, Mo, Ni, Zn)
** Nitrogen suite (Ammonium, Nitrate, Nitrite, TKN, Total Nitrogen)
*** ASLP (Australian Standard Leachate Procedure)
- Use deionised water
- Analysis for both metals & nitrogen suite.

Detection Limits: ~~Use Def~~

Turnaround Required: 5 days

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

Copies: WHITE: Sign on release. YELLOW: If dispatched to interstate Lab, Lab to sign on receipt and fax back to Coffey. BLUE: To be returned with results.

642209-06

coffey

Chain of Custody

No: 28875

Laboratory Quotation / Order No:

Job No: ENAUWOLL00400AE Sheet of

Dispatch to: (Address & Phone No.) SGS Laboratory 16/33 Maddox Street ALEXANDRIA NSW 2015	Sampled by: Alexander Williams	Consigning Officer: A. Williams Date Dispatched: 19/4/11
Attention: Sample Receipt	Project Manager: (report results to) Corinna De Castro	Courier Service: M & B Courier Consignment Note No: 367027

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
A. Williams	7:00AM	19/4/11	K. L	19/4/11	11:50

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	Analyses Required: PAHs	TPHs	MAHs = BTEX	Metals: *	Nitrogen **	ASLP ***	Sample Condition on Receipt
	SOIL	Ice; 250mL Jar	15 CTP93/0.6-0.7	18/4/11				✓	✓	✓	
			16 CTP94/0.4-0.5					↓	↓	↓	
			17 CTP94/0.8-1.0					↓	↓	↓	
	↓	↓	18 QC1	↓				↓	↓	↓	

SGS
Received 19/4/11
Time 11.30 am
Samples intact Yes
Cool/Cooler Pack Yes
Temperature on Receipt 4
Storage Location 5018-19
SE071147A

Special Laboratory Instructions: * Metals (As, Cd, Cr, Cu, Pb, Mo, Ni, Zn) ** Nitrogen suite (Ammonium, Nitrate, Nitrite, TKN, Total Nitrogen)
*** Australian Standard Leachate Procedure - Use deionised water - Analysis for both metals & nitrogen suite.

Detection Limits:

Turnaround Required: 5 days

JOB NUMBER **MUST** BE REFERENCED ON ALL SUBSEQUENT PAGES

Copies: WHITE: Sign on release YELLOW: If dispatched to interstate Lab, Lab to sign on receipt and fax back to Coffey BLUE: To be returned with results

64220/9.06

Appendix E
Laboratory Reports

ANALYTICAL REPORT

1 March 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna de Castro**

Your Reference: ENAUWOLL04009AE

Our Reference: SE85496-R

Samples: 7 Waters
Received: 16/2/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

This report cancels and supersedes report No. SE85496 issued on 23/02/11 by SGS Environmental Services due to the addtion of report comment.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Quality Manager

Snezana Kostoka
Chemist

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Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85496-R -1 MW09 Water 15/02/2011	SE85496-R -2 QC01 Water 15/02/2011	SE85496-R -3 MW11 Water 15/02/2011	SE85496-R -4 SW7 Water 15/02/2011	SE85496-R -5 MW14 Water 15/02/2011
Date Extracted		17/02/2011	17/02/2011	17/02/2011	17/02/2011	17/02/2011
Date Analysed		21/02/2011	21/02/2011	21/02/2011	21/02/2011	21/02/2011
Nitrate as N	mg/L	<0.25	<0.25	<0.025	<0.025	<0.25

Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85496-R -6 MW15 Water 15/02/2011	SE85496-R -7 MW05 Water 15/02/2011
Date Extracted		17/02/2011	17/02/2011
Date Analysed		21/02/2011	21/02/2011
Nitrate as N	mg/L	<0.25	<0.25

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85496-R-1 MW09 Water 15/02/2011	SE85496-R-2 QC01 Water 15/02/2011	SE85496-R-3 MW11 Water 15/02/2011	SE85496-R-4 SW7 Water 15/02/2011	SE85496-R-5 MW14 Water 15/02/2011
Date Extracted (Ammonia)		17/02/2011	17/02/2011	17/02/2011	17/02/2011	17/02/2011
Date Analysed (Ammonia)		17/02/2011	17/02/2011	17/02/2011	17/02/2011	17/02/2011
Ammonia as N	mg/L	1.3	10	0.33	0.08	15
Date Extracted (NO_2)		17/02/2011	17/02/2011	17/02/2011	17/02/2011	17/02/2011
Date Analysed (NO_2)		17/02/2011	17/02/2011	17/02/2011	17/02/2011	17/02/2011
Nitrite as N	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Date Extracted (TKN)		21/02/2011	21/02/2011	21/02/2011	21/02/2011	21/02/2011
Date Analysed (TKN)		21/02/2011	21/02/2011	21/02/2011	21/02/2011	21/02/2011
Total Kjeldahl Nitrogen	mg/L	2.60	10.5	0.810	4.80	17.0
Total Nitrogen (by calc.)	mg/L	2.60	10.5	0.810	4.80	17.0

Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85496-R-6 MW15 Water 15/02/2011	SE85496-R-7 MW05 Water 15/02/2011
Date Extracted (Ammonia)		17/02/2011	17/02/2011
Date Analysed (Ammonia)		17/02/2011	17/02/2011
Ammonia as N	mg/L	20	9.2
Date Extracted (NO_2)		17/02/2011	17/02/2011
Date Analysed (NO_2)		17/02/2011	17/02/2011
Nitrite as N	mg/L	<0.005	<0.005
Date Extracted (TKN)		21/02/2011	21/02/2011
Date Analysed (TKN)		21/02/2011	21/02/2011
Total Kjeldahl Nitrogen	mg/L	42.0	12.0
Total Nitrogen (by calc.)	mg/L	42.0	12.0

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Trace HM (ICP-MS)-Dissolved Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85496-R -1 MW09 Water 15/02/2011	SE85496-R -2 QC01 Water 15/02/2011	SE85496-R -3 MW11 Water 15/02/2011	SE85496-R -4 SW7 Water 15/02/2011	SE85496-R -5 MW14 Water 15/02/2011
Date Extracted (Metals-ICPMS)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Date Analysed (Metals-ICPMS)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Arsenic	µg/L	52	49	4	1	1
Cadmium	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/L	<5	<5	<5	<5	<5
Copper	µg/L	33	38	<1	<1	<1
Nickel	µg/L	<5	6	<5	<5	<5
Lead	µg/L	9	6	5	<1	<1
Zinc	µg/L	160	69	19	30	30
Molybdenum	µg/L	<1	<1	27	<1	4

Trace HM (ICP-MS)-Dissolved Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85496-R -6 MW15 Water 15/02/2011	SE85496-R -7 MW05 Water 15/02/2011
Date Extracted (Metals-ICPMS)		18/02/2011	18/02/2011
Date Analysed (Metals-ICPMS)		18/02/2011	18/02/2011
Arsenic	µg/L	3	55
Cadmium	µg/L	<0.5	<0.5
Chromium	µg/L	<5	<5
Copper	µg/L	<1	50
Nickel	µg/L	<5	5
Lead	µg/L	<1	7
Zinc	µg/L	40	73
Molybdenum	µg/L	2	1

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Method ID	Methodology Summary
SEI-038	Water Soluble Chloride After carrying out a 1:5 soil:water extraction, an aliquot of the extract is reacted with mercuric thiocyanate forming a mercuric chloride complex. In the presence of ferric iron, highly coloured ferric thiocyanate is formed which is proportional to the chloride concentration. Reference NEPM, Schedule B(3), 401 and APHA 4500Cl- Water Soluble Sulphate After carrying out a 1:5 soil:water extraction ,sulphate in the extract is precipitated in an acidic medium with barium chloride. The resulting turbidity is measured photometrically at 405nm and compared with standard calibration solutions to determine the sulphate concentration in the sample. Reference NEPM, Schedule B(3), 401 and APHA 4500-SO42-.
SEI-037	Ammonia - Determined by salicylate colourimetric method using Discrete Analyser.
AN277	Nitrite as N - determined by colourimetric technique using discrete analyser. Based on APHA 21st Edition, 4500-NO2-B.
AN292	Total Kjeldahl Nitrogen (TKN) - Determined by colourimetric technique using discrete analyser following digestion with Sulphuric Acid, K2SO4 and CuSO4. Based on APHA 21st Edition, 4500-Norg D / USEPA 351.2.
SEI-103	Total Nitrogen - The sum of Nitrate, Nitrite and Total Kjeldahl Nitrogen.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				17/02/11	SE85496-1	17/02/2011 || 17/02/2011	LCS	17/02/11
Date Analysed				21/02/11	SE85496-1	21/02/2011 || 21/02/2011	LCS	21/02/11
Nitrate as N	mg/L	0.005	SEI-038	<0.005	SE85496-1	<0.25 || <0.25	LCS	98%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Ammonia as N	mg/L	0.01	SEI-037	<0.01	SE85496-1	1.3 || 1.3 || RPD: 0	LCS	106%
Date Extracted (NO_2)				17/02/2011	SE85496-1	17/02/2011 || 17/02/2011	LCS	17/02/2011
Date Analysed (NO_2)				17/02/2011	SE85496-1	17/02/2011 || 17/02/2011	LCS	17/02/2011
Nitrite as N	mg/L	0.005	AN277	<0.005	SE85496-1	<0.005 || <0.005	LCS	103%
Date Extracted (TKN)				21/02/2011	SE85496-1	21/02/2011 || [N/T]	LCS	21/02/2011
Date Analysed (TKN)				21/02/2011	SE85496-1	21/02/2011 || [N/T]	LCS	21/02/2011
Total Kjeldahl Nitrogen	mg/L	0.2	AN292	<0.200	SE85496-1	2.60 || [N/T]	LCS	103%
Total Nitrogen (by calc.)	mg/L	0.2	SEI-103	<0.200	SE85496-1	2.60 || [N/T]	[NR]	[NR]

QUALITY CONTROL Trace HM (ICP-MS)-Dissolved	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals-ICPMS)				<5	SE85496-1	18/02/2011 || 18/02/2011	SE85496-2	18/02/2011
Date Analysed (Metals-ICPMS)				<5	SE85496-1	18/02/2011 || 18/02/2011	SE85496-2	18/02/2011
Arsenic	µg/L	1	AN318	<1	SE85496-1	52 || 52 || RPD: 0	SE85496-2	105%
Cadmium	µg/L	0.1	AN318	<0.1	SE85496-1	<0.5 || <0.5	SE85496-2	85%
Chromium	µg/L	1	AN318	<1	SE85496-1	<5 || <5	SE85496-2	93%
Copper	µg/L	1	AN318	<1	SE85496-1	33 || 33 || RPD: 0	SE85496-2	96%
Nickel	µg/L	1	AN318	<1	SE85496-1	<5 || <5	SE85496-2	87%
Lead	µg/L	1	AN318	<1	SE85496-1	9 || 9 || RPD: 0	SE85496-2	90%
Zinc	µg/L	1	AN318	<1	SE85496-1	160 || 160 || RPD: 0	SE85496-2	105%
Molybdenum	µg/L	1	AN318	<1	SE85496-1	<1 || <1	SE85496-2	113%

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

LOR's are raised for Nitrate and trace metals due to high dissolved solids in the samples.
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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ANALYTICAL REPORT

29 March 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna de Castro**

Your Reference: ENAUWOLL04009AE - Additional Analysis

Our Reference: SE85496A-R

Samples: 5 Waters
Received: 16/2/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

This report cancels and supersedes report No. SE86496A issued on 21/03/11 by SGS Environmental Services due to the addition of mass balance analysis and correction of anion results for # 7.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Inorganic/Metal Supervisor

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Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85496A-R-1 MW09 Water 15/02/2011	SE85496A-R-3 MW11 Water 15/02/2011	SE85496A-R-5 MW14 Water 15/02/2011	SE85496A-R-6 MW15 Water 15/02/2011	SE85496A-R-7 MW05 Water 15/02/2011
Date Extracted		17/03/2011	17/03/2011	17/03/2011	17/03/2011	17/03/2011
Date Analysed		17/03/2011	17/03/2011	17/03/2011	17/03/2011	17/03/2011
Chloride, Cl	mg/L	16,000	2,200	12,000	21,000	18,000
Sulphate, SO4	mg/L	2,200	340	2,600	850	2,200

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS --- ---	SE85496A-R-1 MW09 Water 15/02/2011	SE85496A-R-3 MW11 Water 15/02/2011	SE85496A-R-5 MW14 Water 15/02/2011	SE85496A-R-6 MW15 Water 15/02/2011	SE85496A-R-7 MW05 Water 15/02/2011
Date Extracted (Alkalinity)		16/03/2011	16/03/2011	16/03/2011	16/03/2011	16/03/2011
Date Analysed (Alkalinity)		16/03/2011	16/03/2011	16/03/2011	16/03/2011	16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	<2.0	290	1,616	1,005	240
Carbonate Alkalinity as $CaCO_3$	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0

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Metals in water by ICP-OES Our Reference: Your Reference Sample Matrix Date Sampled	UNITS --------- ----------	SE85496A-R-1 MW09 Water 15/02/2011	SE85496A-R-3 MW11 Water 15/02/2011	SE85496A-R-5 MW14 Water 15/02/2011	SE85496A-R-6 MW15 Water 15/02/2011	SE85496A-R-7 MW05 Water 15/02/2011
Date Extracted (Metals)		17/03/2011	17/03/2011	17/03/2011	17/03/2011	17/03/2011
Date Analysed (Metals)		17/03/2011	17/03/2011	17/03/2011	17/03/2011	17/03/2011
Sodium (Dissolved)	mg/L	6,700	1,200	5,500	10,000	8,800
Potassium (Dissolved)	mg/L	64	67	250	520	380
Calcium (Dissolved)	mg/L	420	84	1,100	460	380
Magnesium (Dissolved)	mg/L	1,500	120	1,100	1,300	1,100
Iron (Dissolved)	mg/L	94	0.03	6.3	60	210

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Cations / Anions Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85496A-R-1 MW09 Water 15/02/2011	SE85496A-R-3 MW11 Water 15/02/2011	SE85496A-R-5 MW14 Water 15/02/2011	SE85496A-R-6 MW15 Water 15/02/2011	SE85496A-R-7 MW05 Water 15/02/2011
Cations calculated	meq/i	441	65.8	392	588	514
Anions calculated	meq/l	498	75.1	425	631	567
% difference	%	6.0	6.6	4.1	3.5	4.9

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Method ID	Methodology Summary
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN135	The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN320	

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				17/03/11	[NT]	[NT]	LCS	17/03/11
Date Analysed				17/03/11	[NT]	[NT]	LCS	17/03/11
Chloride, Cl	mg/L	0.05	AN245	<0.05	[NT]	[NT]	LCS	99%
Sulphate, SO4	mg/L	0.1	AN245	<0.1	[NT]	[NT]	LCS	98%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Alkalinity)				16/03/2011	[NT]	[NT]	LCS	16/03/2011
Date Analysed (Alkalinity)				16/03/2011	[NT]	[NT]	LCS	16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	2	AN135	<2.0	[NT]	[NT]	LCS	101%
Carbonate Alkalinity as $CaCO_3$	mg/L	2	AN135	<2.0	[NT]	[NT]	LCS	101%

QUALITY CONTROL Metals in water by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				17/03/2011	SE85496A-1	17/03/2011 || 17/03/2011	LCS	17/03/2011
Date Analysed (Metals)				17/03/2011	SE85496A-1	17/03/2011 || 17/03/2011	LCS	17/03/2011
Sodium (Dissolved)	mg/L	0.1	AN320	<0.1	SE85496A-1	6700 || 6700 || RPD: 0	LCS	93%
Potassium (Dissolved)	mg/L	0.2	AN320	<0.2	SE85496A-1	64 || 66 || RPD: 3	LCS	92%
Calcium (Dissolved)	mg/L	0.1	AN320	<0.1	SE85496A-1	420 || 420 || RPD: 0	LCS	99%
Magnesium (Dissolved)	mg/L	0.1	AN320	<0.1	SE85496A-1	1500 || 1500 || RPD: 0	LCS	93%
Iron (Dissolved)	mg/L	0.02	AN320	<0.02	SE85496A-1	94 || 94 || RPD: 0	LCS	99%

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QUALITY CONTROL Cations / Anions	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Cations calculated	meq/i	0		[NT]		441 || [N/T]	[NR]	[NR]
Anions calculated	meq/l	0		[NT]		498 || [N/T]	[NR]	[NR]
% difference	%	0		[NT]		6.0 || [N/T]	[NR]	[NR]

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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ANALYTICAL REPORT

1 March 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna de Castro**

Your Reference: ENAUWOLL04009AE

Our Reference: SE85547-R

Samples: 10 Waters
Received: 17/2/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

This report cancels and supersedes report No. SE85496 issued on 24/02/11 by SGS Environmental Services due to the addition of report comment.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Quality Manager

Snezana Kostoka
Chemist

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Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547-R -1 MW18 Water 16/02/2011	SE85547-R -2 TA6M-D3 Water 16/02/2011	SE85547-R -3 MW3 Water 16/02/2011	SE85547-R -4 SW8 Water 16/02/2011	SE85547-R -5 MW04 Water 16/02/2011
Date Extracted		17/02/2011	17/02/2011	17/02/2011	17/02/2011	17/02/2011
Date Analysed		21/02/2011	21/02/2011	21/02/2011	21/02/2011	21/02/2011
Nitrate as N	mg/L	0.039	<0.025	<0.050	<0.025	<0.050

Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547-R -6 MW17 Water 16/02/2011	SE85547-R -7 MW16 Water 16/02/2011	SE85547-R -8 MW01 Water 16/02/2011	SE85547-R -9 MW02 Water 16/02/2011	SE85547-R -10 QC03 Water 16/02/2011
Date Extracted		17/02/2011	17/02/2011	17/02/2011	17/02/2011	17/02/2011
Date Analysed		21/02/2011	21/02/2011	21/02/2011	21/02/2011	21/02/2011
Nitrate as N	mg/L	<0.050	<0.050	<0.050	<0.050	<0.010

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547-R -1 MW18 Water 16/02/2011	SE85547-R -2 TA6M-D3 Water 16/02/2011	SE85547-R -3 MW3 Water 16/02/2011	SE85547-R -4 SW8 Water 16/02/2011	SE85547-R -5 MW04 Water 16/02/2011
Date Extracted (Ammonia)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Date Analysed (Ammonia)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Ammonia as N	mg/L	0.05	17	0.57	0.33	5.2
Date Extracted (NO_2)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Date Analysed (NO_2)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Nitrite as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Date Extracted (TKN)		23/02/2011	23/02/2011	23/02/2011	23/02/2011	23/02/2011
Date Analysed (TKN)		23/02/2011	23/02/2011	23/02/2011	23/02/2011	23/02/2011
Total Kjeldahl Nitrogen	mg/L	0.690	17.0	1.20	6.70	9.00
Total Nitrogen (by calc.)	mg/L	0.730	17.0	1.20	6.70	9.00

Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547-R -6 MW17 Water 16/02/2011	SE85547-R -7 MW16 Water 16/02/2011	SE85547-R -8 MW01 Water 16/02/2011	SE85547-R -9 MW02 Water 16/02/2011	SE85547-R -10 QC03 Water 16/02/2011
Date Extracted (Ammonia)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Date Analysed (Ammonia)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Ammonia as N	mg/L	8.5	1.6	2.2	0.91	2.3
Date Extracted (NO_2)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Date Analysed (NO_2)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Nitrite as N	mg/L	<0.005	<0.005	<0.005	<0.005	0.006
Date Extracted (TKN)		23/02/2011	23/02/2011	23/02/2011	23/02/2011	23/02/2011
Date Analysed (TKN)		23/02/2011	23/02/2011	23/02/2011	23/02/2011	23/02/2011
Total Kjeldahl Nitrogen	mg/L	9.20	17.0	3.40	4.60	3.60
Total Nitrogen (by calc.)	mg/L	9.20	17.0	3.40	4.60	3.60

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Trace HM (ICP-MS)-Dissolved Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547-R -1 MW18 Water 16/02/2011	SE85547-R -2 TA6M-D3 Water 16/02/2011	SE85547-R -3 MW3 Water 16/02/2011	SE85547-R -4 SW8 Water 16/02/2011	SE85547-R -5 MW04 Water 16/02/2011
Date Extracted (Metals-ICPMS)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Date Analysed (Metals-ICPMS)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Arsenic	µg/L	<1	<1	4	7	9
Cadmium	µg/L	<0.5	<0.5	<1	<0.5	<1
Chromium	µg/L	<5	<5	<10	<5	<10
Copper	µg/L	1	<1	6	<1	<1
Nickel	µg/L	<5	<5	52	<5	37
Lead	µg/L	1	<1	11	<1	<1
Zinc	µg/L	67	32	230	43	88
Molybdenum	µg/L	2	<1	<2	9	5

Trace HM (ICP-MS)-Dissolved Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547-R -6 MW17 Water 16/02/2011	SE85547-R -7 MW16 Water 16/02/2011	SE85547-R -8 MW01 Water 16/02/2011	SE85547-R -9 MW02 Water 16/02/2011	SE85547-R -10 QC03 Water 16/02/2011
Date Extracted (Metals-ICPMS)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Date Analysed (Metals-ICPMS)		18/02/2011	18/02/2011	18/02/2011	18/02/2011	18/02/2011
Arsenic	µg/L	<2	<4	7	9	7
Cadmium	µg/L	<1	<2	<0.5	<1	<0.5
Chromium	µg/L	<10	<20	<5	<10	<5
Copper	µg/L	6	<2	<1	<1	<1
Nickel	µg/L	31	<20	5	<10	5
Lead	µg/L	8	<2	<1	<1	<1
Zinc	µg/L	150	40	67	54	52
Molybdenum	µg/L	2	9	1	<2	2

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Method ID	Methodology Summary
SEI-038	Water Soluble Chloride After carrying out a 1:5 soil:water extraction, an aliquot of the extract is reacted with mercuric thiocyanate forming a mercuric chloride complex. In the presence of ferric iron, highly coloured ferric thiocyanate is formed which is proportional to the chloride concentration. Reference NEPM, Schedule B(3), 401 and APHA 4500Cl- Water Soluble Sulphate After carrying out a 1:5 soil:water extraction ,sulphate in the extract is precipitated in an acidic medium with barium chloride. The resulting turbidity is measured photometrically at 405nm and compared with standard calibration solutions to determine the sulphate concentration in the sample. Reference NEPM, Schedule B(3), 401 and APHA 4500-SO42-.
SEI-037	Ammonia - Determined by salicylate colourimetric method using Discrete Analyser.
AN277	Nitrite as N - determined by colourimetric technique using discrete analyser. Based on APHA 21st Edition, 4500-NO2-B.
AN292	Total Kjeldahl Nitrogen (TKN) - Determined by colourimetric technique using discrete analyser following digestion with Sulphuric Acid, K2SO4 and CuSO4. Based on APHA 21st Edition, 4500-Norg D / USEPA 351.2.
SEI-103	Total Nitrogen - The sum of Nitrate, Nitrite and Total Kjeldahl Nitrogen.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				17/02/11	SE85547-1	17/02/2011 || 17/02/2011	LCS	17/02/11
Date Analysed				22/02/11	SE85547-1	21/02/2011 || 21/02/2011	LCS	22/02/11
Nitrate as N	mg/L	0.005	SEI-038	<0.005	SE85547-1	0.039 || 0.049 || RPD: 23	LCS	98%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Ammonia as N	mg/L	0.01	SEI-037	<0.01	SE85547-1	0.05 || 0.06 || RPD: 18	LCS	109%
Date Extracted (NO_2)				18/02/2011	SE85547-1	18/02/2011 || 18/02/2011	LCS	18/02/2011
Date Analysed (NO_2)				18/02/2011	SE85547-1	18/02/2011 || 18/02/2011	LCS	18/02/2011
Nitrite as N	mg/L	0.005	AN277	<0.005	SE85547-1	0.005 || 0.006 || RPD: 18	LCS	104%
Date Extracted (TKN)				23/02/2011	SE85547-1	23/02/2011 || 23/02/2011	LCS	23/02/2011
Date Analysed (TKN)				23/02/2011	SE85547-1	23/02/2011 || 23/02/2011	LCS	23/02/2011
Total Kjeldahl Nitrogen	mg/L	0.2	AN292	<0.200	SE85547-1	0.690 || 0.750 || RPD: 8	LCS	103%
Total Nitrogen (by calc.)	mg/L	0.2	SEI-103	<0.200	SE85547-1	0.730 || 0.810 || RPD: 10	[NR]	[NR]

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QUALITY CONTROL Trace HM (ICP-MS)-Dissolved	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals-ICPMS)				18/02/2011	SE85547-1	18/02/2011 || 18/02/2011	LCS	18/02/2011
Date Analysed (Metals-ICPMS)				18/02/2011	SE85547-1	18/02/2011 || 18/02/2011	LCS	18/02/2011
Arsenic	µg/L	1	AN318	<1	SE85547-1	<1 || <1	LCS	100%
Cadmium	µg/L	0.1	AN318	<0.1	SE85547-1	<0.5 || <0.5	LCS	82%
Chromium	µg/L	1	AN318	<1	SE85547-1	<5 || <5	LCS	86%
Copper	µg/L	1	AN318	<1	SE85547-1	1 || <1	LCS	83%
Nickel	µg/L	1	AN318	<1	SE85547-1	<5 || <5	LCS	83%
Lead	µg/L	1	AN318	<1	SE85547-1	1 || <1	LCS	90%
Zinc	µg/L	1	AN318	<1	SE85547-1	67 || 41 || RPD: 48	LCS	100%
Molybdenum	µg/L	1	AN318	<1	SE85547-1	2 || 3 || RPD: 40	LCS	81%

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

LOR's are raised for Nitrate and trace metals due to high dissolved solids in the samples.
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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ANALYTICAL REPORT

29 March 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna de Castro**

Your Reference: ENAUWOLL04009AE - Aditional Analysis

Our Reference: SE85547A-R

Samples: 8 Waters
Received: 17/2/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

This report cancels and supersedes report No. SE86547A issued on 21/03/11 by SGS Environmental Services due to the addition of mass balance analysis.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Edward Ibrahim
Laboratory Manager

Dong Liang
Inorganic/Metal Supervisor

Snezana Kostoka
Chemist

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Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547A-R-1 MW18 Water 16/02/2011	SE85547A-R-2 TA6M-D3 Water 16/02/2011	SE85547A-R-3 MW3 Water 16/02/2011	SE85547A-R-5 MW04 Water 16/02/2011	SE85547A-R-6 MW17 Water 16/02/2011
Date Extracted		17/03/2011	17/03/2011	17/03/2011	17/03/2011	17/03/2011
Date Analysed		17/03/2011	17/03/2011	17/03/2011	17/03/2011	17/03/2011
Chloride, Cl	mg/L	1,800	2,000	4,900	4,500	5,400
Sulphate, SO4	mg/L	79	0.6	220	610	4,600

Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547A-R-7 MW16 Water 16/02/2011	SE85547A-R-8 MW01 Water 16/02/2011	SE85547A-R-9 MW02 Water 16/02/2011
Date Extracted		17/03/2011	17/03/2011	17/03/2011
Date Analysed		17/03/2011	17/03/2011	17/03/2011
Chloride, Cl	mg/L	7,700	1,300	6,100
Sulphate, SO4	mg/L	2,600	80	830

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547A-R-1 MW18 Water 16/02/2011	SE85547A-R-2 TA6M-D3 Water 16/02/2011	SE85547A-R-3 MW3 Water 16/02/2011	SE85547A-R-5 MW04 Water 16/02/2011	SE85547A-R-6 MW17 Water 16/02/2011
Date Extracted (Alkalinity)		16/03/2011	16/03/2011	16/03/2011	16/03/2011	16/03/2011
Date Analysed (Alkalinity)		16/03/2011	16/03/2011	16/03/2011	16/03/2011	16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	480	1,614	<2.0	600	160
Carbonate Alkalinity as $CaCO_3$	mg/L	<2.0	<2.0	<2.0	<2.0	<2.0

Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547A-R-7 MW16 Water 16/02/2011	SE85547A-R-8 MW01 Water 16/02/2011	SE85547A-R-9 MW02 Water 16/02/2011
Date Extracted (Alkalinity)		16/03/2011	16/03/2011	16/03/2011
Date Analysed (Alkalinity)		16/03/2011	16/03/2011	16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	1,714	320	810
Carbonate Alkalinity as $CaCO_3$	mg/L	<2.0	<2.0	<2.0

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Metals in water by ICP-OES Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547A-R-1 MW18 Water 16/02/2011	SE85547A-R-2 TA6M-D3 Water 16/02/2011	SE85547A-R-3 MW3 Water 16/02/2011	SE85547A-R-5 MW04 Water 16/02/2011	SE85547A-R-6 MW17 Water 16/02/2011
Date Extracted (Metals)		17/03/2011	17/03/2011	17/03/2011	17/03/2011	17/03/2011
Date Analysed (Metals)		17/03/2011	17/03/2011	17/03/2011	17/03/2011	17/03/2011
Sodium (Dissolved)	mg/L	1,000	1,600	2,300	2,000	3,300
Potassium (Dissolved)	mg/L	1.1	90	1.9	82	190
Calcium (Dissolved)	mg/L	61	27	20	280	390
Magnesium (Dissolved)	mg/L	150	110	270	290	740
Iron (Dissolved)	mg/L	<0.02	1.3	140	93	170

Metals in water by ICP-OES Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547A-R-7 MW16 Water 16/02/2011	SE85547A-R-8 MW01 Water 16/02/2011	SE85547A-R-9 MW02 Water 16/02/2011
Date Extracted (Metals)		17/03/2011	17/03/2011	17/03/2011
Date Analysed (Metals)		17/03/2011	17/03/2011	17/03/2011
Sodium (Dissolved)	mg/L	4,100	640	3,400
Potassium (Dissolved)	mg/L	230	49	170
Calcium (Dissolved)	mg/L	330	110	210
Magnesium (Dissolved)	mg/L	840	130	320
Iron (Dissolved)	mg/L	0.04	31	6.2

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Cations / Anions Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547A-R-1 MW18 Water 16/02/2011	SE85547A-R-2 TA6M-D3 Water 16/02/2011	SE85547A-R-3 MW3 Water 16/02/2011	SE85547A-R-5 MW04 Water 16/02/2011	SE85547A-R-6 MW17 Water 16/02/2011
Cations calculated	meq/i	60.6	80.6	133	134	238
Anions calculated	meq/l	62.2	88.8	143	152	252
% difference	%	1.2	4.8	3.8	6.2	2.8

Cations / Anions Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85547A-R-7 MW16 Water 16/02/2011	SE85547A-R-8 MW01 Water 16/02/2011	SE85547A-R-9 MW02 Water 16/02/2011
Cations calculated	meq/i	272	47.1	190
Anions calculated	meq/l	306	44.8	206
% difference	%	5.9	2.4	4.1

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Method ID	Methodology Summary
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN135	The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN320	

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				17/03/11	[NT]	[NT]	LCS	17/03/11
Date Analysed				17/03/11	[NT]	[NT]	LCS	17/03/11
Chloride, Cl	mg/L	0.05	AN245	<0.05	[NT]	[NT]	LCS	99%
Sulphate, SO4	mg/L	0.1	AN245	<0.1	[NT]	[NT]	LCS	98%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Alkalinity)				16/03/2011	[NT]	[NT]	LCS	16/03/2011
Date Analysed (Alkalinity)				16/03/2011	[NT]	[NT]	LCS	16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	2	AN135	<2.0	[NT]	[NT]	LCS	101%
Carbonate Alkalinity as $CaCO_3$	mg/L	2	AN135	<2.0	[NT]	[NT]	LCS	101%

QUALITY CONTROL Metals in water by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				17/03/2011	SE85547A-1	17/03/2011 || 17/03/2011	LCS	17/03/2011
Date Analysed (Metals)				17/03/2011	SE85547A-1	17/03/2011 || 17/03/2011	LCS	17/03/2011
Sodium (Dissolved)	mg/L	0.1	AN320	<0.1	SE85547A-1	1000 || 1000 || RPD: 0	LCS	93%
Potassium (Dissolved)	mg/L	0.2	AN320	<0.2	SE85547A-1	1.1 || 0.98 || RPD: 12	LCS	92%
Calcium (Dissolved)	mg/L	0.1	AN320	<0.1	SE85547A-1	61 || 60 || RPD: 2	LCS	99%
Magnesium (Dissolved)	mg/L	0.1	AN320	<0.1	SE85547A-1	150 || 150 || RPD: 0	LCS	93%
Iron (Dissolved)	mg/L	0.02	AN320	<0.02	SE85547A-1	<0.02 || <0.02	LCS	99%

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QUALITY CONTROL Cations / Anions	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Cations calculated	meq/i	0		[NT]		60.6 || [N/T]	[NR]	[NR]
Anions calculated	meq/l	0		[NT]		62.2 || [N/T]	[NR]	[NR]
% difference	%	0		[NT]		1.2 || [N/T]	[NR]	[NR]

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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ANALYTICAL REPORT

4 March 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna de Castro**

Your Reference: ENAUWOLL04009AE

Our Reference: SE85743 Samples: 2 Waters
Received: 25/2/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Quality Manager

Snezana Kostoka
Chemist

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Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85743-1 MW06 Water 24/02/2011	SE85743-2 MW08 Water 24/02/2011
Date Extracted		25/02/2011	25/02/2011
Date Analysed		3/03/2011	3/03/2011
Nitrate as N	mg/L	<0.25	<0.25

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85743-1 MW06 Water 24/02/2011	SE85743-2 MW08 Water 24/02/2011
Date Extracted (Ammonia)		25/02/2011	25/02/2011
Date Analysed (Ammonia)		25/02/2011 2011	25/02/2011
Ammonia as N	mg/L	5.6	2.0
Date Extracted (NO_2)		25/02/2011	25/02/2011
Date Analysed (NO_2)		25/02/2011 011	25/02/2011
Nitrite as N	mg/L	0.05	<0.005
Date Extracted (TKN)		4/03/2011	4/03/2011
Date Analysed (TKN)		4/03/2011	4/03/2011
Total Kjeldahl Nitrogen	mg/L	7.20	7.60
Total Nitrogen (by calc.)	mg/L	7.25	7.60

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Trace HM (ICP-MS)-Dissolved Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85743-1 MW06 Water 24/02/2011	SE85743-2 MW08 Water 24/02/2011
Date Extracted (Metals-ICPMS)		1/03/2011	1/03/2011
Date Analysed (Metals-ICPMS)		1/03/2011	1/03/2011
Arsenic	µg/L	330	150
Cadmium	µg/L	<2	<2
Chromium	µg/L	<20	330
Copper	µg/L	<2	7
Nickel	µg/L	66	2,400
Lead	µg/L	<2	<2
Zinc	µg/L	49	90
Molybdenum	µg/L	110	12

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Method ID	Methodology Summary
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN291	
AN277	Nitrite as N - determined by colourimetric technique using discrete analyser. Based on APHA 21st Edition, 4500-NO2-B.
AN292	Total Kjeldahl Nitrogen (TKN) - Determined by colourimetric technique using discrete analyser following digestion with Sulphuric Acid, K2SO4 and CuSO4. Based on APHA 21st Edition, 4500-Norg D / USEPA 351.2.
SEI-103	Total Nitrogen - The sum of Nitrate, Nitrite and Total Kjeldahl Nitrogen.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				25/02/11	[NT]	[NT]	LCS	25/02/11
Date Analysed				03/03/11	[NT]	[NT]	LCS	03/03/11
Nitrate as N	mg/L	0.005	AN245	<0.005	[NT]	[NT]	LCS	97%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Ammonia as N	mg/L	0.01	AN291	<0.01	[NT]	[NT]	LCS	102%
Date Extracted (NO_2)				25/02/2011	[NT]	[NT]	LCS	25/02/2011
Date Analysed (NO_2)				25/02/2011	[NT]	[NT]	LCS	25/02/2011
Nitrite as N	mg/L	0.005	AN277	<0.005	[NT]	[NT]	LCS	102%
Date Extracted (TKN)				04/03/2011	[NT]	[NT]	LCS	04/03/2011
Date Analysed (TKN)				04/03/2011	[NT]	[NT]	LCS	04/03/2011
Total Kjeldahl Nitrogen	mg/L	0.2	AN292	<0.200	[NT]	[NT]	LCS	106%
Total Nitrogen (by calc.)	mg/L	0.2	SEI-103	<0.200	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL Trace HM (ICP-MS)-Dissolved	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals-ICPMS)				1/03/2011	[NT]	[NT]	LCS	1/03/2011
Date Analysed (Metals-ICPMS)				1/03/2011	[NT]	[NT]	LCS	1/03/2011
Arsenic	µg/L	1	AN318	<1	[NT]	[NT]	LCS	98%
Cadmium	µg/L	0.1	AN318	<0.1	[NT]	[NT]	LCS	98%
Chromium	µg/L	1	AN318	<1	[NT]	[NT]	LCS	99%
Copper	µg/L	1	AN318	<1	[NT]	[NT]	LCS	99%
Nickel	µg/L	1	AN318	<1	[NT]	[NT]	LCS	99%
Lead	µg/L	1	AN318	<1	[NT]	[NT]	LCS	103%
Zinc	µg/L	1	AN318	<1	[NT]	[NT]	LCS	95%
Molybdenum	µg/L	1	AN318	<1	[NT]	[NT]	LCS	96%

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

LOR for trace metals has been raised by a dilution of 20 due to sample matrix interferences
DETECTION LIMITS FOR ANIONS RISE 50X DUE TO HIGH EC ..
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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ANALYTICAL REPORT

29 March 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna de Castro**

Your Reference: ENAUWOLL04009AE - Additional Analysis

Our Reference: SE85743A-R

Samples: 2 Waters
Received: 25/2/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

This report cancels and supersedes report No. SE85743A issued on 21/03/11 by SGS Environmental Services due to the addition of mass balance analysis.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Inorganic/Metal Supervisor

Snezana Kostoka
Chemist

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Environmental Services Unit 16/33 Maddox Street Alexandria NSW 2015 Australia
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Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85743A-R-1 MW06 Water 24/02/2011	SE85743A-R-2 MW08 Water 24/02/2011
Date Extracted		17/03/2011	17/03/2011
Date Analysed		17/03/2011	17/03/2011
Chloride, Cl	mg/L	19,000	14,000
Sulphate, SO4	mg/L	2,700	2,400

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85743A-R-1 MW06 Water 24/02/2011	SE85743A-R-2 MW08 Water 24/02/2011
Date Extracted (Alkalinity)		16/03/2011	16/03/2011
Date Analysed (Alkalinity)		16/03/2011	16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	550	54
Carbonate Alkalinity as $CaCO_3$	mg/L	<2.0	<2.0

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Metals in water by ICP-OES Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85743A-R-1 MW06 Water 24/02/2011	SE85743A-R-2 MW08 Water 24/02/2011
Date Extracted (Metals)		17/03/2011	17/03/2011
Date Analysed (Metals)		17/03/2011	17/03/2011
Sodium (Dissolved)	mg/L	10,000	7,200
Potassium (Dissolved)	mg/L	590	330
Calcium (Dissolved)	mg/L	480	330
Magnesium (Dissolved)	mg/L	1,300	910
Iron (Dissolved)	mg/L	16	220

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Cations / Anions Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE85743A-R-1 MW06 Water 24/02/2011	SE85743A-R-2 MW08 Water 24/02/2011
Cations calculated	meq/i	606	427
Anions calculated	meq/l	604	447
% difference	%	0.20	2.3

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Method ID	Methodology Summary
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN135	The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN320	

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				17/03/11	[NT]	[NT]	LCS	17/03/11
Date Analysed				17/03/11	[NT]	[NT]	LCS	17/03/11
Chloride, Cl	mg/L	0.05	AN245	<0.05	[NT]	[NT]	LCS	99%
Sulphate, SO4	mg/L	0.1	AN245	<0.1	[NT]	[NT]	LCS	99%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Alkalinity)				16/03/2011	[NT]	[NT]	LCS	16/03/2011
Date Analysed (Alkalinity)				16/03/2011	[NT]	[NT]	LCS	16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	2	AN135	<2.0	[NT]	[NT]	LCS	101%
Carbonate Alkalinity as $CaCO_3$	mg/L	2	AN135	<2.0	[NT]	[NT]	LCS	101%

QUALITY CONTROL Metals in water by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				17/03/2011	[NT]	[NT]	LCS	17/03/2011
Date Analysed (Metals)				17/03/2011	[NT]	[NT]	LCS	17/03/2011
Sodium (Dissolved)	mg/L	0.1	AN320	<0.1	[NT]	[NT]	LCS	93%
Potassium (Dissolved)	mg/L	0.2	AN320	<0.2	[NT]	[NT]	LCS	92%
Calcium (Dissolved)	mg/L	0.1	AN320	<0.1	[NT]	[NT]	LCS	99%
Magnesium (Dissolved)	mg/L	0.1	AN320	<0.1	[NT]	[NT]	LCS	93%
Iron (Dissolved)	mg/L	0.02	AN320	<0.02	[NT]	[NT]	LCS	99%

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QUALITY CONTROL Cations / Anions	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Cations calculated	meq/i	0		[NT]	[NT]	[NT]	[NR]	[NR]
Anions calculated	meq/l	0		[NT]	[NT]	[NT]	[NR]	[NR]
% difference	%	0		[NT]	[NT]	[NT]	[NR]	[NR]

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
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Quality Acceptance Criteria

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ANALYTICAL REPORT

16 March 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna de Castro**

Your Reference: EW04009AE

Our Reference: SE86052 Samples: 1 Water
Received: 9/3/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Quality Manager

Snezana Kostoka
Chemist

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Anions in water		
Our Reference:	UNITS	SE86052-1
Your Reference	----------	MW10
Sample Matrix	----------	Water
Date Sampled		8/03/2011
Date Extracted		9/03/2011
Date Analysed		9/03/2011
Nitrate as N	mg/L	<0.025

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	 SE86052-1 MW10 Water 8/03/2011
Date Extracted (Ammonia)		9/03/2011
Date Analysed (Ammonia)		9/03/2011
Ammonia as N	mg/L	1.5
Date Extracted (NO_2)		9/03/2011
Date Analysed (NO_2)		9/03/2011
Nitrite as N	mg/L	<0.005
Date Extracted (TKN)		15/03/2011
Date Analysed (TKN)		15/03/2011
Total Kjeldahl Nitrogen	mg/L	3.80
Total Nitrogen (by calc.)	mg/L	3.80

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Trace HM (ICP-MS)-Dissolved Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	 SE86052-1 MW10 Water 8/03/2011
Date Extracted (Metals-ICPMS)		9/03/2011
Date Analysed (Metals-ICPMS)		9/03/2011
Arsenic	µg/L	3
Cadmium	µg/L	<0.1
Chromium	µg/L	<1
Copper	µg/L	<1
Nickel	µg/L	4
Lead	µg/L	<1
Zinc	µg/L	57
Molybdenum	µg/L	<1

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Method ID	Methodology Summary
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN291	
AN277	Nitrite as N - determined by colourimetric technique using discrete analyser. Based on APHA 21st Edition, 4500-NO2-B.
AN292	Total Kjeldahl Nitrogen (TKN) - Determined by colourimetric technique using discrete analyser following digestion with Sulphuric Acid, K2SO4 and CuSO4. Based on APHA 21st Edition, 4500-Norg D / USEPA 351.2.
SEI-103	Total Nitrogen - The sum of Nitrate, Nitrite and Total Kjeldahl Nitrogen.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				09/03/11	SE86052-1	9/03/2011 || 9/03/2011	SE86052-1	09/03/11
Date Analysed				09/03/11	SE86052-1	9/03/2011 || 9/03/2011	SE86052-1	09/03/11
Nitrate as N	mg/L	0.005	AN245	<0.005	SE86052-1	<0.025 || <0.025	SE86052-1	99%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Ammonia as N	mg/L	0.01	AN291	<0.01	[NT]	[NT]	LCS	105%
Date Extracted (NO_2)				9/03/2011	[NT]	[NT]	LCS	9/03/2011
Date Analysed (NO_2)				9/03/2011	[NT]	[NT]	LCS	9/03/2011
Nitrite as N	mg/L	0.005	AN277	<0.005	[NT]	[NT]	LCS	97%
Date Extracted (TKN)				15/03/2011	[NT]	[NT]	LCS	15/03/2011
Date Analysed (TKN)				15/03/2011	[NT]	[NT]	LCS	15/03/2011
Total Kjeldahl Nitrogen	mg/L	0.2	AN292	<0.200	[NT]	[NT]	LCS	114%
Total Nitrogen (by calc.)	mg/L	0.2	SEI-103	<0.200	[NT]	[NT]	[NR]	[NR]

QUALITY CONTROL Trace HM (ICP-MS)-Dissolved	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals-ICPMS)				9/03/2011	[NT]	[NT]	LCS	9/03/2011
Date Analysed (Metals-ICPMS)				9/03/2011	[NT]	[NT]	LCS	9/03/2011
Arsenic	µg/L	1	AN318	<1	[NT]	[NT]	LCS	101%
Cadmium	µg/L	0.1	AN318	<0.1	[NT]	[NT]	LCS	100%
Chromium	µg/L	1	AN318	<1	[NT]	[NT]	LCS	101%
Copper	µg/L	1	AN318	<1	[NT]	[NT]	LCS	102%
Nickel	µg/L	1	AN318	<1	[NT]	[NT]	LCS	105%
Lead	µg/L	1	AN318	<1	[NT]	[NT]	LCS	101%
Zinc	µg/L	1	AN318	<1	[NT]	[NT]	LCS	100%
Molybdenum	µg/L	1	AN318	<1	[NT]	[NT]	LCS	98%

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

DETECTION LIMITS FOR ANIONS RISE 5X DUE TO HIGH EC.
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
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Quality Acceptance Criteria

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ANALYTICAL REPORT

29 March 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna de Castro**

Your Reference: EW04009AE - Additional Analysis

Our Reference: SE86052A-R

Samples: 1 Water
Received: 9/3/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

This report cancels and supersedes report No. SE86052A issued on 21/03/11 by SGS Environmental Services due to the addition of mass balance analysis.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Dong Liang
Inorganic/Metal Supervisor

Snezana Kostoka
Chemist

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Anions in water Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE86052A-R-1 MW10 Water 8/03/2011
Date Extracted		17/03/2011
Date Analysed		17/03/2011
Chloride, Cl	mg/L	1,400
Sulphate, SO4	mg/L	2,100

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	 SE86052A-R-1 MW10 Water 8/03/2011
Date Extracted (Alkalinity)		16/03/2011
Date Analysed (Alkalinity)		16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	250
Carbonate Alkalinity as $CaCO_3$	mg/L	<2.0

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Metals in water by ICP-OES Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE86052A-R-1 MW10 Water 8/03/2011
Date Extracted (Metals)		17/03/2011
Date Analysed (Metals)		17/03/2011
Sodium (Dissolved)	mg/L	1,000
Potassium (Dissolved)	mg/L	25
Calcium (Dissolved)	mg/L	440
Magnesium (Dissolved)	mg/L	270
Iron (Dissolved)	mg/L	84

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Cations / Anions Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE86052A-R-1 MW10 Water 8/03/2011
Cations calculated	meq/i	92.9
Anions calculated	meq/l	88.3
% difference	%	2.5

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Method ID	Methodology Summary
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN135	The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN320	

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				17/03/11	[NT]	[NT]	LCS	17/03/11
Date Analysed				17/03/11	[NT]	[NT]	LCS	17/03/11
Chloride, Cl	mg/L	0.05	AN245	<0.05	[NT]	[NT]	LCS	99%
Sulphate, SO4	mg/L	0.1	AN245	<0.1	[NT]	[NT]	LCS	98%

QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Alkalinity)				16/03/2011	[NT]	[NT]	LCS	16/03/2011
Date Analysed (Alkalinity)				16/03/2011	[NT]	[NT]	LCS	16/03/2011
Bicarbonate Alkalinity as $CaCO_3$	mg/L	2	AN135	<2.0	[NT]	[NT]	LCS	101%
Carbonate Alkalinity as $CaCO_3$	mg/L	2	AN135	<2.0	[NT]	[NT]	LCS	101%

QUALITY CONTROL Metals in water by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				17/03/2011	[NT]	[NT]	LCS	17/03/2011
Date Analysed (Metals)				17/03/2011	[NT]	[NT]	LCS	17/03/2011
Sodium (Dissolved)	mg/L	0.1	AN320	<0.1	[NT]	[NT]	LCS	93%
Potassium (Dissolved)	mg/L	0.2	AN320	<0.2	[NT]	[NT]	LCS	92%
Calcium (Dissolved)	mg/L	0.1	AN320	<0.1	[NT]	[NT]	LCS	99%
Magnesium (Dissolved)	mg/L	0.1	AN320	<0.1	[NT]	[NT]	LCS	93%
Iron (Dissolved)	mg/L	0.02	AN320	<0.02	[NT]	[NT]	LCS	99%

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QUALITY CONTROL Cations / Anions	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Cations calculated	meq/i	0		[NT]	[NT]	[NT]	[NR]	[NR]
Anions calculated	meq/l	0		[NT]	[NT]	[NT]	[NR]	[NR]
% difference	%	0		[NT]	[NT]	[NT]	[NR]	[NR]

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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ANALYTICAL REPORT

4 May 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna De Castro**

Your Reference: ENAUWOLL04009AE

Our Reference: SE87114-R2 Samples: 14 Soils
Received: 19/4/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

This report cancels and supersedes report No. SE87114-R issued on 29/04/11 by SGS Environmental Services due to amendment of report comment for metal.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Huong Crawford
Metals Signatory

Snezana Kostoska
Chemist

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE87114-R2-1 CTP87/0.5-0.6 Soil 18/04/2011	SE87114-R2-2 CTP87/1.4-1.6 Soil 18/04/2011	SE87114-R2-3 CTP88/0.6-0.8 Soil 18/04/2011	SE87114-R2-4 CTP88/3.5-3.7 Soil 18/04/2011	SE87114-R2-5 CTP89/0.5-0.6 Soil 18/04/2011
Date Extracted (Ammonia)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (Ammonia)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Ammonia as N by DA*	mg/kg	0.84	0.37	0.40	1.6	0.73
Date Extracted (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Nitrite as N	mg/kg	0.03	0.03	<0.02	0.08	0.03
Date Extracted (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011	29/04/2011
Date Analysed (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011	29/04/2011
Total Kjeldahl Nitrogen	mg/kg	2,800	1,900	1,100	790	4,200
Total Nitrogen (by calc.)*	mg/kg	2,800	1,900	1,100	790	4,200
Date Extracted (Ammonia as N)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (Ammonia as N)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Ammonia as N (in ASLP Leachate)	mg/L	0.14	0.12	0.12	0.06	0.12
Date Extracted (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Nitrite as N -in ASLP Leachate	mg/L	0.006	0.006	<0.005	0.007	0.006
Date Extracted (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011	29/04/2011
Date Analysed (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011	29/04/2011
Total Kjeldahl Nitrogen (ASLP)	mg/L	4.60	1.70	0.340	<0.200	2.60
Total Nitrogen ASLP(by calc.)	mg/L	4.60	1.70	0.340	<0.200	2.60

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ----------	SE87114-R2-6 CTP89/1.8-2.0 Soil 18/04/2011	SE87114-R2-7 CTP90/0.5-0.6 Soil 18/04/2011	SE87114-R2-8 CTP90/1.8-2.0 Soil 18/04/2011	SE87114-R2-9 CTP91/0.6-0.8 Soil 18/04/2011	SE87114-R2-10 CTP91/1.6-1.8 Soil 18/04/2011
Date Extracted (Ammonia)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (Ammonia)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Ammonia as N by DA*	mg/kg	0.54	0.55	0.48	<0.15	11
Date Extracted (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Nitrite as N	mg/kg	0.03	0.04	0.03	<0.02	0.07
Date Extracted (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011	29/04/2011
Date Analysed (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011	29/04/2011
Total Kjeldahl Nitrogen	mg/kg	2,300	3,300	2,400	550	490
Total Nitrogen (by calc.)*	mg/kg	2,300	3,300	2,400	550	490
Date Extracted (Ammonia as N)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (Ammonia as N)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Ammonia as N (in ASLP Leachate)	mg/L	0.15	0.12	0.11	0.08	0.16
Date Extracted (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011	2/05/2011
Nitrite as N -in ASLP Leachate	mg/L	0.006	0.006	0.006	0.005	0.007
Date Extracted (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011	29/04/2011
Date Analysed (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011	29/04/2011
Total Kjeldahl Nitrogen (ASLP)	mg/L	3.70	3.60	2.60	0.240	0.420
Total Nitrogen ASLP(by calc.)	mg/L	3.70	3.60	2.60	0.240	0.420

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Inorganics Our Reference:	UNITS	SE87114-R2-11	SE87114-R2-12	SE87114-R2-13	SE87114-R2-14
Your Reference	----------	CTP92/0.6-0.8	CTP92/1.0-1.1	QC2	QC3
Sample Matrix	----------	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted (Ammonia)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (Ammonia)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Ammonia as N by DA*	mg/kg	0.54	6.5	0.55	0.15
Date Extracted (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Nitrite as N	mg/kg	0.06	0.05	0.03	0.04
Date Extracted (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011
Date Analysed (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011
Total Kjeldahl Nitrogen	mg/kg	280	300	3,100	300
Total Nitrogen (by calc.)*	mg/kg	280	300	3,100	300
Date Extracted (Ammonia as N)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (Ammonia as N)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Ammonia as N (in ASLP Leachate)	mg/L	0.1	0.25	0.13	0.09
Date Extracted (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Nitrite as N -in ASLP Leachate	mg/L	0.006	0.008	0.007	0.007
Date Extracted (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011
Date Analysed (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011
Total Kjeldahl Nitrogen (ASLP)	mg/L	<0.200	0.300	3.30	0.270
Total Nitrogen ASLP(by calc.)	mg/L	<0.200	0.300	3.30	0.270

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Anions in soil Our Reference:	UNITS	SE87114-R2-1	SE87114-R2-2	SE87114-R2-3	SE87114-R2-4	SE87114-R2-5
Your Reference	----------	CTP87/0.5-0.6	CTP87/1.4-1.6	CTP88/0.6-0.8	CTP88/3.5-3.7	CTP89/0.5-0.6
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted		28/04/2011	28/04/2011	28/04/2011	28/04/2011	28/04/2011
Date Analysed		28/04/2011	28/04/2011	28/04/2011	28/04/2011	28/04/2011
Nitrate as N 1:5 soil:water	mg/kg	0.16	0.24	0.33	<0.025	0.081

Anions in soil Our Reference:	UNITS	SE87114-R2-6	SE87114-R2-7	SE87114-R2-8	SE87114-R2-9	SE87114-R2-10
Your Reference	----------	CTP89/1.8-2.0	CTP90/0.5-0.6	CTP90/1.8-2.0	CTP91/0.6-0.8	CTP91/1.6-1.8
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted		28/04/2011	28/04/2011	28/04/2011	28/04/2011	28/04/2011
Date Analysed		28/04/2011	28/04/2011	28/04/2011	28/04/2011	28/04/2011
Nitrate as N 1:5 soil:water	mg/kg	0.11	0.069	0.13	0.060	0.037

Anions in soil Our Reference:	UNITS	SE87114-R2-11	SE87114-R2-12	SE87114-R2-13	SE87114-R2-14
Your Reference	----------	CTP92/0.6-0.8	CTP92/1.0-1.1	QC2	QC3
Sample Matrix	----------	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted		28/04/2011	28/04/2011	28/04/2011	28/04/2011
Date Analysed		28/04/2011	28/04/2011	28/04/2011	28/04/2011
Nitrate as N 1:5 soil:water	mg/kg	<0.125	<0.125	0.11	0.062

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Metals in Soil by ICP-OES Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE87114-R2-1 CTP87/0.5-0.6 Soil 18/04/2011	SE87114-R2-2 CTP87/1.4-1.6 Soil 18/04/2011	SE87114-R2-3 CTP88/0.6-0.8 Soil 18/04/2011	SE87114-R2-4 CTP88/3.5-3.7 Soil 18/04/2011	SE87114-R2-5 CTP89/0.5-0.6 Soil 18/04/2011
Date Extracted (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011	27/04/2011
Date Analysed (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011	27/04/2011
Arsenic	mg/kg	9	12	6	9	5
Cadmium	mg/kg	0.7	0.5	<0.3	<0.3	0.4
Chromium	mg/kg	1.8	1.8	5.4	4.1	50
Copper	mg/kg	17	21	9.1	5.2	22
Lead	mg/kg	22	23	4	3	15
Molybdenum	mg/kg	1.4	1.2	<1.0	<1.0	1.7
Nickel	mg/kg	5.9	6.1	6.3	6.2	32
Zinc	mg/kg	66	65	13	15	39

Metals in Soil by ICP-OES Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE87114-R2-6 CTP89/1.8-2.0 Soil 18/04/2011	SE87114-R2-7 CTP90/0.5-0.6 Soil 18/04/2011	SE87114-R2-8 CTP90/1.8-2.0 Soil 18/04/2011	SE87114-R2-9 CTP91/0.6-0.8 Soil 18/04/2011	SE87114-R2-10 CTP91/1.6-1.8 Soil 18/04/2011
Date Extracted (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011	27/04/2011
Date Analysed (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011	27/04/2011
Arsenic	mg/kg	<3	15	<3	<3	4
Cadmium	mg/kg	0.5	<0.3	<0.3	<0.3	<0.3
Chromium	mg/kg	1.7	1.8	1.4	4.5	5.3
Copper	mg/kg	21	23	19	5.7	6.8
Lead	mg/kg	15	14	17	3	4
Molybdenum	mg/kg	1.6	1.1	<1.0	<1.0	1.2
Nickel	mg/kg	8.2	8.4	8.1	3.8	4.0
Zinc	mg/kg	45	60	29	11	12

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Metals in Soil by ICP-OES Our Reference:	UNITS	SE87114-R2-11	SE87114-R2-12	SE87114-R2-13	SE87114-R2-14
Your Reference	----------	CTP92/0.6-0.8	CTP92/1.0-1.1	QC2	QC3
Sample Matrix	----------	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
Date Analysed (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
Arsenic	mg/kg	5	<3	<3	<3
Cadmium	mg/kg	<0.3	<0.3	<0.3	<0.3
Chromium	mg/kg	5.3	5.3	1.4	4.4
Copper	mg/kg	6.5	5.8	22	5.7
Lead	mg/kg	4	3	15	3
Molybdenum	mg/kg	<1.0	<1.0	<1.0	<1.0
Nickel	mg/kg	4.4	3.8	8.3	3.9
Zinc	mg/kg	12	11	60	12

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Anions in water Our Reference:	UNITS	SE87114-R2-1	SE87114-R2-2	SE87114-R2-3	SE87114-R2-4	SE87114-R2-5
Your Reference	----------	CTP87/0.5-0.6	CTP87/1.4-1.6	CTP88/0.6-0.8	CTP88/3.5-3.7	CTP89/0.5-0.6
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted		28/04/2011	28/04/2011	28/04/2011	28/04/2011	28/04/2011
Date Analysed		28/04/2011	28/04/2011	28/04/2011	28/04/2011	28/04/2011
Nitrate as N -in ASLP Leachate	mg/L	0.039	0.033	0.031	<0.005	0.036

Anions in water Our Reference:	UNITS	SE87114-R2-6	SE87114-R2-7	SE87114-R2-8	SE87114-R2-9	SE87114-R2-10
Your Reference	----------	CTP89/1.8-2.0	CTP90/0.5-0.6	CTP90/1.8-2.0	CTP91/0.6-0.8	CTP91/1.6-1.8
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted		28/04/2011	28/04/2011	28/04/2011	28/04/2011	28/04/2011
Date Analysed		28/04/2011	28/04/2011	28/04/2011	28/04/2011	28/04/2011
Nitrate as N -in ASLP Leachate	mg/L	0.029	0.022	0.034	<0.005	<0.005

Anions in water Our Reference:	UNITS	SE87114-R2-11	SE87114-R2-12	SE87114-R2-13	SE87114-R2-14
Your Reference	----------	CTP92/0.6-0.8	CTP92/1.0-1.1	QC2	QC3
Sample Matrix	----------	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted		28/04/2011	28/04/2011	28/04/2011	28/04/2011
Date Analysed		28/04/2011	28/04/2011	28/04/2011	28/04/2011
Nitrate as N -in ASLP Leachate	mg/L	<0.005	<0.005	0.017	<0.005

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Metals in TCLP (AS4439) Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE87114-R2-1 CTP87/0.5-0.6 Soil 18/04/2011	SE87114-R2-2 CTP87/1.4-1.6 Soil 18/04/2011	SE87114-R2-3 CTP88/0.6-0.8 Soil 18/04/2011	SE87114-R2-4 CTP88/3.5-3.7 Soil 18/04/2011	SE87114-R2-5 CTP89/0.5-0.6 Soil 18/04/2011
Date Extracted (ASLP Preparation)		20/04/2011	20/04/2011	20/04/2011	20/04/2011	20/04/2011
pH of final Leachate	pH units	7.65	6.80	6.87	6.76	7.02
Date Extracted (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011	27/04/2011
Date Analysed (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011	27/04/2011
Arsenic	µg/L	<1	<1	2	17	<1
Cadmium	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	<1	<1	<1	<1	<1
Copper	µg/L	<1	<1	<1	<1	1
Lead	µg/L	<1	<1	<1	<1	<1
Molybdenum	µg/L	<1	<1	<1	3	<1
Nickel	µg/L	<1	<1	<1	<1	<1
Zinc	µg/L	<1	<1	<1	<1	<1

Metals in TCLP (AS4439) Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE87114-R2-6 CTP89/1.8-2.0 Soil 18/04/2011	SE87114-R2-7 CTP90/0.5-0.6 Soil 18/04/2011	SE87114-R2-8 CTP90/1.8-2.0 Soil 18/04/2011	SE87114-R2-9 CTP91/0.6-0.8 Soil 18/04/2011	SE87114-R2-10 CTP91/1.6-1.8 Soil 18/04/2011
Date Extracted (ASLP Preparation)		20/04/2011	20/04/2011	20/04/2011	27/04/2011	27/04/2011
pH of final Leachate	pH units	6.75	6.67	6.71	7.92	8.03
Date Extracted (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011	27/04/2011
Date Analysed (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011	27/04/2011
Arsenic	µg/L	<1	<1	<1	4	13
Cadmium	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	<1	<1	<1	<1	<1
Copper	µg/L	<1	1	<1	<1	<1
Lead	µg/L	<1	<1	<1	<1	<1
Molybdenum	µg/L	<1	1	<1	<1	5
Nickel	µg/L	<1	<1	<1	<1	<1
Zinc	µg/L	<1	1	<1	<1	<1

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Metals in TCLP (AS4439) Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE87114-R2-11 CTP92/0.6-0.8 Soil 18/04/2011	SE87114-R2-12 CTP92/1.0-1.1 Soil 18/04/2011	SE87114-R2-13 QC2 Soil 18/04/2011	SE87114-R2-14 QC3 Soil 18/04/2011
Date Extracted (ASLP Preparation)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
pH of final Leachate	pH units	7.78	7.18	8.23	7.69
Date Extracted (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
Date Analysed (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
Arsenic	µg/L	4	2	<1	3
Cadmium	µg/L	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	<1	<1	<1	<1
Copper	µg/L	<1	<1	<1	<1
Lead	µg/L	<1	<1	<1	<1
Molybdenum	µg/L	15	7	3	1
Nickel	µg/L	<1	1	<1	<1
Zinc	µg/L	<1	1	<1	<1

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Moisture Our Reference:	UNITS	SE87114-R2-1	SE87114-R2-2	SE87114-R2-3	SE87114-R2-4	SE87114-R2-5
Your Reference	----------	CTP87/0.5-0.6	CTP87/1.4-1.6	CTP88/0.6-0.8	CTP88/3.5-3.7	CTP89/0.5-0.6
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Analysed (moisture)		21/04/2011	21/04/2011	21/04/2011	21/04/2011	21/04/2011
Moisture	%	10	12	34	44	7

Moisture Our Reference:	UNITS	SE87114-R2-6	SE87114-R2-7	SE87114-R2-8	SE87114-R2-9	SE87114-R2-10
Your Reference	----------	CTP89/1.8-2.0	CTP90/0.5-0.6	CTP90/1.8-2.0	CTP91/0.6-0.8	CTP91/1.6-1.8
Sample Matrix	----------	Soil	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Analysed (moisture)		21/04/2011	21/04/2011	21/04/2011	21/04/2011	21/04/2011
Moisture	%	8	9	7	37	45

Moisture Our Reference:	UNITS	SE87114-R2-11	SE87114-R2-12	SE87114-R2-13	SE87114-R2-14
Your Reference	----------	CTP92/0.6-0.8	CTP92/1.0-1.1	QC2	QC3
Sample Matrix	----------	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Analysed (moisture)		21/04/2011	21/04/2011	21/04/2011	21/04/2011
Moisture	%	36	42	6	38

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Method ID	Methodology Summary
AN291	
AN277	Nitrite as N - determined by colourimetric technique using discrete analyser. Based on APHA 21st Edition, 4500-NO2-B.
AN292	Total Kjeldahl Nitrogen (TKN) - Determined by colourimetric technique using discrete analyser following digestion with Sulphuric Acid, K2SO4 and CuSO4. Based on APHA 21st Edition, 4500-Norg D / USEPA 351.2.
AN170	In the presence of H2SO4, K2SO4, Se catalyst and heat, amino nitrogen of many organic materials is converted to ammonium sulphate. Free ammonia and ammonium-nitrogen are similarly converted. After the digestion the ammonia is distilled from an alkaline medium and the ammonia content determined titrimetrically or colorimetrically. Reference APHA 4500-Norg B/APHA 4500-NH3 B/C/F. Internal Reference AN170
SEI-103	Total Nitrogen - The sum of Nitrate, Nitrite and Total Kjeldahl Nitrogen.
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN320	
AN006	Toxicity Characteristic Leaching Procedure (TCLP) - Preparation of leachates for assessing the mobility of both organic and inorganic contaminants present in liquid, solid, and multiphase wastes. Based on USEPA 1311. For volatile analytes, Zero-Headspace Extraction Vessel (ZHE) is used. This method also meets the requirements of Australian Standard Leaching Procedure (ASLP) AS 4439.3-1997 Part 3.
AN101	pH - Measured using pH meter and electrode based on APHA 21st Edition, 4500-H+. For water analyses the results reported are indicative only as the sample holding time requirement specified in APHA was not met (APHA requires that the pH of the samples are to be measured within 15 minutes after sampling).
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN002	

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QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Ammonia as N by DA*	mg/kg	0.15	AN291	<0.15	SE87114-1	0.84 || 0.79 || RPD: 6	LCS	100%
Date Extracted (NO_2)				02/05/2011	SE87114-1	2/05/2011 || 2/05/2011	LCS	02/05/2011
Date Analysed (NO_2)				02/05/2011	SE87114-1	2/05/2011 || 2/05/2011	LCS	02/05/2011
Nitrite as N	mg/kg	0.025	AN277	<0.02	SE87114-1	0.03 || 0.03 || RPD: 0	LCS	102%
Date Extracted (TKN)				29/03/2011	SE87114-1	29/04/2011 || 29/04/2011	LCS	29/03/2011
Date Analysed (TKN)				29/03/2011	SE87114-1	29/04/2011 || 29/04/2011	LCS	29/03/2011
Total Kjeldahl Nitrogen	mg/kg	40	AN292	<40	SE87114-1	2800 || 3400 || RPD: 19	LCS	103%
Total Nitrogen (by calc.)*	mg/kg	20	AN170	<20	SE87114-1	2800 || 3400 || RPD: 19	[NR]	[NR]
Ammonia as N (in ASLP Leachate)	mg/L	0.01	AN291	<0.01	SE87114-1	0.14 || 0.14 || RPD: 0	LCS	94%
Date Extracted (NO_2)				02/05/2011	SE87114-1	2/05/2011 || 2/05/2011	LCS	02/05/2011
Date Analysed (NO_2)				02/05/2011	SE87114-1	2/05/2011 || 2/05/2011	LCS	02/05/2011
Nitrite as N -in ASLP Leachate	mg/L	0.005	AN277	<0.005	SE87114-1	0.006 || 0.006 || RPD: 0	LCS	102%
Date Extracted (TKN)				29/03/2011	SE87114-1	29/04/2011 || 29/04/2011	LCS	29/03/2011
Date Analysed (TKN)				29/03/2011	SE87114-1	29/04/2011 || 29/04/2011	LCS	29/03/2011
Total Kjeldahl Nitrogen (ASLP)	mg/L	0.2	AN292	<0.200	SE87114-1	4.60 || 4.40 || RPD: 4	LCS	103%
Total Nitrogen ASLP(by calc.)	mg/L	0.2	SEI-103	<0.200	SE87114-1	4.60 || 4.40 || RPD: 4	[NR]	[NR]

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QUALITY CONTROL Anions in soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				28/04/11	SE87114-1	28/04/2011 || 28/04/2011	LCS	28/04/11
Date Analysed				28/04/11	SE87114-1	28/04/2011 || 28/04/2011	LCS	28/04/11
Nitrate as N 1:5 soil:water	mg/kg	0.025	AN245	<0.025	SE87114-1	0.16 || 0.15 || RPD: 6	LCS	102%

QUALITY CONTROL Metals in Soil by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				27/04/2011	SE87114-8	27/04/2011 || 27/04/2011	SE87114-9	27/04/2011
Date Analysed (Metals)				27/04/2011	SE87114-8	27/04/2011 || 27/04/2011	SE87114-9	27/04/2011
Arsenic	mg/kg	3	AN320	<3	SE87114-8	<3 || 3	SE87114-9	94%
Cadmium	mg/kg	0.3	AN320	<0.3	SE87114-8	<0.3 || <0.3	SE87114-9	94%
Chromium	mg/kg	0.3	AN320	<0.3	SE87114-8	1.4 || 1.9 || RPD: 30	SE87114-9	97%
Copper	mg/kg	0.5	AN320	<0.5	SE87114-8	19 || 23 || RPD: 19	SE87114-9	97%
Lead	mg/kg	1	AN320	<1	SE87114-8	17 || 30 || RPD: 55	SE87114-9	93%
Molybdenum	mg/kg	1	AN320	<1.0	SE87114-8	<1.0 || <1.0	SE87114-9	93%
Nickel	mg/kg	0.5	AN320	<0.5	SE87114-8	8.1 || 8.0 || RPD: 1	SE87114-9	97%
Zinc	mg/kg	0.5	AN320	<0.5	SE87114-8	29 || 43 || RPD: 39	SE87114-9	97%

QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				28/04/11	SE87114-1	28/04/2011 || 28/04/2011	LCS	28/04/11
Date Analysed				28/04/11	SE87114-1	28/04/2011 || 28/04/2011	LCS	28/04/11
Nitrate as N -in ASLP Leachate	mg/L	0.005	AN245	<0.005	SE87114-1	0.039 || 0.037 || RPD: 5	LCS	102%

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QUALITY CONTROL Metals in TCLP (AS4439)	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
pH of final Leachate	pH units	0	AN101	0.00	[NT]	[NT]	[NR]	[NR]
Date Extracted (Metals)				27/04/2011	[NT]	[NT]	LCS	27/04/2011
Date Analysed (Metals)				27/04/2011	[NT]	[NT]	LCS	27/04/2011
Arsenic	µg/L	1	AN318	<1	[NT]	[NT]	LCS	104%
Cadmium	µg/L	0.1	AN318	<0.1	[NT]	[NT]	LCS	106%
Chromium	µg/L	1	AN318	<1	[NT]	[NT]	LCS	105%
Copper	µg/L	1	AN318	<1	[NT]	[NT]	LCS	109%
Lead	µg/L	1	AN318	<1	[NT]	[NT]	LCS	109%
Molybdenum	µg/L	1	AN318	<1	[NT]	[NT]	LCS	96%
Nickel	µg/L	1	AN318	<1	[NT]	[NT]	LCS	109%
Zinc	µg/L	1	AN318	<1	[NT]	[NT]	LCS	106%

QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	<1

QUALITY CONTROL Inorganics	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Ammonia as N by DA*	mg/kg	SE87114-11	0.54 || 0.52 || RPD: 4	[NR]	[NR]
Date Extracted (NO_2)		SE87114-11	2/05/2011 || 2/05/2011	[NR]	[NR]
Date Analysed (NO_2)		SE87114-11	2/05/2011 || 2/05/2011	[NR]	[NR]
Nitrite as N	mg/kg	SE87114-11	0.06 || 0.06 || RPD: 0	[NR]	[NR]
Ammonia as N (in ASLP Leachate)	mg/L	SE87114-11	0.1 || 0.1 || RPD: 0	[NR]	[NR]
Date Extracted (NO_2)		SE87114-11	2/05/2011 || 2/05/2011	[NR]	[NR]
Date Analysed (NO_2)		SE87114-11	2/05/2011 || 2/05/2011	[NR]	[NR]
Nitrite as N -in ASLP Leachate	mg/L	SE87114-11	0.006 || 0.006 || RPD: 0	[NR]	[NR]

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QUALITY CONTROL Anions in soil	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted		SE87114-10	28/04/2011 || 28/04/2011	SE87114-10	28/04/11
Date Analysed		SE87114-10	28/04/2011 || 28/04/2011	SE87114-10	28/04/11
Nitrate as N 1:5 soil:water	mg/kg	SE87114-10	0.037 || 0.040 || RPD: 8	SE87114-10	101%

QUALITY CONTROL Anions in water	UNITS	Dup. Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted		SE87114-10	28/04/2011 || 28/04/2011	SE87114-10	28/04/11
Date Analysed		SE87114-10	28/04/2011 || 28/04/2011	SE87114-10	28/04/11
Nitrate as N -in ASLP Leachate	mg/L	SE87114-10	<0.005 || <0.005	SE87114-10	100%

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

DETECTION LIMITS FOR ANIONS RISE 5X FOR SAMPLE 11 AND 12 DUE TO HIGH EC.

METALS_ESDAT_S: #8 duplicate failed the acceptance criteria due to sample heterogeneity.
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)

Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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ANALYTICAL REPORT

4 May 2011

Coffey Environments Pty Ltd
118 Auburn Street
Wollongong
NSW 2500

Attention: **Corinna De Castro**

Your Reference: ENAUWOLL04009AE

Our Reference: SE87114A-R

Samples: 4 Soils
Received: 19/4/11

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

This report cancels and supersedes report No. SE87114A issued on 29/04/11 by SGS Environmental Services due to amendment of report comment.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Huong Crawford
Metals Signatory

Snezana Kostoska
Chemist

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Inorganics Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ----------	SE87114A-R-15 CTP93/0.6-0.7 Soil 18/04/2011	SE87114A-R-16 CTP94/0.4-0.5 Soil 18/04/2011	SE87114A-R-17 CTP94/0.8-1.0 Soil 18/04/2011	SE87114A-R-18 QC1 Soil 18/04/2011
Date Extracted (Ammonia)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (Ammonia)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Ammonia as N by DA*	mg/kg	11	4.4	11	6.7
Date Extracted (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Nitrite as N	mg/kg	0.04	0.04	0.04	0.05
Date Extracted (TKN)		30/04/2011	30/04/2011	30/04/2011	30/04/2011
Date Analysed (TKN)		30/04/2011	30/04/2011	30/04/2011	30/04/2011
Total Kjeldahl Nitrogen	mg/kg	420	5,300	450	600
Total Nitrogen (by calc.)*	mg/kg	420	5,300	450	600
Date Extracted (Ammonia as N)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (Ammonia as N)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Ammonia as N (in ASLP Leachate)	mg/L	0.51	0.21	0.37	0.50
Date Extracted (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Date Analysed (NO_2)		2/05/2011	2/05/2011	2/05/2011	2/05/2011
Nitrite as N -in ASLP Leachate	mg/L	0.02	0.008	0.007	0.02
Date Extracted (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011
Date Analysed (TKN)		29/04/2011	29/04/2011	29/04/2011	29/04/2011
Total Kjeldahl Nitrogen (ASLP)	mg/L	8.70	17.0	0.570	5.30
Total Nitrogen ASLP (by calc.)	mg/L	8.70	17.0	0.570	5.30

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Anions in soil Our Reference:	UNITS	SE87114A-R-15	SE87114A-R-16	SE87114A-R-17	SE87114A-R-18
Your Reference	----------	CTP93/0.6-0.7	CTP94/0.4-0.5	CTP94/0.8-1.0	QC1
Sample Matrix	----------	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted		28/04/2011	28/04/2011	28/04/2011	28/04/2011
Date Analysed		28/04/2011	28/04/2011	28/04/2011	28/04/2011
Nitrate as N 1:5 soil:water	mg/kg	<0.050	0.17	<0.025	<0.050

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Metals in Soil by ICP-OES Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE87114A-R-15 CTP93/0.6-0.7 Soil 18/04/2011	SE87114A-R-16 CTP94/0.4-0.5 Soil 18/04/2011	SE87114A-R-17 CTP94/0.8-1.0 Soil 18/04/2011	SE87114A-R-18 QC1 Soil 18/04/2011
Date Extracted (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
Date Analysed (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
Arsenic	mg/kg	<3	5	<3	<3
Cadmium	mg/kg	<0.3	<0.3	<0.3	<0.3
Chromium	mg/kg	5.0	22	14	5.5
Copper	mg/kg	9.2	46	12	7.8
Lead	mg/kg	4	47	5	3
Molybdenum	mg/kg	2.2	2.3	1.2	1.8
Nickel	mg/kg	0.8	15	2.2	0.94
Zinc	mg/kg	3.4	39	10	4.0

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Anions in water Our Reference:	UNITS	SE87114A-R-15	SE87114A-R-16	SE87114A-R-17	SE87114A-R-18
Your Reference	----------	CTP93/0.6-0.7	CTP94/0.4-0.5	CTP94/0.8-1.0	QC1
Sample Matrix	----------	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Extracted		28/04/2011	28/04/2011	28/04/2011	28/04/2011
Date Analysed		28/04/2011	28/04/2011	28/04/2011	28/04/2011
Nitrate as N -in ASLP Leachate	mg/L	0.006	0.025	<0.005	0.010

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Metals in TCLP (AS4439) Our Reference: Your Reference Sample Matrix Date Sampled	UNITS ---------- ----------	SE87114A-R-15 CTP93/0.6-0.7 Soil 18/04/2011	SE87114A-R-16 CTP94/0.4-0.5 Soil 18/04/2011	SE87114A-R-17 CTP94/0.8-1.0 Soil 18/04/2011	SE87114A-R-18 QC1 Soil 18/04/2011
Date Extracted (ASLP Preparation)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
pH of final Leachate	pH units	7.32	4.98	5.01	7.33
Date Extracted (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
Date Analysed (Metals)		27/04/2011	27/04/2011	27/04/2011	27/04/2011
Arsenic	µg/L	<1	<1	<1	<1
Cadmium	µg/L	<0.1	<0.1	<0.1	<0.1
Chromium	µg/L	<1	<1	<1	<1
Copper	µg/L	1	3	1	<1
Lead	µg/L	<1	2	<1	<1
Molybdenum	µg/L	29	<1	<1	24
Nickel	µg/L	<1	2	<1	<1
Zinc	µg/L	<1	8	4	<1

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Moisture Our Reference:	UNITS	SE87114A-R-15	SE87114A-R-16	SE87114A-R-17	SE87114A-R-18
Your Reference	----------	CTP93/0.6-0.7	CTP94/0.4-0.5	CTP94/0.8-1.0	QC1
Sample Matrix	----------	Soil	Soil	Soil	Soil
Date Sampled		18/04/2011	18/04/2011	18/04/2011	18/04/2011
Date Analysed (moisture)		21/04/2011	21/04/2011	21/04/2011	21/04/2011
Moisture	%	24	41	23	25

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Method ID	Methodology Summary
AN291	
AN277	Nitrite as N - determined by colourimetric technique using discrete analyser. Based on APHA 21st Edition, 4500-NO2-B.
AN292	Total Kjeldahl Nitrogen (TKN) - Determined by colourimetric technique using discrete analyser following digestion with Sulphuric Acid, K2SO4 and CuSO4. Based on APHA 21st Edition, 4500-Norg D / USEPA 351.2.
AN170	In the presence of H2SO4, K2SO4, Se catalyst and heat, amino nitrogen of many organic materials is converted to ammonium sulphate. Free ammonia and ammonium-nitrogen are similarly converted. After the digestion the ammonia is distilled from an alkaline medium and the ammonia content determined titrimetrically or colorimetrically. Reference APHA 4500-Norg B/APHA 4500-NH3 B/C/F. Internal Reference AN170
SEI-103	Total Nitrogen - The sum of Nitrate, Nitrite and Total Kjeldahl Nitrogen.
AN245	A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN320	
AN006	Toxicity Characteristic Leaching Procedure (TCLP) - Preparation of leachates for assessing the mobility of both organic and inorganic contaminants present in liquid, solid, and multiphase wastes. Based on USEPA 1311. For volatile analytes, Zero-Headspace Extraction Vessel (ZHE) is used. This method also meets the requirements of Australian Standard Leaching Procedure (ASLP) AS 4439.3-1997 Part 3.
AN101	pH - Measured using pH meter and electrode based on APHA 21st Edition, 4500-H+. For water analyses the results reported are indicative only as the sample holding time requirement specified in APHA was not met (APHA requires that the pH of the samples are to be measured within 15 minutes after sampling).
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN002	

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QUALITY CONTROL Inorganics	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Ammonia as N by DA*	mg/kg	0.15	AN291	<0.15	[NT]	[NT]	LCS	100%
Date Extracted (NO_2)				02/05/2011	[NT]	[NT]	LCS	02/05/2011
Date Analysed (NO_2)				02/05/2011	[NT]	[NT]	LCS	02/05/2011
Nitrite as N	mg/kg	0.025	AN277	<0.02	[NT]	[NT]	LCS	102%
Date Extracted (TKN)				30/04/2011	[NT]	[NT]	LCS	30/04/2011
Date Analysed (TKN)				30/04/2011	[NT]	[NT]	LCS	30/04/2011
Total Kjeldahl Nitrogen	mg/kg	40	AN292	<40	[NT]	[NT]	LCS	101%
Total Nitrogen (by calc.)*	mg/kg	20	AN170	<20	[NT]	[NT]	LCS	101%
Ammonia as N (in ASLP Leachate)	mg/L	0.01	AN291	<0.01	[NT]	[NT]	LCS	94%
Date Extracted (NO_2)				02/05/2011	[NT]	[NT]	LCS	02/05/2011
Date Analysed (NO_2)				02/05/2011	[NT]	[NT]	LCS	02/05/2011
Nitrite as N -in ASLP Leachate	mg/L	0.005	AN277	<0.005	[NT]	[NT]	LCS	102%
Date Extracted (TKN)				29/04/2011	[NT]	[NT]	LCS	29/03/2011
Date Analysed (TKN)				29/04/2011	[NT]	[NT]	LCS	29/03/2011
Total Kjeldahl Nitrogen (ASLP)	mg/L	0.2	AN292	<0.200	[NT]	[NT]	LCS	103%
Total Nitrogen ASLP (by calc.)	mg/L	0.2	SEI-103	<0.200	[NT]	[NT]	[NR]	[NR]

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QUALITY CONTROL Anions in soil	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				28/04/11	[NT]	[NT]	LCS	28/04/11
Date Analysed				28/04/11	[NT]	[NT]	LCS	28/04/11
Nitrate as N 1:5 soil:water	mg/kg	0.025	AN245	<0.025	[NT]	[NT]	LCS	102%

QUALITY CONTROL Metals in Soil by ICP-OES	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted (Metals)				27/04/2011	SE87114A-18	27/04/2011 || 27/04/2011	LCS	27/04/2011
Date Analysed (Metals)				27/04/2011	SE87114A-18	27/04/2011 || 27/04/2011	LCS	27/04/2011
Arsenic	mg/kg	3	AN320	<3	SE87114A-18	<3 || <3	LCS	92%
Cadmium	mg/kg	0.3	AN320	<0.3	SE87114A-18	<0.3 || <0.3	LCS	91%
Chromium	mg/kg	0.3	AN320	<0.3	SE87114A-18	5.5 || 5.6 || RPD: 2	LCS	93%
Copper	mg/kg	0.5	AN320	<0.5	SE87114A-18	7.8 || 7.2 || RPD: 8	LCS	94%
Lead	mg/kg	1	AN320	<1	SE87114A-18	3 || 3 || RPD: 0	LCS	90%
Molybdenum	mg/kg	1	AN320	<1.0	SE87114A-18	1.8 || 1.9 || RPD: 5	LCS	91%
Nickel	mg/kg	0.5	AN320	<0.5	SE87114A-18	0.94 || 0.9 || RPD: 4	LCS	93%
Zinc	mg/kg	0.5	AN320	<0.5	SE87114A-18	4.0 || 4.1 || RPD: 2	LCS	91%

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QUALITY CONTROL Anions in water	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Date Extracted				28/04/11	[NT]	[NT]	LCS	28/04/11
Date Analysed				28/04/11	[NT]	[NT]	LCS	28/04/11
Nitrate as N -in ASLP Leachate	mg/L	0.005	AN245	<0.005	[NT]	[NT]	LCS	102%

QUALITY CONTROL Metals in TCLP (AS4439)	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
pH of final Leachate	pH units	0	AN101	[NT]	[NT]	[NT]	[NR]	[NR]
Date Extracted (Metals)				27/04/2011	[NT]	[NT]	LCS	27/04/2011
Date Analysed (Metals)				27/04/2011	[NT]	[NT]	LCS	27/04/2011
Arsenic	µg/L	1	AN318	<1	[NT]	[NT]	LCS	104%
Cadmium	µg/L	0.1	AN318	<0.1	[NT]	[NT]	LCS	106%
Chromium	µg/L	1	AN318	<1	[NT]	[NT]	LCS	105%
Copper	µg/L	1	AN318	<1	[NT]	[NT]	LCS	109%
Lead	µg/L	1	AN318	<1	[NT]	[NT]	LCS	109%
Molybdenum	µg/L	1	AN318	<1	[NT]	[NT]	LCS	96%
Nickel	µg/L	1	AN318	<1	[NT]	[NT]	LCS	109%
Zinc	µg/L	1	AN318	<1	[NT]	[NT]	LCS	106%

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QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	<1

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

DETECTION LIMITS FOR ANIONS RISE 2X FOR SAMPLE 15AND 18 DUE TO HIGH EC.
Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
This document is issued by the Company subject to its General Conditions of Service (www.sgs.com/terms_and_conditions.htm). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

This document is to be treated as an original within the meaning of UCP 600. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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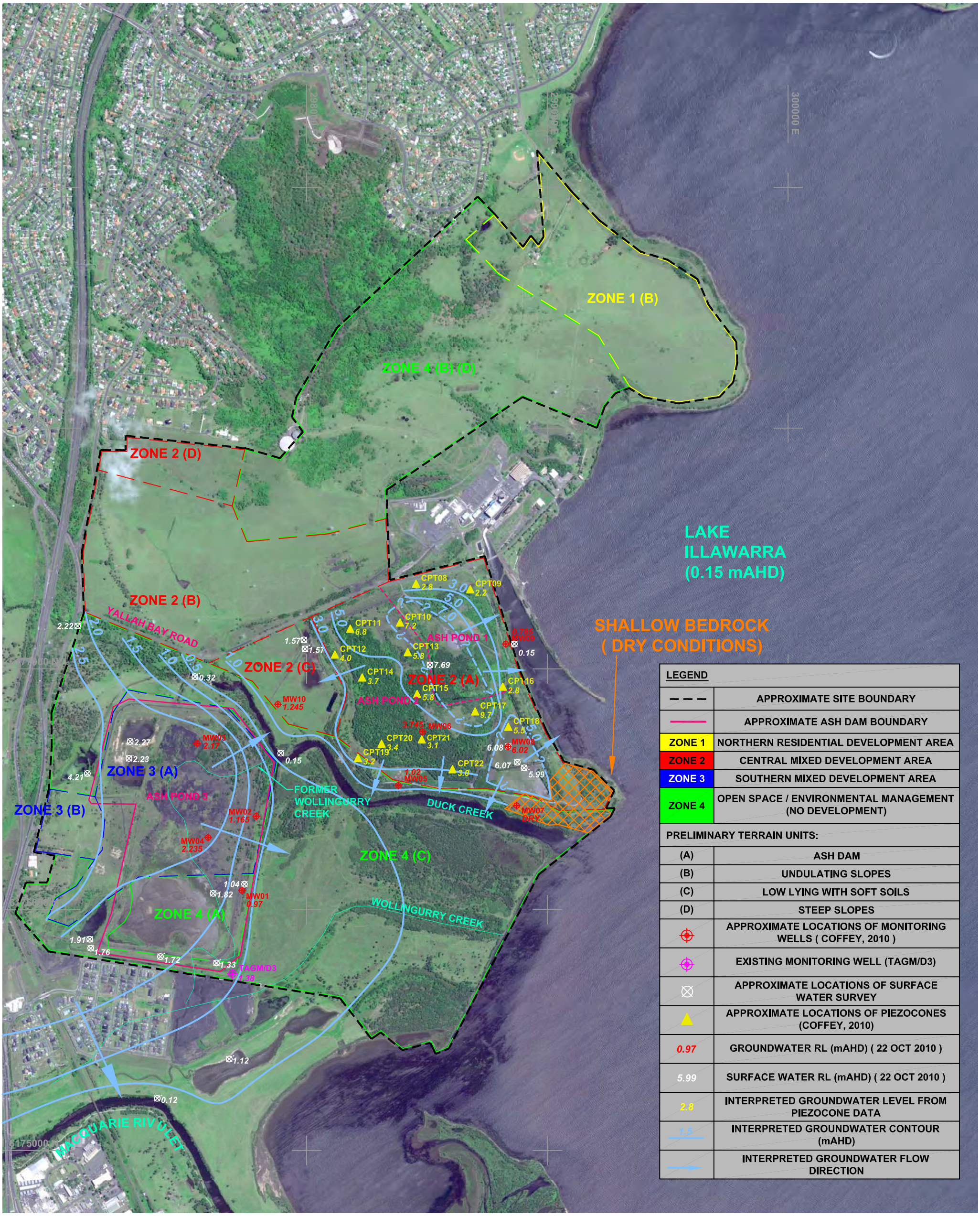
Appendix F
Interpreted Groundwater Contour Map



AERIAL IMAGE SOURCE: WOLLONGONG CITY COUNCIL 2010

0 150 300 450 600 750 900

Scale (metres)

drawn	CDC/AW
approved	PT
date	23/11/10
scale	1:15 000
original size	A3

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SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

client: TRUENERGY

project: PRELIMINARY HYDROGEOLOGICAL ASSESSMENT - ASH PONDS TALLAWARRA LANDS, YALLAH, NSW

title: INTERPRETED GROUNDWATER CONTOUR MAP

project no: ENAUWOLL04009AC

figure no: FIGURE 3

Appendix G
Data Validation

Coffey Environments Australia Pty Ltd

A.C.N. 140 765 902 A.B.N. 65 140 765 902

coffey environments
SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

QA/QC DATA VALIDATION REPORT

Job No: ENAUWOLL04009AE Batches: SE85496, SE85547, SE85743, SE86052
Anions & Cations: SE85496A, SE85547A, SE85743A, SE86052A

I. SAMPLE HANDLING

	Yes	No (Comment below)
1. Were the sample **holding times** met?	☒	☐
2. Were the samples in **proper custody** between the field and reaching the laboratory?	☐	☒
3. Were the samples **properly and adequately** preserved? *This includes keeping the samples chilled, where applicable.*	☒	☐
4. Were the samples received by the laboratory in good condition?	☒	☐

COMMENTS:

Batches SE85496, SE85547, SE85743 and SE86052

- The relinquishment, consigning office and/or despatch date details were not completed on the COC however the remaining sections of the COC were completed. This is not considered significant as the sample batch was received by the laboratory within expected timeframes.

Sample Handling was: ☐ Satisfactory ☐ Unsatisfactory ☒ Partially Satisfactory

QA/QC DATA VALIDATION REPORT

Job No: ENAUWOLL04009AE Batches: SE85496, SE85547, SE85743, SE86052
Anions & Cations: SE85496A, SE85547A, SE85743A, SE86052A

II PRECISION/ACCURACY ASSESSMENT

	Yes	No (Comment below)
1. Was a NATA registered laboratory used?	☒	☐
2. Did the laboratory perform the requested tests?	☒	☐
3. Were the laboratory methods adopted NATA endorsed?	☒	☐
4. Were the appropriate test procedures followed?	☒	☐
5. Were the reporting limits satisfactory?	☐	☒
6. Was the NATA Seal on the reports?	☒	☐
7. Were the reports signed by an authorised person?	☒	☐

COMMENTS:

- For batches SE85496, SE85547, SE85743 and SE86052, the laboratory reporting limit (LOR) was raised for nitrate from 5µg/L to between 25µg/L and 250µg/L due to matrix interference caused by high dissolved solids (ie. electrical conductivity) in samples. This result is not considered significant as the LOR was well below the adopted assessment criteria.
- For batches SE85496, SE85547, SE85743 and SE86052, the LOR was raised for several heavy metals from 0.5µg/L to between 1µg/L and 20µg/L due to matrix interference caused by high dissolved solids (ie. electrical conductivity) in samples. The assessment of some heavy metals was compromised for groundwater at some locations, as the LOR was above the corresponding assessment criteria. The samples affected by this included MW02, MW04, MW08, MW17 (cadmium), MW06 (cadmium, copper) and MW16 (arsenic, cadmium, copper, nickel).

Precision/Accuracy of the Laboratory Report	☐ Satisfactory	☐ Unsatisfactory
	☒ Partially Satisfactory	

QA/QC DATA VALIDATION REPORT

Job No: ENAUWOLL04009AE Batches: SE85496, SE85547, SE85743, SE86052
Anions & Cations: SE85496A, SE85547A, SE85743A, SE86052A

III. FIELD QA/QC

1. Number of Primary Samples Analysed — Soil: 0; Water: 6 (SE85496); 9 (SE85547); 2 (SE85743); 1 (SE86052)

2. Number of Days of Sampling: — Soil: N/A; Water: 4

3. Number and Type of QA/QC Samples Collected:

	SOIL	WATER
Field Duplicates (at least 1 in 10 samples)	NA	2
Trip Blanks (at least 1/day or sampling event)	NA	0
Wash Blanks (at least 1/day/matrix/equipment)	NA	0
Other (Field Blanks, Spiked Trip Blanks, etc.)	NA	0

4. FIELD DUPLICATES

	Yes	No (Comment below)
A. Were an Adequate Number of field duplicates analysed for each chemical (min. 10%)?	☒	☐
B. Were RPDs within Control Limits?*		
a. Organics	N/A ☒	N/A ☐
b. Metals/Inorganics		

* - Result < 10 times LOR then No Limit
- Result between 10 and 20 times LOR then control limit of 30%

COMMENTS:

- Results of quality control samples are presented in Table QAQC1.

5. TRIP BLANKS

	Yes	No (Comment below)
A. Were an Adequate Number of trip blanks collected?	☐	☒
B. Were the Trip Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☐	☐

6. WASH BLANKS

	Yes	No (Comment below)
A. Were an adequate number of Wash Blanks collected?	☐	☒
B. Were the Wash Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☐	☐

COMMENTS:

- Trip spike and blank samples were not transported with samples as volatile petroleum hydrocarbons were not a chemical of concern.
- Groundwater samples were collected using dedicated sampling equipment therefore a wash blank sample was not required.

Field QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

IV LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

1. Type of QA/QC Samples

	Nitrate	Nitrite	TKN	Ammonia	Metals	Anions	Cations
Laboratory Blanks/Reagent Blanks (at least 1 per batch)	✓	✓	✓	✓	✓	✓	✓
Laboratory Duplicates (at least 1 per batch or 1 per 10 samples whichever is the smaller)	✓	✓	-	✓	✓	✓	✓
Matrix Spikes/Matrix Spike Duplicates (1 for each matrix type)	✓	-	-	-	✓	-	-
Laboratory Control Spike	✓	✓	✓	✓	-	✓	✓
Surrogate (where appropriate)*	-	-	-	-	-	-	-

*Number of surrogates spikes carried out on each sample

	Yes	**No** (Comment below)
2 Were the laboratory blanks/reagents blanks free of contamination?	☒	☐
3. Were the spike recoveries within control limits? a. Organics (60% to 110%) b. Metals/Inorganic (70% to 130%)	N/A ☒	N/A ☐
4. Were the RPDs of the laboratory duplicates within control limits?	☐	☒
5. Were the surrogate recoveries within control limits?	N/A	N/A

COMMENTS:

- A reduced frequency of duplicates, matrix spikes and/or laboratory control spikes was used for batches containing less than 10 samples.

Batch SE85547

- In the batch QA/QC, a RPD of 48%, above the control limit of 30% was reported for zinc between laboratory duplicate pair that corresponded to sample MW18. This result may indicate some variability of zinc concentrations for groundwater in the vicinity of MW18.

5. The laboratory internal QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

V. DATA USABILITY

1. Data Directly Usable (see comment below) ☒
2. Data Usable with the following corrections/modifications (see comment below) ☐
3. Data Not Usable. ☐

COMMENTS:

For batches SE85496, SE85547, SE85743 and SE86052, the laboratory reporting limit (LOR) was raised for several heavy metals from 0.5µg/L to between 1µg/L and 20µg/L due to matrix interference caused by high dissolved solids (ie. electrical conductivity) in samples. The assessment of some heavy metals was compromised for groundwater at some locations, as the LOR was above the corresponding assessment criteria. The samples affected by this included MW02, MW04, MW08, MW17 (cadmium), MW06 (cadmium, copper) and MW16 (arsenic, cadmium, copper, nickel).

A higher RPD was reported between the laboratory duplicate pair corresponding to primary sample MW18 for zinc. Therefore, some variability in those heavy metal concentrations can be expected. The reason for the variability is not clear based on observations made at the time of sampling. This result is not considered significant as zinc concentrations are comparable to those reported at other groundwater monitoring locations targeting a similar water bearing zone. Therefore, the zinc concentrations are considered representative of the concentrations at the locations tested.

QA/QC Report Prepared by Colee Quayle

QA/QC Report Reviewed by: Michael Blackam
(Reviewer)

Coffey Environments Australia Pty Ltd

A.C.N. 140 765 902 A.B.N. 65 140 765 902

QA/QC DATA VALIDATION REPORT

Job No: ENAUWOLL04009AE Batches: SE87114 & SE87114A

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SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE

I. SAMPLE HANDLING

	Yes	No (Comment below)
1. Were the sample **holding times** met?	☒	☐
2. Were the samples in **proper custody** between the field and reaching the laboratory?	☒	☐
3. Were the samples **properly and adequately** preserved? *This includes keeping the samples chilled, where applicable.*	☒	☐
4. Were the samples received by the laboratory in good condition?	☒	☐

COMMENTS:

Sample Handling was: ☒ Satisfactory ☐ Unsatisfactory ☐ Partially Satisfactory

II PRECISION/ACCURACY ASSESSMENT

	Yes	No (Comment below)
1. Was a NATA registered laboratory used?	☒	☐
2. Did the laboratory perform the requested tests?	☒	☐
3. Were the laboratory methods adopted NATA endorsed?	☒	☐
4. Were the appropriate test procedures followed?	☒	☐
5. Were the reporting limits satisfactory?	☒	☐
6. Was the NATA Seal on the reports?	☒	☐
7. Were the reports signed by an authorised person?	☒	☐

COMMENTS:

- For batches SE87114 & SE87114A, the LOR was raised for nitrate from 0.025mg/kg to between 0.05mg/kg and 0.125mg/kg due to matrix interference caused by high electrical conductivity in samples CTP92/0.6-0.8m, CTP92/1.0-1.1m, CTP93/0.6-0.7m and QC1. This result is not considered to have a material effect on the conclusions of the report.

Precision/Accuracy of the Laboratory Report	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

III. FIELD QA/QC

1. Number of Primary Samples Analysed — Soil: 12 (SE87114); Water: 0

2. Number of Days of Sampling: — Soil: 1; Water: 0

3. Number and Type of QA/QC Samples Collected:

	SOIL	WATER
Field Duplicates (at least 1 in 10 samples)	2	N/A
Trip Blanks (at least 1/day or sampling event)	0	N/A
Wash Blanks (at least 1/day/matrix/equipment)	0	N/A
Other (Field Blanks, Spiked Trip Blanks, etc.)	0	N/A

4. FIELD DUPLICATES

	Yes	No (Comment below)
A. Were an Adequate Number of field duplicates analysed for each chemical (min. 10%)?	☒	☐
B. Were RPDs within Control Limits?*		
a. Organics	N/A ☐	N/A ☒
b. Metals/Inorganics		

* - Result < 10 times LOR then No Limit
- Result between 10 and 20 times LOR then control limit of 50% (soil) & 30% (water)

COMMENTS:

- A RPD of 59%, above the control limit of 50%, were recorded for TKN and total nitrogen for soil duplicate pair CTP91/0.6-0.8m and QC3. This result is considered to be attributed to the heterogeneous nature of the contaminant distribution throughout the soil/fill matrix.
- RPDs of 49%, above the control limit of 30% were reported for TKN and total nitrogen for leachate duplicate pair CTP93/0.6-0.7m and QC1. It is considered that the variability may be attributed to varying amounts of organic materials in the soil. This result may indicate some variability of TKN and total nitrogen concentrations for leachate derived from clay soils.
- Results of quality control samples are presented in Tables QAQC1 and QAQC2.

5. TRIP BLANKS

	Yes	No (Comment below)
A. Were an Adequate Number of trip blanks collected?	☐	☒
B. Were the Trip Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☐	☐

6. WASH BLANKS

	Yes	No (Comment below)
A. Were an adequate number of Wash Blanks collected?	☐	☒
B. Were the Wash Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☐	☐

COMMENTS:

- Trip spike and blank samples were not transported with samples as volatile petroleum hydrocarbons were not a chemical of concern.
- Soil samples were either collected directly from the excavator bucket or ground surface using a clean pair of disposable gloves for each sample and therefore a wash blank sample was not considered necessary.

Field QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

IV LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

1. Type of QA/QC Samples

	Nitrate	Nitrite	TKN	Ammonia	Metals
Laboratory Blanks/Reagent Blanks (at least 1 per batch)	✓	✓	✓	✓	✓
Laboratory Duplicates (at least 1 per batch or 1 per 10 samples whichever is the smaller)	✓	✓	✓	✓	✓
Matrix Spikes/Matrix Spike Duplicates (1 for each matrix type)	-	-	-	-	✓
Laboratory Control Spike	✓	✓	✓	✓	✓
Surrogate (where appropriate)*	-	-	-	-	-

*Number of surrogates spikes carried out on each sample

	Yes	**No** (Comment below)
2 Were the laboratory blanks/reagents blanks free of contamination?	☒	☐
3. Were the spike recoveries within control limits? a. Organics (60% to 110%) b. Metals/Inorganic (70% to 130%)	N/A ☒	N/A ☐
4. Were the RPDs of the laboratory duplicates within control limits?	☐	☒
5. Were the surrogate recoveries within control limits?	N/A	N/A

COMMENTS:

- A reduced frequency of duplicates, matrix spikes and/or laboratory control spikes was used for batch SE87114A, which contained less than 10 samples.

Batch SE87114

- In the batch QA/QC, a RPD of 55%, above the control limit of 50% was reported for lead between laboratory duplicate pair that corresponded to sample CTP90/1.8-2.0m. This result may indicate some variability of lead concentrations for groundwater in the vicinity of CTP90/1.8-2.0m.

5. The laboratory internal QA/QC was:	☒ Satisfactory	☐ Unsatisfactory	
	☐ Partially Satisfactory		

V. DATA USABILITY

1. Data Directly Usable (see comment below) ☒
2. Data Usable with the following corrections/modifications (see comment below) ☐
3. Data Not Usable. ☐

COMMENTS:

For batches SE87114 & SE87114A, the LOR was raised for nitrate from 0.025mg/kg to between 0.05mg/kg and 0.125mg/kg due to matrix interference caused by high electrical conductivity in samples CTP92/0.6-0.8m, CTP92/1.0-1.1m, CTP93/0.6-0.7m and QC1. This result is not considered to have a material effect on the conclusions of the report.

A higher RPD was reported between the laboratory duplicate pair corresponding to primary sample CTP90/1.8-2.0m for lead in soil. A higher RPD was also reported for field duplicate pair CTP91/0.6-0.8m and QC3 for TKN and total nitrogen in soil. Therefore, some variability in lead, TKN and total nitrogen concentrations can be expected. In both cases, the variability is considered to be attributed to the heterogeneous nature of the contaminant distribution throughout the soil/fill matrix.

Higher RPDs were reported for field duplicate pair CTP93/0.6-0.7m and QC1 for TKN and total nitrogen in leachate derived from clay soil. It is considered that the variability may be attributed to varying amounts of organic materials in the soil. This result may indicate some variability of TKN and total nitrogen concentrations for leachate derived from clay soils.

QA/QC Report Prepared by Colee Quayle

QA/QC Report Reviewed by: Michael Blackam
(Reviewer)

Table QAQC1: Relative Percentage Difference for Groundwater & Leachate

Batch:	SE85496			SE85547			SE87114			SE87114			SE87114A		
	Primary Sample Conc. (µg/L)	Duplicate Sample Conc. (µg/L)	RPD (%)	Primary Sample Conc. (µg/L)	Duplicate Sample Conc. (µg/L)	RPD (%)	Primary Sample Conc. (µg/L)	Duplicate Sample Conc. (µg/L)	RPD (%)	Primary Sample Conc. (µg/L)	Duplicate Sample Conc. (µg/L)	RPD (%)	Primary Sample Conc. (µg/L)	Duplicate Sample Conc. (µg/L)	RPD (%)
Sample No.	MW05	QC01		MW01	QC03		CTP89	QC2		CTP91	QC3		CTP93	QC1	
Depth (m)	-	-		-	-		1.8-2.0	1.8-2.0		0.6-0.8	0.6-0.8		0.6-0.7	0.6-0.7	
Analyte															
HEAVY METALS (DISSOLVED)															
Arsenic	55	49	12	7	7	0	<1	<1	ND	4	3	29	<1	<1	ND
Cadmium	<0.5	<0.5	ND	<0.5	<0.5	ND	<0.1	<0.1	ND	<0.1	<0.1	ND	<0.1	<0.1	ND
Chromium (III)	<5	<5	ND	<5	<5	ND	<1	<1	ND	<1	<1	ND	<1	<1	ND
Copper	50	38	27	<0.5	<0.5	ND	<1	<1	ND	<1	<1	ND	1	<1	NC
Lead	7	6	15	<0.5	<0.5	ND	<1	<1	ND	<1	<1	ND	<1	<1	ND
Molybdenum	1	<1	NC	1	2	67	<1	3	NC	<1	1	NC	29	24	19
Nickel	5	6	18	5	5	0	<1	<1	ND	<1	<1	ND	<1	<1	ND
Zinc	73	69	6	67	52	25	<1	<1	ND	<1	<1	ND	<1	<1	ND
NUTRIENTS															
Ammonium (NH_4^+) as N	9200	10000	8	2200	2300	4	0.15	0.13	14	0.08	0.09	12	0.51	0.5	2
Nitrate as N	<250	<250	ND	<50	<10	ND	0.029	0.017	52	<0.005	<0.005	ND	0.006	0.01	50
Nitrite as N	<5	<5	ND	<5	6.0	NC	0.006	0.007	15	0.005	0.007	33	0.020	0.020	0
Total Kjeldahl Nitrogen	12000	10500	13	3400	3600	6	3.7	3.3	11	0.24	0.27	12	8.7	5.3	**49**
Total Nitrogen (by calc.)	12000	10500	13	3400	3600	6	3.7	3.3	11	0.24	0.27	12	8.7	5.3	**49**

Notes:

Bold RPD exceeds control limit for soil if:
- Result < 10 times LOR then No Limit
- Result between 10 and 20 times LOR then control limit of 30%

RPD Relative Percentage Difference
ND Not Detected
NC Contaminant is not detected in primary sample but is detected in duplicate sample, or vice versa
LOR Limit of Reporting

Table QAQC2: Relative Percentage Difference for Soil

Batch:	SE87114			SE87114			SE87114A		
	Primary Sample Conc. (mg/kg)	**Duplicate Sample Conc. (mg/kg)**	**RPD (%)**	**Primary Sample Conc. (mg/kg)**	**Duplicate Sample Conc. (mg/kg)**	**RPD (%)**	**Primary Sample Conc. (mg/kg)**	**Duplicate Sample Conc. (mg/kg)**	**RPD (%)**
Sample No.	CTP89	QC2		CTP91	QC3		CTP93	QC1	
Depth (m)	1.8-2.0	1.8-2.0		0.6-0.8	0.6-0.8		0.6-0.7	0.6-0.7	
Analyte									
HEAVY METALS (TOTAL)									
Arsenic	<3	<3	ND	<3	<3	ND	<3	<3	ND
Cadmium	0.5	<0.3	NC	<0.3	<0.3	ND	<0.3	<0.3	ND
Chromium (III)	1.7	1.4	19	4.5	4.4	2	5	5.5	10
Copper	21	22	5	5.7	5.7	0	9.2	7.8	16
Lead	15	15	0	3	3	0	4	3	29
Molybdenum	1.6	<1	NC	<1	<1	ND	2.2	1.8	20
Nickel	8.2	8.3	1	3.8	3.9	3	0.8	0.94	16
Zinc	45	60	29	11	12	9	3.4	4	16
NUTRIENTS									
Ammonium (NH_4^+) as N	0.54	0.55	2	<0.15	0.15	NC	11	6.7	49
Nitrate as N	0.11	0.11	0	0.060	0.062	3	<0.050	<0.050	ND
Nitrite as N	0.0	0.0	0	<0.025	0.040	NC	0.0	0.050	22
Total Kjeldahl Nitrogen	2300	3100	30	550	300	**59**	420	600	35
Total Nitrogen (by calc.)	2300	3100	30	550	300	**59**	420	600	35

Notes:

Bold RPD exceeds control limit for soil if:

- Result < 10 times LOR then No Limit
- Result between 10 and 20 times LOR then control limit of 50%

RPD Relative Percentage Difference

ND Not Detected

NC Contaminant is not detected in primary sample but is detected in duplicate sample, or vice versa

LOR Limit of Reporting