Appendix 1 Borelogs

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF01***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***13.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***13.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Piston Core				0.5				Brown silty sandy CLAY, very firm, very plastic, very sticky, moist, medium grained sands, no organics, no odour									SWL 0.4m	Standing water level
								Very dark greenish grey silty CLAY, very weak, slightly plastic, very sticky, wet, abundant fine to coarse organics, sulfur odour										
				1.0				Very dark greenish grey silty CLAY, firm, very plastic, very sticky, moist, many fine to coarse organics, sulfur odour										
				1.5				End of MF01 at 1.3m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF02***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***13.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***13.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Piston Core				0.5				Brown silty sandy CLAY, very firm, slightly plastic, very sticky, moist, no organics, medium grained sands, no odour									
								Dark grey silty CLAY with coarse sand bands, very plastic, very sticky, moist, very few fine organics, coarse sand grains, sulfur odour									SWL 0.3m	Standing water level
				1.0				Greenish grey silty coarse SAND, non plastic, non sticky, loose, no organics, no shells, sulfur odour									
				1.5														
								End of MF02 at 1.75m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF03***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***15.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Very dark grey silty CLAY, weak to firm, very plastic, very sticky, wet, few fine organics, some fine sand, few fine to coarse fragments, no odour									SWL 0.0m (high tide overnight)	
								Lightly yellowish brown silty sandy CLAY, weak, very plastic, very sticky, wet, fine to medium grain sands, few fine to coarse fragments, no odour										
								End of MF03 at 0.3m										
				0.5														
				1.0														
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF04***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***14.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Brown silty sandy CLAY, firm, very plastic, very sticky, moist, many fine to coarse organics, medium sand grains, no odour										SWL 0.0m (location submerged from high tide)	
				1.0				Very dark greenish grey silty CLAY, firm, very plastic, moderate stickiness, slightly moist, many fine to coarse organics, few organics at 0.8m, sulfur odour											
				1.5				End of MF04 at 1.2m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF05***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 82mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Hand Auger				0.5				Brown silty CLAY with grey mottle, firm, very plastic, slightly sticky, dry, no organics, medium sand grains, no odour									SWL 14/5 groundwater not encountered, SWL 15/5 0.0m (high tide overnight)	
				1.0				Light brownish grey silty CLAY, firm, slightly plastic, very low stickiness, dry, no organics, no odour										
				1.5				Dark greenish grey silty CLAY, firm, very plastic, moderately sticky, dry, no organics, fine to medium sands, no odour										
				2.0				Greenish grey silty gravelly coarse SAND, very weak, non plastic, moderately sticky, wet, few coarse fragments, no odour										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF05***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 82mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Hand Auger								Greenish grey silty gravelly coarse SAND, very weak, non plastic, moderately sticky, wet, few coarse fragments, no odour										
								End of MF05 at 2.25m										
				2.5														
				3.0														
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF06***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 82mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Hand Auger				0.0				Very dark greyish brown silty CLAY, topsoil, firm, very plastic, very sticky, dry, many very fine organics, some medium grained sand, no odour											
								Brown silty CLAY with dark brown mottle, very firm, very plastic, moderately sticky, dry, no organics, no odour										
								Dark brown silty CLAY, firm, very plastic, moderately sticky, dry, no organics, no odour										
				0.5														
								Grey silty CLAY, firm, very plastic, very sticky, dry, greasy, some fine sand, no organics, no odour										
				1.0													SWL 1.0m	▼ Standing water level
								Greyish green silty CLAY with fine sand (weathered), very firm, very plastic, moderately sticky, dry, greasy, no odour										
								Brown silty CLAY with yellowish red mottle, very firm, very plastic, slightly sticky, dry, no organics, some medium sands, no odour										
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF06***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 82mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Hand Auger				2.5				Brown silty CLAY with yellowish red mottle, very firm, very plastic, slightly sticky, dry, no organics, some medium sands, no odour											
				3.0				End of MF06 at 3m										
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF07***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 82mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.0				Dark yellowish brown silty CLAY with yellowish red mottle, firm, very plastic, very sticky, dry, no organics, very few coarse fragments, some fine sand, no odour										SWL 14/5 1.04m, SWL 15/5 0.0m (high tide overnight)	
								Brown silty CLAY with fine sand, very firm, very plastic, slightly sticky, dry, no organics, no odour										
				0.5														
								Greyish green silty CLAY with fine sand, very firm, very plastic, moderately sticky, dry, no organics, some carbonates, no odour										
				1.0														▼ Standing water level
								Grey silty CLAY, strong, very plastic, moderately sticky, dry, trace fine sand, no organics, no odour										
Hand Auger								Dark greenish grey silty CLAY with fine to medium sand grains, firm, very plastic, moderately sticky, dry, no organics, no odour									At 1.35m - Vibracore refusal	
				1.5				Light brownish grey silty CLAY with red and strong brown mottle and fine to medium sand grains, dry, very plastic, moderate to very sticky, no odour, no organics, no odour										
				2.0				End of MF07 at 2m										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF08***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 82mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Brown silty CLAY with strong brown and grey mottle and fine sand, weak, very plastic, moderate stickiness, dry, no organics, no odour										SWL 14/5 0.4m, SWL 15/5 0.0m (high tide overnight)	Standing water level
								Dark greenish grey silty CLAY, firm, very plastic, slightly sticky, dry, no organics, no odour									At 0.5m - Vibracore refusal	
Hand Auger				1.0				Greenish grey silty CLAY with some fine sands, firm, very plastic, very sticky, dry, no organics, no odour										
				1.5				Grey brown silty CLAY with yellowish red mottle, very firm, very plastic, very sticky, dry, some fine to medium sands, no organics, no odour										
				2.0				End of MF08 at 2m										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF09***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 82mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Very dark grey silty CLAY, weak, very plastic, moderately sticky, moist, abundant fine to coarse organics, sulfur odour									SWL 14/5 groundwater not encountered, SWL 15/5 0.0m (high tide overnight)	
								Brown silty CLAY with dark grey mottle, weak, very plastic, very sticky, moist, some fine sand, many fine to coarse organics, thick band of fine to coarse abundant organics between 0.25m and 0.3m, no odour										
								Grey silty CLAY, stiff, weathered, very plastic, very sticky, dry, few very fine organics, sulfur odour										
				0.5													Vibracore refusal at 0.5m	
Hand Auger								Greyish green silty CLAY, strong, weathered, very plastic, very sticky, dry, few very fine organics, sulfur odour. At 1.0m, becomes moderately moist										
				1.0														
								End of MF09 at 1.25m										
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF10***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***14.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 82mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Hand Auger				0.5				Very dark greyish brown silty CLAY, weak to firm, very plastic, moderately sticky, dry, no organics, no odour									SWL 14/5 groundwater not encountered, SWL 15/5 0.0m (high tide overnight)	
								Very dark grey silty CLAY, weak, very plastic, moderately sticky, greasy, dry, abundant fine to coarse organics, sulfur odour										
								Grey silty CLAY, stiff, very plastic, slightly sticky, dry, no organics, some fine sands, slight sulfur odour										
				1.0				Dark greenish grey silty CLAY, strong, very plastic, slightly sticky, dry, no organics, some fine sands, slight sulfur odour										
				1.5				Greenish grey silty sandy CLAY with very dark greyish green mottle, weak to firm, very plastic, very sticky, wet, few fine to coarse organics, fine-medium grained sand, few fine coarse fragments, faint sulfur odour										
								End of MF10 at 1.75m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF12***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***15.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Brown silty gravelly SAND, loose, non plastic, non sticky, wet, fine to coarse grained sands, fine to coarse fragments, no organics, no odour									SWL 0.0m (location submerged)	
								Very dark grey silty CLAY, coarse sand with few coarse fine fragments, firm, very plastic, moderate stickiness, dry, no organic matter, no odour										
								End of MF12 at 0.4m										
				0.5														
				1.0														
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF13***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***10.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***10.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Dark grey silty CLAY with yellowish brown mottle, firm, dry, moderately sticky, very plastic, no sand, few fine organics, no odour										SWL 0.28m	Standing water level
				1.0				Dark grey silty CLAY, weak, moist, very plastic, very sticky, abundant fine organics, sulfur odour											
				1.5				Dark grey silty CLAY, firm, dry, very plastic, very high stickiness, few coarse organics, sulfur odour											
								Very dark grey silty CLAY, moist, very plastic, moderately sticky, greasy, abundant fine organics, sulfur odour											
				2.0				1.8m Recovery											

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF13***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***10.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***10.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
								1.8m Recovery										
				2.5				End of MF13 at 2.5m										
				3.0														
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF14***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Yellowish brown silty CLAY, weak, high plasticity, moderately sticky, moist, no sand, few fine organics, no shells, no odour										SWL 0.25m	Standing water level
				1.0				Very dark grey silty CLAY with yellowish brown mottle, weak, very high plasticity, very sticky, moist, abundant fine to medium organics present from 0.2m - 0.8m and further bands down to 1.4m, no sand, no shells, no odour											
				1.5				Black silty CLAY, weak, very plastic, very sticky, moist, few fine to moderate organics, trace sand, very few fine coarse fragments, sulfur odour											
				2.0				1.6m Recovery										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF14***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
								1.6m Recovery										
				2.5				End of MF14 at 2.6m										
				3.0														
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF15***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Dark yellowish brown silty CLAY with grey mottle, weak, very plastic, slightly sticky, moist, few fine organics, no shells, no odour											
				1.0				Very dark grey silty CLAY, weak, very plastic, very sticky, wet, no silt, abundant fine organics, band of medium sized shells throughout, no odour								SWL 0.3m	Standing water level
				1.5														
				2.0				Very dark grey silty CLAY, firm, very plastic, very sticky, wet, no shells, no organics, no odour										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF15***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Black silty CLAY, very plastic, very firm, moderately sticky, moist, no sand, no shells, abundant fine-coarse organics, sulfur odour											
								2.2m Recovery										
				2.5														
				3.0														
				3.5				End of MF15 at 3.5m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF16***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Yellowish brown silty CLAY, weak to firm consistency, very plastic, moderately sticky, dry, no organics, no odour									SWL 0.42m	Standing water level
				1.0				Dark grey silty CLAY, weak to firm, very plastic, very sticky, moist, few fine organics, sulfur odour										
				1.5				Grey silty CLAY, weak, very plastic, very sticky, greasy, dry, few fine organics, many fine shells fragments, sulfur odour										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF16***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				Grey silty CLAY, weak, very plastic, very sticky, greasy, dry, few fine organics, many fine shells fragments, sulfur odour											
								Dark grey silty CLAY, firm, very plastic, moderately sticky, greasy, abundant fine organics, sulfur odour										
				3.0				2.6m Recovery										
				3.5				End of MF16 at 3.5m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF17***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Yellowish brown silty CLAY with red and strong brown mottle, firm, very plastic, very sticky, moist, no organics, few fine to coarse fragments, no odour										SWL 0.48m	Standing water level
				1.0				Very dark grey silty CLAY, weak, very plastic, very sticky, moist, abundant fine to coarse organics, greasy, sulfur odour											
				1.5				Dark grey silty CLAY, firm, very plastic, very sticky, dry, few fine organics, many fine shells fragments, sulfur odour											
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF17***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Dark grey silty CLAY, firm, very plastic, very sticky, dry, few fine organics, many fine shells fragments, sulfur odour										
								Grey silty CLAY, firm, very plastic, moderately sticky, abundant fine organics, greasy, sulfur odour										
								2.4m Recovery										
				2.5														
				3.0														
				3.5				End of MF17 at 3.5m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF18***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Yellowish brown silty CLAY, firm, very plastic, moderately sticky, dry, no organics, no sand, no shells, no odour									SWL 0.34m	Standing water level
				1.0				Very dark grey silty CLAY, firm, very plastic, very sticky, dry, abundant fine to coarse organics, sulfur odour										
				1.5				Grey silty CLAY, firm, very plastic, moderately sticky, dry, few fine to coarse organics, many fine shells, sulfur odour										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF18***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				Grey silty CLAY, firm, very plastic, moderately sticky, dry, few fine to coarse organics, many fine shells, sulfur odour										
								Very dark grey silty CLAY, very firm, very plastic, very strong, dry, very few fine to coarse organics, sulfur odour										
								2.2m Recovery										
				3.0														
				3.5				End of MF18 at 3.5m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF19***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Yellowish brown silty CLAY with strong brown mottle, weak to firm consistency, very plastic, moderately sticky, dry, no organics, no odour Very dark grey silty CLAY, firm, very plastic, very sticky, moist, abundant fine to coarse organics, sulfur odour									SWL 0.48m	Standing water level
				1.0														
				1.5				Dark grey silty CLAY, firm, very plastic, very sticky, dry, few fine organics, many fine shells fragments, sulfur odour										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF19***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Dark grey silty CLAY, firm, very plastic, very sticky, dry, few fine organics, many fine shells fragments, sulfur odour										
								Grey silty CLAY, firm, very plastic, moderately sticky, greasy, abundant fine organics, sulfur odour										
								2.4m Recovery										
				2.5														
				3.0														
				3.5				End of MF19 at 3.5m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF20***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Yellowish brown silty CLAY, weak to firm, very plastic, moderately sticky, dry, no organics, no odour										
								Very dark grey silty CLAY, firm, very plastic, very sticky, moist, abundant fine to coarse organics, sulfur odour									SWL 0.3m	Standing water level
				1.0				Dark grey silty CLAY, firm, very plastic, very sticky, dry, few fine organics, many fine shells fragments, sulfur odour										
				1.5				Grey silty CLAY, firm, very plastic, moderately sticky, greasy, abundant fine organics, sulfur odour										
				2.0				1.95m Recovery										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF20***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***11.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***11.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				1.95m Recovery										
				3.0				End of MF20 at 2.5m										
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF21***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***13.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***13.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Brown silty CLAY, weak, very plastic, very sticky, moist, no organics, no odour									SWI 0.3m	Standing water level
				1.0				Very dark greenish grey silty CLAY, firm, very plastic, very sticky, greasy, moist, abundant fine to coarse organics, sulfur odour										
				1.5				Very dark greenish grey silty CLAY, firm, very plastic, very sticky, many fine to coarse organics, weak at 2.3m, many fine shells at 1.5m, sulfur odour										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF21***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***13.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***13.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				Very dark greenish grey silty CLAY, firm, very plastic, very sticky, many fine to coarse organics, weak at 2.3m, many fine shells at 1.5m, sulfur odour											
								Very dark greenish grey silty CLAY, firm, very plastic, very sticky, moist, few fine to coarse organics, no shells, sulfur odour											
				3.0				2.9m Recovery										
				3.5														
								End of MF21 at 3.5m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF22***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Grey brown silty CLAY, firm, very plastic, moderate stickiness, dry, no organics, no odour									SWL 0.34m	▼ Standing water level
								Very dark grey silty CLAY, firm, very plastic, very sticky, moist, abundant fine to coarse organics, no shells, sulfur odour										
				1.0				Very dark grey silty SAND, loose, non plastic, non sticky, fine sand, moist, abundant fine to coarse organics, no odour										
				1.5				Very dark grey silty CLAY, weak to firm, very plastic, moderately sticky, moist, few fine organics, few fine shells at 1.5m, sulfur odour										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF22***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Very dark grey silty CLAY, weak to firm, very plastic, moderately sticky, moist, few fine organics, few fine shells at 1.5m, sulfur odour										
								Dark grey silty CLAY, firm, very plastic, very sticky, slightly moist, very few fine shells, very few fine to coarse organics, sulfur odour										
								2.4m Recovery										
				2.5														
				3.0														
								End of MF22 at 3.4m										
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF23***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Grey brown silty CLAY, firm, very plastic, moderate stickiness, dry, no organics, no odour										
				1.0				Very dark grey silty CLAY, firm, very plastic, very sticky, moist, many fine to coarse organics, sulfur odour									SWL 0.83m	Standing water level
				1.5				Very dark grey silty CLAY, weak, very plastic, very sticky, moist, few fine shells, very few fine organics, sulfur odour										
				2.0				1.8m Recovery										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF23***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				1.8m Recovery										
				3.0				End of MF23 at 2.7m										
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF24***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark greyish brown silty CLAY, firm, very plastic, slightly sticky, dry, no organics, no odour										
				1.0				Very dark greenish grey silty CLAY, weak-firm, very plastic, very sticky, moist, abundant fine to coarse organics, sulfur odour									SWL 0.74m	Standing water level
				1.5				Very dark greenish grey silty CLAY, weak, very plastic, very sticky, moist, abundant fine organics to 1.4m, few shells at 1.6m, dryer (slightly moist) and firmer at 2.2m, sulfur odour										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF24***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Very dark greenish grey silty CLAY, weak, very plastic, very sticky, moist, abundant fine organics to 1.4m, few shells at 1.6m, dryer (slightly moist) and firmer at 2.2m, sulfur odour										
								2.4m Recovery										
				2.5														
				3.0														
								End of MF24 at 3.4m										
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF25***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Grey brown silty CLAY, firm, very plastic, moderate stickiness, dry, no organics, no odour									SWL 0.2m	Standing water level ▼
				1.0				Very dark grey silty CLAY, firm, very plastic, very sticky, moist, abundant fine to coarse organics, no shells, sulfur odour										
				1.5				Dark grey silty CLAY, weak, very plastic, very sticky, moist, few fine to coarse organics, few fine shells, sulfur odour										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF25***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				Dark grey silty CLAY, weak, very plastic, very sticky, moist, few fine to coarse organics, few fine shells, sulfur odour											
				3.0				2.6m Recovery										
				3.5				End of MF25 at 3.4m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF26***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Grey brown silty CLAY, firm, very plastic, moderate stickiness, dry, no organics, no odour									SWL 0.46m	Standing water level
				1.0				Very dark grey silty SAND, loose, non plastic, non sticky, dry, abundant fine to coarse organics, fine sand, sulfur odour										
				1.5				Very dark grey silty CLAY, weak, very plastic, moderate stickiness, moist, abundant fine to coarse organics, sulfur odour										
				2.0				End of MF26 at 1.5m										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF27***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Brown silty CLAY, firm, very plastic, very sticky, dry, no organics, no odour									SWL 0.38m	Standing water level
								Very dark grey silty CLAY, weak, very plastic, very sticky, moist, abundant fine to coarse organics, sulfur odour										
				1.0				Very dark greenish grey silty sandy CLAY, weak, non plastic, slightly sticky, very moist, few fine to coarse organics, sulfur odour										
				1.5				Very dark grey silty CLAY, firm, very plastic, very sticky, moist, many fine to coarse organics, few fine shells at 2.10m, sulfur odour										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF27***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***12.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***12.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				Very dark grey silty CLAY, firm, very plastic, very sticky, moist, many fine to coarse organics, few fine shells at 2.10m, sulfur odour											
								2.5m Recovery										
				3.0														
								End of MF27 at 3.2m										
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF28***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***10.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***10.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Greyish brown silty CLAY, very firm, very plastic, moderately sticky, dry, few coarse organics, no odour									SWL 0.35m	Standing water level
								Grey silty CLAY, firm, very plastic, very sticky, moist, many fine to coarse organics, thin bands of silt, few shells at 0.19m, no odour										
				1.0				Dark grey silty CLAY, weak, slightly plastic, very sticky, very moist, abundant fine to coarse shells, many organics, sulfur odour										
				1.5				1.8m Recovery										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF28***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***10.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***10.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				1.8m Recovery										
				3.0				End of MF28 at 2.6m										
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF29***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***6.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***6.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Dark grey silty CLAY, firm, very plastic, very sticky, slightly moist, no sand, abundant coarse organics, sulfur odour										
				1.0				Very dark grey silty CLAY, weak, very plastic, very sticky, moist, greasy, abundant fine to coarse organics, few fine shells at 1.8m, sulfur odour									SWL 0.32m	Standing water level
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF29***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***6.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***6.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				2.5				Very dark grey silty CLAY, weak, very plastic, very sticky, moist, greasy, abundant fine to coarse organics, few fine shells at 1.8m, sulfur odour											
				3.0				2.85m Recovery										
				3.5				End of MF29 at 3.2m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF30***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***10.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***10.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Dark grey silty CLAY, firm, very plastic, very sticky, moist, no sand, abundant coarse organics, sulfur odour										
				1.0				Very dark grey silty CLAY, weak, very plastic, very sticky, very moist, abundant fine to coarse organics, few fine shells at 1.2m, sulfur odour									SWL 0.28m	Standing water level
				1.5														
				2.0				Very dark grey silty CLAY, firm, very plastic, very sticky, dry, few coarse organics, sulfur odour										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF30***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***10.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***10.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Very dark grey silty CLAY, firm, very plastic, very sticky, dry, few coarse organics, sulfur odour											
								2.4m Recovery										
				2.5														
				3.0														
				3.5				End of MF30 at 3.5m										
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***MF32***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***15.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***15.5.2010***
LOCATION:	***Mudflats***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Dark grey silty CLAY, weak, very plastic, very sticky, moist, abundant fine to coarse organics, sulfur odour Dark grey silty CLAY, weak to firm, very plastic, very sticky, moist, many fine organics, sulfur odour Dark grey silty clay GRAVEL, weak, non plastic, very sticky, wet, abundant fine organics, fine to medium sized coarse fragments, slight sulfur odour								Location relocated due to tide access Location under water	
				1.0 1.5 2.0				End of MF32 at 0.6m										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W01***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***1.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***1.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, trace fine sands, few fine shells, few very fine organics, no odour										Underwater location	
								Dark grey silty CLAY, weak, very plastic, very sticky, moist, few fine shells, sulfur odour										
				1.0				Dark grey silty CLAY, firm, very plastic, very sticky, dry, few fine organics, sulfur odour										
				1.5				End of W01 at 1.1m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W02***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***1.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***1.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, trace fine sands, few fine shells, few very fine to medium organics, no odour										Underwater location	
				1.0				Dark grey silty CLAY, weak, slightly plastic, very sticky, wet, trace fine sands, few medium shells, common coarse organics, sulfur odour											
				1.5				Dark grey silty CLAY, firm, very plastic, very sticky, dry, abundant coarse organics, no shells, sulfur odour											
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W02***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***1.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***1.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Dark grey silty CLAY, firm, very plastic, very sticky, dry, abundant coarse organics, no shells, sulfur odour										
								End of W02 at 2.4m										
				2.5														
				3.0														
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W03***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***1.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***1.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, trace fine sands, abundant coarse organics, abundant fine to coarse shells, sulfur odour										Underwater location	
								Dark grey silty CLAY, weak, very plastic, very sticky, moist, common fine organics, few fine shells, sulfur odour											
				1.0				Black silty CLAY, firm, very plastic, very sticky, dry, abundant fine to coarse organics, greasy, no visible shells, sulfur odour											
				1.5														
								End of W03 at 1.8m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W04***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***1.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***1.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.0				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, trace fine sands, abundant coarse organics, abundant fine to coarse shells, sulfur odour										Underwater location	
				0.5				Dark grey silty CLAY, weak, very plastic, very sticky, moist, many fine organics, many fine shells, sulfur odour											
				1.0				Grey silty CLAY, firm, very plastic, very sticky, moist, few fine shells, common very fine organics, sulfur odour											
				1.2				End of W04 at 1.2m										
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W05***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***3.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***3.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Dark grey silty CLAY, very weak, slightly plastic, very sticky, wet, many fine to coarse shells, many fine to coarse organics, fine sand, sulfur odour									Underwater location	
								Dark grey silty CLAY, weak to firm, very plastic, very sticky, moist, few fine shells, common fine to medium sized organics, sulfur odour										
				1.0														
				1.5				Black CLAY, firm, very plastic, very sticky, moist, abundant fine to coarse organics, sulfur odour										
								End of W05 at 1.8m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W06***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***6.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***6.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, abundant fine to coarse shells, abundant fine to coarse organics, fine sands, no odour										Underwater location	
				1.0				Very dark grey silty CLAY, weak, moderately plastic, very sticky, moist, abundant fine shells, few fine organics with layer of abundant organics, few fine coarse fragments, no odour											
				1.5														
				2.0				Dark grey silty CLAY, firm, very plastic, very sticky, moist, few fine to medium sized shells, no sands, no odour											

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W06***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***6.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***6.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Dark grey silty CLAY, firm, very plastic, very sticky, moist, few fine to medium sized shells, no sands, no odour										
				2.5				Dark grey CLAY, very firm, very plastic, sticky, dry, no sands, no shells, no odour										
								End of W06 at 2.6m										
				3.0														
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W07***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***6.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***6.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey silty CLAY, very weak, slightly plastic, very sticky, wet, many fine to medium shells, very few fine organics, fine sand, no odour										Underwater location	
								Very dark grey silty CLAY, weak, very plastic, very sticky, moist, few fine to medium coarse fragments, trace fine sand, slight sulfur odour											
				1.0				Dark grey silty CLAY, firm, very plastic, very sticky, moist, very few fine organics, common coarse fine fragments, slight sulfur odour											
				1.5				Dark grey silty CLAY, weak, moderate plasticity, very sticky, very moist, abundant fine to coarse organics, many fine to coarse shells, few medium coarse fragments, trace fine sand, slight sulfur odour											
								Very dark grey CLAY, firm, very plastic, slightly sticky, dry, no organics, no shells, slight sulfur odour											
				2.0				End of W07 at 1.8m										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W08***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***6.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***6.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Dark grey clayey SILT, very weak, non plastic, sticky, wet, loose abundant fine to coarse shells, medium sand grains, very few fine organics, abundant fine to coarse shells, no odour Dark grey clayey SILT with coarse sands, weak, slightly plastic, very sticky, wet, medium sand grains, many fine to coarse shells, no odour Very dark grey sandy silty CLAY, weak, moderately plastic, very sticky, moist, very coarse medium sand grains, common fine shells, common fine organics, no odour									Underwater location	
				1.0				Grey CLAY, very firm, very plastic, slightly sticky, dry, no organics, no shells, no odour										
				1.5				End of W08 at 1.2m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W09***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***4.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***4.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, abundant fine to coarse shells, many coarse fragments, fine to medium sands, no odour										Underwater location	
								Dark greenish grey sandy silty CLAY, very firm, moderately plastic, moderately sticky, moist, fine to medium sand, few coarse fragments, few fine shells, no odour											
				1.0				End of W09 at 0.5m										
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W10***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***4.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***4.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Shells: abundant fine to coarse shells									Underwater location	
								Dark grey clayey silty SAND, weak, non plastic, slightly sticky, wet, abundant fine shells, no odour										
								End of W10 at 0.2m										
				0.5														
				1.0														
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W11***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***5.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***5.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Dark grey silty gravelly CLAY, weak, slightly plastic, very sticky, wet, medium sand grains, abundant fine to coarse fragments, common fine shells, no odour									Underwater location Instant Vibracore refusal	
								End of W11 at 0.05m										

0.5
1.0
1.5
2.0

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W12***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***5.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***5.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
SURFACE SAMPLE								Dark grey silty gravelly CLAY, weak, slightly plastic, very sticky, wet, medium sand grains, abundant fine to coarse fragments, common fine shells, no odour									Underwater location Instant Vibracore refusal	
								End of W12 at 0.08m										
				0.5														
				1.0														
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W13***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***5.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***5.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
SAMPLE								Dark grey silty gravelly CLAY, weak, slightly plastic, very sticky, wet, medium sand grains, abundant fine to coarse fragments, common fine shells, no odour									Underwater location Instant Vibracore refusal	
SURFACE				0.5				End of W13 at 0.1m										
				1.0														
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W14***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***5.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***5.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Dark grey silty clayey GRAVEL, loose, non plastic, slightly sticky, wet, few very fine organics, abundant fine to coarse shells, abundant coarse fragments, trace fine sand, no odour									Underwater location	
								Dark grey silty CLAY, firm, very plastic, very sticky, moist, many coarse fragments, few fine shells, no odour										
				0.5				End of W14 at 0.45m										
				1.0														
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W15***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***4.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***4.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey sandy SILT, very weak, low plasticity, moderately sticky, wet, fine to medium sand grains, few fine to medium coarse fragments, many fine to medium shells, few fine organics, no odour										Underwater location	
								Very dark grey silty sandy CLAY, weak, very plastic, very sticky, wet, abundant fine shells, very few very fine organics, few fine coarse fragments, no odour											
				1.0				Greyish brown silty SAND, loose, non plastic, non sticky, moist, medium sand grains, very few coarse fragments, few fine shells, no odour											
				1.5				Dark grey silty SAND, loose, non plastic, non sticky, wet, abundant fine shells, few very fine organics, medium sand grains, few fine to coarse fragments, no odour											
				2.0				Dark grey silty clayey SAND, weak, non plastic, slightly sticky, wet, medium sand grains, abundant fine shells, very few fine organics, few fine to medium sized coarse fragments, no odour											

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W15***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***4.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***4.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Dark grey silty clayey SAND, weak, non plastic, slightly sticky, wet, medium sand grains, abundant fine shells, very few fine organics, few fine to medium sized coarse fragments, no odour										
								End of W15 at 2.3m										
				2.5														
				3.0														
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W16***
SHEET: 1 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***4.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***4.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Greenish grey clayey sandy SILT, very weak, slightly plastic, moderately sticky, wet, abundant fine coarse shell, few very fine organics, medium sized sand grains, no odour										Underwater location	
				1.0				Dark greenish grey silty clayey SAND, loose, non plastic, slightly sticky, wet, medium grained sands, abundant fine to coarse shells, few very fine organics, no odour											
				1.5				Greyish brown silty clayey SAND, loose, non plastic, non sticky, wet, abundant fine to coarse shells, few fine coarse fragments, no odour											
				2.0				Greenish grey silty clayey SAND, loose, non plastic, non sticky, wet, moderate fine shells, no organics, few fine to coarse fragments, no odour											

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W16***
SHEET: 2 OF 2

CLIENT:	***APLNG***	DATE COMMENCED:	***4.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***4.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 60mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore								Very dark grey silty sandy CLAY, firm, moderately plastic, moderately sticky, wet, medium sand grains, many fine to coarse shells, many fine to medium coarse fragments, no odour										
								End of W16 at 2.2m										
				2.5														
				3.0														
				3.5														
				4.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W17***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***6.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***6.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Grey sandy silty CLAY, weak, moderately plastic, moderately sticky, wet, fine sand, few fine coarse fragments, few fine shells, very few fine organics, no odour										Underwater location	
								Grey silty SAND, weak, slightly plastic, moderately sticky, wet, fine to medium sands, few fine coarse fragments, common fine shells, faint marine odour											
								Grey CLAY with yellowish red mottle, very firm , very plastic, dry, very sticky, trace fine sand, very few fine shells, no odour											
				1.0				End of W17 at 0.75m										
				1.5														
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W18***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***6.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***6.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey SILT, very weak, slightly plastic, very sticky, wet, trace fine sand, no stones, very few very fine shells, no organics, trace fine sand, faint marine odour Dark grey sandy SILT, weak, slightly plastic, very sticky wet, fine to medium grained sands, very few fine coarse fragments, few fine shells, no organics, faint marine odour Dark grey silty SAND, weak, moderately plastic, very sticky, wet, medium sands, very few fine coarse fragments, few fine shells, no organics, no odour Grey CLAY, very firm, very plastic, very sticky, dry, trace fine sands, very few fine coarse fragments, very few fine shells, no organics, no odour									Underwater location	
				1.0 1.5 2.0				End of W18 at 0.6m										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W19***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***3.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***3.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, some fine sand grains, many fine organics, common fine shells, sulfur odour										Underwater location	
				1.0				Dark grey silty sandy CLAY, weak, very plastic, very sticky, wet, fine sand grains, abundant fine to coarse organics, common fine shells, sulfur odour											
				1.5				Very dark grey silty CLAY, very firm, very plastic, very sticky, dry, few fine coarse fragments, sulfur odour											
				2.0				End of W19 at 1.6m										

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W20***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***1.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***1.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, trace sand, few fine to coarse shells, many very fine shells, sulfur odour									Underwater location	
								Dark grey silty CLAY, weak, very plastic, very sticky, wet, trace sand, many fine organics, common fine shells, sulfur odour										
				1.0				Dark grey silty CLAY, firm, very plastic, very sticky, moist, band of abundant very fine to coarse organics, no sand, sulfur odour										
				1.5				End of W20 at 1.1m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W21***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***1.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***1.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, moderately sticky, wet, trace fine sands, abundant coarse organics, abundant fine to coarse shells, sulfur odour										Underwater location	
				1.0				Dark grey silty CLAY, weak, very plastic, very sticky, moist, common fine organics, few fine shells, sulfur odour											
				1.5				End of W21 at 1m										
				2.0														

BOREHOLE LOG

WorleyParsons
resources & energy

BOREHOLE NO.: ***W22***
SHEET: 1 OF 1

CLIENT:	***APLNG***	DATE COMMENCED:	***1.5.2010***
PROJECT:	***ASS INVESTIGATION***	DATE COMPLETED:	***1.5.2010***
LOCATION:	***The Narrows***	LOGGED BY:	***AK***
JOB NUMBER:	***301001-00448***	CHECKED BY:	***DH***

Drill Contractor: ABYSS Diving **Bore Size:** 40mm **Hole Angle:** ° **Easting:** **Surface R.L.:**

Drill Model: **Drill Fluid:** **Bearing:** **Northing:** **Datum:** RL

Method	Casing	Drill Rate (min / m)	RL (m)	Depth (m)	Geological Unit	Graphic Log	Classification Symbol	Material Description	Moisture Condition	Consistency / Strength	Cementation / Weathering	Sample / Test	Lab Tests: Atterberg Limit	Lab Tests: Particle Size	Lab Tests: CBR	Lab Tests: Other	Field Records / Comments	Water
Vibracore				0.5				Very dark grey clayey SILT, very weak, slightly plastic, very sticky, wet, trace fine sands, abundant coarse organics, abundant fine to coarse shells, sulfur odour										Underwater location	
								Very dark grey silty CLAY, weak, very plastic, very sticky, moist, common fine organics, few fine shells, sulfur odour											
								Black silty CLAY, firm, very plastic, very sticky, dry, abundant fine to coarse organics, greasy, no visible shells, sulfur odour											
				1.0				End of W22 at 0.9m										
				1.5														
				2.0														

Appendix 2 Photographs

MF01: 0.0m – 0.32m

MF01: 0.2m – 0.6m

MF01: 0.4m – 0.79m

MF01: 0.67m – 1.08m

MF01: 9.5m – 1.3m

MF02: 0.0m – 0.38m

MF02: 0.27m – 0.67m

MF02: 0.58m – 1.01m

MF02: 0.88m – 1.32m

MF02: 1.14m – 1.59m

MF02: 1.40m – 1.76m

MF03: 0.01m – 0.35m

MF04: 0.01m – 0.37m

MF04: 0.28m – 0.69m

MF04: 0.55m – 0.97m

MF04: 0.86m – 1.26m

MF05: 0.01m – 0.30m

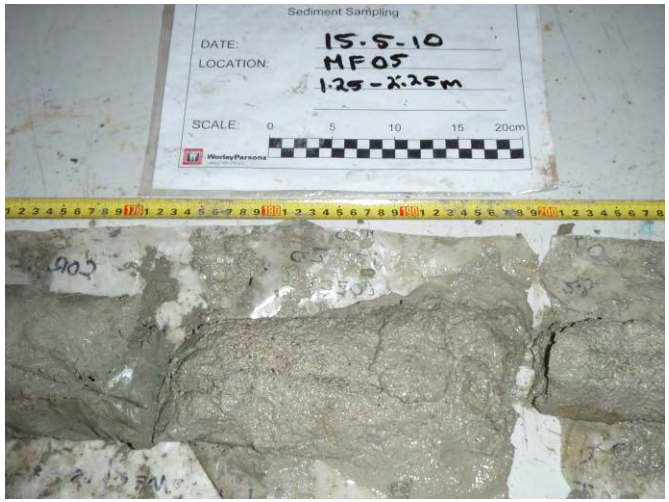
MF05: 0.14m – 0.52m

MF05: 0.40m – 0.79m

MF5: 0.69m – 1.10m

MF5: 0.95m – 1.36m

MF05: 1.22m – 1.62m

		
MF05: 1.41m – 1.88m	**MF05: 1.61m – 2.00m**	**MF05: 1.84m – 2.30m**

MF06: 0.01m – 0.43m

MF06: 0.19m – 0.66m

MF06: 0.41m – 0.89m

MF06: 0.65m – 1.11m

MF06: 0.89m – 1.35m

MF06: 1.18m – 1.61m

MF06: 1.48m – 1.90m

MF06: 1.80m – 2.22m

MF06: 2.07m – 2.50m

MF06: 2.35m – 2.78m

MF06: 2.62m – 3.0m

MF07: 0.01m – 0.36m	**MF07: 0.24m – 0.64m**	**MF07: 0.44m – 0.88m**
MF07: 0.65m – 1.10m	**MF07: 0.90m – 1.35m**	**MF07: 1.06m – 1.50m**

MF07: 1.40m – 1.91m

MF07: 1.60m – 2.10m

MF08: 0.01m – 0.38m

MF08: 0.26m – 0.68m

MF08: 0.54m – 0.97m

MF08: 0.77m – 1.19m

MF08: 0.89m – 1.30m

MF08: 1.23m – 1.62m

MF08: 1.41m – 1.85m

MF08: 1.66m – 2.12m

MF09: 0.01m – 0.38m

MF09: 0.20m – 0.57m

MF09: 0.39m – 0.85m

MF09: 0.62m – 1.09m

MF09: 0.89m – 1.36m

MF10: 0.46m –0.88m

MF10: 0.66m – 1.13m

MF10: 0.85m – 1.29m

MF10: 1.19m – 1.52m

MF10: 1.32m – 1.76m

MF12: 0.01m – 0.37m	**MF12: 0.05m – 0.50m**

MF13: 0.05m – 0.44m

MF13: 0.34m – 0.74m

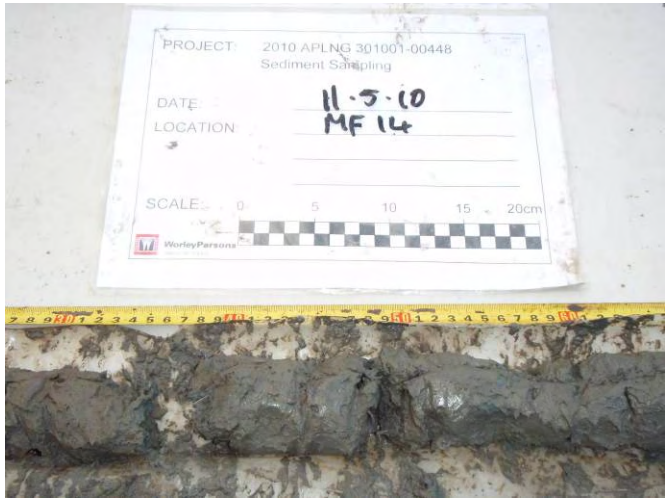
MF13: 0.56m – 1.00m

MF13: 0.78m – 1.23m

MF13: 1.03m – 1.49m

MF13: 1.31m – 1.76m

MF13: 1.46m – 1.76m

		
MF14: 0.01m –0.35m	**MF14: 0.27m – 0.65m**	**MF14: 0.60m – 0.90m**
MF14: 0.8m – 1.0m	**MF14: 1.10m – 1.50m**	**MF14: 1.28m – 1.65m**

MF15: 0.01m – 0.36m	**MF15: 0.27m – 0.64m**	**MF15: 0.55m – 0.96m**
MF15: 0.85m – 1.28m	**MF15: 1.17m – 1.59m**	**MF15: 1.65m – 2.00m**

MF15: 1.82m – 2.15m

MF16: 0.01m – 0.35m

MF16: 0.22m – 0.55m

MF16: 0.58m – 0.90m

MF16: 0.85m – 1.25m

MF16: 1.20m – 1.50m

MF16: 1.38m – 1.73m

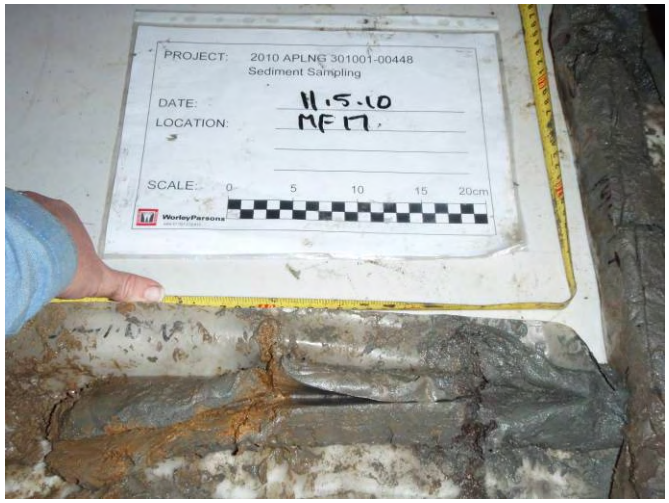
MF16: 1.68m – 2.0m

MF16: 1.85m – 2.3m

MF16: 2..25m – 2.48m

MF16: 2.39m – 2.64m

MF17: 0.01m – 0.35m



MF17: 0.25m – 0.60m

MF17: 0.62m – 1.02m

MF17: 1.02m – 1.33m

MF17: 1.23m – 1.60m

MF17: 1.48m – 1.90m

MF17: 1.79m – 2.20m

MF17: 2.20m – 2.45m

MF18: 0.01m – 0.35m

MF18: 0.25m – 0.67m

MF18: 0.51m – 0.90m

MF18: 0.70m – 1.10m

MF18: 0.98m – 1.35m

MF18: 1.25m – 1.60m

MF018: 1.40m – 1.80m

MF018: 1.80m – 2.10m

MF19: 0.01m – 0.40m	**MF19: 0.35m – 0.64m**	**MF19: 0.70m – 1.0m**
MF19: 0.93m – 1.33m	**MF19: 1.25m – 1.60m**	**MF19: 1.52m – 1.95m**

MF19: 1.84m – 2.22m

MF19: 2.20m – 2.40m

MF20: 0.01m – 0.25m

MF20: 0.25m – 0.65m

MF20: 0.57m – 0.94m

MF20: – 1.25m

MF20: 1.20m – 1.56m

MF20: 1.51m – 1.83m

MF20: 1.73m – 1.90m

MF21: 0.01m – 0.4m

MF21: 0.24m – 0.60m

MF21: 0.60m – 0.97m

MF21: 0.80m – 1.20m

MF21: 1.11m – 1.51m

MF21: 1.40m – 1.78m

MF21: 1.70m – 2.10m

MF21: 1.92m – 2.30m

MF21: 2.30m – 2.67m

MF21: 2.50m – 2.87m

MF22: 0.01m – 0.10m

MF22: 0.17m – 0.30m

MF22: 0.42m – 0.80m

MF22: 0.71m – 1.10m

MF22: 1.01m – 1.35m

MF22: 1.30m – 1.70m

MF22: 1.48m – 1.80m	**MF22: 1.82m – 2.20m**	**MF22: 2.10m – 2.50m**

MF23: 0.01m – 0.30m

MF23: 0.25m – 0.64m

MF23: 0.55m– 0.92m

MF23: 0.79m – 1.17m

MF23: 1.04m – 1.45m

MF23: 1.36m – 1.74m

MF23: 1.44m – 1.80m

MF24: 0.01m – 0.33m

MF24: 0.23m – 0.60m

MF24: 0.65m – 1.0m

MF24: 1.0m – 1.33m

MF24: 1.30m – 1.60m

MF24: 1.55m – 1.90m

MF24: 1.79m – 2.20m

MF24: 2.20m – 2.40m

MF25: 0.01m – 0.40m

MF25: 0.50m – 0.80m

MF25: 0.80m – 1.15m

MF25: 1.10m – 1.40m

MF25: 1.44m – 1.76m

MF25: 1.69m – 2.0m

MF025: 2.05m – 2.38m

MF025: 2.27m – 2.61m

MF26: 0.01m – 0.32m	**MF26: 0.21m – 0.55m**	**MF26: 0.51m – 0.85m**
MF26: 0.81m – 1.14m		

MF27: 0.01m – 0.35m

MF27: 0.27m - 0.60m

MF27: 0.65m – 1.0m

MF27: 0.90m – 1.31m

MF27: 1.30m – 1.62m

MF27: 1.53m – 1.90m

MF027: 1.82m – 2.16m

MF027: 2.20m – 2.40m

MF28: 0.01m – 0.37m

MF28: 0.29m – 0.69m

MF28: 0.62m – 0.99m

MF27: 1.82m – 2.16m

MF27: 2.20m – 2.40m

MF28: 0.01m – 0.37m

MF28: 0.29m – 0.69m

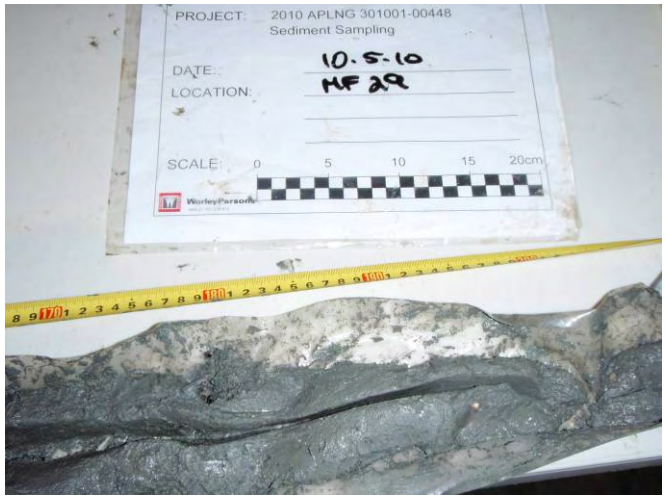
MF28: 0.62m – 0.99m

MF28: 0.88m – 1.27m

MF28: 1.19m – 1.55m

MF28: 1.47m – 1.77m

MF29: 0.03m – 0.44m	**MF29: 0.24m – 0.56m**	**MF29: 0.60m – 0.97m**
MF29: 0.91m – 1.32m	**MF29: 1.17m – 1.54m**	**MF29: 1.47m – 1.85m**



MF29: 1.68m - 2.05m

MF29: 2.14m – 2.40m

MF29: 2.29m – 2.60m

MF29: 2.60m - 2.88m

MF30: 0.01m – 0.60m

MF30: 0.60m – 1.0m

MF30: 0.85 – 1.30m

MF30: 1.16m – 1.60m

MF30: 1.40m – 1.82m

MF30: 1.97m – 2.36m

MF30: 2.16m – 2.44m

MF32: 0.01m – 0.36m	**MF32: 0.12m – 0.54m**	**MF32: 0.26m – 0.68m**

W01: 0.01m – 0.36m

W01: 0.32m – 0.69m

W01: 0.65m – 1.04m

W01: 0.74m – 1.05m

W02: 0.01m – 0.27m

W02: 0.20m – 0.54m

W02: 0.45m – 0.81m

W02: 0.67m – 1.01m

W02: 0.99m – 1.40m

W02: 1.25m – 1.66m

W02: 1.40m – 1.80m

W02: 1.70m – 2.05m

W02: 0.90m – 2.30m

W02: 2.09m – 2.43m

W03: 0.01m – 0.35m

W03: 0.27m – 0.65m

W03: 0.56m – 0.92m

W03: 0.82m – 1.19m

W03: 1.17m – 1.46m

W03: 1.37m – 1.75m

W04: 0.01m – 0.34m

W04: 0.20m – 0.60m

W04: 0.46m – 0.95m

W04: 0.80m – 1.20m

W05: 0.02m – 0.44m

W05: 0.34m – 0.74m

W05: 0.60m – 1.02m

W05: 0.91m – 1.32m

W05: 1.38m – 1.49m

W05: 1.35m – 1.76m

W05: 1.52m – 1.77m

W06: 0.01m – 0.43m

W06: 0.68m – 1.07m

W06: 0.95m – 1.34m

W06: 1.28m – 1.64m

W06: 1.59m – 1.97m

W06: 1.89m – 2.26m

W06: 2.05m – 2.26m

W06: 2.24m – 2.58m

W07: 0.01m – 0.44m

W07: 0.31m – 0.72m

W07: 0.57m – 0.96m

W07: 0.83m – 1.22m

W07: 1.06m – 1.46m

W07: 1.30m – 1.70m

W07: 1.50m – 1.82m

W08: 0.01m – 0.36m

W08: 0.19m – 0.63m

W08: 0.46m – 0.89m

W08: 0.67m – 1.10m

W08: 0.87m – 1.20m

W09: 0.01m – 0.38m	**W09: 0.13m – 0.53m**

W10: 0.01m – 0.30m

W11: 0.0m – 0.05m

W12: 0.0m – 0.1m

W12: coarse fragment

2010 APLNG 301001-00448
Sediment Sampling
DATE:
5.5.10
LOCATION:
W13
SCALE:
0
5
10
15
20cm
WorleyParsons

W13: 0.0m – 0.1m

W14: 0.01m – 0.51m

W15: 0.01m – 0.36m

W15: 0.25m – 0.67m

W15: 0.54m – 0.96m

W15: 0.82m – 1.24m

W15: 1.08m – 1.49m

W15: 1.36m – 1.74m

W15: 1.60m – 2.01m

W15: 1.87m – 2.31m

W16: 0.01m – 0.34m

W16: 0.29m – 0.66m

W16: 0.58m – 0.97m

W16: 0.90m – 1.28m

W16: 1.23m – 1.60m

W16: 1.44m – 1.82m

W16: 1.71m – 2.12m

W16: 2.20m – 2.24m

W17: 0.01m – 0.35m	**W17: 0.23m – 0.60m**	**W17: 0.45m – 0.81m**

W18: 0.01m – 0.30m

W18: 0.23m – 0.63m

W19: 0.01m – 0.20m

W19: 0.20m – 0.50m

W19: 0.52m – 0.90m

W19: 0.85m – 1.25m

W19: 1.08m – 1.52m

W19: 1.29m – 1.65m

W20: 0.01m – 0.28m

W20: 0.23m – 0.56m

W20: 0.51m – 0.88m

W20: 0.74m – 1.08m

W21: 0.01m – 0.34m

W21: 0.19m – 0.62m

W21: 0.45m – 0.88m

W21: 0.68m – 1.05m

W22: 0.01m – 0.30m	**W22: 0.19m – 0.58m**	**W22: 0.49m – 0.89m**

Appendix 3 Summary of results

WorleyParsons
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Appendix 3 Table 1: Summary of Acid Sulfate Soil Data - Sub-tidal

Sample	Date	*Screening Analysis*			*Actual Acidity*			Potential Acidity		EA033-C: Acid Neutralising			EA033-D: Retained Acidity					EA033-E: Acid Base Accounting			
		pH (F)	pH (Fox)	Reaction Rate	pH KCl (23A)	Titratable Actual Acidity (23F)	sulfidic - Titratable Actual Acidity (s-23F)	Chromium Reducible Sulfur (22B)	acidity - Chromium Reducible Sulfur (a-22B)	Acid Neutralising Capacity (19A2)	acidity - Acid Neutralising Capacity (a-19A2)	sulfidic - Acid Neutralising Capacity (s-19A2)	KCl Extractable Sulfur (23Ce)	HCl Extractable Sulfur (20Be)	Net Acid Soluble Sulfur (20Je)	acidity - Net Acid Soluble Sulfur (a-20J)	sulfidic - Net Acid Soluble Sulfur (s-20J)	ANC Fineness Factor	Net Acidity (sulfur units)	Net Acidity (acidity units)	Liming Rate
Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998 - Action Criteria (> 1000 tonnes disturbed)		-	-	-	-	*18*	*0.03*	*0.03*	*18*	-	-	-	-	-	-	-	-	-	**0.03**	**18**	-
Units		*pH Unit*	*pH Unit*	-	*pH Unit*	*mole H+ / t*	*% pyrite S*	*% S*	*mole H+ / t*	*% CaCO3*	*mole H+ / t*	*% pyrite S*	*% S*	*% S*	*% S*	*mole H+ / t*	*% pyrite S*	-	*% S*	*mole H+ / t*	*kg CaCO3/t*
Laboratory Detection Limit		*0.1*	*0.1*	*1*	*0.1*	*2*	*0.02*	*0.02*	*10*	*0.01*	*10*	*0.01*	*0.02*	*0.02*	*0.02*	*10*	*0.02*	*0.5*	*0.02*	*10*	*1*
W1 0.0-0.1	1/05/2010	7.61	5.57	2	8.3	<2	<0.02	0.81	504	2.71	541	0.87						1.5	0.23	143	11
W1 0.15-0.25	1/05/2010	7.73	5.58	2	8.4	<2	<0.02	0.86	536	2.71	541	0.87						1.5	0.28	175	13
W1 0.6-0.7	1/05/2010	7.84	5.11	2	8.5	<2	<0.02	1.72	1080	2.71	541	0.87						1.5	1.15	715	54
W1 0.8	1/05/2010	7.49	4.96	2																	
W1 1.0-1.1	1/05/2010	7.73	5.67	2	7.2	<2	<0.02	1.52	946	1.14	227	0.36						1.5	1.27	795	60
W2 0.0-0.1	1/05/2010	7.76	6.93	2	8.5	<2	<0.02	1.36	847	5.79	1160	1.85						1.5	0.12	76	6
W2 0.2-0.3	1/05/2010	7.67	7.12	2	8.5	<2	<0.02	1.09	680	3.32	663	1.06						1.5	0.38	237	18
W2 0.5	1/05/2010	7.83	6.37	2																	
W2 0.7-0.8	1/05/2010	7.20	6.63	2	8.4	<2	<0.02	2.04	1270	2.34	467	0.75						1.5	1.54	960	72
W2 1.0	1/05/2010	7.04	5.89	2																	
W2 1.1-1.2	1/05/2010	7.21	4.93	2	7.6	<2	<0.02	1.1	689	1.14	227	0.36						1.5	0.86	538	40
W2 1.5	1/05/2010	7.31	4.51	2																	
W2 1.6-1.7	1/05/2010	6.64	5.52	2	7.3	<2	<0.02	1.22	761	1.05	209	0.34						1.5	1.00	621	47
W2 1.9	1/05/2010	6.70	3.59	2																	
W2 2.1-2.2	1/05/2010	6.80	5.37	2	7.1	<2	<0.02	0.98	615	1.18	236	0.38						1.5	0.73	458	34
W2 2.4	1/05/2010	7.10	7.01	2																	
W3 0.0-0.1	1/05/2010	7.36	5.69	1	8.6	<2	<0.02	0.64	400	9.13	1820	2.92						1.5	<0.02	<10	<1
W3 0.2-0.3	1/05/2010	7.77	7.19	1	8.6	<2	<0.02	1.23	765	15.3	3050	4.89						1.5	<0.02	<10	<1
W3 0.5	1/05/2010	7.49	6.09	1																	
W3 0.7-0.8	1/05/2010	7.13	6.63	1	8.4	<2	<0.02	0.9	559	1.29	257	0.41						1.5	0.62	387	29
W3 1.0-1.1	1/05/2010	7.03	6.57	1	8.3	<2	<0.02	1.12	698	1.14	227	0.36						1.5	0.88	547	41
W3 1.25	1/05/2010	7.11	2.92	1																	
W3 1.5-1.6	1/05/2010	7.21	4.34	1	7.1	<2	<0.02	1.43	893	1.22	244	0.39						1.5	1.17	730	55
W3 1.8	1/05/2010	6.90	4.71	1																	
W4 0.0-0.1	1/05/2010	7.45	6.18	1	8.7	<2	<0.02	0.61	380	22.6	4520	7.24						1.5	<0.02	<10	<1
W4 0.25	1/05/2010	7.54	6.87	1																	
W4 0.4-0.5	1/05/2010	7.57	6.74	1	8.5	<2	<0.02	1.28	796	7.95	1590	2.55						1.5	<0.02	<10	<1
W4 0.6	1/05/2010	7.21	6.03	1																	
W4 0.9-1.0	1/05/2010	7.36	6.87	1	8.4	<2	<0.02	1.34	835	2.71	541	0.87						1.5	0.76	474	36
W4 1.0-1.1	1/05/2010	7.39	6.68	1	8.2	<2	<0.02	1.52	951	1.29	257	0.41						1.5	1.25	779	58
W4 1.2	1/05/2010	6.81	5.79	1																	
W5 0.0-0.1	3/05/2010	7.62	7.54	1	8.9	<2	<0.02	0.67	418	24.6	4920	7.9						1.5	<0.02	<10	<1
W5 0.2-0.3	3/05/2010	7.28	6.81	1	8.7	<2	<0.02	0.89	556	2.98	596	0.95						1.5	0.26	159	12
W5 0.5	3/05/2010	6.81	7.42	1																	
W5 0.7-0.8	3/05/2010	7.37	5.97	1	8.3	<2	<0.02	2.12	1320	10	2000	3.21						1.5	<0.02	<10	<1
W5 1.0	3/05/2010	7.26	6.93	1																	
W5 1.2-1.3	3/05/2010	7.22	7.19	1	8.5	<2	<0.02	0.69	430	2.85	569	0.91						1.5	0.08	51	4
W5 1.5	3/05/2010	7.38	4.94	1																	
W5 1.6-1.7	3/05/2010	6.80	3.23	1	7.9	<2	<0.02	1.61	1000	1.69	338	0.54						1.5	1.25	777	58
W5 1.8	3/05/2010	6.92	4.33	1																	
W6 0-0.1	6/05/2010	7.89	7.65	1	8.7	<2	<0.02	0.43	269	36.7	7340	11.8						1.5	<0.02	<10	<1
W6 0.3-0.4	6/05/2010	8.24	6.37	1	8.7	<2	<0.02	0.8	496	37	7390	11.8						1.5	<0.02	<10	<1
W6 0 5	6/05/2010	8.05	5.91	1																	
W6 0.7-0.8	6/05/2010	8.15	6.54	1	8.7	<2	<0.02	0.86	538	18	3590	5.76						1.5	<0.02	<10	<1
W6 1.0	6/05/2010	7.59	5.44	1																	
W6 1.2-1.3	6/05/2010	7.36	6.78	1	8.6	<2	<0.02	0.89	557	16.6	3310	5.31						1.5	<0.02	<10	<1
W6 1.5	6/05/2010	7.47	5.59	1																	
W6 1.9-2.0	6/05/2010	7.40	4.85	1	8.2	<2	<0.02	1.75	1090	5.61	1120	1.8						1.5	0.55	343	26
W6 2.2	6/05/2010	7.26	5.89	1																	
W6 2.5-2.6	6/05/2010	7.59	8.50	1	8.7	<2	<0.02	0.23	146	4.76	950	1.52						1.5	<0.02	<10	<1
W7 0-0.1	6/05/2010	7.73	6.19	1	9	<2	<0.02	0.38	239	37.2	7440	11.9						1.5	<0.02	<10	<1
W7 0.2-0.3	6/05/2010	7.79	6.87	1	8.8	<2	<0.02	0.54	334	16.7	3340	5.36						1.5	<0.02	<10	<1
W7 0.5	6/05/2010	7.54	5.38	1																	
W7 0.8-0.9	6/05/2010	7.63	6.15	1	8.7	<2	<0.02	0.62	387	21.5	4300	6.88						1.5	<0.02	<10	<1
W7 1.1	6/05/2010	7.30	6.10	1																	
W7 1.4-1.5	6/05/2010	7.43	6.11	1	8.8	<2	<0.02	0.51	320	37.1	7420	11.9						1.5	<0.02	<10	<1
W7 1.65-1.8	6/05/2010	6.90	7.88	1	8.6	<2	<0.02	0.35	220	4.49	897	1.44						1.5	<0.02	<10	<1
W8 0.05-0.15	6/05/2010	7.77	6.29	1	8.7	<2	<0.02	0.43	269	37.1	7420	11.9						1.5	<0.02	<10	<1
W8 0.25-0.35	6/05/2010	7.58	6.74	1	8.7	<2	<0.02	0.6	376	16.1	3220	5.16						1.5	<0.02	<10	<1
W8 0.5	6/05/2010	7.44	7.01	1																	
W8 0.7-0.8	6/05/2010	7.58	6.33	1	8.8	<2	<0.02	0.52	322	20.6	4120	6.61						1.5	<0.02	<10	<1
W8 1-1.2	6/05/2010	7.36	8.28	1	8.7	<2	<0.02	0.1	63	2.49	497	0.8						1.5	<0.02	<10	<1
W9 0.0-0.1	4/05/2010	7.98	6.27	2	8.7	<2	<0.02	0.57	357	24.6	4920	7.9						1.5	<0.02	<10	<1
W9 0.25	4/05/2010	8.21	6.03	2																	
W9 0.3-0.4	4/05/2010	8.07	6.06	2	8.8	<2	<0.02	0.47	296	10.4	2090	3.34						1.5	<0.02	<10	<1
W9 0.5	4/05/2010	8.30	8.75	2																	
W10 0.0-0.1	4/05/2010	8.42	7.01	1																	
W10 0.1-0.2	4/05/2010	8.45	6.88	2	8.8	<2	<0.02	0.35	220	10.9	2180	3.5						1.5	<0.02	<10	<1
W11 0-0.05	5/05/2010	7.84	7.52	2	9.1	<2	<0.02	0.06	34	25.1	5010	8.03						1.5	<0.02	<10	<1
W12 0-0.1	5/05/2010	7.85	7.46	2	9.1	<2	<0.02	0.04	24	10.3	2050	3.29						1.5	<0.02	<10	<1
W13 0-0.1	5/05/2010	7.57	7.52	2	9.1	<2	<0.02	0.14	88	11.6	2320	3.72						1.5	<0.02	<10	<1
W14 0-0.1	5/05/2010	8.58	7.28	1	9.1	<2	<0.02	0.1	66	23.1	4610	7.39						1.5	<0.02	<10	<1
W14 0.16-0.26	5/05/2010	8.13	7.89	1	8.7	<2	<0.02	0.63	392	10.9	2170	3.48						1.5	<0.02	<10	<1
W14 0.45	5/05/2010	8.15	7.99	1																	
W15 0-0.1	4/05/2010	7.95	6.87	1	9	<2	<0.02	0.09	56	24.6	4920	7.9						1.5	<0.02	<10	<1
W15 0.1-0.2	4/05/2010	8.34	6.79	1	8.9	<2	<0.02	0.11	70	24.6	4920	7.9						1.5	<0.02	<10	<1
W15 0.4	4/05/2010	7.88	7.84	1																	
W15 0.5-0.6	4/05/2010	8.21	7.00	1	9.1	<2	<0.02	0.1	63	11.1	2210	3.55						1.5	<0.02	<10	<1
W15 0.7	4/05/2010	8.39	7.01	1																	
W15 0.9-1.0	4/05/2010	8.41	6.93	1	9.1	<2	<0.02	0.12	78	11.1	2220	3.56						1.5	<0.02	<10	<1
W15 1.2	4/05/2010	8.51	7.15	1																	
W15 1.3-1.4	4/05/2010	8.54	6.86	1	8.9	<2	<0.02	0.36	224	24.6	4920	7.9						1.5	<0.02	<10	<1
W15 1.6	4/05/2010	8.45	6.90	1																	
W15 1.7-1.8	4/05/2010	8.11	6.46	1	9	<2	<0.02	0.24	147	11.4	2270	3.65						1.5	<0.02	<10	<1
W15 2.0	4/05/2010	8.23	6.72	1																	
W15 2.2-2.3	4/05/2010	8.58	7.43	1	8.8	<2	<0.02	0.31	195	10.3	2050	3.29						1.5	<0.02	<10	<1
W16 0-0.1	4/05/2010	8.15	7.22	1	9.1	<2	<0.02	0.09	59	11.1	2220	3.56						1.5	<0.02	<10	<1
W16 0.25	4/05/2010	8.34	7.15	1																	
W16 0.3-0.4	4/05/2010	8.07	6.90	1	9.2	<2	<0.02	0.08	52	11	2200	3.54						1.5	<0.02	<10	<1
W16 0.6	4/05/2010	8.47	7.07	1																	
W16 0.8-0.9	4/05/2010	8.22	7.58	1	9.2	<2	<0.02	0.07	43	24.6	4920	7.9						1.5	<0.02	<10	<1
W16 1.1	4/05/2010	8.21	6.98	1																	
W16 1.2-1.3	4/05/2010	7.93	7.08	1	9.2	<2	<0.02	0.06	37	24.6	4920	7.9						1.5	<0.02	<10	<1
W16 1.5	4/05/2010	8.23	7.01	1																	
W16 1.6-1.7	4/05/2010	8.28	7.01	1	9.1	<2	<0.02	0.09	58	24.6	4920	7.9						1.5	<0.02	<10	<1
W16 1.9	4/05/2010	8.27	6.85	1																	
W16 2.0-2.1	4/05/2010	8.25	6.63	1	8.9	<2	<0.02	0.3	186	8.81	1760	2.82						1.5	<0.02	<10	<1
W16 2.2	4/05/2010	8.45	6.87	1																	
W17 0-0.1	7/05/2010	8.07	7.64	2	9	<2	<0.02	0.04	28	15.5	3100	4.97						1.5	<0.02	<10	<1
W17 0.23-0.33	7/05/2010	8.21	6.98	2	8.9	<2	<0.02	0.12	72	22.4	4480	7.18						1.5	<0.02	<10	<1
W17 0.5	7/05/2010	8.22	7.00	2																	
W17 0.65-0.75	7/05/2010	7.94	8.71	2	8.7	<2	<0.02	<0.02	<10	3.26	652	1.04						1.5	<0.02	<10	<1
W18 0-0.1	7/05/2010	7.43	6.83	2	8.7	<2	<0.02	0.12	72	8.08	1610	2.59						1.5	<0.02	<10	<1
W18 0.1-0.2	7/05/2010	7.97	7.83	2	9.1	<2	<0.02	0.11	70	11.1	2230	3.57						1.5	<0.02	<10	<1
W18 0.3-0.4	7/05/2010	7.92	7.06	2	9.1	<2	<0.02	0.08	53	7.26	1450	2.32						1.5	<0.02	<10	<1
W18 0.5-0.6	7/05/2010	8.08	8.61	2	8.8	<2	<0.02	0.03	18	2.84	568	0.91						1.5	<0.02	<10	<1
W19 0.0-0.1	3/05/2010	6.93	6.76	1	8.9	<2	<0.02	0.23	144	3.34	667	1.07						1.5	<0.02	<10	<1
W19 0.3-0.4	3/05/2010	7.31	6.54	1	8.8	<2	<0.02	0.3	187	3.02	604	0.97						1.5	<0.02	<10	<1
W19 0.65	3/05/2010	6.94	6.59	1																	
W19 0.9-1.0	3/05/2010	7.50	6.35	1	8.6	<2	<0.02	0.86	535	3.63	724	1.16						1.5	0.08	52	4
W19 1.25	3/05/2010	7.37	6.67	1																	
W19 1.5-1.6	3/05/2010	7.78	8.70	1	8.4	<2	<0.02	0.12	78	0.87	173	0.28						1.5	<0.02	<10	<1
W20 0.0-0.1	1/05/2010	7.55	5.72	1	8.6	<2	<0.02	0.86	538	3.4	678	1.09						1.5	0.14	86	6
W20 0.3-0.4	1/05/2010	7.35	6.69	1	8.4	<2	<0.02	1.56	975	2.16	431	0.69						1.5	1.10	688	52
W20 0.5	1/05/2010	7.23	6.21	2																	
W20 0.6-0.7	1/05/2010	7.39	4.04	2	7.9	<2	<0.02	1.68	1050	1.2	239	0.38						1.5	1.42	887	66
W20 1.0	1/05/2010	7.28	2.35	1																	
W21 0.0-0.1	1/05/2010	7.46	3.38	1	8.2	<2	<0.02	0.47	293	2.52	503	0.81						1.5	<0.02	<10	<1
W21 0.1-0.2	1/05/2010	7.69	6.42	1	7.7	<2	<0.02	0.51	318	0.96	192	0.31						1.5	0.30	191	14
W21 0.5-0.6	1/05/2010	7.33	5.45	1	7.3	<2	<0.02	1.04	652	0.76	152	0.24						1.5	0.88	551	41
W21 0.75	1/05/2010	6.96	2.94	1																	
W21 0.9-1.0	1/05/2010	7.42	2.05	1	7	<2	<0.02	1.02	636	1.12	223	0.36						1.5	0.78	486	36
W22 0.0-0.1	1/05/2010	7.36	4.51	2	8.2	<2	<0.02	0.48	302	5.24	1050	1.68						1.5	<0.02	<10	<1
W22 0.2-0.3	1/05/2010	7.47	6.24	1	7.4	<2	<0.02	1.2	752	0.64	128	0.2						1.5	1.07	666	50
W22 0.9	1/05/2010	7.01	5.57	1																	
W22 0.8-0.9	1/05/2010	7.31	6.63	1	7.2	<2	<0.02	0.39	244	3	599	0.96						1.5	<0.02	<10	<1

NOTES

- Denotes no criteria for that parameter

Yellow highlighting indicates parameters above applied guideline/criteria.

NT indicates a sample which was not tested for a particular parameter.

Reaction rate is a subjective assessment of the strength of the reaction to hydrogen peroxide: 1 (minor bubbling) to 4 (violent with frothing and heat produced)

pH_{FOX}	pH <3
	pH 3 - 4
	pH 4 - 5

Liming rate treatment categories

L	Low treatment	≤0.1
M	Medium treatment	0.1 – 1
H	High treatment	1 – 5
VH	Very high treatment	5 – 25
XH	Extra high treatment	>25

Sample	Date	Landform	Screening Analysis: pH (F)	pH (Fox)	Reaction Rate	Actual Acidity: pH KCl (23A)	Titratable Actual Acidity (23F)	sulfidic - Titratable Actual Acidity (s-23F)	Potential Acidity: Chromium Reducible Sulfur (22B)	acidity - Chromium Reducible Sulfur (a-22B)	EA033-C: Acid Neutralising: Acid Neutralising Capacity (19A2)	acidity - Acid Neutralising Capacity (a-19A2)	sulfidic - Acid Neutralising Capacity (s-19A2)	EA033-D: Retained Acidity: KCl Extractable Sulfur (23Ce)	HCl Extractable Sulfur (20Be)	Net Acid Soluble Sulfur (20Je)	acidity - Net Acid Soluble Sulfur (a-20J)	sulfidic - Net Acid Soluble Sulfur (s-20J)	EA033-E: Acid Base Accounting: ANC Fineness Factor	Net Acidity (sulfur units)	Net Acidity (acidity units)	Liming Rate
Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998 - Action Criteria (> 1000 tonnes disturbed)			-	-	-	-	*18*	*0.03*	*0.03*	*18*	-	-	-	-	-	-	-	-	-	**0.03**	**18**	-
Units			*pH Unit*	*pH Unit*	-	*pH Unit*	*mole H+ / t*	*% pyrite S*	*% S*	*mole H+ / t*	*% CaCO3*	*mole H+ / t*	*% pyrite S*	*% S*	*% S*	*% S*	*mole H+ / t*	*% pyrite S*	-	*% S*	*mole H+ / t*	*kg CaCO3/t*
Laboratory Detection Limit			*0.1*	*0.1*	*1*	*0.1*	*2*	*0.02*	*0.02*	*10*	*0.01*	*10*	*0.01*	*0.02*	*0.02*	*0.02*	*10*	*0.02*	*0.5*	*0.02*	*10*	*1*
MF01 0-0.1	13/05/2010	Supratidal flat	7.84	7.98	1	9	<2	<0.02	<0.02	<10	4.64	928	1.49						1.5	<0.02	<10	<1
MF01 0.1-0.2	13/05/2010	Supratidal flat	7.08	4.69	2	5.1	31	0.05	1.58	989									1.5	1.64	1020	76
MF01 0.5	13/05/2010	Supratidal flat	6.52	8.25	2																	
MF01 0.7-0.8	13/05/2010	Supratidal flat	6.39	2.24	2	5.5	22	0.03	1.68	1050									1.5	1.71	1070	80
MF01 1.0	13/05/2010	Supratidal flat	6.94	3.19	2																	
MF01 1.2-1.3	13/05/2010	Supratidal flat	6.75	2.95	2	6.3	4	<0.02	0.82	509									1.5	0.82	513	38
MF02 0-0.1	13/05/2010	Supratidal flat	7.66	7.89	1	6.6	<2	<0.02	<0.02	<10	10.3	2060	3.31						1.5	<0.02	<10	<1
MF02 0.1-0.2	13/05/2010	Supratidal flat	7.96	6.78	1	6.6	<2	<0.02	0.37	229	6.14	1230	1.97						1.5	<0.02	<10	<1
MF02 0.5	13/05/2010	Supratidal flat	6.91	3.56	2																	
MF02 0.75-0.85	13/05/2010	Supratidal flat	7.26	2.23	2	6.2	3	<0.02	0.4	250									1.5	0.4	252	19
MF02 1.0	13/05/2010	Supratidal flat	7.45	2.17	3																	
MF02 1.25-1.35	13/05/2010	Supratidal flat	7.37	1.86	3	6.3	<2	<0.02	0.2	125									1.5	0.2	126	9
MF02 1.6	13/05/2010	Supratidal flat	7.39	1.95	3																	
MF03 0-0.1	15/05/2010	Tidal Creek	6.93	4.70	1	6.7	<2	<0.02	0.35	216	1.04	207	0.33						1.5	0.12	78	6
MF03 0.15-0.3	15/05/2010	Tidal Creek	7.07	4.48	1	6.2	5	<0.02	<0.02	<10									1.5	0.02	15	1
MF04 0-0.1	14/05/2010	Intertidal flat	7.05	6.40	1	6.3	2	<0.02	0.03	18									1.5	0.03	20	2
MF04 0.25-0.35	14/05/2010	Intertidal flat	6.36	3.80	1	5.9	19	0.03	0.91	568									1.5	0.94	587	44
MF04 0.5	14/05/2010	Intertidal flat	5.49	3.85	1																	
MF04 0.75-0.85	14/05/2010	Intertidal flat	6.28	3.10	1	5.9	15	0.02	1.52	949									1.5	1.55	964	72
MF04 1.1	14/05/2010	Intertidal flat	6.05	2.87	1																	
MF05 0-0.25	14/05/2010	Supratidal flat	7.61	7.73	1	8.2	<2	<0.02	<0.02	<10	1.67	334	0.54						1.5	<0.02	<10	<1
MF05 0.25-0.5	14/05/2010	Supratidal flat	7.73	7.87	1																	
MF05 0.5-0.75	14/05/2010	Supratidal flat	7.37	7.69	1	6.9	<2	<0.02	<0.02	<10	0.42	83	0.13						1.5	<0.02	<10	<1
MF05 0.75-1.0	14/05/2010	Supratidal flat	7.33	7.80	1																	
MF05 1.0-1.25	14/05/2010	Supratidal flat	7.21	7.67	1	6.7	<2	<0.02	<0.02	<10	0.37	74	0.12						1.5	<0.02	<10	<1
MF05 1.25-1.5	15/05/2010	Supratidal flat	7.22	8.16	1	6.6	<2	<0.02	<0.02	<10	0.25	49	0.08						1.5	<0.02	<10	<1
MF05 1.5-1.75	15/05/2010	Supratidal flat	6.61	8.21	1																	
MF05 1.75-2.0	15/05/2010	Supratidal flat	6.89	8.07	1	6.3	2	<0.02	<0.02	<10									1.5	<0.02	<10	<1
MF05 2.0-2.5	15/05/2010	Supratidal flat	6.75	7.51	1																	
MF06 0-0.1	14/05/2010	Extratidal flat	7.32	7.46	1	7.2	<2	<0.02	<0.02	<10	3.14	628	1.01						1.5	<0.02	<10	<1
MF06 0.1-0.25	14/05/2010	Extratidal flat	7.28	7.87	1	6.9	<2	<0.02	<0.02	<10	0.74	147	0.24						1.5	<0.02	<10	<1
MF06 0.25-0.5	15/05/2010	Extratidal flat	7.22	7.79	1																	
MF06 0.5-0.75	14/05/2010	Extratidal flat	7.35	7.97	1	6.8	<2	<0.02	<0.02	<10	0.29	59	0.09						1.5	<0.02	<10	<1
MF06 0.75-1.0	14/05/2010	Extratidal flat	7.20	7.60	1																	
MF06 1-1.25	14/05/2010	Extratidal flat	7.55	8.51	1	6.9	<2	<0.02	<0.02	<10	0.32	64	0.1						1.5	<0.02	<10	<1
MF06 1.25-1.5	15/05/2010	Extratidal flat	7.03	7.30	1	6.3	3	<0.02	<0.02	<10									1.5	<0.02	<10	<1
MF06 1.5-1.75	15/05/2010	Extratidal flat	7.37	7.55	1																	
MF06 1.75-2	15/05/2010	Extratidal flat	6.74	7.03	1	6.1	6	<0.02	<0.02	<10									1.5	<0.02	<10	<1
MF06 2.0-2.25	15/05/2010	Extratidal flat	7.01	7.26	1																	
MF06 2.25-2.5	15/05/2010	Extratidal flat	6.81	7.28	1	6.1	6	<0.02	<0.02	<10									1.5	<0.02	<10	<1
MF06 2.5-2.75	15/05/2010	Extratidal flat	6.46	7.07	1																	
MF06 2.75-3.0	15/05/2010	Extratidal flat	6.54	6.33	1	6.1	7	<0.02	<0.02	<10									1.5	<0.02	<10	<1
MF07 0-0.25	14/05/2010	Supratidal flat	6.84	7.15	1	7	<2	<0.02	<0.02	<10	0.54	108	0.17						1.5	<0.02	<10	<1
MF07 0.25-0.5	14/05/2010	Supratidal flat	7.07	7.36	1																	
MF07 0.5-0.75	14/05/2010	Supratidal flat	7.62	7.48	1	6.6	<2	<0.02	<0.02	<10	0.52	103	0.16						1.5	<0.02	<10	<1
MF07 0.75-1.0	14/05/2010	Supratidal flat	7.74	8.48	1																	
MF07 1.0-1.25	14/05/2010	Supratidal flat	8.14	8.54	1	7.1	<2	<0.02	<0.02	<10	0.24	49	0.08						1.5	<0.02	<10	<1
MF07 1.25-1.35	14/05/2010	Supratidal flat	7.34	8.29	1	6.9	<2	<0.02	<0.02	<10	0.24	49	0.08						1.5	<0.02	<10	<1
MF07 1.25-1.5	15/05/2010	Supratidal flat	7.18	8.30	1	6.4	<2	<0.02	<0.02	<10									1.5	<0.02	<10	<1
MF07 1.5-1.75	15/05/2010	Supratidal flat	6.99	8.25	1	6.4	<2	<0.02	<0.02	<10									1.5	<0.02	<10	<1
MF07 1.75-2.0	15/05/2010	Supratidal flat	6.66	7.37	1																	
MF08 0.0-0.5	14/05/2010	Supratidal flat	7.38	7.54	1	7.9	<2	<0.02	<0.02	<10	3.14	628	1.01						1.5	<0.02	<10	<1
MF08 0.5-0.75	14/05/2010	Supratidal flat	7.49	8.64	1	6.3	<2	<0.02	0.26	162									1.5	0.26	164	12
MF08 0.75-1	14/05/2010	Supratidal flat	7.18	8.61	1	6.6	<2	<0.02	0.44	278	0.64	128	0.2						1.5	0.31	193	14
MF08 1.0-1.25	14/05/2010	Supratidal flat	7.05	8.32	1																	
MF08 1.25-1.5	15/05/2010	Supratidal flat	6.51	7.86	1	6.2	5	<0.02	<0.02	12									1.5	0.03	18	1
MF08 1.5-1.75	15/05/2010	Supratidal flat	6.24	7.36	1																	
MF08 1.75-2	15/05/2010	Supratidal flat	6.54	6.64	1	6.1	6	<0.02	<0.02	<10									1.5	0.02	16	1
MF09 0-0.1	14/05/2010	Supratidal flat	6.99	3.46	1	5.5	30	0.05	1.89	1180									1.5	1.94	1210	91
MF09 0.1-0.2	14/05/2010	Supratidal flat	7.22	7.35	1	6.8	<2	<0.02	0.22	135	10.3	2060	3.31						1.5	<0.02	<10	<1
MF09 0.3-0.4	14/05/2010	Supratidal flat	6.57	2.45	2	6.3	4	<0.02	0.21	129									1.5	0.21	133	10
MF09 0.5-0.75	15/05/2010	Supratidal flat	7.17	4.22	2																	
MF09 0.75-1	15/05/2010	Supratidal flat	7.42	7.32	1	5.8	14	0.02	0.54	339									1.5	0.56	353	26
MF09 1.0-1.25	15/05/2010	Supratidal flat	7.36	7.20	1																	
MF10 0.0-0.1	14/05/2010	Intertidal flat	7.22	7.32	1	6.7	<2	<0.02	<0.02	<10	0.96	192	0.31						1.5	<0.02	<10	<1
MF10 0.1-0.2	14/05/2010	Intertidal flat	6.98	4.07	1	5.9	17	0.03	1.76	1100									1.5	1.79	1110	84
MF10 0.25-0.35	14/05/2010	Intertidal flat	7.00	4.78	1	5.5	11	<0.02	0.94	588									1.5	0.96	599	45
MF10 0.5-0.75	15/05/2010	Intertidal flat	7.47	2.52	1																	
MF10 0.75-1	15/05/2010	Intertidal flat	7.49	5.85	1	6.7	<2	<0.02	0.3	184	0.34	69	0.11						1.5	0.22	138	10
MF10 1.0-1.25	15/05/2010	Intertidal flat	6.95	7.30	1																	
MF10 1.25-1.5	15/05/2010	Intertidal flat	7.13	8.02	1	6.4	<2	<0.02	0.09	59									1.5	0.1	60	4
MF10 1.5-1.75	15/05/2010	Intertidal flat	7.07	5.44	1																	
MF12 0-0.1	15/05/2010	Tidal Creek	7.11	7.54	1	6.9	<2	<0.02	<0.02	<10	0.22	44	0.07						1.5	<0.02	<10	<1
MF12 0.3-0.4	15/05/2010	Tidal Creek	7.40	8.55	1	6.7	<2	<0.02	<0.02	<10	0.27	54	0.09						1.5	<0.02	<10	<1
MF13 0-0.1	10/05/2010	Intertidal flat	8.05	6.85	1	7.2	<2	<0.02	0.18	116	2.06	412	0.66						1.5	<0.02	<10	<1
MF13 0.2-0.3	10/05/2010	Intertidal flat	7.31	2.27	2	6	14	0.02	2.38	1480									1.5	2.4	1500	112
MF13 0.5	10/05/2010	Intertidal flat	6.88	2.99	2																	
MF13 0.8-0.9	10/05/2010	Intertidal flat	6.51	2.45	2	6.3	7	<0.02	1.12	700									1.5	1.13	708	53
MF13 1.1-1.2	10/05/2010	Intertidal flat	7.23	3.47	2	5.5	24	0.04	1.86	1160									1.5	1.9	1180	89
MF13 1.5-1.6	10/05/2010	Intertidal flat	7.72	4.21	2	6	13	0.02	2.94	1830									1.5	2.96	1840	138
MF13 1.8	10/05/2010	Intertidal flat	8.21	2.98	2																	
MF14 0-0.1	11/05/2010	Intertidal flat	6.92	6.60	1	6.5	<2	<0.02	0.06	38	0.42	84	0.13						1.5	<0.02	<10	<1
MF14 0.2-0.3	11/05/2010	Intertidal flat	6.84	2.70	2	6.3	7	<0.02	2.12	1320									1.5	2.13	1330	100
MF14 0.5	11/05/2010	Intertidal flat	6.62	2.40	2																	
MF14 0.75-0.85	11/05/2010	Intertidal flat	6.82	3.20	2	6.4	4	<0.02	1.38	861									1.5	1.39	865	65
MF14 1.0	11/05/2010	Intertidal flat	7.17	2.91	2																	
MF14 1.25-1.35	11/05/2010	Intertidal flat	6.69	3.92	2	6.5	<2	<0.02	1.13	703	0.86	172	0.28						1.5	0.94	588	44
MF14 1.4-1.5	11/05/2010	Intertidal flat	7.00	4.88	2	6.5	<2	<0.02	1.12	696	11.9	2370	3.8						1.5	1.12	696	52
MF14 1.6	11/05/2010	Intertidal flat	6.96	7.33	2																	
MF15 0-0.1	11/05/2010	Supratidal flat	7.38	7.77	1	6.9	<2	<0.02	0.03	17	0.46	93	0.15						1.5	<0.02	<10	<1
MF15 0.3-0.4	11/05/2010	Supratidal flat	6.21	3.03	2	6.6	<2	<0.02	0.65	408	0.77	154	0.25						1.5	0.49	306	23
MF15 0.5	11/05/2010	Supratidal flat	6.57	3.10	2																	
MF15 0.7-0.8	11/05/2010	Supratidal flat	7.24	2.36	2	6.6	<2	<0.02	1.5	938	0.88	177	0.28						1.5	1.32	820	62
MF15 1.0	11/05/2010	Supratidal flat	7.17	5.30	2																	
MF15 1.2-1.3	11/05/2010	Supratidal flat	7.03	4.32	2	8.3	<2	<0.02	1.73	1080	3.03	605	0.97						1.5	1.08	676	51
MF15 1.5	11/05/2010	Supratidal flat	7.51	3.85	2																	
MF15 1.7-1.8	11/05/2010	Supratidal flat	7.00	6.84	2	7.7	<2	<0.02	1.05	657	1	200	0.32						1.5	0.84	524	39
MF15 2.0-2.1	11/05/2010	Supratidal flat	7.10	3.68	2	6.7	<2	<0.02	1.81	1130	1.21	242	0.39						1.5	1.55	966	72
MF16 0-0.1	11/05/2010	Supratidal flat	7.00	7.44	1	7.1	<2	<0.02	0.03	17	0.54	107	0.17						1.5	<0.02	<10	<1
MF16 0.2-0.3	11/05/2010	Supratidal flat	5.98	3.89	1	5.5	27	0.04	0.9	559									1.5	0.94	586	44
MF16 0.5	11/05/2010	Supratidal flat	6.04	2.29	1																	
MF16 0.75-0.85	11/05/2010	Supratidal flat	6.66	3.71	1	6.5	<2	<0.02	1.19	744	0.7	140	0.22						1.5	1.04	651	49
MF16 1-1.1	11/05/2010	Supratidal flat	6.63	2.80	2	7	<2	<0.02	1.31	816	0.84	167	0.27						1.5	1.13	704	53
MF16 1.3	11/05/2010	Supratidal flat	7.03	6.22	2																	
MF16 1.5-1.6	11/05/2010	Supratidal flat	7.14	5.65	2	8.4	<2	<0.02	1.28	801	3.12	623	1						1.5	0.62	386	29
MF16 1.8	11/05/2010	Supratidal flat	6.76	4.90	2																	
MF16 2-2.1	11/05/2010	Supratidal flat	7.16	4.49	2	8.6	<2	<0.02	1.45	905	2.38	474	0.76						1.5	0.94	588	44
MF16 2.3-2.4	11/05/2010	Supratidal flat	7.04	5.41	2	7.7	<2	<0.02	0.79	492	0.88	177	0.28						1.5	0.6	374	28
MF16 2.6	11/05/2010	Supratidal flat	7.35	3.74	2																	
MF17 0-0.1	11/05/2010	Supratidal flat	6.18	6.87	1	7.2	<2	<0.02	0.16	98	0.7	140	0.22						1.5	<0.02	<10	<1
MF17 0.25	11/05/2010	Supratidal flat	6.78	7.25	1																	
MF17 0.5-0.6	11/05/2010	Supratidal flat	5.57	2.32	2	6.6	<2	<0.02	1.28	797	0.35	70	0.11						1.5	1.2	750	56
MF17 0.8	11/05/2010	Supratidal flat	6.76	4.35	2																	
MF17 1.1-1.2	11/05/2010	Supratidal flat	6.93	6.05	2	8.5	<2	<0.02	1.35	840	3.63	726	1.16						1.5	0.57	356	27
MF17 1.5	11/05/2010	Supratidal flat	6.88	6.19	2																	
MF17 1.75-1.85	11/05/2010	Supratidal flat	6.52	5.20	2	8.3	<2	<0.02	1.17	729	2.56	512	0.82						1.5	0.62	388	29
MF17 2.0	11/05/2010	Supratidal flat	6.85	5.10	2																	
MF17 2.2-2.3	11/05/2010	Supratidal flat	6.71	3.24	2	8.1	<2	<0.02	1.66	1040	1.14	228	0.36						1.5	1.42	885	66
MF17 2.4	11/05/2010	Supratidal flat	6.97	4.15	2																	
MF18 0-0.1	11/05/2010	Supratidal flat	6.59	6.63	2	5.7	20	0.03	0.15	91									1.5	0.18	111	8
MF18 0.25	11/05/2010	Supratidal flat	5.89	2.80	2																	
MF18 0.4-0.5	11/05/2010	Supratidal flat	6.23	3.55	2	6.2	9	<0.02	1.73	1080									1.5	1.74	1090	82
MF18 0.75	11/05/2010	Supratidal flat	6.38	3.69	2																	
MF18 1-1.1	11/05/2010	Supratidal flat	6.20	5.86	2	7.2	<2	<0.02	2.5	1560	1.19	237	0.38						1.5	2.25	1400	105
MF18 1.2-1.3	11/05/2010	Supratidal flat	6.58	4.58	2	8	<2	<0.02	1.69	1050	1.3	260	0.42						1.5	1.41	880	66
MF18 1.5	11/05/2010	Supratidal flat	7.25	6.38	2																	
MF18 1.75-1.85	11/05/2010	Supratidal flat	7.16	6.24	2	8.5	<2	<0.02	1.24	773	4.14	828	1.33						1.5	0.35	220	16
MF18 2.0	11/05/2010	Supratidal flat	6.09	4.97	2																	
MF18 2.1-2.2	11/05/2010	Supratidal flat	6.92	4.86	2	8.1	<2	<0.02	1.74	1080	11.9	2370	3.8						1.5	<0.02	<10	<1
MF19 0-0.1	11/05/2010	Supratidal flat	7.20	6.91	2	7.2	<2	<0.02	0.7	436	1.02	205	0.33						1.5	0.48	299	22
MF19 0.1-0.2	11/05/2010	Supratidal flat	5.29	2.17	2	5.6	23	0.04	1.27	792									1.5	1.31	815	61
MF19 0.5	11/05/2010	Supratidal flat	6.82	3.12	2																	
MF19 0.7-0.8	11/05/2010	Supratidal flat	6.30	3.03	2	5.8	18	0.03	1.73	1080									1.5	1.76	1100	82
MF19 1.0	11/05/2010	Supratidal flat	5.17	4.39	2																	
MF19 1.3-1.4	11/05/2010	Supratidal flat	6.88	5.35	2	8.2	<2	<0.02	1.2	746	2.28	456	0.73						1.5	0.71	442	33
MF19 1.7	11/05/2010	Supratidal flat	6.38	5.84	2																	
MF19 2-2.1	11/05/2010	Supratidal flat	6.53	5.58	2	8.6	<2	<0.02	1.1	689	2.72	544	0.87						1.5	0.52	326	24
MF19 2.25-2.35	11/05/2010	Supratidal flat	6.79	6.39	2	8.5	<2	<0.02	1.5	936	2.89	577	0.92						1.5	0.88	551	41
MF20 0-0.05	11/05/2010	Supratidal flat	7.60	6.51	1	7.4	<2	<0.02	0.12	76	1.63	326	0.52						1.5	<0.02	<10	<1

Sample	Date	Landform	Screening Analysis: pH (F)	Screening Analysis: pH (Fox)	Screening Analysis: Reaction Rate	Actual Acidity: pH KCl (23A)	Actual Acidity: Titratable Actual Acidity (23F)	Actual Acidity: sulfidic - Titratable Actual Acidity (s-23F)	Potential Acidity: Chromium Reducible Sulfur (22B)	Potential Acidity: acidity - Chromium Reducible Sulfur (a-22B)	EA033-C: Acid Neutralising: Acid Neutralising Capacity (19A2)	EA033-C: Acid Neutralising: acidity - Acid Neutralising Capacity (a-19A2)	EA033-C: Acid Neutralising: sulfidic - Acid Neutralising Capacity (s-19A2)	EA033-D: Retained Acidity: KCl Extractable Sulfur (23Ce)	EA033-D: Retained Acidity: HCl Extractable Sulfur (20Be)	EA033-D: Retained Acidity: Net Acid Soluble Sulfur (20Je)	EA033-D: Retained Acidity: acidity - Net Acid Soluble Sulfur (a-20J)	EA033-D: Retained Acidity: sulfidic - Net Acid Soluble Sulfur (s-20J)	EA033-E: Acid Base Accounting: ANC Fineness Factor	EA033-E: Acid Base Accounting: Net Acidity (sulfur units)	EA033-E: Acid Base Accounting: Net Acidity (acidity units)	Liming Rate
Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998 - Action Criteria (> 1000 tonnes disturbed)			-	-	-	-	*18*	*0.03*	*0.03*	*18*	-	-	-	-	-	-	-	-	-	**0.03**	**18**	-
Units			*pH Unit*	*pH Unit*	-	*pH Unit*	*mole H+ / t*	*% pyrite S*	*% S*	*mole H+ / t*	*% CaCO3*	*mole H+ / t*	*% pyrite S*	*% S*	*% S*	*% S*	*mole H+ / t*	*% pyrite S*	-	*% S*	*mole H+ / t*	*kg CaCO3/t*
Laboratory Detection Limit			*0.1*	*0.1*	*1*	*0.1*	*2*	*0.02*	*0.02*	*10*	*0.01*	*10*	*0.01*	*0.02*	*0.02*	*0.02*	*10*	*0.02*	*0.5*	*0.02*	*10*	*1*
MF20 0.05-0.15	11/05/2010	Supratidal flat	4.92	1.91	2	5.1	39	0.06	1.85	1160									1.5	1.92	1200	90
MF20 0.4	11/05/2010	Supratidal flat	4.71	3.07	2																	
MF20 0.75-0.85	11/05/2010	Supratidal flat	6.01	3.56	2	6.2	8	<0.02	1.73	1080									1.5	1.74	1090	82
MF20 1-1.1	11/05/2010	Supratidal flat	6.38	5.92	2	8.4	<2	<0.02	1.82	1130	6.05	1210	1.94						1.5	0.52	326	24
MF20 1.25	11/05/2010	Supratidal flat	6.67	5.77	2																	
MF20 1.5-1.6	11/05/2010	Supratidal flat	6.82	4.92	2	8.5	<2	<0.02	1.28	797	2.49	498	0.8						1.5	0.74	465	35
MF20 1.8-1.9	11/05/2010	Supratidal flat	6.27	4.60	2	8.2	<2	<0.02	1.27	792	1.68	335	0.54						1.5	0.91	568	43
MF21 0-0.1	13/05/2010	Supratidal flat	4.78	3.79	2	5	30	0.05	<0.02	<10									1.5	0.05	30	2
MF21 0.2-0.3	13/05/2010	Supratidal flat	3.68	1.78	2	4.5	66	0.11	1.86	1160									1.5	1.96	1220	92
MF21 0.5	13/05/2010	Supratidal flat	4.54	1.45	2																	
MF21 0.75-0.85	13/05/2010	Supratidal flat	4.45	2.27	2	4.4	68	0.11	1.62	1010				0.52	0.6	0.07	33	0.05	1.5	1.78	1110	83
MF21 1.0	13/05/2010	Supratidal flat	5.45	1.89	2																	
MF21 1.3-1.4	13/05/2010	Supratidal flat	5.97	3.55	2	5.6	25	0.04	2.27	1410									1.5	2.31	1440	108
MF21 1.7	13/05/2010	Supratidal flat	6.72	5.62	2																	
MF21 1.9-2.0	13/05/2010	Supratidal flat	6.94	5.78	2	8.1	<2	<0.02	1.76	1100	4.62	923	1.48						1.5	0.77	481	36
MF21 2.3	13/05/2010	Supratidal flat	6.84	6.28	2																	
MF21 2.65-2.75	13/05/2010	Supratidal flat	6.74	5.04	2	7.4	<2	<0.02	0.91	566	1.06	211	0.34						1.5	0.68	425	32
MF21 2.9	13/05/2010	Supratidal flat	6.70	4.33	2																	
MF22 0-0.1	12/05/2010	Supratidal flat	5.67	4.25	1	6.6	<2	<0.02	0.53	328	0.42	85	0.14						1.5	0.44	272	20
MF22 0.1-0.2	12/05/2010	Supratidal flat	5.35	1.41	2	5.3	27	0.04	0.61	379									1.5	0.65	406	30
MF22 0.5	12/05/2010	Supratidal flat	6.30	1.45	2																	
MF22 0.75-0.85	12/05/2010	Supratidal flat	6.75	1.70	2	4.6	53	0.08	1.03	644									1.5	1.12	697	52
MF22 1-1.1	12/05/2010	Supratidal flat	6.85	1.73	2	6.2	7	<0.02	0.87	544									1.5	0.88	551	41
MF22 1.15-1.25	12/05/2010	Supratidal flat	6.86	2.28	2	6.4	3	<0.02	2.31	1440									1.5	2.31	1440	108
MF22 1.5	12/05/2010	Supratidal flat	6.87	4.59	2																	
MF22 1.75-1.85	12/05/2010	Supratidal flat	6.90	4.34	2	8	<2	<0.02	1.76	1100	6.58	1310	2.11						1.5	0.36	223	17
MF22 2.0	12/05/2010	Supratidal flat	6.71	5.49	2																	
MF22 2.15-2.25	12/05/2010	Supratidal flat	6.29	4.55	2	8.2	<2	<0.02	1.16	726	2.77	553	0.89						1.5	0.57	357	27
MF22 2.4	12/05/2010	Supratidal flat	6.74	3.10	2																	
MF23 0-0.1	12/05/2010	Supratidal flat	6.87	6.87	1	7	<2	<0.02	<0.02	<10	0.8	159	0.26						1.5	<0.02	<10	<1
MF23 0.1-0.2	12/05/2010	Supratidal flat	5.60	4.16	1	6.1	15	0.02	0.02	16									1.5	0.05	31	2
MF23 0.5	12/05/2010	Supratidal flat	6.35	2.07	2																	
MF23 0.75-0.85	12/05/2010	Supratidal flat	6.70	2.11	2	6.1	14	0.02	1.21	753									1.5	1.23	767	58
MF23 1.0	12/05/2010	Supratidal flat	6.20	2.71	2																	
MF23 1.25-1.35	12/05/2010	Supratidal flat	6.70	3.35	2	5.6	24	0.04	1.79	1110									1.5	1.82	1140	85
MF23 1.55-1.65	12/05/2010	Supratidal flat	7.19	4.75	2	8	<2	<0.02	1.03	642	0.12	25	0.04						1.5	1	625	47
MF23 1.8	12/05/2010	Supratidal flat	7.01	2.42	2																	
MF24 0-0.1	12/05/2010	Supratidal flat	6.75	7.07	2	7.3	<2	<0.02	0.09	57	0.37	75	0.12						1.5	<0.02	<10	<1
MF24 0.15-0.25	12/05/2010	Supratidal flat	6.63	5.29	2	6.4	7	<0.02	1.86	1160									1.5	1.87	1160	87
MF24 0.5	12/05/2010	Supratidal flat	6.22	2.06	2																	
MF24 0.75-0.85	12/05/2010	Supratidal flat	6.39	2.88	2	6.3	8	<0.02	2.05	1280									1.5	2.06	1290	97
MF24 1.1	12/05/2010	Supratidal flat	6.66	1.80	2																	
MF24 1.4-1.5	12/05/2010	Supratidal flat	6.82	2.11	2	6.6	<2	<0.02	1.54	964	0.77	154	0.25						1.5	1.38	861	64
MF24 1.75	12/05/2010	Supratidal flat	6.79	5.55	2																	
MF24 2-2.1	12/05/2010	Supratidal flat	7.01	5.97	2	7.9	<2	<0.02	1.23	767	1.94	388	0.62						1.5	0.82	508	38
MF24 2.3-2.4	12/05/2010	Supratidal flat	6.75	4.88	2	8.1	<2	<0.02	1.16	721	1.15	229	0.37						1.5	0.91	568	43
MF25 0-0.1	12/05/2010	Supratidal flat	7.03	6.84	2	7.6	<2	<0.02	0.08	52	1.27	254	0.41						1.5	<0.02	<10	<1
MF25 0.1-0.2	12/05/2010	Supratidal flat	6.97	5.98	2	7	<2	<0.02	<0.02	<10	0.85	169	0.27						1.5	<0.02	<10	<1
MF25 0.5	12/05/2010	Supratidal flat	6.60	6.23	2																	
MF25 0.75-0.85	12/05/2010	Supratidal flat	6.72	2.04	2	6.3	7	<0.02	1.6	1000									1.5	1.62	1010	76
MF25 1.1	12/05/2010	Supratidal flat	6.63	3.03	2																	
MF25 1.4-1.5	12/05/2010	Supratidal flat	6.73	2.46	2	6.6	<2	<0.02	1.64	1020	0.57	114	0.18						1.5	1.52	947	71
MF25 1.75	12/05/2010	Supratidal flat	6.46	4.22	2																	
MF25 2-2.1	12/05/2010	Supratidal flat	6.78	5.90	2	8.3	<2	<0.02	1.54	962	5.06	1010	1.62						1.5	0.46	288	22
MF25 2.3	12/05/2010	Supratidal flat	6.40	5.91	2																	
MF25 2.5-2.6	12/05/2010	Supratidal flat	6.85	3.98	2	7.1	<2	<0.02	1.13	706	0.7	139	0.22						1.5	0.98	613	46
MF26 0-0.1	12/05/2010	Supratidal flat	7.51	7.34	2	6.2	4	<0.02	0.26	162									1.5	0.27	167	12
MF26 0.1-0.2	12/05/2010	Supratidal flat	7.12	2.21	2	6.7	<2	<0.02	0.62	384	0.45	90	0.14						1.5	0.52	324	24
MF26 0.5	12/05/2010	Supratidal flat	6.99	1.44	2																	
MF26 0.75-0.85	12/05/2010	Supratidal flat	6.89	2.94	2	6.1	17	0.03	1.89	1180									1.5	1.92	1200	90
MF26 1.05-1.15	12/05/2010	Supratidal flat	7.58	1.39	2	6.3	6	<0.02	2.5	1560									1.5	2.51	1570	118
MF27 0-0.1	12/05/2010	Supratidal flat	7.04	7.77	2	7.1	<2	<0.02	0.05	33	1.12	224	0.36						1.5	<0.02	<10	<1
MF27 0.1-0.2	12/05/2010	Supratidal flat	6.54	6.17	2	6.9	<2	<0.02	0.1	66	0.75	149	0.24						1.5	<0.02	<10	<1
MF27 0.5	12/05/2010	Supratidal flat	6.90	2.22	2																	
MF27 0.75-0.85	12/05/2010	Supratidal flat	6.90	2.22	2	6.1	9	<0.02	0.66	411									1.5	0.67	420	32
MF27 1-1.1	12/05/2010	Supratidal flat	7.03	2.37	2	6.4	<2	<0.02	0.38	240									1.5	0.39	242	18
MF27 1.5	12/05/2010	Supratidal flat	7.11	2.25	2																	
MF27 1.75-1.85	12/05/2010	Supratidal flat	7.14	3.25	2	6.1	13	0.02	1.59	993									1.5	1.61	1000	75
MF27 2.0	12/05/2010	Supratidal flat	7.15	4.22	2																	
MF27 2.25-2.35	12/05/2010	Supratidal flat	7.10	4.89	2	8.5	<2	<0.02	1.32	827	9.74	1950	3.12						1.5	<0.02	<10	<1
MF27 2.5	12/05/2010	Supratidal flat	7.68	5.07	2																	
MF28 0-0.1	10/05/2010	Intertidal flat	7.51	6.75	1	6.9	<2	<0.02	0.04	26	1.69	337	0.54						1.5	<0.02	<10	<1
MF28 0.1-0.2	10/05/2010	Intertidal flat	7.52	7.10	2	6.4	<2	<0.02	0.16	100									1.5	0.16	100	7
MF28 0.5	10/05/2010	Intertidal flat	7.19	3.39	2																	
MF28 0.75-0.85	10/05/2010	Intertidal flat	6.98	4.19	2	7.6	<2	<0.02	1.2	747	1.27	253	0.4						1.5	0.93	578	43
MF28 1.0-1.1	10/05/2010	Intertidal flat	7.22	5.76	2	8.4	<2	<0.02	1.44	895	10.8	2150	3.44						1.5	<0.02	<10	<1
MF28 1.3	10/05/2010	Intertidal flat	6.96	6.24	2																	
MF28 1.5-1.6	10/05/2010	Intertidal flat	7.14	6.51	2	8.4	<2	<0.02	1.41	881	6.4	1280	2.05						1.5	0.04	28	2
MF28 1.8	10/05/2010	Intertidal flat	7.31	6.45	2																	
MF29 0-0.1	10/05/2010	Intertidal flat	6.47	6.70	2	6.5	3	<0.02	0.88	552									1.5	0.88	552	41
MF29 0.25-0.35	10/05/2010	Intertidal flat	6.20	5.05	2	6.3	7	<0.02	0.75	468									1.5	0.76	476	36
MF29 0.5	10/05/2010	Intertidal flat	6.96	2.23	2																	
MF29 0.75-0.85	10/05/2010	Intertidal flat	7.14	3.74	2	6.2	10	<0.02	1.07	668									1.5	1.09	678	51
MF29 1.0	10/05/2010	Intertidal flat	7.00	3.56	2																	
MF29 1.25-1.35	10/05/2010	Intertidal flat	7.32	4.35	2	5.6	22	0.04	2.38	1480									1.5	2.42	1510	113
MF29 1,5	10/05/2010	Intertidal flat	7.54	3.13	2																	
MF29 1.75-1.85	10/05/2010	Intertidal flat	7.34	4.37	2	6.4	4	<0.02	2.79	1740									1.5	2.8	1740	131
MF29 2.0	10/05/2010	Intertidal flat	7.23	6.04	2																	
MF29 2.25-2.35	10/05/2010	Intertidal flat	7.32	6.28	2	8.1	<2	<0.02	1.32	826	2.68	536	0.86						1.5	0.75	468	35
MF29 2.5	10/05/2010	Intertidal flat	7.22	5.39	2																	
MF29 2.75-2.85	10/05/2010	Intertidal flat	7.55	3.35	2	7.1	<2	<0.02	1.74	1080	0.94	188	0.3						1.5	1.54	960	72
MF30 0-0.1	10/05/2010	Intertidal flat	5.09	2.36	2	5.7	29	0.05	0.03	21									1.5	0.08	50	4
MF30 0.2-0.3	10/05/2010	Intertidal flat	6.09	2.81	2	6.4	<2	<0.02	1.08	677									1.5	1.08	677	51
MF30 0.5	10/05/2010	Intertidal flat	7.35	3.28	2																	
MF30 0.7-0.8	10/05/2010	Intertidal flat	7.12	3.80	2	6.2	12	<0.02	1.08	673									1.5	1.1	685	51
MF30 1.0	10/05/2010	Intertidal flat	7.08	2.53	2																	
MF30 1.2-1.3	10/05/2010	Intertidal flat	6.98	5.75	2	8	<2	<0.02	1.76	1100	2.11	422	0.68						1.5	1.31	819	61
MF30 1.6	10/05/2010	Intertidal flat	7.16	6.24	2																	
MF30 1.8-1.9	10/05/2010	Intertidal flat	7.57	5.62	2	8.4	<2	<0.02	1.31	816	2.86	570	0.91						1.5	0.7	436	33
MF30 2.1	10/05/2010	Intertidal flat	7.30	5.54	2																	
MF30 2.3-2.4	10/05/2010	Intertidal flat	7.18	7.07	2	7.8	<2	<0.02	0.98	612	1.19	238	0.38						1.5	0.73	454	34
MF32 0.0.1	15/05/2010	Intertidal flat	7.40	2.88	2	6.6	<2	<0.02	1.77	1100	0.64	128	0.2						1.5	1.63	1020	76
MF32 0.1-0.2	15/05/2010	Intertidal flat	7.19	4.18	2	7.1	<2	<0.02	1.14	713	0.84	168	0.27						1.5	0.96	601	45
MF32 0.5-0.6	15/05/2010	Intertidal flat	7.66	6.09	2	7.1	<2	<0.02	0.26	160	2.64	528	0.84						1.5	<0.02	<10	<1

NOTES

- Denotes no criteria for that parameter

Yellow highlighting indicates parameters above applied guideline/criteria.

NT indicates a sample which was not tested for a particular parameter.

Reaction rate is a subjective assessment of the strength of the reaction to hydrogen peroxide: 1 (minor bubbling) to 4 (violent with frothing and heat produced)

pH_{FOX}

pH <3
pH 3 - 4
pH 4 - 5

Liming rate treatment categories

L	Low treatment	≤0.1
M	Medium treatment	0.1 – 1
H	High treatment	1 – 5
VH	Very high treatment	5 – 25
XH	Extra high treatment	>25

Appendix 4 Laboratory certificates

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1007694**	Page	: 1 of 9
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
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Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Site	: The Narrows		
		No. of samples received	: 29
Quote number	: EN/034/10	No. of samples analysed	: 29

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Cass Sealby	Senior Chemist - Acid Sulphate Soils	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **This report has been amended to alter the site details, project reference code or order number. All analysis results are as per the previous report.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W1/0.0-0.1	W1/0.15-0.25	W1/0.6-0.7	W1/1.0-1.1	W2/0.0-0.1
				Client sampling date / time: 01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00
				EB1007694-001	EB1007694-002	EB1007694-003	EB1007694-004	EB1007694-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.3**	**8.4**	**8.5**	**7.2**	**8.5**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.81**	**0.86**	**1.72**	**1.52**	**1.36**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**504**	**536**	**1080**	**946**	**847**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**2.71**	**2.71**	**2.71**	**1.14**	**5.79**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**541**	**541**	**541**	**227**	**1160**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.87**	**0.87**	**0.87**	**0.36**	**1.85**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.23**	**0.28**	**1.15**	**1.27**	**0.12**
Net Acidity (acidity units)	----	10	mole H+ / t	**143**	**175**	**715**	**795**	**76**
Liming Rate	----	1	kg CaCO3/t	**11**	**13**	**54**	**60**	**6**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	W2/0.2-0.3	W2/0.7-0.8	W2/1.1-1.2	W2/1.6-1.7	W2/2.1-2.2
				Client sampling date / time	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00
					EB1007694-006	EB1007694-007	EB1007694-008	EB1007694-009	EB1007694-010
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		**8.5**	**8.4**	**7.6**	**7.3**	**7.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t		<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.02	% S		**1.09**	**2.04**	**1.10**	**1.22**	**0.98**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		**680**	**1270**	**689**	**761**	**615**
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3		**3.32**	**2.34**	**1.14**	**1.05**	**1.18**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t		**663**	**467**	**227**	**209**	**236**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S		**1.06**	**0.75**	**0.36**	**0.34**	**0.38**
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S		**0.38**	**1.54**	**0.86**	**1.00**	**0.73**
Net Acidity (acidity units)	----	10	mole H+ / t		**237**	**960**	**538**	**621**	**458**
Liming Rate	----	1	kg CaCO3/t		**18**	**72**	**40**	**47**	**34**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W3/0.0-0.1	W3/0.2-0.3	W3/0.7-0.8	W3/1.0-1.1	W3/1.5-1.6
				Client sampling date / time: 01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00
				EB1007694-011	EB1007694-012	EB1007694-013	EB1007694-014	EB1007694-015
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.6**	**8.6**	**8.4**	**8.3**	**7.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.64**	**1.23**	**0.90**	**1.12**	**1.43**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**400**	**765**	**559**	**698**	**893**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**9.13**	**15.3**	**1.29**	**1.14**	**1.22**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**1820**	**3050**	**257**	**227**	**244**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**2.92**	**4.89**	**0.41**	**0.36**	**0.39**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**0.62**	**0.88**	**1.17**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**387**	**547**	**730**
Liming Rate	----	1	kg CaCO3/t	<1	<1	**29**	**41**	**55**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W4/0.0-0.1	W4/0.4-0.5	W4/0.9-1.0	W4/1.0-1.1	W22/0.0-0.1
				Client sampling date / time: 01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00
				EB1007694-016	EB1007694-017	EB1007694-018	EB1007694-019	EB1007694-020
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.7**	**8.5**	**8.4**	**8.2**	**8.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.61**	**1.28**	**1.34**	**1.52**	**0.48**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**380**	**796**	**835**	**951**	**302**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**22.6**	**7.95**	**2.71**	**1.29**	**5.24**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**4520**	**1590**	**541**	**257**	**1050**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**7.24**	**2.55**	**0.87**	**0.41**	**1.68**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**0.76**	**1.25**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**474**	**779**	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	**36**	**58**	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W22/0.2-0.3	W22/0.8-0.9	W21/0.0-0.1	W21/0.1-0.2	W21/0.5-0.6
				Client sampling date / time: 01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00
				EB1007694-021	EB1007694-022	EB1007694-023	EB1007694-024	EB1007694-025
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.4**	**7.2**	**8.2**	**7.7**	**7.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.20**	**0.39**	**0.47**	**0.51**	**1.04**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**752**	**244**	**293**	**318**	**652**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.64**	**3.00**	**2.52**	**0.96**	**0.76**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**128**	**599**	**503**	**192**	**152**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.20**	**0.96**	**0.81**	**0.31**	**0.24**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**1.07**	<0.02	<0.02	**0.30**	**0.88**
Net Acidity (acidity units)	----	10	mole H+ / t	**666**	<10	<10	**191**	**551**
Liming Rate	----	1	kg CaCO3/t	**50**	<1	<1	**14**	**41**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W21/0.9-1.0	W20/0.0-0.1	W20/0.3-0.4	W20/0.6-0.7	----
				Client sampling date / time: 01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	01-MAY-2010 15:00	----
				EB1007694-026	EB1007694-027	EB1007694-028	EB1007694-029	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.0**	**8.6**	**8.4**	**7.9**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.02**	**0.86**	**1.56**	**1.68**	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**636**	**538**	**975**	**1050**	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.12**	**3.40**	**2.16**	**1.20**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**223**	**678**	**431**	**239**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.36**	**1.09**	**0.69**	**0.38**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	**0.78**	**0.14**	**1.10**	**1.42**	----
Net Acidity (acidity units)	----	10	mole H+ / t	**486**	**86**	**688**	**887**	----
Liming Rate	----	1	kg CaCO3/t	**36**	**6**	**52**	**66**	----

QUALITY CONTROL REPORT

Work Order	: **EB1007694**	Page	: 1 of 6
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 29
Quote number	: EN/034/10	No. of samples analysed	: 29

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Cass Sealby	Senior Chemist - Acid Sulphate Soils	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1339159)									
EB1007694-001	W1/0.0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.3	8.3	0.0	0% - 20%
EB1007694-011	W3/0.0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.6	8.7	1.2	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1339160)									
EB1007694-021	W22/0.2-0.3	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.4	7.5	1.3	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1339159)									
EB1007694-001	W1/0.0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.81	0.79	2.3	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	504	492	2.3	0% - 20%
EB1007694-011	W3/0.0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.64	0.64	0.0	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	400	400	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1339160)									
EB1007694-021	W22/0.2-0.3	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.20	1.29	7.1	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	752	807	7.1	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1339159)									
EB1007694-001	W1/0.0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.71	2.71	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.87	0.87	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	541	541	0.0	0% - 20%
EB1007694-011	W3/0.0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	9.13	9.26	1.4	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	2.92	2.97	1.4	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1820	1850	1.4	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1339160)									
EB1007694-021	W22/0.2-0.3	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.64	0.72	11.8	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 1339160) - continued									
EB1007694-021	W22/0.2-0.3	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.20	0.23	11.8	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	128	144	11.8	0% - 50%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1339159)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1339160)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1339159)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1339160)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1339159)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1339160)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1007694**	Page	: 1 of 7
Amendment	: **1**		
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
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Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 29
Quote number	: EN/034/10	No. of samples analysed	: 29

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen								
W1/0.0-0.1,	W1/0.15-0.25,	**01-MAY-2010**	**10-MAY-2010**	01-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W1/0.6-0.7,	W1/1.0-1.1,							
W2/0.0-0.1,	W2/0.2-0.3,							
W2/0.7-0.8,	W2/1.1-1.2,							
W2/1.6-1.7,	W2/2.1-2.2,							
W3/0.0-0.1,	W3/0.2-0.3,							
W3/0.7-0.8,	W3/1.0-1.1,							
W3/1.5-1.6,	W4/0.0-0.1,							
W4/0.4-0.5,	W4/0.9-1.0,							
W4/1.0-1.1,	W22/0.0-0.1,							
W22/0.2-0.3,	W22/0.8-0.9,							
W21/0.0-0.1,	W21/0.1-0.2,							
W21/0.5-0.6,	W21/0.9-1.0,							
W20/0.0-0.1,	W20/0.3-0.4,							
W20/0.6-0.7								

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-B: Potential Acidity								
Snap Lock Bag - frozen								
W1/0.0-0.1,	W1/0.15-0.25,	**01-MAY-2010**	**10-MAY-2010**	01-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W1/0.6-0.7,	W1/1.0-1.1,							
W2/0.0-0.1,	W2/0.2-0.3,							
W2/0.7-0.8,	W2/1.1-1.2,							
W2/1.6-1.7,	W2/2.1-2.2,							
W3/0.0-0.1,	W3/0.2-0.3,							
W3/0.7-0.8,	W3/1.0-1.1,							
W3/1.5-1.6,	W4/0.0-0.1,							
W4/0.4-0.5,	W4/0.9-1.0,							
W4/1.0-1.1,	W22/0.0-0.1,							
W22/0.2-0.3,	W22/0.8-0.9,							
W21/0.0-0.1,	W21/0.1-0.2,							
W21/0.5-0.6,	W21/0.9-1.0,							
W20/0.0-0.1,	W20/0.3-0.4,							
W20/0.6-0.7								
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen								
W1/0.0-0.1,	W1/0.15-0.25,	**01-MAY-2010**	**10-MAY-2010**	01-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W1/0.6-0.7,	W1/1.0-1.1,							
W2/0.0-0.1,	W2/0.2-0.3,							
W2/0.7-0.8,	W2/1.1-1.2,							
W2/1.6-1.7,	W2/2.1-2.2,							
W3/0.0-0.1,	W3/0.2-0.3,							
W3/0.7-0.8,	W3/1.0-1.1,							
W3/1.5-1.6,	W4/0.0-0.1,							
W4/0.4-0.5,	W4/0.9-1.0,							
W4/1.0-1.1,	W22/0.0-0.1,							
W22/0.2-0.3,	W22/0.8-0.9,							
W21/0.0-0.1,	W21/0.1-0.2,							
W21/0.5-0.6,	W21/0.9-1.0,							
W20/0.0-0.1,	W20/0.3-0.4,							
W20/0.6-0.7								

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity								
Snap Lock Bag - frozen								
W1/0.0-0.1,	W1/0.15-0.25,	**01-MAY-2010**	**10-MAY-2010**	01-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W1/0.6-0.7,	W1/1.0-1.1,							
W2/0.0-0.1,	W2/0.2-0.3,							
W2/0.7-0.8,	W2/1.1-1.2,							
W2/1.6-1.7,	W2/2.1-2.2,							
W3/0.0-0.1,	W3/0.2-0.3,							
W3/0.7-0.8,	W3/1.0-1.1,							
W3/1.5-1.6,	W4/0.0-0.1,							
W4/0.4-0.5,	W4/0.9-1.0,							
W4/1.0-1.1,	W22/0.0-0.1,							
W22/0.2-0.3,	W22/0.8-0.9,							
W21/0.0-0.1,	W21/0.1-0.2,							
W21/0.5-0.6,	W21/0.9-1.0,							
W20/0.0-0.1,	W20/0.3-0.4,							
W20/0.6-0.7								
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen								
W1/0.0-0.1,	W1/0.15-0.25,	**01-MAY-2010**	**10-MAY-2010**	01-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W1/0.6-0.7,	W1/1.0-1.1,							
W2/0.0-0.1,	W2/0.2-0.3,							
W2/0.7-0.8,	W2/1.1-1.2,							
W2/1.6-1.7,	W2/2.1-2.2,							
W3/0.0-0.1,	W3/0.2-0.3,							
W3/0.7-0.8,	W3/1.0-1.1,							
W3/1.5-1.6,	W4/0.0-0.1,							
W4/0.4-0.5,	W4/0.9-1.0,							
W4/1.0-1.1,	W22/0.0-0.1,							
W22/0.2-0.3,	W22/0.8-0.9,							
W21/0.0-0.1,	W21/0.1-0.2,							
W21/0.5-0.6,	W21/0.9-1.0,							
W20/0.0-0.1,	W20/0.3-0.4,							
W20/0.6-0.7								

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	3	29	**10.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	29	**6.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1007694**		
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: The Narrows		
Sampler	: Alex Kochnieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 05-MAY-2010	Issue Date	: 26-MAY-2010 10:22
Client Requested Due Date	: 14-MAY-2010	Scheduled Reporting Date	: **14-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 6.2,6.5,6.4' C - Ice present
No. of coolers/boxes	: 4 MEDIUM	No. of samples received	: 29
Sercurity Seal	: Intact.	No. of samples analysed	: 29

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples were received at ALS Gladstone at <0'C.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1007694-001	01-MAY-2010 15:00	W1/0.0-0.1	✓
EB1007694-002	01-MAY-2010 15:00	W1/0.15-0.25	✓
EB1007694-003	01-MAY-2010 15:00	W1/0.6-0.7	✓
EB1007694-004	01-MAY-2010 15:00	W1/1.0-1.1	✓
EB1007694-005	01-MAY-2010 15:00	W2/0.0-0.1	✓
EB1007694-006	01-MAY-2010 15:00	W2/0.2-0.3	✓
EB1007694-007	01-MAY-2010 15:00	W2/0.7-0.8	✓
EB1007694-008	01-MAY-2010 15:00	W2/1.1-1.2	✓
EB1007694-009	01-MAY-2010 15:00	W2/1.6-1.7	✓
EB1007694-010	01-MAY-2010 15:00	W2/2.1-2.2	✓
EB1007694-011	01-MAY-2010 15:00	W3/0.0-0.1	✓
EB1007694-012	01-MAY-2010 15:00	W3/0.2-0.3	✓
EB1007694-013	01-MAY-2010 15:00	W3/0.7-0.8	✓
EB1007694-014	01-MAY-2010 15:00	W3/1.0-1.1	✓
EB1007694-015	01-MAY-2010 15:00	W3/1.5-1.6	✓
EB1007694-016	01-MAY-2010 15:00	W4/0.0-0.1	✓
EB1007694-017	01-MAY-2010 15:00	W4/0.4-0.5	✓
EB1007694-018	01-MAY-2010 15:00	W4/0.9-1.0	✓
EB1007694-019	01-MAY-2010 15:00	W4/1.0-1.1	✓
EB1007694-020	01-MAY-2010 15:00	W22/0.0-0.1	✓
EB1007694-021	01-MAY-2010 15:00	W22/0.2-0.3	✓
EB1007694-022	01-MAY-2010 15:00	W22/0.8-0.9	✓
EB1007694-023	01-MAY-2010 15:00	W21/0.0-0.1	✓
EB1007694-024	01-MAY-2010 15:00	W21/0.1-0.2	✓
EB1007694-025	01-MAY-2010 15:00	W21/0.5-0.6	✓
EB1007694-026	01-MAY-2010 15:00	W21/0.9-1.0	✓
EB1007694-027	01-MAY-2010 15:00	W20/0.0-0.1	✓
EB1007694-028	01-MAY-2010 15:00	W20/0.3-0.4	✓
EB1007694-029	01-MAY-2010 15:00	W20/0.6-0.7	✓

Requested Deliverables

MR ALEX KOCHNIEFF

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

MR MYLES CLARK

- Chain of Custody (CoC) (COC)	Email	myles.clark@alsenviro.com

MS JENNIFER CULLEN

- Chain of Custody (CoC) (COC)	Email	jennifer.cullen@alsenviro.com

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1007696**	Page	: 1 of 5
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 13-MAY-2010
Site	: The Narrows		
		No. of samples received	: 9
Quote number	: EN/034/10	No. of samples analysed	: 9

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W19/0.0-0.1	W19/0.3-0.4	W19/0.9-1.0	W19/1.5-1.6	W5/0.0-0.1
Client sampling date / time				03-MAY-2010 13:13	03-MAY-2010 13:13	03-MAY-2010 13:13	03-MAY-2010 13:13	03-MAY-2010 13:13
				EB1007696-001	EB1007696-002	EB1007696-003	EB1007696-004	EB1007696-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.9**	**8.8**	**8.6**	**8.4**	**8.9**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.23**	**0.30**	**0.86**	**0.12**	**0.67**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**144**	**187**	**535**	**78**	**418**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**3.34**	**3.02**	**3.63**	**0.87**	**24.6**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**667**	**604**	**724**	**173**	**4920**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.07**	**0.97**	**1.16**	**0.28**	**7.90**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**0.08**	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**52**	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	**4**	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W5/0.2-0.3	W5/0.7-0.8	W5/1.2-1.3	W5/1.6-1.7	----
				Client sampling date / time: 03-MAY-2010 13:13	03-MAY-2010 13:13	03-MAY-2010 13:13	03-MAY-2010 13:13	----
				EB1007696-006	EB1007696-007	EB1007696-008	EB1007696-009	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.7**	**8.3**	**8.5**	**7.9**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.89**	**2.12**	**0.69**	**1.61**	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**556**	**1320**	**430**	**1000**	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**2.98**	**10.0**	**2.85**	**1.69**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**596**	**2000**	**569**	**338**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.95**	**3.21**	**0.91**	**0.54**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	**0.26**	<0.02	**0.08**	**1.25**	----
Net Acidity (acidity units)	----	10	mole H+ / t	**159**	<10	**51**	**777**	----
Liming Rate	----	1	kg CaCO3/t	**12**	<1	**4**	**58**	----

QUALITY CONTROL REPORT

Work Order	: **EB1007696**	Page	: 1 of 5
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 13-MAY-2010
Order number	: ----		
		No. of samples received	: 9
Quote number	: EN/034/10	No. of samples analysed	: 9

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1341060)									
EB1007696-001	W19/0.0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.9	8.9	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1341060)									
EB1007696-001	W19/0.0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.23	0.22	0.0	0% - 50%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	144	138	4.1	0% - 50%
EA033-C: Acid Neutralising Capacity (QC Lot: 1341060)									
EB1007696-001	W19/0.0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	3.34	3.29	1.3	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.07	1.05	1.3	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	667	658	1.3	0% - 20%

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

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

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1341060)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1341060)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1341060)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1007696**	Page	: 1 of 6
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 05-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 13-MAY-2010
Order number	: ----		
		No. of samples received	: 9
Quote number	: EN/034/10	No. of samples analysed	: 9

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen							
W19/0.0-0.1, W19/0.3-0.4, W19/0.9-1.0, W19/1.5-1.6, W5/0.0-0.1, W5/0.2-0.3, W5/0.7-0.8, W5/1.2-1.3, W5/1.6-1.7	**03-MAY-2010**	**11-MAY-2010**	03-MAY-2011	✓	**13-MAY-2010**	09-AUG-2010	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen							
W19/0.0-0.1, W19/0.3-0.4, W19/0.9-1.0, W19/1.5-1.6, W5/0.0-0.1, W5/0.2-0.3, W5/0.7-0.8, W5/1.2-1.3, W5/1.6-1.7	**03-MAY-2010**	**11-MAY-2010**	03-MAY-2011	✓	**13-MAY-2010**	09-AUG-2010	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen							
W19/0.0-0.1, W19/0.3-0.4, W19/0.9-1.0, W19/1.5-1.6, W5/0.0-0.1, W5/0.2-0.3, W5/0.7-0.8, W5/1.2-1.3, W5/1.6-1.7	**03-MAY-2010**	**11-MAY-2010**	03-MAY-2011	✓	**13-MAY-2010**	09-AUG-2010	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen							
W19/0.0-0.1, W19/0.3-0.4, W19/0.9-1.0, W19/1.5-1.6, W5/0.0-0.1, W5/0.2-0.3, W5/0.7-0.8, W5/1.2-1.3, W5/1.6-1.7	**03-MAY-2010**	**11-MAY-2010**	03-MAY-2011	✓	**13-MAY-2010**	09-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen							
W19/0.0-0.1, W19/0.3-0.4, W19/0.9-1.0, W19/1.5-1.6, W5/0.0-0.1, W5/0.2-0.3, W5/0.7-0.8, W5/1.2-1.3, W5/1.6-1.7	**03-MAY-2010**	**11-MAY-2010**	03-MAY-2011	✓	**13-MAY-2010**	09-AUG-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	1	9	**11.1**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	9	**11.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1007696**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: The Narrows		
Sampler	: Alex Kochnieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 05-MAY-2010	Issue Date	: 13-MAY-2010
Client Requested Due Date	: 13-MAY-2010	Scheduled Reporting Date	: **13-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 6.2,6.5,6.4' C - Ice present
No. of coolers/boxes	: 4 MEDIUM	No. of samples received	: 9
Sercurity Seal	: Intact.	No. of samples analysed	: 9

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1007696-001	03-MAY-2010 13:13	W19/0.0-0.1	✓
EB1007696-002	03-MAY-2010 13:13	W19/0.3-0.4	✓
EB1007696-003	03-MAY-2010 13:13	W19/0.9-1.0	✓
EB1007696-004	03-MAY-2010 13:13	W19/1.5-1.6	✓
EB1007696-005	03-MAY-2010 13:13	W5/0.0-0.1	✓
EB1007696-006	03-MAY-2010 13:13	W5/0.2-0.3	✓
EB1007696-007	03-MAY-2010 13:13	W5/0.7-0.8	✓
EB1007696-008	03-MAY-2010 13:13	W5/1.2-1.3	✓
EB1007696-009	03-MAY-2010 13:13	W5/1.6-1.7	✓

Requested Deliverables

MR ALEX KOCHNIEFF

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

MR MYLES CLARK

- Chain of Custody (CoC) (COC)	Email	myles.clark@alsenviro.com

MS JENNIFER CULLEN

- Chain of Custody (CoC) (COC)	Email	jennifer.cullen@alsenviro.com

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
PROJECT ID: 301001-00448 WBS 3V4070CN	EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
SITE: ~~Reid Rd~~ The Norrocks. P.O. NO.:	EMAIL INVOICE TO: as above
RESULTS REQUIRED (**Date**): (7 day TAT) QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (**topsoils**)		pH / Electricial Conductivity (**all**)	CEC (Ca, Mg, K, Na) [**all**]		Chromium Suite		HOLD					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
1	W19/0.0-0.1	S	3/5									✓							
2	W19/0.3-0.4	S										✓							
3	W19/0.9-1.0	S										✓							
4	W19/1.5-1.6	S										✓							
5	W5/0.0-0.1	S										✓							
6	W5/0.2-0.3	S										✓							
7	W5/0.7-0.8	S										✓							
8	W5/1.2-1.3	S										✓							
9	W5/1.6-1.7.	S										✓							
		S																	
		S																	
		S																	

Environmental Division
Brisbane
Work Order
EB1007696

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 3/5/2010	Name: Danielle Russell	Date: 3/5/10	Con' Note No:
Of: WorleyParsons	Time: 1315	Of: ALS Acteat	Time: 1315	
Name: D. Radcliffe	Date: 4/5/10	Name: C. Bryant	Date: 5/5/10	Transport Co:
Of: ALS	Time: 1420	Of: ALS	Time: 0850	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1007845**	Page	: 1 of 7
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 06-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 17-MAY-2010
Site	: Narrows		
		No. of samples received	: 16
Quote number	: EN/034/10	No. of samples analysed	: 16

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W10 0.1-0.2	W9 0-0.1	W9 0.3-0.4	W16 0-0.1	W16 0.3-0.4
				Client sampling date / time: 04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00
				EB1007845-001	EB1007845-002	EB1007845-003	EB1007845-004	EB1007845-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.8**	**8.7**	**8.8**	**9.1**	**9.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.35**	**0.57**	**0.47**	**0.09**	**0.08**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**220**	**357**	**296**	**59**	**52**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**10.9**	**24.6**	**10.4**	**11.1**	**11.0**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**2180**	**4920**	**2090**	**2220**	**2200**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**3.50**	**7.90**	**3.34**	**3.56**	**3.54**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W16 0.8-0.9	W16 1.2-1.3	W16 1.6-1.7	W16 2.0-2.1	W15 0-0.1
Client sampling date / time				04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00
				EB1007845-006	EB1007845-007	EB1007845-008	EB1007845-009	EB1007845-010
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.2**	**9.2**	**9.1**	**8.9**	**9.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.07**	**0.06**	**0.09**	**0.30**	**0.09**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**43**	**37**	**58**	**186**	**56**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**24.6**	**24.6**	**24.6**	**8.81**	**24.6**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**4920**	**4920**	**4920**	**1760**	**4920**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**7.90**	**7.90**	**7.90**	**2.82**	**7.90**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W15 0.1-0.2	W15 0.5-0.6	W15 0.9-1.0	W15 1.3-1.4	W15 1.7-1.8
				Client sampling date / time: 04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00	04-MAY-2010 15:00
				EB1007845-011	EB1007845-012	EB1007845-013	EB1007845-014	EB1007845-015
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.9**	**9.1**	**9.1**	**8.9**	**9.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.11**	**0.10**	**0.12**	**0.36**	**0.24**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**70**	**63**	**78**	**224**	**147**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**24.6**	**11.1**	**11.1**	**24.6**	**11.4**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**4920**	**2210**	**2220**	**4920**	**2270**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**7.90**	**3.55**	**3.56**	**7.90**	**3.65**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W15 2.2-2.3	----	----	----	----
				Client sampling date / time: 04-MAY-2010 15:00	----	----	----	----
				EB1007845-016	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.8**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.31**	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**195**	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**10.3**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**2050**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**3.29**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB1007845**	Page	: 1 of 5
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Narrows		
C-O-C number	: ----	Date Samples Received	: 06-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 17-MAY-2010
Order number	: ----		
		No. of samples received	: 16
Quote number	: EN/034/10	No. of samples analysed	: 16

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1339172)									
EB1007845-001	W10 0.1-0.2	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.8	8.8	0.0	0% - 20%
EB1007845-011	W15 0.1-0.2	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.9	9.0	1.1	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1339172)									
EB1007845-001	W10 0.1-0.2	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.35	0.35	0.0	0% - 50%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	220	218	1.0	0% - 20%
EB1007845-011	W15 0.1-0.2	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.11	0.12	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	70	75	8.0	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 1339172)									
EB1007845-001	W10 0.1-0.2	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	10.9	11.0	0.4	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	3.50	3.51	0.4	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	2180	2190	0.4	0% - 20%
EB1007845-011	W15 0.1-0.2	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	24.6	24.6	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	7.90	7.90	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	4920	4920	0.0	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1339172)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1339172)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1339172)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1007845**	Page	: 1 of 6
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Narrows		
C-O-C number	: ----	Date Samples Received	: 06-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 17-MAY-2010
Order number	: ----		
		No. of samples received	: 16
Quote number	: EN/034/10	No. of samples analysed	: 16

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen								
W10 0.1-0.2,	W9 0-0.1,	**04-MAY-2010**	**10-MAY-2010**	04-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W9 0.3-0.4,	W16 0-0.1,							
W16 0.3-0.4,	W16 0.8-0.9,							
W16 1.2-1.3,	W16 1.6-1.7,							
W16 2.0-2.1,	W15 0-0.1,							
W15 0.1-0.2,	W15 0.5-0.6,							
W15 0.9-1.0,	W15 1.3-1.4,							
W15 1.7-1.8,	W15 2.2-2.3							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen								
W10 0.1-0.2,	W9 0-0.1,	**04-MAY-2010**	**10-MAY-2010**	04-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W9 0.3-0.4,	W16 0-0.1,							
W16 0.3-0.4,	W16 0.8-0.9,							
W16 1.2-1.3,	W16 1.6-1.7,							
W16 2.0-2.1,	W15 0-0.1,							
W15 0.1-0.2,	W15 0.5-0.6,							
W15 0.9-1.0,	W15 1.3-1.4,							
W15 1.7-1.8,	W15 2.2-2.3							
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen								
W10 0.1-0.2,	W9 0-0.1,	**04-MAY-2010**	**10-MAY-2010**	04-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W9 0.3-0.4,	W16 0-0.1,							
W16 0.3-0.4,	W16 0.8-0.9,							
W16 1.2-1.3,	W16 1.6-1.7,							
W16 2.0-2.1,	W15 0-0.1,							
W15 0.1-0.2,	W15 0.5-0.6,							
W15 0.9-1.0,	W15 1.3-1.4,							
W15 1.7-1.8,	W15 2.2-2.3							

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity								
Snap Lock Bag - frozen								
W10 0.1-0.2,	W9 0-0.1,	**04-MAY-2010**	**10-MAY-2010**	04-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W9 0.3-0.4,	W16 0-0.1,							
W16 0.3-0.4,	W16 0.8-0.9,							
W16 1.2-1.3,	W16 1.6-1.7,							
W16 2.0-2.1,	W15 0-0.1,							
W15 0.1-0.2,	W15 0.5-0.6,							
W15 0.9-1.0,	W15 1.3-1.4,							
W15 1.7-1.8,	W15 2.2-2.3							
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen								
W10 0.1-0.2,	W9 0-0.1,	**04-MAY-2010**	**10-MAY-2010**	04-MAY-2011	✓	**13-MAY-2010**	08-AUG-2010	✓
W9 0.3-0.4,	W16 0-0.1,							
W16 0.3-0.4,	W16 0.8-0.9,							
W16 1.2-1.3,	W16 1.6-1.7,							
W16 2.0-2.1,	W15 0-0.1,							
W15 0.1-0.2,	W15 0.5-0.6,							
W15 0.9-1.0,	W15 1.3-1.4,							
W15 1.7-1.8,	W15 2.2-2.3							

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	16	**12.5**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	16	**6.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1007845**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: Narrows		
Sampler	: Alex Kochnieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 06-MAY-2010	Issue Date	: 06-MAY-2010 12:45
Client Requested Due Date	: 17-MAY-2010	Scheduled Reporting Date	: **17-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 1.0 °C <-> 4.2 °C - Ice present
No. of coolers/boxes	: 7 MEDIUM	No. of samples received	: 16
Sercurity Seal	: Intact.	No. of samples analysed	: 16

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples were received at ALS Gladstone at <0'C.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1007845-001	04-MAY-2010 15:00	W10 0.1-0.2	✓
EB1007845-002	04-MAY-2010 15:00	W9 0-0.1	✓
EB1007845-003	04-MAY-2010 15:00	W9 0.3-0.4	✓
EB1007845-004	04-MAY-2010 15:00	W16 0-0.1	✓
EB1007845-005	04-MAY-2010 15:00	W16 0.3-0.4	✓
EB1007845-006	04-MAY-2010 15:00	W16 0.8-0.9	✓
EB1007845-007	04-MAY-2010 15:00	W16 1.2-1.3	✓
EB1007845-008	04-MAY-2010 15:00	W16 1.6-1.7	✓
EB1007845-009	04-MAY-2010 15:00	W16 2.0-2.1	✓
EB1007845-010	04-MAY-2010 15:00	W15 0-0.1	✓
EB1007845-011	04-MAY-2010 15:00	W15 0.1-0.2	✓
EB1007845-012	04-MAY-2010 15:00	W15 0.5-0.6	✓
EB1007845-013	04-MAY-2010 15:00	W15 0.9-1.0	✓
EB1007845-014	04-MAY-2010 15:00	W15 1.3-1.4	✓
EB1007845-015	04-MAY-2010 15:00	W15 1.7-1.8	✓
EB1007845-016	04-MAY-2010 15:00	W15 2.2-2.3	✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

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

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
PROJECT ID: 301001-00448 WBS 3V4070CN.T	EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
SITE: ~~Reid Rd~~ Narrows	P.O. NO.:
RESULTS REQUIRED (**Date**): (7 day TAT)	QUOTE NO.:
	EMAIL INVOICE TO: as above

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE:
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (**topsoils**)		pH / Electricial Conductivity (**all**)	CEC (Ca, Mg, K, Na) [**all**]		Chromium Suite		HOLD					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
	~~Narrows~~	S	~~4/5~~																
		S																	
1	W10 0.1-0.2	S	4/5									✓							
2	W9 0-0.1	S	4/5									✓							
3	W9 0.3-0.4	S	4/5									✓							
4	W16 0-0.1	S	4/5									✓							
5	W16 0.3-0.4	S	4/5									✓							
6	W10 0.8-0.9	S	4/5									✓							
7	W16 1.2-1.3	S	4/5									✓							
8	W16 1.6-1.7	S	4/5									✓							
9	W16 2.0-2.0	S	4/5									✓							
10	W15 0-0.1	S	4/5									✓							

Environmental Division
Brisbane
Work Order
EB1007845

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 4/5/10	Name: TYLER DINGLE	Date: 4/5/10	Con' Note No:
Of: WorleyParsons	Time: 1531	Of: ALS	Time: 1831	
Name: D. Radcliffe	Date: 5/5/10	Name:	Date:	Transport Co:
Of: ALS Gladstone	Time: 1315	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN.T
SITE: ~~Reid Rd~~ Newcastle P.O. NO.:
RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com (EXCEL format and PDF)
EMAIL INVOICE TO: as above

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE ID	MATRIX	DATE	Time	CONTAINER INFORMATION Type / Code	Total bottles	TKN / Reactive P (topsoils)		pH / Electricial Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD						
11	WS 0.3-0.4	S	4/5									✓								
12	WS 0.5-0.6	S	4/5									✓								
13	WS 0.9-1.0	S	4/5									✓								
14	WS 1.3-1.4	S	4/5									✓								
15	WS 1.7-1.8	S	4/5									✓								
16	WS 2.2-2.3	S	4/5									✓								
	~~EMB05 0.0-0.1~~		~~4/5~~																	
	~~EMB05 0.5-0.6~~		~~4/5~~																	
	~~EMB05 0.8-0.9~~	S	~~4/5~~																	
		S																		
		S																		
		S																		

RELINQUISHED BY:

Name: ~~Dave Stone~~ Alex Kochnieff Date: 4/5/10
Of: WorleyParsons Time: 18 31
Name: D. Raddiffe Date: 5/5/10
Of: ALS Time: 1316

RECEIVED BY

Name: TYLER DINGLE Date: ~~18~~ 4/5/10
Of: ALS Time: 18:31
Name: Date:
Of: Time:

METHOD OF SHIPMENT
Con' Note No:
Transport Co:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; ...cetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1007910**	Page	: 1 of 4
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CN	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 07-MAY-2010
Sampler	: Alex Konieff	Issue Date	: 26-MAY-2010
Site	: The Narrows		
		No. of samples received	: 5
Quote number	: EN/034/09	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **This report has been amended to alter the site details, project reference code or order number. All analysis results are as per the previous report.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W14 0-0.1	W14 0.16-0.26	W13 0-0.1	W12 0-0.1	W11 0-0.05
				Client sampling date / time: 05-MAY-2010 15:00	05-MAY-2010 15:00	05-MAY-2010 15:00	05-MAY-2010 15:00	05-MAY-2010 15:00
				EB1007910-001	EB1007910-002	EB1007910-003	EB1007910-004	EB1007910-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.1**	**8.7**	**9.1**	**9.1**	**9.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.10**	**0.63**	**0.14**	**0.04**	**0.06**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**66**	**392**	**88**	**24**	**34**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**23.1**	**10.9**	**11.6**	**10.3**	**25.1**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**4610**	**2170**	**2320**	**2050**	**5010**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**7.39**	**3.48**	**3.72**	**3.29**	**8.03**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

QUALITY CONTROL REPORT

Work Order	: **EB1007910**	Page	: 1 of 5
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CN	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 07-MAY-2010
Sampler	: Alex Konieff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 5
Quote number	: EN/034/09	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1339977)									
EB1007846-001	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.7	8.8	1.1	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1339977)									
EB1007846-001	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.26	0.27	0.0	0% - 50%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	164	170	3.4	0% - 50%
EA033-C: Acid Neutralising Capacity (QC Lot: 1339977)									
EB1007846-001	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	3.17	3.04	4.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.02	0.97	4.2	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	634	607	4.2	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1339977)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1339977)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1339977)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1007910**	Page	: 1 of 5
Amendment	: **1**		
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CN	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 07-MAY-2010
Sampler	: Alex Konieff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 5
Quote number	: EN/034/09	No. of samples analysed	: 5

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen W14 0-0.1, W14 0.16-0.26, W13 0-0.1, W12 0-0.1, W11 0-0.05	**05-MAY-2010**	**11-MAY-2010**	05-MAY-2011	✓	**11-MAY-2010**	09-AUG-2010	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen W14 0-0.1, W14 0.16-0.26, W13 0-0.1, W12 0-0.1, W11 0-0.05	**05-MAY-2010**	**11-MAY-2010**	05-MAY-2011	✓	**11-MAY-2010**	09-AUG-2010	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen W14 0-0.1, W14 0.16-0.26, W13 0-0.1, W12 0-0.1, W11 0-0.05	**05-MAY-2010**	**11-MAY-2010**	05-MAY-2011	✓	**11-MAY-2010**	09-AUG-2010	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen W14 0-0.1, W14 0.16-0.26, W13 0-0.1, W12 0-0.1, W11 0-0.05	**05-MAY-2010**	**11-MAY-2010**	05-MAY-2011	✓	**11-MAY-2010**	09-AUG-2010	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen W14 0-0.1, W14 0.16-0.26, W13 0-0.1, W12 0-0.1, W11 0-0.05	**05-MAY-2010**	**11-MAY-2010**	05-MAY-2011	✓	**11-MAY-2010**	09-AUG-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	1	10	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	10	**10.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1007910**		
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CN	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: EP2009WORPAR0226 (EN/034/09)
Site	: The Narrows		
Sampler	: Alex Konieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 07-MAY-2010	Issue Date	: 26-MAY-2010 10:56
Client Requested Due Date	: 18-MAY-2010	Scheduled Reporting Date	: **18-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 3.1, 8.4'C - Ice present
No. of coolers/boxes	: 2 MEDIUM	No. of samples received	: 5
Sercurity Seal	: Intact.	No. of samples analysed	: 5

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples received at ALS Gladstone at <0'C.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1007910-001	05-MAY-2010 15:00	W14 0-0.1	✓
EB1007910-002	05-MAY-2010 15:00	W14 0.16-0.26	✓
EB1007910-003	05-MAY-2010 15:00	W13 0-0.1	✓
EB1007910-004	05-MAY-2010 15:00	W12 0-0.1	✓
EB1007910-005	05-MAY-2010 15:00	W11 0-0.05	✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

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

p1 of 1

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
PROJECT ID: 301001-00448 WBS 3V4070CN...	EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
SITE: Reid Rd P.O. NO.:	EMAIL INVOICE TO: as above
RESULTS REQUIRED (**Date**): (7 day TAT) QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (**topsoils**)		pH / Electricial Conductivity (**all**)	CEC (Ca, Mg, K, Na) [**all**]		Chromium Suite		HOLD						
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles														
1	W14 0-0.1	S	5/5			1						✓								
2	W14 0.16-0.26	S	5/5			1						✓								
3	W13 0-0.1	S	5/5			1						✓								
4	W12 0-0.1	S	5/5			1						✓								
5	W11 0-0.05	S	5/5			1						✓								
	[illegible]	S	[illegible]			[illegible]						[illegible]								
	[illegible]	S	[illegible]																	
		S																		
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		S																		

Environmental Division
Brisbane
Work Order
EB1007910

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 5/5/10	Name: J. Angell	Date: 5/5/10	Con' Note No:
Of: WorleyParsons	Time: 17:16	Of: ALS	Time: 5:15.	
Name: D. Radcliffe	Date: 6/5/10	Name: M. Kalic	Date: 7/5/10	Transport Co:
Of: ALS	Time: 13:30	Of: ALS	Time: 9.20	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1008176**	Page	: 1 of 5
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CN NARROWS	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 11-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Site	: The Narrows		
		No. of samples received	: 7
Quote number	: BN/187/10	No. of samples analysed	: 7

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **This report has been amended to alter the site details, project reference code or order number. All analysis results are as per the previous report.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W17 0-0.1	W17 0.23-0.33	W17 0.65-0.75	W18 0-0.1	W18 0.1-0.2
				Client sampling date / time: 07-MAY-2010 15:00	07-MAY-2010 15:00	07-MAY-2010 15:00	07-MAY-2010 15:00	07-MAY-2010 15:00
				EB1008176-001	EB1008176-002	EB1008176-003	EB1008176-004	EB1008176-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.0**	**8.9**	**8.7**	**8.7**	**9.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.04**	**0.12**	<0.02	**0.12**	**0.11**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**28**	**72**	<10	**72**	**70**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**15.5**	**22.4**	**3.26**	**8.08**	**11.1**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**3100**	**4480**	**652**	**1610**	**2230**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**4.97**	**7.18**	**1.04**	**2.59**	**3.57**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W18 0.3-0.4	Client sample ID: W18 0.5-0.6	----	----	----
				Client sampling date / time: 07-MAY-2010 15:00	07-MAY-2010 15:00	----	----	----
				EB1008176-006	EB1008176-007	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**9.1**	**8.8**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.08**	**0.03**	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**53**	**18**	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**7.26**	**2.84**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**1450**	**568**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**2.32**	**0.91**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	----	----	----
Liming Rate	----	1	kg CaCO3/t	<1	<1	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB1008176**	Page	: 1 of 5
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CN NARROWS	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 11-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 7
Quote number	: BN/187/10	No. of samples analysed	: 7

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1347833)									
EB1008176-001	W17 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.0	9.0	0.0	0% - 20%
EB1008218-004	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	9.0	9.0	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1347833)									
EB1008176-001	W17 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.04	0.04	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	28	26	8.7	No Limit
EB1008218-004	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.09	0.10	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	58	63	7.7	No Limit
EA033-C: Acid Neutralising Capacity (QC Lot: 1347833)									
EB1008176-001	W17 0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	15.5	15.6	0.3	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	4.97	4.98	0.3	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	3100	3110	0.3	0% - 20%
EB1008218-004	Anonymous	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	5.37	4.66	14.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.72	1.49	14.2	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	1070	932	14.2	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1347833)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1347833)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1347833)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1008176**	Page	: 1 of 5
Amendment	: **1**		
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CN NARROWS	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 11-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 7
Quote number	: BN/187/10	No. of samples analysed	: 7

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen							
W17 0-0.1, W17 0.23-0.33, W17 0.65-0.75, W18 0-0.1, W18 0.1-0.2, W18 0.3-0.4, W18 0.5-0.6	**07-MAY-2010**	**17-MAY-2010**	07-MAY-2011	✓	**19-MAY-2010**	15-AUG-2010	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen							
W17 0-0.1, W17 0.23-0.33, W17 0.65-0.75, W18 0-0.1, W18 0.1-0.2, W18 0.3-0.4, W18 0.5-0.6	**07-MAY-2010**	**17-MAY-2010**	07-MAY-2011	✓	**19-MAY-2010**	15-AUG-2010	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen							
W17 0-0.1, W17 0.23-0.33, W17 0.65-0.75, W18 0-0.1, W18 0.1-0.2, W18 0.3-0.4, W18 0.5-0.6	**07-MAY-2010**	**17-MAY-2010**	07-MAY-2011	✓	**19-MAY-2010**	15-AUG-2010	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen							
W17 0-0.1, W17 0.23-0.33, W17 0.65-0.75, W18 0-0.1, W18 0.1-0.2, W18 0.3-0.4, W18 0.5-0.6	**07-MAY-2010**	**17-MAY-2010**	07-MAY-2011	✓	**19-MAY-2010**	15-AUG-2010	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen							
W17 0-0.1, W17 0.23-0.33, W17 0.65-0.75, W18 0-0.1, W18 0.1-0.2, W18 0.3-0.4, W18 0.5-0.6	**07-MAY-2010**	**17-MAY-2010**	07-MAY-2011	✓	**19-MAY-2010**	15-AUG-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1008176**		
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CN NARROWS	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: EB2010WORPAR0239 (BN/187/10)
Site	: The Narrows		
Sampler	: Alex Kochnieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 11-MAY-2010	Issue Date	: 26-MAY-2010 10:21
Client Requested Due Date	: 20-MAY-2010	Scheduled Reporting Date	: **20-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 9.5,2.8,4.7,2.9' C - Ice present
No. of coolers/boxes	: 4 MEDIUM	No. of samples received	: 7
Sercurity Seal	: Intact.	No. of samples analysed	: 7

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples were received at ALS Gladstone at <0'C.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1008176-001	07-MAY-2010 15:00	W17 0-0.1	✓
EB1008176-002	07-MAY-2010 15:00	W17 0.23-0.33	✓
EB1008176-003	07-MAY-2010 15:00	W17 0.65-0.75	✓
EB1008176-004	07-MAY-2010 15:00	W18 0-0.1	✓
EB1008176-005	07-MAY-2010 15:00	W18 0.1-0.2	✓
EB1008176-006	07-MAY-2010 15:00	W18 0.3-0.4	✓
EB1008176-007	07-MAY-2010 15:00	W18 0.5-0.6	✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

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

MS JENNIFER CULLEN

- Chain of Custody (CoC) (COC)	Email	jennifer.cullen@alsenviro.com

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN... NARROWS
SITE: ~~Rankin~~
P.O. NO.:
RESULTS REQUIRED (**Date**): (7 day TAT)
QUOTE NO.: BN/1571/10.

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
EMAIL INVOICE TO: as above

ALS

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: (Yes) No N/A
SAMPLE TEMPERATURE 2.8
CHILLED: (Yes) No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (topsoils)		pH / Electricial Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
1	W17 0-0.1	S	7/5									✓							
2	W17 0.23-0.33	S	7/5									✓							
3	W17 0.65-0.75	S	7/5									✓							
4	W18 0-0.1	S	7/5									✓							
5	W18 0.1-0.2	S	7/5									✓							
6	W18 0.3-0.4	S	7/5									✓							
7	W18 0.5-0.6	S	7/5									✓							
		S																	
		S																	
		S																	
		S																	
		S																	

Environmental Division
Brisbane
Work Order
EB1008176

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Vivian Sch	Date: 7/5/10.	Name: D. Radcliffe	Date: 7/5/10	Con' Note No:
Of: WorleyParsons	Time:	Of: ALS	Time:	
Name: D. Radcliffe	Date: 10/5/10	Name: [illegible]	Date: 11/5	Transport Co:
Of: ALS	Time: 1400	Of: ALS	Time: 0855	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1008177**	Page	: 1 of 6
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 11-MAY-2010
Sampler	: Alex Kochneiff	Issue Date	: 26-MAY-2010
Site	: The Narrows		
		No. of samples received	: 15
Quote number	: EN/034/10	No. of samples analysed	: 15

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**
- **This report has been amended to alter the site details, project reference code or order number. All analysis results are as per the previous report.**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W6 0-0.1	W6 0.3-0.4	W6 0.7-0.8	W6 1.2-1.3	W6 1.9-2.0
				Client sampling date / time: 06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00
				EB1008177-001	EB1008177-002	EB1008177-003	EB1008177-004	EB1008177-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.7**	**8.7**	**8.7**	**8.6**	**8.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.43**	**0.80**	**0.86**	**0.89**	**1.75**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**269**	**496**	**538**	**557**	**1090**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**36.7**	**37.0**	**18.0**	**16.6**	**5.61**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**7340**	**7390**	**3590**	**3310**	**1120**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**11.8**	**11.8**	**5.76**	**5.31**	**1.80**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	**0.55**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	**343**
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	**26**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W6 2.5-2.6	W7 0-0.1	W7 0.2-0.3	W7 0.8-0.9	W7 1.4-1.5
				Client sampling date / time: 06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00
				EB1008177-006	EB1008177-007	EB1008177-008	EB1008177-009	EB1008177-010
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.7**	**9.0**	**8.8**	**8.7**	**8.8**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.23**	**0.38**	**0.54**	**0.62**	**0.51**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**146**	**239**	**334**	**387**	**320**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**4.76**	**37.2**	**16.7**	**21.5**	**37.1**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**950**	**7440**	**3340**	**4300**	**7420**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.52**	**11.9**	**5.36**	**6.88**	**11.9**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: W7 1.65-1.8	W8 0.05-0.15	W8 0.25-0.35	W8 0.7-0.8	W8 1-1.2
				Client sampling date / time: 06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00	06-MAY-2010 15:00
				EB1008177-011	EB1008177-012	EB1008177-013	EB1008177-014	EB1008177-015
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.6**	**8.7**	**8.7**	**8.8**	**8.7**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.35**	**0.43**	**0.60**	**0.52**	**0.10**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**220**	**269**	**376**	**322**	**63**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**4.49**	**37.1**	**16.1**	**20.6**	**2.49**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**897**	**7420**	**3220**	**4120**	**497**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.44**	**11.9**	**5.16**	**6.61**	**0.80**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1

QUALITY CONTROL REPORT

Work Order	: **EB1008177**	Page	: 1 of 5
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 11-MAY-2010
Sampler	: Alex Kochneiff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 15
Quote number	: EN/034/10	No. of samples analysed	: 15

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1347835)									
EB1008177-001	W6 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.7	8.7	0.0	0% - 20%
EB1008177-011	W7 1.65-1.8	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.6	8.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1347835)									
EB1008177-001	W6 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.43	0.44	0.0	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	269	271	0.8	0% - 20%
EB1008177-011	W7 1.65-1.8	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.35	0.35	0.0	0% - 50%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	220	220	0.0	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1347835)									
EB1008177-001	W6 0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	36.7	36.7	0.0	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	11.8	11.8	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	7340	7340	0.0	0% - 20%
EB1008177-011	W7 1.65-1.8	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	4.49	4.42	1.6	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.44	1.41	1.6	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	897	882	1.6	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1347835)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1347835)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1347835)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1008177**	Page	: 1 of 6
Amendment	: **1**		
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: The Narrows		
C-O-C number	: ----	Date Samples Received	: 11-MAY-2010
Sampler	: Alex Kochneiff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 15
Quote number	: EN/034/10	No. of samples analysed	: 15

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen							
W6 0-0.1, W6 0.3-0.4, W6 0.7-0.8, W6 1.2-1.3, W6 1.9-2.0, W6 2.5-2.6, W7 0-0.1, W7 0.2-0.3, W7 0.8-0.9, W7 1.4-1.5, W7 1.65-1.8, W8 0.05-0.15, W8 0.25-0.35, W8 0.7-0.8, W8 1-1.2	**06-MAY-2010**	**17-MAY-2010**	06-MAY-2011	✓	**18-MAY-2010**	15-AUG-2010	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen							
W6 0-0.1, W6 0.3-0.4, W6 0.7-0.8, W6 1.2-1.3, W6 1.9-2.0, W6 2.5-2.6, W7 0-0.1, W7 0.2-0.3, W7 0.8-0.9, W7 1.4-1.5, W7 1.65-1.8, W8 0.05-0.15, W8 0.25-0.35, W8 0.7-0.8, W8 1-1.2	**06-MAY-2010**	**17-MAY-2010**	06-MAY-2011	✓	**18-MAY-2010**	15-AUG-2010	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen							
W6 0-0.1, W6 0.3-0.4, W6 0.7-0.8, W6 1.2-1.3, W6 1.9-2.0, W6 2.5-2.6, W7 0-0.1, W7 0.2-0.3, W7 0.8-0.9, W7 1.4-1.5, W7 1.65-1.8, W8 0.05-0.15, W8 0.25-0.35, W8 0.7-0.8, W8 1-1.2	**06-MAY-2010**	**17-MAY-2010**	06-MAY-2011	✓	**18-MAY-2010**	15-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity							
Snap Lock Bag - frozen							
W6 0-0.1, W6 0.3-0.4, W6 0.7-0.8, W6 1.2-1.3, W6 1.9-2.0, W6 2.5-2.6, W7 0-0.1, W7 0.2-0.3, W7 0.8-0.9, W7 1.4-1.5, W7 1.65-1.8, W8 0.05-0.15, W8 0.25-0.35, W8 0.7-0.8, W8 1-1.2	**06-MAY-2010**	**17-MAY-2010**	06-MAY-2011	✓	**18-MAY-2010**	15-AUG-2010	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen							
W6 0-0.1, W6 0.3-0.4, W6 0.7-0.8, W6 1.2-1.3, W6 1.9-2.0, W6 2.5-2.6, W7 0-0.1, W7 0.2-0.3, W7 0.8-0.9, W7 1.4-1.5, W7 1.65-1.8, W8 0.05-0.15, W8 0.25-0.35, W8 0.7-0.8, W8 1-1.2	**06-MAY-2010**	**17-MAY-2010**	06-MAY-2011	✓	**18-MAY-2010**	15-AUG-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	15	**13.3**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	15	**6.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1008177**		
Amendment	: **1**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNT	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: The Narrows		
Sampler	: Alex Kochneiff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 11-MAY-2010	Issue Date	: 26-MAY-2010 10:21
Client Requested Due Date	: 20-MAY-2010	Scheduled Reporting Date	: **20-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 9.5,2.8,4.7,2.9' C - Ice present
No. of coolers/boxes	: 4 MEDIUM	No. of samples received	: 15
Sercurity Seal	: Intact.	No. of samples analysed	: 15

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples were received at ALS Gladstone at <0'C.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1008177-001	06-MAY-2010 15:00	W6 0-0.1	✓
EB1008177-002	06-MAY-2010 15:00	W6 0.3-0.4	✓
EB1008177-003	06-MAY-2010 15:00	W6 0.7-0.8	✓
EB1008177-004	06-MAY-2010 15:00	W6 1.2-1.3	✓
EB1008177-005	06-MAY-2010 15:00	W6 1.9-2.0	✓
EB1008177-006	06-MAY-2010 15:00	W6 2.5-2.6	✓
EB1008177-007	06-MAY-2010 15:00	W7 0-0.1	✓
EB1008177-008	06-MAY-2010 15:00	W7 0.2-0.3	✓
EB1008177-009	06-MAY-2010 15:00	W7 0.8-0.9	✓
EB1008177-010	06-MAY-2010 15:00	W7 1.4-1.5	✓
EB1008177-011	06-MAY-2010 15:00	W7 1.65-1.8	✓
EB1008177-012	06-MAY-2010 15:00	W8 0.05-0.15	✓
EB1008177-013	06-MAY-2010 15:00	W8 0.25-0.35	✓
EB1008177-014	06-MAY-2010 15:00	W8 0.7-0.8	✓
EB1008177-015	06-MAY-2010 15:00	W8 1-1.2	✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

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

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN.T
SITE: ~~Reid Rd~~ Narrows. P.O. NO.:
RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
EMAIL INVOICE TO: as above

ALS

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: (Yes) No N/A
SAMPLE TEMPERATURE 2.8
CHILLED: (Yes) No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Container Type / Code	Total bottles	TKN / Reactive P (topsoils)		pH / Electricial Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD					
1	WB 0-0.1	S	6/5									✓							
2	WB 0.3-0.4	S	6/5									✓							
3	WB 0.7-0.8	S	6/5									✓							
4	WB 1.2-1.3	S	6/5									✓							
5	WB 1.9-2.0	S	6/5									✓							
6	WB 2.5-2.6	S	6/5									✓							
7	W7 0-0.1	S	6/5									✓							
8	W7 0.2-0.3	S	6/5									✓							
9	W7 0.50-0.9	S	6/5									✓							
10	W7 1.4-1.5	S	6/5									✓							
11	W7 1.65-1.8	S	6/5									✓							
		S			PTD														

Environmental Division
Brisbane
Work Order
EB1008177
Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 6/5/10	Name: J. Angell	Date: 6/5/10	Con' Note No:
Of: WorleyParsons	Time: 1630	Of: ALS	Time: 18:30	
Name: D. Radcliffe	Date: 10/5/10	Name: [illegible]	Date: 11/5/10	Transport Co:
Of: ALS	Time: 1400	Of: ALS BRISBANE	Time: 0615	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
PROJECT ID: 301001-00448 WBS 3V4070CN...	EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
SITE: Reid Rd P.O. NO.:	EMAIL INVOICE TO: as above
RESULTS REQUIRED (**Date**): (7 day TAT) QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (**topsoils**)		pH / Electricial Conductivity (**all**)	CEC (Ca, Mg, K, Na) [**all**]		Chromium Suite		HOLD						Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles														
12	WB 0.05-0.15	S	6/5									✓								
13	WB 0.25-0.35	S	6/5									✓								
14	WB 0.7-0.8	S	6/5									✓								
15	WB 1-1.2	S	6/5									✓								
		S																		
		S																		
		S																		
		S																		
		S																		
		S																		
		S																		
		S																		
		S																		

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Dave Stone	Date:	Name:	Date: 11/5/15	Con' Note No:
Of: WorleyParsons	Time:	Of: ALS BRISBANE	Time: 0815	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1008272**	Page	: 1 of 8
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 12-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 21-MAY-2010
Site	: Mud Flats		
		No. of samples received	: 23
Quote number	: EN/034/10	No. of samples analysed	: 23

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF30 0-0.1	MF30 0.2-0.3	MF30 0.7-0.8	MF30 1.2-1.3	MF30 1.8-1.9
				Client sampling date / time: 10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00
				EB1008272-001	EB1008272-002	EB1008272-003	EB1008272-004	EB1008272-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.7**	**6.4**	**6.2**	**8.0**	**8.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**29**	<2	**12**	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.05**	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.03**	**1.08**	**1.08**	**1.76**	**1.31**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**21**	**677**	**673**	**1100**	**816**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	**2.11**	**2.86**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	**422**	**570**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	**0.68**	**0.91**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.08**	**1.08**	**1.10**	**1.31**	**0.70**
Net Acidity (acidity units)	----	10	mole H+ / t	**50**	**677**	**685**	**819**	**436**
Liming Rate	----	1	kg CaCO3/t	**4**	**51**	**51**	**61**	**33**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF30 2.3-2.4	MF29 0-0.1	MF29 0.25-0.35	MF29 0.75-0.85	MF29 1.25-1.35
				Client sampling date / time: 10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00
				EB1008272-006	EB1008272-007	EB1008272-008	EB1008272-009	EB1008272-010
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.8**	**6.5**	**6.3**	**6.2**	**5.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**3**	**7**	**10**	**22**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	**0.04**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.98**	**0.88**	**0.75**	**1.07**	**2.38**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**612**	**552**	**468**	**668**	**1480**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.19**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**238**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.38**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.73**	**0.88**	**0.76**	**1.09**	**2.42**
Net Acidity (acidity units)	----	10	mole H+ / t	**454**	**552**	**476**	**678**	**1510**
Liming Rate	----	1	kg CaCO3/t	**34**	**41**	**36**	**51**	**113**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF29 1.75-1.85	MF29 2.25-2.35	MF29 2.75-2.85	MF28 0-0.1	MF28 0.1-0.2
				Client sampling date / time: 10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00
				EB1008272-011	EB1008272-012	EB1008272-013	EB1008272-014	EB1008272-015
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.4	8.1	7.1	6.9	6.4
Titratable Actual Acidity (23F)	----	2	mole H+ / t	4	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	2.79	1.32	1.74	0.04	0.16
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	1740	826	1080	26	100
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	2.68	0.94	1.69	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	536	188	337	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.86	0.30	0.54	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	2.80	0.75	1.54	<0.02	0.16
Net Acidity (acidity units)	----	10	mole H+ / t	1740	468	960	<10	100
Liming Rate	----	1	kg CaCO3/t	131	35	72	<1	7

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF28 0.75-0.85	MF28 1.0-1.1	MF28 1.5-1.6	MF13 0-0.1	MF13 0.2-0.3
				Client sampling date / time: 10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00
				EB1008272-016	EB1008272-017	EB1008272-018	EB1008272-019	EB1008272-020
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.6**	**8.4**	**8.4**	**7.2**	**6.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	**14**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	**0.02**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.20**	**1.44**	**1.41**	**0.18**	**2.38**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**747**	**895**	**881**	**116**	**1480**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.27**	**10.8**	**6.40**	**2.06**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**253**	**2150**	**1280**	**412**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.40**	**3.44**	**2.05**	**0.66**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.93**	<0.02	**0.04**	<0.02	**2.40**
Net Acidity (acidity units)	----	10	mole H+ / t	**578**	<10	**28**	<10	**1500**
Liming Rate	----	1	kg CaCO3/t	**43**	<1	**2**	<1	**112**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MF13 0.8-0.9	MF13 1.1-1.2	MF13 1.5-1.6	----	----
				Client sampling date / time	10-MAY-2010 15:00	10-MAY-2010 15:00	10-MAY-2010 15:00	----	----
					EB1008272-021	EB1008272-022	EB1008272-023	----	----
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		**6.3**	**5.5**	**6.0**	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t		**7**	**24**	**13**	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	**0.04**	**0.02**	----	----
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.02	% S		**1.12**	**1.86**	**2.94**	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		**700**	**1160**	**1830**	----	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	**1.5**	----	----
Net Acidity (sulfur units)	----	0.02	% S		**1.13**	**1.90**	**2.96**	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		**708**	**1180**	**1840**	----	----
Liming Rate	----	1	kg CaCO3/t		**53**	**89**	**138**	----	----

QUALITY CONTROL REPORT

Work Order	: **EB1008272**	Page	: 1 of 5
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Mud Flats		
C-O-C number	: ----	Date Samples Received	: 12-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 21-MAY-2010
Order number	: ----		
		No. of samples received	: 23
Quote number	: EN/034/10	No. of samples analysed	: 23

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1350980)									
EB1008272-001	MF30 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.05	0.04	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	29	28	6.2	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.7	5.7	0.0	0% - 20%
EB1008272-011	MF29 1.75-1.85	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	4	4	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.4	6.4	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1350981)									
EB1008272-021	MF13 0.8-0.9	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	7	6	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.3	6.3	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1350980)									
EB1008272-001	MF30 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.03	0.03	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	21	21	0.0	No Limit
EB1008272-011	MF29 1.75-1.85	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	2.79	2.75	1.3	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	1740	1720	1.3	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1350981)									
EB1008272-021	MF13 0.8-0.9	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.12	1.14	1.3	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	700	710	1.3	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1350980)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1350981)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1350980)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1350981)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1350980)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1008272**	Page	: 1 of 6
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Mud Flats		
C-O-C number	: ----	Date Samples Received	: 12-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 21-MAY-2010
Order number	: ----		
		No. of samples received	: 23
Quote number	: EN/034/10	No. of samples analysed	: 23

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen							
MF30 0-0.1, MF30 0.2-0.3, MF30 0.7-0.8, MF30 1.2-1.3, MF30 1.8-1.9, MF30 2.3-2.4, MF29 0-0.1, MF29 0.25-0.35, MF29 0.75-0.85, MF29 1.25-1.35, MF29 1.75-1.85, MF29 2.25-2.35, MF29 2.75-2.85, MF28 0-0.1, MF28 0.1-0.2, MF28 0.75-0.85, MF28 1.0-1.1, MF28 1.5-1.6, MF13 0-0.1, MF13 0.2-0.3, MF13 0.8-0.9, MF13 1.1-1.2, MF13 1.5-1.6	**10-MAY-2010**	**19-MAY-2010**	10-MAY-2011	✓	**20-MAY-2010**	17-AUG-2010	✓
EA033-B: Potential Acidity							
Snap Lock Bag - frozen							
MF30 0-0.1, MF30 0.2-0.3, MF30 0.7-0.8, MF30 1.2-1.3, MF30 1.8-1.9, MF30 2.3-2.4, MF29 0-0.1, MF29 0.25-0.35, MF29 0.75-0.85, MF29 1.25-1.35, MF29 1.75-1.85, MF29 2.25-2.35, MF29 2.75-2.85, MF28 0-0.1, MF28 0.1-0.2, MF28 0.75-0.85, MF28 1.0-1.1, MF28 1.5-1.6, MF13 0-0.1, MF13 0.2-0.3, MF13 0.8-0.9, MF13 1.1-1.2, MF13 1.5-1.6	**10-MAY-2010**	**19-MAY-2010**	10-MAY-2011	✓	**20-MAY-2010**	17-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen							
MF30 0-0.1, MF30 0.2-0.3, MF30 0.7-0.8, MF30 1.2-1.3, MF30 1.8-1.9, MF30 2.3-2.4, MF29 0-0.1, MF29 0.25-0.35, MF29 0.75-0.85, MF29 1.25-1.35, MF29 1.75-1.85, MF29 2.25-2.35, MF29 2.75-2.85, MF28 0-0.1, MF28 0.1-0.2, MF28 0.75-0.85, MF28 1.0-1.1, MF28 1.5-1.6, MF13 0-0.1, MF13 0.2-0.3, MF13 0.8-0.9, MF13 1.1-1.2, MF13 1.5-1.6	**10-MAY-2010**	**19-MAY-2010**	10-MAY-2011	✓	**20-MAY-2010**	17-AUG-2010	✓
EA033-D: Retained Acidity							
Snap Lock Bag - frozen							
MF30 0-0.1, MF30 0.2-0.3, MF30 0.7-0.8, MF30 1.2-1.3, MF30 1.8-1.9, MF30 2.3-2.4, MF29 0-0.1, MF29 0.25-0.35, MF29 0.75-0.85, MF29 1.25-1.35, MF29 1.75-1.85, MF29 2.25-2.35, MF29 2.75-2.85, MF28 0-0.1, MF28 0.1-0.2, MF28 0.75-0.85, MF28 1.0-1.1, MF28 1.5-1.6, MF13 0-0.1, MF13 0.2-0.3, MF13 0.8-0.9, MF13 1.1-1.2, MF13 1.5-1.6	**10-MAY-2010**	**19-MAY-2010**	10-MAY-2011	✓	**20-MAY-2010**	17-AUG-2010	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen							
MF30 0-0.1, MF30 0.2-0.3, MF30 0.7-0.8, MF30 1.2-1.3, MF30 1.8-1.9, MF30 2.3-2.4, MF29 0-0.1, MF29 0.25-0.35, MF29 0.75-0.85, MF29 1.25-1.35, MF29 1.75-1.85, MF29 2.25-2.35, MF29 2.75-2.85, MF28 0-0.1, MF28 0.1-0.2, MF28 0.75-0.85, MF28 1.0-1.1, MF28 1.5-1.6, MF13 0-0.1, MF13 0.2-0.3, MF13 0.8-0.9, MF13 1.1-1.2, MF13 1.5-1.6	**10-MAY-2010**	**19-MAY-2010**	10-MAY-2011	✓	**20-MAY-2010**	17-AUG-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	3	23	**13.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	23	**8.7**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1008272**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: Mud Flats		
Sampler	: Alex Kochnieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 12-MAY-2010	Issue Date	: 12-MAY-2010 17:03
Client Requested Due Date	: 21-MAY-2010	Scheduled Reporting Date	: **21-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 6.5, 7.8, 17.4°C - Ice present
No. of coolers/boxes	: 3 MEDIUM	No. of samples received	: 23
Sercurity Seal	: Intact.	No. of samples analysed	: 23

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples were originally received by ALS Gladstone on 11/05/10 (1 Esky, -3.6°C), and forwarded to ALS Brisbane for analysis.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1008272-001	10-MAY-2010 15:00	MF30 0-0.1	✓
EB1008272-002	10-MAY-2010 15:00	MF30 0.2-0.3	✓
EB1008272-003	10-MAY-2010 15:00	MF30 0.7-0.8	✓
EB1008272-004	10-MAY-2010 15:00	MF30 1.2-1.3	✓
EB1008272-005	10-MAY-2010 15:00	MF30 1.8-1.9	✓
EB1008272-006	10-MAY-2010 15:00	MF30 2.3-2.4	✓
EB1008272-007	10-MAY-2010 15:00	MF29 0-0.1	✓
EB1008272-008	10-MAY-2010 15:00	MF29 0.25-0.35	✓
EB1008272-009	10-MAY-2010 15:00	MF29 0.75-0.85	✓
EB1008272-010	10-MAY-2010 15:00	MF29 1.25-1.35	✓
EB1008272-011	10-MAY-2010 15:00	MF29 1.75-1.85	✓
EB1008272-012	10-MAY-2010 15:00	MF29 2.25-2.35	✓
EB1008272-013	10-MAY-2010 15:00	MF29 2.75-2.85	✓
EB1008272-014	10-MAY-2010 15:00	MF28 0-0.1	✓
EB1008272-015	10-MAY-2010 15:00	MF28 0.1-0.2	✓
EB1008272-016	10-MAY-2010 15:00	MF28 0.75-0.85	✓
EB1008272-017	10-MAY-2010 15:00	MF28 1.0-1.1	✓
EB1008272-018	10-MAY-2010 15:00	MF28 1.5-1.6	✓
EB1008272-019	10-MAY-2010 15:00	MF13 0-0.1	✓
EB1008272-020	10-MAY-2010 15:00	MF13 0.2-0.3	✓
EB1008272-021	10-MAY-2010 15:00	MF13 0.8-0.9	✓
EB1008272-022	10-MAY-2010 15:00	MF13 1.1-1.2	✓
EB1008272-023	10-MAY-2010 15:00	MF13 1.5-1.6	✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

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

P1 of 2

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN.M
SITE: ~~Reid Rd~~ Mead Flats. P.O. NO.:
RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
EMAIL INVOICE TO: as above

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (topsoils)		pH / Electricial Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
1	MF30 0-0.1	S	10/5									✓							
2	MF30 0.2-0.3	S	10/5									✓							
3	MF30 0.7-0.8	S	10/5									✓							
4	MF30 1.2-1.3	S	10/5									✓							
5	MF30 1.8-1.9	S	10/5									✓							
6	MF30 2.3-2.4	S	10/5									✓							
7	MF29 0-0.1	S	10/5									✓							
8	MF29 025-035	S	10/5									✓							
9	MF29 075-085	S	10/5									✓							
10	MF29 1.25-1.35	S	10/5									✓							
11	MF29 1.75-1.85	S	10/5									✓							
12	MF29 2.25-2.35	S	10/5									✓							

Environmental Division
Brisbane
Work Order
EB1008272

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Dave Stone	Date:	Name: D. Radcliffe	Date: 11/5/10	Con' Note No:
Of: WorleyParsons	Time:	Of: ALS Gladstone	Time: 1820	
Name: D. Radcliffe	Date: 11/5/10	Name: Christen	Date: 12/5/10	Transport Co:
Of: ALS Gladstone	Time: 1320	Of: ALS	Time: 8:05	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN...
SITE: ~~Reid Rd~~ Meadowlands P.O. NO.:
RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
EMAIL INVOICE TO: as above

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate) Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Container Type / Code	Total bottles	TKN / Reactive P (topsoils)		pH / Electrical Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD						
13	MF29 2.75-2.85	S	10/5									✓								
14	MF28 0-0.1	S	10/5									✓								
15	MF28 0.1-0.2	S	10/5									✓								
16	MF28 0.75-0.85	S	10/5									✓								
17	MF28 1.0 -1.1	S	10/5									✓								
18	MF28 1.5-1.6	S	10/5									✓								
19	MF13 0-0.1	S	10/5									✓								
20	MF13 0.2-0.3	S	10/5									✓								
21	MF13 0.8-0.9	S	10/5									✓								
22	MF13 1.1-1.2	S	10/5									✓								
23	MF13 1.5-1.6	S	10/5									✓								
		S																		

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Vivian Seto	Date: 10/5/10.	Name Belinda Pollock	Date: 10.5.10	Con' Note No:
Of: WorleyParsons	Time:	Of: ALS	Time:	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1008399**	Page	: 1 of 12
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 13-MAY-2010
Sampler	: Alex Kochneiff	Issue Date	: 24-MAY-2010
Site	: MUDFLATS		
		No. of samples received	: 41
Quote number	: EN/034/10	No. of samples analysed	: 41

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF14 0-0.1	MF14 0.2-0.3	MF14 0.75-0.85	MF14 1.25-1.35	MF14 1.4-1.5
				Client sampling date / time: 11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00
				EB1008399-001	EB1008399-002	EB1008399-003	EB1008399-004	EB1008399-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.5	6.3	6.4	6.5	6.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	7	4	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	0.06	2.12	1.38	1.13	1.12
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	38	1320	861	703	696
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.42	----	----	0.86	11.9
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	84	----	----	172	2370
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.13	----	----	0.28	3.80
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	2.13	1.39	0.94	1.12
Net Acidity (acidity units)	----	10	mole H+ / t	<10	1330	865	588	696
Liming Rate	----	1	kg CaCO3/t	<1	100	65	44	52

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF15 0-0.1	MF15 0.3-0.4	MF15 0.7-0.8	MF15 1.2-1.3	MF15 1.7-1.8
				Client sampling date / time: 11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00
				EB1008399-006	EB1008399-007	EB1008399-008	EB1008399-009	EB1008399-010
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.9**	**6.6**	**6.6**	**8.3**	**7.7**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.03**	**0.65**	**1.50**	**1.73**	**1.05**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**17**	**408**	**938**	**1080**	**657**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.46**	**0.77**	**0.88**	**3.03**	**1.00**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**93**	**154**	**177**	**605**	**200**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.15**	**0.25**	**0.28**	**0.97**	**0.32**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**0.49**	**1.32**	**1.08**	**0.84**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**306**	**820**	**676**	**524**
Liming Rate	----	1	kg CaCO3/t	<1	**23**	**62**	**51**	**39**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF15 2.0-2.1	MF18 0-0.1	MF18 0.4-0.5	MF18 1-1.1	MF18 1.2-1.3
				Client sampling date / time: 11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00
				EB1008399-011	EB1008399-012	EB1008399-013	EB1008399-014	EB1008399-015
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.7**	**5.7**	**6.2**	**7.2**	**8.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**20**	**9**	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**0.03**	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.81**	**0.15**	**1.73**	**2.50**	**1.69**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**1130**	**91**	**1080**	**1560**	**1050**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.21**	----	----	**1.19**	**1.30**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**242**	----	----	**237**	**260**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.39**	----	----	**0.38**	**0.42**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**1.55**	**0.18**	**1.74**	**2.25**	**1.41**
Net Acidity (acidity units)	----	10	mole H+ / t	**966**	**111**	**1090**	**1400**	**880**
Liming Rate	----	1	kg CaCO3/t	**72**	**8**	**82**	**105**	**66**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF18 1.75-1.85	MF18 2.1-2.2	MF17 0-0.1	MF17 0.5-0.6	MF17 1.1-1.2
				Client sampling date / time: 11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00
				EB1008399-016	EB1008399-017	EB1008399-018	EB1008399-019	EB1008399-020
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.5**	**8.1**	**7.2**	**6.6**	**8.5**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.24**	**1.74**	**0.16**	**1.28**	**1.35**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**773**	**1080**	**98**	**797**	**840**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**4.14**	**11.9**	**0.70**	**0.35**	**3.63**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**828**	**2370**	**140**	**70**	**726**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.33**	**3.80**	**0.22**	**0.11**	**1.16**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.35**	<0.02	<0.02	**1.20**	**0.57**
Net Acidity (acidity units)	----	10	mole H+ / t	**220**	<10	<10	**750**	**356**
Liming Rate	----	1	kg CaCO3/t	**16**	<1	<1	**56**	**27**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF17 1.75-1.85	MF17 2.2-2.3	MF16 0-0.1	MF16 0.2-0.3	MF16 0.75-0.85
				Client sampling date / time: 11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00
				EB1008399-021	EB1008399-022	EB1008399-023	EB1008399-024	EB1008399-025
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.3**	**8.1**	**7.1**	**5.5**	**6.5**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	**27**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	**0.04**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.17**	**1.66**	**0.03**	**0.90**	**1.19**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**729**	**1040**	**17**	**559**	**744**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**2.56**	**1.14**	**0.54**	----	**0.70**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**512**	**228**	**107**	----	**140**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.82**	**0.36**	**0.17**	----	**0.22**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.62**	**1.42**	<0.02	**0.94**	**1.04**
Net Acidity (acidity units)	----	10	mole H+ / t	**388**	**885**	<10	**586**	**651**
Liming Rate	----	1	kg CaCO3/t	**29**	**66**	<1	**44**	**49**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF16 1-1.1	MF16 1.5-1.6	MF16 2-2.1	MF16 2.3-2.4	MF19 0-0.1
Client sampling date / time				11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00
				EB1008399-026	EB1008399-027	EB1008399-028	EB1008399-029	EB1008399-030
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	7.0	8.4	8.6	7.7	7.2
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	1.31	1.28	1.45	0.79	0.70
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	816	801	905	492	436
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.84	3.12	2.38	0.88	1.02
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	167	623	474	177	205
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.27	1.00	0.76	0.28	0.33
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	1.13	0.62	0.94	0.60	0.48
Net Acidity (acidity units)	----	10	mole H+ / t	704	386	588	374	299
Liming Rate	----	1	kg CaCO3/t	53	29	44	28	22

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF19 0.1-0.2	MF19 0.7-0.8	MF19 1.3-1.4	MF19 2-2.1	MF19 2.25-2.35
				Client sampling date / time: 11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00
				EB1008399-031	EB1008399-032	EB1008399-033	EB1008399-034	EB1008399-035
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.6**	**5.8**	**8.2**	**8.6**	**8.5**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**23**	**18**	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.04**	**0.03**	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.27**	**1.73**	**1.20**	**1.10**	**1.50**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**792**	**1080**	**746**	**689**	**936**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	**2.28**	**2.72**	**2.89**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	**456**	**544**	**577**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	**0.73**	**0.87**	**0.92**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**1.31**	**1.76**	**0.71**	**0.52**	**0.88**
Net Acidity (acidity units)	----	10	mole H+ / t	**815**	**1100**	**442**	**326**	**551**
Liming Rate	----	1	kg CaCO3/t	**61**	**82**	**33**	**24**	**41**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF20 0-0.05	MF20 0.05-0.15	MF20 0.75-0.85	MF20 1-1.1	MF20 1.5-1.6
				Client sampling date / time: 11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00	11-MAY-2010 15:00
				EB1008399-036	EB1008399-037	EB1008399-038	EB1008399-039	EB1008399-040
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	7.4	5.1	6.2	8.4	8.5
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	39	8	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	0.06	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	0.12	1.85	1.73	1.82	1.28
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	76	1160	1080	1130	797
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.63	----	----	6.05	2.49
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	326	----	----	1210	498
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.52	----	----	1.94	0.80
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	<0.02	1.92	1.74	0.52	0.74
Net Acidity (acidity units)	----	10	mole H+ / t	<10	1200	1090	326	465
Liming Rate	----	1	kg CaCO3/t	<1	90	82	24	35

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF20 1.8-1.9	----	----	----	----
				Client sampling date / time: 11-MAY-2010 15:00	----	----	----	----
				EB1008399-041	----	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**8.2**	----	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.27**	----	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**792**	----	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.68**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**335**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.54**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	----	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.91**	----	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**568**	----	----	----	----
Liming Rate	----	1	kg CaCO3/t	**43**	----	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB1008399**	Page	: 1 of 6
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
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Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: MUDFLATS		
C-O-C number	: ----	Date Samples Received	: 13-MAY-2010
Sampler	: Alex Kochneiff	Issue Date	: 24-MAY-2010
Order number	: ----		
		No. of samples received	: 41
Quote number	: EN/034/10	No. of samples analysed	: 41

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Myles.Clark	Acid Sulfate Soils Supervisor	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1352618)									
EB1008399-001	MF14 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.5	6.6	1.5	0% - 20%
EB1008399-011	MF15 2.0-2.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.7	6.6	1.5	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1352619)									
EB1008399-021	MF17 1.75-1.85	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.3	8.6	3.6	0% - 20%
EB1008399-031	MF19 0.1-0.2	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.04	0.04	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	23	24	5.8	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.6	5.5	1.8	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1352620)									
EB1008399-041	MF20 1.8-1.9	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	8.2	8.3	1.2	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1352618)									
EB1008399-001	MF14 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.06	0.06	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	38	41	6.1	No Limit
EB1008399-011	MF15 2.0-2.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.81	1.83	1.0	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	1130	1140	1.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1352619)									
EB1008399-021	MF17 1.75-1.85	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.17	1.37	15.8	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	729	854	15.8	0% - 20%
EB1008399-031	MF19 0.1-0.2	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.27	1.27	0.0	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	792	792	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1352620)									
EB1008399-041	MF20 1.8-1.9	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.27	1.30	2.1	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	792	809	2.1	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 1352618)									
EB1008399-001	MF14 0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.42	0.35	18.2	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.13	0.11	18.2	0% - 50%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	84	70	18.2	No Limit
EB1008399-011	MF15 2.0-2.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.21	1.19	1.9	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.39	0.38	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	242	237	1.9	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1352619)									
EB1008399-021	MF17 1.75-1.85	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	2.56	2.54	0.9	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.82	0.81	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	512	507	0.9	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1352620)									
EB1008399-041	MF20 1.8-1.9	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.68	1.58	5.7	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.54	0.51	5.7	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	335	316	5.7	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1352618)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1352619)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1352620)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1352618)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1352619)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1352620)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1352618)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1352619)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1352620)								
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1008399**	Page	: 1 of 9
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: MUDFLATS		
C-O-C number	: ----	Date Samples Received	: 13-MAY-2010
Sampler	: Alex Kochneiff	Issue Date	: 24-MAY-2010
Order number	: ----		
		No. of samples received	: 41
Quote number	: EN/034/10	No. of samples analysed	: 41

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity							
Snap Lock Bag - frozen							
MF14 0-0.1, MF14 0.2-0.3, MF14 0.75-0.85, MF14 1.25-1.35, MF14 1.4-1.5, MF15 0-0.1, MF15 0.3-0.4, MF15 0.7-0.8, MF15 1.2-1.3, MF15 1.7-1.8, MF15 2.0-2.1, MF18 0-0.1, MF18 0.4-0.5, MF18 1-1.1, MF18 1.2-1.3, MF18 1.75-1.85, MF18 2.1-2.2, MF17 0-0.1, MF17 0.5-0.6, MF17 1.1-1.2, MF17 1.75-1.85, MF17 2.2-2.3, MF16 0-0.1, MF16 0.2-0.3, MF16 0.75-0.85, MF16 1-1.1, MF16 1.5-1.6, MF16 2-2.1, MF16 2.3-2.4, MF19 0-0.1, MF19 0.1-0.2, MF19 0.7-0.8, MF19 1.3-1.4, MF19 2-2.1, MF19 2.25-2.35, MF20 0-0.05, MF20 0.05-0.15, MF20 0.75-0.85, MF20 1-1.1, MF20 1.5-1.6, MF20 1.8-1.9	**11-MAY-2010**	**20-MAY-2010**	11-MAY-2011	✓	**22-MAY-2010**	18-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-B: Potential Acidity							
Snap Lock Bag - frozen							
MF14 0-0.1, MF14 0.2-0.3, MF14 0.75-0.85, MF14 1.25-1.35, MF14 1.4-1.5, MF15 0-0.1, MF15 0.3-0.4, MF15 0.7-0.8, MF15 1.2-1.3, MF15 1.7-1.8, MF15 2.0-2.1, MF18 0-0.1, MF18 0.4-0.5, MF18 1-1.1, MF18 1.2-1.3, MF18 1.75-1.85, MF18 2.1-2.2, MF17 0-0.1, MF17 0.5-0.6, MF17 1.1-1.2, MF17 1.75-1.85, MF17 2.2-2.3, MF16 0-0.1, MF16 0.2-0.3, MF16 0.75-0.85, MF16 1-1.1, MF16 1.5-1.6, MF16 2-2.1, MF16 2.3-2.4, MF19 0-0.1, MF19 0.1-0.2, MF19 0.7-0.8, MF19 1.3-1.4, MF19 2-2.1, MF19 2.25-2.35, MF20 0-0.05, MF20 0.05-0.15, MF20 0.75-0.85, MF20 1-1.1, MF20 1.5-1.6, MF20 1.8-1.9	**11-MAY-2010**	**20-MAY-2010**	11-MAY-2011	✓	**22-MAY-2010**	18-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen							
MF14 0-0.1, MF14 0.2-0.3, MF14 0.75-0.85, MF14 1.25-1.35, MF14 1.4-1.5, MF15 0-0.1, MF15 0.3-0.4, MF15 0.7-0.8, MF15 1.2-1.3, MF15 1.7-1.8, MF15 2.0-2.1, MF18 0-0.1, MF18 0.4-0.5, MF18 1-1.1, MF18 1.2-1.3, MF18 1.75-1.85, MF18 2.1-2.2, MF17 0-0.1, MF17 0.5-0.6, MF17 1.1-1.2, MF17 1.75-1.85, MF17 2.2-2.3, MF16 0-0.1, MF16 0.2-0.3, MF16 0.75-0.85, MF16 1-1.1, MF16 1.5-1.6, MF16 2-2.1, MF16 2.3-2.4, MF19 0-0.1, MF19 0.1-0.2, MF19 0.7-0.8, MF19 1.3-1.4, MF19 2-2.1, MF19 2.25-2.35, MF20 0-0.05, MF20 0.05-0.15, MF20 0.75-0.85, MF20 1-1.1, MF20 1.5-1.6, MF20 1.8-1.9	**11-MAY-2010**	**20-MAY-2010**	11-MAY-2011	✓	**22-MAY-2010**	18-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity							
Snap Lock Bag - frozen							
MF14 0-0.1, MF14 0.2-0.3, MF14 0.75-0.85, MF14 1.25-1.35, MF14 1.4-1.5, MF15 0-0.1, MF15 0.3-0.4, MF15 0.7-0.8, MF15 1.2-1.3, MF15 1.7-1.8, MF15 2.0-2.1, MF18 0-0.1, MF18 0.4-0.5, MF18 1-1.1, MF18 1.2-1.3, MF18 1.75-1.85, MF18 2.1-2.2, MF17 0-0.1, MF17 0.5-0.6, MF17 1.1-1.2, MF17 1.75-1.85, MF17 2.2-2.3, MF16 0-0.1, MF16 0.2-0.3, MF16 0.75-0.85, MF16 1-1.1, MF16 1.5-1.6, MF16 2-2.1, MF16 2.3-2.4, MF19 0-0.1, MF19 0.1-0.2, MF19 0.7-0.8, MF19 1.3-1.4, MF19 2-2.1, MF19 2.25-2.35, MF20 0-0.05, MF20 0.05-0.15, MF20 0.75-0.85, MF20 1-1.1, MF20 1.5-1.6, MF20 1.8-1.9	**11-MAY-2010**	**20-MAY-2010**	11-MAY-2011	✓	**22-MAY-2010**	18-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen							
MF14 0-0.1, MF14 0.2-0.3, MF14 0.75-0.85, MF14 1.25-1.35, MF14 1.4-1.5, MF15 0-0.1, MF15 0.3-0.4, MF15 0.7-0.8, MF15 1.2-1.3, MF15 1.7-1.8, MF15 2.0-2.1, MF18 0-0.1, MF18 0.4-0.5, MF18 1-1.1, MF18 1.2-1.3, MF18 1.75-1.85, MF18 2.1-2.2, MF17 0-0.1, MF17 0.5-0.6, MF17 1.1-1.2, MF17 1.75-1.85, MF17 2.2-2.3, MF16 0-0.1, MF16 0.2-0.3, MF16 0.75-0.85, MF16 1-1.1, MF16 1.5-1.6, MF16 2-2.1, MF16 2.3-2.4, MF19 0-0.1, MF19 0.1-0.2, MF19 0.7-0.8, MF19 1.3-1.4, MF19 2-2.1, MF19 2.25-2.35, MF20 0-0.05, MF20 0.05-0.15, MF20 0.75-0.85, MF20 1-1.1, MF20 1.5-1.6, MF20 1.8-1.9	**11-MAY-2010**	**20-MAY-2010**	11-MAY-2011	✓	**22-MAY-2010**	18-AUG-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	5	41	**12.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	3	41	**7.3**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1008399**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: MUDFLATS		
Sampler	: Alex Kochneiff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 13-MAY-2010	Issue Date	: 17-MAY-2010 11:52
Client Requested Due Date	: 24-MAY-2010	Scheduled Reporting Date	: **24-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 1.5°C <-> 6.5°C - Ice present
No. of coolers/boxes	: 5 MEDIUM	No. of samples received	: 41
Sercurity Seal	: Intact.	No. of samples analysed	: 41

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples were received at ALS Gladstone at -2.8'C.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1008399-001	11-MAY-2010 15:00	MF14 0-0.1	✓
EB1008399-002	11-MAY-2010 15:00	MF14 0.2-0.3	✓
EB1008399-003	11-MAY-2010 15:00	MF14 0.75-0.85	✓
EB1008399-004	11-MAY-2010 15:00	MF14 1.25-1.35	✓
EB1008399-005	11-MAY-2010 15:00	MF14 1.4-1.5	✓
EB1008399-006	11-MAY-2010 15:00	MF15 0-0.1	✓
EB1008399-007	11-MAY-2010 15:00	MF15 0.3-0.4	✓
EB1008399-008	11-MAY-2010 15:00	MF15 0.7-0.8	✓
EB1008399-009	11-MAY-2010 15:00	MF15 1.2-1.3	✓
EB1008399-010	11-MAY-2010 15:00	MF15 1.7-1.8	✓
EB1008399-011	11-MAY-2010 15:00	MF15 2.0-2.1	✓
EB1008399-012	11-MAY-2010 15:00	MF18 0-0.1	✓
EB1008399-013	11-MAY-2010 15:00	MF18 0.4-0.5	✓
EB1008399-014	11-MAY-2010 15:00	MF18 1-1.1	✓
EB1008399-015	11-MAY-2010 15:00	MF18 1.2-1.3	✓
EB1008399-016	11-MAY-2010 15:00	MF18 1.75-1.85	✓
EB1008399-017	11-MAY-2010 15:00	MF18 2.1-2.2	✓
EB1008399-018	11-MAY-2010 15:00	MF17 0-0.1	✓
EB1008399-019	11-MAY-2010 15:00	MF17 0.5-0.6	✓
EB1008399-020	11-MAY-2010 15:00	MF17 1.1-1.2	✓
EB1008399-021	11-MAY-2010 15:00	MF17 1.75-1.85	✓
EB1008399-022	11-MAY-2010 15:00	MF17 2.2-2.3	✓
EB1008399-023	11-MAY-2010 15:00	MF16 0-0.1	✓
EB1008399-024	11-MAY-2010 15:00	MF16 0.2-0.3	✓
EB1008399-025	11-MAY-2010 15:00	MF16 0.75-0.85	✓
EB1008399-026	11-MAY-2010 15:00	MF16 1-1.1	✓
EB1008399-027	11-MAY-2010 15:00	MF16 1.5-1.6	✓
EB1008399-028	11-MAY-2010 15:00	MF16 2-2.1	✓
EB1008399-029	11-MAY-2010 15:00	MF16 2.3-2.4	✓
EB1008399-030	11-MAY-2010 15:00	MF19 0-0.1	✓
EB1008399-031	11-MAY-2010 15:00	MF19 0.1-0.2	✓
EB1008399-032	11-MAY-2010 15:00	MF19 0.7-0.8	✓
EB1008399-033	11-MAY-2010 15:00	MF19 1.3-1.4	✓
EB1008399-034	11-MAY-2010 15:00	MF19 2-2.1	✓
EB1008399-035	11-MAY-2010 15:00	MF19 2.25-2.35	✓

			SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1008399-036	11-MAY-2010 15:00	MF20 0-0.05	✓
EB1008399-037	11-MAY-2010 15:00	MF20 0.05-0.15	✓
EB1008399-038	11-MAY-2010 15:00	MF20 0.75-0.85	✓
EB1008399-039	11-MAY-2010 15:00	MF20 1-1.1	✓
EB1008399-040	11-MAY-2010 15:00	MF20 1.5-1.6	✓
EB1008399-041	11-MAY-2010 15:00	MF20 1.8-1.9	✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

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

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
PROJECT ID: 301001-00448 WBS 3V4070CN.YM	EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
SITE: ~~Reid Rd~~ MUDFLATS. P.O. NO.:	EMAIL INVOICE TO: as above
RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (topsoils)		pH / Electricial Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD						Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles														
1	MF14 0-0.1	S	11/5									✓								
2	MF14 0.2-0.3	S	11/5									✓								
3	MF14 0.75-0.85	S	11/5									✓								
4	MF14 1.25-1.35	S	11/5									✓								
5	MF14 1.4-1.5	S	11/5									✓								
6	MF15 0-0.1	S	11/5									✓								
7	MF15 0.3-0.4	S	11/5									✓								
8	MF15 0.7-0.8	S	11/5									✓								
9	MF15 1.2-1.3	S	11/5									✓								
10	MF15 1.7-1.8	S	11/5									✓								
11	MF15 2.0-2.1	S	11/5									✓								
12	MF18 0-0.1	S	11/5									✓								

Environmental Division
Brisbane
Work Order
EB1008399
Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 11/5/10	Name: J. Angell	Date: 11/5/10	Con' Note No:
Of: WorleyParsons	Time:	Of: ALS	Time: 1900	
Name: D. Radcliffe	Date: 12/5/10	Name: Christiaan	Date: 13/5	Transport Co:
Of: ALS GLADSTONE	Time: 1320	Of: ALS	Time: 9:40	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN.M
SITE: ~~Reid Rd~~ MUDFLATS. P.O. NO.:
RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
EMAIL INVOICE TO: as above

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

ALS ID	SAMPLE ID	MATRIX	DATE	Time	CONTAINER INFORMATION Type / Code	Total bottles	TKN / Reactive P (topsoils)		pH / Electrical Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD						
13	MF18 0.4-0.5	S-	11/5									✓								
14	MF18 1-1.1	S-	11/5									✓								
15	MF18 1.2-1.3	S-	11/5									✓								
16	MF18 1.75-1.85	S-	11/5									✓								
17	MF18 2.1-2.2	S-	11/5									✓								
18	MF17 0-0.1	S-	11/5									✓								
19	MF17 0.5-0.6	S-	11/5									✓								
20	MF17 1.1-1.2	S-	11/5									✓								
21	MF17 1.75-1.85	S-	11/5									✓								
22	MF17 2.2-2.3	S-	11/5									✓								
23	MF16 0-0.1	S-	11/5									✓								
24	MF16 0.2-0.3	S-	11/5									✓								

RELINQUISHED BY:

Name: ~~Dave Stone~~ Date: 11/5/10
Of: WorleyParsons Time:
Name: D. Radcliffe Date: 12/5/10
Of: ALS Time: 1320

RECEIVED BY

Name: D. Radcliffe Date: 12/5/10
Of: ALS Time: 1320
Name: Date: 13/5
Of: ALS Time: 9:10

METHOD OF SHIPMENT
Con' Note No:
Transport Co:

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
PROJECT ID: 301001-00448 WBS 3V4070CN M MUDFLATS	EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
SITE: Reid Rd P.O. NO.:	EMAIL INVOICE TO: as above
RESULTS REQUIRED (**Date**): (7 day TAT) QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (**topsoils**)		pH / Electricial Conductivity (**all**)	CEC (Ca, Mg, K, Na) [**all**]		Chromium Suite		HOLD						Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles														
25	MF16 0.75-0.85	S-										✓								
26	MF16 1-1.1	S-										✓								
27	MF16 1.5-1.6	S-										✓								
28	MF16 2-2.1	S-										✓								
29	MF16 2.3-2.4	S-										✓								
30	MF19 0-0.1	S-										✓								
31	MF19 0.1-0.2	S-										✓								
32	MF19 0.7-0.8	S-										✓								
33	MF19 1.3-1.4	S-										✓								
34	MF19 2-2.1	S-										✓								
35	MF19 2.25-2.35	S-										✓								
36	MF20 0-0.05	S-										✓								

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~	Date:	Name: R. Radcliffe	Date: 12/5/10	Con' Note No:
Of: WorleyParsons	Time:	Of: ALS	Time: 1320	
Name: D. Radcliffe	Date: 12/5/10	Name: [signature]	Date: 13.5	Transport Co:
Of: ALS	Time: 1320	Of: ALS	Time: 9:10	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN.M
SITE: ~~Reid Rd~~ MUDFLATS P.O. NO.:
RESULTS REQUIRED (**Date**): (7 day TAT) QUOTE NO.:

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
EMAIL INVOICE TO: as above

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (**topsoils**)		pH / Electricial Conductivity (**all**)	CEC (Ca, Mg, K, Na) [**all**]		Chromium Suite		HOLD							Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles															
34	MF20 0.05-0.15	S	11/5									✓									
35	MF20 0.75-0.85	S	11/5									✓									
37	MF20 1-1.1	S	11/5									✓									
41	MF20 1.5-1.6	S	11/5									✓									
42	MF20 1.8-1.9	S	11/5									✓									
		S																			
		S																			
		S																			
		S																			
		S																			
		S																			
		S																			

RELINQUISHED BY:

Name: ~~Dave Stone~~	Date:
Of: WorleyParsons	Time:
Name:	Date:
Of:	Time:

RECEIVED BY

		METHOD OF SHIPMENT
Name:	Date:	Con' Note No:
Of:	Time:	
Name: Christian	Date: 13/5	Transport Co:
Of: ALS	Time: 9:10	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1008463**	Page	: 1 of 10
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 14-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Site	: Mudflats		
		No. of samples received	: 34
Quote number	: EN/034/10	No. of samples analysed	: 34

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF 27 0-0.1	MF 27 0.1-0.2	MF 27 0.75-0.85	MF 27 1-1.1	MF 27 1.75-1.85
				Client sampling date / time: 12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00
				EB1008463-001	EB1008463-002	EB1008463-003	EB1008463-004	EB1008463-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.1**	**6.9**	**6.1**	**6.4**	**6.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	**9**	<2	**13**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	**0.02**
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.05**	**0.10**	**0.66**	**0.38**	**1.59**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**33**	**66**	**411**	**240**	**993**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.12**	**0.75**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**224**	**149**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.36**	**0.24**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**0.67**	**0.39**	**1.61**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**420**	**242**	**1000**
Liming Rate	----	1	kg CaCO3/t	<1	<1	**32**	**18**	**75**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MF 27 2.25-2.35	MF 24 0-0.1	MF 24 0.15-0.25	MF 24 0.75-0.85	MF 24 1.4-1.5
				Client sampling date / time	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00
					EB1008463-006	EB1008463-007	EB1008463-008	EB1008463-009	EB1008463-010
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		**8.5**	**7.3**	**6.4**	**6.3**	**6.6**
Titratable Actual Acidity (23F)	----	2	mole H+ / t		<2	<2	**7**	**8**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.02	% S		**1.32**	**0.09**	**1.86**	**2.05**	**1.54**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		**827**	**57**	**1160**	**1280**	**964**
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3		**9.74**	**0.37**	----	----	**0.77**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t		**1950**	**75**	----	----	**154**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S		**3.12**	**0.12**	----	----	**0.25**
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S		<0.02	<0.02	**1.87**	**2.06**	**1.38**
Net Acidity (acidity units)	----	10	mole H+ / t		<10	<10	**1160**	**1290**	**861**
Liming Rate	----	1	kg CaCO3/t		<1	<1	**87**	**97**	**64**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF 24 2-2.1	MF 24 2.3-2.4	MF 25 0-0.1	MF 25 0.1-0.2	MF 25 0.75-0.85
				Client sampling date / time: 12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00
				EB1008463-011	EB1008463-012	EB1008463-013	EB1008463-014	EB1008463-015
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.9**	**8.1**	**7.6**	**7.0**	**6.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	**7**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.23**	**1.16**	**0.08**	<0.02	**1.60**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**767**	**721**	**52**	<10	**1000**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.94**	**1.15**	**1.27**	**0.85**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**388**	**229**	**254**	**169**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.62**	**0.37**	**0.41**	**0.27**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.82**	**0.91**	<0.02	<0.02	**1.62**
Net Acidity (acidity units)	----	10	mole H+ / t	**508**	**568**	<10	<10	**1010**
Liming Rate	----	1	kg CaCO3/t	**38**	**43**	<1	<1	**76**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MF 25 1.4-1.5	MF 25 2-2.1	MF 25 2.5-2.6	MF 22 0-0.1	MF 22 0.1-0.2
				Client sampling date / time	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00
					EB1008463-016	EB1008463-017	EB1008463-018	EB1008463-019	EB1008463-020
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		**6.6**	**8.3**	**7.1**	**6.6**	**5.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t		<2	<2	<2	<2	**27**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	<0.02	<0.02	<0.02	**0.04**
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.02	% S		**1.64**	**1.54**	**1.13**	**0.53**	**0.61**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		**1020**	**962**	**706**	**328**	**379**
EA033-C: Acid Neutralising Capacity									
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3		**0.57**	**5.06**	**0.70**	**0.42**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t		**114**	**1010**	**139**	**85**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S		**0.18**	**1.62**	**0.22**	**0.14**	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S		**1.52**	**0.46**	**0.98**	**0.44**	**0.65**
Net Acidity (acidity units)	----	10	mole H+ / t		**947**	**288**	**613**	**272**	**406**
Liming Rate	----	1	kg CaCO3/t		**71**	**22**	**46**	**20**	**30**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF 22 0.75-0.85	MF 22 1-1.1	MF 22 1.15-1.25	MF 22 1.75-1.85	MF 22 2.15-2.25
				Client sampling date / time: 12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00
				EB1008463-021	EB1008463-022	EB1008463-023	EB1008463-024	EB1008463-025
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**4.6**	**6.2**	**6.4**	**8.0**	**8.2**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**53**	**7**	**3**	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.08**	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**1.03**	**0.87**	**2.31**	**1.76**	**1.16**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**644**	**544**	**1440**	**1100**	**726**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	**6.58**	**2.77**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	**1310**	**553**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	**2.11**	**0.89**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**1.12**	**0.88**	**2.31**	**0.36**	**0.57**
Net Acidity (acidity units)	----	10	mole H+ / t	**697**	**551**	**1440**	**223**	**357**
Liming Rate	----	1	kg CaCO3/t	**52**	**41**	**108**	**17**	**27**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF 23 0-0.1	MF 23 0.1-0.2	MF 23 0.75-0.85	MF 23 1.25-1.35	MF 23 1.55-1.65
				Client sampling date / time: 12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00
				EB1008463-026	EB1008463-027	EB1008463-028	EB1008463-029	EB1008463-030
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.0**	**6.1**	**6.1**	**5.6**	**8.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**15**	**14**	**24**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**0.02**	**0.02**	**0.04**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	**0.02**	**1.21**	**1.79**	**1.03**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**16**	**753**	**1110**	**642**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.80**	----	----	----	**0.12**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**159**	----	----	----	**25**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.26**	----	----	----	**0.04**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	**0.05**	**1.23**	**1.82**	**1.00**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	**31**	**767**	**1140**	**625**
Liming Rate	----	1	kg CaCO3/t	<1	**2**	**58**	**85**	**47**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF 26 0-0.1	MF 26 0.1-0.2	MF 26 0.75-0.85	MF 26 1.05-1.15	----
				Client sampling date / time: 12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	12-MAY-2010 15:00	----
				EB1008463-031	EB1008463-032	EB1008463-033	EB1008463-034	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.2**	**6.7**	**6.1**	**6.3**	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**4**	<2	**17**	**6**	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	**0.03**	<0.02	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.26**	**0.62**	**1.89**	**2.50**	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**162**	**384**	**1180**	**1560**	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**0.45**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**90**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**0.14**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	----
Net Acidity (sulfur units)	----	0.02	% S	**0.27**	**0.52**	**1.92**	**2.51**	----
Net Acidity (acidity units)	----	10	mole H+ / t	**167**	**324**	**1200**	**1570**	----
Liming Rate	----	1	kg CaCO3/t	**12**	**24**	**90**	**118**	----

QUALITY CONTROL REPORT

Work Order	: **EB1008463**	Page	: 1 of 6
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Mudflats		
C-O-C number	: ----	Date Samples Received	: 14-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 34
Quote number	: EN/034/10	No. of samples analysed	: 34

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1356435)									
EB1008463-001	MF 27 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.1	7.3	2.8	0% - 20%
EB1008463-011	MF 24 2-2.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.9	8.2	3.7	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1356436)									
EB1008463-021	MF 22 0.75-0.85	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.08	0.09	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	53	54	2.3	0% - 20%
		EA033: pH KCl (23A)	----	0.1	pH Unit	4.6	4.5	2.2	0% - 20%
EB1008463-031	MF 26 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	4	5	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.2	6.3	1.6	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1356435)									
EB1008463-001	MF 27 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.05	0.05	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	33	33	0.0	No Limit
EB1008463-011	MF 24 2-2.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.23	1.25	1.6	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	767	780	1.6	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1356436)									
EB1008463-021	MF 22 0.75-0.85	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	1.03	1.02	1.2	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	644	637	1.2	0% - 20%
EB1008463-031	MF 26 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.26	0.26	0.0	0% - 50%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	162	160	1.5	0% - 50%
EA033-C: Acid Neutralising Capacity (QC Lot: 1356435)									
EB1008463-001	MF 27 0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.12	1.17	4.3	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.36	0.38	4.3	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	224	234	4.3	0% - 20%
EB1008463-011	MF 24 2-2.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	1.94	1.97	1.3	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 1356435) - continued									
EB1008463-011	MF 24 2-2.1	EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.62	0.63	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	388	393	1.3	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1356435)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1356436)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1356435)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1356436)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1008463**	Page	: 1 of 7
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
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Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Mudflats		
C-O-C number	: ----	Date Samples Received	: 14-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 26-MAY-2010
Order number	: ----		
		No. of samples received	: 34
Quote number	: EN/034/10	No. of samples analysed	: 34

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen								
MF 27 0-0.1,	MF 27 0.1-0.2,	**12-MAY-2010**	**25-MAY-2010**	12-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
MF 27 0.75-0.85,	MF 27 1-1.1,							
MF 27 1.75-1.85,	MF 27 2.25-2.35,							
MF 24 0-0.1,	MF 24 0.15-0.25,							
MF 24 0.75-0.85,	MF 24 1.4-1.5,							
MF 24 2-2.1,	MF 24 2.3-2.4,							
MF 25 0-0.1,	MF 25 0.1-0.2,							
MF 25 0.75-0.85,	MF 25 1.4-1.5,							
MF 25 2-2.1,	MF 25 2.5-2.6,							
MF 22 0-0.1,	MF 22 0.1-0.2,							
MF 22 0.75-0.85,	MF 22 1-1.1,							
MF 22 1.15-1.25,	MF 22 1.75-1.85,							
MF 22 2.15-2.25,	MF 23 0-0.1,							
MF 23 0.1-0.2,	MF 23 0.75-0.85,							
MF 23 1.25-1.35,	MF 23 1.55-1.65,							
MF 26 0-0.1,	MF 26 0.1-0.2,							
MF 26 0.75-0.85,	MF 26 1.05-1.15							

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-B: Potential Acidity							
Snap Lock Bag - frozen							
MF 27 0-0.1, MF 27 0.1-0.2, MF 27 0.75-0.85, MF 27 1-1.1, MF 27 1.75-1.85, MF 27 2.25-2.35, MF 24 0-0.1, MF 24 0.15-0.25, MF 24 0.75-0.85, MF 24 1.4-1.5, MF 24 2-2.1, MF 24 2.3-2.4, MF 25 0-0.1, MF 25 0.1-0.2, MF 25 0.75-0.85, MF 25 1.4-1.5, MF 25 2-2.1, MF 25 2.5-2.6, MF 22 0-0.1, MF 22 0.1-0.2, MF 22 0.75-0.85, MF 22 1-1.1, MF 22 1.15-1.25, MF 22 1.75-1.85, MF 22 2.15-2.25, MF 23 0-0.1, MF 23 0.1-0.2, MF 23 0.75-0.85, MF 23 1.25-1.35, MF 23 1.55-1.65, MF 26 0-0.1, MF 26 0.1-0.2, MF 26 0.75-0.85, MF 26 1.05-1.15	**12-MAY-2010**	**25-MAY-2010**	12-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen							
MF 27 0-0.1, MF 27 0.1-0.2, MF 27 0.75-0.85, MF 27 1-1.1, MF 27 1.75-1.85, MF 27 2.25-2.35, MF 24 0-0.1, MF 24 0.15-0.25, MF 24 0.75-0.85, MF 24 1.4-1.5, MF 24 2-2.1, MF 24 2.3-2.4, MF 25 0-0.1, MF 25 0.1-0.2, MF 25 0.75-0.85, MF 25 1.4-1.5, MF 25 2-2.1, MF 25 2.5-2.6, MF 22 0-0.1, MF 22 0.1-0.2, MF 22 0.75-0.85, MF 22 1-1.1, MF 22 1.15-1.25, MF 22 1.75-1.85, MF 22 2.15-2.25, MF 23 0-0.1, MF 23 0.1-0.2, MF 23 0.75-0.85, MF 23 1.25-1.35, MF 23 1.55-1.65, MF 26 0-0.1, MF 26 0.1-0.2, MF 26 0.75-0.85, MF 26 1.05-1.15	**12-MAY-2010**	**25-MAY-2010**	12-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity							
Snap Lock Bag - frozen							
MF 27 0-0.1, MF 27 0.1-0.2, MF 27 0.75-0.85, MF 27 1-1.1, MF 27 1.75-1.85, MF 27 2.25-2.35, MF 24 0-0.1, MF 24 0.15-0.25, MF 24 0.75-0.85, MF 24 1.4-1.5, MF 24 2-2.1, MF 24 2.3-2.4, MF 25 0-0.1, MF 25 0.1-0.2, MF 25 0.75-0.85, MF 25 1.4-1.5, MF 25 2-2.1, MF 25 2.5-2.6, MF 22 0-0.1, MF 22 0.1-0.2, MF 22 0.75-0.85, MF 22 1-1.1, MF 22 1.15-1.25, MF 22 1.75-1.85, MF 22 2.15-2.25, MF 23 0-0.1, MF 23 0.1-0.2, MF 23 0.75-0.85, MF 23 1.25-1.35, MF 23 1.55-1.65, MF 26 0-0.1, MF 26 0.1-0.2, MF 26 0.75-0.85, MF 26 1.05-1.15	**12-MAY-2010**	**25-MAY-2010**	12-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen							
MF 27 0-0.1, MF 27 0.1-0.2, MF 27 0.75-0.85, MF 27 1-1.1, MF 27 1.75-1.85, MF 27 2.25-2.35, MF 24 0-0.1, MF 24 0.15-0.25, MF 24 0.75-0.85, MF 24 1.4-1.5, MF 24 2-2.1, MF 24 2.3-2.4, MF 25 0-0.1, MF 25 0.1-0.2, MF 25 0.75-0.85, MF 25 1.4-1.5, MF 25 2-2.1, MF 25 2.5-2.6, MF 22 0-0.1, MF 22 0.1-0.2, MF 22 0.75-0.85, MF 22 1-1.1, MF 22 1.15-1.25, MF 22 1.75-1.85, MF 22 2.15-2.25, MF 23 0-0.1, MF 23 0.1-0.2, MF 23 0.75-0.85, MF 23 1.25-1.35, MF 23 1.55-1.65, MF 26 0-0.1, MF 26 0.1-0.2, MF 26 0.75-0.85, MF 26 1.05-1.15	**12-MAY-2010**	**25-MAY-2010**	12-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	4	34	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	34	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1008463**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001-00448 WBS 3V4070CNM	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: Mudflats		
Sampler	: Alex Kochnieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 14-MAY-2010	Issue Date	: 18-MAY-2010 10:52
Client Requested Due Date	: 25-MAY-2010	Scheduled Reporting Date	: **26-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 2.5 °C <-> 9.8 °C - Ice present
No. of coolers/boxes	: 7 MEDIUM	No. of samples received	: 34
Sercurity Seal	: Intact.	No. of samples analysed	: 34

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples received at ALS Gladstone at -2'C.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils
EB1008463-001	12-MAY-2010 15:00	MF 27 0-0.1	✓
EB1008463-002	12-MAY-2010 15:00	MF 27 0.1-0.2	✓
EB1008463-003	12-MAY-2010 15:00	MF 27 0.75-0.85	✓
EB1008463-004	12-MAY-2010 15:00	MF 27 1-1.1	✓
EB1008463-005	12-MAY-2010 15:00	MF 27 1.75-1.85	✓
EB1008463-006	12-MAY-2010 15:00	MF 27 2.25-2.35	✓
EB1008463-007	12-MAY-2010 15:00	MF 24 0-0.1	✓
EB1008463-008	12-MAY-2010 15:00	MF 24 0.15-0.25	✓
EB1008463-009	12-MAY-2010 15:00	MF 24 0.75-0.85	✓
EB1008463-010	12-MAY-2010 15:00	MF 24 1.4-1.5	✓
EB1008463-011	12-MAY-2010 15:00	MF 24 2-2.1	✓
EB1008463-012	12-MAY-2010 15:00	MF 24 2.3-2.4	✓
EB1008463-013	12-MAY-2010 15:00	MF 25 0-0.1	✓
EB1008463-014	12-MAY-2010 15:00	MF 25 0.1-0.2	✓
EB1008463-015	12-MAY-2010 15:00	MF 25 0.75-0.85	✓
EB1008463-016	12-MAY-2010 15:00	MF 25 1.4-1.5	✓
EB1008463-017	12-MAY-2010 15:00	MF 25 2-2.1	✓
EB1008463-018	12-MAY-2010 15:00	MF 25 2.5-2.6	✓
EB1008463-019	12-MAY-2010 15:00	MF 22 0-0.1	✓
EB1008463-020	12-MAY-2010 15:00	MF 22 0.1-0.2	✓
EB1008463-021	12-MAY-2010 15:00	MF 22 0.75-0.85	✓
EB1008463-022	12-MAY-2010 15:00	MF 22 1-1.1	✓
EB1008463-023	12-MAY-2010 15:00	MF 22 1.15-1.25	✓
EB1008463-024	12-MAY-2010 15:00	MF 22 1.75-1.85	✓
EB1008463-025	12-MAY-2010 15:00	MF 22 2.15-2.25	✓
EB1008463-026	12-MAY-2010 15:00	MF 23 0-0.1	✓
EB1008463-027	12-MAY-2010 15:00	MF 23 0.1-0.2	✓
EB1008463-028	12-MAY-2010 15:00	MF 23 0.75-0.85	✓
EB1008463-029	12-MAY-2010 15:00	MF 23 1.25-1.35	✓
EB1008463-030	12-MAY-2010 15:00	MF 23 1.55-1.65	✓
EB1008463-031	12-MAY-2010 15:00	MF 26 0-0.1	✓
EB1008463-032	12-MAY-2010 15:00	MF 26 0.1-0.2	✓
EB1008463-033	12-MAY-2010 15:00	MF 26 0.75-0.85	✓
EB1008463-034	12-MAY-2010 15:00	MF 26 1.05-1.15	✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

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

P1 of 3.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN.M
SITE: ~~Red Rd~~ Mudflats P.O. NO.:
RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com (EXCEL format and PDF)
EMAIL INVOICE TO: as above

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (topsoils)		pH / Electrical Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD						
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles														
1	MF27 0-0.1	S	12/5	/								✓								
2	MF27 0.1-0.2	S	12/5									✓								
3	MF27 0.75-0.85	S	12/5									✓								
4	MF27 1-1.1	S	12/5									✓								
5	MF27 1.75-1.85	S	12/5									✓								
6	MF27 2.25-2.35	S	12/5									✓								
7	MF24 0-0.1	S	12/5									✓								
8	MF24 0.15-0.25	S	12/5									✓								
9	MF24 0.75-0.85	S	12/5									✓								
10	MF24 1.4-1.5	S	12/5									✓								
11	MF24 2-2.1	S	12/5									✓								
12	MF24 2.3-2.4	S	12/5									✓								

Environmental Division
Brisbane
Work Order
EB1008463
Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 12/5	Name: AARON MITCHELL	Date: 12/5/10	Con' Note No:
Of: WorleyParsons	Time:	Of: ALS ACTEST	Time: 18:20	
Name:	Date:	Name: C. Bryant	Date: 14/5/10	Transport Co:
Of:	Time:	Of: ALS	Time: 910	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons

ADDRESS / OFFICE: 60 Albert St, Brisbane City

PROJECT MANAGER (PM): Alex Kochnieff

PROJECT ID: 301001-00448 WBS 3V4070CN

SITE: ~~Reid Rd~~ MUDFLATS

P.O. NO.:

RESULTS REQUIRED (Date): (7 day TAT)

QUOTE NO.:

SAMPLER: Alex Kochnieff

MOBILE: 0419645639

PHONE 33193940

EMAIL REPORT TO: alex.kochnieff@worleyparsons.com (EXCEL format and PDF)

EMAIL INVOICE TO: as above

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No N/A

SAMPLE TEMPERATURE

CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

ALS ID	SAMPLE ID	MATRIX	DATE	Time	CONTAINER INFORMATION Type / Code	Total bottles	TKN / Reactive P (topsoils)		pH / Electrical Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD						Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.
13	MF25 0-0.1	S	12/5									✓								
14	MF25 0.1-0.2	S	12/5									✓								
15	MF25 0.75-0.85	S	12/5									✓								
16	MF25 1.4-1.5	S	12/5									✓								
17	MF25 2-2.1	S	12/5									✓								
18	MF25 2.5-2.6	S	12/5									✓								
19	MF22 0-0.1	S	12/5									✓								
20	MF22 0.1-0.2	S	12/5									✓								
21	MF22 0.75-0.85	S	12/5									✓								
22	MF22 1-1.1	S	12/5									✓								
23	MF22 1.15-1.25	S	12/5									✓								
24	MF22 1.75-1.85	S	12/5									✓								

RELINQUISHED BY:

Name: ~~Dave Stone~~ Alex Kochnieff	Date: 12/5
Of: WorleyParsons	Time:
Name:	Date:
Of:	Time:

RECEIVED BY

Name:	Date:	METHOD OF SHIPMENT
Of:	Time:	Con' Note No:
Name:	Date:	Transport Co:
Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

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CHAIN OF CUSTODY DOCUMENTATION

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
PROJECT ID: 301001-00448 WBS 3V4070CN.M	EMAIL REPORT TO: alex.kochnieff@worleyparsons.com (EXCEL format and PDF)
SITE: ~~Reid Rd~~ MUDFLATS P.O. NO.:	EMAIL INVOICE TO: as above
RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:	ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

ALS

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (topsoils)		pH / Electricial Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD						Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles														
25	MF22 2.15-2.25	S	12/5									✓								
26	MF23 0-0.1	S										✓								
27	MF23 0.1-0.2	S										✓								
28	~~Blank~~ MF23 0.75-0.85	S										✓								
29	MF23 1.25-1.35	S										✓								
30	MF23 1.55-1.65	S										✓								
31	MF26 0-0.1	S										✓								
32	MF26 0.1-0.2	S										✓								
33	MF26 0.75-0.85	S										✓								
34	MF26 1.05-1.15	S										✓								
		S																		
		S																		

RELINQUISHED BY:			RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 12/5/10		Name:	Date:	Con' Note No:
Of: WorleyParsons	Time:		Of:	Time:	
Name:	Date:		Name:	Date:	Transport Co:
Of:	Time:		Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS

ENFM (204/4)

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1008678**	Page	: 1 of 8
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001 00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 18-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 28-MAY-2010
Site	: MUDFLATS		
		No. of samples received	: 22
Quote number	: EN/034/10	No. of samples analysed	: 22

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dianne Blane	Laboratory Supervisor	Newcastle
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MF06 1.25-1.5	MF06 1.75-2	MF06 2.25-2.5	MF06 2.75-3.0	MF07 1.25-1.5
				Client sampling date / time	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00
					EB1008678-001	EB1008678-002	EB1008678-003	EB1008678-004	EB1008678-005
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		**6.3**	**6.1**	**6.1**	**6.1**	**6.4**
Titratable Actual Acidity (23F)	----	2	mole H+ / t		**3**	**6**	**6**	**7**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.02	% S		<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		<10	<10	<10	<10	<10
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S		<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t		<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t		<1	<1	<1	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF07 1.5-1.75	MF05 1.25-1.5	MF05 1.75-2.0	MF08 1.25-1.5	MF08 1.75-2
				Client sampling date / time: 15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00
				EB1008678-006	EB1008678-007	EB1008678-008	EB1008678-009	EB1008678-010
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.4**	**6.6**	**6.3**	**6.2**	**6.1**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	**2**	**5**	**6**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	**12**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**0.25**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**49**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**0.08**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	**0.03**	**0.02**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	**18**	**16**
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	**1**	**1**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF09 0.75-1	MF32 0.0.1	MF32 0.1-0.2	MF32 0.5-0.6	MF03 0-0.1
				Client sampling date / time: 15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00
				EB1008678-011	EB1008678-012	EB1008678-013	EB1008678-014	EB1008678-015
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.8**	**6.6**	**7.1**	**7.1**	**6.7**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**14**	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.02**	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.54**	**1.77**	**1.14**	**0.26**	**0.35**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**339**	**1100**	**713**	**160**	**216**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	**0.64**	**0.84**	**2.64**	**1.04**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	**128**	**168**	**528**	**207**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	**0.20**	**0.27**	**0.84**	**0.33**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.56**	**1.63**	**0.96**	<0.02	**0.12**
Net Acidity (acidity units)	----	10	mole H+ / t	**353**	**1020**	**601**	<10	**78**
Liming Rate	----	1	kg CaCO3/t	**26**	**76**	**45**	<1	**6**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF03 0.15-0.3	MF12 0-0.1	MF12 0.3-0.4	MF12 0-0.3	MF03 0-0.15
				Client sampling date / time: 15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00	15-MAY-2010 15:00
				EB1008678-016	EB1008678-017	EB1008678-018	EB1008678-019	EB1008678-020
EA150: Particle Sizing								
+75µm	----	1	%	----	----	36	88	33
+150µm	----	1	%	----	----	30	88	25
+300µm	----	1	%	----	----	25	87	20
+425µm	----	1	%	----	----	22	86	17
+600µm	----	1	%	----	----	18	85	14
+1180µm	----	1	%	----	----	12	81	9
+2.36mm	----	1	%	----	----	5	71	6
+4.75mm	----	1	%	----	----	1	56	2
+9.5mm	----	1	%	----	----	<1	36	<1
+19.0mm	----	1	%	----	----	<1	11	<1
+37.5mm	----	1	%	----	----	<1	<1	<1
+75.0mm	----	1	%	----	----	<1	<1	<1
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	6.2	6.9	6.7	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	5	<2	<2	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	<0.02	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	0.22	0.27	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	44	54	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	0.07	0.09	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	----	----
Net Acidity (sulfur units)	----	0.02	% S	0.02	<0.02	<0.02	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	15	<10	<10	----	----
Liming Rate	----	1	kg CaCO3/t	1	<1	<1	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	----	----	30	3	31
Silt (2-60 µm)	----	1	%	----	----	31	9	32
Sand (0.06-2.00 mm)	----	1	%	----	----	34	17	31
Gravel (>2mm)	----	1	%	----	----	5	71	6
Cobbles (>6cm)	----	1	%	----	----	<1	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF10 0.75-1	Client sample ID: MF10 1.25-1.5	-----	-----	-----
				Client sampling date / time: 15-MAY-2010 15:00	15-MAY-2010 15:00	----	----	----
				EB1008678-021	EB1008678-022	----	----	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.7**	**6.4**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	----	----	----
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.30**	**0.09**	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**184**	**59**	----	----	----
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.34**	----	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**69**	----	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.11**	----	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S	**0.22**	**0.10**	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t	**138**	**60**	----	----	----
Liming Rate	----	1	kg CaCO3/t	**10**	**4**	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB1008678**	Page	: 1 of 5
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001 00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: MUDFLATS		
C-O-C number	: ----	Date Samples Received	: 18-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 28-MAY-2010
Order number	: ----		
		No. of samples received	: 22
Quote number	: EN/034/10	No. of samples analysed	: 22

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Dianne Blane	Laboratory Supervisor	Newcastle
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-A: Actual Acidity (QC Lot: 1356438)									
EB1008678-001	MF06 1.25-1.5	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	3	3	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.3	6.3	0.0	0% - 20%
EB1008678-011	MF09 0.75-1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	14	12	12.3	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.8	5.7	1.7	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1356438)									
EB1008678-001	MF06 1.25-1.5	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EB1008678-011	MF09 0.75-1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.54	0.53	2.9	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	339	330	2.9	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA033-A: Actual Acidity (QCLot: 1356438)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1356438)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----

Matrix Spike (MS) Report

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

- **No Matrix Spike (MS) Results are required to be reported.**

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1008678**	Page	: 1 of 7
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
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Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001 00448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: MUDFLATS		
C-O-C number	: ----	Date Samples Received	: 18-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 28-MAY-2010
Order number	: ----		
		No. of samples received	: 22
Quote number	: EN/034/10	No. of samples analysed	: 22

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-A: Actual Acidity								
Snap Lock Bag - frozen								
MF06 1.25-1.5,	MF06 1.75-2,	**15-MAY-2010**	**25-MAY-2010**	15-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
MF06 2.25-2.5,	MF06 2.75-3.0,							
MF07 1.25-1.5,	MF07 1.5-1.75,							
MF05 1.25-1.5,	MF05 1.75-2.0,							
MF08 1.25-1.5,	MF08 1.75-2,							
MF09 0.75-1,	MF32 0.0.1,							
MF32 0.1-0.2,	MF32 0.5-0.6,							
MF03 0-0.1,	MF03 0.15-0.3,							
MF12 0-0.1,	MF12 0.3-0.4,							
MF10 0.75-1,	MF10 1.25-1.5							
EA033-B: Potential Acidity								
Snap Lock Bag - frozen								
MF06 1.25-1.5,	MF06 1.75-2,	**15-MAY-2010**	**25-MAY-2010**	15-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
MF06 2.25-2.5,	MF06 2.75-3.0,							
MF07 1.25-1.5,	MF07 1.5-1.75,							
MF05 1.25-1.5,	MF05 1.75-2.0,							
MF08 1.25-1.5,	MF08 1.75-2,							
MF09 0.75-1,	MF32 0.0.1,							
MF32 0.1-0.2,	MF32 0.5-0.6,							
MF03 0-0.1,	MF03 0.15-0.3,							
MF12 0-0.1,	MF12 0.3-0.4,							
MF10 0.75-1,	MF10 1.25-1.5							

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen								
MF06 1.25-1.5,	MF06 1.75-2,	**15-MAY-2010**	**25-MAY-2010**	15-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
MF06 2.25-2.5,	MF06 2.75-3.0,							
MF07 1.25-1.5,	MF07 1.5-1.75,							
MF05 1.25-1.5,	MF05 1.75-2.0,							
MF08 1.25-1.5,	MF08 1.75-2,							
MF09 0.75-1,	MF32 0.0.1,							
MF32 0.1-0.2,	MF32 0.5-0.6,							
MF03 0-0.1,	MF03 0.15-0.3,							
MF12 0-0.1,	MF12 0.3-0.4,							
MF10 0.75-1,	MF10 1.25-1.5							
EA033-D: Retained Acidity								
Snap Lock Bag - frozen								
MF06 1.25-1.5,	MF06 1.75-2,	**15-MAY-2010**	**25-MAY-2010**	15-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
MF06 2.25-2.5,	MF06 2.75-3.0,							
MF07 1.25-1.5,	MF07 1.5-1.75,							
MF05 1.25-1.5,	MF05 1.75-2.0,							
MF08 1.25-1.5,	MF08 1.75-2,							
MF09 0.75-1,	MF32 0.0.1,							
MF32 0.1-0.2,	MF32 0.5-0.6,							
MF03 0-0.1,	MF03 0.15-0.3,							
MF12 0-0.1,	MF12 0.3-0.4,							
MF10 0.75-1,	MF10 1.25-1.5							
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen								
MF06 1.25-1.5,	MF06 1.75-2,	**15-MAY-2010**	**25-MAY-2010**	15-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
MF06 2.25-2.5,	MF06 2.75-3.0,							
MF07 1.25-1.5,	MF07 1.5-1.75,							
MF05 1.25-1.5,	MF05 1.75-2.0,							
MF08 1.25-1.5,	MF08 1.75-2,							
MF09 0.75-1,	MF32 0.0.1,							
MF32 0.1-0.2,	MF32 0.5-0.6,							
MF03 0-0.1,	MF03 0.15-0.3,							
MF12 0-0.1,	MF12 0.3-0.4,							
MF10 0.75-1,	MF10 1.25-1.5							
EA150: Particle Sizing								
Snap Lock Bag								
MF12 0.3-0.4,	MF12 0-0.3,	**15-MAY-2010**	**---**	---	----	**24-MAY-2010**	11-NOV-2010	✓
MF03 0-0.15								

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA150: Soil Classification based on Particle Size							
Snap Lock Bag MF12 0.3-0.4, MF12 0-0.3, MF03 0-0.15	**15-MAY-2010**	**---**	---	----	**24-MAY-2010**	11-NOV-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	1	20	**5.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Particle Size Analysis (Sieving)	EA150	SOIL	Particle Size Analysis by Sieving according to AS1289.3.6.1 - 1995
Particle Size Analysis by Hydrometer	EA150H	SOIL	Particle Size Analysis by Hydrometer according to AS1289.3.6.3 - 2003

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**
- **For all matrices, no Matrix Spike outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

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

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1008678**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001 00448 WBS 3V4070CNM	Page	: 1 of 2
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: MUDFLATS		
Sampler	: Alex Kochnieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 18-MAY-2010	Issue Date	: 26-MAY-2010 10:15
Client Requested Due Date	: 26-MAY-2010	Scheduled Reporting Date	: **26-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 0.2 °C<->8.6°C - Ice present
No. of coolers/boxes	: 14 MEDIUM	No. of samples received	: 22
Sercurity Seal	: Intact.	No. of samples analysed	: 22

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Samples were received at ALS Gladstone at <0'C.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA150H Particle Sizing by Hydrometer
EB1008678-001	15-MAY-2010 15:00	MF06 1.25-1.5	✓	
EB1008678-002	15-MAY-2010 15:00	MF06 1.75-2	✓	
EB1008678-003	15-MAY-2010 15:00	MF06 2.25-2.5	✓	
EB1008678-004	15-MAY-2010 15:00	MF06 2.75-3.0	✓	
EB1008678-005	15-MAY-2010 15:00	MF07 1.25-1.5	✓	
EB1008678-006	15-MAY-2010 15:00	MF07 1.5-1.75	✓	
EB1008678-007	15-MAY-2010 15:00	MF05 1.25-1.5	✓	
EB1008678-008	15-MAY-2010 15:00	MF05 1.75-2.0	✓	
EB1008678-009	15-MAY-2010 15:00	MF08 1.25-1.5	✓	
EB1008678-010	15-MAY-2010 15:00	MF08 1.75-2	✓	
EB1008678-011	15-MAY-2010 15:00	MF09 0.75-1	✓	
EB1008678-012	15-MAY-2010 15:00	MF32 0.0.1	✓	
EB1008678-013	15-MAY-2010 15:00	MF32 0.1-0.2	✓	
EB1008678-014	15-MAY-2010 15:00	MF32 0.5-0.6	✓	
EB1008678-015	15-MAY-2010 15:00	MF03 0-0.1	✓	
EB1008678-016	15-MAY-2010 15:00	MF03 0.15-0.3	✓	
EB1008678-017	15-MAY-2010 15:00	MF12 0-0.1	✓	
EB1008678-018	15-MAY-2010 15:00	MF12 0.3-0.4	✓	✓
EB1008678-019	15-MAY-2010 15:00	MF12 0-0.3		✓
EB1008678-020	15-MAY-2010 15:00	MF03 0-0.15		✓
EB1008678-021	15-MAY-2010 15:00	MF10 0.75-1	✓	
EB1008678-022	15-MAY-2010 15:00	MF10 1.25-1.5	✓	

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

- *AU Certificate of Analysis - NATA (COA)	Email	alex.kochnieff@worleyparsons.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	alex.kochnieff@worleyparsons.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	alex.kochnieff@worleyparsons.com
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	alex.kochnieff@worleyparsons.com
- A4 - AU Tax Invoice (INV)	Email	alex.kochnieff@worleyparsons.com
- Attachment - Report (SUBCO)	Email	alex.kochnieff@worleyparsons.com
- Chain of Custody (CoC) (COC)	Email	alex.kochnieff@worleyparsons.com
- EDI Format - ENMRG (ENMRG)	Email	alex.kochnieff@worleyparsons.com
- EDI Format - XTab (XTAB)	Email	alex.kochnieff@worleyparsons.com

Plot 2. '6/5 Mf.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons
ADDRESS / OFFICE: 60 Albert St, Brisbane City
PROJECT MANAGER (PM): Alex Kochnieff
PROJECT ID: 301001-00448 WBS 3V4070CN M
SITE: ~~Reid Rd~~ MUDFLATS
RESULTS REQUIRED (Date): (7 day TAT)

SAMPLER: Alex Kochnieff
MOBILE: 0419645639
PHONE 33193940
EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
EMAIL INVOICE TO: as above

P.O. NO.:
QUOTE NO.:

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: (Yes) No N/A
SAMPLE TEMPERATURE
CHILLED: (Yes) No

COMMENTS / SPECIAL HANDLING / STORAGE OR DISPOSAL:

ALS ID	SAMPLE ID	MATRIX	DATE	Time	CONTAINER Type / Code	CONTAINER Total bottles	TKN / Reactive P (topsoils)		pH / Electricial Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite		HOLD					
1	MF06 1.25-1.5	s	5/5									✓							
2	MF06 1.75-2	s	15/5									✓							
3	MF06 2.25-2.5	s	15/5									✓							
4	MF06 2.75-3.0	s	15/5									✓							
5	MF07 1.25-1.5	s	15/5									✓							
6	MF07 1.5-1.75	s	15/5									✓							
7	MF05 1.25-1.5	s	15/5									✓							
8	MF05 1.75-2.0	s	15/5									✓							
9	MF08 1.25-1.5	s	15/5									✓							
10	MF08 1.75-2.	s	15/5									✓							
11	MF09 0.75-1	s	15/5									✓							
12	MF32 0-0.1	s	~~15~~/5									✓							

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SCANNED
18/5 K

Environmental Division
Brisbane
Work Order
EB1008678

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~	Date: 15/5/10.	Name: JAW S.	Date: 15/05/10	Con' Note No:
Of: WorleyParsons	Time: 2035.	Of:	Time:	
Name: D. Radcliffe	Date: 15/5/10	Name: Christian	Date: 15/5	Transport Co:
Of: ALS	Time:	Of: ALS	Time: 0500	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

ALS

CLIENT: WorleyParsons

ADDRESS / OFFICE: 60 Albert St, Brisbane City

PROJECT MANAGER (PM): Alex Kochnieff

PROJECT ID: 301001-00448 WBS 3V4070CN.M

SITE: ~~Reid Rd~~ MUDFLATS. P.O. NO.:

RESULTS REQUIRED (Date): (7 day TAT) QUOTE NO.:

SAMPLER: Alex Kochnieff

MOBILE: 0419645639

PHONE 33193940

EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**

EMAIL INVOICE TO: as above

ANALYSIS REQUIRED including SUITES (note - suite codes must be listed to attract suite prices)

FOR LABORATORY USE ONLY

COOLER SEAL (circle appropriate)

Intact: Yes No N/A

SAMPLE TEMPERATURE

CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (topsoils)		pH / Electricial Conductivity (all)	CEC (Ca, Mg, K, Na) [all]		Chromium Suite	PSD	HOLD					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
13	MF32 0.1-0.2	S	15/5									✓							
14	MF32 0.5-0.6	S	15/5									✓							
15	MF 03 0-0.1	S	15/5									✓							
16	MF 03 0.15-0.3	S	15/5									✓							
17	MF 12 0-0.1	S	15/5									✓							
18	MF 12 03-0.4	S	15/5									✓							
19	MF 12 0-0.3	S	15/5									✓							
	~~MF-03-0.3~~	S																	
18	~~MF 12 03-0.4~~	S	15/5										✓						
20	MF 03 0-0.15	S	15/5										✓						
21	MF 10 0.75-1	S	15/5									✓							
22	MF 10 1.25-1.5	S	15/5									✓							

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Dave Stone	Date:	Name:	Date:	Con' Note No:
Of: WorleyParsons	Time:	Of:	Time:	
Name:	Date:	Name:	Date:	Transport Co:
Of:	Time:	Of:	Time:	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB1008685**	Page	: 1 of 11
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001 11448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 18-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 31-MAY-2010
Site	: MUDFLATS		
		No. of samples received	: 37
Quote number	: EN/034/10	No. of samples analysed	: 37

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Inorganics
Stephen Hislop	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m3'.**
- **Retained Acidity not required because pH KCl greater than or equal to 4.5**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF21 0-0.1	MF21 0.2-0.3	MF21 0.75-0.85	MF21 1.3-1.4	MF21 1.9-2.0
				Client sampling date / time: 13-MAY-2010 15:00	13-MAY-2010 15:00	13-MAY-2010 15:00	13-MAY-2010 15:00	13-MAY-2010 15:00
				EB1008685-001	EB1008685-002	EB1008685-003	EB1008685-004	EB1008685-005
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	5.0	4.5	4.4	5.6	8.1
Titratable Actual Acidity (23F)	----	2	mole H+ / t	30	66	68	25	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.05	0.11	0.11	0.04	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	1.86	1.62	2.27	1.76
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	1160	1010	1410	1100
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	----	----	4.62
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	----	----	923
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	----	----	1.48
EA033-D: Retained Acidity								
KCl Extractable Sulfur (23Ce)	----	0.02	% S	----	----	0.52	----	----
HCl Extractable Sulfur (20Be)	----	0.02	% S	----	----	0.60	----	----
Net Acid Soluble Sulfur (20Je)	----	0.02	% S	----	----	0.07	----	----
acidity - Net Acid Soluble Sulfur (a-20J)	----	10	mole H+ / t	----	----	33	----	----
sulfidic - Net Acid Soluble Sulfur (s-20J)	----	0.02	% pyrite S	----	----	0.05	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	1.5	1.5	1.5	1.5	1.5
Net Acidity (sulfur units)	----	0.02	% S	0.05	1.96	1.78	2.31	0.77
Net Acidity (acidity units)	----	10	mole H+ / t	30	1220	1110	1440	481
Liming Rate	----	1	kg CaCO3/t	2	92	83	108	36

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF21 2.65-2.75	MF1 0-0.1	MF1 0.1-0.2	MF1 0.7-0.8	MF1 1.2-1.3
				Client sampling date / time: 13-MAY-2010 15:00	13-MAY-2010 15:00	13-MAY-2010 15:00	13-MAY-2010 15:00	13-MAY-2010 15:00
				EB1008685-006	EB1008685-007	EB1008685-008	EB1008685-009	EB1008685-010
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.4**	**9.0**	**5.1**	**5.5**	**6.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	**31**	**22**	**4**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	**0.05**	**0.03**	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.91**	<0.02	**1.58**	**1.68**	**0.82**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**566**	<10	**989**	**1050**	**509**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**1.06**	**4.64**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**211**	**928**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.34**	**1.49**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.68**	<0.02	**1.64**	**1.71**	**0.82**
Net Acidity (acidity units)	----	10	mole H+ / t	**425**	<10	**1020**	**1070**	**513**
Liming Rate	----	1	kg CaCO3/t	**32**	<1	**76**	**80**	**38**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF2 0-0.1	MF2 0.1-0.2	MF2 0.75-0.85	MF2 1.25-1.35	MF4 0-0.1
				Client sampling date / time: 13-MAY-2010 15:00	13-MAY-2010 15:00	13-MAY-2010 15:00	13-MAY-2010 15:00	14-MAY-2010 15:00
				EB1008685-011	EB1008685-012	EB1008685-013	EB1008685-014	EB1008685-015
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.6**	**6.6**	**6.2**	**6.3**	**6.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	**3**	<2	**2**
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	**0.37**	**0.40**	**0.20**	**0.03**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	**229**	**250**	**125**	**18**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**10.3**	**6.14**	----	----	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**2060**	**1230**	----	----	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**3.31**	**1.97**	----	----	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	**0.40**	**0.20**	**0.03**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	**252**	**126**	**20**
Liming Rate	----	1	kg CaCO3/t	<1	<1	**19**	**9**	**2**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF4 0.25-0.35	MF4 0.75-0.85	MF5 0-0.25	MF5 0.5-0.75	MF5 1-1.25
				Client sampling date / time: 14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00
				EB1008685-016	EB1008685-017	EB1008685-018	EB1008685-019	EB1008685-020
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**5.9**	**5.9**	**8.2**	**6.9**	**6.7**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	**19**	**15**	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	**0.03**	**0.02**	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.91**	**1.52**	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**568**	**949**	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	----	----	**1.67**	**0.42**	**0.37**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	----	----	**334**	**83**	**74**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	----	----	**0.54**	**0.13**	**0.12**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.94**	**1.55**	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**587**	**964**	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	**44**	**72**	<1	<1	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF6 0-0.1	MF6 0.1-0.25	MF6 0.5-0.75	MF61-1.25	MF07 0-0.25
				Client sampling date / time: 14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00
				EB1008685-021	EB1008685-022	EB1008685-023	EB1008685-024	EB1008685-025
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	**8.1**	----	----	**9.3**	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	**3820**	----	----	**10700**	----
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**7.2**	**6.9**	**6.8**	**6.9**	**7.0**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**3.14**	**0.74**	**0.29**	**0.32**	**0.54**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**628**	**147**	**59**	**64**	**108**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**1.01**	**0.24**	**0.09**	**0.10**	**0.17**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	<10
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	<1
EA055: Moisture Content								
^ Moisture Content (dried @ 103°C)	----	1.0	%	**14.5**	----	----	----	----
ED007: Exchangeable Cations								
^ Exchangeable Calcium	----	0.1	meq/100g	**3.0**	----	----	**2.3**	----
^ Exchangeable Magnesium	----	0.1	meq/100g	**13.5**	----	----	**13.7**	----
^ Exchangeable Potassium	----	0.1	meq/100g	**2.6**	----	----	**2.4**	----
^ Exchangeable Sodium	----	0.1	meq/100g	**25.8**	----	----	**58.8**	----
^ Cation Exchange Capacity	----	0.1	meq/100g	**44.9**	----	----	**77.1**	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	**1160**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	2	mg/kg	**323**	----	----	----	----

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF07 0.5-0.75	MF07 1.0-1.25	MF07 1.25-1.35	MF08 0-0.5	MF08 0.5-0.75
				Client sampling date / time: 14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00
				EB1008685-026	EB1008685-027	EB1008685-028	EB1008685-029	EB1008685-030
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.6**	**7.1**	**6.9**	**7.9**	**6.3**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	<2	<2	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	**0.26**
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	<10	<10	**162**
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.52**	**0.24**	**0.24**	**3.14**	----
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**103**	**49**	**49**	**628**	----
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.16**	**0.08**	**0.08**	**1.01**	----
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	<0.02	<0.02	<0.02	<0.02	**0.26**
Net Acidity (acidity units)	----	10	mole H+ / t	<10	<10	<10	<10	**164**
Liming Rate	----	1	kg CaCO3/t	<1	<1	<1	<1	**12**

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID: MF08 0.75-1	MF09 0-0.1	MF09 0.1-0.2	MF09 0.3-0.4	MF10 0-0.1
				Client sampling date / time: 14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00	14-MAY-2010 15:00
				EB1008685-031	EB1008685-032	EB1008685-033	EB1008685-034	EB1008685-035
EA033-A: Actual Acidity								
pH KCl (23A)	----	0.1	pH Unit	**6.6**	**5.5**	**6.8**	**6.3**	**6.7**
Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	**30**	<2	**4**	<2
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	**0.05**	<0.02	<0.02	<0.02
EA033-B: Potential Acidity								
Chromium Reducible Sulfur (22B)	----	0.02	% S	**0.44**	**1.89**	**0.22**	**0.21**	<0.02
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	**278**	**1180**	**135**	**129**	<10
EA033-C: Acid Neutralising Capacity								
Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	**0.64**	----	**10.3**	----	**0.96**
acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	**128**	----	**2060**	----	**192**
sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	**0.20**	----	**3.31**	----	**0.31**
EA033-E: Acid Base Accounting								
ANC Fineness Factor	----	0.5	-	**1.5**	**1.5**	**1.5**	**1.5**	**1.5**
Net Acidity (sulfur units)	----	0.02	% S	**0.31**	**1.94**	<0.02	**0.21**	<0.02
Net Acidity (acidity units)	----	10	mole H+ / t	**193**	**1210**	<10	**133**	<10
Liming Rate	----	1	kg CaCO3/t	**14**	**91**	<1	**10**	<1

Analytical Results

Sub-Matrix: **SOIL**

Compound	CAS Number	LOR	Unit	Client sample ID	MF10 0.1-0.2	MF10 0.25-0.35	----	----	----
				Client sampling date / time	14-MAY-2010 15:00	14-MAY-2010 15:00	----	----	----
					EB1008685-036	EB1008685-037	----	----	----
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit		**5.9**	**5.5**	----	----	----
Titratable Actual Acidity (23F)	----	2	mole H+ / t		**17**	**11**	----	----	----
sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S		**0.03**	<0.02	----	----	----
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.02	% S		**1.76**	**0.94**	----	----	----
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t		**1100**	**588**	----	----	----
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-		**1.5**	**1.5**	----	----	----
Net Acidity (sulfur units)	----	0.02	% S		**1.79**	**0.96**	----	----	----
Net Acidity (acidity units)	----	10	mole H+ / t		**1110**	**599**	----	----	----
Liming Rate	----	1	kg CaCO3/t		**84**	**45**	----	----	----

QUALITY CONTROL REPORT

Work Order	: **EB1008685**	Page	: 1 of 6
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001 11448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: MUDFLATS		
C-O-C number	: ----	Date Samples Received	: 18-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 31-MAY-2010
Order number	: ----		
		No. of samples received	: 37
Quote number	: EN/034/10	No. of samples analysed	: 37

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

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

NATA Accredited Laboratory 825

This document is issued in accordance with NATA accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Bne Acid Sulphate Soils
Kim McCabe	Senior Inorganic Chemist	Inorganics
Stephen Hislop	Senior Inorganic Chemist	Inorganics

General Comments

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

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

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

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

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA010: Conductivity (QC Lot: 1352221)									
EB1008685-021	MF6 0-0.1	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	3820	3820	0.0	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1356499)									
EB1008685-001	MF21 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	0.05	0.05	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	30	30	0.0	0% - 50%
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.0	5.0	0.0	0% - 20%
EB1008685-011	MF2 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.6	7.0	5.9	0% - 20%
EA033-A: Actual Acidity (QC Lot: 1356500)									
EB1008685-021	MF6 0-0.1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	7.2	7.4	2.7	0% - 20%
EB1008685-031	MF08 0.75-1	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.0	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.0	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.6	6.6	0.0	0% - 20%
EA033-B: Potential Acidity (QC Lot: 1356499)									
EB1008685-001	MF21 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EB1008685-011	MF2 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EA033-B: Potential Acidity (QC Lot: 1356500)									
EB1008685-021	MF6 0-0.1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	<0.02	0.0	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.0	No Limit
EB1008685-031	MF08 0.75-1	EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	0.44	0.44	0.0	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	278	273	1.8	0% - 20%
EA033-C: Acid Neutralising Capacity (QC Lot: 1356499)									
EB1008685-011	MF2 0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	10.3	10.1	2.4	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	3.31	3.23	2.4	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	2060	2010	2.4	0% - 20%

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA033-C: Acid Neutralising Capacity (QC Lot: 1356500)									
EB1008685-021	MF6 0-0.1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	3.14	3.17	0.8	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	1.01	1.02	0.0	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	628	633	0.8	0% - 20%
EB1008685-031	MF08 0.75-1	EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	0.64	0.69	7.4	0% - 20%
		EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	0.20	0.22	7.4	0% - 20%
		EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	128	137	7.4	0% - 50%
EA055: Moisture Content (QC Lot: 1353307)									
EB1008681-002	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	6.0	5.0	17.5	No Limit
EB1008727-003	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	13.1	12.8	2.0	0% - 50%
ED007: Exchangeable Cations (QC Lot: 1356699)									
EB1008685-021	MF6 0-0.1	ED007: Exchangeable Calcium	----	0.1	meq/100g	3.0	3.0	0.0	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	13.5	13.7	1.5	0% - 20%
		ED007: Exchangeable Potassium	----	0.1	meq/100g	2.6	2.6	0.0	0% - 20%
		ED007: Exchangeable Sodium	----	0.1	meq/100g	25.8	26.0	0.9	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 1356697)									
EB1008587-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	28000	28000	0.2	0% - 20%
EB1008685-021	MF6 0-0.1	EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	1160	1120	3.7	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1356698)									
EB1008587-001	Anonymous	EK067G: Total Phosphorus as P	----	2	mg/kg	11900	11300	5.4	0% - 20%
EB1008685-021	MF6 0-0.1	EK067G: Total Phosphorus as P	----	2	mg/kg	323	304	6.2	0% - 20%

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002 : pH (Soils) (QCLot: 1352220)								
EA002: pH Value	----	0.1	pH Unit	----	5.2 pH Unit	101	96	104
EA010: Conductivity (QCLot: 1352221)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	196 µS/cm	102	91	111
EA033-A: Actual Acidity (QCLot: 1356499)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-A: Actual Acidity (QCLot: 1356500)								
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	----	----	----	----
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1356499)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-B: Potential Acidity (QCLot: 1356500)								
EA033: Chromium Reducible Sulfur (22B)	----	0.02	% S	<0.02	----	----	----	----
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EA033-C: Acid Neutralising Capacity (QCLot: 1356500)								
EA033: Acid Neutralising Capacity (19A2)	----	0.01	% CaCO3	<0.01	----	----	----	----
EA033: acidity - Acid Neutralising Capacity (a-19A2)	----	10	mole H+ / t	<10	----	----	----	----
EA033: sulfidic - Acid Neutralising Capacity (s-19A2)	----	0.01	% pyrite S	<0.01	----	----	----	----
ED007: Exchangeable Cations (QCLot: 1356699)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	1.47 meq/100g	87.1	70.2	106
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	0.77 meq/100g	93.7	76.4	112
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.20 meq/100g	71.0	70	100
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.51 meq/100g	76.2	70	104
ED007: Cation Exchange Capacity	----	0.1	meq/100g	----	2.95 meq/100g	85.8	70.1	104
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1356697)								
EK061G: Total Kjeldahl Nitrogen as N	----	20	mg/kg	<20	534 mg/kg	81.1	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1356698)								
EK067G: Total Phosphorus as P	----	2	mg/kg	<2	75 mg/kg	96.4	70	130

Matrix Spike (MS) Report

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

Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 1356697)							
EB1008587-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	500 mg/kg	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1356698)							
EB1008587-002	Anonymous	EK067G: Total Phosphorus as P	----	100 mg/kg	# Not Determined	70	130

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EB1008685**	Page	: 1 of 9
Client	: WORLEY PARSONS - INFRASTRUCTURE MWE	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001 11448 WBS 3V4070CNM	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: MUDFLATS		
C-O-C number	: ----	Date Samples Received	: 18-MAY-2010
Sampler	: Alex Kochnieff	Issue Date	: 31-MAY-2010
Order number	: ----		
		No. of samples received	: 37
Quote number	: EN/034/10	No. of samples analysed	: 37

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non -volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002 : pH (Soils)								
Snap Lock Bag								
MF6 0-0.1,	MF61-1.25	**14-MAY-2010**	**21-MAY-2010**	21-MAY-2010	✓	**27-MAY-2010**	21-MAY-2010	×
EA010: Conductivity								
Snap Lock Bag								
MF6 0-0.1,	MF61-1.25	**14-MAY-2010**	**21-MAY-2010**	21-MAY-2010	✓	**27-MAY-2010**	18-JUN-2010	✓
EA033-A: Actual Acidity								
Snap Lock Bag - frozen								
MF21 0-0.1,	MF21 0.2-0.3,	**13-MAY-2010**	**25-MAY-2010**	13-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
MF21 0.75-0.85,	MF21 1.3-1.4,							
MF21 1.9-2.0,	MF21 2.65-2.75,							
MF1 0-0.1,	MF1 0.1-0.2,							
MF1 0.7-0.8,	MF1 1.2-1.3,							
MF2 0-0.1,	MF2 0.1-0.2,							
MF2 0.75-0.85,	MF2 1.25-1.35							
Snap Lock Bag - frozen								
MF4 0-0.1,	MF4 0.25-0.35,	**14-MAY-2010**	**25-MAY-2010**	14-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
MF4 0.75-0.85,	MF5 0-0.25,							
MF5 0.5-0.75,	MF5 1-1.25,							
MF6 0-0.1,	MF6 0.1-0.25,							
MF6 0.5-0.75,	MF61-1.25,							
MF07 0-0.25,	MF07 0.5-0.75,							
MF07 1.0-1.25,	MF07 1.25-1.35,							
MF08 0-0.5,	MF08 0.5-0.75,							
MF08 0.75-1,	MF09 0-0.1,							
MF09 0.1-0.2,	MF09 0.3-0.4,							
MF10 0-0.1,	MF10 0.1-0.2,							
MF10 0.25-0.35								

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-B: Potential Acidity							
Snap Lock Bag - frozen							
MF21 0-0.1, MF21 0.2-0.3, MF21 0.75-0.85, MF21 1.3-1.4, MF21 1.9-2.0, MF21 2.65-2.75, MF1 0-0.1, MF1 0.1-0.2, MF1 0.7-0.8, MF1 1.2-1.3, MF2 0-0.1, MF2 0.1-0.2, MF2 0.75-0.85, MF2 1.25-1.35	**13-MAY-2010**	**25-MAY-2010**	13-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
Snap Lock Bag - frozen							
MF4 0-0.1, MF4 0.25-0.35, MF4 0.75-0.85, MF5 0-0.25, MF5 0.5-0.75, MF5 1-1.25, MF6 0-0.1, MF6 0.1-0.25, MF6 0.5-0.75, MF61-1.25, MF07 0-0.25, MF07 0.5-0.75, MF07 1.0-1.25, MF07 1.25-1.35, MF08 0-0.5, MF08 0.5-0.75, MF08 0.75-1, MF09 0-0.1, MF09 0.1-0.2, MF09 0.3-0.4, MF10 0-0.1, MF10 0.1-0.2, MF10 0.25-0.35	**14-MAY-2010**	**25-MAY-2010**	14-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-C: Acid Neutralising Capacity							
Snap Lock Bag - frozen							
MF21 0-0.1, MF21 0.2-0.3, MF21 0.75-0.85, MF21 1.3-1.4, MF21 1.9-2.0, MF21 2.65-2.75, MF1 0-0.1, MF1 0.1-0.2, MF1 0.7-0.8, MF1 1.2-1.3, MF2 0-0.1, MF2 0.1-0.2, MF2 0.75-0.85, MF2 1.25-1.35	**13-MAY-2010**	**25-MAY-2010**	13-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
Snap Lock Bag - frozen							
MF4 0-0.1, MF4 0.25-0.35, MF4 0.75-0.85, MF5 0-0.25, MF5 0.5-0.75, MF5 1-1.25, MF6 0-0.1, MF6 0.1-0.25, MF6 0.5-0.75, MF61-1.25, MF07 0-0.25, MF07 0.5-0.75, MF07 1.0-1.25, MF07 1.25-1.35, MF08 0-0.5, MF08 0.5-0.75, MF08 0.75-1, MF09 0-0.1, MF09 0.1-0.2, MF09 0.3-0.4, MF10 0-0.1, MF10 0.1-0.2, MF10 0.25-0.35	**14-MAY-2010**	**25-MAY-2010**	14-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-D: Retained Acidity							
Snap Lock Bag - frozen							
MF21 0-0.1, MF21 0.2-0.3, MF21 0.75-0.85, MF21 1.3-1.4, MF21 1.9-2.0, MF21 2.65-2.75, MF1 0-0.1, MF1 0.1-0.2, MF1 0.7-0.8, MF1 1.2-1.3, MF2 0-0.1, MF2 0.1-0.2, MF2 0.75-0.85, MF2 1.25-1.35	**13-MAY-2010**	**25-MAY-2010**	13-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
Snap Lock Bag - frozen							
MF4 0-0.1, MF4 0.25-0.35, MF4 0.75-0.85, MF5 0-0.25, MF5 0.5-0.75, MF5 1-1.25, MF6 0-0.1, MF6 0.1-0.25, MF6 0.5-0.75, MF61-1.25, MF07 0-0.25, MF07 0.5-0.75, MF07 1.0-1.25, MF07 1.25-1.35, MF08 0-0.5, MF08 0.5-0.75, MF08 0.75-1, MF09 0-0.1, MF09 0.1-0.2, MF09 0.3-0.4, MF10 0-0.1, MF10 0.1-0.2, MF10 0.25-0.35	**14-MAY-2010**	**25-MAY-2010**	14-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA033-E: Acid Base Accounting							
Snap Lock Bag - frozen							
MF21 0-0.1, MF21 0.2-0.3, MF21 0.75-0.85, MF21 1.3-1.4, MF21 1.9-2.0, MF21 2.65-2.75, MF1 0-0.1, MF1 0.1-0.2, MF1 0.7-0.8, MF1 1.2-1.3, MF2 0-0.1, MF2 0.1-0.2, MF2 0.75-0.85, MF2 1.25-1.35	**13-MAY-2010**	**25-MAY-2010**	13-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
Snap Lock Bag - frozen							
MF4 0-0.1, MF4 0.25-0.35, MF4 0.75-0.85, MF5 0-0.25, MF5 0.5-0.75, MF5 1-1.25, MF6 0-0.1, MF6 0.1-0.25, MF6 0.5-0.75, MF61-1.25, MF07 0-0.25, MF07 0.5-0.75, MF07 1.0-1.25, MF07 1.25-1.35, MF08 0-0.5, MF08 0.5-0.75, MF08 0.75-1, MF09 0-0.1, MF09 0.1-0.2, MF09 0.3-0.4, MF10 0-0.1, MF10 0.1-0.2, MF10 0.25-0.35	**14-MAY-2010**	**25-MAY-2010**	14-MAY-2011	✓	**25-MAY-2010**	23-AUG-2010	✓
EA055: Moisture Content							
Snap Lock Bag							
MF6 0-0.1	**14-MAY-2010**	**----**	----	----	**21-MAY-2010**	21-MAY-2010	✓
ED007: Exchangeable Cations							
Pulp Bag							
MF6 0-0.1, MF61-1.25	**14-MAY-2010**	**26-MAY-2010**	10-NOV-2010	✓	**27-MAY-2010**	10-NOV-2010	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser							
Snap Lock Bag							
MF6 0-0.1	**14-MAY-2010**	**26-MAY-2010**	10-NOV-2010	✓	**27-MAY-2010**	10-NOV-2010	✓
EK067G: Total Phosphorus as P by Discrete Analyser							
Snap Lock Bag							
MF6 0-0.1	**14-MAY-2010**	**26-MAY-2010**	10-NOV-2010	✓	**27-MAY-2010**	10-NOV-2010	✓

Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Chromium Suite for Acid Sulphate Soils	EA033	4	37	**10.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations	ED007	1	2	**50.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	2	20	**10.0**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	2	17	**11.8**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosporus By Discrete Analyser	EK067G	2	11	**18.2**	**10.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations	ED007	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH (1:5)	EA002	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	17	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosporus By Discrete Analyser	EK067G	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Chromium Suite for Acid Sulphate Soils	EA033	2	37	**5.4**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations	ED007	1	2	**50.0**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	1	17	**5.9**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Total Phosporus By Discrete Analyser	EK067G	1	11	**9.1**	**5.0**	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
TKN as N By Discrete Analyser	EK061G	1	17	**5.9**	**5.0**	✓	ALS QCS3 requirement
Total Phosporus By Discrete Analyser	EK067G	1	11	**9.1**	**5.0**	✓	ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	(APHA 21st ed., 4500H+) pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (1999) Schedule B(3) (Method 103)
Electrical Conductivity (1:5)	EA010	SOIL	(APHA 21st ed., 2510) Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (1999) Schedule B(3) (Method 104)
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (1999) Schedule B(3) (Method 102)
Exchangeable Cations	ED007	SOIL	Rayment & Higginson (1992) Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (1999) Schedule B(3) (Method 301)
TKN as N By Discrete Analyser	EK061G	SOIL	APHA 21st ed., 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Total Phosporus By Discrete Analyser	EK067G	SOIL	APHA 21st ed., 4500 P-B&F This procedure involves sulfuric acid digestion and quantification using Discrete Analyser.
Emerson Aggregate Testing	EME-SOL	SOIL	Emerson Aggregate Testing per AS1289.3.8.1 performed by Subcontrator Laboratory.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	Rayment & Higginson (1992) method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
TKN/TP Digestion	EK061/EK067	SOIL	APHA 21st ed., 4500 Norg- D; APHA 21st ed., 4500 P - H. Macro Kjeldahl digestion.
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser	EB1008587-002	Anonymous	**Total Kjeldahl Nitrogen as N**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EK067G: Total Phosphorus as P by Discrete Analyser	EB1008587-002	Anonymous	**Total Phosphorus as P**	----	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **SOIL**

Method / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
EA002 : pH (Soils)							
Snap Lock Bag							
MF6 0-0.1,	MF61-1.25	----	----	----	27-MAY-2010	21-MAY-2010	**6**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

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

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB1008685**		
Client	: **WORLEY PARSONS - INFRASTRUCTURE MWE**	Laboratory	: Environmental Division Brisbane
Contact	: MR ALEX KOCHNIEFF	Contact	: Greg Vogel
Address	: LEVEL 3, 60 ALBERT STREET PO BOX 15081 CITY EAST BRISBANE QLD, AUSTRALIA 4000	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: alex.kochnieff@worleyparsons.com	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 07 3319 3940	Telephone	: +61-7-3243 7222
Facsimile	: +61 07 3319 7791	Facsimile	: +61-7-3243 7218
Project	: 301001 11448 WBS 3V4070CNM	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: ES2010WORPAR0241 (EN/034/10)
Site	: MUDFLATS		
Sampler	: Alex Kochnieff	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 18-MAY-2010	Issue Date	: 31-MAY-2010 16:44
Client Requested Due Date	: 27-MAY-2010	Scheduled Reporting Date	: **27-MAY-2010**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 0.2° C<->8.6°C - Ice present
No. of coolers/boxes	: 14 MEDIUM	No. of samples received	: 37
Sercurity Seal	: Intact.	No. of samples analysed	: 37

General Comments

- This report contains the following information:
  - Sample Container(s)/Preservation Non-Compliances
  - Summary of Sample(s) and Requested Analysis
  - Requested Deliverables
- **Samples received in appropriately pretreated and preserved containers.**
- **Sample(s) have been received within recommended holding times.**
- **Emerson analysis will be subcontracted to Golder Associates.**
- **Samples were received Frozen at ALS Gladstone.**
- Please direct any turn around / technical queries to the laboratory contact designated above.
- Please direct any queries related to sample condition / numbering / breakages to Maggie Kahi.
- Analytical work for this work order will be conducted at ALS Brisbane.
- Sample Disposal - Aqueous (14 days), Solid (90 days) from date of completion of work order.

Sample Container(s)/Preservation Non-Compliances

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

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

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process neccessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.
When date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

Matrix: **SOIL**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	SOIL - EA002 pH (1:5)	SOIL - EA010 (solids): Electrical Conductivity (1:5) Electrical Conductivity (1:5)	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA055-103 Moisture Content	SOIL - ED007 CEC / Exchangeable Cations (ED007)	SOIL - EK061G (Solids) Total Kjeldahl Nitrogen as N (TKN) By Discrete Analyser	SOIL - EK067G (Solids) Total Phosphorus as P by Discrete Analyser
EB1008685-001	13-MAY-2010 15:00	MF21 0-0.1			✓				
EB1008685-002	13-MAY-2010 15:00	MF21 0.2-0.3			✓				
EB1008685-003	13-MAY-2010 15:00	MF21 0.75-0.85			✓				
EB1008685-004	13-MAY-2010 15:00	MF21 1.3-1.4			✓				
EB1008685-005	13-MAY-2010 15:00	MF21 1.9-2.0			✓				
EB1008685-006	13-MAY-2010 15:00	MF21 2.65-2.75			✓				
EB1008685-007	13-MAY-2010 15:00	MF1 0-0.1			✓				
EB1008685-008	13-MAY-2010 15:00	MF1 0.1-0.2			✓				
EB1008685-009	13-MAY-2010 15:00	MF1 0.7-0.8			✓				
EB1008685-010	13-MAY-2010 15:00	MF1 1.2-1.3			✓				
EB1008685-011	13-MAY-2010 15:00	MF2 0-0.1			✓				
EB1008685-012	13-MAY-2010 15:00	MF2 0.1-0.2			✓				
EB1008685-013	13-MAY-2010 15:00	MF2 0.75-0.85			✓				
EB1008685-014	13-MAY-2010 15:00	MF2 1.25-1.35			✓				
EB1008685-015	14-MAY-2010 15:00	MF4 0-0.1			✓				
EB1008685-016	14-MAY-2010 15:00	MF4 0.25-0.35			✓				
EB1008685-017	14-MAY-2010 15:00	MF4 0.75-0.85			✓				
EB1008685-018	14-MAY-2010 15:00	MF5 0-0.25			✓				
EB1008685-019	14-MAY-2010 15:00	MF5 0.5-0.75			✓				
EB1008685-020	14-MAY-2010 15:00	MF5 1-1.25			✓				
EB1008685-021	14-MAY-2010 15:00	MF6 0-0.1	✓	✓	✓	✓	✓	✓	✓
EB1008685-022	14-MAY-2010 15:00	MF6 0.1-0.25			✓				
EB1008685-023	14-MAY-2010 15:00	MF6 0.5-0.75			✓				
EB1008685-024	14-MAY-2010 15:00	MF61-1.25	✓	✓	✓		✓		
EB1008685-025	14-MAY-2010 15:00	MF07 0-0.25			✓				
EB1008685-026	14-MAY-2010 15:00	MF07 0.5-0.75			✓				
EB1008685-027	14-MAY-2010 15:00	MF07 1.0-1.25			✓				
EB1008685-028	14-MAY-2010 15:00	MF07 1.25-1.35			✓				
EB1008685-029	14-MAY-2010 15:00	MF08 0-0.5			✓				
EB1008685-030	14-MAY-2010 15:00	MF08 0.5-0.75			✓				
EB1008685-031	14-MAY-2010 15:00	MF08 0.75-1			✓				
EB1008685-032	14-MAY-2010 15:00	MF09 0-0.1			✓				
EB1008685-033	14-MAY-2010 15:00	MF09 0.1-0.2			✓				
EB1008685-034	14-MAY-2010 15:00	MF09 0.3-0.4			✓				
EB1008685-035	14-MAY-2010 15:00	MF10 0-0.1			✓				

			SOIL - EA002 pH (1:5)	SOIL - EA010 (solids): Electrical Conductivity (1:5) Electrical Conductivity (1:5)	SOIL - EA033 Chromium Suite for Acid Sulphate Soils	SOIL - EA055-103 Moisture Content	SOIL - ED007 CEC / Exchangeable Cations (ED007)	SOIL - EK061G (Solids) Total Kjeldahl Nitrogen as N (TKN) By Discrete Analyser	SOIL - EK067G (Solids) Total Phosphorus as P by Discrete Analyser
EB1008685-036	14-MAY-2010 15:00	MF10 0.1-0.2			✓				
EB1008685-037	14-MAY-2010 15:00	MF10 0.25-0.35			✓				

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	eva.tetana@worleyparsons.com

MR ALEX KOCHNIEFF

- *AU Certificate of Analysis - NATA (COA)	Email	alex.kochnieff@worleyparsons.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	alex.kochnieff@worleyparsons.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	alex.kochnieff@worleyparsons.com
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	alex.kochnieff@worleyparsons.com
- A4 - AU Tax Invoice (INV)	Email	alex.kochnieff@worleyparsons.com
- Attachment - Report (SUBCO)	Email	alex.kochnieff@worleyparsons.com
- Chain of Custody (CoC) (COC)	Email	alex.kochnieff@worleyparsons.com
- EDI Format - ENMRG (ENMRG)	Email	alex.kochnieff@worleyparsons.com
- EDI Format - XTab (XTAB)	Email	alex.kochnieff@worleyparsons.com

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
PROJECT ID: 301001-00448 WBS 3V4070CN.M	EMAIL REPORT TO: alex.kochnieff@worleyparsons.com **(EXCEL format and PDF)**
SITE: ~~Reid Rd~~ MUDFLATS P.O. NO.:	EMAIL INVOICE TO: as above
RESULTS REQUIRED (**Date**): (7 day TAT) QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

ALS

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (**topsoils**)		pH / Electricial Conductivity (**all**)	CEC (Ca, Mg, K, Na) [**all**]		Chromium Suite		HOLD					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
1	MF21 0-0.1	S	13/5									✓							
2	MF21 0.2-0.3	S	13/5									✓							
3	MF21 0.75-0.85	S	13/5									✓							
4	MF21 1.3-1.4	S	13/5									✓							
5	MF21 1.9-1.2	S	13/5									✓							
6	MF21 2.65-2.75	S	13/5									✓							
7	MF1 0-0.1	S	13/5									✓							
8	MF1 0.1-0.2	S	13/5									✓							
9	MF1 0.7-0.8	S	13/5									✓							
10	MF1 1.2-1.3	S	13/5									✓							
11	MF2 0-0.1	S	13/5									✓							
12	MF2 0.1-0.2	S	13/5									✓							

Environmental Division
Brisbane
Work Order
EB1008685
Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 14/5/10.	Name:	Date: 14/05/2010	Con' Note No:
Of: WorleyParsons	Time: 1925	Of:	Time:	
Name: D. Radcliffe	Date: 14/5/10	Name: Ameham	Date: 18/5	Transport Co:
Of: ALS	Time:	Of: ALS	Time: 9:00	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: WorleyParsons	SAMPLER: Alex Kochnieff
ADDRESS / OFFICE: 60 Albert St, Brisbane City	MOBILE: 0419645639
PROJECT MANAGER (PM): Alex Kochnieff	PHONE 33193940
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SITE: ~~Reid Rd~~ MUDFLATS P.O. NO.:	EMAIL INVOICE TO: as above
RESULTS REQUIRED (**Date**): (7 day TAT) QUOTE NO.:	**ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract suite prices)

ALS

FOR LABORATORY USE ONLY
COOLER SEAL (circle appropriate)
Intact: Yes No N/A
SAMPLE TEMPERATURE
CHILLED: Yes No

COMMENTS / SPECIAL HANDLING / STORAGE OR DIPOSAL:

Notes: e.g. Highly contaminated samples, Extra volume for QC or trace LORs etc.

SAMPLE INFORMATION (note: S = Soil, W=Water)					CONTAINER INFORMATION		TKN / Reactive P (**topsoils**)		pH / Electricial Conductivity (**all**)	CEC (Ca, Mg, K, Na) [**all**]		Chromium Suite		HOLD					
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles													
1	MF21 0-0.1	S	13/5									✓							
2	MF21 0.2-0.3	S	13/5									✓							
3	MF21 0.75-0.85	S	13/5									✓							
4	MF21 1.3-1.4	S	13/5									✓							
5	MF21 1.9-1.2	S	13/5									✓							
6	MF21 2.65-2.75	S	13/5									✓							
7	MF1 0-0.1	S	13/5									✓							
8	MF1 0.1-0.2	S	13/5									✓							
9	MF1 0.7-0.8	S	13/5									✓							
10	MF1 1.2-1.3	S	13/5									✓							
11	MF2 0-0.1	S	13/5									✓							
12	MF2 0.1-0.2	S	13/5									✓							

Environmental Division
Brisbane
Work Order
EB1008685
Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: ~~Dave Stone~~ Alex Kochnieff	Date: 14/5/10.	Name:	Date: 14/05/2010	Con' Note No:
Of: WorleyParsons	Time: 1925	Of:	Time:	
Name: D. Radcliffe	Date: 14/5/10	Name: Ameham	Date: 18/5	Transport Co:
Of: ALS	Time:	Of: ALS	Time: 9:00	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserveed Plastic; AG = Amber Glass Unpreserved; V = VOA Vial HCl Preserved; VS = VOA Vial Sulphuric Preserved; SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

Golder Associates

MANSFIELD LABORATORY

1/51 Secam Street, Mansfield QLD 4122
PO Box 2034 Mansfield DC QLD 4122
Phone:(07) 3343 3166 Fax:(07) 3849 4705
www.golder.com.au

TEST RESULTS

Client :	ALS Environmental Brisbane	Report No. :	R8899
Address :	32 Shand Street, Stafford	Job No. :	107634002/1
Project :	Delivered Samples	Date Received :	21/05/2010
Batch No. :	EB1008685	Sampled by :	Client

EMERSON CLASSIFICATION

Reg'n No.	Sample No.	Sample ID	Description	Emerson Classification Number
10303630	24	MF6 1-1.25	(CH) Sandy CLAY, grey & brown	2

Remarks : Deionised water at 23 °C used in Emerson Class test.

Test Procedure : AS 1289 3.8.1

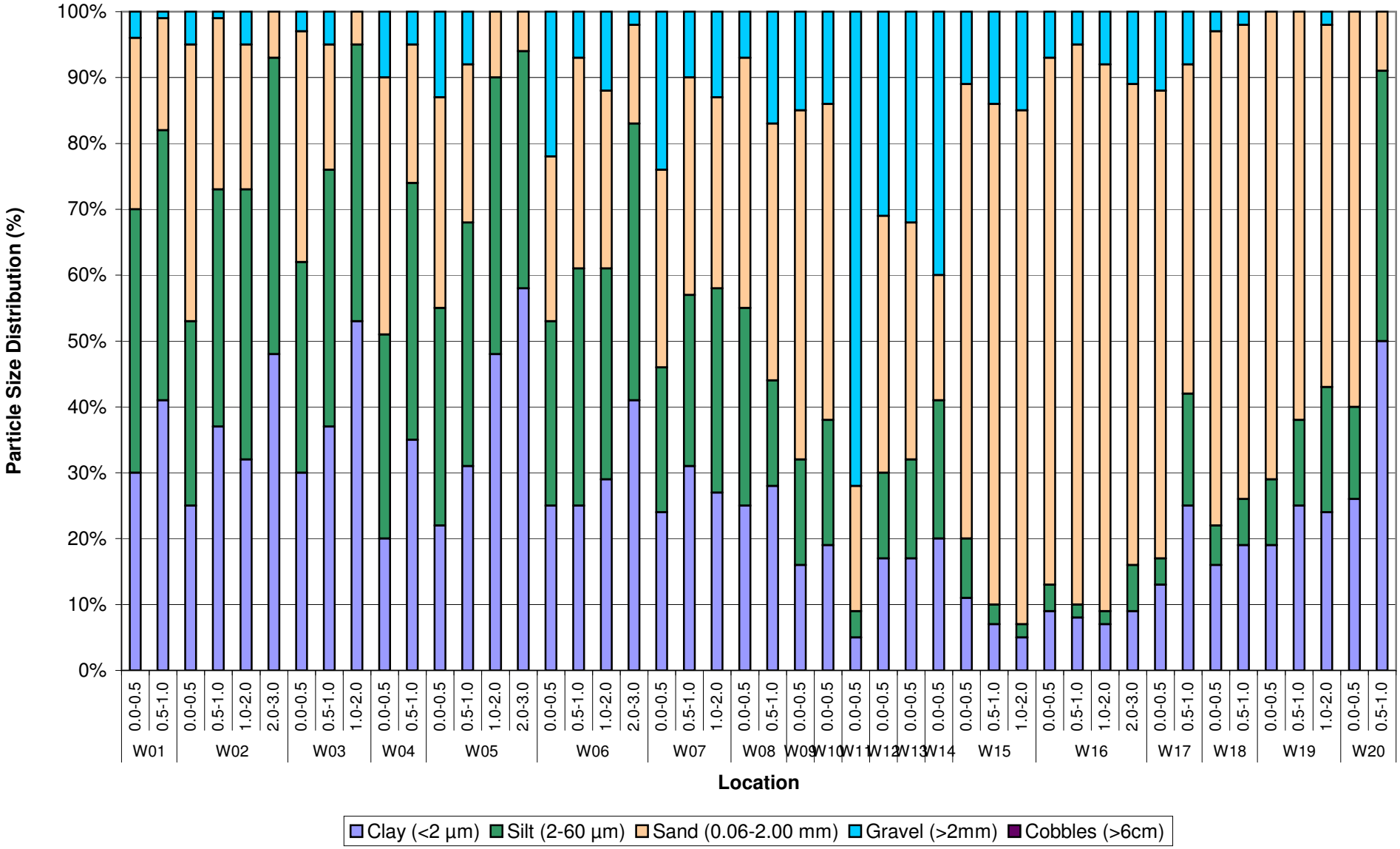
Prepared by AW Checked by JA

This document is issued in accordance with NATA's accreditation requirements.

NATA 1961

Authorised Signatory 1.6.10

Appendix 5 Narrows sub-tidal particle distribution


Particle Size Distribution (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.0-0.5
0.5-1.0
1.0-2.0
2.0-3.0
W01
W02
W03
W04
W05
W06
W07
W08
W09
W10
W11
W12
W13
W14
W15
W16
W17
W18
W19
W20
Location
Clay (<2 µm)
Silt (2-60 µm)
Sand (0.06-2.00 mm)
Gravel (>2mm)
Cobbles (>6cm)