



Vista Gold Australia Pty Ltd  
WDL 178-4  
2015-2016 Aquatic Monitoring

June 2016



# Executive summary

GHD undertook the 2016 round of the Mt Todd Aquatic Monitoring Program on behalf of Vista Gold, as required under WDL 178-4.

The Edith River was assessed for aquatic ecological health to determine if treated mine water discharged through the licenced discharge point RP3 is having an adverse impact on the downstream ecology of the river. This assessment was undertaken through sampling of water and sediment quality, and macroinvertebrate community composition. Stow Creek, which flows through the Mt Todd mine site into the Edith River, was also assessed for aquatic health to provide Vista Gold with a further understanding of any potential impacts of mine run-off in other areas on the Mt Todd site.

Overall, the results from the 2016 monitoring round were consistent with the previous year's monitoring event, showing no discernible impact from treated mine water discharged from RP3 on the Edith River aquatic ecosystem. Water quality in the Edith River was found to be relatively benign in terms of toxicity potential; iron was the only parameter elevated above the site specific trigger values. Sediment quality along the Edith River showed no elevation of parameters above guideline levels. Macroinvertebrate results were similar to the previous year's monitoring event, with samples from the Edith River showing no significant community change as a result of the RP3 discharge.

The results from the survey show that Vista Gold remain compliant with licence requirements under WDL 178-4.

*This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the Report.*

# Table of contents

1.	Introduction.....	1
1.1	Background.....	1
1.2	Scope and limitations.....	1
1.3	Purpose of this report.....	2
1.4	Assumptions .....	2
2.	Study Area.....	3
2.1	Mine and Bioregion Location .....	3
2.2	The Edith River Catchment.....	3
2.3	Existing Land Use .....	3
2.4	Geology and Soils.....	4
2.5	Regional Climate.....	4
3.	Methods.....	6
3.1	Survey Timing .....	6
3.2	Study Design.....	6
3.3	Survey Sites .....	6
3.4	Macroinvertebrate sampling .....	9
3.5	Habitat assessment .....	14
3.6	Water Quality .....	14
3.7	Quality Assurance / Quality Control.....	15
4.	Site Descriptions .....	16
5.	Results .....	24
5.1	Water Quality .....	24
5.2	Sediment Quality.....	26
5.3	Macroinvertebrates .....	27
5.4	Temporal Analysis .....	36
6.	Discussion .....	39
7.	References.....	41

# Table index

Table 3-1	Site location details, April 2016 aquatic ecology baseline survey .....	7
Table 3-2	AUSRIVAS bands for the Darwin-Daly Model .....	12
Table 5-1	In-situ water quality results (April 2016).....	24
Table 5-2	Single-factor ANOVA (upstream vs downstream) for Edith River and Stow Creek abundance results.....	28
Table 5-3	Single-factor ANOVA (upstream vs downstream) for Edith River and Stow Creek taxonomic results .....	29

Table 5-4	Single-factor ANOVA (upstream vs downstream) for Edith River and Stow Creek EPT results.....	31
Table 5-5	Single-factor ANOVA (upstream vs downstream) for Edith River and Stow Creek SIGNAL 2 results.....	33
Table 5-6	AUSRIVAS Darwin-Daly model output .....	34

## Figure index

Figure 2-1	15 month rainfall (mm) recorded at Edith Ridge (Source: BOM website, 2016). .....	5
Figure 3-1	Project Location .....	8
Figure 3-2	Marchant sub-sampler .....	10
Figure 4-1	Site photos from ERTOP: looking downstream (left), looking upstream (right).....	16
Figure 4-2	Site photos from ERUS: looking at riffle section (left), looking pool section (right). .....	17
Figure 4-3	Site photos from ERDS: looking at riffle section (left), looking pool section (right). .....	18
Figure 4-4	Site photos from ERSW4: shallow isolated pool in upstream section of reach (left), large deeper pool downstream (right). .....	19
Figure 4-5	Site photos from ERBTM: looking upstream (left) looking downstream (right).....	20
Figure 4-6	Site photos from SCTOP: looking upstream (left) looking downstream (right).....	21
Figure 4-7	Site photos from SCDS: looking upstream (left) looking downstream (right) .....	22
Figure 4-8	Site photos from SCBTM: looking upstream (left) looking downstream (right).....	23
Figure 5-1	Sediment particle size for all sites sampled.....	26
Figure 5-2	Macroinvertebrate abundance by site.....	27
Figure 5-3	Macroinvertebrate Diversity .....	29
Figure 5-4	Ephemeroptera, Plecoptera, and Trichoptera (EPT) Richness .....	30
Figure 5-5	Percentage EPT family abundance from total EPT family count.....	31
Figure 5-6	SIGNAL 2 calculated scores.....	32
Figure 5-7	MDS sites based on 'Treatment' .....	35
Figure 5-8	Site Extrapolated Abundance Totals .....	36
Figure 5-9	Temporal change in taxa diversity .....	37
Figure 5-10	Temporal change in EPT Diversity .....	37
Figure 5-11	Temporal change in EPT Diversity .....	38

## Appendices

- Appendix A – Water Chemistry Summary Table
- Appendix B – Water Quality Laboratory Reports
- Appendix C – Sediment Chemistry Summary Table

Appendix D – Sediment Quality Laboratory Reports

Appendix E - Macroinvertebrate Raw Data

# 1. Introduction

## 1.1 Background

### 1.1.1 Mine Site

The Mt Todd Gold Mine site is located approximately 55 km north-west of Katherine and 250 km south of Darwin in the Northern Territory (NT). The Mt Todd Gold Mine site is a brownfield site that was previously mined for gold in the 1990's until the year 2000. Mining infrastructure such as tailing dams, waste rock dumps and the remanent processing facilities remain on site.

The current owner of the site is Vista Gold Australia Pty Ltd, a wholly owned subsidiary of Vista Gold Corporation.

Vista Gold Corporation is an international gold mining company with more than 20 years of history in gold exploration, project development and operations. In addition to the Mt Todd Gold Project (the Project), Vista Gold Corporation have ventures in the United States, Mexico and Indonesia.

Vista Gold purchased the rights to the Mt Todd property on 1 March 2006. Under the terms of an agreement between Vista Gold and the NT Government (Agreement D92226), Vista Gold would initiate a comprehensive review of the Project to evaluate current site conditions and develop programs to stabilise legacy issues associated with the Project to minimise offsite migration of potential contaminants. Vista Gold was additionally required to examine all technical, economic and environmental issues, estimate costs to rehabilitate the site, explore and evaluate the potential of the Project, and prepare a technical and economic feasibility study for the potential development and recommencement of the Project.

Operating conditions at Mt Todd Mine are subject to regulatory obligations, including waste discharge licence WDL 178-4. Mt Todd mine is currently discharging treated waste water from RP3 according to WDL 178-4 requirements.

## 1.2 Scope and limitations

The scope of works for the Mt Todd Aquatic Monitoring Program (the Program) are based on a review of the scope detailed in the 2013-14 Wet Season Macroinvertebrate and Sediment Report undertaken by Envirotech Monitoring (Envirotech, 2014) and GHD's determination of the requirements to meet the aims of the Biological Monitoring Program contained within WDL 178-4.

The Program includes the following key components:

- The collection of two replicate macroinvertebrate samples from eight sites using the NT AUSRIVAS sampling methodology.
- Process macroinvertebrate samples to family level as per the NT AUSRIVAS method
- Water quality sampling at each of the eight macroinvertebrate monitoring sites, including in-situ measurements and grab samples for laboratory analysis. Sampling includes the collection of a duplicate sample at one location and a field blank sample for QA/QC purposes. Samples are analysed for the analytes outlined in Envirotech (2014).
- Sediment quality sampling at each of the eight macroinvertebrate monitoring sites, with samples collected from the edge habitat of sites for laboratory analysis. Sampling includes the collection of a duplicate sample for QA/QC purposes. Samples were analysed for the analytes outlined in Envirotech (2014).

- Carry out analysis on macroinvertebrate, sediment and water quality data to determine if there is any evidence of impacts associated with the discharge of treated mine water from the Mt Todd Mine site.
- Analysis of macroinvertebrate data to include:
  - Univariate and multivariate statistical analysis
  - Calculation of SIGNAL2 sensitivity ratings based on Chessman (2003) to assess whether or not spatial or temporal trends in community composition relate to the prescribed pollution sensitivity of taxa.
- Provide an annual report with appropriate statistical analysis and interpretation

### 1.2.1 Limitations

*This report: has been prepared by GHD for Vista Gold Australia Pty Ltd and may only be used and relied on by Vista Gold Australia Pty Ltd for the purpose agreed between GHD and the Vista Gold Australia Pty Ltd as set out in section 1.3 of this report.*

*GHD otherwise disclaims responsibility to any person other than Vista Gold Australia Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.*

*The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

*The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.*

*The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.*

*GHD has prepared this report on the basis of information provided by Vista Gold Australia Pty Ltd and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.*

*The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.*

*Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.*

*Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.*

## 1.3 Purpose of this report

The purpose of this report is to provide the results for the 2016 Aquatic Monitoring event undertaken on behalf of Vista Gold, as required under WDL 178-4 and described in the Scope in Section 1.2.

## 1.4 Assumptions

GHD assumes the following:

- All licencing is current and up to date.



## 2. Study Area

### 2.1 Mine and Bioregion Location

The Mt Todd Mine site lies within the Pine Creek bioregion. The Pine Creek bioregion comprises foothill environments below and to the west of the western Arnhem Land sandstone massif. Its main defining feature is the highly mineraliferous Pine Creek Geosyncline, comprising Archaean granite and gneiss overlain by Palaeoprotozoic sediments.

Land types of the Pine Creek bioregion are mainly hilly to rugged ridges with undulating plains. Vegetation communities include eucalypt woodlands, patches of monsoon forests, Melaleuca woodlands, riparian vegetation and tussock grasslands (DOTE 2008). The major vegetation types are eucalypt tall open forests typically dominated by Darwin Woollybutt (*Eucalyptus miniata*) and Darwin Stringybark (*E. tetradonta*), and woodlands (dominated by a range of *Eucalyptus* species); with smaller areas of monsoon rainforest.

### 2.2 The Edith River Catchment

The study area is located on the Edith River, located in the Daly River catchment. The Daly River is one of the Northern Territory's largest rivers with a catchment area of 52,577 square kilometres, and is one of the few catchments in the Northern Territory that has perennial flows. The Edith River is an important tributary of the Daly River, with a catchment of 1,057 square kilometres. The Edith River flows to the Fergusson River before joining the Daly River.

The Edith River rises at an elevation of 257 m and ends at an elevation of 81.8 m where it merges with the Fergusson River, dropping around 175 m over its 69.1 km length. The Edith River is the largest waterway in the immediate vicinity of the mine and has been the recipient of mine overflow waters via Stow Creek and West Creek. In the past, it has received licensed discharge from the mines RP1 waste rock retention pond. Currently, the Edith River receives treated mine water from RP3 through Batman Creek and Stow Creek. The river has been intensively sampled because it is the end receiving environment for the majority of the Mt Todd Mine Site catchment.

### 2.3 Existing Land Use

The rivers and creeks within the Daly River catchment are a major focus for recreational activities, including fishing. Commercial fishing also occurs along the lower estuary and adjoining coastal waters (Griffin, 1987) and catches contribute to the NT barramundi and salmon catches. The waterways are also utilised for traditional hunting and gathering, mining, domestic and stock water supplies, irrigation and urban water supplies.

Clearing of native vegetation for agriculture has occurred to a limited extent throughout the Daly River catchment. Areas are often confined to higher population centres or where agriculture is being researched or promoted (e.g. Douglas-Daly area, Daly River and Katherine). Fogarty and Gibbs (1976) noted that at the time of their survey of the Daly River agricultural area, difficulties were experienced in recording the vegetation communities in the levee farms area (i.e. along the Daly River from Mt Nancar downstream to Brown's Creek) due to selective or total clearing of native vegetation. Clearing for agriculture within the 18,210.4 km<sup>2</sup> region defined as the 'Katherine- Douglas Area' has been estimated at 45 km<sup>2</sup> for the period 1990 to 1995 (i.e. 0.2%). Very approximate figures for the total clearing within this same area are estimated at 1,044 km<sup>2</sup> or 5.7%.

Pervasive land management issues that affect biodiversity values in the Daly River Catchment include feral animals, weeds and inappropriate fire regimes.

There is significant fire activity in the bioregion (particularly in the late dry season) due to large tracts of grazing land that have nil to low levels of pastoral development and consequent minimal firebreaks and control measures. Feral animals (pigs, cattle, horses and buffalo) and weeds (especially mission grass and gamba grass) are widespread.

## 2.4 Geology and Soils

The Mt Todd Gold Mine is located in the Early Proterozoic Pine Creek Geosyncline (PCG), comprising meta-sediments, granitoids, basic intrusives, acid and intermediate volcanic rocks. The deposits are similar to other gold deposits of the PCG. Gold deposits in the PCG are classified as orogenic gold deposits in the subdivision of thermal aureole gold style (Tetra Tech 2011).

The Batman Deposit shares some characteristics with intrusion-related gold systems, especially in terms of the association of gold with bismuth and reduced ore mineralogies. This makes the deposit unique in the PCG. The mineralisation in the Batman Deposit is directly related to the intensity of the north-south trending quartz sulphide veining. The lithological units impact on the orientation and intensity of mineralisation (Tetra Tech 2011). Sulphide minerals associated with the gold mineralisation are pyrite, pyrrhotite, and lesser amounts of chalcopyrite, bismuthinite, and arsenopyrite. Galena and sphalerite are present but appear to be post-gold mineralisation and are related to calcite veining, bedding, and the eastwest trending faults and joints (Tetra Tech 2011).

## 2.5 Regional Climate

The climate in the Katherine Region is characterised by hot, humid wet seasons lasting from November to March followed by a hot dry season from April to October. Transition periods occur between the wet and dry seasons.

The Katherine region has an average rainfall of approximately 1,100 mm. This is highly seasonal ranging from 0.4 mm in June to 269.4 mm in January (BoM 2011). Temperatures have average maxima of 35.9°C and minima of 20.3°C. Relative humidity at 0900 hours ranges from 83% in February to 52% in August, with respective monthly values of 60% and 24% at 15:00 hours. Daily evaporation rates range from 7.9 mm in October to 4.9 mm in June, with an annual average of 6.2 mm.

The rainfall levels recorded prior to the sampling event are shown in Figure 2-1.

Water courses in the study area are ephemeral and cease to flow during the late dry season, but have regular flows during the wet season, with some of the more major watercourses remaining inundated into the early dry season. Some seasonal and semi-permanent waterholes exist in the area. These are likely to be ecologically important and serve as a refuge for fish and aquatic reptiles during the dry season.

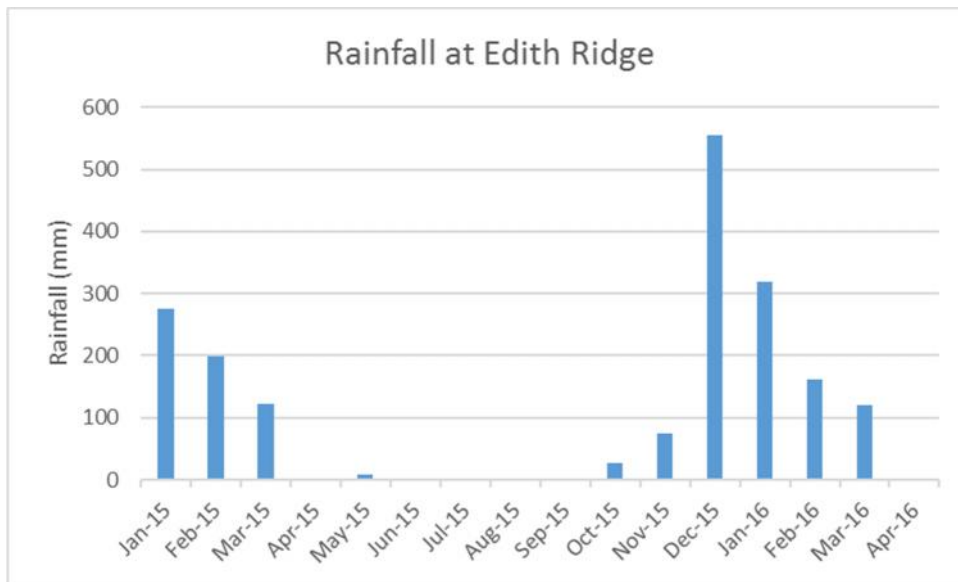


Figure 2-1 15 month rainfall (mm) recorded at Edith Ridge (Source: BOM website, 2016).

## 3. Methods

### 3.1 Survey Timing

Sampling was undertaken between 6 and 8 April 2016. At the time, there was low flow at most sites. Inundated sites were characterised by deep pools, connected by very shallow runs or hyporheic flow.

### 3.2 Study Design

The primary aim of the study design is to detect impacts on the aquatic environment in the Edith River from mine water released from discharge point RP3, in accordance with the discharge licence. The study design for the 2016 sampling round has been simplified from previous years, as the use of the Ferguson River as a reference system in previous studies (GHD 2015a) was found to be unsuitable; this was confirmed by the NT EPA and the DME in 2015. Therefore, the current study focusses solely on the comparison of the aquatic environments between the sites upstream and downstream of the discharge location.

As a secondary objective of the study design, sites were assessed on Stow Creek which receives the treated mine water through Horseshoe Creek. Sites have been located upstream and downstream of the confluence of Horseshoe Creek and Stow Creek to provide an indication of any potential impacts that the discharge may be having on the receiving environment.

The 2016 survey was timed to align with previous aquatic assessments (~April) undertaken for the Project to maintain consistency of results.

### 3.3 Survey Sites

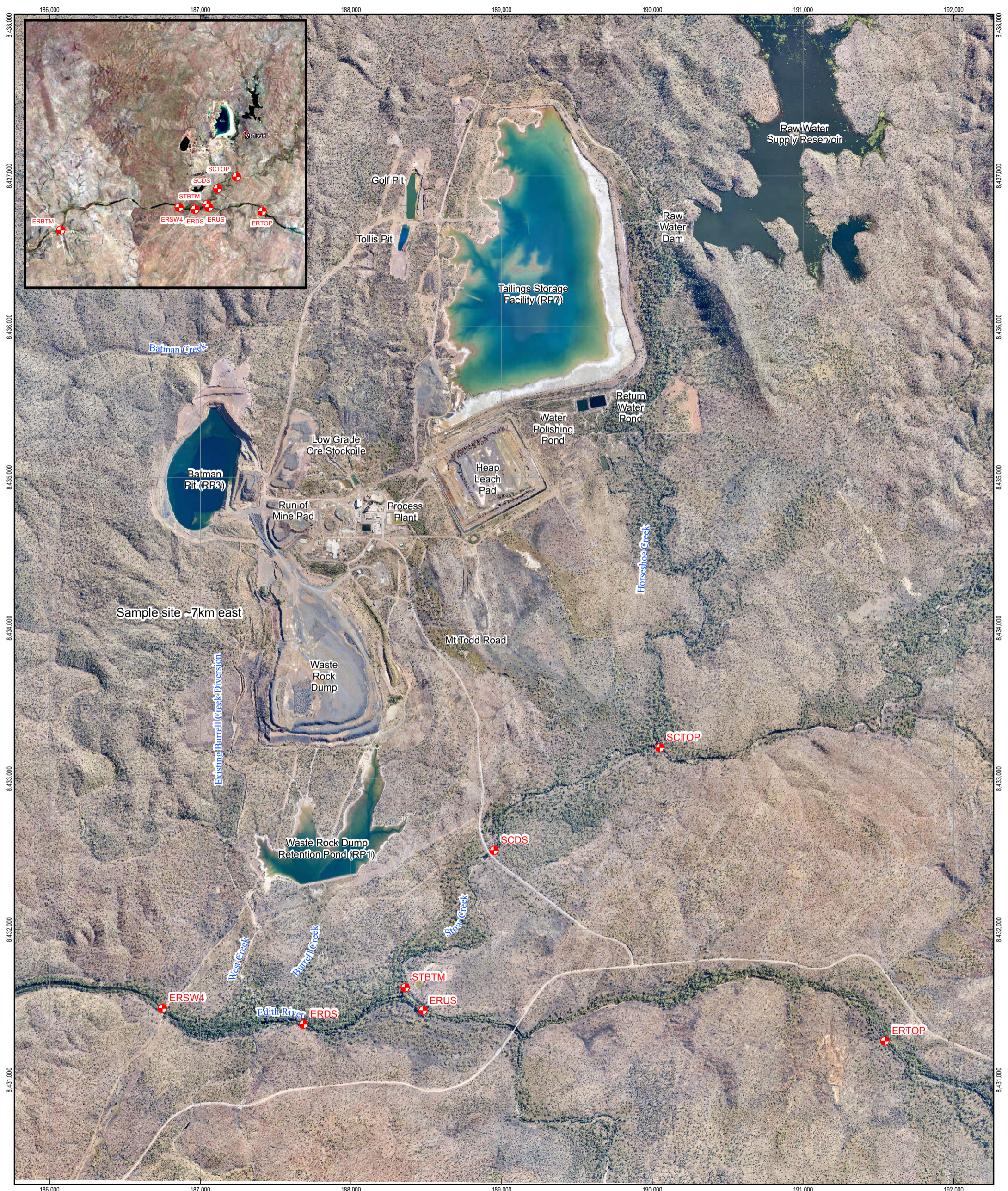
Sites for water, sediment, and macroinvertebrate sampling were chosen to provide an assessment of the state of the aquatic environment in the footprint of the mineral leases and adjacent waterways. Sites were positioned to efficiently quantify existing conditions and allow for detection of impacts from potential pollutant sources.

A total of eight sites were sampled in April 2016. These sites were located on the Edith River and in Stow Creek. Both waterways are ephemeral and had low flow at the time of sampling. There was no direct discharge from RP3 into the Edith River at the time of the survey, nor during the immediate period leading up to the survey.


The range of sites nominated for sampling included historic monitoring sites used by Vista Gold since 2008. The sample sites are detailed in Table 3-1 and their locations shown spatially in Figure 3-1.

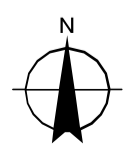
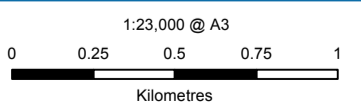
Table 3-1 Site location details, April 2016 aquatic ecology baseline survey

Site	GPS Coordinate UTM (GDA 94 Zone 53L)		Altitude (m)	Location	Treatment
	Easting	Northing			
<b>Edith River</b>					
ERTOP	191545	8431259	121.0	Edith River farthest upstream site	Control
ERUS	188476	8431460	117.2	Edith River upstream of Stow Creek confluence.	Control
ERDS	187685	8431369	116.7	Edith River downstream of Stow Creek confluence.	Potentially Impacted
ERSW4	186750	8431478	114.0	Edith River downstream of site ERSW4	Potentially Impacted
ERBTM	180080	8430235	101.1	Edith River farthest downstream site	Potentially Impacted
<b>Stow Creek (New Sites)</b>					
SCTOP	53019005	8433207	-	Stow Creek upstream site	Control
SCDS	53018895	8432524	-	Stow Creek downstream site	Potentially Impacted
SCBTM	53018836	8431616	-	Stow Creek farthest downstream site	Potentially Impacted



**LEGEND**

 Sampling Locations



Map Projection: Universal Transverse Mercator  
 Horizontal Datum: Geocentric Datum of Australia  
 Grid: Map Grid of Australia 1994, Zone 53

Vista Gold Australia Pty Ltd  
 Mt Todd Gold Project

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**Project Site & Sampling Locations**

**Figure 3-1**

## 3.4 Macroinvertebrate sampling

### 3.4.1 Sampling Methods

Macroinvertebrate sampling and processing followed procedures outlined in the Northern Territory AUSRIVAS Manual for the Darwin-Daly Region (Lamche, 2007). Sampling involved scraping the edge habitat of a site to agitate and suspend macroinvertebrates into the water column whilst a dip net was swept through the water downstream. Areas of riffle or fast flowing habitat, Pandanus roots and severe bank undercuts were avoided when collecting edge habitat samples.

Once collected, the samples were washed through 10 mm and 250 µm mesh sieves. The coarse mesh sieve was examined for large, conspicuous taxa, and these were placed in a labelled sample container along with the contents of the fine mesh sieve; the container was then preserved with 70% ethanol. Samples were subsequently sent to the GHD laboratory in Brisbane for further processing and identification.

Replicate samples were taken at each site to increase statistical power to detect potential impacts.

### 3.4.2 Laboratory processing

Each sample collected was registered into GHD's sample registration system and allocated a unique identifying number.

Samples were washed through a series of sieves (10 mm, 500 µm and 250 µm mesh sizes). Any large, conspicuous taxa identified in the 10 mm mesh sieve were added to the contents of the large mesh fraction retained in the field. The contents of the 500 µm mesh sieve were retained for macroinvertebrate identification and enumeration, while the 250 µm fraction was retained as sample residue for quality assurance purposes. The contents of the 500 µm mesh fraction was poured into a Marchant sub-sampler (Marchant, 1989; Figure 3-2) and extractions made randomly from cells (aliquots) in this apparatus. These extractions were placed under a microscope and the taxa identified and counted. This process continued until either all aliquots were examined, or a total of 200 individuals had been counted and identified. The number of aliquots required to be processed to obtain a minimum 200 individual sub-sample was recorded in order to be able to calculate abundance. Leica MZ9.5 stereo-dissection microscopes with planachromat objectives and a zoom capability between 6.3x and 60x were used to examine specimens. An Olympus BX40 compound microscope with zoom capabilities between 100x and 1000x magnification was used for smaller taxa that required greater magnification.

Taxa were identified to family level where possible, with the exception of key taxa identified in Lamche (2007) as either requiring identification to sub-family level (e.g. Chironomidae) or only to order level (e.g. acarina). All taxa were identified using the keys specified in Hawking (2000). Following identification, taxa counts were recorded in a database and samples preserved and archived by GHD. Raw macroinvertebrate data is presented in Appendix E.



Figure 3-2 Marchant sub-sampler

### 3.4.3 Data analysis

The macroinvertebrate data collected was analysed using univariate and multivariate statistical techniques. Univariate metrics provide an indication of waterway ‘health’, whilst multivariate analysis focussed on variability in community composition between sites.

#### *Univariate techniques*

Univariate measures (biotic indices) were used to assess the ‘health’ status of the macroinvertebrate community at each site. For each analysis, replicate samples were combined to provide an overall site community. The macroinvertebrate community biotic indices used for this study included:

- Abundance
- Taxonomic Richness
- EPT Richness
- SIGNAL 2
- Northern Territory AUSRIVAS Observed over Expected (O/E) scores and bandings

**Abundance** is the count of macroinvertebrates per sample, this is an applicable index in this study as sampling methods were quantitative. To derive whole of sample abundance counts, the percentage of the total sample counted was used with the count in the subsample to calculate the number of macroinvertebrates in the entire sample. This index can be useful in detecting impacts on pollution-affected sites if counts are significantly different between control and impact sites. It can also indicate declines in habitat availability and therefore should be interpreted with a degree of caution, in conjunction with other indices.



**Taxonomic Richness** refers to the number of different taxa contained in a sample. In theory, the higher the taxa richness value, the healthier a community is, but there are some instances where anthropogenic activities promote taxa richness through increased supply of nutrients or habitat (e.g. riffles through additional flows). Therefore, taxa richness data needs to be interpreted on a case by case basis.

**EPT Richness** refers to the proportional representation of key macroinvertebrate taxa belonging to the sensitive macroinvertebrate orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). High EPT richness is indicative of a healthy macroinvertebrate community, though it must be noted that some EPT taxa have more tolerance to pollution than others, so generally EPT richness data is interpreted together with other data such as community composition and SIGNAL score information (discussed further below). It should be noted that in the Northern Territory there are no known Plecoptera species, so in this study, the number of EPT taxa is limited to the number of ephemeropteran and trichopteran families.

**SIGNAL 2 Scores** (Stream Invertebrate Grade Number – Average Level) are based on the sensitivity of each macroinvertebrate family to environmental conditions, including forms of water pollution (Chessman 2003). Macroinvertebrate families are assigned a pollution sensitivity grade between 1 (most tolerant) and 10 (most sensitive). Families in a sample that have not been assigned a grade are excluded from the analysis. This assessment allows an additional line of evidence for assessing the potential impacts of water quality. Lamche (2007) cautions against the use of the SIGNAL 2 index for assessing the status of Northern Territory macroinvertebrate communities, however, GHD still view the assessment of pollution-sensitive versus pollution-tolerant species as a useful indicator to provide some insight as to the level of stress the macroinvertebrate community is currently subjected to from the environment.

**Northern Territory AUSRIVAS O/E 50** is a predictive system that uses macroinvertebrates to assess the biological health of rivers in the Darwin-Daly Region (Lamche, 2007). AUSRIVAS uses site-specific predictions of the macroinvertebrate fauna expected to be present in the absence of environmental stress. The expected (E) fauna from reference sites with similar sets of predictor variables (natural physical and chemical characteristics) are compared to the observed (O) fauna and the ratio derived is used to indicate the extent of any impact. The ratio can range from zero, when none of the expected taxa are found at a site, to one, when all the expected taxa are found. Values greater than one are achieved when more families are found at the site than predicted by the model. The scores derived from the model can be placed in bands delineated by the Monitoring River Health Initiative (Table 3-2), which allows assessment of the level of environmental health at a site.

Table 3-2 AUSRIVAS bands for the Darwin-Daly Model

Band Label	Upper Limit	Band Name	Band Description
Band X	O/E greater than 90th percentile of reference sites used to create the model.	More biologically diverse than reference sites	More families found than expected. Potential biodiversity "hot-spot" or mild organic enrichment. Continuous irrigation flow in a normally intermittent stream.
Band A	O/E within range of central 80% of reference sites used to create the model.	Reference condition	Expected number of families within the range found at 80% of the reference sites.
Band B	O/E below 10th percentile of reference sites used to create the model. Same width as band A.	Significantly impaired	Potential impact either on water and/or habitat quality resulting in a loss of families.
Band C	O/E below band B. Same width as band A.	Severely impaired	Many fewer families than expected. Loss of families from substantial impairment of expected biota caused by water and/or habitat quality.
Band D	O/E below band C down to zero.	Extremely impaired	Few of the expected families and only the hardy, pollution tolerant families remain. Severe impairment.

For this study, macroinvertebrate data was assessed using the NT AUSRIVAS Darwin-Daly Early (dry season) Family level Edge habitat model. The habitat variables required to run this model are latitude, longitude, RIP500 (amount of rainforest in km<sup>2</sup> within a 500 m radius of a given site) and average stream width. RIP500 data has been estimated using vegetation classification GIS data obtained from the Northern Territory Department of Land Resource Management (DLRM).

**An analysis of similarity (ANOSIM)** was run to identify any statistically significant differences between sites upstream and downstream of mine inputs for the abundance, taxonomic richness, EPT richness, and SIGNAL 2 indices. Statistical significance was set at a P-value of <0.05, therefore the null hypothesis of no difference between upstream and downstream sites was accepted for any P-value >0.05.

#### **Multivariate techniques**

Multivariate data analysis was used to assess variation in community composition between samples. Site based replicate samples were kept separate for this analysis.

The multivariate analysis methods used to assess macroinvertebrate data included:

- Non-metric Multi-Dimensional Scaling (NMDS) Ordination;
- Analysis of Similarity (ANOSIM); and
- Similarity Percentage (SIMPER) Analysis.

**NMDS Ordination** provides a representation of the relative similarity of entities (i.e. site samples) based on their attributes (i.e. macroinvertebrate community composition) within a reduced dimensional space. The more similar sites are to each other, the closer they are located in the NMDS ordination space. The initial step in this process was to square root transform the data to reduce the biasing influence of highly abundant taxa on results.

Following data transformation, a similarity matrix for all pairs of samples based on the Bray-Curtis similarity coefficient was calculated. The number of dimensions (axes) used in the NMDS procedure was based on the resultant Stress levels. The stress level is a measure of the distortion produced by compressing multi-dimensional data into a reduced set of dimensions and would increase as the number of axes (i.e. dimensions) is reduced. Stress levels above 0.20 indicate a poor representation of inter-sample similarity and, as such, the NMDS results with stress values of this order require interpretation with caution.

The NMDS was used to display the similarity between treatments ('potentially impacted' and 'control' site groups). This was done in order to establish whether or not there was any evidence of treated mine water discharge impacts on macroinvertebrate community composition.

In order to assess whether between-treatment differences in macroinvertebrate community composition observed were significant, a one-way **Analysis of Similarity (ANOSIM)** was performed also undertaken.

### 3.5 Habitat assessment

Descriptions of habitat conditions were recorded at each site following the criteria listed in the Northern Territory AUSRIVAS "Darwin-Daly Region Model" field sheets (Lamche, 2007). Habitat assessments included the whole reach sampled (100 m longitudinal section of the river) and included:

- Site description
- Water Quality
- Characteristics of macroinvertebrate habitat
- Instream physical characteristics (flow velocity and depth, instream habitat characteristics, bank height, riparian width)
- Riparian vegetation characteristics (types, %cover, exotic species, erosion, land use)
- Water quality observations (clarity, odour, oils, foam/scum, plumes etc.)
- Sketches of the site, including a cross-section of the reach.

The information recorded was used to help interpret biological data and to provide input data for the Northern Territory AUSRIVAS model (e.g. mean stream width, mean flow). All stream width and flow data collected was based on field estimates.

Photos were taken of upstream and downstream portions of the reach sampled, as well as bank habitat and other key habitat features to further characterise the habitat conditions at each site, serving as a pictorial record of site conditions that can be tracked over time using photos taken from the same photo points.

### 3.6 Water Quality

#### 3.6.1 Sampling Methods

The physical and chemical parameters of the water at each site were measured *in-situ* using a calibrated YSI 650 MDS multi-parameter water quality meter.

The YSI Water Quality meter was used to measure pH; electrical conductivity (EC) ( $\mu\text{S}/\text{cm}$ ); water temperature ( $^{\circ}\text{C}$ ) and Dissolved Oxygen (DO) concentrations ( $\text{mg}/\text{L}$ ).

#### 3.6.2 Data analysis

Water quality results were compared against the Site Specific Trigger Values (SSTVs) derived for the Edith River to be met at SW4 (GHD 2015b).

### 3.7 Quality Assurance / Quality Control

The following Quality Assurance / Quality Control (QA/QC) measures were undertaken as part of this project:

#### 3.7.1 General

- One team member checked that all field sheet fields were completed correctly, all required site photographs were taken and that all necessary sampling completed before leaving site.
- Data entry was checked and verified by one team member not involved in data entry to ensure it was correct before data analysis was carried out.
- All report outputs were reviewed by a senior GHD staff member prior to their release to Vista Gold.

#### 3.7.2 Water Quality

- To reduce the potential for sample contamination of *in-situ* physical and chemical readings, water quality measurements and water samples were taken before any other sampling (for this program samples were collected on the first day of the study).
- The water quality meters used were calibrated in accordance with the manufacturer's specifications prior to sampling.
- QA/QC samples were taken and compared.

#### 3.7.3 Macroinvertebrate Sampling

- Sample contamination was prevented through thorough rinsing of dip nets and sieves between samples and sites. This also helped to prevent the spread of nuisance algae between sites.
- New sample containers were used for each sample collected. Screw top sample containers were used for all samples and were taped to reduce the risk of sample loss during transport.
- Each sample was clearly labelled, with a waterproof label placed inside the sample container as well as sample details written on the sample container lid in permanent marker to ensure streamlined sample tracking when samples were sent to the laboratory for processing.
- Once samples arrived at the Brisbane laboratory, they were entered into GHD's sample registration system and allocated a unique identifying number so that they are easily traced.
- A senior taxonomist cross-checked 5% of all samples to assess the accuracy of identification and enumeration.

## 4. Site Descriptions

### 4.1.1 ERTOP (Control Site)

The site is located upstream of historical Mt Todd mining operations on the Edith River, and was characterised by large deep pools, with a short riffle at the downstream end, extending for the length of the reach. The pools were divided by a deposit of sand and gravel. The substrate in the pools consisted of gravel, sand and cobbles. A large amount of woody debris was found at the site, and the majority of the banks upstream of the riffle contained exposed roots and undercut banks. The river was approximately 8 m wide through most of the reach, and riparian vegetation was almost a closed canopy, shading the majority of the river, consisting largely of *Pandanus aquaticus*.



Figure 4-1 Site photos from ERTOP: looking downstream (left), looking upstream (right).

#### 4.1.2 ERUS (Control Site)

This site was located on the Edith River upstream of its confluence with Stow Creek. The flow channel was approximately 8 m wide. The river was characterised by angled and undercut banks, with exposed roots lining much of the larger sections. The substrate was a mix of cobbles, pebbles and sand with several large leaf packs and macrophytes. The entire reach was shaded.



Figure 4-2 Site photos from ERUS: looking at riffle section (left), looking pool section (right).

#### 4.1.3 ERDS (Potentially Impacted Site)

This site is located downstream of the Edith River confluence with Stow Creek which receives flow from RP1. This site was characterised by a long deep (>1.5 m) pool. The substrate at this site appeared to mostly consist of sand/silt and detritus, however, it was difficult to determine due to the depth and turbidity. The channel at this site was shaded, with continuous longitudinal coverage of large trees along both banks. The length of this section was characterised by vertical undercut banks, with exposed roots lining much of the larger pools. There was a fresh crocodile indicator installed at this site, as the previous one had been destroyed, (presumably by a crocodile).



Figure 4-3 Site photos from ERDS: looking at riffle section (left), looking pool section (right).



#### 4.1.4 ERSW4 (Potentially Impacted Site)

The site is located at SW4 monitoring point that is also one of the WDL compliance monitoring points. This site is 1.4 km downstream from the point where RP3 enters the Edith River. There is a small weir at this section of the Edith River. Upstream of the weir is a pool (>1.5 m deep at the time of sampling) and downstream of the weir there was a riffle, shallow run section approximately 200 m in length before the river opened up to a longer deeper run section. The pool section was characterised by undercut banks. The substrate was a mix of cobbles, pebbles and sand with several large leaf packs. The entire resection downstream of the weir was reach was shaded, whereas the upstream weir pool was more exposed.



Figure 4-4 Site photos from ERSW4: shallow isolated pool in upstream section of reach (left), large deeper pool downstream (right).

#### 4.1.5 ERBTM (Potentially Impacted Site)

The site was located just upstream of the Edith River rail bridge approximately 10 km downstream from the mine site and was characterised by a large open channel. The water at this site was restricted to a series of isolated pools and riffles. There was visible flow within these pools likely through hyporheic flows. The substrate consisted of sand and silt, macrophytes and snags. The banks were approximately 3.5 m high and were very steep. Riparian vegetation was thick. Large trees lined the banks, with their roots exposed.

This site contains copper contamination from the train derailment in December 2011 which has the potential to confound any results.



Figure 4-5 Site photos from ERBTM: looking upstream (left) looking downstream (right)

#### 4.1.6 SCTOP (Control Site)

The site is located on Stow Creek, just upstream of the Horseshoe Creek confluence with Stow Creek. Horseshoe Creek receives treated mine water discharge from RP3. This site is characterised by a shallow riffle run that flows into a deep, slow flowing pool. The substrate consisted of sand and silt, with an abundance of snags. The banks were approximately 3 m high and were very steep. Riparian vegetation consisted of riparian woodland.



Figure 4-6 Site photos from SCTOP: looking upstream (left) looking downstream (right)

#### 4.1.7 SCDS (Potentially Impacted Site)

The site is located upstream of the Mt Todd Mine road bridge on Jatbula Road and was characterised by a shallow run with a series of vegetated bar islands in the channel. There was visible flow within this section with areas of high flow between the vegetated bar islands. The substrate consisted of sand and there were areas of macrophytes and snags. The banks were steep and approximately 2 m high on the left bank and 1 m on the right. Riparian vegetation consisted of riparian woodland, with Pandanas groves along the water's edge.



Figure 4-7 Site photos from SCDS: looking upstream (left) looking downstream (right)

#### 4.1.8 SCBTM (Control Site)

This site was located just upstream of the Stow Creek and Edith River confluence, approximately 1 km downstream of SCDS. The water at this site was restricted to a series of small stepped pools and riffles. The substrate consisted of sand, cobbles and bedrock. Macrophytes and snags were prevalent at this site. The banks were approximately 4 m high and were very steep. Riparian vegetation consisted of riparian woodland.



Figure 4-8 Site photos from SCBTM: looking upstream (left) looking downstream (right)

# 5. Results

## 5.1 Water Quality

### 5.1.1 In-situ Water Testing Results

*In-situ* water quality testing results collected as part of the April 2016 survey are presented in Table 5-1. These have been compared to the site specific trigger values (SSTV) listed in WDL 178-04.

Results show:

- Temperature varied by 4°C between sites, with the warmest site at the highest point sampled on Stow Creek
- pH was lowest (outside of the SSTV range) at the furthest upstream (control) site on the Edith River, with pH increasing at the sites downstream. Stow Creek showed the opposite pattern, with the highest pH at the uppermost site, with pH trending lower downstream
- EC was very low at the upstream reference sites on the Edith River, which increased approximately three-fold at the downstream sites. This pattern was also observed at the Stow Creek sites, with a low headwater value followed by a large increase in EC at the potentially impacted downstream sites. However, all EC values recorded were within the SSTV
- Dissolved oxygen tended to be lowest at the furthest upstream sites on both waterways, increasing downstream. Only three sites were within the SSTV for percentage saturation of oxygen, all at the bottom sites of the two waterways.

Table 5-1 In-situ water quality results (April 2016)

Site	Treatment	Time	Temperature (°C)	pH	EC (µS/cm)	DO (mg/L)	DO % (calc)
SSTV				<b>6.0-8.0</b>	<b>250</b>		<b>85-120</b>
ERTOP	Upstream Control	10:00	29.0	<b>5.37</b>	17.7	5.35	<b>70.4</b>
ERUS	Upstream Control	14:30	29.2	6.51	18	5.90	<b>77.9</b>
ERDS	Potentially Impacted	15:00	29.7	6.39	66.3	5.34	<b>71.1</b>
ERSW4	Potentially Impacted	07:40	29.1	6.71	65.3	6.03	<b>79.5</b>
ERBTM	Potentially Impacted	09:00	29.1	6.49	61.1	6.67	87.9
SCTOP	Upstream Control	14:47	33.1	6.59	14.8	3.97	<b>55.5</b>
SCDS	Potentially Impacted	16:03	30.5	6.02	186.5	6.61	89.0
STBTM	Potentially Impacted	12:00	31.1	6.01	184	7.10	99.2

*Text in Bold denotes an exceedance of site specific trigger values (SSTVs) for the Mt Todd Mine Site*

### 5.1.2 Laboratory Water Quality Data

Water samples were taken at the time of macroinvertebrate sampling for laboratory analysis for a range of parameters including nutrients, physicochemical parameters and metals. The results are useful when interpreting macroinvertebrate results, as high levels of certain chemicals can explain macroinvertebrate community compositions. The full summary of results for water quality at all sites are presented in Appendix A, with laboratory reports included in Appendix B.

Water quality parameters of note along the Edith River included the following:

- A large spike in TDS was seen at ERUS, which was not seen at any of the remaining sites. This may have been a result of collecting the sample from an area disturbed during sampling of macroinvertebrates, or an area of no flow
- Sulphur levels went from undetectable upstream to a steady range of 13-15 mg/L at the downstream sites
- Nutrient levels remained steady and low at all sites sampled
- Slight increases in calcium, potassium and sodium occur between upstream and downstream sites
- Magnesium and manganese levels were detectable and increased between upstream sites and downstream sites; all levels were below the SSTVs for these metals
- Iron levels were above SSTVs at all sites, with no particular spatial trend observed in relation to position of the release point, suggesting a natural occurrence

Water quality parameters of note along Stow Creek included the following:

- TDS values and water hardness increased significantly between the upstream and downstream site
- Sulphur values increased from undetectable limits upstream to >50 mg/L at downstream sites
- Slight nutrient concentration increases were seen between upstream and downstream sites.
- Notable increases in magnesium concentration were seen between the upstream and downstream sites, with concentrations at downstream sites above SSTVs.
- Iron levels were elevated above the SSTV at all sites, with higher concentrations downstream.
- Zinc was detectable at only the first downstream site, but was below the SSTV.

### 5.1.3 QA/QC Samples

Analysis was undertaken for the laboratory QA sample, with results shown in Appendix A. The majority of samples show repeatability below a 50% relative percentage difference (RPD). The exceptions were sulphur, calcium and magnesium, where there was over a 50% difference, with the difference more than five times the limit of reporting. In each case, the concentrations were relatively low (i.e. below criteria) and this assessment has conservatively used the higher of the two values in each case for assessment. Some degree of variability due to nature of the sampling (surface water) is to be expected in this case, and therefore it can be concluded that these data can be relied upon to draw conclusions in the context of the investigative objectives.

Laboratory QC documentation is included in Appendix B.

## 5.2 Sediment Quality

### 5.2.1 Laboratory Sediment Quality Data

Sediment quality results are presented in Appendix C and sediment particle size results in Figure 5-1. Laboratory reports are attached in Appendix D.

The sediment quality results were compared against the ANZECC Guideline (2016) Sediment Quality Guideline (SQG) low values. No values exceeded the SQG-Low values, with most metals undetectable. The highest metal concentration at all sites was iron, followed by manganese. Metal concentrations did not show spatial patterns relative to the position of the release point for any analytes. This may have been due partly to the observed broad similarity in sediment particle size distribution across study sites (see below).

Sediment particle size was broadly similar at the two furthest sites upstream on Stow Creek, though there was slightly coarser sediment at site SCDS. The site at the bottom of the creek had significantly coarser sediment, with a higher proportion in the range >2.36 mm.

On the Edith River, the four most upstream sites had generally similar sediment particle size distribution, though the two impact sites closest to the release point featured a slightly higher proportion of finer sediment particles compared to the upstream control sites. Further downstream at site ERBTM, the sediment makeup changed significantly, with close to 70% of sediment particles being >600 µm (i.e. coarse), with limited fines.

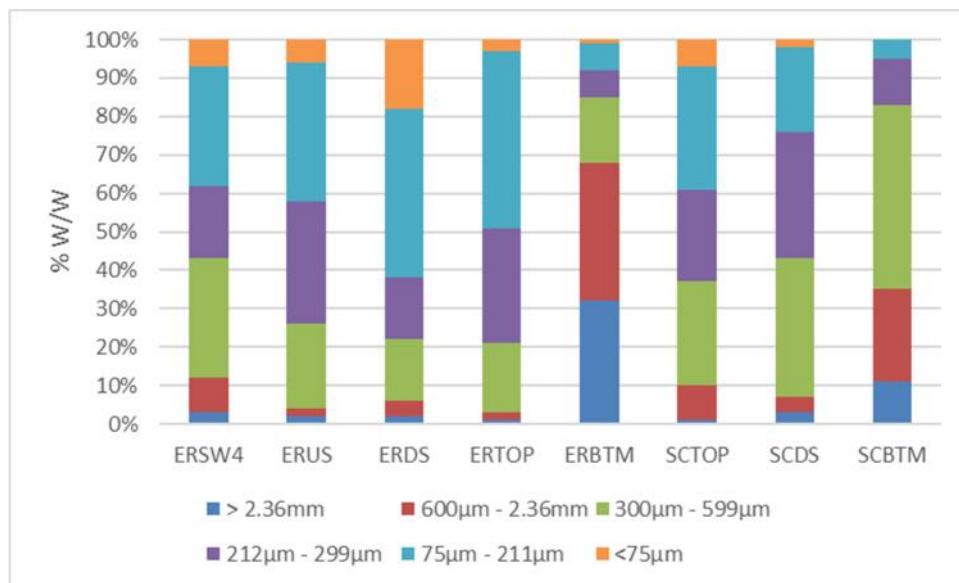


Figure 5-1 Sediment particle size for all sites sampled

### 5.2.2 QA/QC Samples

Analysis was undertaken for the laboratory QA sample, with results shown in Appendix C. Results show an RPD below 50% for all samples, therefore repeatability is considered sound and results reliable.

Laboratory QC documentation is included in Appendix D.



### 5.3 Macroinvertebrates

Replicate macroinvertebrate samples were taken from the edge habitat from each of the eight sites outlined in the survey design, replicates are denoted as R1 and R2 throughout the results section.

The following sections outline the results of the samples.

#### 5.3.1 Abundance

Extrapolated macroinvertebrate abundance counts from replicate samples are shown in Figure 5-2 for both the Edith River and Stow Creek. Graphically presented, the results do not suggest any strong spatial trend in relation to the release point location for either of the waterways sampled. This is supported by the ANOVA undertaken for both waterways, shown in Table 5-2, with no statistically significant difference in abundance detected between upstream and downstream sites on the Edith River (P-value = 0.309) or Stow Creek (P-value = 0.25).

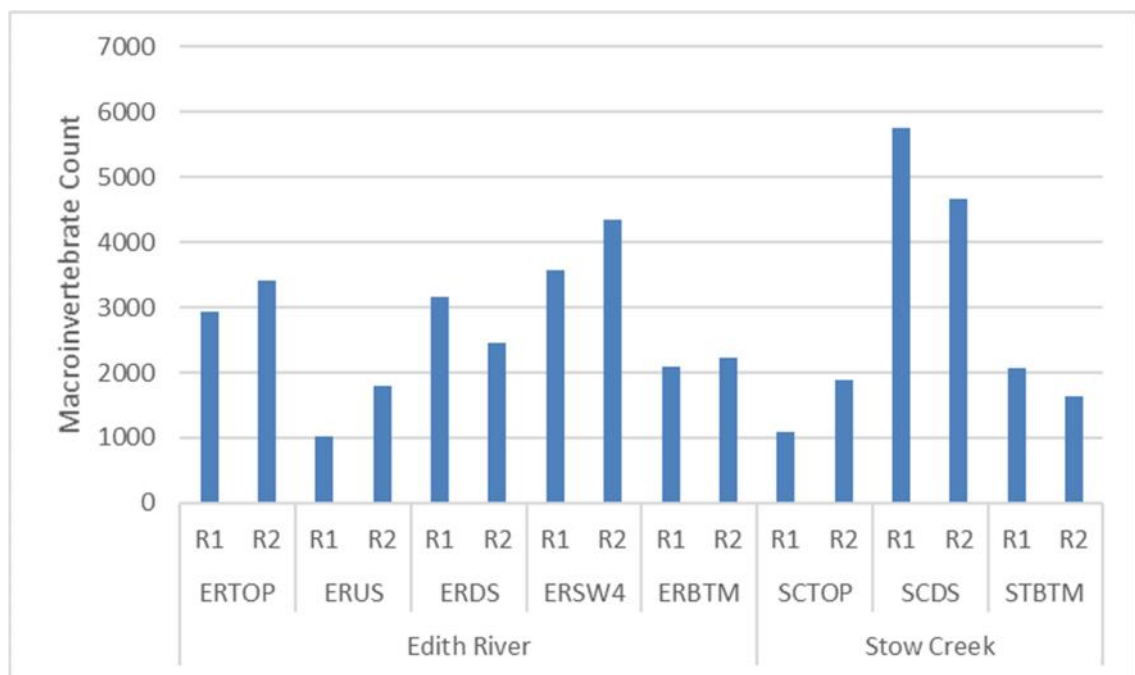


Figure 5-2 Macroinvertebrate abundance by site

Table 5-2 Single-factor ANOVA (upstream vs downstream) for Edith River and Stow Creek abundance results

Source of Variation	SS	df	MS	F	P-value	F crit
<b>Edith River</b>						
Between Groups	1103616	1	1103616	1.181	<b>0.309</b>	5.318
Within Groups	7477735	8	934717			
Total	8581351	9				
<b>Stow Creek</b>						
Between Groups	5567133	1	5567133	1.808	<b>0.25</b>	7.709
Within Groups	12317370	4	3079342			
Total	17884502	5				

### 5.3.2 Taxonomic richness

Taxonomic richness results for each replicate and combined totals for each site on both waterways are shown in Figure 5-3. The Edith River results show that at least 19 taxa were found at each of the five sites, with the highest combined site count (30) found at ERDS (impact).

The highest number of taxa were found in the furthest upstream site on Stow Creek.

No statistically significant difference in abundance was detected between upstream and downstream sites on either waterway from the ANOVA undertaken, with Edith River showing a P-value of 0.844 and Stow Creek a P-value of 0.196. Full results of the ANOVA are shown in Table 5-3.

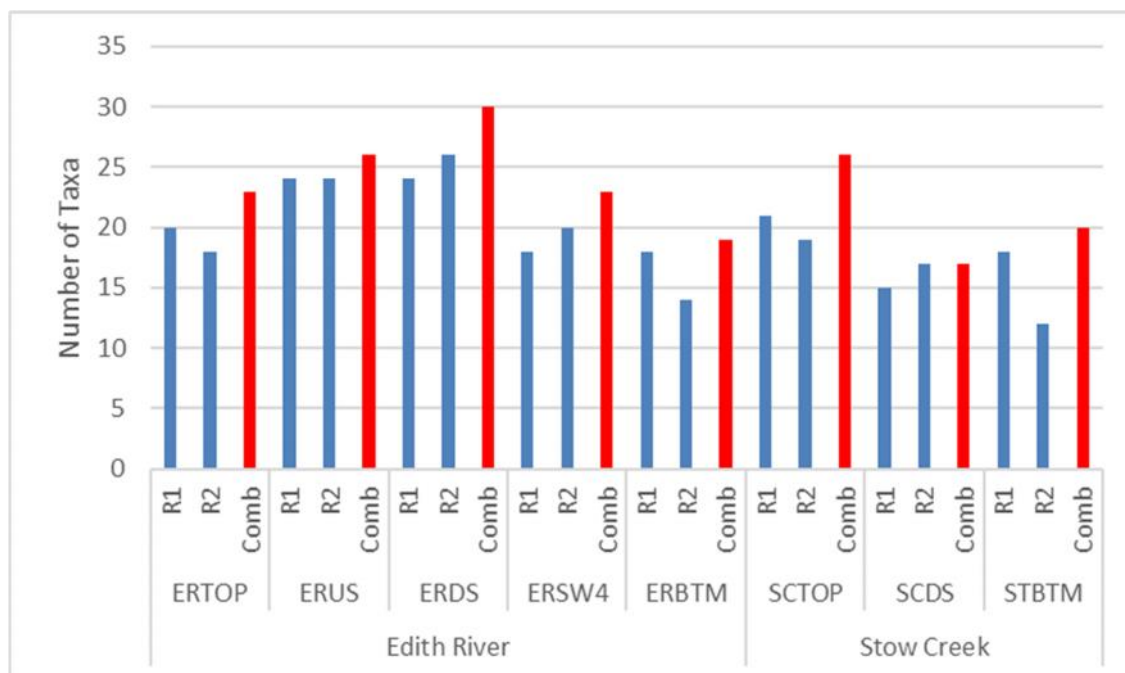


Figure 5-3 Macroinvertebrate Diversity

Table 5-3 Single-factor ANOVA (upstream vs downstream) for Edith River and Stow Creek taxonomic results

Source of Variation	SS	df	MS	F	P-value	F crit
<b>Edith River</b>						
Between Groups	0.07	1	0.067	0.042	<b>0.844</b>	5.318
Within Groups	12.83	8	1.604			
Total	12.9	9				
<b>Stow Creek</b>						
Between Groups	0.75	1	0.75	2.4	<b>0.196</b>	7.709
Within Groups	1.25	4	0.313			
Total	2	5				

### 5.3.3 EPT Richness

The number of EPT taxa recorded at each site replicate sampled and the combined total in 2016 is shown in Figure 5-4. The percentage composition of each of the Ephemeroptera and Trichoptera families identified by site is shown in Figure 5-5.

The number of EPT taxa recorded on the Edith River ranged from a total of four at the downstream monitoring site ERSW4 to six at several other sites, with no particular spatial trend apparent in relation to position relative to the release point. The dominant families overall by abundance (in descending order) were the Caenidae (SIGNAL = 4), Baetidae (SIGNAL = 5) and Leptoceridae (SIGNAL = 6). The most pollution sensitive PET taxon recorded in the study area was Leptophlebiidae (SIGNAL = 8). It was recorded at all sites, except the control site ERTOP.

Results for Stow Creek show a drop in EPT diversity between the upstream site (SCTOP) and the first downstream site (SCDS) by two families. There was also a shift in dominance from the more sensitive Baetidae to Caenidae from SCTOP to sites downstream.

An ANOVA of the number of EPT families between upstream and downstream sites on both waterways was undertaken (Table 5-4). No statistical difference was identified for the Edith River sites (P-value of 0.844) or the Stow Creek sites (P-value of 0.196).

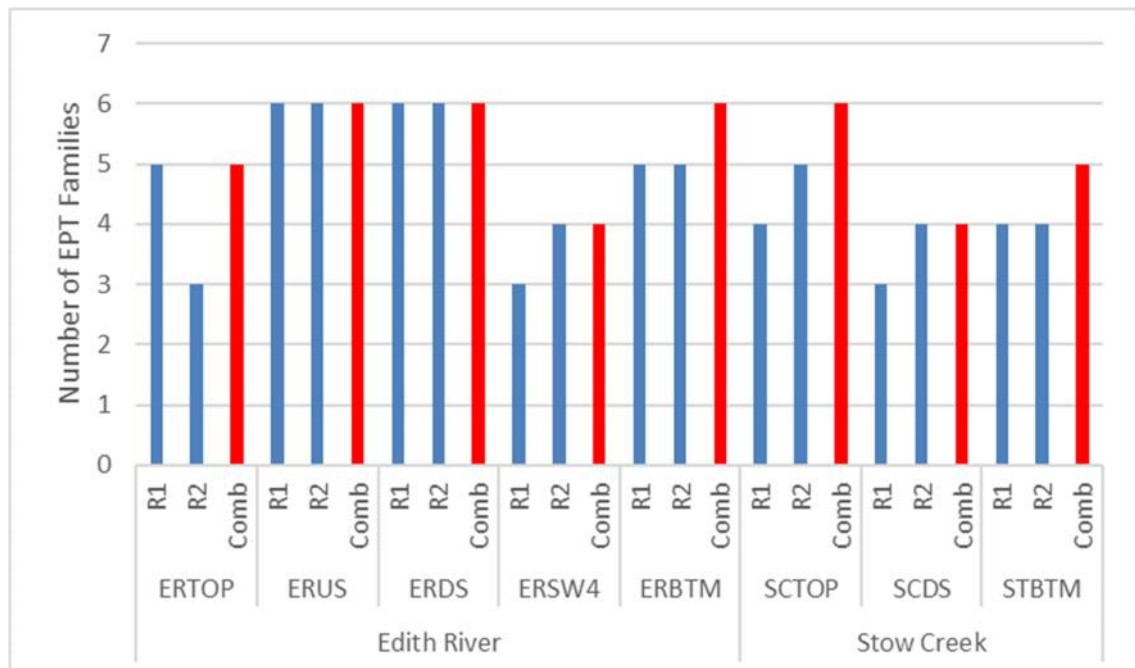


Figure 5-4 Ephemeroptera, Plecoptera, and Trichoptera (EPT) Richness

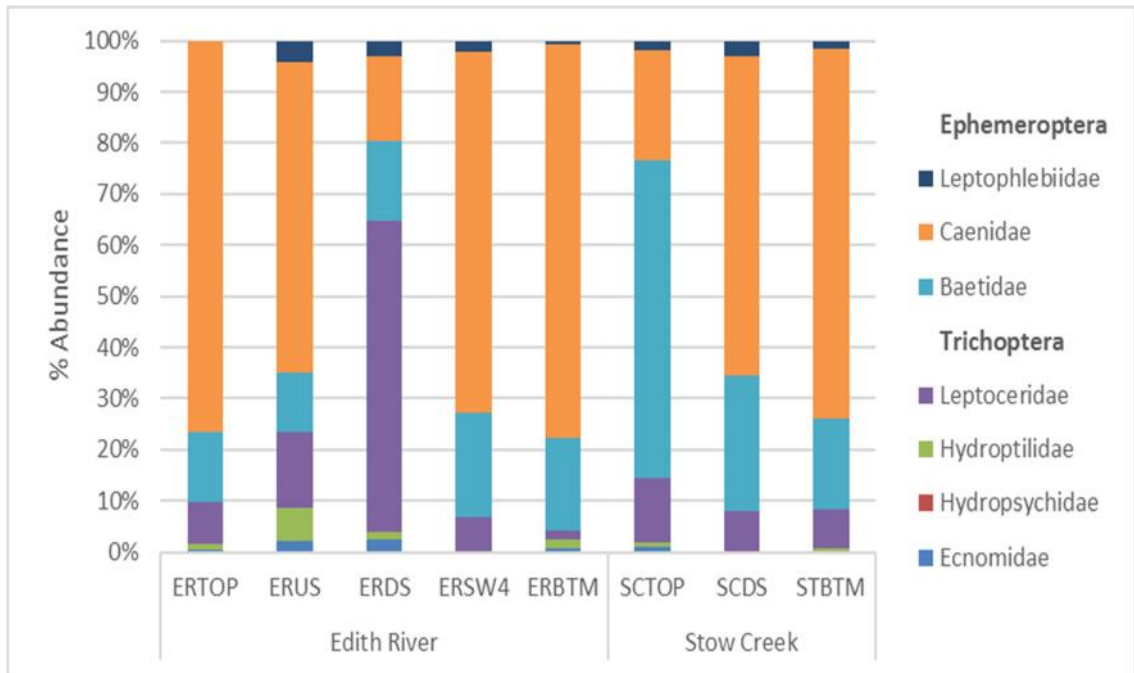


Figure 5-5 Percentage EPT family abundance from total EPT family count

Table 5-4 Single-factor ANOVA (upstream vs downstream) for Edith River and Stow Creek EPT results

Source of Variation	SS	df	MS	F	P-value	F crit
<b>Edith River</b>						
Between Groups	0.067	1	0.067	0.042	<b>0.844</b>	5.318
Within Groups	12.8	8	1.604			
Total	12.9	9				
<b>Stow Creek</b>						
Between Groups	0.75	1	0.75	2.4	<b>0.196</b>	7.709
Within Groups	1.25	4	0.313			
Total	2	5				

### 5.3.4 SIGNAL 2

The scores from the SIGNAL 2 analysis are presented graphically in Figure 5-6.

The SIGNAL 2 scores for the Edith River sites were considered low overall relative to healthier perennial streams in the >7 SIGNAL score region, ranging from 3.82 to 4.44. There was a slight upwards trend in the score from upstream to downstream. The overall low scores are most likely reflective of the nature of the habitat rather than impact of treated mine water.

The scores for the Stow Creek sites were also low. Results ranged from 3.64 at SCSD R1 to 4.73 at one of the furthest downstream replicate sites. Again there was a slight improvement seen in sites from upstream to downstream.

The ANOVA undertaken showed no significant difference in SIGNAL 2 scores between upstream and downstream sites on either waterway, with a P-value of 0.23 for the Edith River and a P-value of 0.6 for Stow Creek.

It should be reaffirmed here that the SIGNAL 2 system is used an indicative index only and is not recommended for use in the Northern Territory by some parties; any conclusions from the data should be interpreted with a degree of caution.

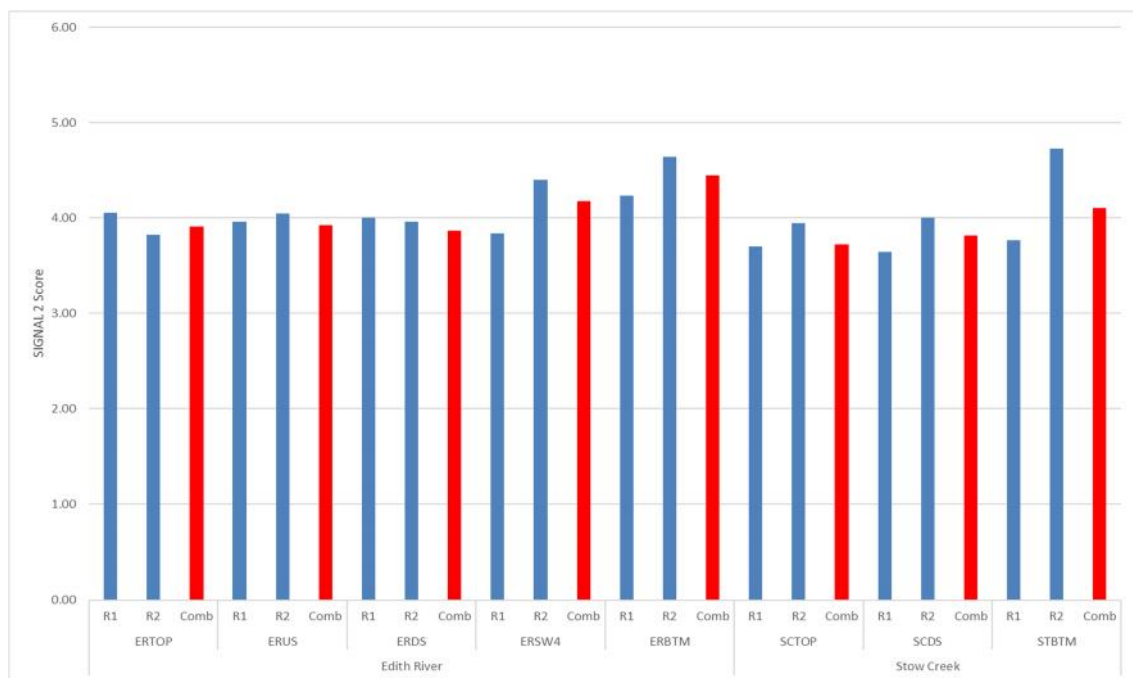


Figure 5-6 SIGNAL 2 calculated scores

Table 5-5 Single-factor ANOVA (upstream vs downstream) for Edith River and Stow Creek SIGNAL 2 results

Source of Variation	SS	df	MS	F	P-value	F crit
<b>Edith River</b>						
Between Groups	0.106	1	0.106	1.692	<b>0.23</b>	5.318
Within Groups	0.500	8	0.062			
Total	0.605	9				
<b>Stow Creek</b>						
Between Groups	0.060	1	0.060	0.324	<b>0.6</b>	7.709
Within Groups	0.737	4	0.184			
Total	0.797	5				

### 5.3.5 AUSRIVAS Modelling

All samples except SCBTM\_1 returned an AUSRIVAS band 'A' rating which indicates the site are similar to reference with the expected number of families within the range found at 80% of the reference sites (Table 5-6).

Table 5-6 AUSRIVAS Darwin-Daly model output

River	Site	OE50	Band
Edith River	ERTOP_1	1.16	A
	ERTOP_2	0.91	A
	ERUS_1	1.16	A
	ERUS_2	1.16	A
	ERDS_1	1.07	A
	ERDS_2	1.15	A
	ERSW4_1	0.99	A
	ERSW4_2	0.99	A
	ERBTM_1	0.99	A
	ERBTM_2	0.82	A
Stow Creek	SCTOP_1	0.99	A
	SCTOP_2	0.82	A
	SCDS_1	0.83	A
	SCDS_2	0.83	A
	STBTM_1	0.91	B
	STBTM_2	0.74	A



### 5.3.6 Multivariate Community Analysis

Multivariate analysis in the form of non-metric multidimensional scaling (NMDS) was performed on the replicate macroinvertebrate taxonomic composition data from the Edith River to determine the degree of similarity in composition between samples.

The Analysis of Similarity (ANOSIM) identified the macroinvertebrate communities of Edith River were significantly different that those of Stow Creek (Significance 2.4%, Global R 0.244).

The ANOSIM failed to identify a significant difference between upstream (US) and downstream (DS) sites of the respective waterways. The result from this analysis showed:

- The ANOSIM comparing Edith Upstream and Downstream samples returned a significance value of 14.8% with a Global R of 0.163. This is not a significant result
- The ANOSIM comparing Stow Creek Upstream and Downstream samples returned a significance value of 13.3% with a Global R of 0.357. This is not a significant result

Overall the multivariate community analysis indicates that the treated mine water discharges and runoff from the mine site do not adversely impact on the macroinvertebrate community composition of either waterway.

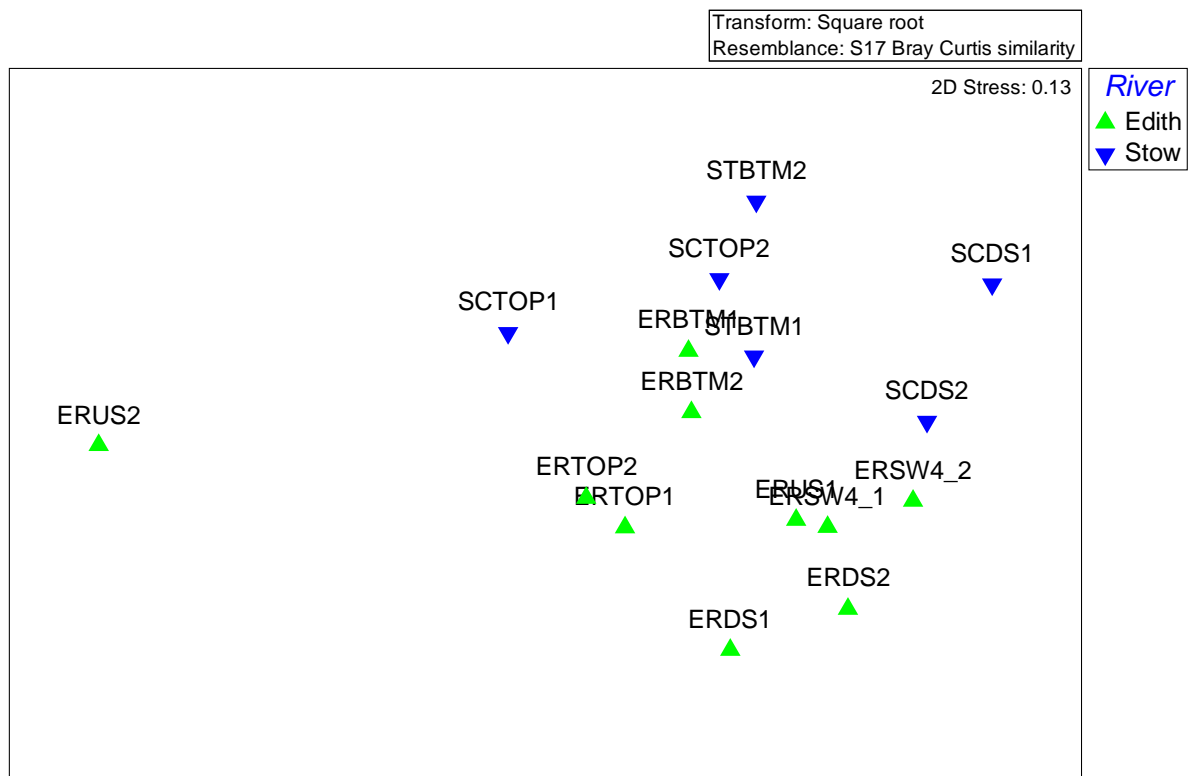


Figure 5-7 MDS sites based on 'Treatment'

## 5.4 Temporal Analysis

Temporal analysis has been undertaken here for the Edith River. As this is the first monitoring event at Stow Creek for a number of years, temporal analysis has not been completed for this waterway.

The analysis has compared this year's monitoring event with last year's only. Slight differences in monitoring technique will impair the comparison of any monitoring events prior to 2015 and for this reason, results prior to 2015 are not shown here.

### 5.4.1 Macroinvertebrate Abundance

The differences in abundance between the 2015 and 2016 monitoring events are shown in the histogram in Figure 5-8. Abundance was lower in this year's monitoring event at both upstream sites, particularly at site ERUS. Results were similar at the next two downstream sites and then a drop in abundance was seen as the furthest downstream site. There is no consistent trend in the manner in which abundance changes between these two years.

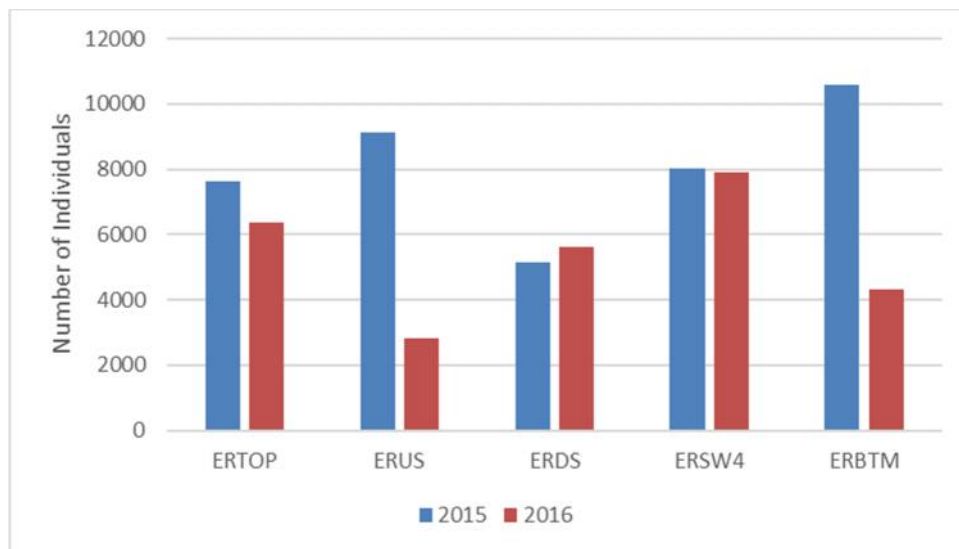


Figure 5-8 Site Extrapolated Abundance Totals

### 5.4.2 Taxa Diversity

Taxa diversity changes between the two sampling events are shown in Figure 5-9. Overall there was no notable or consistent changes between years at any of the sites monitored.

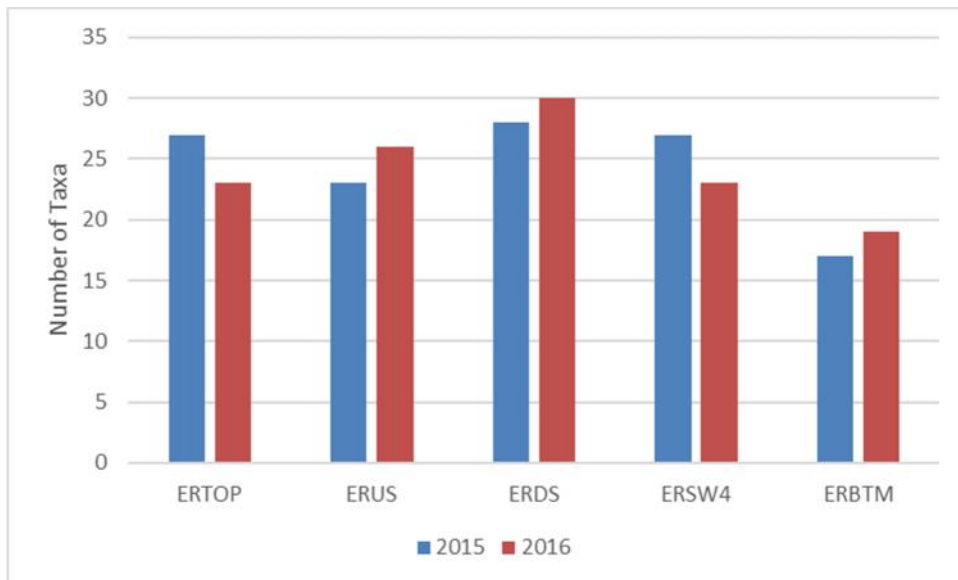


Figure 5-9 Temporal change in taxa diversity

#### 5.4.3 EPT Taxa

Taxa diversity changes between the two sampling events are shown in Figure 5-10. There was no consistent temporal trend for EPT richness across sites. Among the impact sites, the most notable changes were observed at site ERSW4 and ERBTM, but those sites featured opposing temporal trends. Hence, there is no consistent pattern of decline in PET richness across impact sites.

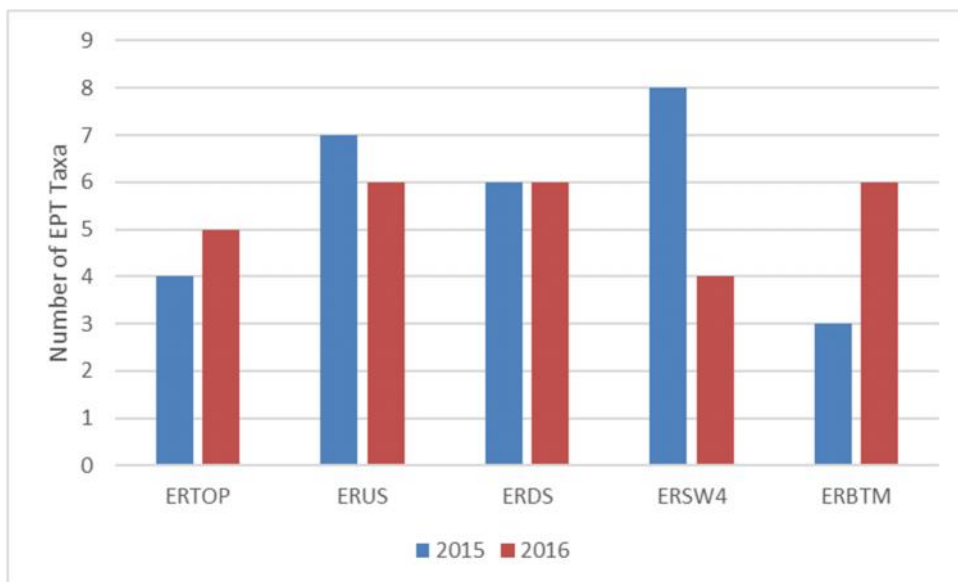


Figure 5-10 Temporal change in EPT Diversity

#### 5.4.4 SIGNAL 2

SIGNAL 2 scores comparisons between the two sampling events are shown in Figure 5-11. The results have not varied substantially between years and SIGNAL 2 scores have increased slightly at two of the impact sites. .

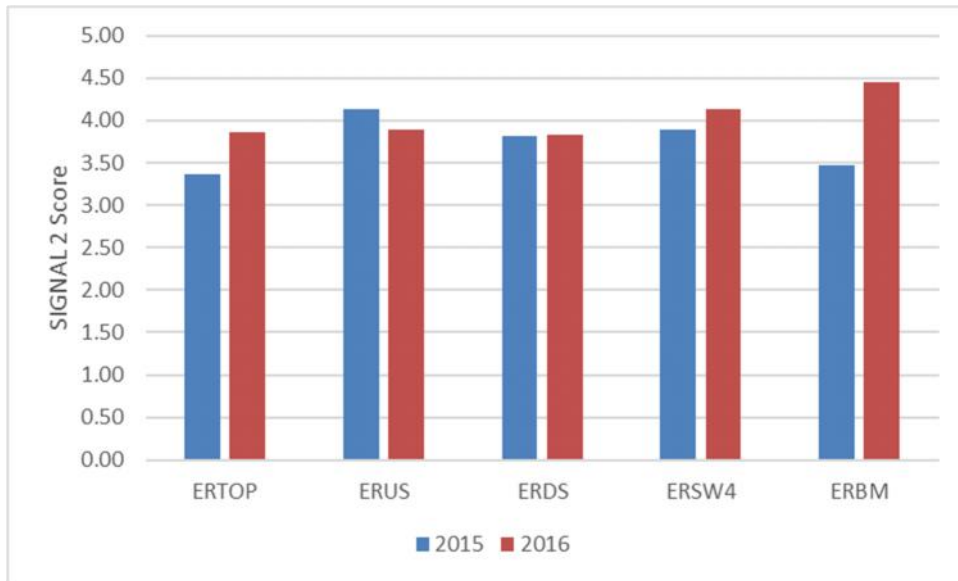


Figure 5-11 Temporal change in EPT Diversity

## 6. Discussion

### *Edith River*

Water quality along the Edith River at the time of sampling showed the water chemistry to be benign in terms of toxic potential. There were some noticeable trends from upstream to downstream with magnesium and manganese content, but all were below SSTVs, with manganese, significantly below the SSTV. Total iron concentrations were above SSTVs at all sites, with no spatial trend between upstream and downstream sites, suggesting a natural source. Further, dissolved iron concentrations (the bioavailable fraction) were all below the SSTV.

Sediment quality analysis along the waterway showed that no parameter concentrations exceeded the SQG-low trigger values stipulated in the ANZECC Guidelines (2016). Iron and manganese were the only metals detectable in bioavailable forms within the sediment sampled. Sediments along the Edith River are considered to be benign in terms of potential toxicity.

The abundance of macroinvertebrates was highly variable between sites on the Edith River, with no spatial trends noted. Therefore, the differences in abundances seen along the river are most likely a result of changes in habitat availability between sites rather than any impacts of treated mine water discharge. The ANOVA showed no significant difference between upstream and downstream sites for this index.

Taxonomic richness results do not suggest an impact from exposure to treated mine water. The site immediately downstream of the discharge area (ERDS) showed the highest diversity and equal highest number of EPT families for the Edith River sites. There was a decline in taxa richness from this site towards the site at the bottom of the waterway. However, this is likely explained by habitat changes rather than treated mine water impacts as the influence of the discharge would be expected to decline through dilution with distance from the release point. Also, no significant difference was detected in the ANOVA.

The EPT results do not point to any obvious impacts from treated mine water on the Edith River, with no significant difference in EPT counts between the sites immediately upstream and downstream of the discharge area. There was a change in EPT family percentage abundance between the sites, but this is more likely a result of habitat availability rather than water chemistry, as pollution sensitive EPT taxa (e.g. Leptophlebiidae) still occur at both these sites.

AUSRIVAS results showed that the macroinvertebrate communities all sites (regardless of their orientation to the discharge) returned the expected number of families within the range found at 80% of the reference sites of the Darwin Daley model. This consistent AUSRIVAS result indicates that there was no deleterious impact on invertebrate communities during the time of, or the weeks leading up to the survey.

Multivariate community analysis confirms all of the above observations, showing no significant statistical difference between sites upstream and downstream of the discharge location.

Temporally, there are no notable or consistent trends for any of the macroinvertebrate indices between the sample events in 2015 and 2016.

In conclusion, the results show that treated mine water discharge is not resulting in any significant detrimental impacts to the aquatic ecology of the Edith River.

### *Stow Creek*

The Stow Creek sites showed some changes in water chemistry between upstream and downstream sites. Sulphur content, TDS and water hardness increased and pH became slightly more acidic downstream of Horseshoe Creek, as RP3 was not discharging at the time of

sampling these observed changes are naturally occurring. Total and dissolved magnesium concentrations were found to increase downstream also, to concentrations above the SSTVs. Total iron concentrations were above the SSTVs at all sites, but as was the case in the Edith River, the dissolved bioavailable fractions were all within the SSTV. Nutrient levels increased slightly downstream of Horseshoe Creek. Most parameters that showed an increase at the first downstream site began to recover towards ambient levels at the next downstream site.

Sediment chemistry was similar to the Edith River, with no parameters exceeding the adopted SQG-low trigger values. Manganese showed an increasing pattern from upstream to downstream. Iron concentrations were similar at all sites. Zinc was detected only at the furthest downstream site, but at a low concentration slightly above detection limits. Overall sediment is considered to have a low potential toxicity.

Macroinvertebrate abundance increased dramatically at the first downstream site (SCDS), then showed a corresponding drop in abundance at the next downstream site. The large abundance change is related to numbers of chironomids and cladocerans in the samples. This is unlikely to be related to the noted changes to water chemistry, as the same taxa are seen upstream. It is more likely a result of increased habitat for the abovementioned macroinvertebrates. No significant difference was noted in the ANOVA between the total of the upstream site and the sites downstream of Horseshoe Creek.

The diversity at the Stow Creek monitoring sites show a non significant drop between the site upstream of Horseshoe Creek and the site immediately downstream. The results then show a recovery in the next downstream site. The same pattern is also observed in the EPT results.. However, overall between the upstream and downstream sites, the ANOVA did not detect a significant difference in either index. The SIGNAL 2 results also show no significant difference between upstream and downstream sites. The most pollution sensitive family found during the study, Leptophlebiidae (SIGNAL 2 = 8), was found at all three sites, suggesting water quality may not be having an adverse effect.

Multivariate community analysis confirms no significant statistical difference between sites upstream and downstream of the horseshoe creek confluence.

In conclusion, the macroinvertebrate communities of Stow Creek do appear to be slightly influenced by discharges into Horseshoe Creek however ANOVA tests indicate that this is not significant, and habitat availability may be attributable to the differences. There are still some significantly pollution sensitive taxa present at the first downstream site, including three families from the Ephemeroptera, therefore any impact is considered slight. The macroinvertebrate community appears to recover in the next downstream site, therefore any influences are highly localised.

## 7. References

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# Appendices



# Appendix A – Water Chemistry Summary Table

## Water Quality Results

	Analyte Name	Units	LOR	SSTV (WDL)	ERTOP	ERUS	ERDS	ERSW4	ERBTM	SCTOP	SCDS	SCBTM	QA1 (ERBTM)	QA RPD
General	pH	pH Units	0.1		6.8	6.8	6.8	6.3	6.9	6.5	6.9	7.0	6.9	0%
	Total Alkalinity as CaCO3	mg/L	5		7	6	8	12	9	5	11	7	9	0%
	Bicarbonate Alkalinity as CaCO3	mg/L	5	<b>319</b>	<5	<5	<5	<5	<5	<5	<5	<5	<5	0%
	Chloride, Cl	mg/L	1	<b>64</b>	2	2	2	2	2	1	2	2	2	0%
	Total Suspended Solids Dried at 103-105°C	mg/L	5		<5	22	10	5	<5	<5	<5	<5	<5	0%
	Total Dissolved Solids Dried at 175-185°C	mg/L	10		12	20000	50	39	48	11	130	130	52	8%
	Total Solids Dried at 105°C	mg/L	10		30	31	57	59	58	24	120	120	58	0%
	Sulphur as Sulphate (Dissolved)	mg/L	0.5	<b>129</b>	<0.5	<0.5	13	15	13	<0.5	56	52	6.6	65%
	Total Hardness	mg CaCO3/L	1		4	4	15	7	8	1	48	47	11	32%
	Total Cyanide	mg/L	0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0%
Nutrients	Ammonia Nitrogen, NH3 as N	mg/L	0.005		<0.005	0.009	0.070	0.078	0.010	<0.005	0.30	0.26	0.011	10%
	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005		0.018	<0.005	0.040	0.025	0.019	<0.005	0.061	0.056	0.019	0%
	Nitrate Nitrogen, NO3 as N	mg/L	0.005		0.017	<0.005	0.039	0.024	0.018	<0.005	0.059	0.054	0.018	0%
	Nitrite Nitrogen, NO2 as N	mg/L	0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0%
	Total Kjeldahl Nitrogen	mg/L	0.05		0.11	0.21	0.29	0.48	0.14	0.14	0.65	0.56	0.15	7%
	Total Nitrogen (calc)	mg/L	0.05		0.13	0.21	0.33	0.50	0.16	0.14	0.71	0.62	0.17	6%
	Organic Nitrogen (calc)	mg/L	0.05		0.11	0.20	0.22	0.40	0.13	0.14	0.35	0.31	0.14	7%
Dissolved Metals & Metalloids	Calcium (Dissolved)	mg/L	0.1		0.4	0.5	2.0	2.0	1.9	0.1	6.7	6.4	1.0	62%
	Potassium (Dissolved)	mg/L	0.1		0.3	0.3	0.9	1.0	0.9	0.1	3.1	2.8	0.4	77%
	Sodium (Dissolved)	mg/L	0.5		1.3	1.6	3.1	3.5	3.3	0.7	9.6	8.6	1.5	75%
	Hexavalent Chromium, Cr6+	mg/L	0.002		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0%
	Trivalent Chromium, Cr3+	mg/L	0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0%
	Aluminium (Dissolved)	mg/L	0.005	<b>0.15</b>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0%

	Analyte Name	Units	LOR	SSTV (WDL)	ERTOP	ERUS	ERDS	ERSW4	ERBTM	SCTOP	SCDS	SCBTM	QA1 (ERBTM)	QA RPD
	Boron (Dissolved)	mg/L	0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0%
	Iron (Dissolved)	mg/L	0.005	<b>0.3</b>	<0.005	0.047	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0%
	Zinc (Dissolved)	mg/L	0.005	<b>0.031</b>	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.008	<0.005	<0.005	0%
	Beryllium (Dissolved)	mg/L	0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0%
	Cadmium (Dissolved)	mg/L	0.0001	<b>(0.0008)</b>	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0%
	Chromium (Dissolved)	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
	Cobalt (Dissolved)	mg/L	0.001	<b>0.0025</b>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
	Copper (Dissolved)	mg/L	0.001	<b>0.0025</b>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
	Lead (Dissolved)	mg/L	0.001	<b>0.0094</b>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
	Nickel (Dissolved)	mg/L	0.001	<b>0.017</b>	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
	Magnesium (Dissolved)	mg/L	0.1		0.6	0.7	2.2	2.4	2.3	0.2	7.3	6.6	1.2	63%
	Manganese (Dissolved)	mg/L	0.001	<b>3.6</b>	0.008	0.005	0.041	0.030	0.009	0.006	0.19	0.12	0.012	29%
	Uranium (Dissolved)	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
	Arsenic (Dissolved)	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	0%
	Mercury (Dissolved)	mg/L	0.00005		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0%
Total Metals & Metalloids	Aluminium (Total)	mg/L	0.005		0.034	0.042	0.019	0.029	0.034	0.040	0.062	0.027	0.044	26%
	Boron (Total)	mg/L	0.005		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0%
	Iron (Total)	mg/L	0.005		0.70	0.85	0.59	0.77	0.76	0.33	1.1	0.92	0.78	3%
	Zinc (Total)	mg/L	0.005		<0.005	0.006	0.008	0.006	<0.005	<0.005	0.022	<0.005	<0.005	0%
	Beryllium (Total)	mg/L	0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0%
	Cadmium (Total)	mg/L	0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0%
	Total Cobalt (Total)	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	0%
	Total Copper (Total)	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0%
	Total Lead (Total)	mg/L	0.001		0.007	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
	Total Nickel (Total)	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%

Analyte Name	Units	LOR	SSTV (WDL)	ERTOP	ERUS	ERDS	ERSW4	ERBTM	SCTOP	SCDS	SCBTM	QA1 (ERBTM)	QA RPD
Total Manganese (Total)	mg/L	0.001		0.011	0.008	0.044	0.023	0.016	0.009	0.21	0.14	0.020	22%
Uranium (Total)	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
Arsenic (Total)	mg/L	0.001		<0.001	<0.001	0.001	0.001	0.001	<0.001	0.005	0.004	0.001	0%
Lanthanum (Total)	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0%
Mercury (Total)	mg/L	0.00005		<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0%
Magnesium (Total)	mg/L	0.05		0.73	0.62	2.4	1.2	1.4	0.24	7.5	7.4	1.7	19%
Calcium (Total)	mg/L	0.05		0.45	0.40	2.0	1.0	1.1	0.14	6.8	6.8	1.4	24%
Potassium (Total)	mg/L	0.05		0.23	0.16	0.98	0.40	0.52	0.13	3.3	3.2	0.50	4%
Sodium (Total)	mg/L	0.5		1.8	1.1	3.4	1.5	1.9	0.7	10	9.8	2.0	5%

\*Bold figures indicate an exceedance of the SSTVs/ANZECC Guideline default trigger values

# Appendix B – Water Quality Laboratory Reports

CLIENT DETAILS

Contact **Simon Lukies**  
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Project **Mt Todd Macroinvertebrate Sampling**  
 Order Number **432218703**  
 Samples **9**

LABORATORY DETAILS

Manager **Jon Dicker**  
 Laboratory **SGS Cairns Environmental**  
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Telephone **+61 07 4035 5111**  
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 Email **AU.Environmental.Cairns@sgs.com**

SGS Reference **CE120542 R0**  
 Date Received **12 Apr 2016**  
 Date Reported **22 Apr 2016**

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(3146)

For determination of soluble metals, filtered sample was not received so samples were laboratory filtered on receipt. This may give soluble metals results that do not represent the concentrations present at the time of sampling.  
 Trace Metals subcontracted to SGS Leeder Consulting, 4-5/18 Redland Drive, Mitcham VIC, NATA Accreditation Number 14429, M160855.  
 Hex Cr subcontracted to SGS Sydney, Unit 16 33 Maddox St Alexandria NSW 2015, NATA Accreditation Number: 2562, Site Number: 4354, SE151105.

SIGNATORIES



Anthony Nilsson  
 Operations Manager



Jon Dicker  
 Manager Northern QLD



Leanne Orsmond  
 Quality & Microbiology Coordinator



Maristela Ganzan  
 Metals Team Leader

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Number			CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Matrix			Water	Water	Water	Water
Sample Date			07 Apr 2016	07 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERSW4	ERUS	ERDS	ERTOP

**pH in water Method: AN101 Tested: 12/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
pH**	pH Units	0.1	6.3	6.8	6.8	6.8

**Alkalinity Method: AN135 Tested: 12/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Alkalinity as CaCO3	mg/L	5	12	6	8	7
Bicarbonate Alkalinity as CaCO3	mg/L	5	<5	<5	<5	<5
Carbonate Alkalinity as CaCO3	mg/L	5	-	-	-	-
Hydroxide Alkalinity as CaCO3	mg/L	5	-	-	-	-

**Chloride by Discrete Analyser in Water Method: AN274 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Chloride, Cl	mg/L	1	2	2	2	2

**Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 19/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Suspended Solids Dried at 103-105°C	mg/L	5	5	22	10	<5

**Total Dissolved Solids (TDS) in water Method: AN113 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Dissolved Solids Dried at 175-185°C	mg/L	10	39	20000	50	12

**Total and Volatile Solids for Water Method: AN113 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Solids Dried at 105°C	mg/L	10	59	31	57	30

**Total Cyanide in water Method: AN077/AN154 Tested: 15/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

**Ammonia Nitrogen by Discrete Analyser Method: AN280 Tested: 18/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.078	0.009	0.070	<0.005

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Number			CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Matrix			Water	Water	Water	Water
Sample Date			07 Apr 2016	07 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERSW4	ERUS	ERDS	ERTOP

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 18/4/2016**

Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<b>0.025</b>	<0.005	<b>0.040</b>	<b>0.018</b>
Nitrate Nitrogen, NO3 as N	mg/L	0.005	<b>0.024</b>	<0.005	<b>0.039</b>	<b>0.017</b>

**Nitrite in Water Method: AN277/WC250.312 Tested: 14/4/2016**

Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
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**TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 13/4/2016**

Total Kjeldahl Nitrogen	mg/L	0.05	<b>0.48</b>	<b>0.21</b>	<b>0.29</b>	<b>0.11</b>
Total Nitrogen (calc)	mg/L	0.05	<b>0.50</b>	<b>0.21</b>	<b>0.33</b>	<b>0.13</b>
Organic Nitrogen (calc)	mg/L	0.05	<b>0.40</b>	<b>0.20</b>	<b>0.22</b>	<b>0.11</b>

**Hexavalent Chromium in water by UV-Vis Method: AN201 Tested: 20/4/2016**

Hexavalent Chromium, Cr6+	mg/L	0.002	<0.002	<0.002	<0.002	<0.002
Trivalent Chromium, Cr3+	mg/L	0.005	<0.005	<0.005	<0.005	<0.005

**Metals in Water (Dissolved) by ICPOES Method: AN320/AN321 Tested: 14/4/2016**

Aluminium, Al	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Boron, B	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Calcium, Ca	mg/L	0.1	<b>2.0</b>	<b>0.5</b>	<b>2.0</b>	<b>0.4</b>
Iron, Fe	mg/L	0.005	<0.005	<b>0.047</b>	<0.005	<0.005
Magnesium, Mg	mg/L	0.1	<b>2.4</b>	<b>0.7</b>	<b>2.2</b>	<b>0.6</b>
Potassium, K	mg/L	0.1	<b>1.0</b>	<b>0.3</b>	<b>0.9</b>	<b>0.3</b>
Sodium, Na	mg/L	0.5	<b>3.5</b>	<b>1.6</b>	<b>3.1</b>	<b>1.3</b>
Sulphur as Sulphate, SO4	mg/L	0.5	<b>15</b>	<0.5	<b>13</b>	<0.5
Zinc, Zn	mg/L	0.005	<0.005	<0.005	<0.005	<0.005

**Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 14/4/2016**

Total Aluminium	mg/L	0.005	<b>0.029</b>	<b>0.042</b>	<b>0.019</b>	<b>0.034</b>
Total Hardness*	mg CaCO3/L	1	<b>7</b>	<b>4</b>	<b>15</b>	<b>4</b>
Total Boron	mg/L	0.005	<0.005	<0.005	<0.005	<b>0.005</b>
Total Calcium	mg/L	0.05	<b>1.0</b>	<b>0.40</b>	<b>2.0</b>	<b>0.45</b>
Total Iron	mg/L	0.005	<b>0.77</b>	<b>0.85</b>	<b>0.59</b>	<b>0.70</b>
Total Magnesium	mg/L	0.05	<b>1.2</b>	<b>0.62</b>	<b>2.4</b>	<b>0.73</b>
Total Potassium	mg/L	0.05	<b>0.40</b>	<b>0.16</b>	<b>0.98</b>	<b>0.23</b>
Total Sodium	mg/L	0.5	<b>1.5</b>	<b>1.1</b>	<b>3.4</b>	<b>1.8</b>
Total Zinc	mg/L	0.005	<b>0.006</b>	<b>0.006</b>	<b>0.008</b>	<0.005

**Metals in Water (Dissolved) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016**

Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium, Cr	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt, Co	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Copper, Cu	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Lead, Pb	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Manganese, Mn	mg/L	0.001	<b>0.030</b>	<b>0.005</b>	<b>0.041</b>	<b>0.008</b>
Nickel, Ni	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Metals in Water (Total) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016**

Total Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Cobalt, Co	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Total Copper, Cu	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Total Lead, Pb	mg/L	0.001	<0.001	<0.001	<0.001	<b>0.007</b>
Total Manganese, Mn*	mg/L	0.001	<b>0.023</b>	<b>0.008</b>	<b>0.044</b>	<b>0.011</b>
Total Nickel, Ni	mg/L	0.001	<0.001	<0.001	<0.001	<0.001



Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Number			CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Matrix			Water	Water	Water	Water
Sample Date			07 Apr 2016	07 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERSW4	ERUS	ERDS	ERTOP

**Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016**

Arsenic, As	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Uranium, U	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Trace Metals (Total) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016**

Total Arsenic	mg/L	0.001	<b>0.001</b>	<0.001	<b>0.001</b>	<0.001
Total Uranium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Additional Total Metals in Water by ICPMS Method: MA-1400.WW.ADD.02 Tested: 14/4/2016**

Total Lanthanum, La*	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
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**Additional and Rare Earth Soluble Metals in Water by ICPMS Method: MA-1400 Tested: 14/4/2016**

Lanthanum, La*	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
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**Mercury (dissolved) in Water Method: AN311/AN312 Tested: 14/4/2016**

Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
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**Mercury (total) in Water Method: AN311/AN312 Tested: 14/4/2016**

Total Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
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**Calculation of Anion-Cation Balance (SAR Calc) Method: AN121 Tested: 22/4/2016**

Sum of Cation Milliequivalents*	meq/L	-	<b>0.480</b>	<b>0.163</b>	<b>0.439</b>	<b>0.138</b>
Sum of Anion Milliequivalents*	meq/L	-	<b>0.586</b>	<b>0.165</b>	<b>0.509</b>	<b>0.190</b>
Anion-Cation Balance	%	-100	<b>-9.9</b>	<b>-0.7</b>	<b>-7.4</b>	<b>-16</b>

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Number			CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Matrix			Water	Water	Water	Water
Sample Date			08 Apr 2016	08 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERBTM	ERBTM	SCTOP	SCDS

**pH in water Method: AN101 Tested: 12/4/2016**

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
pH**	pH Units	0.1	6.9	6.9	6.5	6.9

**Alkalinity Method: AN135 Tested: 12/4/2016**

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Alkalinity as CaCO3	mg/L	5	9	9	5	11
Bicarbonate Alkalinity as CaCO3	mg/L	5	<5	<5	<5	<5
Carbonate Alkalinity as CaCO3	mg/L	5	-	-	-	-
Hydroxide Alkalinity as CaCO3	mg/L	5	-	-	-	-

**Chloride by Discrete Analyser in Water Method: AN274 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Chloride, Cl	mg/L	1	2	2	1	2

**Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 19/4/2016**

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Suspended Solids Dried at 103-105°C	mg/L	5	<5	<5	<5	<5

**Total Dissolved Solids (TDS) in water Method: AN113 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Dissolved Solids Dried at 175-185°C	mg/L	10	48	52	11	130

**Total and Volatile Solids for Water Method: AN113 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Solids Dried at 105°C	mg/L	10	58	58	24	120

**Total Cyanide in water Method: AN077/AN154 Tested: 15/4/2016**

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

**Ammonia Nitrogen by Discrete Analyser Method: AN280 Tested: 18/4/2016**

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.010	0.011	<0.005	0.30

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Number			CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Matrix			Water	Water	Water	Water
Sample Date			08 Apr 2016	08 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERBTM	ERBTM	SCTOP	SCDS

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 18/4/2016**

Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<b>0.019</b>	<b>0.019</b>	<0.005	<b>0.061</b>
Nitrate Nitrogen, NO3 as N	mg/L	0.005	<b>0.018</b>	<b>0.018</b>	<0.005	<b>0.059</b>

**Nitrite in Water Method: AN277/WC250.312 Tested: 14/4/2016**

Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
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**TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 13/4/2016**

Total Kjeldahl Nitrogen	mg/L	0.05	<b>0.14</b>	<b>0.15</b>	<b>0.14</b>	<b>0.65</b>
Total Nitrogen (calc)	mg/L	0.05	<b>0.16</b>	<b>0.17</b>	<b>0.14</b>	<b>0.71</b>
Organic Nitrogen (calc)	mg/L	0.05	<b>0.13</b>	<b>0.14</b>	<b>0.14</b>	<b>0.35</b>

**Hexavalent Chromium in water by UV-Vis Method: AN201 Tested: 20/4/2016**

Hexavalent Chromium, Cr6+	mg/L	0.002	<0.002	<0.002	<0.002	<0.002
Trivalent Chromium, Cr3+	mg/L	0.005	<0.005	<0.005	<0.005	<0.005

**Metals in Water (Dissolved) by ICPOES Method: AN320/AN321 Tested: 14/4/2016**

Aluminium, Al	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Boron, B	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Calcium, Ca	mg/L	0.1	<b>1.9</b>	<b>1.0</b>	<b>0.1</b>	<b>6.7</b>
Iron, Fe	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Magnesium, Mg	mg/L	0.1	<b>2.3</b>	<b>1.2</b>	<b>0.2</b>	<b>7.3</b>
Potassium, K	mg/L	0.1	<b>0.9</b>	<b>0.4</b>	<b>0.1</b>	<b>3.1</b>
Sodium, Na	mg/L	0.5	<b>3.3</b>	<b>1.5</b>	<b>0.7</b>	<b>9.6</b>
Sulphur as Sulphate, SO4	mg/L	0.5	<b>13</b>	<b>6.6</b>	<0.5	<b>56</b>
Zinc, Zn	mg/L	0.005	<0.005	<0.005	<0.005	<b>0.008</b>

**Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 14/4/2016**

Total Aluminium	mg/L	0.005	<b>0.034</b>	<b>0.044</b>	<b>0.040</b>	<b>0.062</b>
Total Hardness*	mg CaCO3/L	1	<b>8</b>	<b>11</b>	<b>1</b>	<b>48</b>
Total Boron	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Calcium	mg/L	0.05	<b>1.1</b>	<b>1.4</b>	<b>0.14</b>	<b>6.8</b>
Total Iron	mg/L	0.005	<b>0.76</b>	<b>0.78</b>	<b>0.33</b>	<b>1.1</b>
Total Magnesium	mg/L	0.05	<b>1.4</b>	<b>1.7</b>	<b>0.24</b>	<b>7.5</b>
Total Potassium	mg/L	0.05	<b>0.52</b>	<b>0.50</b>	<b>0.13</b>	<b>3.3</b>
Total Sodium	mg/L	0.5	<b>1.9</b>	<b>2.0</b>	<b>0.7</b>	<b>10</b>
Total Zinc	mg/L	0.005	<0.005	<0.005	<0.005	<b>0.022</b>

**Metals in Water (Dissolved) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016**

Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium, Cr	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt, Co	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Copper, Cu	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Lead, Pb	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Manganese, Mn	mg/L	0.001	<b>0.009</b>	<b>0.012</b>	<b>0.006</b>	<b>0.19</b>
Nickel, Ni	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Metals in Water (Total) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016**

Total Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Cobalt, Co	mg/L	0.001	<0.001	<0.001	<0.001	<b>0.001</b>
Total Copper, Cu	mg/L	0.001	<0.001	<0.001	<0.001	<b>0.001</b>
Total Lead, Pb	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese, Mn*	mg/L	0.001	<b>0.016</b>	<b>0.020</b>	<b>0.009</b>	<b>0.21</b>
Total Nickel, Ni	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Number			CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Matrix			Water	Water	Water	Water
Sample Date			08 Apr 2016	08 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERBTM	ERBTM	SCTOP	SCDS

**Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016**

Arsenic, As	mg/L	0.001	<0.001	<0.001	<0.001	<b>0.001</b>
Uranium, U	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Trace Metals (Total) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016**

Total Arsenic	mg/L	0.001	<b>0.001</b>	<b>0.001</b>	<0.001	<b>0.005</b>
Total Uranium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Additional Total Metals in Water by ICPMS Method: MA-1400.WW.ADD.02 Tested: 14/4/2016**

Total Lanthanum, La*	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
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**Additional and Rare Earth Soluble Metals in Water by ICPMS Method: MA-1400 Tested: 14/4/2016**

Lanthanum, La*	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
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**Mercury (dissolved) in Water Method: AN311/AN312 Tested: 14/4/2016**

Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
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**Mercury (total) in Water Method: AN311/AN312 Tested: 14/4/2016**

Total Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
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**Calculation of Anion-Cation Balance (SAR Calc) Method: AN121 Tested: 22/4/2016**

Sum of Cation Milliequivalents*	meq/L	-	<b>0.447</b>	<b>0.223</b>	<b>0.061</b>	<b>1.43</b>
Sum of Anion Milliequivalents*	meq/L	-	<b>0.508</b>	<b>0.364</b>	<b>0.134</b>	<b>1.45</b>
Anion-Cation Balance	%	-100	<b>-6.4</b>	<b>-24</b>	<b>-38</b>	<b>-0.7</b>

Sample Number	CE120542.009	
Sample Matrix	Water	
Sample Date	07 Apr 2016	
Sample Name	SCBTM	
Parameter	Units	LOR

**pH in water Method: AN101 Tested: 12/4/2016**

pH**	pH Units	0.1	<b>7.0</b>
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**Alkalinity Method: AN135 Tested: 12/4/2016**

Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	<b>7</b>
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	<5
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	-
Hydroxide Alkalinity as CaCO <sub>3</sub>	mg/L	5	-

**Chloride by Discrete Analyser in Water Method: AN274 Tested: 14/4/2016**

Chloride, Cl	mg/L	1	<b>2</b>
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**Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 19/4/2016**

Total Suspended Solids Dried at 103-105°C	mg/L	5	<5
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**Total Dissolved Solids (TDS) in water Method: AN113 Tested: 14/4/2016**

Total Dissolved Solids Dried at 175-185°C	mg/L	10	<b>130</b>
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**Total and Volatile Solids for Water Method: AN113 Tested: 14/4/2016**

Total Solids Dried at 105°C	mg/L	10	<b>120</b>
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**Total Cyanide in water Method: AN077/AN154 Tested: 15/4/2016**

Total Cyanide	mg/L	0.004	<0.004
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Sample Number	CE120542.009	
Sample Matrix	Water	
Sample Date	07 Apr 2016	
Sample Name	SCBTM	
Parameter	Units	LOR

**Ammonia Nitrogen by Discrete Analyser Method: AN280 Tested: 18/4/2016**

Ammonia Nitrogen, NH3 as N	mg/L	0.005	<b>0.26</b>
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**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 18/4/2016**

Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<b>0.056</b>
Nitrate Nitrogen, NO3 as N	mg/L	0.005	<b>0.054</b>

**Nitrite in Water Method: AN277/WC250.312 Tested: 14/4/2016**

Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005
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**TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 13/4/2016**

Total Kjeldahl Nitrogen	mg/L	0.05	<b>0.56</b>
Total Nitrogen (calc)	mg/L	0.05	<b>0.62</b>
Organic Nitrogen (calc)	mg/L	0.05	<b>0.31</b>

**Hexavalent Chromium in water by UV-Vis Method: AN201 Tested: 20/4/2016**

Hexavalent Chromium, Cr6+	mg/L	0.002	<0.002
Trivalent Chromium, Cr3+	mg/L	0.005	<0.005

**Metals in Water (Dissolved) by ICPOES Method: AN320/AN321 Tested: 14/4/2016**

Aluminium, Al	mg/L	0.005	<0.005
Boron, B	mg/L	0.005	<0.005
Calcium, Ca	mg/L	0.1	<b>6.4</b>
Iron, Fe	mg/L	0.005	<0.005
Magnesium, Mg	mg/L	0.1	<b>6.6</b>
Potassium, K	mg/L	0.1	<b>2.8</b>
Sodium, Na	mg/L	0.5	<b>8.6</b>
Sulphur as Sulphate, SO4	mg/L	0.5	<b>52</b>
Zinc, Zn	mg/L	0.005	<0.005

**Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 14/4/2016**

Total Aluminium	mg/L	0.005	<b>0.027</b>
Total Hardness*	mg CaCO3/L	1	<b>47</b>
Total Boron	mg/L	0.005	<0.005
Total Calcium	mg/L	0.05	<b>6.8</b>
Total Iron	mg/L	0.005	<b>0.92</b>
Total Magnesium	mg/L	0.05	<b>7.4</b>
Total Potassium	mg/L	0.05	<b>3.2</b>
Total Sodium	mg/L	0.5	<b>9.8</b>
Total Zinc	mg/L	0.005	<0.005

Sample Number	CE120542.009
Sample Matrix	Water
Sample Date	07 Apr 2016
Sample Name	SCBTM

Parameter	Units	LOR	
<b>Metals in Water (Dissolved) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016</b>			
Beryllium, Be	mg/L	0.0001	<0.0001
Cadmium, Cd	mg/L	0.0001	<0.0001
Chromium, Cr	mg/L	0.001	<0.0010
Cobalt, Co	mg/L	0.001	<0.001
Copper, Cu	mg/L	0.001	<0.001
Lead, Pb	mg/L	0.001	<0.001
Manganese, Mn	mg/L	0.001	<b>0.12</b>
Nickel, Ni	mg/L	0.001	<0.001

<b>Metals in Water (Total) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016</b>			
Total Beryllium, Be	mg/L	0.0001	<0.0001
Total Cadmium, Cd	mg/L	0.0001	<0.0001
Total Cobalt, Co	mg/L	0.001	<b>0.001</b>
Total Copper, Cu	mg/L	0.001	<0.001
Total Lead, Pb	mg/L	0.001	<0.001
Total Manganese, Mn*	mg/L	0.001	<b>0.14</b>
Total Nickel, Ni	mg/L	0.001	<0.001

<b>Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016</b>			
Arsenic, As	mg/L	0.001	<b>0.001</b>
Uranium, U	mg/L	0.001	<0.001

<b>Trace Metals (Total) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016</b>			
Total Arsenic	mg/L	0.001	<b>0.004</b>
Total Uranium	mg/L	0.001	<0.001

<b>Additional Total Metals in Water by ICPMS Method: MA-1400.WW.ADD.02 Tested: 14/4/2016</b>			
Total Lanthanum, La*	mg/L	0.001	<0.001

<b>Additional and Rare Earth Soluble Metals in Water by ICPMS Method: MA-1400 Tested: 14/4/2016</b>			
Lanthanum, La*	mg/L	0.001	<0.001

	Sample Number	CE120542.009
	Sample Matrix	Water
	Sample Date	07 Apr 2016
	Sample Name	SCBTM
Parameter	Units	LOR

**Mercury (dissolved) in Water** Method: AN311/AN312 Tested: 14/4/2016

Mercury	mg/L	0.00005	<0.00005
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**Mercury (total) in Water** Method: AN311/AN312 Tested: 14/4/2016

Total Mercury	mg/L	0.00005	<0.00005
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**Calculation of Anion-Cation Balance (SAR Calc)** Method: AN121 Tested: 22/4/2016

Sum of Cation Milliequivalents*	meq/L	-	<b>1.31</b>
Sum of Anion Milliequivalents*	meq/L	-	<b>1.27</b>
Anion-Cation Balance	%	-100	<b>1.6</b>



MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Additional and Rare Earth Soluble Metals in Water by ICPMS Method: MA-1400**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Lanthanum, La*	LB035625	mg/L	0.001	<0.001	0%	NA

**Additional Total Metals in Water by ICPMS Method: MA-1400.WW.ADD.02**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Lanthanum, La*	LB035628	mg/L	0.001	<0.001	0%	NA

**Alkalinity Method: ME-(AU)-[ENV]AN135**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB035546	mg/L	5	<5	0 - 3%	89 - 93%
Bicarbonate Alkalinity as CaCO3	LB035546	mg/L	5	<5		

**Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN280**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Ammonia Nitrogen, NH3 as N	LB035690	mg/L	0.005	<0.005	0 - 1%	98 - 103%

**Chloride by Discrete Analyser in Water Method: ME-(AU)-[ENV]AN274**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chloride, Cl	LB035631	mg/L	1	<1	0 - 2%	105%

**Mercury (dissolved) in Water Method: ME-(AU)-[ENV]AN311/AN312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Mercury	LB035637	mg/L	0.00005	<0.00005 - <5	0%	102 - 106%	100 - 104%

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Mercury (total) in Water Method: ME-(AU)-[ENV]AN311/AN312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Mercury	LB035638	mg/L	0.00005	<0.00005	0 - 29%	NA	NA

**Metals in Water (Total) by ICPOES Method: ME-(AU)-[ENV]AN022/AN320**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Aluminium	LB035599	mg/L	0.005	<0.005	9%	99%	108%
Total Hardness*	LB035599	mg CaCO3/L	1	<1			
Total Boron	LB035599	mg/L	0.005	<0.005	0%	98%	110%
Total Calcium	LB035599	mg/L	0.05	<0.05	0%	103%	105%
Total Iron	LB035599	mg/L	0.005	<0.005	0%	105%	NA
Total Magnesium	LB035599	mg/L	0.05	<0.05	0%	100%	101%
Total Potassium	LB035599	mg/L	0.05	<0.05	0%	107%	111%
Total Sodium	LB035599	mg/L	0.5	<0.5	0%	96%	98%
Total Zinc	LB035599	mg/L	0.005	<0.005	0%	107%	110%

**Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320/AN321**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Aluminium, Al	LB035596	mg/L	0.005	<0.005	0%	99%	108%
Boron, B	LB035596	mg/L	0.005	<0.005	0%	99%	111%
Calcium, Ca	LB035596	mg/L	0.1	<0.1	0%	104%	106%
Iron, Fe	LB035596	mg/L	0.005	<0.005	0%	105%	110%
Magnesium, Mg	LB035596	mg/L	0.1	<0.1	0%	101%	101%
Potassium, K	LB035596	mg/L	0.1	<0.1	0%	107%	112%
Sodium, Na	LB035596	mg/L	0.5	<0.5	0%	96%	99%
Sulphur as Sulphate, SO4	LB035596	mg/L	0.5	<0.5	1%	NA	
Zinc, Zn	LB035596	mg/L	0.005	<0.005	0%	108%	112%

**Metals in Water (Dissolved) by ICPOES-USN Method: ME-(AU)-[ENV]AN320/AN322**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Beryllium, Be	LB035604	mg/L	0.0001	<0.0001	0%	100%	105%
Cadmium, Cd	LB035604	mg/L	0.0001	<0.0001	0%	97%	100%
Chromium, Cr	LB035604	mg/L	0.001	<0.0010	0%	99%	99%
Cobalt, Co	LB035604	mg/L	0.001	<0.001	0%	103%	100%
Copper, Cu	LB035604	mg/L	0.001	<0.001	0%	100%	105%
Lead, Pb	LB035604	mg/L	0.001	<0.001	0%	102%	97%
Manganese, Mn	LB035604	mg/L	0.001	<0.001	0%	NA	NA
Nickel, Ni	LB035604	mg/L	0.001	<0.001	0%	104%	99%

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Metals in Water (Total) by ICPOES-USN Method: ME-(AU)-[ENV]AN320/AN322**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Beryllium, Be	LB035608	mg/L	0.0001	<0.0001	0%	100%	102%
Total Cadmium, Cd	LB035608	mg/L	0.0001	<0.0001	0%	98%	98%
Total Cobalt, Co	LB035608	mg/L	0.001	<0.001	3%	103%	99%
Total Copper, Cu	LB035608	mg/L	0.001	<0.001	0%	102%	104%
Total Lead, Pb	LB035608	mg/L	0.001	<0.001	0%	102%	98%
Total Manganese, Mn*	LB035608	mg/L	0.001	<0.001	1%	NA	NA
Total Nickel, Ni	LB035608	mg/L	0.001	<0.001	0%	105%	99%

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: ME-(AU)-[ENV]AN248**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate/Nitrite Nitrogen, NOx as N	LB035640	mg/L	0.005	<0.005	0 - 8%	96 - 101%

**Nitrite in Water Method: ME-(AU)-[ENV]AN277/WC250.312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrite Nitrogen, NO2 as N	LB035632	mg/L	0.005	<0.005	0%	87 - 90%

**pH in water Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH**	LB035546	pH Units	0.1	5.6 - 6.8	0 - 4%	99 - 100%

**TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Kjeldahl Nitrogen	LB035586	mg/L	0.05	<0.05	0 - 4%	94 - 102%

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Total and Volatile Solids for Water Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	DUP %RPD
Total Solids Dried at 105°C	LB035621	mg/L	10	6%

**Total and Volatile Suspended Solids (TSS / VSS) Method: ME-(AU)-[ENV]AN114**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Suspended Solids Dried at 103-105°C	LB035721	mg/L	5	<5	2 - 10%	89 - 95%	101%

**Total Cyanide in water Method: ME-(AU)-[ENV]AN077/AN154**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Cyanide	LB035645	mg/L	0.004	<0.004	0%	100%	100%

**Total Dissolved Solids (TDS) in water Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Dissolved Solids Dried at 175-185°C	LB035619	mg/L	10	<10	1 - 9%	100%	111%

**Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: ME-(AU)-[ENV]AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Arsenic, As	LB035620	mg/L	0.001	<0.001	0%	NA
Uranium, U	LB035620	mg/L	0.001	<0.001	0%	NA

**Trace Metals (Total) in Water by ICPMS in mg/L Method: ME-(AU)-[ENV]AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Arsenic	LB035623	mg/L	0.001	<0.001	8%	NA
Total Uranium	LB035623	mg/L	0.001	<0.001	0%	NA

METHOD

METHODOLOGY SUMMARY

AN022/AN320	Total (acid soluble) Metals by ICP-OES: Samples are digested in nitric or nitric and hydrochloric acids prior to analysis for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
AN121	This method is used to calculation the balance of major Anions and Cations in water samples and converts major ion concentration to milliequivalents and then summed. Anions sum and Cation sum is calculated as a difference and expressed as a percentage.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN154	A buffered distillate or water sample is treated with chloramine /barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration.
AN248	Nitrate / Nitrite by Auto Analyser: In an acidic medium, nitrate is reduced quantitatively to nitrite by cadmium metal. This nitrite plus any original nitrite is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. Reference APHA 4500-NO3- F.
AN274	Chloride by Aquakem DA: Chloride reacts with mercuric thiocyanate forming a mercuric chloride complex. In the presence of ferric iron, highly coloured ferric thiocyanate is formed which is proportional to the chloride concentration. Reference APHA 4500Cl-
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN280	A filtered water sample containing ammonia (NH3) or ammonium cations (NH4+) is reacted with alkaline phenol and hypochlorite in a buffered solution to form the blue indophenol colour. The absorbance is measured at 630nm and compared with calibration standards to obtain the concentration of ammonia in the sample.

METHOD	METHODOLOGY SUMMARY
AN281	An unfiltered water or soil sample is first digested in a block digester with sulfuric acid, K <sub>2</sub> SO <sub>4</sub> and CuSO <sub>4</sub> . The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN311/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN320/	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN320/AN321	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320/AN321	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN320/AN322	ICP-OES (Ultrasonic Nebuliser): After preservation with 10% nitric acid, a wide range of metals and some non-metals in solution can be measured by ICP- Ultrasonic nebulisation. Solutions are aspirated using an ultrasonic nebuliser into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320/AN322	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B
AN322	ICP-OES (Ultrasonic Nebuliser): After preservation with 10% nitric acid, a wide range of metals and some non-metals in solution can be measured by ICP- Ultrasonic nebulisation. Solutions are aspirated using an ultrasonic nebuliser into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN322	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO <sub>2</sub> D.
MA-1400	Rare Earth Metals by ICP MS by SGS Leeder.
MA-1400.WW.ADD.02	Additional total metals in water by ICP MS. Performed by SGS Leeder.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : <http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf>

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## STATEMENT OF QA/QC PERFORMANCE

CE120542 R0

### CLIENT DETAILS

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Project            **Mt Todd Macroinvertebrate Sampling**  
 Order Number    **432218703**  
 Samples           9

### LABORATORY DETAILS

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SGS Reference    **CE120542 R0**  
 Date Received    12 Apr 2016  
 Date Reported    22 Apr 2016

### COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client. This QA/QC Statement must be read in conjunction with the referenced Analytical Report. The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	Alkalinity	9 items
	Nitrite in Water	9 items
	pH in water	9 items
	Total and Volatile Suspended Solids (TSS / VSS)	9 items
Analysis Date	Alkalinity	18 items
	Nitrite in Water	9 items
	pH in water	9 items
	Total and Volatile Solids for Water	9 items
	Total Dissolved Solids (TDS) in water	9 items

### SAMPLE SUMMARY

Sample counts by matrix	9 waters	Type of documentation received	COC
Date documentation received	12/4/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	frozen
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	2



SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Additional and Rare Earth Soluble Metals in Water by ICPMS

Method: MA-1400

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERUS	CE120542.002	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERDS	CE120542.003	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERTOP	CE120542.004	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERBTM	CE120542.005	LB035625	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
ERBTM	CE120542.006	LB035625	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
SCTOP	CE120542.007	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCDS	CE120542.008	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCBTM	CE120542.009	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

### Additional Total Metals in Water by ICPMS

Method: MA-1400.VVV.ADD.02

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERUS	CE120542.002	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERDS	CE120542.003	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERTOP	CE120542.004	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERBTM	CE120542.005	LB035628	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
ERBTM	CE120542.006	LB035628	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
SCTOP	CE120542.007	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCDS	CE120542.008	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCBTM	CE120542.009	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

### Alkalinity

Method: ME-(AU)-[ENV]AN153

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
ERUS	CE120542.002	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
ERDS	CE120542.003	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
ERTOP	CE120542.004	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
ERBTM	CE120542.005	LB035546	08 Apr 2016	12 Apr 2016	09 Apr 2016	12 Apr 2016†	09 Apr 2016	19 Apr 2016†
ERBTM	CE120542.006	LB035546	08 Apr 2016	12 Apr 2016	09 Apr 2016	12 Apr 2016†	09 Apr 2016	19 Apr 2016†
SCTOP	CE120542.007	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
SCDS	CE120542.008	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
SCBTM	CE120542.009	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†

### Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN280

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
ERUS	CE120542.002	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
ERDS	CE120542.003	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
ERTOP	CE120542.004	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
ERBTM	CE120542.005	LB035690	08 Apr 2016	12 Apr 2016	06 May 2016	18 Apr 2016	06 May 2016	19 Apr 2016
ERBTM	CE120542.006	LB035690	08 Apr 2016	12 Apr 2016	06 May 2016	18 Apr 2016	06 May 2016	19 Apr 2016
SCTOP	CE120542.007	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
SCDS	CE120542.008	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
SCBTM	CE120542.009	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016

### Chloride by Discrete Analyser in Water

Method: ME-(AU)-[ENV]AN274

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
ERUS	CE120542.002	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
ERDS	CE120542.003	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
ERTOP	CE120542.004	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
ERBTM	CE120542.005	LB035631	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	14 Apr 2016
ERBTM	CE120542.006	LB035631	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	14 Apr 2016
SCTOP	CE120542.007	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
SCDS	CE120542.008	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
SCBTM	CE120542.009	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016

### Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERUS	CE120542.002	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Mercury (dissolved) in Water (continued)

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERDS	CE120542.003	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERTOP	CE120542.004	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERBTM	CE120542.005	LB035637	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
ERBTM	CE120542.006	LB035637	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
SCTOP	CE120542.007	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCDS	CE120542.008	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCBTM	CE120542.009	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016

### Mercury (total) In Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERUS	CE120542.002	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERDS	CE120542.003	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERTOP	CE120542.004	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERBTM	CE120542.005	LB035638	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
ERBTM	CE120542.006	LB035638	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
SCTOP	CE120542.007	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCDS	CE120542.008	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCBTM	CE120542.009	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016

### Metals in Water (Total) by ICPOES

Method: ME-(AU)-[ENV]AN022/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERUS	CE120542.002	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERDS	CE120542.003	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERTOP	CE120542.004	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERBTM	CE120542.005	LB035599	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
ERBTM	CE120542.006	LB035599	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
SCTOP	CE120542.007	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCDS	CE120542.008	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCBTM	CE120542.009	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016

### Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320/AN321

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERUS	CE120542.002	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERDS	CE120542.003	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERTOP	CE120542.004	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERBTM	CE120542.005	LB035596	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
ERBTM	CE120542.006	LB035596	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
SCTOP	CE120542.007	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCDS	CE120542.008	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCBTM	CE120542.009	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016

### Metals in Water (Dissolved) by ICPOES-USN

Method: ME-(AU)-[ENV]AN320/AN322

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERUS	CE120542.002	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERDS	CE120542.003	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERTOP	CE120542.004	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERBTM	CE120542.005	LB035604	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
ERBTM	CE120542.006	LB035604	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
SCTOP	CE120542.007	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	18 Apr 2016
SCDS	CE120542.008	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	18 Apr 2016
SCBTM	CE120542.009	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	18 Apr 2016

### Metals in Water (Total) by ICPOES-USN

Method: ME-(AU)-[ENV]AN320/AN322

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERUS	CE120542.002	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERDS	CE120542.003	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERTOP	CE120542.004	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Metals in Water (Total) by ICPOES-USN (continued)

Method: ME-(AU)-[ENV]AN320/AN322

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERBTM	CE120542.005	LB035608	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
ERBTM	CE120542.006	LB035608	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
SCTOP	CE120542.007	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCDS	CE120542.008	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCBTM	CE120542.009	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016

### Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser

Method: ME-(AU)-[ENV]AN248

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
ERUS	CE120542.002	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
ERDS	CE120542.003	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
ERTOP	CE120542.004	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
ERBTM	CE120542.005	LB035640	08 Apr 2016	12 Apr 2016	06 May 2016	18 Apr 2016	06 May 2016	18 Apr 2016
ERBTM	CE120542.006	LB035640	08 Apr 2016	12 Apr 2016	06 May 2016	18 Apr 2016	06 May 2016	18 Apr 2016
SCTOP	CE120542.007	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
SCDS	CE120542.008	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
SCBTM	CE120542.009	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016

### Nitrite in Water

Method: ME-(AU)-[ENV]AN277/WC250.312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
ERUS	CE120542.002	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
ERDS	CE120542.003	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
ERTOP	CE120542.004	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
ERBTM	CE120542.005	LB035632	08 Apr 2016	12 Apr 2016	12 Apr 2016	14 Apr 2016†	12 Apr 2016	14 Apr 2016†
ERBTM	CE120542.006	LB035632	08 Apr 2016	12 Apr 2016	12 Apr 2016	14 Apr 2016†	12 Apr 2016	14 Apr 2016†
SCTOP	CE120542.007	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
SCDS	CE120542.008	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
SCBTM	CE120542.009	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†

### pH in water

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
ERUS	CE120542.002	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
ERDS	CE120542.003	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
ERTOP	CE120542.004	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
ERBTM	CE120542.005	LB035546	08 Apr 2016	12 Apr 2016	09 Apr 2016	12 Apr 2016†	09 Apr 2016	13 Apr 2016†
ERBTM	CE120542.006	LB035546	08 Apr 2016	12 Apr 2016	09 Apr 2016	12 Apr 2016†	09 Apr 2016	13 Apr 2016†
SCTOP	CE120542.007	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
SCDS	CE120542.008	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
SCBTM	CE120542.009	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†

### TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
ERUS	CE120542.002	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
ERDS	CE120542.003	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
ERTOP	CE120542.004	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
ERBTM	CE120542.005	LB035586	08 Apr 2016	12 Apr 2016	06 May 2016	13 Apr 2016	06 May 2016	19 Apr 2016
ERBTM	CE120542.006	LB035586	08 Apr 2016	12 Apr 2016	06 May 2016	13 Apr 2016	06 May 2016	19 Apr 2016
SCTOP	CE120542.007	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
SCDS	CE120542.008	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
SCBTM	CE120542.009	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016

### Total and Volatile Solids for Water

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
ERUS	CE120542.002	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
ERDS	CE120542.003	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
ERTOP	CE120542.004	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
ERBTM	CE120542.005	LB035621	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	15 Apr 2016	20 Apr 2016†
ERBTM	CE120542.006	LB035621	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	15 Apr 2016	20 Apr 2016†

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Total and Volatile Solids for Water (continued)

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
SCTOP	CE120542.007	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
SCDS	CE120542.008	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
SCBTM	CE120542.009	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†

### Total and Volatile Suspended Solids (TSS / VSS)

Method: ME-(AU)-[ENV]AN114

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERUS	CE120542.002	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERDS	CE120542.003	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERTOP	CE120542.004	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERBTM	CE120542.005	LB035721	08 Apr 2016	12 Apr 2016	15 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERBTM	CE120542.006	LB035721	08 Apr 2016	12 Apr 2016	15 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
SCTOP	CE120542.007	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
SCDS	CE120542.008	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
SCBTM	CE120542.009	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016

### Total Cyanide in water

Method: ME-(AU)-[ENV]AN077/AN154

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
ERUS	CE120542.002	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
ERDS	CE120542.003	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
ERTOP	CE120542.004	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
ERBTM	CE120542.005	LB035645	08 Apr 2016	12 Apr 2016	22 Apr 2016	15 Apr 2016	22 Apr 2016	20 Apr 2016
ERBTM	CE120542.006	LB035645	08 Apr 2016	12 Apr 2016	22 Apr 2016	15 Apr 2016	22 Apr 2016	20 Apr 2016
SCTOP	CE120542.007	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
SCDS	CE120542.008	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
SCBTM	CE120542.009	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016

### Total Dissolved Solids (TDS) in water

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
ERUS	CE120542.002	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
ERDS	CE120542.003	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
ERTOP	CE120542.004	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
ERBTM	CE120542.005	LB035619	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	15 Apr 2016	18 Apr 2016†
ERBTM	CE120542.006	LB035619	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	15 Apr 2016	18 Apr 2016†
SCTOP	CE120542.007	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
SCDS	CE120542.008	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
SCBTM	CE120542.009	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†

### Trace Metals (Dissolved) in Water by ICPMS in mg/L

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERUS	CE120542.002	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERDS	CE120542.003	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERTOP	CE120542.004	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERBTM	CE120542.005	LB035620	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
ERBTM	CE120542.006	LB035620	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
SCTOP	CE120542.007	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCDS	CE120542.008	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCBTM	CE120542.009	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

### Trace Metals (Total) in Water by ICPMS in mg/L

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERUS	CE120542.002	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERDS	CE120542.003	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERTOP	CE120542.004	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERBTM	CE120542.005	LB035623	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
ERBTM	CE120542.006	LB035623	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
SCTOP	CE120542.007	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCDS	CE120542.008	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Trace Metals (Total) in Water by ICPMS in mg/L (continued)

Method: ME-(AU)-ENVJAN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
SCBTM	CE120542.009	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No surrogates were required for this job.

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Alkalinity** Method: ME-(AU)-[ENV]AN135

Sample Number	Parameter	Units	LOR	Result
LB035546.001	Total Alkalinity as CaCO3	mg/L	5	<5
LB035546.082	Total Alkalinity as CaCO3	mg/L	5	<5
LB035546.109	Total Alkalinity as CaCO3	mg/L	5	<5

**Ammonia Nitrogen by Discrete Analyser** Method: ME-(AU)-[ENV]AN280

Sample Number	Parameter	Units	LOR	Result
LB035690.001	Ammonia Nitrogen, NH3 as N	mg/L	0.005	<0.005
LB035690.023	Ammonia Nitrogen, NH3 as N	mg/L	0.005	<0.005

**Chloride by Discrete Analyser in Water** Method: ME-(AU)-[ENV]AN274

Sample Number	Parameter	Units	LOR	Result
LB035631.001	Chloride, Cl	mg/L	1	<1

**Mercury (dissolved) in Water** Method: ME-(AU)-[ENV]AN311/AN312

Sample Number	Parameter	Units	LOR	Result
LB035637.001	Mercury	mg/L	0.00005	<5e-005
LB035637.025	Mercury	mg/L	0.00005	<5e-005
LB035637.049	Mercury	mg/L	0.00005	<0.00005

**Metals in Water (Total) by ICPOES** Method: ME-(AU)-[ENV]AN022/AN320

Sample Number	Parameter	Units	LOR	Result
LB035599.001	Total Aluminium	mg/L	0.005	<0.005
	Total Boron	mg/L	0.005	<0.005
	Total Calcium	mg/L	0.05	<0.05
	Total Magnesium	mg/L	0.05	<0.05
	Total Potassium	mg/L	0.05	<0.05
	Total Sodium	mg/L	0.5	<0.5
	Total Zinc	mg/L	0.005	<0.005

**Metals in Water (Dissolved) by ICPOES** Method: ME-(AU)-[ENV]AN320/AN321

Sample Number	Parameter	Units	LOR	Result
LB035596.001	Aluminium, Al	mg/L	0.005	<0.005
	Boron, B	mg/L	0.005	<0.005
	Calcium, Ca	mg/L	0.1	<0.1
	Iron, Fe	mg/L	0.005	<0.005
	Magnesium, Mg	mg/L	0.1	<0.1
	Potassium, K	mg/L	0.1	<0.1
	Sodium, Na	mg/L	0.5	<0.5
	Zinc, Zn	mg/L	0.005	<0.005

**Metals in Water (Dissolved) by ICPOES-USN** Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result
LB035604.001	Beryllium, Be	mg/L	0.0001	<0.0001
	Cadmium, Cd	mg/L	0.0001	<0.0001
	Chromium, Cr	mg/L	0.001	<0.0010
	Cobalt, Co	mg/L	0.001	<0.001
	Lead, Pb	mg/L	0.001	<0.001
	Nickel, Ni	mg/L	0.001	<0.001

**Metals in Water (Total) by ICPOES-USN** Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result
LB035608.001	Total Beryllium, Be	mg/L	0.0001	<0.0001
	Total Cadmium, Cd	mg/L	0.0001	<0.0001
	Total Cobalt, Co	mg/L	0.001	<0.001
	Total Lead, Pb	mg/L	0.001	<0.001
	Total Nickel, Ni	mg/L	0.001	<0.001

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser** Method: ME-(AU)-[ENV]AN248

Sample Number	Parameter	Units	LOR	Result
LB035640.001	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<0.005
LB035640.047	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<0.005

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Nitrite in Water**

Method: ME-(AU)-[ENV]AN277/WC250.312

Sample Number	Parameter	Units	LOR	Result
LB035632.001	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005
LB035632.024	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005

**pH in water**

Method: ME-(AU)-[ENV]AN101

Sample Number	Parameter	Units	LOR	Result
LB035546.001	pH**	pH Units	0.1	6.8
LB035546.082	pH**	pH Units	0.1	5.6
LB035546.109	pH**	pH Units	0.1	5.8

**TKN Kjeldahl Digestion by Discrete Analyser**

Method: ME-(AU)-[ENV]AN281

Sample Number	Parameter	Units	LOR	Result
LB035586.001	Total Kjeldahl Nitrogen	mg/L	0.05	<0.05
LB035586.024	Total Kjeldahl Nitrogen	mg/L	0.05	<0.05

**Total and Volatile Suspended Solids (TSS / VSS)**

Method: ME-(AU)-[ENV]AN114

Sample Number	Parameter	Units	LOR	Result
LB035721.001	Total Suspended Solids Dried at 103-105°C	mg/L	5	<5
LB035721.025	Total Suspended Solids Dried at 103-105°C	mg/L	5	<5

**Total Cyanide in water**

Method: ME-(AU)-[ENV]AN077/AN154

Sample Number	Parameter	Units	LOR	Result
LB035645.001	Total Cyanide	mg/L	0.004	<0.004

**Total Dissolved Solids (TDS) in water**

Method: ME-(AU)-[ENV]AN113

Sample Number	Parameter	Units	LOR	Result
LB035619.001	Total Dissolved Solids Dried at 175-185°C	mg/L	10	<10



Duplicates are calculated as Relative Percentage Difference (RPD) using the formula:  $RPD = |OriginalResult - ReplicateResult| \times 100 / Mean$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times SDL / Mean + LR$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

**Additional and Rare Earth Soluble Metals in Water by ICPMS**

Method: MA-1400

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.008	LB035625.011	Lanthanum, La*	mg/L	0.001	<0.001	<0.001	200	0

**Additional Total Metals in Water by ICPMS**

Method: MA-1400.WW.ADD.02

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.008	LB035628.011	Total Lanthanum, La*	mg/L	0.001	<0.001	<0.001	200	0

**Alkalinity**

Method: ME-(AU)-[ENV]AN135

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120540.001	LB035546.150	Total Alkalinity as CaCO3	mg/L	5	63.57021492363	842368454	17	0
CE120540.011	LB035546.151	Total Alkalinity as CaCO3	mg/L	5	18.12554641424	915698063	16	1
CE120544.001	LB035546.152	Total Alkalinity as CaCO3	mg/L	5	19.01308502245	552761626	37	29
CE120544.011	LB035546.153	Total Alkalinity as CaCO3	mg/L	5	19.80083312489	097394967	25	1
CE120544.021	LB035546.154	Total Alkalinity as CaCO3	mg/L	5	72.52767788570	624026862	22	3
CE120552.001	LB035546.157	Total Alkalinity as CaCO3	mg/L	5	<5	<5	161	0
CE120558.001	LB035546.158	Total Alkalinity as CaCO3	mg/L	5	47	52	25	10

**Ammonia Nitrogen by Discrete Analyser**

Method: ME-(AU)-[ENV]AN280

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.001	LB035690.004	Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.078	0.078	28	1
CE120554.001	LB035690.015	Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.1438	0.1431	22	0
CE120575.008	LB035690.028	Ammonia Nitrogen, NH3 as N	mg/L	0.005	41.3621	41.7356	15	1

**Chloride by Discrete Analyser in Water**

Method: ME-(AU)-[ENV]AN274

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120525.001	LB035631.005	Chloride, Cl	mg/L	1	180	180	16	0
CE120542.009	LB035631.016	Chloride, Cl	mg/L	1	2	2	66	2

**Mercury (dissolved) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120492.003	LB035637.014	Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0
CE120505.002	LB035637.028	Mercury	µg/L	0.00005	0	0	200	0
CE120510.004	LB035637.040	Mercury	µg/L	0.00005	0	0	200	0
CE120542.006	LB035637.054	Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0
CE120542.009	LB035637.057	Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0

**Mercury (total) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120482.002	LB035638.014	Total Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0
CE120492.005	LB035638.028	Total Mercury	µg/L	0.00005	<0.00005	0.00004	148	0
CE120505.004	LB035638.040	Total Mercury	µg/L	0.00005	0	0	200	0
CE120510.006	LB035638.054	Total Mercury	µg/L	0.00005	0.03	0.033	174	10
CE120542.008	LB035638.065	Total Mercury	µg/L	0.00005	<0.00005	0.00001	200	0
CE120542.009	LB035638.066	Total Mercury	µg/L	0.00005	<0.00005	0.00001	200	29

**Metals in Water (Total) by ICPOES**

Method: ME-(AU)-[ENV]AN022/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035599.013	Total Aluminium	mg/L	0.005	0.027	0.025	91	9
		Total Boron	mg/L	0.005	<0.005	<0.005	200	0
		Total Calcium	mg/L	0.05	6.8	6.8	18	0
		Total Iron	mg/L	0.005	0.92	0.92	17	0
		Total Magnesium	mg/L	0.05	7.4	7.4	16	0
		Total Potassium	mg/L	0.05	3.2	3.2	18	0
		Total Sodium	mg/L	0.5	9.8	9.9	20	0
		Total Zinc	mg/L	0.005	<0.005	<0.005	200	0

**Metals in Water (Dissolved) by ICPOES**

Method: ME-(AU)-[ENV]AN320/AN321

Original	Duplicate	Parameter	Units	LOR
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Duplicates are calculated as Relative Percentage Difference (RPD) using the formula:  $RPD = |OriginalResult - ReplicateResult| \times 100 / Mean$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times SDL / Mean + LR$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Metals in Water (Dissolved) by ICPOES (continued)

Method: ME-(AU)-[ENV]JAN320/AN321

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035596.013	Aluminium, Al	mg/L	0.005	<0.005	<0.005	200	0
		Boron, B	mg/L	0.005	<0.005	<0.005	200	0
		Calcium, Ca	mg/L	0.1	6.4	6.4	18	0
		Iron, Fe	mg/L	0.005	<0.005	<0.005	200	0
		Magnesium, Mg	mg/L	0.1	6.6	6.7	17	0
		Potassium, K	mg/L	0.1	2.8	2.8	19	0
		Sodium, Na	mg/L	0.5	8.6	8.6	21	0
		Sulphur as Sulphate, SO4	mg/L	0.5	52	52	16	1
		Zinc, Zn	mg/L	0.005	<0.005	<0.005	200	0

Metals in Water (Dissolved) by ICPOES-USN

Method: ME-(AU)-[ENV]JAN320/AN322

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035604.013	Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	200	0
		Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	200	0
		Chromium, Cr	mg/L	0.001	<0.0010	<0.0010	200	0
		Cobalt, Co	mg/L	0.001	<0.001	<0.001	136	0
		Copper, Cu	mg/L	0.001	<0.001	<0.001	182	0
		Lead, Pb	mg/L	0.001	<0.001	<0.001	200	0
		Manganese, Mn	mg/L	0.001	0.12	0.12	17	0
		Nickel, Ni	mg/L	0.001	<0.001	<0.001	200	0

Metals in Water (Total) by ICPOES-USN

Method: ME-(AU)-[ENV]JAN320/AN322

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035608.013	Total Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	200	0
		Total Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	200	0
		Total Cobalt, Co	mg/L	0.001	0.001	<0.001	115	3
		Total Copper, Cu	mg/L	0.001	<0.001	<0.001	170	0
		Total Lead, Pb	mg/L	0.001	<0.001	<0.001	200	0
		Total Manganese, Mn*	mg/L	0.001	0.14	0.14	16	1
		Total Nickel, Ni	mg/L	0.001	<0.001	<0.001	200	0

Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser

Method: ME-(AU)-[ENV]JAN248

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120533.001	LB035640.004	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	0.057	0.062	23	8
CE120542.008	LB035640.015	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	0.061	0.064	23	5
CE120552.005	LB035640.028	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	0.13	0.12	19	2
CE120567.003	LB035640.039	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<0.005	<0.005	200	0

Nitrite in Water

Method: ME-(AU)-[ENV]JAN277/WC250.312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120521.001	LB035632.004	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0
CE120542.005	LB035632.015	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0
CE120552.006	LB035632.028	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0

pH in water

Method: ME-(AU)-[ENV]JAN101

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120532.001	LB035546.144	pH**	pH Units	0.1	5.8	5.6	17	2
CE120532.011	LB035546.145	pH**	pH Units	0.1	7.6	7.6	16	0
CE120534.001	LB035546.146	pH**	pH Units	0.1	7.0	6.9	16	2
CE120534.011	LB035546.147	pH**	pH Units	0.1	6.7	6.7	16	0
CE120540.001	LB035546.150	pH**	pH Units	0.1	7.81753730777.8988690376		16	1
CE120540.011	LB035546.151	pH**	pH Units	0.1	7.06148099897.0490922927		16	0
CE120542.001	LB035546.149	pH**	pH Units	0.1	6.3	6.6	17	4
CE120544.001	LB035546.152	pH**	pH Units	0.1	6.83234596256.8711681365		16	1
CE120544.011	LB035546.153	pH**	pH Units	0.1	7.77349424367.7755899429		16	0
CE120544.021	LB035546.154	pH**	pH Units	0.1	7.61369943617.5934090614		16	0
CE120552.001	LB035546.157	pH**	pH Units	0.1	5.4	5.3	17	1
CE120558.001	LB035546.158	pH**	pH Units	0.1	7.7	7.8	16	1

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]JAN281

Original	Duplicate	Parameter	Units	LOR
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Duplicates are calculated as Relative Percentage Difference (RPD) using the formula:  $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

TKN Kjeldahl Digestion by Discrete Analyser (continued)

Method: ME-(AU)-[ENV]AN281

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.002	LB035586.016	Total Kjeldahl Nitrogen	mg/L	0.05	0.21	0.20	39	4
CE120547.003	LB035586.030	Total Kjeldahl Nitrogen	mg/L	0.05	<0.05	<0.05	200	0

Total and Volatile Solids for Water

Method: ME-(AU)-[ENV]AN113

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035621.012	Total Solids Dried at 105°C	mg/L	10	120	130	23	6

Total and Volatile Suspended Solids (TSS / VSS)

Method: ME-(AU)-[ENV]AN114

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.001	LB035721.004	Total Suspended Solids Dried at 103-105°C	mg/L	5	5	<5	156	2
CE120547.002	LB035721.015	Total Suspended Solids Dried at 103-105°C	mg/L	5	37	33	29	10

Total Cyanide in water

Method: ME-(AU)-[ENV]AN077/AN154

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035645.013	Total Cyanide	mg/L	0.004	<0.004	<0.004	200	0

Total Dissolved Solids (TDS) in water

Method: ME-(AU)-[ENV]AN113

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120480.001	LB035619.004	Total Dissolved Solids Dried at 175-185°C	mg/L	10	72	79	28	9
CE120535.002	LB035619.016	Total Dissolved Solids Dried at 175-185°C	mg/L	10	1100	1100	16	1

Trace Metals (Dissolved) in Water by ICPMS in mg/L

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.008	LB035620.011	Arsenic, As	µg/L	0.001	0.001	0.001	98	0
		Uranium, U	µg/L	0.001	<0.001	<0.001	200	0

Trace Metals (Total) in Water by ICPMS in mg/L

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.008	LB035623.011	Total Arsenic	µg/L	0.001	0.005	0.005	35	8
		Total Uranium	µg/L	0.001	<0.001	<0.001	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Alkalinity**

Method: ME-(AU)-[ENV]AN135

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035546.002	Total Alkalinity as CaCO3	mg/L	5	64	59.5	80 - 120	107
LB035546.003	Total Alkalinity as CaCO3	mg/L	5	210	229	80 - 120	92
LB035546.056	Total Alkalinity as CaCO3	mg/L	5	64	59.5	80 - 120	107
LB035546.057	Total Alkalinity as CaCO3	mg/L	5	210	229	80 - 120	92
LB035546.083	Total Alkalinity as CaCO3	mg/L	5	64	59.5	80 - 120	107
LB035546.084	Total Alkalinity as CaCO3	mg/L	5	210	229	80 - 120	93
LB035546.110	Total Alkalinity as CaCO3	mg/L	5	62	59.5	80 - 120	104
LB035546.111	Total Alkalinity as CaCO3	mg/L	5	200	229	80 - 120	89

**Ammonia Nitrogen by Discrete Analyser**

Method: ME-(AU)-[ENV]AN280

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035690.002	Ammonia Nitrogen, NH3 as N	mg/L	0.005	1.0	1	80 - 120	103
LB035690.024	Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.98	1	80 - 120	98

**Chloride by Discrete Analyser in Water**

Method: ME-(AU)-[ENV]AN274

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035631.002	Chloride, Cl	mg/L	1	130	125	80 - 120	104
LB035631.003	Chloride, Cl	mg/L	1	11	10	80 - 120	105

**Mercury (dissolved) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035637.002	Mercury	mg/L	0.00005	0.0021	0.002	80 - 120	105
LB035637.026	Mercury	mg/L	0.00005	0.0021	0.002	80 - 120	106
LB035637.050	Mercury	mg/L	0.00005	0.0020	0.002	80 - 120	102

**Metals in Water (Total) by ICPOES**

Method: ME-(AU)-[ENV]AN022/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035599.002	Total Aluminium	mg/L	0.005	0.99	1	80 - 120	99
	Total Boron	mg/L	0.005	0.20	0.2	80 - 120	98
	Total Calcium	mg/L	0.05	21	20	80 - 120	103
	Total Iron	mg/L	0.005	1.0	1	80 - 120	105
	Total Magnesium	mg/L	0.05	20	20	80 - 120	100
	Total Potassium	mg/L	0.05	21	20	80 - 120	107
	Total Sodium	mg/L	0.5	19	20	80 - 120	96
	Total Zinc	mg/L	0.005	1.1	1	80 - 120	107

**Metals in Water (Dissolved) by ICPOES**

Method: ME-(AU)-[ENV]AN320/AN321

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035596.002	Aluminium, Al	mg/L	0.005	0.99	1	80 - 120	99
	Boron, B	mg/L	0.005	0.20	0.2	80 - 120	99
	Calcium, Ca	mg/L	0.1	21	20	80 - 120	104
	Iron, Fe	mg/L	0.005	1.1	1	80 - 120	105
	Magnesium, Mg	mg/L	0.1	20	20	80 - 120	101
	Potassium, K	mg/L	0.1	21	20	80 - 120	107
	Sodium, Na	mg/L	0.5	19	20	80 - 120	96
	Zinc, Zn	mg/L	0.005	1.1	1	80 - 120	108

**Metals in Water (Dissolved) by ICPOES-USN**

Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035604.002	Beryllium, Be	mg/L	0.0001	0.0020	0.002	80 - 120	100
	Cadmium, Cd	mg/L	0.0001	0.0097	0.01	80 - 120	97
	Chromium, Cr	mg/L	0.001	0.0099	0.01	80 - 120	99
	Cobalt, Co	mg/L	0.001	0.010	0.01	80 - 120	103
	Copper, Cu	mg/L	0.001	0.010	0.01	80 - 120	100
	Lead, Pb	mg/L	0.001	0.010	0.01	80 - 120	102
	Nickel, Ni	mg/L	0.001	0.010	0.01	80 - 120	104

**Metals in Water (Total) by ICPOES-USN**

Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035608.002	Total Beryllium, Be	mg/L	0.0001	0.0020	0.002	80 - 120	100
	Total Cadmium, Cd	mg/L	0.0001	0.0098	0.01	80 - 120	98
	Total Cobalt, Co	mg/L	0.001	0.010	0.01	80 - 120	103

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Metals in Water (Total) by ICPOES-USN (continued)**

Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035608.002	Total Copper, Cu	mg/L	0.001	0.010	0.01	80 - 120	102
	Total Lead, Pb	mg/L	0.001	0.010	0.01	80 - 120	102
	Total Nickel, Ni	mg/L	0.001	0.011	0.01	80 - 120	105

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser**

Method: ME-(AU)-[ENV]AN248

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035640.002	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	1.8	2	80 - 120	91
LB035640.025	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	1.9	2	80 - 120	96
LB035640.048	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	2.0	2	80 - 120	101

**Nitrite in Water**

Method: ME-(AU)-[ENV]AN277/WC250.312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035632.002	Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.043	0.05	80 - 120	87
LB035632.025	Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.045	0.05	80 - 120	90

**pH in water**

Method: ME-(AU)-[ENV]AN101

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035546.006	pH**	pH Units	0.1	7.4	7.415	98 - 102	100
LB035546.033	pH**	pH Units	0.1	7.4	7.415	98 - 102	100
LB035546.087	pH**	pH Units	0.1	7.4	7.415	98 - 102	99
LB035546.114	pH**	pH Units	0.1	7.4	7.415	98 - 102	100

**TKN Kjeldahl Digestion by Discrete Analyser**

Method: ME-(AU)-[ENV]AN281

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035586.002	Total Kjeldahl Nitrogen	mg/L	0.05	4.5	5	80 - 120	90
LB035586.003	Total Kjeldahl Nitrogen	mg/L	0.05	0.51	0.5	80 - 120	102
LB035586.025	Total Kjeldahl Nitrogen	mg/L	0.05	4.5	5	80 - 120	90
LB035586.026	Total Kjeldahl Nitrogen	mg/L	0.05	0.47	0.5	80 - 120	94

**Total and Volatile Suspended Solids (TSS / VSS)**

Method: ME-(AU)-[ENV]AN114

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035721.002	Total Suspended Solids Dried at 103-105°C	mg/L	5	890	1000	80 - 120	89
LB035721.026	Total Suspended Solids Dried at 103-105°C	mg/L	5	950	1000	80 - 120	95

**Total Cyanide in water**

Method: ME-(AU)-[ENV]AN077/AN154

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035645.002	Total Cyanide	mg/L	0.004	0.020	0.02	80 - 120	100

**Total Dissolved Solids (TDS) in water**

Method: ME-(AU)-[ENV]AN113

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035619.002	Total Dissolved Solids Dried at 175-185°C	mg/L	10	250	250	80 - 120	100

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

**Mercury (dissolved) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120482.001	LB035637.004	Mercury	mg/L	0.00005	0.0021	<0.00005	0.0025	104
CE120505.004	LB035637.030	Mercury	mg/L	0.00005	0.0020	0.003	0.0025	100

**Mercury (total) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120470.001	LB035638.004	Total Mercury	mg/L	0.00005	0.0021	<0.00005	-	-
CE120492.007	LB035638.030	Total Mercury	mg/L	0.00005	0.0020	<0.00005	-	-
CE120542.001	LB035638.056	Total Mercury	mg/L	0.00005	0.0021	<0.00005	-	-

**Metals in Water (Total) by ICPOES**

Method: ME-(AU)-[ENV]AN022/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035599.004	Total Aluminium	mg/L	0.005	1.1	0.029	1	108
		Total Boron	mg/L	0.005	1.1	<0.005	1	110
		Total Calcium	mg/L	0.05	54	1.0	50	105
		Total Iron	mg/L	0.005	1.8	0.77	-	-
		Total Magnesium	mg/L	0.05	52	1.2	50	101
		Total Potassium	mg/L	0.05	56	0.40	50	111
		Total Sodium	mg/L	0.5	51	1.5	50	98
		Total Zinc	mg/L	0.005	1.1	0.006	1	110

**Metals in Water (Dissolved) by ICPOES**

Method: ME-(AU)-[ENV]AN320/AN321

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035596.004	Aluminium, Al	mg/L	0.005	1.1	<0.005	1	108
		Boron, B	mg/L	0.005	1.1	<0.005	1	111
		Calcium, Ca	mg/L	0.1	55	2.0	50	106
		Iron, Fe	mg/L	0.005	1.1	<0.005	1	110
		Magnesium, Mg	mg/L	0.1	53	2.4	50	101
		Potassium, K	mg/L	0.1	57	1.0	50	112
		Sodium, Na	mg/L	0.5	53	3.5	50	99
		Zinc, Zn	mg/L	0.005	1.1	<0.005	1	112

**Metals in Water (Dissolved) by ICPOES-USN**

Method: ME-(AU)-[ENV]AN320/AN322

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035604.004	Beryllium, Be	mg/L	0.0001	0.010	<0.0001	0.01	105
		Cadmium, Cd	mg/L	0.0001	0.010	<0.0001	0.01	100
		Chromium, Cr	mg/L	0.001	0.010	<0.0010	0.01	99
		Cobalt, Co	mg/L	0.001	0.010	<0.001	0.01	100
		Copper, Cu	mg/L	0.001	0.011	<0.001	0.01	105
		Lead, Pb	mg/L	0.001	0.010	<0.001	0.01	97
		Manganese, Mn	mg/L	0.001	0.049	0.030	-	-
		Nickel, Ni	mg/L	0.001	0.010	<0.001	0.01	99

**Metals in Water (Total) by ICPOES-USN**

Method: ME-(AU)-[ENV]AN320/AN322

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035608.004	Total Beryllium, Be	mg/L	0.0001	0.010	<0.0001	0.01	102
		Total Cadmium, Cd	mg/L	0.0001	0.0099	<0.0001	0.01	98
		Total Cobalt, Co	mg/L	0.001	0.010	<0.001	0.01	99
		Total Copper, Cu	mg/L	0.001	0.011	<0.001	0.01	104
		Total Lead, Pb	mg/L	0.001	0.010	<0.001	0.01	98
		Total Manganese, Mn*	mg/L	0.001	0.033	0.023	-	-
		Total Nickel, Ni	mg/L	0.001	0.010	<0.001	0.01	99

**Total Cyanide in water**

Method: ME-(AU)-[ENV]AN077/AN154

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035645.004	Total Cyanide	mg/L	0.004	0.020	<0.004	0.02	100

**Total Dissolved Solids (TDS) in water**

Method: ME-(AU)-[ENV]AN113

QC Sample	Sample Number	Parameter	Units	LOR
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Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Total Dissolved Solids (TDS) in water (continued)

Method: ME-(AU)-[ENV]AN113

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120480.001	LB035619.005	Total Dissolved Solids Dried at 175-185°C	mg/L	10	1200	72	1000	111

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula:  $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.



Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: [http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022\\_QA\\_QC\\_Plan.pdf](http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf)

- \* NATA accreditation does not cover the performance of this service.
- Sample not analysed for this analyte.

IS Insufficient sample for analysis.  
 LNR Sample listed, but not received.  
 LOR Limit of reporting.  
 QFH QC result is above the upper tolerance.  
 QFL QC result is below the lower tolerance.

- ① At least 2 of 3 surrogates are within acceptance criteria.
- ② RPD failed acceptance criteria due to sample heterogeneity.
- ③ Results less than 5 times LOR preclude acceptance criteria for RPD.
- ④ Recovery failed acceptance criteria due to matrix interference.
- ⑤ Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
- ⑥ LOR was raised due to sample matrix interference.
- ⑦ LOR was raised due to dilution of significantly high concentration of analyte in sample.
- ⑧ Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
- ⑨ Low surrogate recovery due to the sample emulsifying during extraction.
- ⑩ Legionella Test Result <10 cfu/mL  
Control Strategy (1)  
Maintain Monthly Program or at least 3-monthly monitoring. Maintain water treatment program
- ⑪ Legionella Test Result <1000 cfu/mL  
Control Strategy (2)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy 3.
- ⑫ Control Strategy (3)  
Retest water within 3 to 7 days of plant operation. If not detected, continue to retest water every 3 to 7 days until 2 consecutive samples return readings of 'not detected', then repeat control strategy (1).  
If detected at <100 cfu/mL, repeat control strategy (2).  
If detected at >100 cfu/mL, investigate the problem and review water treatment program, and immediately carry out online decontamination.  
If detected at >1000 cfu/mL, undertake control strategy (4).
- ⑬ Legionella Test Result >1000 cfu/mL  
Control Strategy (4)  
Investigate problem. Review water treatment program.  
Take necessary remedial action (including immediate online decontamination) and undertake control strategy (5).
- ⑭ Control Strategy (5)  
Retest water within 3 to 7 days of plant operation. If not detected, continue to retest water every 3 to 7 days until 2 consecutive samples return readings of 'not detected', then repeat control strategy (1).  
If detected at <100 cfu/mL, repeat control strategy (1)  
If detected at >100 and <1000 cfu/mL, investigate the problem and review water treatment program, immediately carry out online decontamination, and repeat control strategy (5).  
If detected at >1000 cfu/mL, investigate and review the water treatment program, immediately carry out system decontamination and repeat control strategy (5).
- ⑮ HPC - Test Result < 100 000 cfu/mL  
Control Strategy (1)  
Maintain Monthly Program. Maintain water treatment program.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: [http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022\\_QA\\_QC\\_Plan.pdf](http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf)

- ⑥ HPC Test Result > 100 000 cfu/mL <5 000 000 cfu/mL  
Control Strategy (2)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy 3.
- ⑦ Control Strategy (3)  
Retest water within 3 to 7 days of plant operation. If the test result is <100 000 cfu/mL, repeat control strategy (1)  
If the test result is >100 000 cfu/mL but <5 000 000 cfu/mL, undertake control strategy (2).  
If the test result is >5 000 000 cfu/mL, undertake control strategy (4).
- ⑧ HPC Test Result >5 000 000 cfu/mL  
Control Strategy (4)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy (5).
- ⑨ Control Strategy (5)  
Retest water within 3 to 7 days of plant operation. If the test result is <100 000 cfu/mL, repeat control strategy (1)  
If the test result is >100 000 cfu/mL but <5 000 000 cfu/mL, undertake control strategy (4).  
If the test result is >5 000 000 cfu/mL, investigate the problem.  
review the water treatment program, and carry out immediate online decontamination.
- ⑩ Enterococci - Median result should not exceed 230 cfu/100mL  
(maximum number in any one sample: 450-700 cfu/100mL)  
Sourced from NHMRC (National Health and Medical Research Council)  
& NWQMS (National Water Quality Management Strategy)  
-Australian Guidelines for Recreational Use of Water. Version Oct 2000.
- † Refer to Analytical Report comments for further information.

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# Appendix C – Sediment Chemistry Summary Table

### Sediment Quality Results

	Analyte Name	Units	SQG-Low	ERSW4	ERUS	ERDS	ERTOP	ERBTM	SCTOP	SCDS	SCBTM	QA (ERBTM)	QA RPD
General	Total Cyanide	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0%
	Total Organic Carbon	%w/w		0.55	0.95	1.7	0.57	0.27	0.27	0.20	0.18	0.30	11%
	Chloride (water extractable 1:5)	mg/kg		30	24	20	17	56	17	19	33	61	9%
Nutrients	Soluble Ammonia Nitrogen, NH <sub>3</sub> as N	mg/kg		3.7	4.5	7.9	3.3	2.7	3.0	3.9	2.7	3.6	29%
	Nitrite, NO <sub>2</sub> as N in Soil	mg/kg		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0%
	Nitrate/Nitrite Nitrogen, NO <sub>x</sub> as N	mg/kg		0.47	0.42	0.46	0.47	0.11	0.09	0.15	0.17	0.11	0%
	Nitrate Nitrogen, NO <sub>3</sub> as N	mg/kg		0.47	0.42	0.46	0.47	0.11	0.09	0.15	0.17	0.11	0%
	Total Kjeldahl Nitrogen	mg/kg		290	410	830	260	100	170	160	130	110	10%
	Organic Nitrogen	mg/kg		280	410	820	260	100	160	150	130	110	10%
	Total Nitrogen	mg/kg		290	410	830	260	100	170	160	130	110	10%
Water soluble metals in soil	Calcium, Ca	mg/kg		4	4	7	<2	4	<2	<2	4	3	29%
	Magnesium, Mg	mg/kg		4	2	5	2	2	2	1	4	3	40%
	Potassium, K	mg/kg		21	21	23	11	25	14	15	26	31	21%
	Sodium, Na	mg/kg		12	11	12	6	17	11	7	9	19	11%
	Sulphur as Sulphate, SO <sub>4</sub>	mg/kg		23	6	44	4	10	32	14	26	13	26%
Bioavailable metals in soil	Arsenic, As	mg/kg	<b>20</b>	3	<2	2	<2	<2	<2	<2	<2	<2	0%
	Beryllium, Be	mg/kg		<1	<1	<1	<1	<1	<1	<1	<1	<1	0%
	Cadmium, Cd	mg/kg	<b>1.5</b>	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	0%
	Cobalt, Co	mg/kg		<2	<2	3	<2	<2	<2	<2	<2	<2	0%
	Chromium, Cr	mg/kg	<b>80</b>	<5	<5	<5	<5	<5	<5	<5	<5	<5	0%
	Copper, Cu	mg/kg	<b>65</b>	9	<5	6	<5	<5	<5	<5	<5	<5	0%
	Iron, Fe	mg/kg		1900	1900	4200	1800	1100	1100	1500	1400	1300	17%
	Lanthanum, La	mg/kg		<5	<5	6	<5	<5	<5	<5	<5	<5	0%

	Analyte Name	Units	SQG-Low	ERSW4	ERUS	ERDS	ERTOP	ERBTM	SCTOP	SCDS	SCBTM	QA (ERBTM)	QA RPD
	Manganese, Mn	mg/kg		61	42	130	20	42	19	23	76	44	5%
	Nickel, Ni	mg/kg	<b>21</b>	<4	<4	<4	<4	<4	<4	<4	<4	<4	0%
	Lead, Pb	mg/kg	<b>50</b>	<5	<5	<5	<5	<5	<5	<5	<5	<5	0%
	Silver, Ag	mg/kg	<b>1</b>	<2	<2	<2	<2	<2	<2	<2	<2	<2	0%
	Uranium, U	mg/kg		<5	<5	<5	<5	<5	<5	<5	<5	<5	0%
	Zinc, Zn	mg/kg	<b>200</b>	7	<5	9	<5	<5	<5	<5	6	<5	0%

# Appendix D – Sediment Quality Laboratory Reports

CLIENT DETAILS

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Project **Mt Todd Macroinvertebrate Sampling**  
 Order Number **432218703**  
 Samples **9**

LABORATORY DETAILS

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SGS Reference **CE120542 R0**  
 Date Received **12 Apr 2016**  
 Date Reported **22 Apr 2016**

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(3146)

For determination of soluble metals, filtered sample was not received so samples were laboratory filtered on receipt. This may give soluble metals results that do not represent the concentrations present at the time of sampling.  
 Trace Metals subcontracted to SGS Leeder Consulting, 4-5/18 Redland Drive, Mitcham VIC, NATA Accreditation Number 14429, M160855.  
 Hex Cr subcontracted to SGS Sydney, Unit 16 33 Maddox St Alexandria NSW 2015, NATA Accreditation Number: 2562, Site Number: 4354, SE151105.

SIGNATORIES



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Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Number			CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Matrix			Water	Water	Water	Water
Sample Date			07 Apr 2016	07 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERSW4	ERUS	ERDS	ERTOP

**pH in water Method: AN101 Tested: 12/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
pH**	pH Units	0.1	6.3	6.8	6.8	6.8

**Alkalinity Method: AN135 Tested: 12/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Alkalinity as CaCO3	mg/L	5	12	6	8	7
Bicarbonate Alkalinity as CaCO3	mg/L	5	<5	<5	<5	<5
Carbonate Alkalinity as CaCO3	mg/L	5	-	-	-	-
Hydroxide Alkalinity as CaCO3	mg/L	5	-	-	-	-

**Chloride by Discrete Analyser in Water Method: AN274 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Chloride, Cl	mg/L	1	2	2	2	2

**Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 19/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Suspended Solids Dried at 103-105°C	mg/L	5	5	22	10	<5

**Total Dissolved Solids (TDS) in water Method: AN113 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Dissolved Solids Dried at 175-185°C	mg/L	10	39	20000	50	12

**Total and Volatile Solids for Water Method: AN113 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Solids Dried at 105°C	mg/L	10	59	31	57	30

**Total Cyanide in water Method: AN077/AN154 Tested: 15/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

**Ammonia Nitrogen by Discrete Analyser Method: AN280 Tested: 18/4/2016**

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.078	0.009	0.070	<0.005



Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Number			CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Matrix			Water	Water	Water	Water
Sample Date			07 Apr 2016	07 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERSW4	ERUS	ERDS	ERTOP

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 18/4/2016**

Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<b>0.025</b>	<0.005	<b>0.040</b>	<b>0.018</b>
Nitrate Nitrogen, NO3 as N	mg/L	0.005	<b>0.024</b>	<0.005	<b>0.039</b>	<b>0.017</b>

**Nitrite in Water Method: AN277/WC250.312 Tested: 14/4/2016**

Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
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**TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 13/4/2016**

Total Kjeldahl Nitrogen	mg/L	0.05	<b>0.48</b>	<b>0.21</b>	<b>0.29</b>	<b>0.11</b>
Total Nitrogen (calc)	mg/L	0.05	<b>0.50</b>	<b>0.21</b>	<b>0.33</b>	<b>0.13</b>
Organic Nitrogen (calc)	mg/L	0.05	<b>0.40</b>	<b>0.20</b>	<b>0.22</b>	<b>0.11</b>

**Hexavalent Chromium in water by UV-Vis Method: AN201 Tested: 20/4/2016**

Hexavalent Chromium, Cr6+	mg/L	0.002	<0.002	<0.002	<0.002	<0.002
Trivalent Chromium, Cr3+	mg/L	0.005	<0.005	<0.005	<0.005	<0.005

**Metals in Water (Dissolved) by ICPOES Method: AN320/AN321 Tested: 14/4/2016**

Aluminium, Al	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Boron, B	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Calcium, Ca	mg/L	0.1	<b>2.0</b>	<b>0.5</b>	<b>2.0</b>	<b>0.4</b>
Iron, Fe	mg/L	0.005	<0.005	<b>0.047</b>	<0.005	<0.005
Magnesium, Mg	mg/L	0.1	<b>2.4</b>	<b>0.7</b>	<b>2.2</b>	<b>0.6</b>
Potassium, K	mg/L	0.1	<b>1.0</b>	<b>0.3</b>	<b>0.9</b>	<b>0.3</b>
Sodium, Na	mg/L	0.5	<b>3.5</b>	<b>1.6</b>	<b>3.1</b>	<b>1.3</b>
Sulphur as Sulphate, SO4	mg/L	0.5	<b>15</b>	<0.5	<b>13</b>	<0.5
Zinc, Zn	mg/L	0.005	<0.005	<0.005	<0.005	<0.005

**Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 14/4/2016**

Total Aluminium	mg/L	0.005	<b>0.029</b>	<b>0.042</b>	<b>0.019</b>	<b>0.034</b>
Total Hardness*	mg CaCO3/L	1	<b>7</b>	<b>4</b>	<b>15</b>	<b>4</b>
Total Boron	mg/L	0.005	<0.005	<0.005	<0.005	<b>0.005</b>
Total Calcium	mg/L	0.05	<b>1.0</b>	<b>0.40</b>	<b>2.0</b>	<b>0.45</b>
Total Iron	mg/L	0.005	<b>0.77</b>	<b>0.85</b>	<b>0.59</b>	<b>0.70</b>
Total Magnesium	mg/L	0.05	<b>1.2</b>	<b>0.62</b>	<b>2.4</b>	<b>0.73</b>
Total Potassium	mg/L	0.05	<b>0.40</b>	<b>0.16</b>	<b>0.98</b>	<b>0.23</b>
Total Sodium	mg/L	0.5	<b>1.5</b>	<b>1.1</b>	<b>3.4</b>	<b>1.8</b>
Total Zinc	mg/L	0.005	<b>0.006</b>	<b>0.006</b>	<b>0.008</b>	<0.005

**Metals in Water (Dissolved) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016**

Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium, Cr	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt, Co	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Copper, Cu	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Lead, Pb	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Manganese, Mn	mg/L	0.001	<b>0.030</b>	<b>0.005</b>	<b>0.041</b>	<b>0.008</b>
Nickel, Ni	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Metals in Water (Total) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016**

Total Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Cobalt, Co	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Total Copper, Cu	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Total Lead, Pb	mg/L	0.001	<0.001	<0.001	<0.001	<b>0.007</b>
Total Manganese, Mn*	mg/L	0.001	<b>0.023</b>	<b>0.008</b>	<b>0.044</b>	<b>0.011</b>
Total Nickel, Ni	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

Parameter	Units	LOR	CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Number			CE120542.001	CE120542.002	CE120542.003	CE120542.004
Sample Matrix			Water	Water	Water	Water
Sample Date			07 Apr 2016	07 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERSW4	ERUS	ERDS	ERTOP

**Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016**

Arsenic, As	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Uranium, U	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Trace Metals (Total) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016**

Total Arsenic	mg/L	0.001	<b>0.001</b>	<0.001	<b>0.001</b>	<0.001
Total Uranium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Additional Total Metals in Water by ICPMS Method: MA-1400.WW.ADD.02 Tested: 14/4/2016**

Total Lanthanum, La*	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
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**Additional and Rare Earth Soluble Metals in Water by ICPMS Method: MA-1400 Tested: 14/4/2016**

Lanthanum, La*	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
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**Mercury (dissolved) in Water Method: AN311/AN312 Tested: 14/4/2016**

Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
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**Mercury (total) in Water Method: AN311/AN312 Tested: 14/4/2016**

Total Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
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**Calculation of Anion-Cation Balance (SAR Calc) Method: AN121 Tested: 22/4/2016**

Sum of Cation Milliequivalents*	meq/L	-	<b>0.480</b>	<b>0.163</b>	<b>0.439</b>	<b>0.138</b>
Sum of Anion Milliequivalents*	meq/L	-	<b>0.586</b>	<b>0.165</b>	<b>0.509</b>	<b>0.190</b>
Anion-Cation Balance	%	-100	<b>-9.9</b>	<b>-0.7</b>	<b>-7.4</b>	<b>-16</b>

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Number			CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Matrix			Water	Water	Water	Water
Sample Date			08 Apr 2016	08 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERBTM	ERBTM	SCTOP	SCDS

**pH in water** Method: AN101 Tested: 12/4/2016

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
pH**	pH Units	0.1	6.9	6.9	6.5	6.9

**Alkalinity** Method: AN135 Tested: 12/4/2016

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Alkalinity as CaCO3	mg/L	5	9	9	5	11
Bicarbonate Alkalinity as CaCO3	mg/L	5	<5	<5	<5	<5
Carbonate Alkalinity as CaCO3	mg/L	5	-	-	-	-
Hydroxide Alkalinity as CaCO3	mg/L	5	-	-	-	-

**Chloride by Discrete Analyser in Water** Method: AN274 Tested: 14/4/2016

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Chloride, Cl	mg/L	1	2	2	1	2

**Total and Volatile Suspended Solids (TSS / VSS)** Method: AN114 Tested: 19/4/2016

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Suspended Solids Dried at 103-105°C	mg/L	5	<5	<5	<5	<5

**Total Dissolved Solids (TDS) in water** Method: AN113 Tested: 14/4/2016

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Dissolved Solids Dried at 175-185°C	mg/L	10	48	52	11	130

**Total and Volatile Solids for Water** Method: AN113 Tested: 14/4/2016

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Solids Dried at 105°C	mg/L	10	58	58	24	120

**Total Cyanide in water** Method: AN077/AN154 Tested: 15/4/2016

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

**Ammonia Nitrogen by Discrete Analyser** Method: AN280 Tested: 18/4/2016

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.010	0.011	<0.005	0.30

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Number			CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Matrix			Water	Water	Water	Water
Sample Date			08 Apr 2016	08 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERBTM	ERBTM	SCTOP	SCDS

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 18/4/2016**

Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<b>0.019</b>	<b>0.019</b>	<0.005	<b>0.061</b>
Nitrate Nitrogen, NO3 as N	mg/L	0.005	<b>0.018</b>	<b>0.018</b>	<0.005	<b>0.059</b>

**Nitrite in Water Method: AN277/WC250.312 Tested: 14/4/2016**

Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
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**TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 13/4/2016**

Total Kjeldahl Nitrogen	mg/L	0.05	<b>0.14</b>	<b>0.15</b>	<b>0.14</b>	<b>0.65</b>
Total Nitrogen (calc)	mg/L	0.05	<b>0.16</b>	<b>0.17</b>	<b>0.14</b>	<b>0.71</b>
Organic Nitrogen (calc)	mg/L	0.05	<b>0.13</b>	<b>0.14</b>	<b>0.14</b>	<b>0.35</b>

**Hexavalent Chromium in water by UV-Vis Method: AN201 Tested: 20/4/2016**

Hexavalent Chromium, Cr6+	mg/L	0.002	<0.002	<0.002	<0.002	<0.002
Trivalent Chromium, Cr3+	mg/L	0.005	<0.005	<0.005	<0.005	<0.005

**Metals in Water (Dissolved) by ICPOES Method: AN320/AN321 Tested: 14/4/2016**

Aluminium, Al	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Boron, B	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Calcium, Ca	mg/L	0.1	<b>1.9</b>	<b>1.0</b>	<b>0.1</b>	<b>6.7</b>
Iron, Fe	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Magnesium, Mg	mg/L	0.1	<b>2.3</b>	<b>1.2</b>	<b>0.2</b>	<b>7.3</b>
Potassium, K	mg/L	0.1	<b>0.9</b>	<b>0.4</b>	<b>0.1</b>	<b>3.1</b>
Sodium, Na	mg/L	0.5	<b>3.3</b>	<b>1.5</b>	<b>0.7</b>	<b>9.6</b>
Sulphur as Sulphate, SO4	mg/L	0.5	<b>13</b>	<b>6.6</b>	<0.5	<b>56</b>
Zinc, Zn	mg/L	0.005	<0.005	<0.005	<0.005	<b>0.008</b>

**Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 14/4/2016**

Total Aluminium	mg/L	0.005	<b>0.034</b>	<b>0.044</b>	<b>0.040</b>	<b>0.062</b>
Total Hardness*	mg CaCO3/L	1	<b>8</b>	<b>11</b>	<b>1</b>	<b>48</b>
Total Boron	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Calcium	mg/L	0.05	<b>1.1</b>	<b>1.4</b>	<b>0.14</b>	<b>6.8</b>
Total Iron	mg/L	0.005	<b>0.76</b>	<b>0.78</b>	<b>0.33</b>	<b>1.1</b>
Total Magnesium	mg/L	0.05	<b>1.4</b>	<b>1.7</b>	<b>0.24</b>	<b>7.5</b>
Total Potassium	mg/L	0.05	<b>0.52</b>	<b>0.50</b>	<b>0.13</b>	<b>3.3</b>
Total Sodium	mg/L	0.5	<b>1.9</b>	<b>2.0</b>	<b>0.7</b>	<b>10</b>
Total Zinc	mg/L	0.005	<0.005	<0.005	<0.005	<b>0.022</b>

**Metals in Water (Dissolved) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016**

Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium, Cr	mg/L	0.001	<0.0010	<0.0010	<0.0010	<0.0010
Cobalt, Co	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Copper, Cu	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Lead, Pb	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Manganese, Mn	mg/L	0.001	<b>0.009</b>	<b>0.012</b>	<b>0.006</b>	<b>0.19</b>
Nickel, Ni	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Metals in Water (Total) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016**

Total Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Cobalt, Co	mg/L	0.001	<0.001	<0.001	<0.001	<b>0.001</b>
Total Copper, Cu	mg/L	0.001	<0.001	<0.001	<0.001	<b>0.001</b>
Total Lead, Pb	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese, Mn*	mg/L	0.001	<b>0.016</b>	<b>0.020</b>	<b>0.009</b>	<b>0.21</b>
Total Nickel, Ni	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

Parameter	Units	LOR	CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Number			CE120542.005	CE120542.006	CE120542.007	CE120542.008
Sample Matrix			Water	Water	Water	Water
Sample Date			08 Apr 2016	08 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERBTM	ERBTM	SCTOP	SCDS

**Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016**

Arsenic, As	mg/L	0.001	<0.001	<0.001	<0.001	<b>0.001</b>
Uranium, U	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Trace Metals (Total) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016**

Total Arsenic	mg/L	0.001	<b>0.001</b>	<b>0.001</b>	<0.001	<b>0.005</b>
Total Uranium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001

**Additional Total Metals in Water by ICPMS Method: MA-1400.WW.ADD.02 Tested: 14/4/2016**

Total Lanthanum, La*	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
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**Additional and Rare Earth Soluble Metals in Water by ICPMS Method: MA-1400 Tested: 14/4/2016**

Lanthanum, La*	mg/L	0.001	<0.001	<0.001	<0.001	<0.001
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**Mercury (dissolved) in Water Method: AN311/AN312 Tested: 14/4/2016**

Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
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**Mercury (total) in Water Method: AN311/AN312 Tested: 14/4/2016**

Total Mercury	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005
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**Calculation of Anion-Cation Balance (SAR Calc) Method: AN121 Tested: 22/4/2016**

Sum of Cation Milliequivalents*	meq/L	-	<b>0.447</b>	<b>0.223</b>	<b>0.061</b>	<b>1.43</b>
Sum of Anion Milliequivalents*	meq/L	-	<b>0.508</b>	<b>0.364</b>	<b>0.134</b>	<b>1.45</b>
Anion-Cation Balance	%	-100	<b>-6.4</b>	<b>-24</b>	<b>-38</b>	<b>-0.7</b>

Sample Number	CE120542.009	
Sample Matrix	Water	
Sample Date	07 Apr 2016	
Sample Name	SCBTM	
Parameter	Units	LOR

**pH in water Method: AN101 Tested: 12/4/2016**

pH**	pH Units	0.1	<b>7.0</b>
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**Alkalinity Method: AN135 Tested: 12/4/2016**

Total Alkalinity as CaCO <sub>3</sub>	mg/L	5	<b>7</b>
Bicarbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	<5
Carbonate Alkalinity as CaCO <sub>3</sub>	mg/L	5	-
Hydroxide Alkalinity as CaCO <sub>3</sub>	mg/L	5	-

**Chloride by Discrete Analyser in Water Method: AN274 Tested: 14/4/2016**

Chloride, Cl	mg/L	1	<b>2</b>
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**Total and Volatile Suspended Solids (TSS / VSS) Method: AN114 Tested: 19/4/2016**

Total Suspended Solids Dried at 103-105°C	mg/L	5	<5
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**Total Dissolved Solids (TDS) in water Method: AN113 Tested: 14/4/2016**

Total Dissolved Solids Dried at 175-185°C	mg/L	10	<b>130</b>
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**Total and Volatile Solids for Water Method: AN113 Tested: 14/4/2016**

Total Solids Dried at 105°C	mg/L	10	<b>120</b>
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**Total Cyanide in water Method: AN077/AN154 Tested: 15/4/2016**

Total Cyanide	mg/L	0.004	<0.004
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Sample Number	CE120542.009	
Sample Matrix	Water	
Sample Date	07 Apr 2016	
Sample Name	SCBTM	
Parameter	Units	LOR

**Ammonia Nitrogen by Discrete Analyser Method: AN280 Tested: 18/4/2016**

Ammonia Nitrogen, NH3 as N	mg/L	0.005	<b>0.26</b>
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**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: AN248 Tested: 18/4/2016**

Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<b>0.056</b>
Nitrate Nitrogen, NO3 as N	mg/L	0.005	<b>0.054</b>

**Nitrite in Water Method: AN277/WC250.312 Tested: 14/4/2016**

Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005
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**TKN Kjeldahl Digestion by Discrete Analyser Method: AN281 Tested: 13/4/2016**

Total Kjeldahl Nitrogen	mg/L	0.05	<b>0.56</b>
Total Nitrogen (calc)	mg/L	0.05	<b>0.62</b>
Organic Nitrogen (calc)	mg/L	0.05	<b>0.31</b>

**Hexavalent Chromium in water by UV-Vis Method: AN201 Tested: 20/4/2016**

Hexavalent Chromium, Cr6+	mg/L	0.002	<0.002
Trivalent Chromium, Cr3+	mg/L	0.005	<0.005

**Metals in Water (Dissolved) by ICPOES Method: AN320/AN321 Tested: 14/4/2016**

Aluminium, Al	mg/L	0.005	<0.005
Boron, B	mg/L	0.005	<0.005
Calcium, Ca	mg/L	0.1	<b>6.4</b>
Iron, Fe	mg/L	0.005	<0.005
Magnesium, Mg	mg/L	0.1	<b>6.6</b>
Potassium, K	mg/L	0.1	<b>2.8</b>
Sodium, Na	mg/L	0.5	<b>8.6</b>
Sulphur as Sulphate, SO4	mg/L	0.5	<b>52</b>
Zinc, Zn	mg/L	0.005	<0.005

**Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 14/4/2016**

Total Aluminium	mg/L	0.005	<b>0.027</b>
Total Hardness*	mg CaCO3/L	1	<b>47</b>
Total Boron	mg/L	0.005	<0.005
Total Calcium	mg/L	0.05	<b>6.8</b>
Total Iron	mg/L	0.005	<b>0.92</b>
Total Magnesium	mg/L	0.05	<b>7.4</b>
Total Potassium	mg/L	0.05	<b>3.2</b>
Total Sodium	mg/L	0.5	<b>9.8</b>
Total Zinc	mg/L	0.005	<0.005

Sample Number	CE120542.009
Sample Matrix	Water
Sample Date	07 Apr 2016
Sample Name	SCBTM

Parameter	Units	LOR	
<b>Metals in Water (Dissolved) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016</b>			
Beryllium, Be	mg/L	0.0001	<0.0001
Cadmium, Cd	mg/L	0.0001	<0.0001
Chromium, Cr	mg/L	0.001	<0.0010
Cobalt, Co	mg/L	0.001	<0.001
Copper, Cu	mg/L	0.001	<0.001
Lead, Pb	mg/L	0.001	<0.001
Manganese, Mn	mg/L	0.001	<b>0.12</b>
Nickel, Ni	mg/L	0.001	<0.001

<b>Metals in Water (Total) by ICPOES-USN Method: AN320/AN322 Tested: 14/4/2016</b>			
Total Beryllium, Be	mg/L	0.0001	<0.0001
Total Cadmium, Cd	mg/L	0.0001	<0.0001
Total Cobalt, Co	mg/L	0.001	<b>0.001</b>
Total Copper, Cu	mg/L	0.001	<0.001
Total Lead, Pb	mg/L	0.001	<0.001
Total Manganese, Mn*	mg/L	0.001	<b>0.14</b>
Total Nickel, Ni	mg/L	0.001	<0.001

<b>Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016</b>			
Arsenic, As	mg/L	0.001	<b>0.001</b>
Uranium, U	mg/L	0.001	<0.001

<b>Trace Metals (Total) in Water by ICPMS in mg/L Method: AN318 Tested: 14/4/2016</b>			
Total Arsenic	mg/L	0.001	<b>0.004</b>
Total Uranium	mg/L	0.001	<0.001

<b>Additional Total Metals in Water by ICPMS Method: MA-1400.WW.ADD.02 Tested: 14/4/2016</b>			
Total Lanthanum, La*	mg/L	0.001	<0.001

<b>Additional and Rare Earth Soluble Metals in Water by ICPMS Method: MA-1400 Tested: 14/4/2016</b>			
Lanthanum, La*	mg/L	0.001	<0.001



	Sample Number	CE120542.009
	Sample Matrix	Water
	Sample Date	07 Apr 2016
	Sample Name	SCBTM
Parameter	Units	LOR

**Mercury (dissolved) in Water** Method: AN311/AN312 Tested: 14/4/2016

Mercury	mg/L	0.00005	<0.00005
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**Mercury (total) in Water** Method: AN311/AN312 Tested: 14/4/2016

Total Mercury	mg/L	0.00005	<0.00005
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**Calculation of Anion-Cation Balance (SAR Calc)** Method: AN121 Tested: 22/4/2016

Sum of Cation Milliequivalents*	meq/L	-	<b>1.31</b>
Sum of Anion Milliequivalents*	meq/L	-	<b>1.27</b>
Anion-Cation Balance	%	-100	<b>1.6</b>

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Additional and Rare Earth Soluble Metals in Water by ICPMS Method: MA-1400**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Lanthanum, La*	LB035625	mg/L	0.001	<0.001	0%	NA

**Additional Total Metals in Water by ICPMS Method: MA-1400.WW.ADD.02**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Lanthanum, La*	LB035628	mg/L	0.001	<0.001	0%	NA

**Alkalinity Method: ME-(AU)-[ENV]AN135**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB035546	mg/L	5	<5	0 - 3%	89 - 93%
Bicarbonate Alkalinity as CaCO3	LB035546	mg/L	5	<5		

**Ammonia Nitrogen by Discrete Analyser Method: ME-(AU)-[ENV]AN280**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Ammonia Nitrogen, NH3 as N	LB035690	mg/L	0.005	<0.005	0 - 1%	98 - 103%

**Chloride by Discrete Analyser in Water Method: ME-(AU)-[ENV]AN274**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chloride, Cl	LB035631	mg/L	1	<1	0 - 2%	105%

**Mercury (dissolved) in Water Method: ME-(AU)-[ENV]AN311/AN312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Mercury	LB035637	mg/L	0.00005	<0.00005 - <5	0%	102 - 106%	100 - 104%

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Mercury (total) in Water Method: ME-(AU)-[ENV]AN311/AN312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Mercury	LB035638	mg/L	0.00005	<0.00005	0 - 29%	NA	NA

**Metals in Water (Total) by ICPOES Method: ME-(AU)-[ENV]AN022/AN320**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Aluminium	LB035599	mg/L	0.005	<0.005	9%	99%	108%
Total Hardness*	LB035599	mg CaCO3/L	1	<1			
Total Boron	LB035599	mg/L	0.005	<0.005	0%	98%	110%
Total Calcium	LB035599	mg/L	0.05	<0.05	0%	103%	105%
Total Iron	LB035599	mg/L	0.005	<0.005	0%	105%	NA
Total Magnesium	LB035599	mg/L	0.05	<0.05	0%	100%	101%
Total Potassium	LB035599	mg/L	0.05	<0.05	0%	107%	111%
Total Sodium	LB035599	mg/L	0.5	<0.5	0%	96%	98%
Total Zinc	LB035599	mg/L	0.005	<0.005	0%	107%	110%

**Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320/AN321**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Aluminium, Al	LB035596	mg/L	0.005	<0.005	0%	99%	108%
Boron, B	LB035596	mg/L	0.005	<0.005	0%	99%	111%
Calcium, Ca	LB035596	mg/L	0.1	<0.1	0%	104%	106%
Iron, Fe	LB035596	mg/L	0.005	<0.005	0%	105%	110%
Magnesium, Mg	LB035596	mg/L	0.1	<0.1	0%	101%	101%
Potassium, K	LB035596	mg/L	0.1	<0.1	0%	107%	112%
Sodium, Na	LB035596	mg/L	0.5	<0.5	0%	96%	99%
Sulphur as Sulphate, SO4	LB035596	mg/L	0.5	<0.5	1%	NA	
Zinc, Zn	LB035596	mg/L	0.005	<0.005	0%	108%	112%

**Metals in Water (Dissolved) by ICPOES-USN Method: ME-(AU)-[ENV]AN320/AN322**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Beryllium, Be	LB035604	mg/L	0.0001	<0.0001	0%	100%	105%
Cadmium, Cd	LB035604	mg/L	0.0001	<0.0001	0%	97%	100%
Chromium, Cr	LB035604	mg/L	0.001	<0.0010	0%	99%	99%
Cobalt, Co	LB035604	mg/L	0.001	<0.001	0%	103%	100%
Copper, Cu	LB035604	mg/L	0.001	<0.001	0%	100%	105%
Lead, Pb	LB035604	mg/L	0.001	<0.001	0%	102%	97%
Manganese, Mn	LB035604	mg/L	0.001	<0.001	0%	NA	NA
Nickel, Ni	LB035604	mg/L	0.001	<0.001	0%	104%	99%

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Metals in Water (Total) by ICPOES-USN Method: ME-(AU)-[ENV]AN320/AN322**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Beryllium, Be	LB035608	mg/L	0.0001	<0.0001	0%	100%	102%
Total Cadmium, Cd	LB035608	mg/L	0.0001	<0.0001	0%	98%	98%
Total Cobalt, Co	LB035608	mg/L	0.001	<0.001	3%	103%	99%
Total Copper, Cu	LB035608	mg/L	0.001	<0.001	0%	102%	104%
Total Lead, Pb	LB035608	mg/L	0.001	<0.001	0%	102%	98%
Total Manganese, Mn*	LB035608	mg/L	0.001	<0.001	1%	NA	NA
Total Nickel, Ni	LB035608	mg/L	0.001	<0.001	0%	105%	99%

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser Method: ME-(AU)-[ENV]AN248**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate/Nitrite Nitrogen, NOx as N	LB035640	mg/L	0.005	<0.005	0 - 8%	96 - 101%

**Nitrite in Water Method: ME-(AU)-[ENV]AN277/WC250.312**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrite Nitrogen, NO2 as N	LB035632	mg/L	0.005	<0.005	0%	87 - 90%

**pH in water Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
pH**	LB035546	pH Units	0.1	5.6 - 6.8	0 - 4%	99 - 100%

**TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Kjeldahl Nitrogen	LB035586	mg/L	0.05	<0.05	0 - 4%	94 - 102%

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA', the results are less than the LOR and thus the RPD is not applicable.

**Total and Volatile Solids for Water Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	DUP %RPD
Total Solids Dried at 105°C	LB035621	mg/L	10	6%

**Total and Volatile Suspended Solids (TSS / VSS) Method: ME-(AU)-[ENV]AN114**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Suspended Solids Dried at 103-105°C	LB035721	mg/L	5	<5	2 - 10%	89 - 95%	101%

**Total Cyanide in water Method: ME-(AU)-[ENV]AN077/AN154**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Cyanide	LB035645	mg/L	0.004	<0.004	0%	100%	100%

**Total Dissolved Solids (TDS) in water Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Dissolved Solids Dried at 175-185°C	LB035619	mg/L	10	<10	1 - 9%	100%	111%

**Trace Metals (Dissolved) in Water by ICPMS in mg/L Method: ME-(AU)-[ENV]AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Arsenic, As	LB035620	mg/L	0.001	<0.001	0%	NA
Uranium, U	LB035620	mg/L	0.001	<0.001	0%	NA

**Trace Metals (Total) in Water by ICPMS in mg/L Method: ME-(AU)-[ENV]AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Arsenic	LB035623	mg/L	0.001	<0.001	8%	NA
Total Uranium	LB035623	mg/L	0.001	<0.001	0%	NA

METHOD

METHODOLOGY SUMMARY

AN022/AN320	Total (acid soluble) Metals by ICP-OES: Samples are digested in nitric or nitric and hydrochloric acids prior to analysis for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN114	Total Suspended and Volatile Suspended Solids: The sample is homogenised by shaking and a known volume is filtered through a pre-weighed GF/C filter paper and washed well with deionised water. The filter paper is dried and reweighed. The TSS is the residue retained by the filter per unit volume of sample. Reference APHA 2540 D. Internal Reference AN114
AN121	This method is used to calculation the balance of major Anions and Cations in water samples and converts major ion concentration to milliequivalents and then summed. Anions sum and Cation sum is calculated as a difference and expressed as a percentage.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN154	A buffered distillate or water sample is treated with chloramine /barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration.
AN248	Nitrate / Nitrite by Auto Analyser: In an acidic medium, nitrate is reduced quantitatively to nitrite by cadmium metal. This nitrite plus any original nitrite is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. Reference APHA 4500-NO3- F.
AN274	Chloride by Aquakem DA: Chloride reacts with mercuric thiocyanate forming a mercuric chloride complex. In the presence of ferric iron, highly coloured ferric thiocyanate is formed which is proportional to the chloride concentration. Reference APHA 4500Cl-
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN280	A filtered water sample containing ammonia (NH <sub>3</sub> ) or ammonium cations (NH <sub>4</sub> <sup>+</sup> ) is reacted with alkaline phenol and hypochlorite in a buffered solution to form the blue indophenol colour. The absorbance is measured at 630nm and compared with calibration standards to obtain the concentration of ammonia in the sample.

METHOD	METHODOLOGY SUMMARY
AN281	An unfiltered water or soil sample is first digested in a block digester with sulfuric acid, K <sub>2</sub> SO <sub>4</sub> and CuSO <sub>4</sub> . The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN311/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN320/	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN320/AN321	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320/AN321	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN320/AN322	ICP-OES (Ultrasonic Nebuliser): After preservation with 10% nitric acid, a wide range of metals and some non-metals in solution can be measured by ICP- Ultrasonic nebulisation. Solutions are aspirated using an ultrasonic nebuliser into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320/AN322	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B
AN322	ICP-OES (Ultrasonic Nebuliser): After preservation with 10% nitric acid, a wide range of metals and some non-metals in solution can be measured by ICP- Ultrasonic nebulisation. Solutions are aspirated using an ultrasonic nebuliser into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN322	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO <sub>2</sub> D.
MA-1400	Rare Earth Metals by ICP MS by SGS Leeder.
MA-1400.WW.ADD.02	Additional total metals in water by ICP MS. Performed by SGS Leeder.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : <http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf>

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## STATEMENT OF QA/QC PERFORMANCE

CE120542 R0

### CLIENT DETAILS

Contact            Simon Lukies  
 Client             GHD Pty Ltd  
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Project            **Mt Todd Macroinvertebrate Sampling**  
 Order Number    **432218703**  
 Samples           9

### LABORATORY DETAILS

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SGS Reference    **CE120542 R0**  
 Date Received    12 Apr 2016  
 Date Reported    22 Apr 2016

### COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client. This QA/QC Statement must be read in conjunction with the referenced Analytical Report. The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	Alkalinity	9 items
	Nitrite in Water	9 items
	pH in water	9 items
	Total and Volatile Suspended Solids (TSS / VSS)	9 items
Analysis Date	Alkalinity	18 items
	Nitrite in Water	9 items
	pH in water	9 items
	Total and Volatile Solids for Water	9 items
	Total Dissolved Solids (TDS) in water	9 items

### SAMPLE SUMMARY

Sample counts by matrix	9 waters	Type of documentation received	COC
Date documentation received	12/4/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	frozen
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	2

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Additional and Rare Earth Soluble Metals in Water by ICPMS

Method: MA-1400

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERUS	CE120542.002	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERDS	CE120542.003	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERTOP	CE120542.004	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERBTM	CE120542.005	LB035625	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
ERBTM	CE120542.006	LB035625	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
SCTOP	CE120542.007	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCDS	CE120542.008	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCBTM	CE120542.009	LB035625	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

### Additional Total Metals in Water by ICPMS

Method: MA-1400.VVV.ADD.02

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERUS	CE120542.002	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERDS	CE120542.003	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERTOP	CE120542.004	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERBTM	CE120542.005	LB035628	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
ERBTM	CE120542.006	LB035628	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
SCTOP	CE120542.007	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCDS	CE120542.008	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCBTM	CE120542.009	LB035628	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

### Alkalinity

Method: ME-(AU)-[ENV]AN153

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
ERUS	CE120542.002	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
ERDS	CE120542.003	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
ERTOP	CE120542.004	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
ERBTM	CE120542.005	LB035546	08 Apr 2016	12 Apr 2016	09 Apr 2016	12 Apr 2016†	09 Apr 2016	19 Apr 2016†
ERBTM	CE120542.006	LB035546	08 Apr 2016	12 Apr 2016	09 Apr 2016	12 Apr 2016†	09 Apr 2016	19 Apr 2016†
SCTOP	CE120542.007	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
SCDS	CE120542.008	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†
SCBTM	CE120542.009	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	19 Apr 2016†

### Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN280

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
ERUS	CE120542.002	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
ERDS	CE120542.003	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
ERTOP	CE120542.004	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
ERBTM	CE120542.005	LB035690	08 Apr 2016	12 Apr 2016	06 May 2016	18 Apr 2016	06 May 2016	19 Apr 2016
ERBTM	CE120542.006	LB035690	08 Apr 2016	12 Apr 2016	06 May 2016	18 Apr 2016	06 May 2016	19 Apr 2016
SCTOP	CE120542.007	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
SCDS	CE120542.008	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016
SCBTM	CE120542.009	LB035690	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	19 Apr 2016

### Chloride by Discrete Analyser in Water

Method: ME-(AU)-[ENV]AN274

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
ERUS	CE120542.002	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
ERDS	CE120542.003	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
ERTOP	CE120542.004	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
ERBTM	CE120542.005	LB035631	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	14 Apr 2016
ERBTM	CE120542.006	LB035631	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	14 Apr 2016
SCTOP	CE120542.007	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
SCDS	CE120542.008	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016
SCBTM	CE120542.009	LB035631	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	14 Apr 2016

### Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERUS	CE120542.002	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Mercury (dissolved) in Water (continued)

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERDS	CE120542.003	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERTOP	CE120542.004	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERBTM	CE120542.005	LB035637	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
ERBTM	CE120542.006	LB035637	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
SCTOP	CE120542.007	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCDS	CE120542.008	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCBTM	CE120542.009	LB035637	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016

### Mercury (total) In Water

Method: ME-(AU)-[ENV]AN311/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERUS	CE120542.002	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERDS	CE120542.003	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERTOP	CE120542.004	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERBTM	CE120542.005	LB035638	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
ERBTM	CE120542.006	LB035638	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
SCTOP	CE120542.007	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCDS	CE120542.008	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCBTM	CE120542.009	LB035638	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016

### Metals in Water (Total) by ICPOES

Method: ME-(AU)-[ENV]AN022/AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERUS	CE120542.002	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERDS	CE120542.003	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERTOP	CE120542.004	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERBTM	CE120542.005	LB035599	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
ERBTM	CE120542.006	LB035599	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
SCTOP	CE120542.007	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCDS	CE120542.008	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCBTM	CE120542.009	LB035599	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016

### Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320/AN321

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERUS	CE120542.002	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERDS	CE120542.003	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERTOP	CE120542.004	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERBTM	CE120542.005	LB035596	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
ERBTM	CE120542.006	LB035596	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
SCTOP	CE120542.007	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCDS	CE120542.008	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCBTM	CE120542.009	LB035596	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016

### Metals in Water (Dissolved) by ICPOES-USN

Method: ME-(AU)-[ENV]AN320/AN322

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERUS	CE120542.002	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERDS	CE120542.003	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERTOP	CE120542.004	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERBTM	CE120542.005	LB035604	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
ERBTM	CE120542.006	LB035604	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
SCTOP	CE120542.007	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	18 Apr 2016
SCDS	CE120542.008	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	18 Apr 2016
SCBTM	CE120542.009	LB035604	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	18 Apr 2016

### Metals in Water (Total) by ICPOES-USN

Method: ME-(AU)-[ENV]AN320/AN322

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERUS	CE120542.002	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERDS	CE120542.003	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
ERTOP	CE120542.004	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Metals in Water (Total) by ICPOES-USN (continued)

Method: ME-(AU)-[ENV]AN320/AN322

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERBTM	CE120542.005	LB035608	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
ERBTM	CE120542.006	LB035608	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	15 Apr 2016
SCTOP	CE120542.007	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCDS	CE120542.008	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016
SCBTM	CE120542.009	LB035608	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	15 Apr 2016

### Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser

Method: ME-(AU)-[ENV]AN248

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
ERUS	CE120542.002	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
ERDS	CE120542.003	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
ERTOP	CE120542.004	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
ERBTM	CE120542.005	LB035640	08 Apr 2016	12 Apr 2016	06 May 2016	18 Apr 2016	06 May 2016	18 Apr 2016
ERBTM	CE120542.006	LB035640	08 Apr 2016	12 Apr 2016	06 May 2016	18 Apr 2016	06 May 2016	18 Apr 2016
SCTOP	CE120542.007	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
SCDS	CE120542.008	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016
SCBTM	CE120542.009	LB035640	07 Apr 2016	12 Apr 2016	05 May 2016	18 Apr 2016	05 May 2016	18 Apr 2016

### Nitrite in Water

Method: ME-(AU)-[ENV]AN277/WC250.312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
ERUS	CE120542.002	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
ERDS	CE120542.003	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
ERTOP	CE120542.004	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
ERBTM	CE120542.005	LB035632	08 Apr 2016	12 Apr 2016	12 Apr 2016	14 Apr 2016†	12 Apr 2016	14 Apr 2016†
ERBTM	CE120542.006	LB035632	08 Apr 2016	12 Apr 2016	12 Apr 2016	14 Apr 2016†	12 Apr 2016	14 Apr 2016†
SCTOP	CE120542.007	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
SCDS	CE120542.008	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†
SCBTM	CE120542.009	LB035632	07 Apr 2016	12 Apr 2016	11 Apr 2016	14 Apr 2016†	11 Apr 2016	14 Apr 2016†

### pH in water

Method: ME-(AU)-[ENV]AN101

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
ERUS	CE120542.002	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
ERDS	CE120542.003	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
ERTOP	CE120542.004	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
ERBTM	CE120542.005	LB035546	08 Apr 2016	12 Apr 2016	09 Apr 2016	12 Apr 2016†	09 Apr 2016	13 Apr 2016†
ERBTM	CE120542.006	LB035546	08 Apr 2016	12 Apr 2016	09 Apr 2016	12 Apr 2016†	09 Apr 2016	13 Apr 2016†
SCTOP	CE120542.007	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
SCDS	CE120542.008	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†
SCBTM	CE120542.009	LB035546	07 Apr 2016	12 Apr 2016	08 Apr 2016	12 Apr 2016†	08 Apr 2016	13 Apr 2016†

### TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
ERUS	CE120542.002	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
ERDS	CE120542.003	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
ERTOP	CE120542.004	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
ERBTM	CE120542.005	LB035586	08 Apr 2016	12 Apr 2016	06 May 2016	13 Apr 2016	06 May 2016	19 Apr 2016
ERBTM	CE120542.006	LB035586	08 Apr 2016	12 Apr 2016	06 May 2016	13 Apr 2016	06 May 2016	19 Apr 2016
SCTOP	CE120542.007	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
SCDS	CE120542.008	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016
SCBTM	CE120542.009	LB035586	07 Apr 2016	12 Apr 2016	05 May 2016	13 Apr 2016	05 May 2016	19 Apr 2016

### Total and Volatile Solids for Water

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
ERUS	CE120542.002	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
ERDS	CE120542.003	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
ERTOP	CE120542.004	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
ERBTM	CE120542.005	LB035621	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	15 Apr 2016	20 Apr 2016†
ERBTM	CE120542.006	LB035621	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	15 Apr 2016	20 Apr 2016†

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Total and Volatile Solids for Water (continued)

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
SCTOP	CE120542.007	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
SCDS	CE120542.008	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†
SCBTM	CE120542.009	LB035621	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	20 Apr 2016†

### Total and Volatile Suspended Solids (TSS / VSS)

Method: ME-(AU)-[ENV]AN114

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERUS	CE120542.002	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERDS	CE120542.003	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERTOP	CE120542.004	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERBTM	CE120542.005	LB035721	08 Apr 2016	12 Apr 2016	15 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
ERBTM	CE120542.006	LB035721	08 Apr 2016	12 Apr 2016	15 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
SCTOP	CE120542.007	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
SCDS	CE120542.008	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016
SCBTM	CE120542.009	LB035721	07 Apr 2016	12 Apr 2016	14 Apr 2016	19 Apr 2016†	26 Apr 2016	19 Apr 2016

### Total Cyanide in water

Method: ME-(AU)-[ENV]AN077/AN154

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
ERUS	CE120542.002	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
ERDS	CE120542.003	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
ERTOP	CE120542.004	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
ERBTM	CE120542.005	LB035645	08 Apr 2016	12 Apr 2016	22 Apr 2016	15 Apr 2016	22 Apr 2016	20 Apr 2016
ERBTM	CE120542.006	LB035645	08 Apr 2016	12 Apr 2016	22 Apr 2016	15 Apr 2016	22 Apr 2016	20 Apr 2016
SCTOP	CE120542.007	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
SCDS	CE120542.008	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016
SCBTM	CE120542.009	LB035645	07 Apr 2016	12 Apr 2016	21 Apr 2016	15 Apr 2016	21 Apr 2016	20 Apr 2016

### Total Dissolved Solids (TDS) in water

Method: ME-(AU)-[ENV]AN113

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
ERUS	CE120542.002	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
ERDS	CE120542.003	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
ERTOP	CE120542.004	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
ERBTM	CE120542.005	LB035619	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	15 Apr 2016	18 Apr 2016†
ERBTM	CE120542.006	LB035619	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	15 Apr 2016	18 Apr 2016†
SCTOP	CE120542.007	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
SCDS	CE120542.008	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†
SCBTM	CE120542.009	LB035619	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	14 Apr 2016	18 Apr 2016†

### Trace Metals (Dissolved) in Water by ICPMS in mg/L

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERUS	CE120542.002	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERDS	CE120542.003	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERTOP	CE120542.004	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERBTM	CE120542.005	LB035620	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
ERBTM	CE120542.006	LB035620	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
SCTOP	CE120542.007	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCDS	CE120542.008	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCBTM	CE120542.009	LB035620	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

### Trace Metals (Total) in Water by ICPMS in mg/L

Method: ME-(AU)-[ENV]AN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542.001	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERUS	CE120542.002	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERDS	CE120542.003	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERTOP	CE120542.004	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
ERBTM	CE120542.005	LB035623	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
ERBTM	CE120542.006	LB035623	08 Apr 2016	12 Apr 2016	05 Oct 2016	14 Apr 2016	05 Oct 2016	20 Apr 2016
SCTOP	CE120542.007	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016
SCDS	CE120542.008	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

Trace Metals (Total) in Water by ICPMS in mg/L (continued)

Method: ME-(AU)-ENVJAN318

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
SCBTM	CE120542.009	LB035623	07 Apr 2016	12 Apr 2016	04 Oct 2016	14 Apr 2016	04 Oct 2016	20 Apr 2016

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No surrogates were required for this job.

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Alkalinity** Method: ME-(AU)-[ENV]AN135

Sample Number	Parameter	Units	LOR	Result
LB035546.001	Total Alkalinity as CaCO3	mg/L	5	<5
LB035546.082	Total Alkalinity as CaCO3	mg/L	5	<5
LB035546.109	Total Alkalinity as CaCO3	mg/L	5	<5

**Ammonia Nitrogen by Discrete Analyser** Method: ME-(AU)-[ENV]AN280

Sample Number	Parameter	Units	LOR	Result
LB035690.001	Ammonia Nitrogen, NH3 as N	mg/L	0.005	<0.005
LB035690.023	Ammonia Nitrogen, NH3 as N	mg/L	0.005	<0.005

**Chloride by Discrete Analyser in Water** Method: ME-(AU)-[ENV]AN274

Sample Number	Parameter	Units	LOR	Result
LB035631.001	Chloride, Cl	mg/L	1	<1

**Mercury (dissolved) in Water** Method: ME-(AU)-[ENV]AN311/AN312

Sample Number	Parameter	Units	LOR	Result
LB035637.001	Mercury	mg/L	0.00005	<5e-005
LB035637.025	Mercury	mg/L	0.00005	<5e-005
LB035637.049	Mercury	mg/L	0.00005	<0.00005

**Metals in Water (Total) by ICPOES** Method: ME-(AU)-[ENV]AN022/AN320

Sample Number	Parameter	Units	LOR	Result
LB035599.001	Total Aluminium	mg/L	0.005	<0.005
	Total Boron	mg/L	0.005	<0.005
	Total Calcium	mg/L	0.05	<0.05
	Total Magnesium	mg/L	0.05	<0.05
	Total Potassium	mg/L	0.05	<0.05
	Total Sodium	mg/L	0.5	<0.5
	Total Zinc	mg/L	0.005	<0.005

**Metals in Water (Dissolved) by ICPOES** Method: ME-(AU)-[ENV]AN320/AN321

Sample Number	Parameter	Units	LOR	Result
LB035596.001	Aluminium, Al	mg/L	0.005	<0.005
	Boron, B	mg/L	0.005	<0.005
	Calcium, Ca	mg/L	0.1	<0.1
	Iron, Fe	mg/L	0.005	<0.005
	Magnesium, Mg	mg/L	0.1	<0.1
	Potassium, K	mg/L	0.1	<0.1
	Sodium, Na	mg/L	0.5	<0.5
	Zinc, Zn	mg/L	0.005	<0.005

**Metals in Water (Dissolved) by ICPOES-USN** Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result
LB035604.001	Beryllium, Be	mg/L	0.0001	<0.0001
	Cadmium, Cd	mg/L	0.0001	<0.0001
	Chromium, Cr	mg/L	0.001	<0.0010
	Cobalt, Co	mg/L	0.001	<0.001
	Lead, Pb	mg/L	0.001	<0.001
	Nickel, Ni	mg/L	0.001	<0.001

**Metals in Water (Total) by ICPOES-USN** Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result
LB035608.001	Total Beryllium, Be	mg/L	0.0001	<0.0001
	Total Cadmium, Cd	mg/L	0.0001	<0.0001
	Total Cobalt, Co	mg/L	0.001	<0.001
	Total Lead, Pb	mg/L	0.001	<0.001
	Total Nickel, Ni	mg/L	0.001	<0.001

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser** Method: ME-(AU)-[ENV]AN248

Sample Number	Parameter	Units	LOR	Result
LB035640.001	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<0.005
LB035640.047	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<0.005



Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Nitrite in Water**

Method: ME-(AU)-[ENV]AN277/WC250.312

Sample Number	Parameter	Units	LOR	Result
LB035632.001	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005
LB035632.024	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005

**pH in water**

Method: ME-(AU)-[ENV]AN101

Sample Number	Parameter	Units	LOR	Result
LB035546.001	pH**	pH Units	0.1	6.8
LB035546.082	pH**	pH Units	0.1	5.6
LB035546.109	pH**	pH Units	0.1	5.8

**TKN Kjeldahl Digestion by Discrete Analyser**

Method: ME-(AU)-[ENV]AN281

Sample Number	Parameter	Units	LOR	Result
LB035586.001	Total Kjeldahl Nitrogen	mg/L	0.05	<0.05
LB035586.024	Total Kjeldahl Nitrogen	mg/L	0.05	<0.05

**Total and Volatile Suspended Solids (TSS / VSS)**

Method: ME-(AU)-[ENV]AN114

Sample Number	Parameter	Units	LOR	Result
LB035721.001	Total Suspended Solids Dried at 103-105°C	mg/L	5	<5
LB035721.025	Total Suspended Solids Dried at 103-105°C	mg/L	5	<5

**Total Cyanide in water**

Method: ME-(AU)-[ENV]AN077/AN154

Sample Number	Parameter	Units	LOR	Result
LB035645.001	Total Cyanide	mg/L	0.004	<0.004

**Total Dissolved Solids (TDS) in water**

Method: ME-(AU)-[ENV]AN113

Sample Number	Parameter	Units	LOR	Result
LB035619.001	Total Dissolved Solids Dried at 175-185°C	mg/L	10	<10

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula:  $RPD = |OriginalResult - ReplicateResult| \times 100 / Mean$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times SDL / Mean + LR$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

**Additional and Rare Earth Soluble Metals in Water by ICPMS**

Method: MA-1400

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.008	LB035625.011	Lanthanum, La*	mg/L	0.001	<0.001	<0.001	200	0

**Additional Total Metals in Water by ICPMS**

Method: MA-1400.WW.ADD.02

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.008	LB035628.011	Total Lanthanum, La*	mg/L	0.001	<0.001	<0.001	200	0

**Alkalinity**

Method: ME-(AU)-[ENV]AN135

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120540.001	LB035546.150	Total Alkalinity as CaCO3	mg/L	5	63.57021492363	842368454	17	0
CE120540.011	LB035546.151	Total Alkalinity as CaCO3	mg/L	5	18.12554641424	915698063	16	1
CE120544.001	LB035546.152	Total Alkalinity as CaCO3	mg/L	5	19.01308502245	552761626	37	29
CE120544.011	LB035546.153	Total Alkalinity as CaCO3	mg/L	5	19.80083312489	097394967	25	1
CE120544.021	LB035546.154	Total Alkalinity as CaCO3	mg/L	5	72.52767788570	624026862	22	3
CE120552.001	LB035546.157	Total Alkalinity as CaCO3	mg/L	5	<5	<5	161	0
CE120558.001	LB035546.158	Total Alkalinity as CaCO3	mg/L	5	47	52	25	10

**Ammonia Nitrogen by Discrete Analyser**

Method: ME-(AU)-[ENV]AN280

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.001	LB035690.004	Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.078	0.078	28	1
CE120554.001	LB035690.015	Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.1438	0.1431	22	0
CE120575.008	LB035690.028	Ammonia Nitrogen, NH3 as N	mg/L	0.005	41.3621	41.7356	15	1

**Chloride by Discrete Analyser in Water**

Method: ME-(AU)-[ENV]AN274

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120525.001	LB035631.005	Chloride, Cl	mg/L	1	180	180	16	0
CE120542.009	LB035631.016	Chloride, Cl	mg/L	1	2	2	66	2

**Mercury (dissolved) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120492.003	LB035637.014	Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0
CE120505.002	LB035637.028	Mercury	µg/L	0.00005	0	0	200	0
CE120510.004	LB035637.040	Mercury	µg/L	0.00005	0	0	200	0
CE120542.006	LB035637.054	Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0
CE120542.009	LB035637.057	Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0

**Mercury (total) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120482.002	LB035638.014	Total Mercury	µg/L	0.00005	<0.00005	<0.00005	200	0
CE120492.005	LB035638.028	Total Mercury	µg/L	0.00005	<0.00005	0.00004	148	0
CE120505.004	LB035638.040	Total Mercury	µg/L	0.00005	0	0	200	0
CE120510.006	LB035638.054	Total Mercury	µg/L	0.00005	0.03	0.033	174	10
CE120542.008	LB035638.065	Total Mercury	µg/L	0.00005	<0.00005	0.00001	200	0
CE120542.009	LB035638.066	Total Mercury	µg/L	0.00005	<0.00005	0.00001	200	29

**Metals in Water (Total) by ICPOES**

Method: ME-(AU)-[ENV]AN022/AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035599.013	Total Aluminium	mg/L	0.005	0.027	0.025	91	9
		Total Boron	mg/L	0.005	<0.005	<0.005	200	0
		Total Calcium	mg/L	0.05	6.8	6.8	18	0
		Total Iron	mg/L	0.005	0.92	0.92	17	0
		Total Magnesium	mg/L	0.05	7.4	7.4	16	0
		Total Potassium	mg/L	0.05	3.2	3.2	18	0
		Total Sodium	mg/L	0.5	9.8	9.9	20	0
		Total Zinc	mg/L	0.005	<0.005	<0.005	200	0

**Metals in Water (Dissolved) by ICPOES**

Method: ME-(AU)-[ENV]AN320/AN321

Original	Duplicate	Parameter	Units	LOR
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Duplicates are calculated as Relative Percentage Difference (RPD) using the formula:  $RPD = |OriginalResult - ReplicateResult| \times 100 / Mean$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times SDL / Mean + LR$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Metals in Water (Dissolved) by ICPOES (continued)

Method: ME-(AU)-[ENV]JAN320/AN321

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035596.013	Aluminium, Al	mg/L	0.005	<0.005	<0.005	200	0
		Boron, B	mg/L	0.005	<0.005	<0.005	200	0
		Calcium, Ca	mg/L	0.1	6.4	6.4	18	0
		Iron, Fe	mg/L	0.005	<0.005	<0.005	200	0
		Magnesium, Mg	mg/L	0.1	6.6	6.7	17	0
		Potassium, K	mg/L	0.1	2.8	2.8	19	0
		Sodium, Na	mg/L	0.5	8.6	8.6	21	0
		Sulphur as Sulphate, SO4	mg/L	0.5	52	52	16	1
		Zinc, Zn	mg/L	0.005	<0.005	<0.005	200	0

Metals in Water (Dissolved) by ICPOES-USN

Method: ME-(AU)-[ENV]JAN320/AN322

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035604.013	Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	200	0
		Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	200	0
		Chromium, Cr	mg/L	0.001	<0.0010	<0.0010	200	0
		Cobalt, Co	mg/L	0.001	<0.001	<0.001	136	0
		Copper, Cu	mg/L	0.001	<0.001	<0.001	182	0
		Lead, Pb	mg/L	0.001	<0.001	<0.001	200	0
		Manganese, Mn	mg/L	0.001	0.12	0.12	17	0
		Nickel, Ni	mg/L	0.001	<0.001	<0.001	200	0

Metals in Water (Total) by ICPOES-USN

Method: ME-(AU)-[ENV]JAN320/AN322

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035608.013	Total Beryllium, Be	mg/L	0.0001	<0.0001	<0.0001	200	0
		Total Cadmium, Cd	mg/L	0.0001	<0.0001	<0.0001	200	0
		Total Cobalt, Co	mg/L	0.001	0.001	<0.001	115	3
		Total Copper, Cu	mg/L	0.001	<0.001	<0.001	170	0
		Total Lead, Pb	mg/L	0.001	<0.001	<0.001	200	0
		Total Manganese, Mn*	mg/L	0.001	0.14	0.14	16	1
		Total Nickel, Ni	mg/L	0.001	<0.001	<0.001	200	0

Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser

Method: ME-(AU)-[ENV]JAN248

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120533.001	LB035640.004	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	0.057	0.062	23	8
CE120542.008	LB035640.015	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	0.061	0.064	23	5
CE120552.005	LB035640.028	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	0.13	0.12	19	2
CE120567.003	LB035640.039	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	<0.005	<0.005	200	0

Nitrite in Water

Method: ME-(AU)-[ENV]JAN277/WC250.312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120521.001	LB035632.004	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0
CE120542.005	LB035632.015	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0
CE120552.006	LB035632.028	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0

pH in water

Method: ME-(AU)-[ENV]JAN101

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120532.001	LB035546.144	pH**	pH Units	0.1	5.8	5.6	17	2
CE120532.011	LB035546.145	pH**	pH Units	0.1	7.6	7.6	16	0
CE120534.001	LB035546.146	pH**	pH Units	0.1	7.0	6.9	16	2
CE120534.011	LB035546.147	pH**	pH Units	0.1	6.7	6.7	16	0
CE120540.001	LB035546.150	pH**	pH Units	0.1	7.81753730777.8988690376		16	1
CE120540.011	LB035546.151	pH**	pH Units	0.1	7.06148099897.0490922927		16	0
CE120542.001	LB035546.149	pH**	pH Units	0.1	6.3	6.6	17	4
CE120544.001	LB035546.152	pH**	pH Units	0.1	6.83234596256.8711681365		16	1
CE120544.011	LB035546.153	pH**	pH Units	0.1	7.77349424367.7755899429		16	0
CE120544.021	LB035546.154	pH**	pH Units	0.1	7.61369943617.5934090614		16	0
CE120552.001	LB035546.157	pH**	pH Units	0.1	5.4	5.3	17	1
CE120558.001	LB035546.158	pH**	pH Units	0.1	7.7	7.8	16	1

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]JAN281

Original	Duplicate	Parameter	Units	LOR
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Duplicates are calculated as Relative Percentage Difference (RPD) using the formula:  $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

**TKN Kjeldahl Digestion by Discrete Analyser (continued)**

Method: ME-(AU)-[ENV]AN281

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.002	LB035586.016	Total Kjeldahl Nitrogen	mg/L	0.05	0.21	0.20	39	4
CE120547.003	LB035586.030	Total Kjeldahl Nitrogen	mg/L	0.05	<0.05	<0.05	200	0

**Total and Volatile Solids for Water**

Method: ME-(AU)-[ENV]AN113

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035621.012	Total Solids Dried at 105°C	mg/L	10	120	130	23	6

**Total and Volatile Suspended Solids (TSS / VSS)**

Method: ME-(AU)-[ENV]AN114

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.001	LB035721.004	Total Suspended Solids Dried at 103-105°C	mg/L	5	5	<5	156	2
CE120547.002	LB035721.015	Total Suspended Solids Dried at 103-105°C	mg/L	5	37	33	29	10

**Total Cyanide in water**

Method: ME-(AU)-[ENV]AN077/AN154

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.009	LB035645.013	Total Cyanide	mg/L	0.004	<0.004	<0.004	200	0

**Total Dissolved Solids (TDS) in water**

Method: ME-(AU)-[ENV]AN113

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120480.001	LB035619.004	Total Dissolved Solids Dried at 175-185°C	mg/L	10	72	79	28	9
CE120535.002	LB035619.016	Total Dissolved Solids Dried at 175-185°C	mg/L	10	1100	1100	16	1

**Trace Metals (Dissolved) in Water by ICPMS in mg/L**

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.008	LB035620.011	Arsenic, As	µg/L	0.001	0.001	0.001	98	0
		Uranium, U	µg/L	0.001	<0.001	<0.001	200	0

**Trace Metals (Total) in Water by ICPMS in mg/L**

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542.008	LB035623.011	Total Arsenic	µg/L	0.001	0.005	0.005	35	8
		Total Uranium	µg/L	0.001	<0.001	<0.001	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Alkalinity**

Method: ME-(AU)-[ENV]AN135

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035546.002	Total Alkalinity as CaCO3	mg/L	5	64	59.5	80 - 120	107
LB035546.003	Total Alkalinity as CaCO3	mg/L	5	210	229	80 - 120	92
LB035546.056	Total Alkalinity as CaCO3	mg/L	5	64	59.5	80 - 120	107
LB035546.057	Total Alkalinity as CaCO3	mg/L	5	210	229	80 - 120	92
LB035546.083	Total Alkalinity as CaCO3	mg/L	5	64	59.5	80 - 120	107
LB035546.084	Total Alkalinity as CaCO3	mg/L	5	210	229	80 - 120	93
LB035546.110	Total Alkalinity as CaCO3	mg/L	5	62	59.5	80 - 120	104
LB035546.111	Total Alkalinity as CaCO3	mg/L	5	200	229	80 - 120	89

**Ammonia Nitrogen by Discrete Analyser**

Method: ME-(AU)-[ENV]AN280

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035690.002	Ammonia Nitrogen, NH3 as N	mg/L	0.005	1.0	1	80 - 120	103
LB035690.024	Ammonia Nitrogen, NH3 as N	mg/L	0.005	0.98	1	80 - 120	98

**Chloride by Discrete Analyser in Water**

Method: ME-(AU)-[ENV]AN274

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035631.002	Chloride, Cl	mg/L	1	130	125	80 - 120	104
LB035631.003	Chloride, Cl	mg/L	1	11	10	80 - 120	105

**Mercury (dissolved) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035637.002	Mercury	mg/L	0.00005	0.0021	0.002	80 - 120	105
LB035637.026	Mercury	mg/L	0.00005	0.0021	0.002	80 - 120	106
LB035637.050	Mercury	mg/L	0.00005	0.0020	0.002	80 - 120	102

**Metals in Water (Total) by ICPOES**

Method: ME-(AU)-[ENV]AN022/AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035599.002	Total Aluminium	mg/L	0.005	0.99	1	80 - 120	99
	Total Boron	mg/L	0.005	0.20	0.2	80 - 120	98
	Total Calcium	mg/L	0.05	21	20	80 - 120	103
	Total Iron	mg/L	0.005	1.0	1	80 - 120	105
	Total Magnesium	mg/L	0.05	20	20	80 - 120	100
	Total Potassium	mg/L	0.05	21	20	80 - 120	107
	Total Sodium	mg/L	0.5	19	20	80 - 120	96
	Total Zinc	mg/L	0.005	1.1	1	80 - 120	107

**Metals in Water (Dissolved) by ICPOES**

Method: ME-(AU)-[ENV]AN320/AN321

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035596.002	Aluminium, Al	mg/L	0.005	0.99	1	80 - 120	99
	Boron, B	mg/L	0.005	0.20	0.2	80 - 120	99
	Calcium, Ca	mg/L	0.1	21	20	80 - 120	104
	Iron, Fe	mg/L	0.005	1.1	1	80 - 120	105
	Magnesium, Mg	mg/L	0.1	20	20	80 - 120	101
	Potassium, K	mg/L	0.1	21	20	80 - 120	107
	Sodium, Na	mg/L	0.5	19	20	80 - 120	96
	Zinc, Zn	mg/L	0.005	1.1	1	80 - 120	108

**Metals in Water (Dissolved) by ICPOES-USN**

Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035604.002	Beryllium, Be	mg/L	0.0001	0.0020	0.002	80 - 120	100
	Cadmium, Cd	mg/L	0.0001	0.0097	0.01	80 - 120	97
	Chromium, Cr	mg/L	0.001	0.0099	0.01	80 - 120	99
	Cobalt, Co	mg/L	0.001	0.010	0.01	80 - 120	103
	Copper, Cu	mg/L	0.001	0.010	0.01	80 - 120	100
	Lead, Pb	mg/L	0.001	0.010	0.01	80 - 120	102
	Nickel, Ni	mg/L	0.001	0.010	0.01	80 - 120	104

**Metals in Water (Total) by ICPOES-USN**

Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035608.002	Total Beryllium, Be	mg/L	0.0001	0.0020	0.002	80 - 120	100
	Total Cadmium, Cd	mg/L	0.0001	0.0098	0.01	80 - 120	98
	Total Cobalt, Co	mg/L	0.001	0.010	0.01	80 - 120	103

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Metals in Water (Total) by ICPOES-USN (continued)**

Method: ME-(AU)-[ENV]AN320/AN322

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035608.002	Total Copper, Cu	mg/L	0.001	0.010	0.01	80 - 120	102
	Total Lead, Pb	mg/L	0.001	0.010	0.01	80 - 120	102
	Total Nickel, Ni	mg/L	0.001	0.011	0.01	80 - 120	105

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser**

Method: ME-(AU)-[ENV]AN248

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035640.002	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	1.8	2	80 - 120	91
LB035640.025	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	1.9	2	80 - 120	96
LB035640.048	Nitrate/Nitrite Nitrogen, NOx as N	mg/L	0.005	2.0	2	80 - 120	101

**Nitrite in Water**

Method: ME-(AU)-[ENV]AN277/WC250.312

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035632.002	Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.043	0.05	80 - 120	87
LB035632.025	Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.045	0.05	80 - 120	90

**pH in water**

Method: ME-(AU)-[ENV]AN101

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035546.006	pH**	pH Units	0.1	7.4	7.415	98 - 102	100
LB035546.033	pH**	pH Units	0.1	7.4	7.415	98 - 102	100
LB035546.087	pH**	pH Units	0.1	7.4	7.415	98 - 102	99
LB035546.114	pH**	pH Units	0.1	7.4	7.415	98 - 102	100

**TKN Kjeldahl Digestion by Discrete Analyser**

Method: ME-(AU)-[ENV]AN281

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035586.002	Total Kjeldahl Nitrogen	mg/L	0.05	4.5	5	80 - 120	90
LB035586.003	Total Kjeldahl Nitrogen	mg/L	0.05	0.51	0.5	80 - 120	102
LB035586.025	Total Kjeldahl Nitrogen	mg/L	0.05	4.5	5	80 - 120	90
LB035586.026	Total Kjeldahl Nitrogen	mg/L	0.05	0.47	0.5	80 - 120	94

**Total and Volatile Suspended Solids (TSS / VSS)**

Method: ME-(AU)-[ENV]AN114

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035721.002	Total Suspended Solids Dried at 103-105°C	mg/L	5	890	1000	80 - 120	89
LB035721.026	Total Suspended Solids Dried at 103-105°C	mg/L	5	950	1000	80 - 120	95

**Total Cyanide in water**

Method: ME-(AU)-[ENV]AN077/AN154

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035645.002	Total Cyanide	mg/L	0.004	0.020	0.02	80 - 120	100

**Total Dissolved Solids (TDS) in water**

Method: ME-(AU)-[ENV]AN113

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035619.002	Total Dissolved Solids Dried at 175-185°C	mg/L	10	250	250	80 - 120	100

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

**Mercury (dissolved) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120482.001	LB035637.004	Mercury	mg/L	0.00005	0.0021	<0.00005	0.0025	104
CE120505.004	LB035637.030	Mercury	mg/L	0.00005	0.0020	0.003	0.0025	100

**Mercury (total) in Water**

Method: ME-(AU)-[ENV]AN311/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120470.001	LB035638.004	Total Mercury	mg/L	0.00005	0.0021	<0.00005	-	-
CE120492.007	LB035638.030	Total Mercury	mg/L	0.00005	0.0020	<0.00005	-	-
CE120542.001	LB035638.056	Total Mercury	mg/L	0.00005	0.0021	<0.00005	-	-

**Metals in Water (Total) by ICPOES**

Method: ME-(AU)-[ENV]AN022/AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035599.004	Total Aluminium	mg/L	0.005	1.1	0.029	1	108
		Total Boron	mg/L	0.005	1.1	<0.005	1	110
		Total Calcium	mg/L	0.05	54	1.0	50	105
		Total Iron	mg/L	0.005	1.8	0.77	-	-
		Total Magnesium	mg/L	0.05	52	1.2	50	101
		Total Potassium	mg/L	0.05	56	0.40	50	111
		Total Sodium	mg/L	0.5	51	1.5	50	98
		Total Zinc	mg/L	0.005	1.1	0.006	1	110

**Metals in Water (Dissolved) by ICPOES**

Method: ME-(AU)-[ENV]AN320/AN321

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035596.004	Aluminium, Al	mg/L	0.005	1.1	<0.005	1	108
		Boron, B	mg/L	0.005	1.1	<0.005	1	111
		Calcium, Ca	mg/L	0.1	55	2.0	50	106
		Iron, Fe	mg/L	0.005	1.1	<0.005	1	110
		Magnesium, Mg	mg/L	0.1	53	2.4	50	101
		Potassium, K	mg/L	0.1	57	1.0	50	112
		Sodium, Na	mg/L	0.5	53	3.5	50	99
		Zinc, Zn	mg/L	0.005	1.1	<0.005	1	112

**Metals in Water (Dissolved) by ICPOES-USN**

Method: ME-(AU)-[ENV]AN320/AN322

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035604.004	Beryllium, Be	mg/L	0.0001	0.010	<0.0001	0.01	105
		Cadmium, Cd	mg/L	0.0001	0.010	<0.0001	0.01	100
		Chromium, Cr	mg/L	0.001	0.010	<0.0010	0.01	99
		Cobalt, Co	mg/L	0.001	0.010	<0.001	0.01	100
		Copper, Cu	mg/L	0.001	0.011	<0.001	0.01	105
		Lead, Pb	mg/L	0.001	0.010	<0.001	0.01	97
		Manganese, Mn	mg/L	0.001	0.049	0.030	-	-
		Nickel, Ni	mg/L	0.001	0.010	<0.001	0.01	99

**Metals in Water (Total) by ICPOES-USN**

Method: ME-(AU)-[ENV]AN320/AN322

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035608.004	Total Beryllium, Be	mg/L	0.0001	0.010	<0.0001	0.01	102
		Total Cadmium, Cd	mg/L	0.0001	0.0099	<0.0001	0.01	98
		Total Cobalt, Co	mg/L	0.001	0.010	<0.001	0.01	99
		Total Copper, Cu	mg/L	0.001	0.011	<0.001	0.01	104
		Total Lead, Pb	mg/L	0.001	0.010	<0.001	0.01	98
		Total Manganese, Mn*	mg/L	0.001	0.033	0.023	-	-
		Total Nickel, Ni	mg/L	0.001	0.010	<0.001	0.01	99

**Total Cyanide in water**

Method: ME-(AU)-[ENV]AN077/AN154

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542.001	LB035645.004	Total Cyanide	mg/L	0.004	0.020	<0.004	0.02	100

**Total Dissolved Solids (TDS) in water**

Method: ME-(AU)-[ENV]AN113

QC Sample	Sample Number	Parameter	Units	LOR
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Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Total Dissolved Solids (TDS) in water (continued)

Method: ME-(AU)-[ENV]AN113

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120480.001	LB035619.005	Total Dissolved Solids Dried at 175-185°C	mg/L	10	1200	72	1000	111



Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula:  $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: [http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022\\_QA\\_QC\\_Plan.pdf](http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf)

- \* NATA accreditation does not cover the performance of this service.
- Sample not analysed for this analyte.

IS Insufficient sample for analysis.  
 LNR Sample listed, but not received.  
 LOR Limit of reporting.  
 QFH QC result is above the upper tolerance.  
 QFL QC result is below the lower tolerance.

- ① At least 2 of 3 surrogates are within acceptance criteria.
- ② RPD failed acceptance criteria due to sample heterogeneity.
- ③ Results less than 5 times LOR preclude acceptance criteria for RPD.
- ④ Recovery failed acceptance criteria due to matrix interference.
- ⑤ Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
- ⑥ LOR was raised due to sample matrix interference.
- ⑦ LOR was raised due to dilution of significantly high concentration of analyte in sample.
- ⑧ Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
- ⑨ Low surrogate recovery due to the sample emulsifying during extraction.
- ⑩ Legionella Test Result <10 cfu/mL  
Control Strategy (1)  
Maintain Monthly Program or at least 3-monthly monitoring. Maintain water treatment program
- ⑪ Legionella Test Result <1000 cfu/mL  
Control Strategy (2)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy 3.
- ⑫ Control Strategy (3)  
Retest water within 3 to 7 days of plant operation. If not detected, continue to retest water every 3 to 7 days until 2 consecutive samples return readings of 'not detected', then repeat control strategy (1).  
If detected at <100 cfu/mL, repeat control strategy (2).  
If detected at >100 cfu/mL, investigate the problem and review water treatment program, and immediately carry out online decontamination.  
If detected at >1000 cfu/mL, undertake control strategy (4).
- ⑬ Legionella Test Result >1000 cfu/mL  
Control Strategy (4)  
Investigate problem. Review water treatment program.  
Take necessary remedial action (including immediate online decontamination) and undertake control strategy (5).
- ⑭ Control Strategy (5)  
Retest water within 3 to 7 days of plant operation. If not detected, continue to retest water every 3 to 7 days until 2 consecutive samples return readings of 'not detected', then repeat control strategy (1).  
If detected at <100 cfu/mL, repeat control strategy (1)  
If detected at >100 and <1000 cfu/mL, investigate the problem and review water treatment program, immediately carry out online decontamination, and repeat control strategy (5).  
If detected at >1000 cfu/mL, investigate and review the water treatment program, immediately carry out system decontamination and repeat control strategy (5).
- ⑮ HPC - Test Result < 100 000 cfu/mL  
Control Strategy (1)  
Maintain Monthly Program. Maintain water treatment program.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: [http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022\\_QA\\_QC\\_Plan.pdf](http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf)

- ⑥ HPC Test Result > 100 000 cfu/mL <5 000 000 cfu/mL  
Control Strategy (2)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy 3.
- ⑦ Control Strategy (3)  
Retest water within 3 to 7 days of plant operation. If the test result is <100 000 cfu/mL, repeat control strategy (1)  
If the test result is >100 000 cfu/mL but <5 000 000 cfu/mL, undertake control strategy (2).  
If the test result is >5 000 000 cfu/mL, undertake control strategy (4).
- ⑧ HPC Test Result >5 000 000 cfu/mL  
Control Strategy (4)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy (5).
- ⑨ Control Strategy (5)  
Retest water within 3 to 7 days of plant operation. If the test result is <100 000 cfu/mL, repeat control strategy (1)  
If the test result is >100 000 cfu/mL but <5 000 000 cfu/mL, undertake control strategy (4).  
If the test result is >5 000 000 cfu/mL, investigate the problem.  
review the water treatment program, and carry out immediate online decontamination.
- ⑩ Enterococci - Median result should not exceed 230 cfu/100mL  
(maximum number in any one sample: 450-700 cfu/100mL)  
Sourced from NHMRC (National Health and Medical Research Council)  
& NWQMS (National Water Quality Management Strategy)  
-Australian Guidelines for Recreational Use of Water. Version Oct 2000.
- † Refer to Analytical Report comments for further information.

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Project **Mt Todd Macroinvertebrate Sampling**  
 Order Number **432218703**  
 Samples **9**

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SGS Reference **CE120542A R0**  
 Date Received **12 Apr 2016**  
 Date Reported **26 Apr 2016**

COMMENTS

Accredited for compliance with ISO/IEC 17025. NATA accredited laboratory 2562(3146)

U, As, La subcontracted to SGS Leeder Consulting, 4-5/18 Redland Drive, Mitcham VIC, NATA Accreditation Number 14429, M160877.

SIGNATORIES

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Parameter	Units	LOR	CE120542A.001	CE120542A.002	CE120542A.003	CE120542A.004
Sample Number			CE120542A.001	CE120542A.002	CE120542A.003	CE120542A.004
Sample Matrix			Soil	Soil	Soil	Soil
Sample Date			07 Apr 2016	07 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERSW4	ERUS	ERDS	ERTOP

**Moisture Content Method: AN002 Tested: 13/4/2016**

% Moisture	%w/w	0.5	20	30	28	21
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**Particle sizing of soils by sieving Method: AN005 Tested: 19/4/2016**

Passing 2.36mm	%w/w	1	97	98	98	99
Retained 2.36mm	%w/w	1	3	2	2	1
Passing 600µm	%w/w	1	88	97	94	98
Retained 600µm	%w/w	1	9	2	4	2
Passing 300µm	%w/w	1	57	75	79	79
Retained 300µm	%w/w	1	31	22	16	18
Passing 212µm	%w/w	1	37	43	63	49
Retained 212µm	%w/w	1	19	32	16	30
Passing 75µm	%w/w	1	7	8	19	3
Retained 75µm	%w/w	1	31	36	44	46

**Total Cyanide in soil Method: AN077/AN154 Tested: 18/4/2016**

Total Cyanide*	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
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**Total Organic Carbon by Heanes Oxidation Method: AN273 Tested: 14/4/2016**

Total Organic Carbon	%w/w	0.05	0.55	0.95	1.7	0.57
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**Chloride (water extractable) Method: AN274 Tested: 18/4/2016**

Chloride (water extractable 1:5)	mg/kg	5	30	24	20	17
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**Ammonia Nitrogen (soluble) in Soil Method: AN280 Tested: 18/4/2016**

Soluble Ammonia Nitrogen, NH <sub>3</sub> as N	mg/kg	0.1	3.7	4.5	7.9	3.3
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**Nitrite Nitrogen in Soil Method: AN277 Tested: 15/4/2016**

Nitrite, NO <sub>2</sub> as N in Soil	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05
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Parameter	Units	LOR	CE120542A.001	CE120542A.002	CE120542A.003	CE120542A.004
Sample Number			CE120542A.001	CE120542A.002	CE120542A.003	CE120542A.004
Sample Matrix			Soil	Soil	Soil	Soil
Sample Date			07 Apr 2016	07 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERSW4	ERUS	ERDS	ERTOP

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser in Soil Method: AN248 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542A.001	CE120542A.002	CE120542A.003	CE120542A.004
Nitrate/Nitrite Nitrogen, NOx as N	mg/kg	0.05	0.47	0.42	0.46	0.47
Nitrate Nitrogen, NO <sub>3</sub> as N	mg/kg	0.05	0.47	0.42	0.46	0.47

**Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges Method: AN281 Tested: 18/4/2016**

Parameter	Units	LOR	CE120542A.001	CE120542A.002	CE120542A.003	CE120542A.004
Total Kjeldahl Nitrogen	mg/kg	20	290	410	830	260
Organic Nitrogen*	mg/kg	20	280	410	820	260
Total Nitrogen	mg/kg	20	290	410	830	260

**Water Soluble Metals in Soil by ICPOES Method: AN002/AN320/AN321 Tested: 19/4/2016**

Parameter	Units	LOR	CE120542A.001	CE120542A.002	CE120542A.003	CE120542A.004
Calcium, Ca	mg/kg	2	4	4	7	<2
Magnesium, Mg	mg/kg	1	4	2	5	2
Potassium, K	mg/kg	1	21	21	23	11
Sodium, Na	mg/kg	5	12	11	12	6
Sulphur as Sulphate, SO <sub>4</sub>	mg/kg	3	23	6	44	4

**Bioavailable Metals in Soil by ICPOES Method: AN037/AN320/AN321 Tested: 22/4/2016**

Parameter	Units	LOR	CE120542A.001	CE120542A.002	CE120542A.003	CE120542A.004
Arsenic, As - Bioavailable*	mg/kg	2	3	<2	2	<2
Beryllium, Be - Bioavailable*	mg/kg	1	<1	<1	<1	<1
Cadmium, Cd - Bioavailable*	mg/kg	0.4	<0.4	<0.4	<0.4	<0.4
Cobalt, Co - Bioavailable*	mg/kg	2	<2	<2	3	<2
Chromium, Cr - Bioavailable*	mg/kg	5	<5	<5	<5	<5
Copper, Cu - Bioavailable*	mg/kg	5	9	<5	6	<5
Iron, Fe - Bioavailable*	mg/kg	20	1900	1900	4200	1800
Lanthanum, La - Bioavailable*	mg/kg	5	<5	<5	6	<5
Manganese, Mn - Bioavailable*	mg/kg	5	61	42	130	20
Nickel, Ni - Bioavailable*	mg/kg	4	<4	<4	<4	<4
Lead, Pb - Bioavailable*	mg/kg	5	<5	<5	<5	<5
Silver, Ag - Bioavailable*	mg/kg	2	<2	<2	<2	<2
Uranium, U - Bioavailable*	mg/kg	5	<5	<5	<5	<5
Zinc, Zn - Bioavailable*	mg/kg	5	7	<5	9	<5

Parameter	Units	LOR	CE120542A.005	CE120542A.006	CE120542A.007	CE120542A.008
Sample Number			CE120542A.005	CE120542A.006	CE120542A.007	CE120542A.008
Sample Matrix			Soil	Soil	Soil	Soil
Sample Date			08 Apr 2016	08 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERBTM	ERBTM	SCTOP	SCDS

**Moisture Content Method: AN002 Tested: 13/4/2016**

% Moisture	%w/w	0.5	16	15	18	19
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**Particle sizing of soils by sieving Method: AN005 Tested: 19/4/2016**

Passing 2.36mm	%w/w	1	68	70	99	97
Retained 2.36mm	%w/w	1	32	30	1	3
Passing 600µm	%w/w	1	33	31	90	93
Retained 600µm	%w/w	1	36	39	9	4
Passing 300µm	%w/w	1	16	15	62	56
Retained 300µm	%w/w	1	17	17	27	36
Passing 212µm	%w/w	1	9	8	38	24
Retained 212µm	%w/w	1	7	7	24	33
Passing 75µm	%w/w	1	2	1	6	2
Retained 75µm	%w/w	1	7	6	32	22

**Total Cyanide in soil Method: AN077/AN154 Tested: 18/4/2016**

Total Cyanide*	mg/kg	0.5	<0.5	<0.5	<0.5	<0.5
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**Total Organic Carbon by Heanes Oxidation Method: AN273 Tested: 14/4/2016**

Total Organic Carbon	%w/w	0.05	0.27	0.30	0.27	0.20
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**Chloride (water extractable) Method: AN274 Tested: 18/4/2016**

Chloride (water extractable 1:5)	mg/kg	5	56	61	17	19
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**Ammonia Nitrogen (soluble) in Soil Method: AN280 Tested: 18/4/2016**

Soluble Ammonia Nitrogen, NH <sub>3</sub> as N	mg/kg	0.1	2.7	3.6	3.0	3.9
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**Nitrite Nitrogen in Soil Method: AN277 Tested: 15/4/2016**

Nitrite, NO <sub>2</sub> as N in Soil	mg/kg	0.05	<0.05	<0.05	<0.05	<0.05
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Parameter	Units	LOR	CE120542A.005	CE120542A.006	CE120542A.007	CE120542A.008
Sample Number			CE120542A.005	CE120542A.006	CE120542A.007	CE120542A.008
Sample Matrix			Soil	Soil	Soil	Soil
Sample Date			08 Apr 2016	08 Apr 2016	07 Apr 2016	07 Apr 2016
Sample Name			ERBTM	ERBTM	SCTOP	SCDS

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser in Soil Method: AN248 Tested: 14/4/2016**

Parameter	Units	LOR	CE120542A.005	CE120542A.006	CE120542A.007	CE120542A.008
Nitrate/Nitrite Nitrogen, NOx as N	mg/kg	0.05	0.11	0.11	0.09	0.15
Nitrate Nitrogen, NO <sub>3</sub> as N	mg/kg	0.05	0.11	0.11	0.09	0.15

**Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges Method: AN281 Tested: 18/4/2016**

Parameter	Units	LOR	CE120542A.005	CE120542A.006	CE120542A.007	CE120542A.008
Total Kjeldahl Nitrogen	mg/kg	20	100	110	170	160
Organic Nitrogen*	mg/kg	20	100	110	160	150
Total Nitrogen	mg/kg	20	100	110	170	160

**Water Soluble Metals in Soil by ICPOES Method: AN002/AN320/AN321 Tested: 19/4/2016**

Parameter	Units	LOR	CE120542A.005	CE120542A.006	CE120542A.007	CE120542A.008
Calcium, Ca	mg/kg	2	4	3	<2	<2
Magnesium, Mg	mg/kg	1	2	3	2	1
Potassium, K	mg/kg	1	25	31	14	15
Sodium, Na	mg/kg	5	17	19	11	7
Sulphur as Sulphate, SO <sub>4</sub>	mg/kg	3	10	13	32	14

**Bioavailable Metals in Soil by ICPOES Method: AN037/AN320/AN321 Tested: 22/4/2016**

Parameter	Units	LOR	CE120542A.005	CE120542A.006	CE120542A.007	CE120542A.008
Arsenic, As - Bioavailable*	mg/kg	2	<2	<2	<2	<2
Beryllium, Be - Bioavailable*	mg/kg	1	<1	<1	<1	<1
Cadmium, Cd - Bioavailable*	mg/kg	0.4	<0.4	<0.4	<0.4	<0.4
Cobalt, Co - Bioavailable*	mg/kg	2	<2	<2	<2	<2
Chromium, Cr - Bioavailable*	mg/kg	5	<5	<5	<5	<5
Copper, Cu - Bioavailable*	mg/kg	5	<5	<5	<5	<5
Iron, Fe - Bioavailable*	mg/kg	20	1100	1300	1100	1500
Lanthanum, La - Bioavailable*	mg/kg	5	<5	<5	<5	<5
Manganese, Mn - Bioavailable*	mg/kg	5	42	44	19	23
Nickel, Ni - Bioavailable*	mg/kg	4	<4	<4	<4	<4
Lead, Pb - Bioavailable*	mg/kg	5	<5	<5	<5	<5
Silver, Ag - Bioavailable*	mg/kg	2	<2	<2	<2	<2
Uranium, U - Bioavailable*	mg/kg	5	<5	<5	<5	<5
Zinc, Zn - Bioavailable*	mg/kg	5	<5	<5	<5	<5



Sample Number	CE120542A.009	
Sample Matrix	Soil	
Sample Date	07 Apr 2016	
Sample Name	SCBTM	
Parameter	Units	LOR

**Moisture Content Method: AN002 Tested: 13/4/2016**

% Moisture	%w/w	0.5	<b>20</b>
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**Particle sizing of soils by sieving Method: AN005 Tested: 19/4/2016**

Passing 2.36mm	%w/w	1	<b>89</b>
Retained 2.36mm	%w/w	1	<b>11</b>
Passing 600µm	%w/w	1	<b>65</b>
Retained 600µm	%w/w	1	<b>24</b>
Passing 300µm	%w/w	1	<b>17</b>
Retained 300µm	%w/w	1	<b>48</b>
Passing 212µm	%w/w	1	<b>6</b>
Retained 212µm	%w/w	1	<b>12</b>
Passing 75µm	%w/w	1	<b>&lt;1</b>
Retained 75µm	%w/w	1	<b>5</b>

**Total Cyanide in soil Method: AN077/AN154 Tested: 18/4/2016**

Total Cyanide*	mg/kg	0.5	<b>&lt;0.5</b>
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**Total Organic Carbon by Heanes Oxidation Method: AN273 Tested: 14/4/2016**

Total Organic Carbon	%w/w	0.05	<b>0.18</b>
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**Chloride (water extractable) Method: AN274 Tested: 18/4/2016**

Chloride (water extractable 1:5)	mg/kg	5	<b>33</b>
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**Ammonia Nitrogen (soluble) in Soil Method: AN280 Tested: 18/4/2016**

Soluble Ammonia Nitrogen, NH <sub>3</sub> as N	mg/kg	0.1	<b>2.7</b>
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**Nitrite Nitrogen in Soil Method: AN277 Tested: 15/4/2016**

Nitrite, NO <sub>2</sub> as N in Soil	mg/kg	0.05	<b>&lt;0.05</b>
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Sample Number	CE120542A.009
Sample Matrix	Soil
Sample Date	07 Apr 2016
Sample Name	SCBTM

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser in Soil Method: AN248 Tested: 14/4/2016**

Parameter	Units	LOR	
Nitrate/Nitrite Nitrogen, NOx as N	mg/kg	0.05	<b>0.17</b>
Nitrate Nitrogen, NO <sub>3</sub> as N	mg/kg	0.05	<b>0.17</b>

**Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges Method: AN281 Tested: 18/4/2016**

Total Kjeldahl Nitrogen	mg/kg	20	<b>130</b>
Organic Nitrogen*	mg/kg	20	<b>130</b>
Total Nitrogen	mg/kg	20	<b>130</b>

**Water Soluble Metals in Soil by ICPOES Method: AN002/AN320/AN321 Tested: 19/4/2016**

Calcium, Ca	mg/kg	2	<b>4</b>
Magnesium, Mg	mg/kg	1	<b>4</b>
Potassium, K	mg/kg	1	<b>26</b>
Sodium, Na	mg/kg	5	<b>9</b>
Sulphur as Sulphate, SO <sub>4</sub>	mg/kg	3	<b>26</b>

**Bioavailable Metals in Soil by ICPOES Method: AN037/AN320/AN321 Tested: 22/4/2016**

Arsenic, As - Bioavailable*	mg/kg	2	<2
Beryllium, Be - Bioavailable*	mg/kg	1	<1
Cadmium, Cd - Bioavailable*	mg/kg	0.4	<0.4
Cobalt, Co - Bioavailable*	mg/kg	2	<2
Chromium, Cr - Bioavailable*	mg/kg	5	<5
Copper, Cu - Bioavailable*	mg/kg	5	<5
Iron, Fe - Bioavailable*	mg/kg	20	<b>1400</b>
Lanthanum, La - Bioavailable*	mg/kg	5	<5
Manganese, Mn - Bioavailable*	mg/kg	5	<b>76</b>
Nickel, Ni - Bioavailable*	mg/kg	4	<4
Lead, Pb - Bioavailable*	mg/kg	5	<5
Silver, Ag - Bioavailable*	mg/kg	2	<2
Uranium, U - Bioavailable*	mg/kg	5	<5
Zinc, Zn - Bioavailable*	mg/kg	5	<b>6</b>

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Ammonia Nitrogen (soluble) in Soil Method: ME-(AU)-[ENV]AN280**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Soluble Ammonia Nitrogen, NH <sub>3</sub> as N	LB035691	mg/kg	0.1	<0.1	1%	NA

**Bioavailable Metals in Soil by ICPOES Method: ME-(AU)-[ENV]AN037/AN320/AN321**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Arsenic, As - Bioavailable*	LB035825	mg/kg	2	<2	3%	97%
Beryllium, Be - Bioavailable*	LB035825	mg/kg	1	<1	0%	NA
Cadmium, Cd - Bioavailable*	LB035825	mg/kg	0.4	<0.4	0%	103%
Cobalt, Co - Bioavailable*	LB035825	mg/kg	2	<2	0%	96%
Chromium, Cr - Bioavailable*	LB035825	mg/kg	5	<5	0%	100%
Copper, Cu - Bioavailable*	LB035825	mg/kg	5	<5	11%	101%
Iron, Fe - Bioavailable*	LB035825	mg/kg	20	<20	10%	100%
Lanthanum, La - Bioavailable*	LB035825	mg/kg	5	<5	0%	NA
Manganese, Mn - Bioavailable*	LB035825	mg/kg	5	<5	11%	101%
Nickel, Ni - Bioavailable*	LB035825	mg/kg	4	<4	0%	97%
Lead, Pb - Bioavailable*	LB035825	mg/kg	5	<5	0%	95%
Silver, Ag - Bioavailable*	LB035825	mg/kg	2	<2	0%	102%
Uranium, U - Bioavailable*	LB035825	mg/kg	5	<5	0%	NA
Zinc, Zn - Bioavailable*	LB035825	mg/kg	5	<5	16%	99%

**Chloride (water extractable) Method: ME-(AU)-[ENV]AN274**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Chloride (water extractable 1:5)	LB035693	mg/kg	5	<5	1%	104%

**Nitrate Nitrogen and Nitrite Nitrogen (NO<sub>x</sub>) by Auto Analyser in Soil Method: ME-(AU)-[ENV]AN248**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrate/Nitrite Nitrogen, NO <sub>x</sub> as N	LB035633	mg/kg	0.05	<0.05	1%	100%

MB blank results are compared to the Limit of Reporting  
 LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.  
 DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

**Nitrite Nitrogen in Soil Method: ME-(AU)-[ENV]AN277**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrite, NO <sub>2</sub> as N in Soil	LB035660	mg/kg	0.05	<0.05	0 - 3%	88%

**Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges Method: ME-(AU)-[ENV]AN281**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Kjeldahl Nitrogen	LB035688	mg/kg	20	<20	0 - 8%	98 - 103%

**Total Organic Carbon by Heanes Oxidation Method: ME-(AU)-[ENV]AN273**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Organic Carbon	LB035636	%w/w	0.05	<0.05	14%	96%	116%

**Water Soluble Metals in Soil by ICPOES Method: ME-(AU)-[ENV]AN002/AN320/AN321**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Calcium, Ca	LB035728	mg/kg	2	<2	0%	NA
Magnesium, Mg	LB035728	mg/kg	1	<1	0%	NA
Potassium, K	LB035728	mg/kg	1	<1	0%	NA
Sodium, Na	LB035728	mg/kg	5	<5	0%	NA
Sulphur as Sulphate, SO <sub>4</sub>	LB035728	mg/kg	3	<3	2%	NA

METHOD

METHODOLOGY SUMMARY

AN002	The test is carried out by drying (at either 40°C or 105°C) a known mass of sample in a weighed evaporating basin. After fully dry the sample is re-weighed. Samples such as sludge and sediment having high percentages of moisture will take some time in a drying oven for complete removal of water.
AN002/AN320/AN321	Soil sample is extracted in deionised water (1:2 or 1:5) and metals analysed by ICP OES, method AN320/AN321, with results reported on the dried sample basis.
AN005	The particle size distribution of a soil is determined by wet sieving, using a maximum of 900 mL of deionised water to sieve all fractions down to 75 µm. Referenced to AS1289.3.6.1 and AS1141.11.
AN077	Hydrogen cyanide is liberated from an acidified soil alkali extract by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN154	A buffered distillate or water sample is treated with chloramine /barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration.
AN248	Nitrate / Nitrite in extract by Auto Analyser: In an acidic medium, nitrate is reduced quantitatively to nitrite by cadmium metal. This nitrite plus any original nitrite is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. Reference APHA 4500-NO3- F.
AN273	The sample is digested in Dichromate / Sulfuric Acid to oxidise the organic carbon. The determination is completed colourimetrically by Aquakem Discrete Analyser at 600 nm. Based on Rayment & Higginson 6B1.
AN274	Chloride by Aquakem DA following 1:5 or 1:2 DI water extraction: Chloride reacts with mercuric thiocyanate forming a mercuric chloride complex. In the presence of ferric iron, highly coloured ferric thiocyanate is formed which is proportional to the chloride concentration. Results reported on dry sample basis. Reference APHA 4500CI-
AN277	Nitrite on the extract is determined as an intense red-pink azo dye at 540 nm following diazotisation with sulphanilamide and subsequent coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The original nitrite is determined. Reference APHA 4500-NO2- B.
AN280	Filtered soil water extract containing ammonia (NH <sub>3</sub> ) or ammonium cations (NH <sub>4</sub> <sup>+</sup> ) is reacted with alkaline phenol and hypochlorite in a buffered solution to form the blue indophenol colour. The absorbance is measured at 630nm and compared with calibration standards to obtain the concentration of ammonia in the sample.
AN281	The sample is heated in the presence of Sulphuric acid, K <sub>2</sub> SO <sub>4</sub> and CuSO <sub>4</sub> for two and half hours using a temperature controlled digestion block. Amino Nitrogen of many organic materials is converted to ammonium ion. Free ammonia also is converted to ammonium. The digest is cooled and placed on the Aquakem 250 discrete analyser for Ammonia determination.
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320/AN321	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
**	Indicative data, theoretical holding time exceeded.	QFL	QC result is below the lower tolerance
		-	The sample was not analysed for this analyte
		NVL	Not Validated

Samples analysed as received.  
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the "Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : <http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022 QA QC Plan.pdf>

This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at <http://www.sgs.com/en/terms-and-conditions>. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

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### CLIENT DETAILS

### LABORATORY DETAILS

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### COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document and was supplied by the Client. This QA/QC Statement must be read in conjunction with the referenced Analytical Report. The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met with the exception of the following:

Extraction Date	Ammonia Nitrogen (soluble) in Soil	9 items
	Chloride (water extractable)	9 items
	Nitrite Nitrogen in Soil	7 items
	Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges	9 items
Analysis Date	Nitrite Nitrogen in Soil	9 items
	Total Cyanide in soil	7 items
	Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges	9 items

### SAMPLE SUMMARY

Sample counts by matrix	9 soils	Type of documentation received	COC
Date documentation received	12/4/2016	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	frozen
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice Bricks	Samples clearly labelled	Yes
Complete documentation received	Yes	Number of eskies/boxes received	1

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Ammonia Nitrogen (soluble) In Soil

Method: ME-(AU)-[ENV]AN280

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035691	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016
ERUS	CE120542A.002	LB035691	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016
ERDS	CE120542A.003	LB035691	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016
ERTOP	CE120542A.004	LB035691	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016
ERBTM	CE120542A.005	LB035691	08 Apr 2016	12 Apr 2016	15 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016
ERBTM	CE120542A.006	LB035691	08 Apr 2016	12 Apr 2016	15 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016
SCTOP	CE120542A.007	LB035691	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016
SCDS	CE120542A.008	LB035691	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016
SCBTM	CE120542A.009	LB035691	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	20 Apr 2016	18 Apr 2016

### Bioavailable Metals in Soil by ICPOES

Method: ME-(AU)-[ENV]AN037/AN320/AN321

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035825	07 Apr 2016	12 Apr 2016	04 Oct 2016	22 Apr 2016	04 Oct 2016	22 Apr 2016
ERUS	CE120542A.002	LB035825	07 Apr 2016	12 Apr 2016	04 Oct 2016	22 Apr 2016	04 Oct 2016	22 Apr 2016
ERDS	CE120542A.003	LB035825	07 Apr 2016	12 Apr 2016	04 Oct 2016	22 Apr 2016	04 Oct 2016	22 Apr 2016
ERTOP	CE120542A.004	LB035825	07 Apr 2016	12 Apr 2016	04 Oct 2016	22 Apr 2016	04 Oct 2016	22 Apr 2016
ERBTM	CE120542A.005	LB035825	08 Apr 2016	12 Apr 2016	05 Oct 2016	22 Apr 2016	05 Oct 2016	22 Apr 2016
ERBTM	CE120542A.006	LB035825	08 Apr 2016	12 Apr 2016	05 Oct 2016	22 Apr 2016	05 Oct 2016	22 Apr 2016
SCTOP	CE120542A.007	LB035825	07 Apr 2016	12 Apr 2016	04 Oct 2016	22 Apr 2016	04 Oct 2016	22 Apr 2016
SCDS	CE120542A.008	LB035825	07 Apr 2016	12 Apr 2016	04 Oct 2016	22 Apr 2016	04 Oct 2016	22 Apr 2016
SCBTM	CE120542A.009	LB035825	07 Apr 2016	12 Apr 2016	04 Oct 2016	22 Apr 2016	04 Oct 2016	22 Apr 2016

### Chloride (water extractable)

Method: ME-(AU)-[ENV]AN274

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035693	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016
ERUS	CE120542A.002	LB035693	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016
ERDS	CE120542A.003	LB035693	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016
ERTOP	CE120542A.004	LB035693	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016
ERBTM	CE120542A.005	LB035693	08 Apr 2016	12 Apr 2016	15 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016
ERBTM	CE120542A.006	LB035693	08 Apr 2016	12 Apr 2016	15 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016
SCTOP	CE120542A.007	LB035693	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016
SCDS	CE120542A.008	LB035693	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016
SCBTM	CE120542A.009	LB035693	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	16 May 2016	19 Apr 2016

### Moisture Content

Method: ME-(AU)-[ENV]AN002

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035585	07 Apr 2016	12 Apr 2016	21 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016
ERUS	CE120542A.002	LB035585	07 Apr 2016	12 Apr 2016	21 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016
ERDS	CE120542A.003	LB035585	07 Apr 2016	12 Apr 2016	21 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016
ERTOP	CE120542A.004	LB035585	07 Apr 2016	12 Apr 2016	21 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016
ERBTM	CE120542A.005	LB035585	08 Apr 2016	12 Apr 2016	22 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016
ERBTM	CE120542A.006	LB035585	08 Apr 2016	12 Apr 2016	22 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016
SCTOP	CE120542A.007	LB035585	07 Apr 2016	12 Apr 2016	21 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016
SCDS	CE120542A.008	LB035585	07 Apr 2016	12 Apr 2016	21 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016
SCBTM	CE120542A.009	LB035585	07 Apr 2016	12 Apr 2016	21 Apr 2016	13 Apr 2016	18 Apr 2016	14 Apr 2016

### Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser in Soil

Method: ME-(AU)-[ENV]AN248

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035633	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016
ERUS	CE120542A.002	LB035633	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016
ERDS	CE120542A.003	LB035633	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016
ERTOP	CE120542A.004	LB035633	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016
ERBTM	CE120542A.005	LB035633	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016
ERBTM	CE120542A.006	LB035633	08 Apr 2016	12 Apr 2016	15 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016
SCTOP	CE120542A.007	LB035633	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016
SCDS	CE120542A.008	LB035633	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016
SCBTM	CE120542A.009	LB035633	07 Apr 2016	12 Apr 2016	14 Apr 2016	14 Apr 2016	12 May 2016	19 Apr 2016

### Nitrite Nitrogen in Soil

Method: ME-(AU)-[ENV]AN277

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035660	07 Apr 2016	12 Apr 2016	14 Apr 2016	15 Apr 2016†	17 Apr 2016	18 Apr 2016†
ERUS	CE120542A.002	LB035660	07 Apr 2016	12 Apr 2016	14 Apr 2016	15 Apr 2016†	17 Apr 2016	18 Apr 2016†



SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the sampled date is not supplied then compliance with criteria cannot be determined. If the received date is after one or both due dates then holding time will fail by default.

### Nitrite Nitrogen in Soil (continued)

Method: ME-(AU)-[ENV]AN277

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERDS	CE120542A.003	LB035660	07 Apr 2016	12 Apr 2016	14 Apr 2016	15 Apr 2016†	17 Apr 2016	18 Apr 2016†
ERTOP	CE120542A.004	LB035660	07 Apr 2016	12 Apr 2016	14 Apr 2016	15 Apr 2016†	17 Apr 2016	18 Apr 2016†
ERBTM	CE120542A.005	LB035660	08 Apr 2016	12 Apr 2016	15 Apr 2016	15 Apr 2016	17 Apr 2016	18 Apr 2016†
ERBTM	CE120542A.006	LB035660	08 Apr 2016	12 Apr 2016	15 Apr 2016	15 Apr 2016	17 Apr 2016	18 Apr 2016†
SCTOP	CE120542A.007	LB035660	07 Apr 2016	12 Apr 2016	14 Apr 2016	15 Apr 2016†	17 Apr 2016	18 Apr 2016†
SCDS	CE120542A.008	LB035660	07 Apr 2016	12 Apr 2016	14 Apr 2016	15 Apr 2016†	17 Apr 2016	18 Apr 2016†
SCBTM	CE120542A.009	LB035660	07 Apr 2016	12 Apr 2016	14 Apr 2016	15 Apr 2016†	17 Apr 2016	18 Apr 2016†

### Total Cyanide in soil

Method: ME-(AU)-[ENV]AN077/AN154

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035674	07 Apr 2016	12 Apr 2016	21 Apr 2016	18 Apr 2016	21 Apr 2016	22 Apr 2016†
ERUS	CE120542A.002	LB035674	07 Apr 2016	12 Apr 2016	21 Apr 2016	18 Apr 2016	21 Apr 2016	22 Apr 2016†
ERDS	CE120542A.003	LB035674	07 Apr 2016	12 Apr 2016	21 Apr 2016	18 Apr 2016	21 Apr 2016	22 Apr 2016†
ERTOP	CE120542A.004	LB035674	07 Apr 2016	12 Apr 2016	21 Apr 2016	18 Apr 2016	21 Apr 2016	22 Apr 2016†
ERBTM	CE120542A.005	LB035674	08 Apr 2016	12 Apr 2016	22 Apr 2016	18 Apr 2016	22 Apr 2016	22 Apr 2016
ERBTM	CE120542A.006	LB035674	08 Apr 2016	12 Apr 2016	22 Apr 2016	18 Apr 2016	22 Apr 2016	22 Apr 2016
SCTOP	CE120542A.007	LB035674	07 Apr 2016	12 Apr 2016	21 Apr 2016	18 Apr 2016	21 Apr 2016	22 Apr 2016†
SCDS	CE120542A.008	LB035674	07 Apr 2016	12 Apr 2016	21 Apr 2016	18 Apr 2016	21 Apr 2016	22 Apr 2016†
SCBTM	CE120542A.009	LB035674	07 Apr 2016	12 Apr 2016	21 Apr 2016	18 Apr 2016	21 Apr 2016	22 Apr 2016†

### Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges

Method: ME-(AU)-[ENV]AN281

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035688	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†
ERUS	CE120542A.002	LB035688	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†
ERDS	CE120542A.003	LB035688	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†
ERTOP	CE120542A.004	LB035688	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†
ERBTM	CE120542A.005	LB035688	08 Apr 2016	12 Apr 2016	15 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†
ERBTM	CE120542A.006	LB035688	08 Apr 2016	12 Apr 2016	15 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†
SCTOP	CE120542A.007	LB035688	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†
SCDS	CE120542A.008	LB035688	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†
SCBTM	CE120542A.009	LB035688	07 Apr 2016	12 Apr 2016	14 Apr 2016	18 Apr 2016†	25 Apr 2016	26 Apr 2016†

### Total Organic Carbon by Heanes Oxidation

Method: ME-(AU)-[ENV]AN273

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035636	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERUS	CE120542A.002	LB035636	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERDS	CE120542A.003	LB035636	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERTOP	CE120542A.004	LB035636	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
ERBTM	CE120542A.005	LB035636	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
ERBTM	CE120542A.006	LB035636	08 Apr 2016	12 Apr 2016	06 May 2016	14 Apr 2016	06 May 2016	15 Apr 2016
SCTOP	CE120542A.007	LB035636	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCDS	CE120542A.008	LB035636	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016
SCBTM	CE120542A.009	LB035636	07 Apr 2016	12 Apr 2016	05 May 2016	14 Apr 2016	05 May 2016	15 Apr 2016

### Water Soluble Metals in Soil by ICPOES

Method: ME-(AU)-[ENV]AN002/AN320/AN321

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
ERSW4	CE120542A.001	LB035728	07 Apr 2016	12 Apr 2016	04 Oct 2016	19 Apr 2016	04 Oct 2016	19 Apr 2016
ERUS	CE120542A.002	LB035728	07 Apr 2016	12 Apr 2016	04 Oct 2016	19 Apr 2016	04 Oct 2016	19 Apr 2016
ERDS	CE120542A.003	LB035728	07 Apr 2016	12 Apr 2016	04 Oct 2016	19 Apr 2016	04 Oct 2016	19 Apr 2016
ERTOP	CE120542A.004	LB035728	07 Apr 2016	12 Apr 2016	04 Oct 2016	19 Apr 2016	04 Oct 2016	19 Apr 2016
ERBTM	CE120542A.005	LB035728	08 Apr 2016	12 Apr 2016	05 Oct 2016	19 Apr 2016	05 Oct 2016	19 Apr 2016
ERBTM	CE120542A.006	LB035728	08 Apr 2016	12 Apr 2016	05 Oct 2016	19 Apr 2016	05 Oct 2016	19 Apr 2016
SCTOP	CE120542A.007	LB035728	07 Apr 2016	12 Apr 2016	04 Oct 2016	19 Apr 2016	04 Oct 2016	19 Apr 2016
SCDS	CE120542A.008	LB035728	07 Apr 2016	12 Apr 2016	04 Oct 2016	19 Apr 2016	04 Oct 2016	19 Apr 2016
SCBTM	CE120542A.009	LB035728	07 Apr 2016	12 Apr 2016	04 Oct 2016	19 Apr 2016	04 Oct 2016	19 Apr 2016

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No surrogates were required for this job.

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Bioavailable Metals in Soil by ICPOES**

Method: ME-(AU)-[ENV]AN037/AN320/AN321

Sample Number	Parameter	Units	LOR	Result
LB035825.001	Arsenic, As - Bioavailable*	mg/kg	2	<2
	Cadmium, Cd - Bioavailable*	mg/kg	0.4	<0.4
	Chromium, Cr - Bioavailable*	mg/kg	5	<5
	Copper, Cu - Bioavailable*	mg/kg	5	<5
	Iron, Fe - Bioavailable*	mg/kg	20	<20
	Manganese, Mn - Bioavailable*	mg/kg	5	<5
	Nickel, Ni - Bioavailable*	mg/kg	4	<4
	Lead, Pb - Bioavailable*	mg/kg	5	<5
	Silver, Ag - Bioavailable*	mg/kg	2	<2
	Zinc, Zn - Bioavailable*	mg/kg	5	<5

**Chloride (water extractable)**

Method: ME-(AU)-[ENV]AN274

Sample Number	Parameter	Units	LOR	Result
LB035693.001	Chloride (water extractable 1:5)	mg/kg	5	<5

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser in Soil**

Method: ME-(AU)-[ENV]AN248

Sample Number	Parameter	Units	LOR	Result
LB035633.001	Nitrate/Nitrite Nitrogen, NOx as N	mg/kg	0.05	<0.05

**Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges**

Method: ME-(AU)-[ENV]AN281

Sample Number	Parameter	Units	LOR	Result
LB035688.001	Total Kjeldahl Nitrogen	mg/kg	20	<20
LB035688.025	Total Kjeldahl Nitrogen	mg/kg	20	<20

**Total Organic Carbon by Heanes Oxidation**

Method: ME-(AU)-[ENV]AN273

Sample Number	Parameter	Units	LOR	Result
LB035636.001	Total Organic Carbon	%w/w	0.05	<0.05

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula:  $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

**Ammonia Nitrogen (soluble) In Soil**

Method: ME-(AU)-[ENV]AN280

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120355.001	LB035691.004	Soluble Ammonia Nitrogen, NH <sub>3</sub> as N	mg/kg	0.1	7.7	7.768	31	1
CE120542A.006	LB035691.015	Soluble Ammonia Nitrogen, NH <sub>3</sub> as N	mg/kg	0.1	3.6	3.6	33	1

**Bioavailable Metals in Soil by ICPOES**

Method: ME-(AU)-[ENV]AN037/AN320/AN321

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542A.001	LB035825.004	Arsenic, As - Bioavailable*	mg/kg	2	3	3	90	3
		Beryllium, Be - Bioavailable*	mg/kg	1	<1	<1	200	0
		Cadmium, Cd - Bioavailable*	mg/kg	0.4	<0.4	<0.4	200	0
		Cobalt, Co - Bioavailable*	mg/kg	2	<2	<2	200	0
		Chromium, Cr - Bioavailable*	mg/kg	5	<5	<5	200	0
		Copper, Cu - Bioavailable*	mg/kg	5	9	8	89	11
		Iron, Fe - Bioavailable*	mg/kg	20	1900	1700	31	10
		Lanthanum, La - Bioavailable*	mg/kg	5	<5	<5	200	0
		Manganese, Mn - Bioavailable*	mg/kg	5	61	55	39	11
		Nickel, Ni - Bioavailable*	mg/kg	4	<4	<4	200	0
		Lead, Pb - Bioavailable*	mg/kg	5	<5	<5	145	0
		Silver, Ag - Bioavailable*	mg/kg	2	<2	<2	200	0
		Uranium, U - Bioavailable*	mg/kg	5	<5	<5	200	0
		Zinc, Zn - Bioavailable*	mg/kg	5	7	6	113	16

**Chloride (water extractable)**

Method: ME-(AU)-[ENV]AN274

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542A.001	LB035693.005	Chloride (water extractable 1:5)	mg/kg	5	30	30	47	1

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser In Soil**

Method: ME-(AU)-[ENV]AN248

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120355.001	LB035633.004	Nitrate/Nitrite Nitrogen, NOx as N	mg/kg	0.05	11.06	11.17	15	1

**Nitrite Nitrogen in Soil**

Method: ME-(AU)-[ENV]AN277

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120355.001	LB035660.004	Nitrite, NO <sub>2</sub> as N in Soil	mg/kg	0.05	0.111	0.108	61	3
CE120542A.007	LB035660.015	Nitrite, NO <sub>2</sub> as N in Soil	mg/kg	0.05	<0.05	<0.05	200	0

**Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges**

Method: ME-(AU)-[ENV]AN281

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542A.001	LB035688.006	Total Kjeldahl Nitrogen	mg/kg	20	290	310	37	8
CE120619.001	LB035688.017	Total Kjeldahl Nitrogen	mg/kg	20	32878.75	32561.25	30	1
CE120624.005	LB035688.032	Total Kjeldahl Nitrogen	mg/kg	20	196	196.1	40	0

**Total Organic Carbon by Heanes Oxidation**

Method: ME-(AU)-[ENV]AN273

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542A.001	LB035636.006	Total Organic Carbon	%w/w	0.05	0.55	0.64	18	14

**Water Soluble Metals in Soil by ICPOES**

Method: ME-(AU)-[ENV]AN002/AN320/AN321

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
CE120542A.001	LB035728.005	Calcium, Ca	mg/kg	2	4	4	67	0
		Magnesium, Mg	mg/kg	1	4	4	42	0
		Potassium, K	mg/kg	1	21	21	20	0
		Sodium, Na	mg/kg	5	12	12	56	0
		Sulphur as Sulphate, SO <sub>4</sub>	mg/kg	3	23	23	28	2

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

**Bioavailable Metals in Soil by ICPOES**

Method: ME-(AU)-[ENV]AN037/AN320/AN321

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035825.002	Arsenic, As - Bioavailable*	mg/kg	2	490	500	80 - 120	97
	Cadmium, Cd - Bioavailable*	mg/kg	0.4	520	500	80 - 120	103
	Cobalt, Co - Bioavailable*	mg/kg	2	480	500	80 - 120	96
	Chromium, Cr - Bioavailable*	mg/kg	5	500	500	80 - 120	100
	Copper, Cu - Bioavailable*	mg/kg	5	500	500	80 - 120	101
	Iron, Fe - Bioavailable*	mg/kg	20	500	500	80 - 120	100
	Manganese, Mn - Bioavailable*	mg/kg	5	500	500	80 - 120	101
	Nickel, Ni - Bioavailable*	mg/kg	4	490	500	80 - 120	97
	Lead, Pb - Bioavailable*	mg/kg	5	480	500	80 - 120	95
	Silver, Ag - Bioavailable*	mg/kg	2	51	50	70 - 130	102
Zinc, Zn - Bioavailable*	mg/kg	5	490	500	80 - 120	99	

**Chloride (water extractable)**

Method: ME-(AU)-[ENV]AN274

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035693.002	Chloride (water extractable 1:5)	mg/kg	5	130	125	80 - 120	101
LB035693.003	Chloride (water extractable 1:5)	mg/kg	5	10	10	80 - 120	104

**Nitrate Nitrogen and Nitrite Nitrogen (NOx) by Auto Analyser in Soil**

Method: ME-(AU)-[ENV]AN248

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035633.002	Nitrate/Nitrite Nitrogen, NOx as N	mg/kg	0.05	2.0	2	80 - 120	100

**Nitrite Nitrogen in Soil**

Method: ME-(AU)-[ENV]AN277

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035660.002	Nitrite, NO <sub>2</sub> as N in Soil	mg/kg	0.05	<0.05	0.05	80 - 120	88

**Total Kjeldahl Nitrogen and Total Nitrogen in Soil/Sludges**

Method: ME-(AU)-[ENV]AN281

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035688.002	Total Kjeldahl Nitrogen	mg/kg	20	<20	5	80 - 120	98
LB035688.003	Total Kjeldahl Nitrogen	mg/kg	20	600	670	80 - 120	90
LB035688.004	Total Kjeldahl Nitrogen	mg/kg	20	3400	3700	80 - 120	92
LB035688.026	Total Kjeldahl Nitrogen	mg/kg	20	<20	5	80 - 120	103
LB035688.027	Total Kjeldahl Nitrogen	mg/kg	20	600	670	80 - 120	90
LB035688.028	Total Kjeldahl Nitrogen	mg/kg	20	3500	3700	80 - 120	96

**Total Organic Carbon by Heanes Oxidation**

Method: ME-(AU)-[ENV]AN273

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB035636.002	Total Organic Carbon	%w/w	0.05	1.0	1	80 - 120	102
LB035636.003	Total Organic Carbon	%w/w	0.05	0.70	0.73	80 - 120	96

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub-sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Total Organic Carbon by Heanes Oxidation

Method: ME-(AU)-[ENV]AN273

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
CE120542A.00	LB035636.007	Total Organic Carbon	%w/w	0.05	1.7	0.55	1	116

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula:  $RPD = | \text{OriginalResult} - \text{ReplicateResult} | \times 100 / \text{Mean}$

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula:  $MAD = 100 \times \text{SDL} / \text{Mean} + \text{LR}$

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifier when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: [http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022\\_QA\\_QC\\_Plan.pdf](http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf)

- \* NATA accreditation does not cover the performance of this service.
- Sample not analysed for this analyte.

IS Insufficient sample for analysis.  
 LNR Sample listed, but not received.  
 LOR Limit of reporting.  
 QFH QC result is above the upper tolerance.  
 QFL QC result is below the lower tolerance.

- ① At least 2 of 3 surrogates are within acceptance criteria.
- ② RPD failed acceptance criteria due to sample heterogeneity.
- ③ Results less than 5 times LOR preclude acceptance criteria for RPD.
- ④ Recovery failed acceptance criteria due to matrix interference.
- ⑤ Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
- ⑥ LOR was raised due to sample matrix interference.
- ⑦ LOR was raised due to dilution of significantly high concentration of analyte in sample.
- ⑧ Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
- ⑨ Low surrogate recovery due to the sample emulsifying during extraction.
- ⑩ Legionella Test Result <10 cfu/mL  
Control Strategy (1)  
Maintain Monthly Program or at least 3-monthly monitoring. Maintain water treatment program
- ⑪ Legionella Test Result <1000 cfu/mL  
Control Strategy (2)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy 3.
- ⑫ Control Strategy (3)  
Retest water within 3 to 7 days of plant operation. If not detected, continue to retest water every 3 to 7 days until 2 consecutive samples return readings of 'not detected', then repeat control strategy (1).  
If detected at <100 cfu/mL, repeat control strategy (2).  
If detected at >100 cfu/mL, investigate the problem and review water treatment program, and immediately carry out online decontamination.  
If detected at >1000 cfu/mL, undertake control strategy (4).
- ⑬ Legionella Test Result >1000 cfu/mL  
Control Strategy (4)  
Investigate problem. Review water treatment program.  
Take necessary remedial action (including immediate online decontamination) and undertake control strategy (5).
- ⑭ Control Strategy (5)  
Retest water within 3 to 7 days of plant operation. If not detected, continue to retest water every 3 to 7 days until 2 consecutive samples return readings of 'not detected', then repeat control strategy (1).  
If detected at <100 cfu/mL, repeat control strategy (1)  
If detected at >100 and <1000 cfu/mL, investigate the problem and review water treatment program, immediately carry out online decontamination, and repeat control strategy (5).  
If detected at >1000 cfu/mL, investigate and review the water treatment program, immediately carry out system decontamination and repeat control strategy (5).
- ⑮ HPC - Test Result < 100 000 cfu/mL  
Control Strategy (1)  
Maintain Monthly Program. Maintain water treatment program.



Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: [http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022\\_QA\\_QC\\_Plan.pdf](http://www.sgs.com.au/~media/Local/Australia/Documents/Technical Documents/MP-AU-ENV-QU-022_QA_QC_Plan.pdf)

- ⑮ HPC Test Result > 100 000 cfu/mL <5 000 000 cfu/mL  
Control Strategy (2)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy 3.
- ⑯ Control Strategy (3)  
Retest water within 3 to 7 days of plant operation. If the test result is <100 000 cfu/mL, repeat control strategy (1). If the test result is >100 000 cfu/mL but <5 000 000 cfu/mL, undertake control strategy (2). If the test result is >5 000 000 cfu/mL, undertake control strategy (4).
- ⑰ HPC Test Result >5 000 000 cfu/mL  
Control Strategy (4)  
Investigate problem. Review water treatment program. Take necessary remedial action (including immediate online disinfection) and undertake control strategy (5).
- ⑱ Control Strategy (5)  
Retest water within 3 to 7 days of plant operation. If the test result is <100 000 cfu/mL, repeat control strategy (1). If the test result is >100 000 cfu/mL but <5 000 000 cfu/mL, undertake control strategy (4). If the test result is >5 000 000 cfu/mL, investigate the problem. review the water treatment program, and carry out immediate online decontamination.
- ⑳ Enterococci - Median result should not exceed 230 cfu/100mL (maximum number in any one sample: 450-700 cfu/100mL)  
Sourced from NHMRC (National Health and Medical Research Council) & NWQMS (National Water Quality Management Strategy)  
-Australian Guidelines for Recreational Use of Water. Version Oct 2000.
- † Refer to Analytical Report comments for further information.

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# Appendix E - Macroinvertebrate Raw Data



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