CODLEA 2 PTY LTD

SURFACE & GROUNDWATER ASSESSMENT

LOT 1 DP 871039

BAYSIDE WAY, BRUNSWICK HEADS

Prepared By
Waste Solutions Australia Pty Ltd
November 2010

RN10/W516-2/01

Revision	Date	Written	Verified	Status
A	22.6.09	S. Pfeffer	S. Pfeffer	Draft
B	30.7.09	S. Pfeffer	S. Pfeffer	Draft
C	14.9.09	S. Pfeffer	P. Smith	Draft
D	29.10.09	S. Pfeffer	R. Gerardi	Draft
E	17.11.09	S. Pfeffer	P. Smith	Draft
0	4.11.10	S. Pfeffer	P. Smith	Final

Level 1, 254 Waterworks Road, (PO Box 514) Ashgrove, Qld 4060, Australia
Ph: 61-7-3366 5778 Fax: 61-7-3366 7302 office@wastesolutions.biz ABN 64 010 824 487

INDEX

APPENDICES

LIST OF FIGURES (APPENDIX A)

LIST OF ACRONYMS/ABBREVIATIONS

AHD	Australian Height Datum
BOD	Biochemical Oxygen Demand
BTEX	Benzene Toluene Ethyl-benzene Xylene
DERM	(Qld) Department of Environment and Resource Management
DOP	NSW Department of Planning
EA	Environmental Assessment
EC	Electrical Conductivity
FC	Faecal Coliforms
ha	Hectares
LOR	Laboratory Limit of Reporting
mBGL	Metres Below Ground Level
MEQ/L	Milliequivalents per Litre
µS/cm	Microsiemens Per Centimetre
µg/L	Micrograms Per Litre
N	Nitrogen
NATA	National Association of Testing Authorities
NTU	Nephelometric Turbidity Units
P	Phosphorus
QA	Quality Assurance
QC	Quality Control
SEPP	State Environmental Planning Policy
SWL	Standing Water Level
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
WSA	Waste Solutions Australia Pty Ltd

1 BACKGROUND

Waste Solutions Australia Pty Ltd (WSA) was commissioned by Codlea Pty Ltd to undertake a surface and groundwater assessment at Lot 1 DP 871039, located at Bayside Way, Brunswick Heads NSW. The current owner of the site is Codlea Pty Ltd and it is proposed that the site be developed into a residential subdivision. An area of wetlands located in the far east of the site has been protected under the State Environmental Planning Policy (SEPP) No 14 - Coastal Wetlands. In Section 7 (restriction on development of certain land), the policy states:

> "In considering whether to grant concurrence under subclause (1), the Director shall take into consideration the surface and groundwater characteristics of the site on which the development is proposed to be carried out and the surrounding area, including salinity and water quality".

As such, as part of the Environmental Assessment (EA) for the development, the NSW Department of Planning (DOP) required the owner to assess the potential for the development to impact on the local surface water and groundwater and any dependent ecosystems and on the SEPP 14 wetland located in the northeast of the allotment.

1.1 SCOPE OF WORK

The scope of works comprised:

- Installation of three groundwater wells in locations that provide information on groundwater level and gradient;
- Logging of the soil profile in the bores to establish the nature of any aquifer that may be present on the site;
- Determination of any interaction between the groundwater and surface water on the site and preparation of a conceptual model identifying the likely hydrogeological characteristics of the site;
- Sampling of three groundwater wells (on two separate occasions) to determine the quality of the groundwater on the site prior to the development;
- Sampling of Simpson Creek to the east of the property and the drainage line that intersects the property (on two separate occasions) to determine the quality of the surface water on and near the site prior to the development;
- Analysis of water samples for a range of water quality parameters and potential contaminants; and

- Submission of a report to Codlea detailing the findings of the investigation and the potential impacts the development could have upon the local ecosystem and the SEPP 14 Wetland area and outlining a groundwater monitoring program suitable for the site.

The work was completed generally in accordance with the ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* Australian Government Department of Environment, Water, Heritage and the Arts, Canberra.

2 SITE DESCRIPTION

The site is located on Bayside Way, approximately 1.5 kilometres south of the township of Brunswick Heads. The area to be developed is south of the "Stage 1 Bayside Brunswick" development that was completed. The real property description is Lot 73 on DP851902. The site location is presented in *Figure 1, Appendix A.*

At the time of this report, the property covered an area of 31.33 hectares (ha) and was bordered by housing to the north, forest, wetlands and Simpson Creek to the east, forest to the south and west and the Pacific Highway in the far west (*Figure 2, Appendix A*). Site infrastructure consisted of a track that intersected the site from the northern boundary to the southeast corner of the site (see photographs in *Appendix B*). There were no fences or other infrastructure on the site, although the grass appeared to have been slashed across the majority of the site.

The western side of the property was fairly level, with some areas of soil that were saturated pools of water on the surface of the soil during the June sampling round. In the eastern half of the site, the ground level gradually declined in the north but dropped sharply across a short distance in the south. The nearest surface water body to the site was Simpson Creek to the east, which ran roughly north-south adjacent to the eastern site boundary. A major drainage line intersected the site from the northwest to the southwest of the site and some minor drainage lines wound through the site, as evident in *Figure 2* in *Appendix A.*

The elevation of the Bores' locations was estimated by correlating site features close to the bores with survey data for site. The results indicated that Bore 1 was at approximately 5m AHD whilst Bores 2 and 3 were at approximately 4.5m AHD.

Information about the regional geology was obtained from the Tweed Heads Geological Series Sheet SH56-3 produced by the Department of Mines in 1972 (Scale 1:250,000). According to the map, the site is underlain by beach and dune sand.

Local geology onsite is described in the soil logs attached in *Appendix C*. Generally the soil profile consisted of sand with traces of organic matter and silt from 0mBGL to 0.2mBGL/0.5mBGL and grey sand from 0.2mBGL/0.5mBGL to 3mBGL (extent of drilling). The only exception was Bore 3, in which a significant amount of organic matter and clay was evident in the surface soil from 0mBG to 0.5mBGL (refer to *Photo 5* in *Appendix B*).

3 METHODOLOGY

3.1 SAMPLE LOCATIONS

In order to determine the quality, chemical characteristics and likely flow direction of the groundwater on the site, three groundwater wells were progressed in a triangular pattern across the site in June 2009 (refer to *Figure 2* in *Appendix A*). The bores were drilled to 3mBGL (greater than the depth of the casing to be installed) since, due to the nature of the soil profile, collapse of the holes restricted final bore depth. Once installation was complete (June 2009), the water level in each bore was measured and three volumes of water were purged from each bore. After time was allowed for recovery, water levels were measured again and water was extracted for sampling. In October 2009, the bores were sampled a second time, however, a low-flow sampling device was used in place of the bailers used in the first sampling round. Water samples from the second round were analysed in the field and in the laboratory and water levels were measured to determine whether there had been any variation in groundwater height since the June site visit. Bore 1 was dry during the October sampling round.

Six surface water samples were collected from the site: two from Simpson Creek and one from the drainage line in the southwest of the site in June and three samples from the same locations again in October.

During the June sampling round, a duplicate water sample was taken from Bore 3. During the October sampling round, a duplicate was taken at the location of *Ck North* (2).

During the October site visit, field measurements were taken of pH, conductivity, temperature, dissolved solids and dissolved oxygen. During both rounds of sampling, all sample bottles collected were chilled and were delivered to Australian Laboratory Services (ALS), a NATA accredited laboratory, for analysis.

Analytical results were compared against the:

- ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* Australian Government Department of Environment, Water, Heritage and the Arts, Canberra; and
- The "Dutch Guidelines": Ministry of Housing, Spatial Planning and the Environment. *Environmental Quality Objectives in the Netherlands: A review of environmental quality objectives and their policy framework in the Netherlands* (1994).

Where no guideline levels were available or where guidelines were inappropriate for the site under investigation, the south-east Queensland regional values from the *Queensland Water Quality Guidelines (2006)* were applied.

3.2 QUALITY ASSURANCE AND QUALITY CONTROL

3.2.1 Field Quality Assurance and Quality Control

All field investigation work was carried out in accordance with WSA standard operating procedures for field Quality Assurance (QA) and Quality Control (QC). These procedures cover:

- The use of appropriate equipment for obtaining samples, including disposable bailers for purging and sampling bores;
- The use of suitable sample containers;
- Appropriate sample storage, preservation and transportation;
- Rigorous decontamination procedures;
- The collection of QC samples (field duplicates);
- The use of trip blanks to verify that cross-contamination did not occur;
- Documentation of all fieldwork, including sample locations and features.

3.2.2 Laboratory Quality Assurance and Quality Control

The laboratory completed routine QA/QC procedures in accordance with NATA requirements, and internal laboratory standards, as part of the analytical testing program.

3.2.3 Quality Assurance and Quality Control Results

WSA carried out a detailed review of field and laboratory QA/QC. Detailed results of the QA/QC assessment are presented in the QA/QC Report, located in *Appendix D*. Overall, the results indicate that the quality of data gathered was satisfactory to enable valid assessment of the site.

4 RESULTS

4.1 GROUNDWATER

4.1.1 Bore 1

Summarised laboratory data is contained in *Appendix E*.

Bore 1 was located in an area classified as "tall, open dry sclerophyll forest" on the vegetation plan (refer to *Appendix F*). The bore log indicated that the soil profile consisted of sand with some organic matter in the surface soil (refer to logs in *Appendix C*) and in June 2009 the Standing Water Level (SWL) was 1.51m below ground level (mBGL). The bore recharged rapidly when water was extracted for purging or sampling, indicating free movement of the groundwater in the sand aquifer. In October 2009, the bore did not contain any groundwater. As such, no results are available for this bore for the second round of sampling and the results outlined below relate to the June sampling round only.

Bore 1 contained acidic groundwater; a pH of 3.29 was measured through laboratory analysis. This reading was significantly below the ANZECC guideline range for estuaries of 7-8.5 but was only slightly below the range of the Qld Water Quality Guidelines for Wallum Areas (pH 3.6-6.0). The electrical conductivity (EC), measured at 321µS/cm, was relatively fresh compared to the ANZECC guideline range of 125-2200µS/cm for lowland river systems.

Sulphate was the dominant anion and sodium the dominant cation (refer to *Figure 3* in *Appendix A*). As displayed on the piper plot in *Figure 4* in *Appendix A*, Bore 1 was the only location on the site where the water was classified as "sulphate type".

Nutrients in the groundwater exceeded ANZECC guidelines for estuarine ecosystems. The total nitrogen concentration of 3200µg/L (ANZECC guideline 300µg/L) was predominantly comprised of Total Kjeldahl Nitrogen (TKN), which was recorded at 3200µg/L. The combined nitrites and nitrates concentration, recorded at 20µg/L, exceeded the ANZECC guideline of 15µg/L but was too low to be recorded in the total nitrogen reading (Laboratory limit of report [LOR] of 100µg/L). The total phosphorus concentration of 310µg/L exceeded the ANZECC guideline limit of 30µg/L.

No TPH (total petroleum hydrocarbons) or BTEX (benzene, toluene, ethylbenzene, xylenes) was detected above laboratory reporting limits in the sample from Bore 1.

4.1.2 Bore 2

Bore 2 was also located in an area of "tall, open dry sclerophyll forest", and the soil profile was very similar to that of Bore 1 (refer to logs in *Appendix C*). The SWL was 1.31mBGL in June 2009 and the bore exhibited rapid recharge. In October 2009, the SWL was 2.01mBGL and the low flow sampler did not run dry at any point, indicating recharge of the aquifer was occurring.

The pH in Bore 2 was acidic, ranging from the June laboratory reading of 4.48 to the October field reading of 3.45. Both results were well below the ANZECC guideline range for estuaries but were almost within the range of the Qld Water Quality Guidelines for Wallum Areas (pH 3.6-6.0). Like Bore 1, the water in Bore 2 was fresh, with laboratory results indicating an EC of 153µS/cm in June and 136.3µS/cm in October.

Chloride was the dominant anion and sodium the dominant cation in both sampling rounds (refer to *Figure 3* and *Figure 4* in *Appendix A*). As displayed on the piper plots in *Figure 5* and *Figure 6* in *Appendix A*, the groundwater in Bore 2 reflected the ionic signature of seawater.

Nutrients in the groundwater exceeded ANZECC guidelines for estuarine ecosystems during both sampling rounds. The composition of the total nitrogen concentration in the June sampling round (1100µg/L) was similar to that of Bore 1, with TKN recorded at 1100µg/L and combined nitrites and nitrates recorded at 40µg/L. The (June) total phosphorus concentration of 220µg/L exceeded the ANZECC guideline limit of 30µg/L.

In the October sampling round, the concentration of total nitrogen was significantly lower (400µg/L), however, the nitrites and nitrates (90µg/L) were higher. Of the TKN concentration (300µg/L), 20µg/L was ammonia and 280µg/L was organic nitrogen. The phosphorus concentration was 60µg/L, double the ANZECC guideline limit for estuaries.

No TPH or BTEX was detected above laboratory reporting limits in Bore 2 in June or October 2009.

Additional parameters measured in the bores in the October sampling round included total suspended solids (TSS), total dissolved solids (TDS), turbidity, dissolved oxygen (DO), total and dissolved metals, biochemical oxygen demand (BOD) and faecal coliforms and E. Coli. The results for these parameters are outlined in *Appendix E.*

Of note, the concentrations of some metals (copper, lead and zinc) exceeded ANZECC guidelines for fresh surface water but did not exceed Dutch Guidelines for groundwater. The DO concentration was below 5ppm, the threshold below which the ANZECC guidelines state that stress is caused to many aquatic organisms. The BOD of 5mg/L would indicate a moderately polluted surface water body (SCBD 2006). As the water in question was groundwater, the low DO was not unexpected and the guideline levels for DO and BOD were more relevant to the surface water samples for the site than the groundwater.

The TSS of 37mg/L exceeded the Qld Water Quality Guidelines and the turbidity of 16 NTU exceeded the ANZECC guideline for estuaries. Whilst both guidelines refer to surface water rather than groundwater, both parameters will be discussed further in *Section 5.6*.

Concentrations of faecal coliforms (FC) and E. Coli in Bore 2 were both below laboratory reporting limits in the October 2009 sampling round.

4.1.3 Bore 3

Bore 3 was located in an area on the boundary of “low open slashed heath community” and “low closed wet heath / sedgeland”. The soil profile differed from Bore 1 and Bore 2, consisting of organic clay with traces of sand from 0mBGL to 0.5mBGL, and grey to brown sand from 0.5mBGL to 3mBGL (refer to logs in *Appendix C*). In June 2009, the SWL was 0.26mBGL and the bore exhibited rapid recharge. In October 2009, the SWL was 1.23mBGL and the low-flow sampling pump did not run dry, indicating that the bore was recharging.

The pH in the bore was acidic, ranging from the June laboratory reading of 4.55 to the October field reading of 3.87. Both results were well below the ANZECC guideline range for estuaries, but were within the range of the Qld Water Quality Guidelines for Wallum Areas (pH 3.6-6.0). The EC readings of 385µS/cm in June and 259µS/cm in October were similar to the conductivity readings measured in Bore 1 and Bore 2.

Chloride was the dominant anion and sodium the dominant cation in both rounds (refer to *Figure 3* and *Figure 4* in *Appendix A*). The groundwater in Bore 3 also reflected the ionic signature of seawater (refer to the piper plots in *Figure 5* and *Figure 6* in *Appendix A*).

Nutrients in the groundwater exceeded ANZECC guidelines and represented the highest concentrations of nitrogen (N) and phosphorus (P) measured on the site in both sampling rounds. However, the concentrations measured in the October round were significantly lower than those recorded in June. The total nitrogen concentration in June (8200µg/L) was composed entirely of TKN; combined nitrites and nitrates were below the laboratory LOR. In October, the total nitrogen concentration of 1300µg/L was composed of 1300µg/L TKN and 40µg/L of nitrites and nitrates. Of the 1300µg/L TKN, 80µg/L was ammonia and 1220µg/L was organic nitrogen. The total phosphorus concentrations of 590µg/L (June) and 110µg/L (October) exceeded the ANZECC guideline limit.

No TPH or BTEX was detected above laboratory reporting limits in Bore 3.

The concentrations of some metals (chromium, copper, lead and zinc) exceeded ANZECC guidelines for fresh surface water but did not exceed Dutch Guidelines for groundwater. The DO concentration was below 5ppm, the threshold below which the ANZECC guidelines state that stress is caused to many aquatic organisms. The BOD of 4mg/L would indicate a lightly polluted surface water body (SCBD 2006). As the water in question was groundwater, the low DO was not unexpected and the guideline levels for DO and BOD were more relevant to the surface water samples for the site than the groundwater.

The TSS of 1090mg/L exceeded the Qld Water Quality Guidelines and the turbidity of 210 NTU exceeded the ANZECC guideline for estuaries. Whilst both guidelines refer to surface water, not groundwater, the readings for TSS and NTU were significantly higher in Bore 3 than in any other sample location. This will be discussed further in *Section 5.6*.

Concentrations of FC and E. Coli in Bore 3 were both below laboratory reporting limits in the October 2009 sampling round.

4.2 SURFACE WATER

Surface water samples were taken from Simpson Creek at locations adjacent to the far north (Sample *Ck North*) and far south (sample *Ck South*) of the site. A third sample was also taken from the main north-south drainage line that intersected the site (sample *Drain*). Locations of these sample points are marked on *Figure 2* in *Appendix A*.

4.2.1 Ck North

The samples known as *Ck North* (1 and 2) were taken from an area of Simpson Creek that appeared from the aerial photo view to be a side-branch; at the time that the sample was collected, however, there was no division evident between the main body of the creek and the offshoot.

Ck North had a pH of 6.33 in the June sampling round and 7.95 in the October sampling round. The June result was below the ANZECC guideline range for estuaries but was similar to the range of the Qld Water Quality Guidelines for Wallum Areas (pH 3.6-6.0). The electrical conductivity (EC), which was 1230µS/cm in June and 49,900µS/cm in October, was within the ANZECC guideline range of 125-2200µS/cm for lowland river systems in the June sampling round. The EC measured in October reflected seawater – further discussion of the pH and EC is contained in *Section 5.2*.

Chloride was the dominant anion and sodium the dominant cation in both rounds (refer to *Figure 3* and *Figure 4* in *Appendix A*). As displayed on the piper plots in *Figure 5* and *Figure 6* in *Appendix A*, the ionic signature of the water was very similar to that of seawater.

The Biochemical Oxygen Demand (BOD) was 7mg/L in the June sampling round and 4mg/L in the October sampling round. As such, the water reflected a light (3-4mg/L) to moderate (5-7mg/L) level of pollution overall (SCBD 2006). The suspended solids (TSS) were recorded at 8mg/L, which was below the Qld Water Quality Guideline level of 15mg/L for enclosed coastal/lower estuary waterways.

Dissolved Oxygen (DO) was only recorded in the October sampling round. The level recorded, 8.63ppm, was above the ANZECC threshold of 5ppm, below which a lack of oxygen causes stress to aquatic species.

Water from *Ck North* was tested for both dissolved and total metals in the October sampling round. However, due to the high salinity of the water, dilution was required to perform the analysis, which resulted in increased laboratory reporting limits (LOR). The only metal that was detected above the LOR was chromium (6µg/L was measured, in comparison with the ANZECC guideline of 1µg/L), however, the adjusted LORs for most metals were above the ANZECC guidelines. As such, the results for metals in the surface water were not useful for determining water quality at this sampling point.

Nutrients in the water exceeded ANZECC guidelines for estuarine ecosystems during both sampling rounds. The total N in June (300µg/L) and October (300µg/L) was composed mostly of TKN (200µg/L) in both sampling rounds. Whilst these levels of total N were within the same order of magnitude as the guidelines, the concentration of P in October (820µg/L) was significantly higher than in June (120µg/L). However, the duplicate sample taken from *Ck North* in October returned a result of 100µg/L total P. These results will be discussed in *Section 5.3*.

Water from *Ck North* contained faecal coliforms (FC) of 190cfu/100mL in June and 800cfu/100mL in October, exceeding the ANZECC guideline for recreational water quality (primary contact) (150fc/100mL). In the October sampling round, E. Coli was also measured and was found to compose the entirety of the FC count – 800fc/100mL. Sources of E. Coli are generally birds, mammals and humans.

No TPH or BTEX was detected above laboratory reporting limits in any of the samples from the *Ck North* sampling location.

4.2.2 Ck South

The *Ck South* samples had a pH of 6.22 in June and 8.39 in October. The June result was below the ANZECC guideline range for estuaries but was similar to the range of the Qld Water Quality Guidelines for Wallum Areas (pH 3.6-6.0). The electrical conductivity (EC), which was 588µS/cm in June and 50,700µS/cm in October, was within the ANZECC guideline range of 125-2200µS/cm for lowland river systems in the June sampling round only. The pH and EC of the water is discussed in *Section 5.2*.

As found in *Ck North*, chloride and sodium were the dominant ions in both sampling rounds in *Ck South* (refer to *Figure 3* and *Figure 4* in *Appendix A*). As displayed on the piper plots in *Figure 5* and *Figure 6* in *Appendix A*, the ionic signature of the water was very similar to that of seawater.

The BOD of the sample was 7mg/L in June and 2mg/L in October. As such, the creek reflected a moderately polluted system in June and an almost-pristine system in October (SCBD 2006).

TSS was 43mg/L in June and 32mg/L in October. As such, the water in Simpson Creek at the southern end of the site had improved in quality in October but still exceeded the Qld Water Quality Guideline level of 15mg/L in both sampling rounds.

Dissolved Oxygen (DO) was only recorded in the October sampling round. The level recorded, 16.4ppm, was above the ANZECC threshold of 5ppm, below which a lack of oxygen causes stress to aquatic species.

Total metals were measured at *Ck South* in both sampling rounds. The results indicated that the concentrations of arsenic, cadmium, copper, lead, nickel, zinc and mercury were below ANZECC guidelines in the June sampling round, whilst the concentration of chromium was 1µg/L, which was equal to the guideline level for that parameter.

Water from *Ck South* was tested for both dissolved and total metals in the October sampling round. However, due to the high salinity of the water, dilution was required to perform the analysis, which resulted in increased laboratory reporting limits (LOR). The only metal that was detected above the LOR was chromium (8µg/L was measured, in comparison with the ANZECC guideline of 1µg/L), however, the adjusted LORs for most metals were above the ANZECC guidelines. As such, the results for metals in the surface water were not useful for determining water quality at this sampling point.

Nutrients in the water exceeded ANZECC guidelines for estuarine ecosystems in both sampling rounds. Of note was the concentration of nitrites and nitrates in the June round, which were recorded at 1300µg/L. This was the highest level recorded on the site and made up the majority of the total nitrogen concentration of 2300µg/L, with TKN measured at 1000µg/L. In the October sampling round, the total nitrogen concentration was below the

ANZECC guidelines and the nitrites and nitrates were measured at 70µg/L. Discussion of these results is contained in *Section 5.3*.

Total P was recorded at 180µg/L in June and 360µg/L in October. Both results exceeded the ANZECC guidelines.

Water from *Ck South* contained 100cfu/100mL in the June sampling round (below the ANZECC guideline) and 430cfu/100mL in October (in excess of the ANZECC guideline). The FC measured in October was defined as E. Coli; sources of E. Coli are generally birds, mammals and humans.

The sample from *Ck South* did not contain any (laboratory) detectable concentrations of TPH or BTEX in either sampling round.

4.2.3 Drain

The water sample taken from the southern end of the drain, known as *Drain* (1 & 2), had a pH of 4.36 in the June sampling round and 3.07 in October. This was below the ANZECC guideline and was similar to the concentrations measured in the groundwater bores and to the range of the Qld Water Quality Guidelines for Wallum Areas (pH 3.6-6.0). The electrical conductivity (EC), which measured 138µS/cm in June and 129.6µS/cm in October, was within the ANZECC guideline range of 125-2200µS/cm and was the lowest EC measured on the site.

Chloride and sodium were the dominant ions in both sampling rounds (refer to *Figure 3* and *Figure 4* in *Appendix A*). As displayed on the piper plots in *Figure 5* and *Figure 6* in *Appendix A*, the ionic signature of the water was very similar to that of seawater.

The BOD of the sample was 6mg/L in both sampling rounds, indicating that the drain contained moderately polluted water (SCBD 2006). TSS was recorded at 5mg/L in June and 4mg/L in October. As such, the TSS level was below the recommended guideline of 15mg/L for enclosed coastal/lower estuary waterways.

Dissolved Oxygen (DO) was only recorded in the October sampling round. The level recorded, 12.5ppm, was above the ANZECC threshold of 5ppm, below which a lack of oxygen causes stress to aquatic species.

Water from the drain was tested for both dissolved and total metals in the October sampling round (only). Results indicated a very minor exceedance of the ANZECC guidelines for zinc, whilst the rest of the metals tested for were wither below reporting limits or below guidelines.

Nutrients in the drain were lower than anywhere else on site. In the June sampling round, only total N exceeded ANZECC guidelines (600µg/L exceeded the ANZECC guideline of 300µg/L); TKN was 600µg/L whilst nitrite plus nitrate and total P were both below the LOR. In October, total P was again below guidelines, whilst total N again exceeded the guidelines. Of the 700µg/L of total N that was measured, 600µg/L was TKN which was further delineated as 10µg/L of ammonia and 590µg/L of organic nitrogen. Nitrite and Nitrate was recorded at 40µg/L.

In terms of faecal coliforms, the water from the drain contained 44cfu/100mL in the June sampling round and 6cfu/100mL in October. Both values were below the ANZECC guideline for recreational water quality (primary contact) and the FC measured in October was defined as E. Coli.

No TPH or BTEX was detected above laboratory reporting limits in the sample from the drain .

4.3 HYDROGEOLOGICAL CONCEPTUAL MODEL

The conceptual model of the hydrogeological system at the site has been based upon elevation data; the location of surface water bodies including Simpson Creek in the east and the drainage line in the west; the depth of groundwater as measured in three locations across the site; the vegetation types present on the site and the geological formation beneath the site.

The conceptual model in Figure 7 displays the groundwater system in dry weather conditions and the model in Figure 8 shows the system after wet weather. The site is most likely underlain by a continuous sand aquifer that exhibits short-term mounding in response to rainfall events. In wet weather (as it was on the day of the June WSA site visit), shallow groundwater across the west of the site would discharge into the drainage line in the west and would potentially discharge from the slope in the environmental area. Groundwater in the environmental area and SEPP 14 wetland would be level with the soil surface and would

discharge into Simpson Creek. As such, there would also be potential that water would pool on the ground surface in the environmental area.

In dry weather, the groundwater in the west of the site would drop to become level with the base of the drain, however, due to the established vegetation present in the east of the site (which would be pumping the groundwater from the soil in the form of transpiration), the groundwater level will be lower in the east than in the west. Under these dry conditions, a limited amount of groundwater may flow towards Simpson Creek and through the SEPP 14 wetland.

5 DISCUSSION

5.1 pH

The groundwater bores and the drainage line on the site contained water with a pH below 4.6. Based on the conceptual model of the groundwater, the water in the drain was most likely a combination of groundwater and surface water runoff. As such, it is not surprising that the pH of the water in the drain was similar to that measured in the bores.

An investigation of the potential for Acid Sulfate Soils at the site (Border-Tech 2009) stated "Acid Sulfate soils are not present at the subject site to a depth of 2 metres below existing surface level". As such, it is unlikely that the acidity observed in the ground and surface water on the site was the result of acid sulfate soil disturbance.

The acidity of the water can most likely be attributed to the type of vegetation present in the area: wallum heath. The Qld Water Quality Guidelines (2006) state: "in Wallum areas, waters contain naturally high levels of humic acids (and have a characteristic brown ti-tree stain). In these types of waters, natural pH values may range from 3.6-6.0". As shown in the site photographs (refer to *Appendix B*), the groundwater in the bores on the site was brown and the aerial photograph in *Figure 1* displays the discolouration of the water in Simpson Creek.

The water in Simpson Creek had a higher pH than that of the groundwater, although it was still below the ANZECC guideline range for estuaries in the June sampling round. In the October sampling round, the pH in the creek was significantly higher, ranging from 7.95 to 8.39. As such, acidic ground- and surface-water discharging into the creek was most likely buffered by tidal flushing of the system. As the June sampling round was undertaken during a period of wet weather, a significant volume of surface water input to the creek most likely caused the low pH that was recorded. However, in the October sampling round, which was

undertaken following a long period of dry weather, surface water input to the creek was most likely minimal and tidal influence had the most significant impact on the system.

As the low pH of the groundwater is a natural occurrence in the area of the site, any artificial increase of the pH (such as resulting from the addition of lime to gardens) could have a detrimental effect on the local ecosystem (Sullivan, LA 2008).

5.2 CONDUCTIVITY, ANIONS AND CATIONS

The groundwater across the site had low conductivity values, with the lowest evident in the drainage line where fresh surface water runoff was diluting the groundwater that entered the drain. The highest conductivity values were recorded in Simpson Creek in the October sampling round. This was consistent with the climatic conditions at the time, in that the samples were collected following a period of dry weather. As discussed in *Section 5.1*, this would have resulted in minimal surface water input to the creek and maximum tidal influence on the creek water.

The dominant ions in the majority of the samples collected on the site were sodium and chloride. The only exception was Bore 1, for which the dominant anion was sulphate in the June sampling round. Explanations for this anomaly could include an error in analysis or that a natural or anthropogenic source (such as a fertiliser containing sulphate) had caused localised groundwater impact in the vicinity of Bore 1. As the bore did not contain any water in the October sampling round, this data could not be verified or explored further.

Despite the differences in conductivity across the site, the ionic signature of each of the samples was very similar to that of seawater. This is consistent with the hydrogeological and atmospheric processes that occur in an estuarine environment.

5.3 NUTRIENTS

Total nitrogen and total phosphorus exceeded the ANZECC guidelines in all sample locations with the exception of the *Drain* sample in June and October and the *Creek South* sample in October. The surface water samples generally contained lower concentrations of nutrients than the groundwater. For the drain, this was most likely because the groundwater that flowed into the drain was diluted by surface runoff also entering the drain. In Simpson Creek, the trend was most likely due to dilution of the groundwater by seawater and by water flows from upstream in Simpson Creek. The other obvious trend was a reduction in nutrients in the

groundwater samples in October compared to June. This was attributed to the use of a low flow sampling pump in the October sampling round (as opposed to the disposable bailers used in the June sampling round), which generated less disturbance of the sediments (and associated organic matter) than the bailing technique.

In five out of the six June samples, the total N concentration was composed mostly of TKN. TKN measures organic nitrogen (which is from naturally occurring organic matter) as well as ammonia and ammonium (which may be natural but can also be added to soil in fertilisers). The nitrite and nitrate concentrations in the samples (sources of which are often anthropogenic) were very low in comparison with the TKN. Whilst this may have indicated that the high levels of total nitrogen in the samples were due to organic matter, the TKN readings could have been due to ammonia and ammonium from anthropogenic sources.

The only exception to the trend of low nitrites and nitrates was *Ck South* in the June sampling round, which contained the highest concentration of nitrites and nitrates anywhere on the site: two orders of magnitude higher than the ANZECC guideline level. This may have been caused by an influx of fertilisers from drains that entered the creek. It also may have resulted from the natural process of decomposition of organic matter in the system.

In order to further investigate the issue of the high nitrogen levels and the potential sources thereof, the October samples were analysed for ammonia content in addition to all the parameters measured in June. The results indicated that the total nitrogen measured in all samples was (again) mostly composed of TKN. Of the TKN recorded, very little ammonia was detected, with the great majority of the nitrogen in the samples being identified as organic nitrogen. As such, the high nutrient loading in the water samples in October was due to the presence of organic matter. As an example of this, the sample containing the highest concentration of nitrogen in the October round (from Bore 3) also contained the highest TSS count.

5.4 TPH, BTEX AND METALS

There was no TPH or BTEX above laboratory reporting limits in any of the surface or groundwater sampled at the site.

The majority of metals were below reporting limits in the surface water samples. In the June sampling round, chromium at *Ck South* was equal to the ANZECC guideline level. In the October sampling round, zinc was slightly in excess of guidelines in the drain and chromium was measured at concentrations in excess of ANZECC guidelines at *Ck North* and *Ck South*.

All other metals in the surface water samples were below guidelines or below the LOR, however, the high salinity of the samples from Simpson Creek in October resulted in dilution of samples and increased reporting limits. As the LOR for arsenic, cadmium copper, lead, nickel and zinc was above the ANZECC guidelines, it was unclear whether this type of metal contamination was present in Simpson Creek in October 2009.

The concentrations of metals recorded in Bores 2 and 3 in October exceeded some ANZECC guidelines for surface water but did not exceed the Dutch guidelines for groundwater.

5.5 BOD AND DO

BOD was measured in the surface water in the June sampling round and in all sample locations in the October sampling rounds. The results indicated that all samples were classed as either lightly or moderately polluted with the exception of the *CK South* sample in October, which was not polluted (2mg/L BOD).

DO was only measured in the October sampling round using field equipment. The DO was above the 5mg/L minimum threshold set in the ANZECC guidelines (below which lack of oxygen caused stress to aquatic species) in all of the surface water samples. Whilst the DO in the samples from Bore 2 and Bore 3 were below the threshold, this was to be expected as groundwater naturally contains less oxygen than surface water. As groundwater does not contain "aquatic species" the ANZECC guidelines do not apply to the bore samples in this instance.

5.6 TSS AND TURBIDITY

TSS was measured in the surface water samples in June and in all samples in the October sampling round. In June, TSS was only above Qld Water Quality Guidelines in the sample *Ck South*. A number of factors may have influenced this result, including the presence of a drainage line entering Simpson Creek near the sample point. Alternatively, the result from *Ck South* may have reflected the conditions throughout the creek whilst the sample from *Ck North* may have only reflected the conditions in the side arm of the creek where the water velocity appeared to be significantly less than in the main body of the creek.

TSS in the October sampling round exceeded the Qld Water Quality Guidelines in all locations except the drain. The highest concentration of TSS was recorded in Bore 3, which yielded very murky water that appeared to contain a significant amount of suspended organic

matter. This sample also contained the highest concentration of total nitrogen, the majority of which was identified as organic nitrogen.

The TSS measurements were most likely influenced by suspended organic matter in the water, the sampling method utilised in each round and/or environmental factors such as tidal variation. The low-flow sampling pump used in October generated less disturbance of sediments in the water than the bailing method used in June. As such, it is likely that the concentrations of some elements in the bores was less in October than in June as a result of the sampling methodology. In terms of the surface water samples, silty and sandy sediments were observed on the floor of Simpson Creek during both sampling rounds. The suspension of sediments in the water column was potentially affected by the velocity of the water flow in response to tidal variation. Likewise, in the drain in the October sampling round the water appeared to be static, which may have resulted in settling out of the majority of suspended solids and the low TSS readings that were recorded.

Turbidity was only measured in the October sampling round. Results indicated that the water from Bore 2 and Bore 3 exceeded the ANZECC guidelines whilst the water from the drain and Simpson Creek did not. This was most likely due to the high concentration of organic matter that was observed in the bore water in contrast with the reasonably clear water taken from the creek and drain (refer to *Photo 6* and *Photo 8* in *Appendix B*).

5.7 FAECAL COLIFORMS

Faecal coliforms (FC) were measured in the surface water samples in June and in all samples in October. The level of FC was above recreational water quality guidelines (primary contact) in *Ck North* in June and in *Ck North* and *Ck South* in October. Drain 1 contained FC concentrations below the ANZECC guidelines in both sample rounds. As the October samples were tested for E. Coli and the results indicated that all of the FC measured were E. Coli, the sources of the coliforms may have included humans, mammals and birds.

As the groundwater did not contain any FC above the laboratory LOR, it is unlikely that the high nutrients observed in the groundwater were the result of sewage contamination.

6 CONCLUSIONS

This report outlines the condition of the surface and groundwater across the site as measured in June and October 2009. It also presents a model of the most likely hydrogeological system based upon survey data, geological information and groundwater level measurements taken in June 2009.

The hydrogeological conceptual model indicates that the site is most likely underlain by a continuous sand aquifer. During wet weather conditions, recharge of the aquifer in the grassed heath area in the west of the site would result in short term mounding of groundwater which gradually dispersed, creating flow to the east in the direction of the environmental area and Simpson Creek and to the west towards the drain. Due to the decrease in elevation in the east of the site, it is likely that the environmental area would receive discharging groundwater during these wet conditions. Saturation of the soil profile beneath the environmental area would most likely occur. During dry weather conditions, limited volumes of groundwater may still flow from the grassland area toward Simpson Creek. However, the extraction of groundwater by the trees in the environmental area will result in a decrease of the groundwater level beneath the eastern side of the site.

The dynamic nature of this shallow groundwater system will mean that the groundwater gradient (and hence flow velocity) will vary throughout the year depending on the rate of rainfall recharge. It is likely that lateral flow will mainly occur during and after the wet season while the raised mound under the grassed/heath area dissipates. The majority of groundwater movement through the remainder of the year will be vertical.

The hydrogeological conceptual model represents the current, natural conditions on the site. Depending upon the design of the development and the type of drainage systems that are to be installed, the model would necessarily require review to reflect the future site conditions.

Chemical analysis results indicated that the groundwater was naturally acidic (as occurs in Wallum ecosystems) and fresh, however, the ionic signature of the water reflected the influence of seawater on the system. The high levels of nutrients, suspended solids and turbidity that were observed in the bore samples were the result of a high concentration of organic matter in the soil and groundwater. Concentrations of metals recorded in Bores 2 and 3 in October exceeded some ANZECC guidelines for surface water but did not exceed the

Dutch guidelines for groundwater. No TPH, BTEX or faecal coliforms were detected in the groundwater, indicating that the system was free of such contaminants at the time of testing.

Surface water on the site and in Simpson Creek was acidic in the June sampling round, with greater acidity observed in the drain than in the creek. In the October sampling round, water in the creek was significantly more alkaline than it had been in June whilst the water in the drain had increased in acidity in comparison with the June results. The data indicated that acidic ground- and surface water discharging into the creek was buffered by the influx of tidal seawater. Conductivity results supported this finding, with low conductivity and acidic pH in the creek in June and high conductivity and alkaline pH in the creek in October.

Nutrients in the surface water exceeded guidelines in most samples but were generally lower than in the groundwater, with the exception of *Ck South*, where a (potentially anthropogenic) source of nitrite and nitrate was observed in the June sampling round. The total nitrogen measured in the surface water samples in October was identified as predominantly organic nitrogen.

No TPH or BTEX was detected in the surface water, and the majority of metals were below reporting limits in the surface water samples. However, due to the high salinity of the creek samples in October, reporting limits were increased beyond ANZECC guidelines. As such, it was unclear whether metal contamination was present at *Ck North* and *Ck South* in the October sampling round.

BOD concentrations indicated that the surface water was lightly to moderately polluted throughout the sampling rounds, with the exception of *Ck South* in October which was classed as unpolluted. Dissolved oxygen was above the minimum ANZECC threshold in all surface water samples.

TSS exceeded guidelines at *Ck South* in June and at *Ck South* and *Ck North* in October. These readings were most likely influenced by the velocity of the water flow in each of the waterways. Turbidity, which was only measured in October, was below the ANZECC guidelines in all surface water samples.

Faecal coliforms (FC) were present in all surface water samples but only exceeded guidelines in *Ck North* in June and in *Ck North* and *Ck South* in October. In October, the FC was further delineated as E. Coli, for which humans, birds and mammals are the key sources. As the drain water contained comparatively low concentrations of FC and E.Coli, it did not appear to be

contributing to the levels recorded in Simpson Creek. Upstream or downstream influences, therefore, were more likely causes of the FC contamination.

6.1 POTENTIAL IMPACTS

The parameters most likely to be impacted upon through the development include

- TSS, which could increase in surface water as a result of erosion and runoff after clearing of vegetation;
- Conductivity, which could decrease in Simpson Creek if storm water collected from the sealed surfaces of the site was discharged to the creek;
- Conductivity, which could increase in the groundwater if sealed surfaces in the recharge zone reduced the rate of freshwater recharge;
- Groundwater level and flow rate, which could decrease as a result of a reduction in recharge (potentially affecting the health of reliant vegetation in the environmental area) or increase as a result of removal of some of the vegetation in the environmental area to allow for construction to proceed;
- Nutrients and pH, both of which could increase through the addition of fertilisers and soil conditioning agents to residents' gardens/lawns; and
- TPH, BTEX, pesticides and metals, all of which could increase as a result of road runoff and household activities.

7 RECOMMENDATIONS

The results of the two sampling events may be viewed as indicative of site conditions prior to development. The concentrations of the parameters measured naturally varied in response to environmental factors such as rainfall and tidal activity.

The development has the potential to affect the groundwater and surface water, and in turn the local ecosystem including the SEPP 14 wetland habitat, of the site as described in *Section 6.1*. As such, sediment control measures should be implemented during the construction phase to ensure TSS in Simpson Creek and its tributaries is not affected. Similarly, the design of the stormwater management system for the development should ensure that sediment loads and potential contaminants such as TPH, BTEX and metals are mitigated prior to release of stormwater to Simpson Creek.

It is assumed that the site will be filled in some or all areas to reduce flood risk; if this was to occur, the presence of imported topsoil could reduce the likelihood that residents would apply chemical treatments to increase soil pH. In any case, residents should be educated on the prevailing soil conditions, the most ecologically sustainable methods for gardening in these conditions and any other sensitivities of the local ecosystem, including information on local endangered species such as the Wallum Froglet.

8 LIMITATIONS

Waste Solutions Australia Pty Ltd has prepared this report for the use of Codlea Pty Ltd and the NSW Department of Planning in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report may not contain sufficient information for purposes other than for the client and its respective consulting advisers.

The accuracy of the assessment made in this report is dependent upon the accuracy and reliability of evidence drawn together from a number of sources. The field investigations on which this report is based were restricted to a level of detail appropriate for the current stage of the project. Waste Solutions Australia Pty Ltd has taken steps to ensure the accuracy and reliability of field observations and investigations. It is important, however, that the limitations of the assessment be clearly recognised when the findings of this study are being interpreted. This report is based on information derived partly from other parties over which Waste Solutions Australia Pty Ltd has no control.

The report is based on conditions encountered in a limited number of investigation locations. Investigations have not been conducted to characterise all possible contamination on site, nor to fulfil the purposes of all possible site developments. Conditions may be encountered in subsequent investigations or during site redevelopment, which were not encountered in this investigation. The proposed sampling and analysis plan is prepared in draft only for consideration and possible refinement by project stakeholders. It is intended to provide a thorough indication of the nature and extent of contamination at the site to advice on management; however, its undertaking does not necessary preclude the need for further investigation to characterise any unforeseen contamination.

REFERENCES

ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* Australian Government Department of Environment, Water, Heritage and the Arts, Canberra.

DERM (2006) *Queensland Water Quality Guidelines*, Department of Environment and Resource Management, Brisbane.

NSW SPCC (1989), *Pollution control manual for urban stormwater*, NSW State Pollution Control Commission, Sydney.

Secretariat of the Convention on Biological Diversity [SCBD] (2006) *Global Biodiversity Outlook 2*. Montreal. Available online: http://www.cbd.int/doc/gbo/gbo2/cbd-gbo2-en.pdf

Sullivan, L.A. (2008) *Chapter 1: Introduction to Acid Sulfate Soil Materials* in *Acid Sulfate Soils: Interpretation, Assessment and Management.* Centre for Acid Sulfate Soil Research, Southern Cross University, QLD.

Written by:

.....……
Sarah Pfeffer
B. Sc (Ecology)
Environmental Scientist

Approved By:

……
Paul Smith
M Sc (Hydrogeol) M Sc (Envir Sc)
Certified Environmental Practitioner
Director & Principal Consultant

APPENDIX A

FIGURES

Approximate Scale
0 50m 150m

N

Legend
- Site outline
- SEPP 14 Wetland

Image courtesy of Google Maps

waste solutions AUSTRALIA PTY LTD

Client: Codlea Pty Ltd
Project: Groundwater Assessment, Brunswick Heads
Title: Site Location

Drawn: SP	Approved:PS	Date: November 2010	Job: W 0516	Figure 1

N

Approximate Scale

0 100m 200m

Legend

- Location of groundwater well
- Location of surface water sample

Base image courtesy of Google Maps

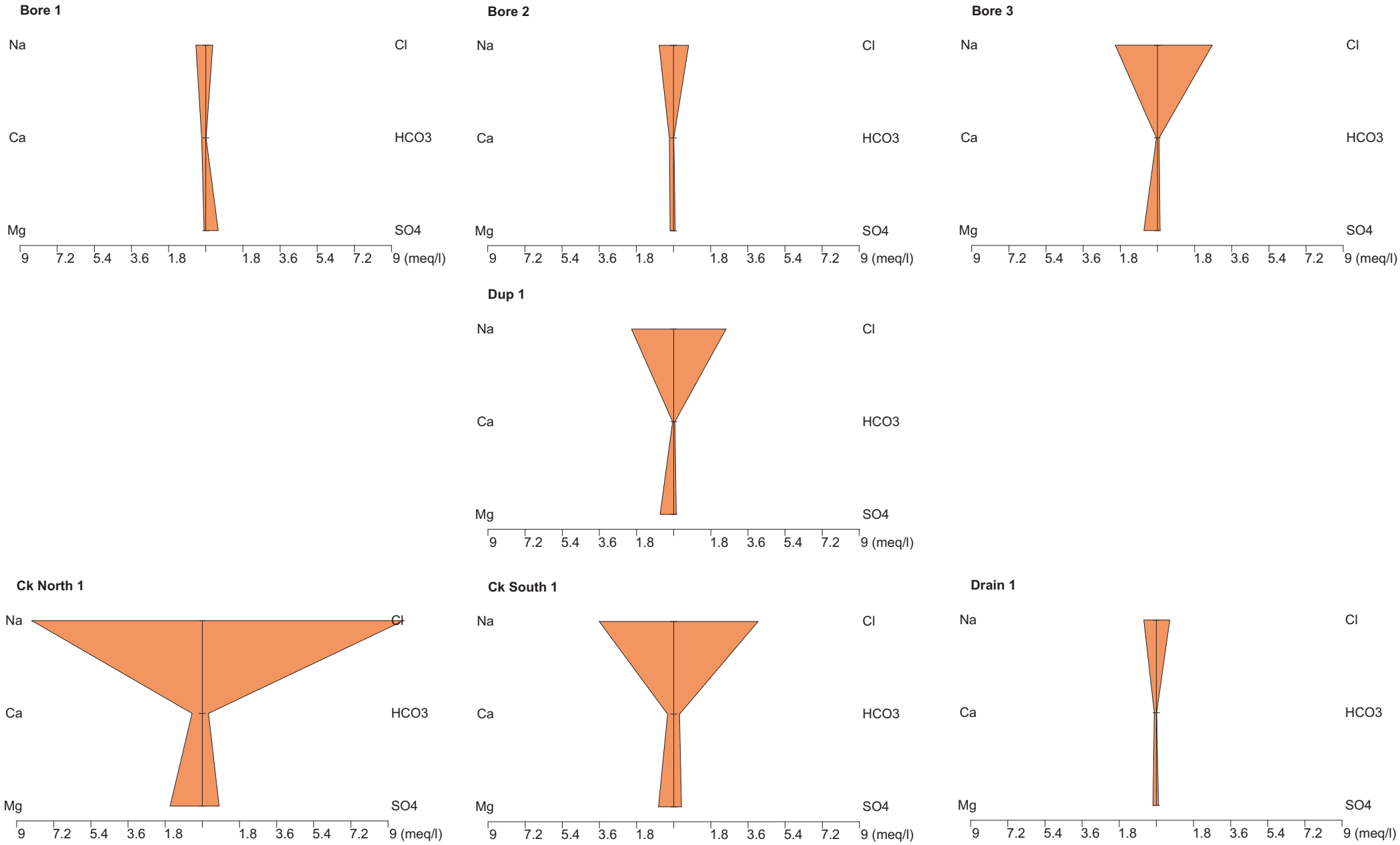
waste solutions
AUSTRALIA PTY LTD

Client: Codlea Pty Ltd

Project: Groundwater Assessment, Brunswick Heads

Title: Sample Locations

Drawn: SP	Approved:PS	Date: November 2010	Job: W 0516	Figure 2



waste solutions
AUSTRALIA PTY LTD

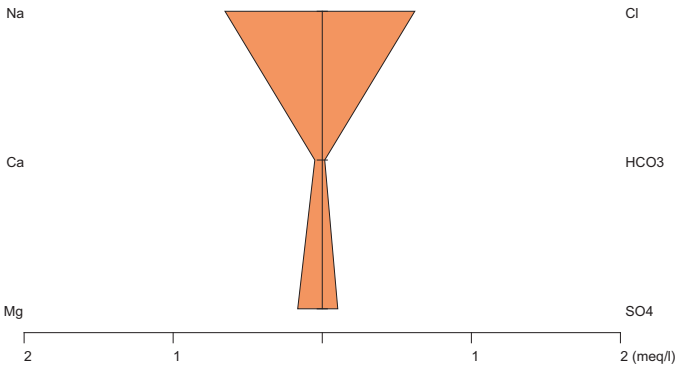
Client: Codlea Pty Ltd

Project: Groundwater Assessment, Brunswick Heads

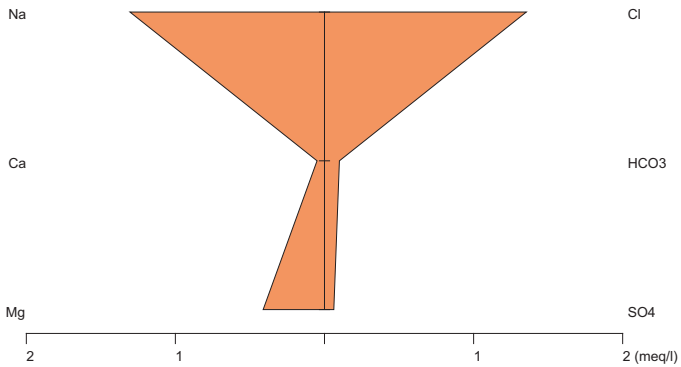
Title: Stiff Diagrams for Bores and Surface Water Samples (June 2009)

Drawn: SP	Approved:PS	Date: November 2010	Job: W 0516	Figure 3

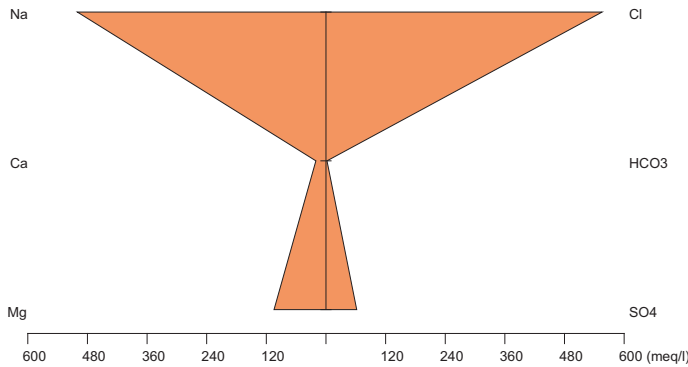
BH2 R2, 8/10/2009



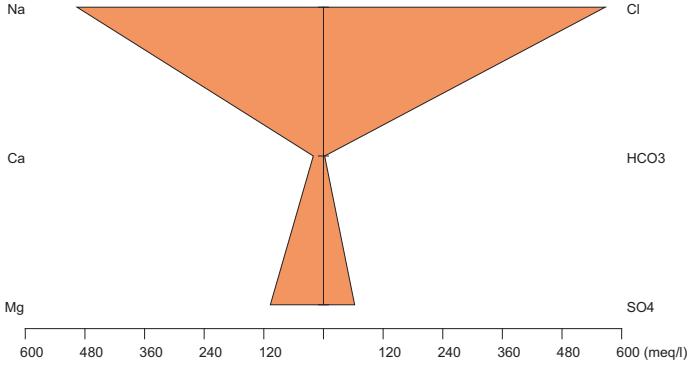
BH3 R2, 8/10/2009



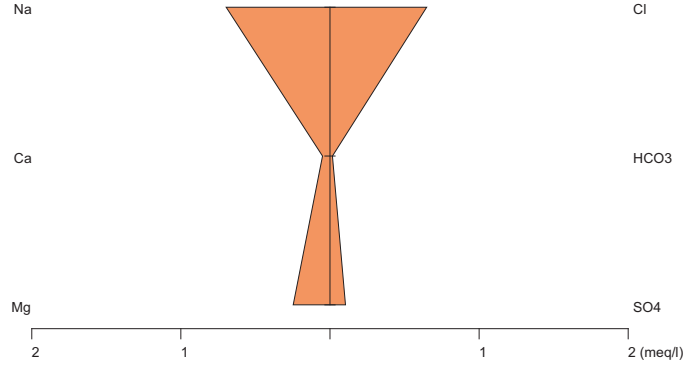
CK North 2, 8/10/2009



CK South 2, 8/10/2009



Drain 2, 8/10/2009



waste solutions AUSTRALIA PTY LTD

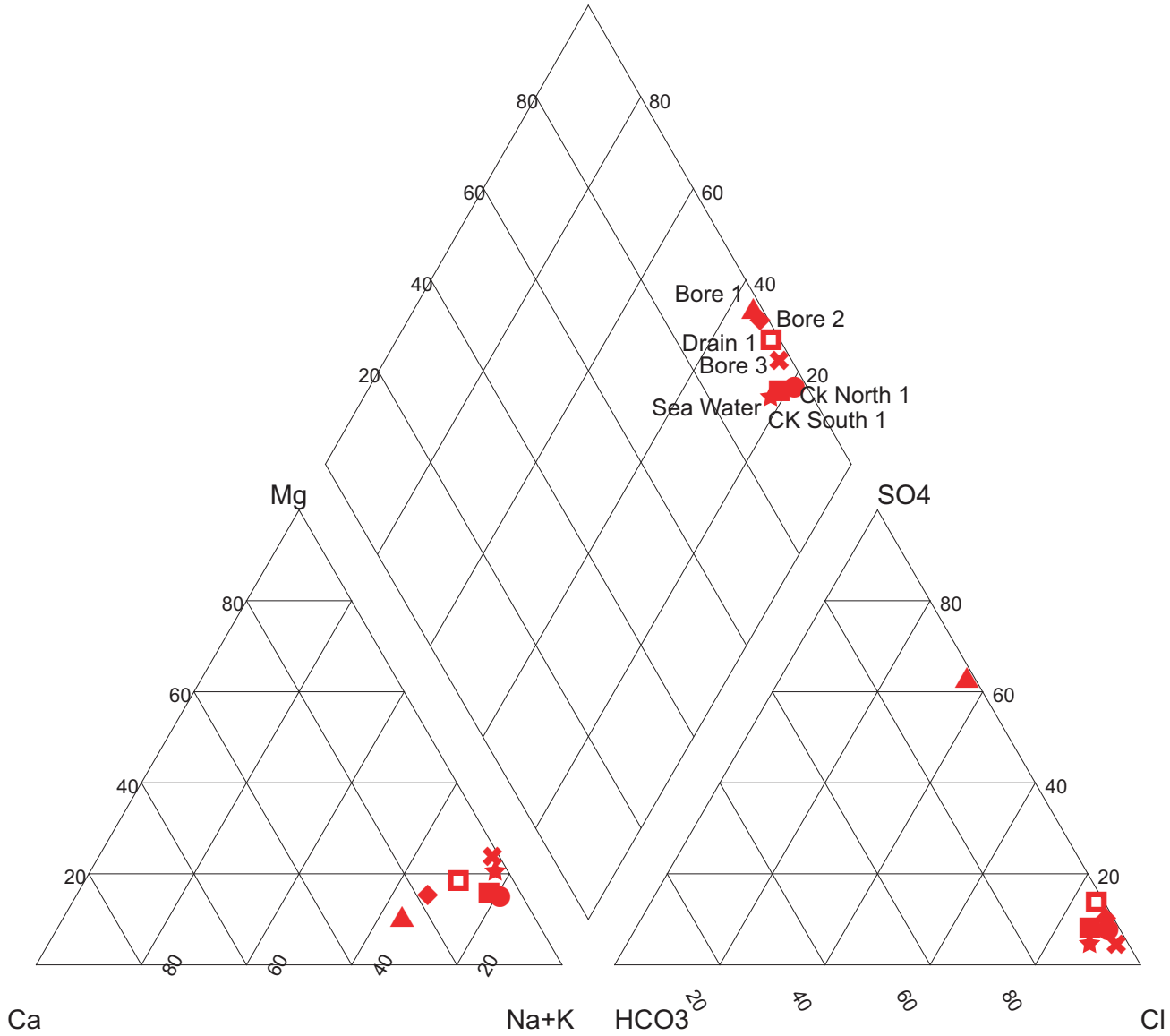
Client: Codlea Pty Ltd

Project: Groundwater Assessment, Brunswick Heads

Title: Stiff Diagrams for Bores and Surface Water Samples (October 2009)

Drawn: SP	Approved:PS	Date: November 2010	Job: W 0516	Figure 4

Piper Plot



Legend

- Bore 1
- Bore 2
- Bore 3
- Ck North 1
- Ck South 1
- Drain 1
- Sea Water

waste solutions AUSTRALIA PTY LTD

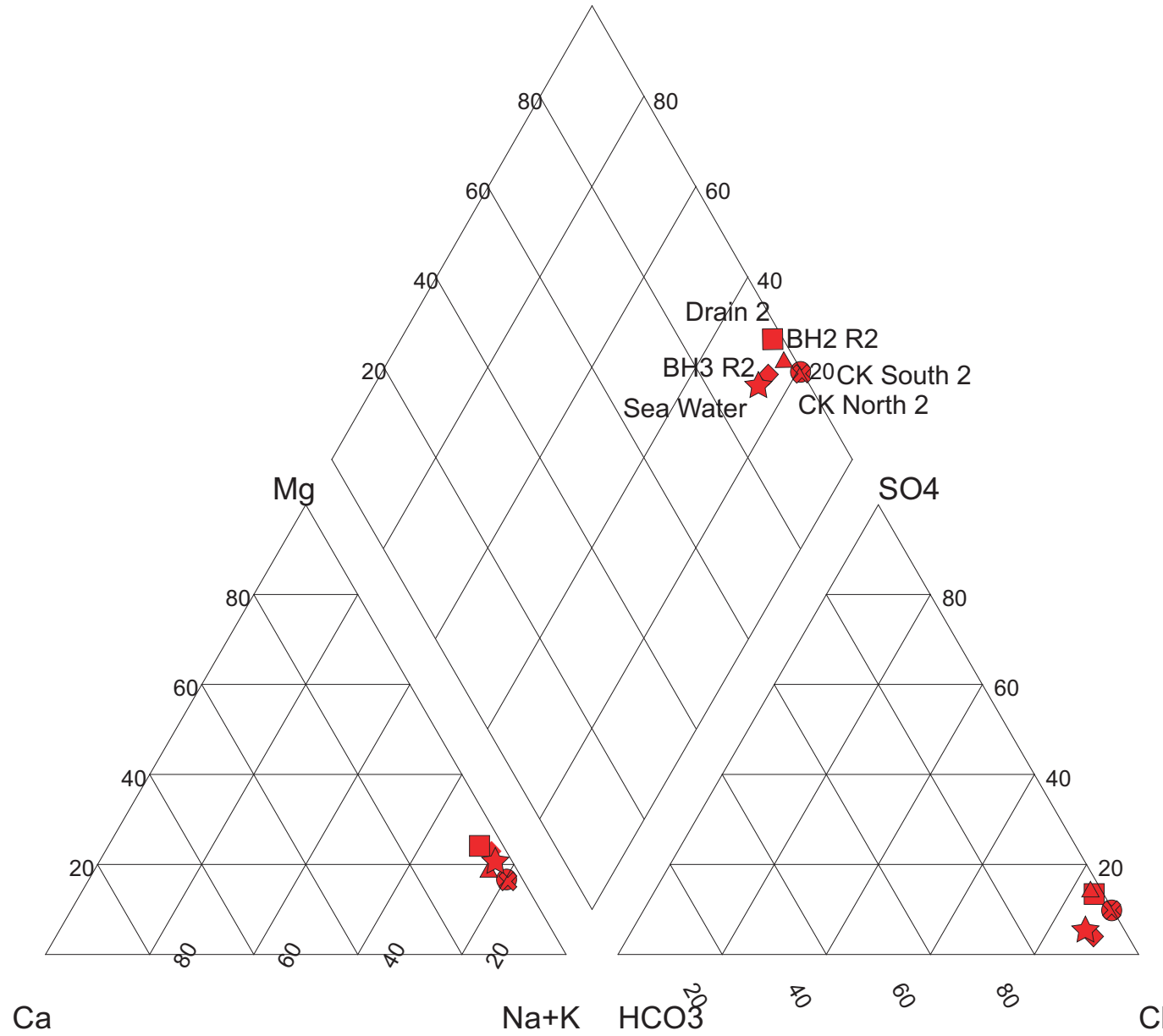
Client: Codlea Pty Ltd

Project: Groundwater Assessment, Brunswick Heads

Title: Piper Plot for Site - June 2009

Drawn: SP | Approved:PS | Date: November 2010 | Job: W 0516 | Figure 5

Piper Plot



Legend
- BH2 R2
- BH3 R2
- CK North 2
- CK South 2
- Drain 2
- Sea Water

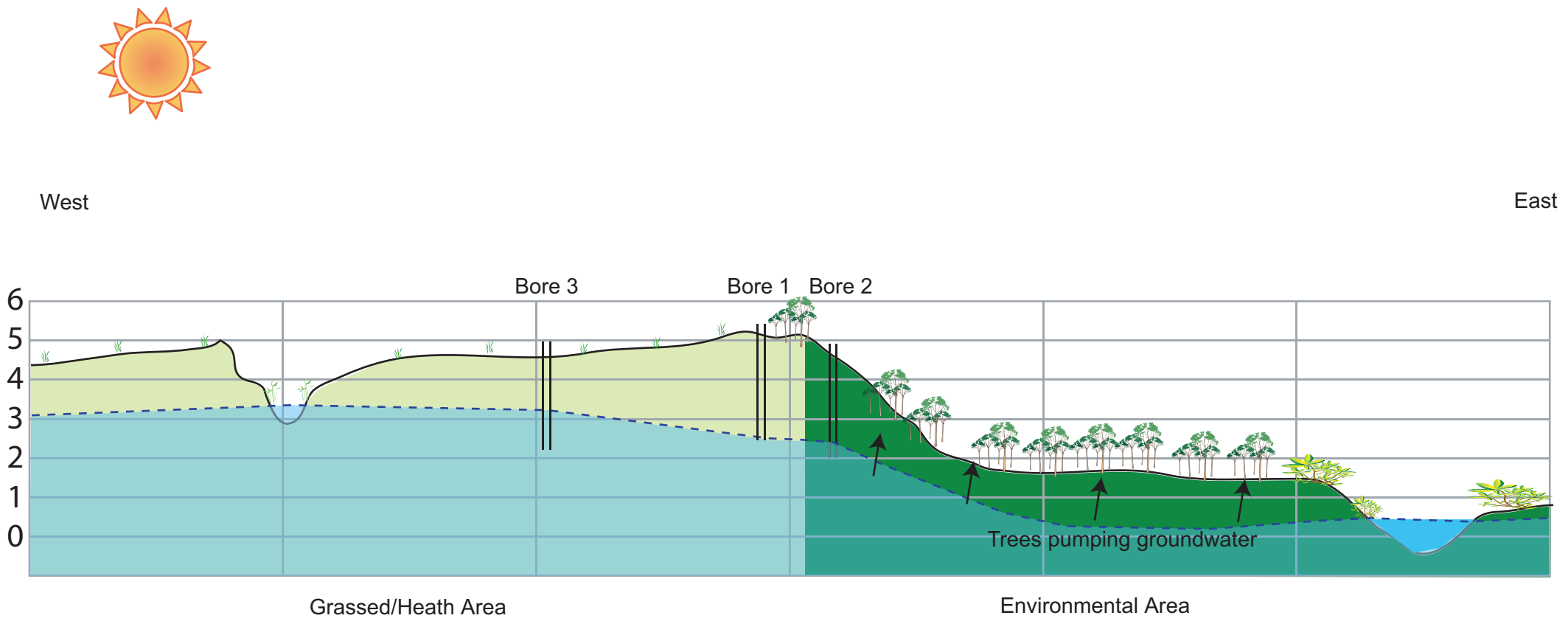
waste solutions AUSTRALIA PTY LTD

Client: Codlea Pty Ltd

Project: Groundwater Assessment, Brunswick Heads

Title: Piper Plot for Site - October 2009

Drawn: SP | Approved:PS | Date: November 2010 | Job: W 0516 | Figure 6

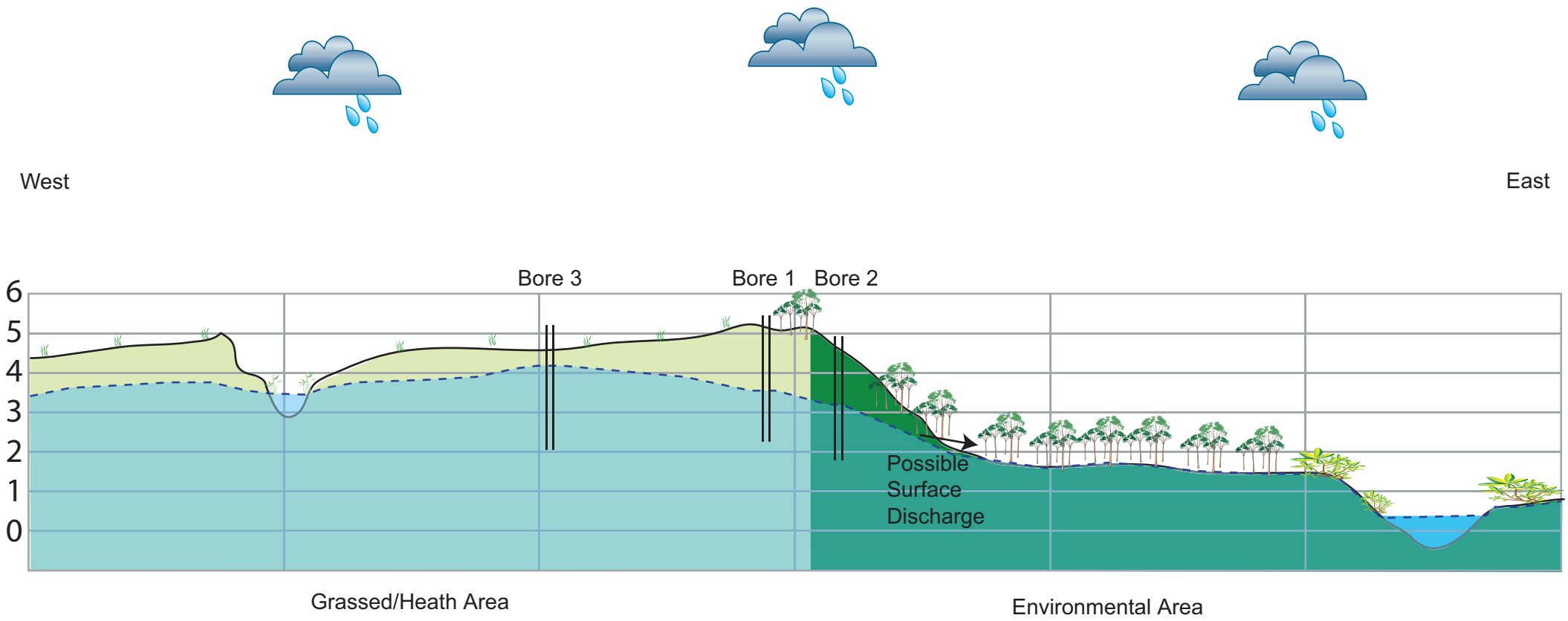


NOTE:
Vertical Scale Exaggerated
Ground level data derived from provided contours
Water level data is estimation only

waste solutions
AUSTRALIA PTY LTD

Client: Codlea Pty Ltd
Project: Groundwater Assessment, Brunswick Heads
Title: Hydrogeological Cross Section - "Dry Season"

Drawn: SP | Approved:PS | Date: November 2010 | Job: W 0516 | Figure 7



NOTE:
Vertical Scale Exaggerated
Ground level data derived from provided contours
Water level data derived from field measurements in bores

waste solutions
AUSTRALIA PTY LTD

Client: Codlea Pty Ltd
Project: Groundwater Assessment, Brunswick Heads
Title: Hydrogeological Cross Section - "Wet Season"

Drawn: SP	Approved:PS	Date: November 2010	Job: W 0516	Figure 8

APPENDIX B

SITE PHOTOGRAPHS

Photo 1: Installation of Bore 1 in north of site amongst Banksia trees.

Photo 2: Off-shoot of Simpson Creek in June sampling round.

Photo 3: Sand from Bore 1.

Photo 4: Sand from Bore 2.

Photo 5: Soil profile (from 0 to 0.6m) in Bore 3.

Photo 6: Water extracted from Bore 3 in October sampling round.

Photo 7: Water in Drain in October sampling round.

Photo 8: Water extracted from the drain in October.

Photo 9: Simpson Creek, looking north, in October sampling round.

APPENDIX C

SOIL LOGS

BORDER - TECH

GEOTECHNICAL ENGINEERING SERVICES
Suite 10, No. 8 Corporation Cct, Tweed Heads South Ph (07) 5524 6199
1/35 Old Pacific Highway, Yatala Ph (07) 3804 6844

BOREHOLE PROFILE

CLIENT: WASTE SOLUTIONS PTY LTD	**BOREHOLE No:** BH 1
PROJECT: BAYSIDE BRUNSWICK	**JOB No:** BT 19134
EQUIPMENT TYPE: MAIDTECH 500 **HOLE DIAMETER:** 110mm **APPROXIMATE SL (m):** -	

Geological Profile	Samples / Tests	WATER	Depth in m	Graphic Log	Soil or Rock Description – Field and /or Laboratory	Consistency / Rel. Density	DCP Blows / 100mm
ALLUVIUM			0.2		**(SP) SAND:** Fine sand, Trace of SILT, With organic material (fine roots and decomposed vegetable matter), Moist, Dark grey		
		▼	1.3		**(SP) SAND:** Fine sand, Moist becoming wet, Pale grey		
			3.0				

BH 1 TERMINATED AT 3.0m
LIMIT OF INVESTIGATION

NOTES:

Logged By	DAW	Date	4/06/09	Checked By		Date	12/6/09

BORDER - TECH

GEOTECHNICAL ENGINEERING SERVICES
Suite 10, No. 8 Corporation Cct, Tweed Heads South Ph (07) 5524 6199
1/35 Old Pacific Highway, Yatala Ph (07) 3804 6844

BOREHOLE PROFILE

CLIENT: WASTE SOLUTIONS PTY LTD	**BOREHOLE No:** BH 2
PROJECT: BAYSIDE BRUNSWICK	**JOB No:** BT 19134
EQUIPMENT TYPE: MAIDTECH 500 **HOLE DIAMETER:** 110mm **APPROXIMATE SL (m):** -	

Geological Profile	Samples / Tests	WATER	Depth in m	Graphic Log	Soil or Rock Description – Field and /or Laboratory	Consistency / Rel. Density	DCP Blows / 100mm
ALLUVIUM					**(SP) SAND:** Fine sand, Trace of SILT, With organic material (fine roots and decomposed vegetable matter), Moist, Dark grey		
			0.5				
					(SP) SAND: Fine sand, Moist becoming wet, Pale grey		
		▼	1.3				
			3.0				

BH 2 TERMINATED AT 3.0m
LIMIT OF INVESTIGATION

NOTES:

Logged By	DAW	Date	4/06/09	Checked By		Date	12/6/09

BORDER - TECH

GEOTECHNICAL ENGINEERING SERVICES
Suite 10, No. 8 Corporation Cct, Tweed Heads South Ph (07) 5524 6199
1/35 Old Pacific Highway, Yatala Ph (07) 3804 6844

BOREHOLE PROFILE

CLIENT: WASTE SOLUTIONS PTY LTD	**BOREHOLE No:** BH 3
PROJECT: BAYSIDE BRUNSWICK	**JOB No:** BT 19134
EQUIPMENT TYPE: MAIDTECH 500 **HOLE DIAMETER:** 110mm **APPROXIMATE SL (m):** -	

Geological Profile	Samples / Tests	WATER	Depth in m	Graphic Log	Soil or Rock Description – Field and /or Laboratory	Consistency / Rel. Density	DCP Blows / 100mm
ALLUVIUM		▼	0.5		**(OH)** Organic **CLAY:** Trace of fine SAND, Moist ($w>w_p$), Dark brown		
			1.2		**(SP) SAND:** Fine sand, Moist becoming wet, Pale grey		
			1.3		**(SP) SAND:** Fine sand, Wet, Brown		
			3.0				

BH 3 TERMINATED AT 3.0m
LIMIT OF INVESTIGATION

NOTES:

Logged By	DAW	Date	4/06/09	Checked By		Date	12/6/09

APPENDIX D

QA/QC ANALYSIS

Analytical Data Quality Validation Form

		Sheet No:	1 of 1
Job/Project Name:	Codlea W516	**Phase/Task No:**	
Analytical Laboratory:	ALS	**Batch(s)/Ref. No(s):**	EB0908980

Sample Type(s)	**No. of Original Samples**	**No. Dupl. /QC Samples**	**Analytes**
Water	6	1	pH, Conductivity, TSS, Anions and Cations, N, P, BOD, Metals, TPH, BTEX, faecal coliforms

Sample Handling/Holding	**(y/n)**
COC completed adequately?	y
Samples received by Laboratory intact and preserved?	y
Samples analysed within appropriate holding times per analytical method?	y
Laboratory NATA-registered for the analytical method and matrix performed?	y
Analytical Method(s) used are Approved Method(s)?	y
PQLs were as proposed/not modified due to interference?	y
PQLs were within Environmental Media Quality Assessment Guidelines?	y

Blanks Samples	**(y/n)**
Method blank analysed for relevant analytes?	y
Rinsate blanks analysed for relevant analytes?	na
Trip Blank analysed for relevant analytes?	y
Number and type of blanks appropriate?	y
Anomalies or Analytes detected in Blanks?	n

Matrix Spikes (MS)/Matrix Spike Duplicates (MSD) Samples		**(Acceptable/See Below)**
MS/MSD analysed for appropriate analytes?		y
% Recovery of metals (range) =	93.7% - 101%	y
% Recovery of organics (range) =	51% - 129%	y*1

Laboratory Control Samples		**(Acceptable/See Below)**
Control Spike analysed for appropriate analytes?		y
% Recovery of metals (range) =	97.3% - 110%	y
% Recovery of organics (range) =	56.5% - 121%	y

Field and Laboratory Duplicates		**(Acceptable/See Below)**
Sufficient Field Duplicates collected/analysed?		y
Field Duplicate %RPD for metals (range) =	na	na
Field Duplicate %RPD for organics (range) =	0% - 71.7%	y*2
Laboratory Dupl. % RPD for metals (range) =	0% - 17.5%	y
Laboratory Dupl. % RPD for organics (range) =	0% - 61.9%	y

Surrogate Monitoring Compound Analyses		**(Acceptable/See Below)**
Surrogates run for relevant analyses?		y
% Recovery for organics (range) =	88.6% - 117%	y

Overall Assessment

Data quality is suitable for use in reporting.

Discussion of Anomalies & Reliability of Analytical Data:

1. % recovery of TPH (C10-C28) less than lower recovery objective. ALS stated this was due to suspected matrix interference.

2. % recovery for phosphorus was above upper objective. This was most likely due to sample heterogeneity and is not expected to affect overall data integrity.

Notes: %RPD = Relative Percent Difference. PQL (EQL) = Practical (Estimated) Quantitation Limit. NA=No samples analysed for this analyte

Validation Performed by:	Sarah Pfeffer	Date:	Jul-09

Analytical Data Quality Validation Form

		Sheet No:	1 of 1
Job/Project Name:	Codlea W516-2	**Phase/Task No:**	
Analytical Laboratory:	ALS	**Batch(s)/Ref. No(s):**	EB0916004

Sample Type(s)	**No. of Original Samples**	**No. Dupl. /QC Samples**	**Analytes**
Water	5	1	TSS, turbidity, alkalinity, Anions and Cations, N, P, Ammonia, nitrites and nitrates, BOD, Dissolved Metals, Total Metals, TPH, BTEX, faecal coliforms, E. Coli

Sample Handling/Holding	**(y/n)**
COC completed adequately?	y
Samples received by Laboratory intact and preserved?	y
Samples analysed within appropriate holding times per analytical method?	y*1
Laboratory NATA-registered for the analytical method and matrix performed?	y
Analytical Method(s) used are Approved Method(s)?	y
PQLs were as proposed/not modified due to interference?	y*2
PQLs were within Environmental Media Quality Assessment Guidelines?	y

Blanks Samples	**(y/n)**
Method blank analysed for relevant analytes?	y
Rinsate blanks analysed for relevant analytes?	NA
Trip Blank analysed for relevant analytes?	y
Number and type of blanks appropriate?	y
Anomalies or Analytes detected in Blanks?	n

Matrix Spikes (MS)/Matrix Spike Duplicates (MSD) Samples		**(Acceptable/See Below)**
MS/MSD analysed for appropriate analytes?		y
% Recovery of metals (range) =	45.7% - 105%	y*3
% Recovery of organics (range) =	71.2% - 108%	y*4

Laboratory Control Samples		**(Acceptable/See Below)**
Control Spike analysed for appropriate analytes?		y
% Recovery of metals (range) =	90.7% - 104%	y
% Recovery of organics (range) =	54.5% - 120%	y

Field and Laboratory Duplicates		**(Acceptable/See Below)**
Sufficient Field Duplicates collected/analysed?		y
Field Duplicate %RPD for metals (range) =	0% - 28.6%	y
Field Duplicate %RPD for organics (range) =	0% - 156.5%	y*5
Laboratory Dupl. % RPD for metals (range) =	0% - 24.5%	y
Laboratory Dupl. % RPD for organics (range) =	0% - 104%	y

Surrogate Monitoring Compound Analyses		**(Acceptable/See Below)**
Surrogates run for relevant analyses?		y
% Recovery for organics (range) =	90.9% - 106%	y

Overall Assessment

Data quality is suitable for use in reporting.

Discussion of Anomalies & Reliability of Analytical Data:

1. Samples exceeded holding time for turbidity analysis. Turbidity results should be reviewed in conjunction with other results including TSS.
2. LOR raised for metals analysis for Ck North 2 and Ck South 2. Lab stated that this was due to high salinity of these samples. Comments on this anomaly are to be included in main report.
3. Sample Ck South 2 showed poor matrix spike recovery for metals due to matrix interference.
4. Recovery of TKN and total P was not determined. The samples analysed were anonymous, so belonged to a different project.
5. %RPD for total P and E. Coli was greater than upper limit. This was most likely due to sample heterogeneity.

Notes: %RPD = Relative Percent Difference. PQL (EQL) = Practical (Estimated) Quantitation Limit. NA=No samples analysed for this analyte

Validation Performed by:	Sarah Pfeffer	Date:	Nov-09

APPENDIX E

SUMMARISED LABORATORY DATA

			Sample Identification		Bore 1	Bore 2	Bore 3	Dup 1	Ck North 1	CK South 1	Drain 1	Trip Blank
			Lab Batch No.		EB0908980	EB0908980	EB0908980	EB0908980	EB0908980	EB0908980	EB0908980	EB0908980
			Date Sampled		4/06/2009	4/06/2009	4/06/2009	4/06/2009	4/06/2009	4/06/2009	4/06/2009	4/06/2009
			Location Reference					Dup of Bore 3				
Analyte grouping/Analyte	**Units**	**LOR**	**Dutch Guidelines**	**ANZECC Aquatic Ecosystems Estuarine/Lowland Trigger Values**								
pH												
pH Value	pH Unit	0.01	NE	7-8.5	3.29	4.48	4.55	4.57	6.33	6.22	4.36	-
Field pH	pH Unit	0.01	NE	7-8.5	NE	NE	NE	NE	NE	NE	NE	NE
Conductivity by PC Titrator												
Electrical Conductivity @ 25°C	µS/cm	1	NE	125-2200	321	153	385	399	1230	588	138	-
Field Conductivity	µS/cm	1	NE	125-2200	NE	NE	NE	NE	NE	NE	NE	NE
Suspended Solids												
Suspended Solids (SS)	mg/L	1	NE	NE*1	-	-	-	-	8	43	5	-
Field Dissolved Solids												
Total dissolved solids	ppm	NE	NE		NE	NE	NE	NE	NE	NE	NE	NE
Turbidity												
Turbidity	NTU	0.1	NE	0.5-10	-	-	-	-	-	-	-	-
Field measured dissolved oxygen												
DO	ppm	NE	NE	NE*2	NE	NE	NE	NE	NE	NE	NE	NE
Alkalinity by PC Titrator												
Hydroxide Alkalinity as CaCO3	mg/L	1	NE	NE	<1	<1	<1	<1	<1	<1	<1	-
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	<1	<1	<1	<1	<1	<1	<1	-
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	<1	<1	4	3	15	14	<1	-
Total Alkalinity as CaCO3	mg/L	1	NE	NE	<1	<1	4	3	15	14	<1	-
Dissolved Major Anions												
Sulfate as SO4 2-	mg/L	1	NE	NE	29	4	6	6	39	18	5	-
Chloride by PC Titrator												
Chloride	mg/L	1	NE	NE	12	26	94	90	346	145	23	-
Dissolved Major Cations												
Calcium	mg/L	1	NE	NE	4	4	1	1	10	6	2	-
Magnesium	mg/L	1	NE	NE	1	2	8	8	19	9	2	-
Sodium	mg/L	1	NE	NE	11	16	47	47	190	83	14	-
Potassium	mg/L	1	NE	NE	<1	<1	<1	<1	8	4	1	-
Dissolved Metals												
Arsenic	µg/L	1	NE	NE	-	-	-	-	-	-	-	-
Cadmium	µg/L	0.1	NE	NE	-	-	-	-	-	-	-	-
Chromium	µg/L	1	NE	NE	-	-	-	-	-	-	-	-
Copper	µg/L	1	NE	NE	-	-	-	-	-	-	-	-
Lead	µg/L	1	NE	NE	-	-	-	-	-	-	-	-
Nickel	µg/L	1	NE	NE	-	-	-	-	-	-	-	-
Zinc	µg/L	5	NE	NE	-	-	-	-	-	-	-	-
Mercury	µg/L	0.1	NE	NE	-	-	-	-	-	-	-	-
Total Metals												
Arsenic	µg/L	1	60	24(III), 13 (V)	-	-	-	-	-	<1	-	-
Cadmium	µg/L	0.1	6	0.2	-	-	-	-	-	0.1	-	-
Chromium	µg/L	1	30	1	-	-	-	-	-	1	-	-
Copper	µg/L	1	75	1.4	-	-	-	-	-	<1	-	-
Lead	µg/L	1	75	3.4	-	-	-	-	-	<1	-	-
Nickel	µg/L	1	75	11	-	-	-	-	-	<1	-	-
Zinc	µg/L	5	800	8	-	-	-	-	-	<5	-	-
Mercury	µg/L	0.1	0.3	0.6	-	-	-	-	-	<0.1	-	-
Nitrogen and Phosphorus												
Ammonia	µg/L	10	NE	15	-	-	-	-	-	-	-	-
Nitrite + Nitrate	µg/L	10	NE	15	20	40	<10	50	70	1300	<10	-
Nitrite	µg/L	10	NE	NE	-	-	-	-	-	-	-	-
Nitrate	µg/L	10	NE	NE	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen	µg/L	100	NE	NE	3200	1100	8200	11400	200	1000	600	-
Total Nitrogen	µg/L	100	NE	300	3200	1100	8200	11400	300	2300	600	-
Total Phosphorus	µg/L	10	NE	30	310	220	590	1250	120	180	<10	-
Ionic Balance												
Total Anions	meq/L	0.01	NE	NE	0.94	0.82	2.84	2.73	10.9	4.74	0.76	-
Total Cations	meq/L	0.01	NE	NE	0.83	1.01	2.76	2.78	10.5	4.75	0.95	-
Ionic Balance	%	0.01	NE	NE	-	-	-	-	1.58	0.08		-
Biochemical Oxygen Demand (BOD)												
Biochemical Oxygen Demand	mg/L	2	NE	NE*3	-	-	-	-	7	7	6	-
BTEX												
Benzene	µg/L	1	30	950	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	1000	NE	<2	<2	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	150	NE	<2	<2	<2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	NE	200	<2	<2	<2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	NE	350	<2	<2	<2	<2	<2	<2	<2	<2
total xylenes	µg/L	-	70	NE	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL BTEX	µg/L	-	1250	NE	NA	NA	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons												
C6 - C9 Fraction	µg/L	20	NE	NE	<20	<20	<20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	NE	NE	<50	<50	<50	<50	<50	<50	<50	-
C15 - C28 Fraction	µg/L	100	NE	NE	<100	<100	<100	<100	<100	<100	<100	-
C29 - C36 Fraction	µg/L	50	NE	NE	<50	<50	<50	<50	<50	<50	<50	-
Total TPH	µg/L	-	600 (b)	NE	NA	NA	NA	NA	NA	NA	NA	NA
E Coli												
E Coli	cfu/100mL	10			-	-	-	-	-	-	-	-
Faecal Coliforms by Membrane Filtration (MF)												
Faecal Coliforms	cfu/100mL	10		*4	-	-	-	-	190	100	44	-

Exceeds ANZECC Guidelines
Exceeds Dutch Guidelines
NE- Not Established
NA -Not applicable
LOR - Laboratory reporting limit
MEQ- milliequivalents

*1 = Qld water quality guidelines 2006 recommend that TSS should be <15mg/L

*2 < 5mg/L of dissolved oxygen is stressful to aquatic species (p3.3-25 of ANZECC Guidelines)

*3 = SCBD states that lightly polluted surface water has BOD of 3-4mg/L and moderately polluted 5-7mg/L

*4 = Recreational water quality guidelines indicate that medial bacterial content in water which is used for swimming (primary contact) should be <150fc/100mL.

Analyte grouping/Analyte	Units	LOR	Dutch Guidelines	ANZECC Aquatic Ecosystems Estuarine/Lowland Trigger Values	Bore 2 R2 EB0916004 8/10/2009	Bore 3 R2 EB0916004 8/10/2009	Ck North 2 EB0916004 8/10/2009	Ck South 2 EB0916004 8/10/2009	Drain 2 EB0916004 8/10/2009	Dup 1 EB0916004 8/10/2009 Dup of Ck North 2
Sample Identification					Bore 2 R2	Bore 3 R2	Ck North 2	Ck South 2	Drain 2	Dup 1
Lab Batch No.					EB0916004	EB0916004	EB0916004	EB0916004	EB0916004	EB0916004
Date Sampled					8/10/2009	8/10/2009	8/10/2009	8/10/2009	8/10/2009	8/10/2009
Location Reference										Dup of Ck North 2
pH										
pH Value	pH Unit	0.01	NE	7-8.5	NE	NE	NE	NE	NE	NE
Field pH	pH Unit	0.01	NE	7-8.5	3.45	3.87	7.95	8.39	3.07	NE
Conductivity by PC Titrator										
Electrical Conductivity @ 25℃	µS/cm	1	NE	125-2200	NE	NE	NE	NE	NE	NE
Field Conductivity	µS/cm	1	NE	125-2200	136.3	259	49900	50700	129.6	NE
Suspended Solids										
Suspended Solids (SS)	mg/L	1	NE	NE*1	37	1090	28	32	4	28
Field Dissolved Solids										
Total dissolved solids	ppm	NE	NE		78.3	150	38300	38800	78.2	NE
Turbidity										
Turbidity	NTU	0.1	NE	0.5-10	16	210	1.3	0.8	1.8	1.1
Field measured dissolved oxygen										
DO	ppm	NE	NE	NE*2	1.78	2.20	8.63	16.4	12.5	NE
Alkalinity by PC Titrator										
Hydroxide Alkalinity as CaCO3	mg/L	1	NE	NE	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	<1	5	105	118	<1	145
Total Alkalinity as CaCO3	mg/L	1	NE	NE	<1	5	105	118	<1	145
Dissolved Major Anions										
Sulfate as SO4 2-	mg/L	1	NE	NE	5	3	2970	3010	5	2960
Chloride by PC Titrator										
Chloride	mg/L	1	NE	NE	22	48	19700	20100	23	20000
Dissolved Major Cations										
Calcium	mg/L	1	NE	NE	<1	<1	408	411	<1	402
Magnesium	mg/L	1	NE	NE	2	5	1270	1300	3	1270
Sodium	mg/L	1	NE	NE	15	30	11500	11400	16	11300
Potassium	mg/L	1	NE	NE	<1	<1	559	569	<1	554
Dissolved Metals										
Arsenic	µg/L	1	NE	NE	<1	<1	<50	<50	<1	<50
Cadmium	µg/L	0.1	NE	NE	0.1	<0.1	<0.5	<0.5	<0.1	<0.5
Chromium	µg/L	1	NE	NE	<1	1	5	<5	<1	6
Copper	µg/L	1	NE	NE	33	8	<50	<50	1	<50
Lead	µg/L	1	NE	NE	7	2	<5	<5	<1	<5
Nickel	µg/L	1	NE	NE	2	<1	<50	<50	<1	<50
Zinc	µg/L	5	NE	NE	170	37	<50	<50	15	<50
Mercury	µg/L	0.1	NE	NE	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Metals										
Arsenic	µg/L	1	60	24(III), 13 (V)	<1	1	<50	<50	1	<50
Cadmium	µg/L	0.1	6	0.2	<0.1	<0.1	<0.5	<0.5	<0.1	<0.5
Chromium	µg/L	1	30	1	<1	4	6	8	<1	8
Copper	µg/L	1	75	1.4	31	22	<50	<50	<1	<50
Lead	µg/L	1	75	3.4	7	9	<5	<5	<1	<5
Nickel	µg/L	1	75	11	<1	<1	<50	<50	<1	<50
Zinc	µg/L	5	800	8	114	90	<50	<50	9	<50
Mercury	µg/L	0.1	0.3	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrogen and Phosphorus										
Ammonia	µg/L	10	NE	15	20	80	70	40	10	50
Nitrite + Nitrate	µg/L	10	NE	15	90	40	50	70	40	40
Nitrite	µg/L	10	NE	NE	<10	<10	<10	<10	<10	<10
Nitrate	µg/L	10	NE	NE	90	40	50	70	40	40
Total Kjeldahl Nitrogen	µg/L	100	NE	NE	300	1300	200	200	600	200
Total Nitrogen	µg/L	100	NE	300	400	1300	300	200	700	300
Total Phosphorus	µg/L	10	NE	30	60	110	820	360	<10	100
Ionic Balance										
Total Anions	meq/L	0.01	NE	NE	-	-	-	-	-	-
Total Cations	meq/L	0.01	NE	NE	-	-	-	-	-	-
Ionic Balance	%	0.01	NE	NE	-	-	-	-	-	-
Biochemical Oxygen Demand (BOD)										
Biochemical Oxygen Demand	mg/L	2	NE	NE*3	5	4	4	2	6	4
BTEX										
Benzene	µg/L	1	30	950	<1	<1	<1	<1	<1	<1
Toluene	µg/L	2	1000	NE	<2	<2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	150	NE	<2	<2	<2	<2	<2	<2
meta- & para-Xylene	µg/L	2	NE	200	<2	<2	<2	<2	<2	<2
ortho-Xylene	µg/L	2	NE	350	<2	<2	<2	<2	<2	<2
total xylenes	µg/L	-	70	NE	NA	NA	NA	NA	NA	NA
TOTAL BTEX	µg/L	-	1250	NE	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons										
C6 - C9 Fraction	µg/L	20	NE	NE	<20	<20	<20	<20	<20	<20
C10 - C14 Fraction	µg/L	50	NE	NE	<50	<50	<50	<50	<50	<50
C15 - C28 Fraction	µg/L	100	NE	NE	<100	<100	<100	<100	<100	<100
C29 - C36 Fraction	µg/L	50	NE	NE	<50	<50	<50	<50	<50	<50
Total TPH	µg/L	-	600 (b)	NE	NA	NA	NA	NA	NA	NA
E Coli										
E Coli	cfu/100mL	10			<10	<10	800	430	6	360
Faecal Coliforms by Membrane Filtration (MF)										
Faecal Coliforms	cfu/100mL	10		*4	<10	<10	800	430	6	600

Exceeds ANZECC Guidelines

Exceeds Dutch Guidelines

NE- Not Established

NA -Not applicable

LOR - Laboratory reporting limit

MEQ- milliequivalents

*1 = Qld water quality guidelines 2006 recommend that TSS should be <15mg/L

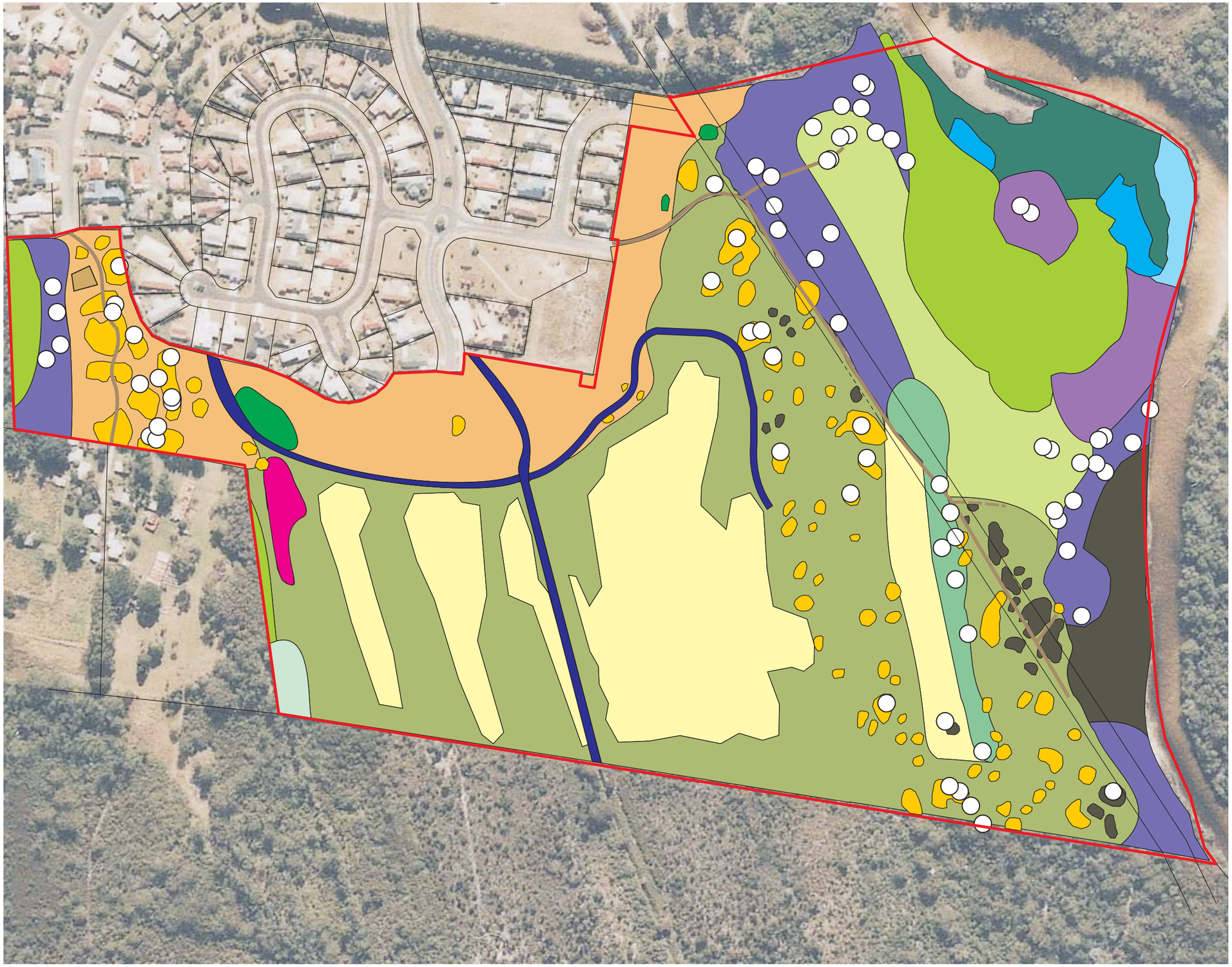
*2 < 5mg/L of dissolved oxygen is stressful to aquatic species (p3.3-25 of ANZECC Guidelines)

*3 = SCBD states that lightly polluted surface water has BOD of 3-4mg/L and moderately polluted 5-7mg/L

*4 = Recreational water quality guidelines indicate that medial bacterial content in water which is used for swimming (primary contact) should be <150fc/100mL.

APPENDIX F

VEGETATION PLAN



N

LEGEND

Swamp sclerophyll communities
- Community 1a - Tall closed swamp sclerophyll forest *(Eucalyptus robusta)*
- Community 1b - Tall closed swamp sclerophyll woodland *(Eucalyptus robusta)*
- Community 1c - Tall closed swamp sclerophyll forest *(Melaleuca quinquenervia)*
- Community 1d - Tall closed swamp sclerophyll forest *(Eucalyptus racemosa, Eucalyptus robusta)*
- Community 1e - Tall closed swamp sclerophyll forest *(Eucalyptus robusta +/- Melaleuca quinquenervia / Leptospermum polygalifolium)*
- Community 1f - Regenerating swamp sclerophyll forest (*Leptospermum polygalifolium +/- Melaleuca quinquenervia / Eucalyptus robusta)*

Dry sclerophyll communities
- Community 2a - Tall closed sclerophyll forest (*Eucalyptus racemosa, Endiandra sieberi*)
- Community 2b - Tall open dry sclerophyll forest (*Eucalyptus racemosa, Allocasuarina littoralis, Banksia aemula*)

Heath communities
- Community 3a - Tall closed heath (*Banksia aemula* & *Allocasuarina littoralis*)
- Community 3b - Low closed slashed dry heath
- Community 3c - Low closed slashed wet heath

Estuarine communities
- Community 4a - Mid-high mid-dense mangrove forest *(Avicennia marina, Aegiceras corniculatum)*
- Community 4b - Mid-high forest (*Casuarina glauca +/- Melaleuca quinquenervia*)
- Community 4c - Brackish swamp (*Juncus kraussii / Acrostichum speciosum*)

Other communities
- Community 5 - Tall closed grassland (*Andropogon virginicus*)
- Community 6 - Drainage lines
- Community 7 - Scattered trees (*Eucalyptus racemosa*)
- Garden weeds
- Habitat Trees
- Track
- Subject Site

DRAFT 27.11.09

0 100m

1 : 3000

SOURCE: JWA Site Investigations; Dept of Lands 2004 Aerial; Landpartners (LM080082_EV4A.pdf)

SCALE: 1 : 3000 @ A3

JAMES WARREN & ASSOCIATES PTY LIMITED
Environmental Consultants

CLIENT
Codlea Pty Ltd

PROJECT
Ecological Assessment
Bayside Brunswick
Lot 73 on DP851902; Brunswick Heads, NSW
Shire of Byron

FIGURE 12

PREPARED: BW
DATE: 27 November 2009
FILE: N97066_Veg.cdr

TITLE

EXISTING VEGETATION COMMUNITIES

APPENDIX G

FULL LABORATORY DOCUMENTATION

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: **Waste Solutions Australia**	SAMPLER: **Sarah Pfeffer**
ADDRESS / OFFICE: **PO Box 514 Ashgrove QLD 4060**	MOBILE: **0448 66 88 30**
PROJECT MANAGER (PM): **Sarah Pfeffer**	PHONE: **(07) 3366 5778**
PROJECT ID: **W516**	EMAIL REPORT TO: **sarah@wastesolutions.biz**
SITE:	P.O. NO.: EMAIL INVOICE TO: **office@wastesolutions.biz**
RESULTS REQUIRED (Date): **11.6.09**	QUOTE NO.: **ANALYSIS REQUIRED including SUITES** (note - suite codes must be listed to attract sui) **Page 1 of 1**

Australian Laboratory Services Pty Ltd

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		W-5 TPH, BTEX, 8 Metals	pH, conductivity, Total N & total P	TSS, BOD, faecal coliforms	W-4 TPH, Btex	NT-1 & NT-2							
ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles												
1	Bore 1	W	4.6.09					X		X	X							
2	Bore 2	W	4.6.09					X		X	X							
3	Bore 3	W	4.6.09					X		X	X							
4	Ck North 1	W	4.6.09					X	X	X	X							
5	Ck South 1	W	4.6.09				X	X	X		X							
6	Drain 1	W	4.6.09					X	X	X	X							
7	Dup 1	W	4.6.09					X		X	X							
8	Trip blank	W	4.6.09							X								

Environmental Division
Brisbane
Work Order
EB0908980

Telephone : +61-7-3243 7222

RELINQUISHED BY:		RECEIVED BY		METHOD OF SHIPMENT
Name: Sarah Pfeffer	Date: 5.6.09	Name: N. Kraft ALS	Date: 5/6	Con' Note No:
Of: Waste Solutions	Time:	Of:	Time: 1200	
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 Environmental

Environmental Division

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order : **EB0908980**

Client	: **WASTE SOLUTIONS AUSTRALIA P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS SARAH PFEFFER	Contact	: Tim Kilmister
Address	: P O BOX 514 ASHGROVE QLD, AUSTRALIA 4060	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: sarah@wastesolutions.biz	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 33665778	Telephone	: +61-7-3243 7222
Facsimile	: +61 33667302	Facsimile	: +61-7-3243 7218
Project	: W516	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: EB2008WASSOL0237 (BN/459/08)
Site	: ----		
Sampler	: Sarah Pfeffer	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 05-JUN-2009	Issue Date	: 09-JUN-2009 08:41
Client Requested Due Date	: 11-JUN-2009	Scheduled Reporting Date	: **15-JUN-2009**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 8.6 C, 11.4 C - Ice present
No. of coolers/boxes	: 2 MEDIUM	No. of samples received	: 8
Sercurity Seal	: Intact.	No. of samples analysed	: 8

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) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Breaches in recommended extraction / analysis holding times may occur.**
- **pH holding time is six hours after sampling.**
- **Microbiological testing will be subcontracted to Brisbane City Council Laboratory.**
- **For sample Trip Blank we are only able to perform analysis of W18 (C6-9/BTEX) as only a Maroon Vial was supplied for this sample.**
- 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: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA005: pH pH	WATER - EA010P Conductivity (PC)	WATER - EA025 Suspended Solids	WATER - EK062G Total Nitrogen as N (TKN + NOx) By Discrete Analyser	WATER - EK067G Total Phosphorus as P By Discrete Analyser	WATER - EN055 Ionic Balance	WATER - EP030 BOD	WATER - FCF-WAT (Subcontracted) Faecal Coliforms (Water)
EB0908980-001	04-JUN-2009 15:00	Bore 1	✓	✓		✓	✓	✓		
EB0908980-002	04-JUN-2009 15:00	Bore 2	✓	✓		✓	✓	✓		
EB0908980-003	04-JUN-2009 15:00	Bore 3	✓	✓		✓	✓	✓		
EB0908980-004	04-JUN-2009 15:00	Ck North 1	✓	✓	✓	✓	✓	✓	✓	✓
EB0908980-005	04-JUN-2009 15:00	CK South 1	✓	✓	✓	✓	✓	✓	✓	✓
EB0908980-006	04-JUN-2009 15:00	Drain 1	✓	✓	✓	✓	✓	✓	✓	✓
EB0908980-007	04-JUN-2009 15:00	Dup 1	✓	✓		✓	✓	✓		

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 (EB/PCT) Major Anions (Cl, SO4, Alkalinity)	WATER - W-04 TPH/BTEX	WATER - W-05T TPH/BTEX/8 Metals (Total)	WATER - W-18 TPH(C6 - C9)/BTEX
EB0908980-001	04-JUN-2009 15:00	Bore 1	✓	✓	✓		
EB0908980-002	04-JUN-2009 15:00	Bore 2	✓	✓	✓		
EB0908980-003	04-JUN-2009 15:00	Bore 3	✓	✓	✓		
EB0908980-004	04-JUN-2009 15:00	Ck North 1	✓	✓	✓		
EB0908980-005	04-JUN-2009 15:00	CK South 1	✓	✓		✓	
EB0908980-006	04-JUN-2009 15:00	Drain 1	✓	✓	✓		
EB0908980-007	04-JUN-2009 15:00	Dup 1	✓	✓	✓		
EB0908980-008	04-JUN-2009 15:00	Trip Blank					✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	office@wastesolutions.biz

MS SARAH PFEFFER

- *AU Certificate of Analysis - NATA (COA)	Email	sarah@wastesolutions.biz
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah@wastesolutions.biz
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah@wastesolutions.biz
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	sarah@wastesolutions.biz
- Default - Chain of Custody (COC)	Email	sarah@wastesolutions.biz
- EDI Format - ENMRG (ENMRG)	Email	sarah@wastesolutions.biz
- EDI Format - XTab (XTAB)	Email	sarah@wastesolutions.biz
- Trigger - Subcontract Report (SUBCO)	Email	sarah@wastesolutions.biz

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB0908980**	Page	: 1 of 7
Client	: **WASTE SOLUTIONS AUSTRALIA P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS SARAH PFEFFER	Contact	: Tim Kilmister
Address	: P O BOX 514 ASHGROVE QLD, AUSTRALIA 4060	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: sarah@wastesolutions.biz	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 33665778	Telephone	: +61-7-3243 7222
Facsimile	: +61 33667302	Facsimile	: +61-7-3243 7218
Project	: W516	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 05-JUN-2009
Sampler	: Sarah Pfeffer	Issue Date	: 16-JUN-2009
Site	: ----		
		No. of samples received	: 8
Quote number	: BN/459/08	No. of samples analysed	: 8

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
- Surrogate Control 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*
Phillip Kennedy	2IC Environmental Laboratory	Inorganics
Sarah Ashworth	Organic Chemist	Organics
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

- **Ionic balances are within acceptable limits as detailed in the 20th Ed. APHA "Standard Methods for the Examination of Water and Wastewater".**
- **Semivolatile TPH: Poor matrix spike recovery due to suspected matrix interference. Insufficient sample for re-extraction and re-analysis.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Bore 1	Bore 2	Bore 3	Ck North 1	CK South 1
				Client sampling date / time: 04-JUN-2009 15:00	04-JUN-2009 15:00	04-JUN-2009 15:00	04-JUN-2009 15:00	04-JUN-2009 15:00
				EB0908980-001	EB0908980-002	EB0908980-003	EB0908980-004	EB0908980-005
EA005: pH								
pH Value	----	0.01	pH Unit	3.29	4.48	4.55	6.33	6.22
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	321	153	385	1230	588
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	----	----	----	8	43
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	4	15	14
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	4	15	14
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	29	4	6	39	18
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	12	26	94	346	145
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	4	4	1	10	6
Magnesium	7439-95-4	1	mg/L	1	2	8	19	9
Sodium	7440-23-5	1	mg/L	11	16	47	190	83
Potassium	7440-09-7	1	mg/L	<1	<1	<1	8	4
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	----	----	----	----	<0.001
Cadmium	7440-43-9	0.0001	mg/L	----	----	----	----	0.0001
Chromium	7440-47-3	0.001	mg/L	----	----	----	----	0.001
Copper	7440-50-8	0.001	mg/L	----	----	----	----	<0.001
Lead	7439-92-1	0.001	mg/L	----	----	----	----	<0.001
Nickel	7440-02-0	0.001	mg/L	----	----	----	----	<0.001
Zinc	7440-66-6	0.005	mg/L	----	----	----	----	<0.005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	----	----	----	----	<0.0001
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.04	<0.01	0.07	1.30
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.2	1.1	8.2	0.2	1.0
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	3.2	1.1	8.2	0.3	2.3
EK067G: Total Phosphorus as P by Discrete Analyser								

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Bore 1	Bore 2	Bore 3	Ck North 1	CK South 1
				Client sampling date / time: 04-JUN-2009 15:00	04-JUN-2009 15:00	04-JUN-2009 15:00	04-JUN-2009 15:00	04-JUN-2009 15:00
				EB0908980-001	EB0908980-002	EB0908980-003	EB0908980-004	EB0908980-005
EK067G: Total Phosphorus as P by Discrete Analyser - Continued								
Total Phosphorus as P	----	0.01	mg/L	**0.31**	**0.22**	**0.59**	**0.12**	**0.18**
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**0.94**	**0.82**	**2.84**	**10.9**	**4.74**
^ Total Cations	----	0.01	meq/L	**0.83**	**1.01**	**2.76**	**10.5**	**4.75**
^ Ionic Balance	----	0.01	%	----	----	----	**1.58**	**0.08**
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	----	----	----	**7**	**7**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
EP080: BTEX								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**107**	**111**	**109**	**103**	**117**
Toluene-D8	2037-26-5	0.1	%	**97.7**	**97.4**	**97.5**	**100**	**96.9**
4-Bromofluorobenzene	460-00-4	0.1	%	**91.8**	**88.6**	**92.7**	**99.0**	**98.8**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Drain 1	Dup 1	Trip Blank	----	----
				Client sampling date / time: 04-JUN-2009 15:00	04-JUN-2009 15:00	04-JUN-2009 15:00	----	----
				EB0908980-006	EB0908980-007	EB0908980-008	----	----
EA005: pH								
pH Value	----	0.01	pH Unit	**4.36**	**4.57**	----	----	----
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**138**	**399**	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**5**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	**3**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	<1	**3**	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**5**	**6**	----	----	----
ED045P: Chloride by PC Titrator								
Chloride	16887-00-6	1	mg/L	**23**	**90**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**2**	**1**	----	----	----
Magnesium	7439-95-4	1	mg/L	**2**	**8**	----	----	----
Sodium	7440-23-5	1	mg/L	**14**	**47**	----	----	----
Potassium	7440-09-7	1	mg/L	**1**	<1	----	----	----
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	**0.05**	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.6**	**11.4**	----	----	----
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**0.6**	**11.4**	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	<0.01	**1.25**	----	----	----
EN055: Ionic Balance								
^ Total Anions	----	0.01	meq/L	**0.76**	**2.73**	----	----	----
^ Total Cations	----	0.01	meq/L	**0.95**	**2.78**	----	----	----
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	**6**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Drain 1	Dup 1	Trip Blank	----	----
				Client sampling date / time: 04-JUN-2009 15:00	04-JUN-2009 15:00	04-JUN-2009 15:00	----	----
				EB0908980-006	**EB0908980-007**	**EB0908980-008**	**----**	**----**
EP080/071: Total Petroleum Hydrocarbons - Continued								
C29 - C36 Fraction	----	50	µg/L	<50	<50	----	----	----
EP080: BTEX								
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**102**	**100**	**100**	----	----
Toluene-D8	2037-26-5	0.1	%	**99.9**	**97.4**	**98.0**	----	----
4-Bromofluorobenzene	460-00-4	0.1	%	**99.8**	**98.0**	**97.7**	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	80	120
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **EB0908980**	Page	: 1 of 8
Client	: **WASTE SOLUTIONS AUSTRALIA P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS SARAH PFEFFER	Contact	: Tim Kilmister
Address	: P O BOX 514 ASHGROVE QLD, AUSTRALIA 4060	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: sarah@wastesolutions.biz	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 33665778	Telephone	: +61-7-3243 7222
Facsimile	: +61 33667302	Facsimile	: +61-7-3243 7218
Project	: W516	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----		
C-O-C number	: ----	Date Samples Received	: 05-JUN-2009
Sampler	: Sarah Pfeffer	Issue Date	: 16-JUN-2009
Order number	: ----		
		No. of samples received	: 8
Quote number	: BN/459/08	No. of samples analysed	: 8

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*
Phillip Kennedy	2IC Environmental Laboratory	Inorganics
Sarah Ashworth	Organic Chemist	Organics
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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA005: pH (QC Lot: 1002857)									
EB0908980-001	Bore 1	EA005: pH Value	----	0.01	pH Unit	3.29	3.29	0.0	0% - 20%
EB0909034-002	Anonymous	EA005: pH Value	----	0.01	pH Unit	7.88	7.90	0.2	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 1006320)									
EB0908980-001	Bore 1	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	321	286	11.5	0% - 20%
EB0909032-005	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	1010	1010	0.0	0% - 20%
EA025: Suspended Solids (QC Lot: 1003914)									
EB0908978-005	Anonymous	EA025: Suspended Solids (SS)	----	1	mg/L	78	82	5.0	0% - 20%
EB0909008-011	Anonymous	EA025: Suspended Solids (SS)	----	1	mg/L	168	176	4.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1006319)									
EB0908980-001	Bore 1	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
EB0909010-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	140	143	2.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	140	143	2.0	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 1005390)									
EB0908727-001	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	82	85	3.6	0% - 20%
EB0908973-007	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	2680	2710	1.2	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 1005391)									
EB0908980-002	Bore 2	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	4	4	0.0	No Limit
EB0909032-006	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	15	15	0.0	0% - 50%
ED045P: Chloride by PC Titrator (QC Lot: 1006321)									
EB0908980-001	Bore 1	ED045-P: Chloride	16887-00-6	1	mg/L	14	14	0.0	0% - 50%
EB0909032-005	Anonymous	ED045-P: Chloride	16887-00-6	1	mg/L	157	149	5.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1005389)									
EB0908604-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	108	112	4.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	6	7	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	524	542	3.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	37	37	0.0	0% - 20%
EB0908973-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	497	528	6.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1140	1160	1.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	6110	6340	3.6	0% - 20%

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
ED093F: Dissolved Major Cations (QC Lot: 1005389) - continued									
EB0908973-007	Anonymous	ED093F: Potassium	7440-09-7	1	mg/L	274	278	1.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1005392)									
EB0908980-002	Bore 2	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	18	18	0.0	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EB0909032-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	44	46	4.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	28	29	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	103	106	2.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1005202)									
EB0908954-017	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.016	0.014	17.5	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.007	0.006	0.0	No Limit
EB0909083-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1004109)									
EB0908941-015	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB0908978-004	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	0.0003	0.0003	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 1006218)									
EB0908956-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.01	61.9	No Limit
EB0908980-007	Dup 1	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.05	0.03	50.1	No Limit
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 1007165)									
EB0908980-001	Bore 1	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	3.2	3.2	0.0	0% - 20%
EB0909016-004	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.6	0.6	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1007166)									
EB0908980-001	Bore 1	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.31	0.32	3.2	0% - 20%
EB0909016-004	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.04	0.0	No Limit
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 1004536)									
EB0908963-004	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	4	4	25.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 1004536) - continued									
EB0908963-003	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	4	8	77.5	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1002865)									
EB0908887-044	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB0909008-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1003165)									
EB0908955-005	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EB0908980-001	Bore 1	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080: BTEX (QC Lot: 1002865)									
EB0908887-044	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB0909008-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit

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

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control 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: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005: pH (QCLot: 1002857)								
EA005: pH Value	----	0.01	pH Unit	----	7.00 pH Unit	99.8	82	118
EA010P: Conductivity by PC Titrator (QCLot: 1006320)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1413 µS/cm	100	97	103
EA025: Suspended Solids (QCLot: 1003914)								
EA025: Suspended Solids (SS)	----	1	mg/L	<1	150 mg/L	101	86	108
ED037P: Alkalinity by PC Titrator (QCLot: 1006319)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	500 mg/L	97.6	83	111
ED040F: Dissolved Major Anions (QCLot: 1005390)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED040F: Dissolved Major Anions (QCLot: 1005391)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED045P: Chloride by PC Titrator (QCLot: 1006321)								
ED045-P: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	106	87	111
ED093F: Dissolved Major Cations (QCLot: 1005389)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
ED093F: Dissolved Major Cations (QCLot: 1005392)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020T: Total Metals by ICP-MS (QCLot: 1005202)								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	97.4	76	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	103	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	110	82	124
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	105	82	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	100	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	105	81	117
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	104	81	123
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1004109)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0100 mg/L	97.3	80	116

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EK059G: NOX as N by Discrete Analyser (QCLot: 1006218)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	121	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 1007165)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10.0 mg/L	70.6	70	115
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1007166)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.2 mg/L	89.5	73	117
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 1004536)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	198 mg/L	90.7	84.5	115.4
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1002865)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	160 µg/L	93.5	73	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1003163)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	600 µg/L	56.5	49	110
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1020 µg/L	73.0	58	130
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1003165)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	600 µg/L	64.2	49	110
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1020 µg/L	66.4	58	130
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080: BTEX (QCLot: 1002865)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	97.8	77.6	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	95.9	74	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	91.3	73	126
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	20 µg/L	91.0	70.4	129
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	94.2	74.3	126

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045P: Chloride by PC Titrator (QCLot: 1006321)							
EB0908980-002	Bore 2	ED045-P: Chloride	16887-00-6	400 mg/L	97.0	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1005202)							
EB0908954-018	Anonymous	EG020A-T: Arsenic	7440-38-2	1.000 mg/L	98.3	70	130
		EG020A-T: Cadmium	7440-43-9	0.500 mg/L	100	70	130
		EG020A-T: Chromium	7440-47-3	1.000 mg/L	101	70	130
		EG020A-T: Copper	7440-50-8	1.000 mg/L	99.9	70	130
		EG020A-T: Lead	7439-92-1	1.000 mg/L	97.9	70	130
		EG020A-T: Nickel	7440-02-0	1.000 mg/L	100	70	130
		EG020A-T: Zinc	7440-66-6	1.000 mg/L	97.0	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1004109)							
EB0908952-001	Anonymous	EG035T: Mercury	7439-97-6	0.010 mg/L	93.7	70	130
EK059G: NOX as N by Discrete Analyser (QCLot: 1006218)							
EB0908956-002	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	129	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 1007165)							
EB0908980-002	Bore 2	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	85.6	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1007166)							
EB0908980-002	Bore 2	EK067G: Total Phosphorus as P	----	1.0 mg/L	98.8	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1002865)							
EB0908887-045	Anonymous	EP080: C6 - C9 Fraction	----	140 µg/L	78.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1003165)							
EB0908955-013	Anonymous	EP071: C10 - C14 Fraction	----	600 µg/L	# 51.4	70	130
		EP071: C15 - C28 Fraction	----	1020 µg/L	# 51.0	70	130
EP080: BTEX (QCLot: 1002865)							
EB0908887-045	Anonymous	EP080: Benzene	71-43-2	10 µg/L	81.7	70	130
		EP080: Toluene	108-88-3	10 µg/L	82.7	70	130

Scientific Analytical Services

ABN 72 002 765 795

Biological Accreditation Number 11085
Chemical Accreditation Number 11750

180 Ashridge Road
Darra Brisbane Qld 4076

Telephone 07 3407 2666
Facsimile 07 3407 2690

A unit of Brisbane City Council

Dedicated to a better Brisbane

Microbiology Unit Report

Client: Australian Laboratory Services Pty Ltd
PO Box 66
Everton Park
QLD 4053
Attention: Michael Heery
Job Name: EB0908980 306170
Sampling Date: 04/06/2009
Sampled By: Client
Sampling Method: Not Specified
Sample Matrix: Aqueous
Batch Number: 09/07086
Registration Date: 5/06/09
Analysis Date and Time: 05/06/2009 at 15:55
Date of Report: 9/06/09

Batch Number	ALS Batch No	Sample Description	Faecal Coliforms (MF) cfu/100mL 4.404
09/07086/1	EB0908980-4	Ck North 1	190
09/07086/2	EB0908980-5	Ck South 1	100
09/07086/3	EB0908980-6	Drain 1	44

Bob Phillips
Supervising Microbiologist

ACCREDITED FOR TECHNICAL COMPETENCE

This document is issued in accordance with NATA's accreditation requirements.

Please note that the above results refer only to the samples tested, and not to the batches from which they were drawn.

Courier 5739

CHAIN OF CUSTODY DOCUMENTATION

CLIENT: Waste Solutions Australia
ADDRESS / OFFICE: 254 waterworks rd Ashgrove
PROJECT MANAGER (PM): Sarah Pfeffer
PROJECT ID: WS16 /2
SITE: Bayside Brunswick P.O. NO.:
RESULTS REQUIRED (Date): 15/10/09 QUOTE NO.:

SAMPLER: S. Pfeffer
MOBILE: 0448 66 88 30
PHONE 3366 5778
EMAIL REPORT TO: sarah@wastesolutions.biz.
EMAIL INVOICE TO: (if different to report) office@wastesolutions.biz

ALS Australian Laboratory Services Pty Ltd

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)

ALS ID	SAMPLE ID	MATRIX	DATE	Time	Type / Code	Total bottles	NT8 (NH3, TKN, NOx, NO2, NO3)	NT1 Cations	NT2 Anions	W5 (TPH BTEX Total metals & metals dissolved)	W2 (Total metals & metals dissolved)	M5 + E coli Faecal	TSS	Turbidity (NTU)	BOD
1	Bore 2 R2	W	8/10				X	X	X	X	X	X	X	X	X
2	Bore 3 R2						X	X	X	X	X	X	X	X	X
3	Ck North 2						X	X	X	X	X	X	X	X	X
4	Ck South 2						X	X	X	X	X	X	X	X	X
5	Drain 2						X	X	X	X	X	X	X	X	X
6	DUP 1						X	X	X	X	X	X	X	X	X
7	Trip Blank.														

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

Please note all samples that are marked for dissolved metals were field filtered however for Ck North 2 + Dup 1 No metals samples were filtered. Can you please run half the samples for total metals & half for dissolved (& filter these ones?)

RELINQUISHED BY:
Name: Sarah Pfeffer Date: 9/10/9
Of: WSA. Time:
Name: Date:
Of: Time:

RECEIVED BY
Name: Christian Date: 9.10.09.
Of: ALS Time: 11:05.
Name: Date:
Of: Time:

Environmental Division
Brisbane
Work Order
EB0916004

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 = Amb
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 =
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bad for Acid Sulphate Soils; B = Unpreserved Bag.

ALS Environmental

ENFM (204/4)

Telephone : +61-7-3243 7222

SAMPLE RECEIPT NOTIFICATION (SRN)

Comprehensive Report

Work Order	: **EB0916004**		
Client	: **WASTE SOLUTIONS AUSTRALIA P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS SARAH PFEFFER	Contact	: Tim Kilmister
Address	: P O BOX 514 ASHGROVE QLD, AUSTRALIA 4060	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: sarah@wastesolutions.biz	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 33665778	Telephone	: +61-7-3243 7222
Facsimile	: +61 33667302	Facsimile	: +61-7-3243 7218
Project	: W516 12	Page	: 1 of 3
Order number	: ----		
C-O-C number	: ----	Quote number	: EB2009WASSOL0362 (BN/440/09)
Site	: Bayside Brunswick		
Sampler	: S Pfeffer	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement

Dates

Date Samples Received	: 09-OCT-2009	Issue Date	: 09-OCT-2009 17:34
Client Requested Due Date	: 15-OCT-2009	Scheduled Reporting Date	: **15-OCT-2009**

Delivery Details

Mode of Delivery	: Carrier	Temperature	: 1.2C - Ice present
No. of coolers/boxes	: 2 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
- **Sample containers do not comply to pretreatment / preservation standards (AS, APHA, USEPA). Please refer to the Sample Container(s)/Preservation Non-Compliance Log at the end of this report for details.**
- **Sample(s) have been received within recommended holding times.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Microbiological testing will be subcontracted to Brisbane City Council Laboratory.**
- 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.

Method / Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
EG020A-F : Dissolved Metals by ICP-MS - Suite A		
Bore 3R 2	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
Ck North 2	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
DUP 1	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
EG035F : Dissolved Mercury by FIMS		
Bore 3R 2	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
Ck North 2	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered
DUP 1	- Clear Plastic Bottle - Natural	- Clear Plastic Bottle - Nitric Acid; Filtered

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: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - EA025 Suspended Solids	WATER - EA045 Turbidity	WATER - ECTFC-WAT (Subcontracted) E.coli /Total & Faecal Coliforms	WATER - EP030 BOD	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 (EB) Major Anions (Cl, SO4, Alkalinity)	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	WATER - W-02 8 Metals
EB0916004-001	08-OCT-2009 11:05	Bore 2 R2	✓	✓	✓	✓	✓	✓	✓	✓
EB0916004-002	08-OCT-2009 11:05	Bore 3R 2	✓	✓	✓	✓	✓	✓	✓	✓
EB0916004-003	08-OCT-2009 11:05	Ck North 2	✓	✓	✓	✓	✓	✓	✓	✓
EB0916004-004	08-OCT-2009 11:05	Ck South 2	✓	✓	✓	✓	✓	✓	✓	✓
EB0916004-005	08-OCT-2009 11:05	Drain 2	✓	✓	✓	✓	✓	✓	✓	✓
EB0916004-006	08-OCT-2009 11:05	DUP 1	✓	✓	✓	✓	✓	✓	✓	✓
EB0916004-007	08-OCT-2009 11:05	Trip Blank			✓					

Matrix: **WATER**

Laboratory sample ID	*Client sampling date / time*	*Client sample ID*	WATER - W-05T TPH/BTEX/8 Metals (Total)	WATER - W-18 TPH(C6 - C9)/BTEX
EB0916004-001	08-OCT-2009 11:05	Bore 2 R2	✓	
EB0916004-002	08-OCT-2009 11:05	Bore 3R 2	✓	
EB0916004-003	08-OCT-2009 11:05	Ck North 2	✓	
EB0916004-004	08-OCT-2009 11:05	Ck South 2	✓	
EB0916004-005	08-OCT-2009 11:05	Drain 2	✓	
EB0916004-006	08-OCT-2009 11:05	DUP 1	✓	
EB0916004-007	08-OCT-2009 11:05	Trip Blank		✓

Requested Deliverables

ACCOUNTS PAYABLE

- A4 - AU Tax Invoice (INV)	Email	office@wastesolutions.biz

MS SARAH PFEFFER

- *AU Certificate of Analysis - NATA (COA)	Email	sarah@wastesolutions.biz
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	sarah@wastesolutions.biz
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	sarah@wastesolutions.biz
- A4 - AU Sample Receipt Notification - Environmental (SRN)	Email	sarah@wastesolutions.biz
- Default - Chain of Custody (COC)	Email	sarah@wastesolutions.biz
- EDI Format - ENMRG (ENMRG)	Email	sarah@wastesolutions.biz
- EDI Format - XTab (XTAB)	Email	sarah@wastesolutions.biz
- Trigger - Subcontract Report (SUBCO)	Email	sarah@wastesolutions.biz

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EB0916004**	Page	: 1 of 7
Client	: **WASTE SOLUTIONS AUSTRALIA P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS SARAH PFEFFER	Contact	: Tim Kilmister
Address	: P O BOX 514 ASHGROVE QLD, AUSTRALIA 4060	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: sarah@wastesolutions.biz	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 33665778	Telephone	: +61-7-3243 7222
Facsimile	: +61 33667302	Facsimile	: +61-7-3243 7218
Project	: W516 12	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 09-OCT-2009
Sampler	: S Pfeffer	Issue Date	: 19-OCT-2009
Site	: Bayside Brunswick		
		No. of samples received	: 7
Quote number	: BN/440/09	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
- Surrogate Control 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	Inorganics
Matt Frost	Organic Instrument Chemist	Organics
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

- **EG020A-F (Dissolved Metals) Sample EB0916004-004(Ck South 2) shows poor matrix spike recovery due to matrix interference. Confirmed by re-extraction and re-analysis.**
- **EG020A-F (IDissolved Metals): LORs have been raised due to saline sample matrix.**
- **EG020A-T(Total Metals): The LORs have been raised due to saline sample matrix.**
- **EG020F (Filtered Metals) were higher than EG020T (Total Metals) for EB0916004 001 (Bore 2-R2) for Zinc. This was confirmed by redigestion and reanalysis. All other values are within experimental variation and are as such deemed acceptable.**
- **MW006 is ALS's internal code and is equivalent to AS4276.7.**
- **MW007 is ALS's internal code and is equivalent to AS4276.5.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Bore 2 R2	Bore 3R 2	Ck North 2	Ck South 2	Drain 2
				Client sampling date / time: 08-OCT-2009 11:05	08-OCT-2009 11:05	08-OCT-2009 11:05	08-OCT-2009 11:05	08-OCT-2009 11:05
				EB0916004-001	EB0916004-002	EB0916004-003	EB0916004-004	EB0916004-005
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**37**	**1090**	**28**	**32**	**4**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**16.0**	**210**	**1.3**	**0.8**	**1.8**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	**5**	**105**	**118**	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	**5**	**105**	**118**	<1
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**5**	**3**	**2970**	**3010**	**5**
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**22**	**48**	**19700**	**20100**	**23**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	**408**	**411**	<1
Magnesium	7439-95-4	1	mg/L	**2**	**5**	**1270**	**1300**	**3**
Sodium	7440-23-5	1	mg/L	**15**	**30**	**11500**	**11400**	**16**
Potassium	7440-09-7	1	mg/L	<1	<1	**559**	**569**	<1
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.050	<0.050	<0.001
Cadmium	7440-43-9	0.0001	mg/L	**0.0001**	<0.0001	<0.0005	<0.0005	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.001**	**0.005**	<0.005	<0.001
Copper	7440-50-8	0.001	mg/L	**0.033**	**0.008**	<0.050	<0.050	**0.001**
Lead	7439-92-1	0.001	mg/L	**0.007**	**0.002**	<0.005	<0.005	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.002**	<0.001	<0.050	<0.050	<0.001
Zinc	7440-66-6	0.005	mg/L	**0.170**	**0.037**	<0.050	<0.050	**0.015**
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.001**	<0.050	<0.050	**0.001**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0005	<0.0005	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	**0.004**	**0.006**	**0.008**	<0.001
Copper	7440-50-8	0.001	mg/L	**0.031**	**0.022**	<0.050	<0.050	<0.001
Lead	7439-92-1	0.001	mg/L	**0.007**	**0.009**	<0.005	<0.005	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.050	<0.050	<0.001
Zinc	7440-66-6	0.005	mg/L	**0.114**	**0.090**	<0.050	<0.050	**0.009**
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: Bore 2 R2	Bore 3R 2	Ck North 2	Ck South 2	Drain 2
				Client sampling date / time: 08-OCT-2009 11:05	08-OCT-2009 11:05	08-OCT-2009 11:05	08-OCT-2009 11:05	08-OCT-2009 11:05
				EB0916004-001	EB0916004-002	EB0916004-003	EB0916004-004	EB0916004-005
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.02**	**0.08**	**0.07**	**0.04**	<0.01
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
^ Nitrate as N	14797-55-8	0.01	mg/L	**0.09**	**0.04**	**0.05**	**0.07**	**0.04**
EK059G: NOX as N by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.09**	**0.04**	**0.05**	**0.07**	**0.04**
EK061: Total Kjeldahl Nitrogen (TKN)								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.3**	**1.3**	**0.2**	**0.2**	**0.6**
EK062: Total Nitrogen as N								
^ Total Nitrogen as N	----	0.1	mg/L	**0.4**	**1.3**	**0.3**	**0.2**	**0.7**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.06**	**0.11**	**0.82**	**0.36**	<0.01
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	**5**	**4**	**4**	**2**	**6**
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080: BTEX								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**105**	**104**	**115**	**110**	**103**
Toluene-D8	2037-26-5	0.1	%	**102**	**99.6**	**109**	**104**	**99.1**
4-Bromofluorobenzene	460-00-4	0.1	%	**93.0**	**91.6**	**102**	**95.6**	**98.3**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: DUP 1	Trip Blank	----	----	----
				Client sampling date / time: 08-OCT-2009 11:05	08-OCT-2009 11:05	----	----	----
				EB0916004-006	EB0916004-007	----	----	----
EA025: Suspended Solids								
^ Suspended Solids (SS)	----	1	mg/L	**28**	----	----	----	----
EA045: Turbidity								
Turbidity	----	0.1	NTU	**1.1**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**145**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**145**	----	----	----	----
ED040F: Dissolved Major Anions								
Sulfate as SO4 2-	14808-79-8	1	mg/L	**2960**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**20000**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**402**	----	----	----	----
Magnesium	7439-95-4	1	mg/L	**1270**	----	----	----	----
Sodium	7440-23-5	1	mg/L	**11300**	----	----	----	----
Potassium	7440-09-7	1	mg/L	**554**	----	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.050	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0005	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.006**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.050	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.005	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.050	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.050	----	----	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.050	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0005	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	**0.008**	----	----	----	----
Copper	7440-50-8	0.001	mg/L	<0.050	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.005	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.050	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	<0.050	----	----	----	----
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----

Analytical Results

Sub-Matrix: WATER				Client sample ID	DUP 1	Trip Blank	----	----	----
				Client sampling date / time	08-OCT-2009 11:05	08-OCT-2009 11:05	----	----	----
Compound	CAS Number	LOR	Unit		EB0916004-006	EB0916004-007	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		**0.05**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	0.01	mg/L		<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
^ Nitrate as N	14797-55-8	0.01	mg/L		**0.04**	----	----	----	----
EK059G: NOX as N by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L		**0.04**	----	----	----	----
EK061: Total Kjeldahl Nitrogen (TKN)									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L		**0.2**	----	----	----	----
EK062: Total Nitrogen as N									
^ Total Nitrogen as N	----	0.1	mg/L		**0.3**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		**0.10**	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L		**4**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	----	----	----	----
EP080: BTEX									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**106**	**102**	----	----	----
Toluene-D8	2037-26-5	0.1	%		**100**	**103**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		**93.4**	**90.9**	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	80	120
Toluene-D8	2037-26-5	88	110
4-Bromofluorobenzene	460-00-4	86	115

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **EB0916004**	Page	: 1 of 11
Client	: **WASTE SOLUTIONS AUSTRALIA P/L**	Laboratory	: Environmental Division Brisbane
Contact	: MS SARAH PFEFFER	Contact	: Tim Kilmister
Address	: P O BOX 514 ASHGROVE QLD, AUSTRALIA 4060	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: sarah@wastesolutions.biz	E-mail	: Services.Brisbane@alsenviro.com
Telephone	: +61 33665778	Telephone	: +61-7-3243 7222
Facsimile	: +61 33667302	Facsimile	: +61-7-3243 7218
Project	: W516 12	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: Bayside Brunswick		
C-O-C number	: ----	Date Samples Received	: 09-OCT-2009
Sampler	: S Pfeffer	Issue Date	: 19-OCT-2009
Order number	: ----		
		No. of samples received	: 7
Quote number	: BN/440/09	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

WORLD RECOGNISED ACCREDITATION

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	Inorganics
Matt Frost	Organic Instrument Chemist	Organics
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: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA025: Suspended Solids (QC Lot: 1130596)									
EB0916004-001	Bore 2 R2	EA025: Suspended Solids (SS)	----	1	mg/L	37	41	10.2	0% - 20%
EB0916099-001	Anonymous	EA025: Suspended Solids (SS)	----	1	mg/L	14	14	0.0	0% - 50%
EA045: Turbidity (QC Lot: 1127647)									
EB0916002-001	Anonymous	EA045: Turbidity	----	0.1	NTU	80.0	80.0	0.0	0% - 20%
EB0916032-001	Anonymous	EA045: Turbidity	----	0.1	NTU	4.0	4.0	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1129169)									
EB0915888-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	315	322	2.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	315	322	2.2	0% - 20%
EB0915888-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	112	105	6.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	112	105	6.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 1129171)									
EB0916004-002	Bore 3R 2	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	5	5	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	5	5	0.0	No Limit
ED040F: Dissolved Major Anions (QC Lot: 1127212)									
EB0915990-027	Anonymous	ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	122	127	4.3	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 1127216)									
EB0915990-027	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2350	2340	0.5	0% - 20%
EB0916019-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1100	1110	1.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 1127213)									
EB0915990-027	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	154	157	2.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	230	231	0.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1080	1100	2.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	45	46	4.0	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1129865)									
EB0915849-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	0.0001	0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1129865) - continued									
EB0915849-001	Anonymous	EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.008	0.007	0.0	No Limit
EB0915948-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.005	0.005	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 1129867)									
EB0916004-003	Ck North 2	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0005	<0.0005	0.0	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.050	<0.050	0.0	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.005	0.006	0.0	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.050	<0.050	0.0	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.050	<0.050	0.0	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 1129087)									
EB0915848-001	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	0.0003	0.0003	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.010	0.010	0.0	0% - 50%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.013	0.014	9.7	No Limit
EB0916004-003	Ck North 2	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0005	<0.0005	0.0	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.050	<0.050	0.0	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.006	0.008	24.5	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.050	<0.050	0.0	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.050	<0.050	0.0	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.0	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 1129866)									
EB0915914-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB0916004-006	DUP 1	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 1130437)									
EB0915991-006	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EB0916175-004	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 1130458)									
EB0916004-001	Bore 2 R2	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.02	<0.01	0.0	No Limit
EK057G: Nitrite as N by Discrete Analyser (QC Lot: 1127214)									
EB0915990-027	Anonymous	EK057G: Nitrite as N	----	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EK059G: NOX as N by Discrete Analyser (QC Lot: 1130457)									
EB0916004-001	Bore 2 R2	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.09	0.08	0.0	No Limit
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 1127573)									
EB0915923-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	123	123	0.0	0% - 20%
EB0915971-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	33.6	34.6	2.9	0% - 20%
EK061: Total Kjeldahl Nitrogen (TKN) (QC Lot: 1127575)									
EB0916004-004	Ck South 2	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.2	0.2	0.0	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1127574)									
EB0915923-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	12.6	12.2	3.2	0% - 20%
EB0915971-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	5.54	5.53	0.2	0% - 20%
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 1127576)									
EB0916004-004	Ck South 2	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.36	0.42	14.0	0% - 20%
EB0916023-005	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.04	0.01	104	No Limit
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 1126961)									
EB0915912-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	10	9	13.6	No Limit
EB0915947-007	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	1430	1620	12.8	0% - 20%
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1127393)									
EB0915952-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EB0916004-007	Trip Blank	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 1127916)									
EB0916004-001	Bore 2 R2	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EB0916004-006	DUP 1	EP071: C15 - C28 Fraction	----	100	µg/L	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	<50	<50	0.0	No Limit
EP080: BTEX (QC Lot: 1127393)									
EB0915952-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
EB0916004-007	Trip Blank	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP080: BTEX (QC Lot: 1127393) - continued									
EB0916004-007	Trip Blank	EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit

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

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control 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: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA025: Suspended Solids (QCLot: 1130596)								
EA025: Suspended Solids (SS)	----	1	mg/L	<1	150 mg/L	101	82	120
EA045: Turbidity (QCLot: 1127647)								
EA045: Turbidity	----	0.1	NTU	<0.1	40.0 NTU	100	96	104
ED037P: Alkalinity by PC Titrator (QCLot: 1129169)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	500 mg/L	90.6	83	111
ED037P: Alkalinity by PC Titrator (QCLot: 1129171)								
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	----	500 mg/L	90.6	83	111
ED040F: Dissolved Major Anions (QCLot: 1127212)								
ED040F: Sulfate as SO4 2-	14808-79-8	1	mg/L	<1	----	----	----	----
ED045G: Chloride Discrete analyser (QCLot: 1127216)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	120	90	130
ED093F: Dissolved Major Cations (QCLot: 1127213)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	----	----	----	----
ED093F: Magnesium	7439-95-4	1	mg/L	<1	----	----	----	----
ED093F: Sodium	7440-23-5	1	mg/L	<1	----	----	----	----
ED093F: Potassium	7440-09-7	1	mg/L	<1	----	----	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 1129865)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	93.0	80	124
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	95.9	89	117
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	104	85	127
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	91.8	85	119
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	97.8	88	116
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	93.8	85	119
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	96.8	86	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1129867)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	90.7	80	124
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	96.0	89	117
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	101	85	127
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	90.3	85	119
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	96.6	88	116
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	91.4	85	119
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	93.6	86	130
EG020T: Total Metals by ICP-MS (QCLot: 1129087)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 1129087) - continued								
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.100 mg/L	91.3	76	120
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.100 mg/L	92.3	84	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.100 mg/L	97.8	82	124
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.200 mg/L	96.6	82	116
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.100 mg/L	101	85	113
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.100 mg/L	96.1	81	117
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.200 mg/L	99.4	81	123
EG035F: Dissolved Mercury by FIMS (QCLot: 1129866)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.010 mg/L	100	81	115
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1130437)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0100 mg/L	102	80	116
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1130458)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	0.5 mg/L	87.4	70	129
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1127214)								
EK057G: Nitrite as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	74	128
EK059G: NOX as N by Discrete Analyser (QCLot: 1130457)								
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	99.4	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 1127573)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10.0 mg/L	86.3	70	115
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 1127575)								
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10.0 mg/L	83.5	70	115
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1127574)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.2 mg/L	102	73	117
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1127576)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.2 mg/L	98.1	73	117
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 1126961)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	198 mg/L	91.7	84.5	115.4
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1127393)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	160 µg/L	117	73	135
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1127916)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	600 µg/L	54.5	49	110
EP071: C15 - C28 Fraction	----	100	µg/L	<100	1020 µg/L	75.6	58	130
EP071: C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----
EP080: BTEX (QCLot: 1127393)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	114	77.6	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	114	74	122
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	112	73	126

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
				Result	Concentration	LCS	Low	High
EP080: BTEX (QCLot: 1127393) - continued								
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	20 µg/L	112	70.4	129
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	108	74.3	126

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride Discrete analyser (QCLot: 1127216)							
EB0915990-025	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1129865)							
EB0915849-002	Anonymous	EG020A-F: Arsenic	7440-38-2	0.100 mg/L	105	70	130
		EG020A-F: Cadmium	7440-43-9	0.100 mg/L	105	70	130
		EG020A-F: Chromium	7440-47-3	0.100 mg/L	103	70	130
		EG020A-F: Copper	7440-50-8	0.2 mg/L	95.0	70	130
		EG020A-F: Lead	7439-92-1	0.100 mg/L	98.9	70	130
		EG020A-F: Nickel	7440-02-0	0.100 mg/L	96.3	70	130
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	104	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 1129867)							
EB0916004-004	Ck South 2	EG020A-F: Arsenic	7440-38-2	0.100 mg/L	# 53.8	70	130
		EG020A-F: Cadmium	7440-43-9	0.100 mg/L	# 47.1	70	130
		EG020A-F: Chromium	7440-47-3	0.100 mg/L	# 58.3	70	130
		EG020A-F: Copper	7440-50-8	.2 mg/L	# 48.6	70	130
		EG020A-F: Lead	7439-92-1	0.100 mg/L	# 45.7	70	130
		EG020A-F: Nickel	7440-02-0	0.100 mg/L	# 51.1	70	130
		EG020A-F: Zinc	7440-66-6	.2 mg/L	# 47.3	70	130
EG020T: Total Metals by ICP-MS (QCLot: 1129087)							
EB0915849-001	Anonymous	EG020A-T: Arsenic	7440-38-2	2 mg/L	99.6	70	130
		EG020A-T: Cadmium	7440-43-9	1 mg/L	90.4	70	130
		EG020A-T: Chromium	7440-47-3	2 mg/L	90.4	70	130
		EG020A-T: Copper	7440-50-8	2 mg/L	91.3	70	130
		EG020A-T: Lead	7439-92-1	2 mg/L	90.3	70	130
		EG020A-T: Nickel	7440-02-0	2 mg/L	91.5	70	130
		EG020A-T: Zinc	7440-66-6	2 mg/L	95.2	70	130
EG035F: Dissolved Mercury by FIMS (QCLot: 1129866)							
EB0915914-002	Anonymous	EG035F: Mercury	7439-97-6	0.010 mg/L	83.8	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 1130437)							
EB0916004-001	Bore 2 R2	EG035T: Mercury	7439-97-6	0.010 mg/L	90.4	70	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 1130458)							
EB0916004-002	Bore 3R 2	EK055G: Ammonia as N	7664-41-7	0.4 mg/L	74.6	70	130
EK057G: Nitrite as N by Discrete Analyser (QCLot: 1127214)							
EB0915990-025	Anonymous	EK057G: Nitrite as N	----	0.4 mg/L	99.2	70	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EK059G: NOX as N by Discrete Analyser (QCLot: 1130457)							
EB0916004-002	Bore 3R 2	EK059G: Nitrite + Nitrate as N	----	0.4 mg/L	108	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 1127573)							
EB0915923-002	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	# Not Determined	70	130
EK061: Total Kjeldahl Nitrogen (TKN) (QCLot: 1127575)							
EB0916004-005	Drain 2	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	93.5	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1127574)							
EB0915923-002	Anonymous	EK067G: Total Phosphorus as P	----	1.0 mg/L	# Not Determined	70	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 1127576)							
EB0916004-005	Drain 2	EK067G: Total Phosphorus as P	----	1.0 mg/L	91.7	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1127393)							
EB0915952-002	Anonymous	EP080: C6 - C9 Fraction	----	140 µg/L	90.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 1127916)							
EB0916004-002	Bore 3R 2	EP071: C10 - C14 Fraction	----	600 µg/L	71.2	70	130
		EP071: C15 - C28 Fraction	----	1020 µg/L	88.9	70	130
EP080: BTEX (QCLot: 1127393)							
EB0915952-002	Anonymous	EP080: Benzene	71-43-2	10 µg/L	107	70	130
		EP080: Toluene	108-88-3	10 µg/L	106	70	130

Scientific Analytical Services

ABN 72 002 765 795

Biological Accreditation Number 11085
Chemical Accreditation Number 11750

180 Ashridge Road
Darra Brisbane Qld 4076

Telephone 07 3407 2666
Facsimile 07 3407 2690

A unit of Brisbane City Council

Dedicated to a better Brisbane

Microbiology Unit Report

Client: Australian Laboratory Services Pty Ltd
PO Box 66
Everton Park
QLD 4053
Attention: Michael Heery
Job Name: EB0916004 306889
Sampling Date: 08/10/2009
Sampled By: Client
Sampling Method: Grab
Sample Matrix: Aqueous
Batch Number: 09/12430
Registration Date: 9/10/09
Analysis Date and Time: 09/10/2009 at 16:10
Date of Report: 12/10/09

Batch Number	ALS Batch No	Sample Description	Faecal Coliforms (MF) cfu/100mL 4.404	Escherichia coli cfu/100mL 4.412
09/12430/1	EB0916004-1	Bore 2 R2	<10	<10
09/12430/2	EB0916004-2	Bore 3 R2	<10	<10
09/12430/3	EB0916004-3	Ck North 2	800	800
09/12430/4	EB0916004-4	Ck South 2	430	430
09/12430/5	EB0916004-5	Drain 2	6	6
09/12430/6	EB0916004-6	DUP 1	600	360

Bob Phillips
Supervising Microbiologist

Please note that the above results refer only to the samples tested, and not to the batches from which they were drawn.

ACCREDITED FOR TECHNICAL COMPETENCE

This document is issued in accordance with NATA's accreditation requirements.