

6/04/2020 Coochiemudlo Island Former Landfill – Quarterly Report (Quarter 1, February 2020) **Our Ref: Redland City Council** 5329 Landfill Environmental Monitoring Program (LEMP) **Elizabeth Str Coochiemudlo Island, QLD 4184 Client: Redland City Council Future-Plus Environmental** 4/40 Technology Drive, Warana QLD 4575



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Date: 6 April 2020

Signed on behalf of Future-Plus Environmental Paul Wood Director

6 April 2020

Coochiemudlo Island Former Landfill – Quarterly Report (Quarter 1, 2020) Redland City Council Landfill Environmental Monitoring Program Elizabeth Street, Coochiemudlo Island



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Project Summary: Quarterly reporting of environmental monitoring undertaken in accordance with the site Landfill Environmental Monitoring Plan (LEMP) at Coochiemudlo Island Former Landfill including groundwater and, surface water monitoring.

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EXECUTIVE SUMMARY

Future-Plus Environmental (FPE) were commissioned by Redland City Council (RCC) to undertake environmental monitoring in accordance with the *RCC Landfill Environmental Monitoring Program* (LEMP) (GHD, December 2019) at Coochiemudlo Island Former Landfill, located at Elizabeth Street, Coochiemudlo Island (the site).

This report presents the quarterly sampling results of groundwater and surface water environmental monitoring conducted by FPE on 12 February 2020 for Quarter 1.

In summary, the Quarter 1 monitoring event identified the following:

Groundwater:

- Statistically significant results (where available) were not reported for any parameters at any of the groundwater monitoring locations. New maximums were however reported for the following locations and parameters:
 - o GW1 for Aluminium and pH;
 - GW2 for Aluminium, Chromium (III+VI), Nitrate, Potassium and TOC; and
 - GW3 for pH.
- Ammonia continues to fluctuate across most groundwater wells; however remains within historical data and low concentrations. The adopted WQO was only exceeded at GW1 during the current event. Iron concentrations remained low at all upgradient and downgradient groundwater wells.
- No evidence of landfill leachate impacts was evident at down-gradient wells from February 2020 results.

Surface water:

- Ammonia was not detected during the current sampling event at any surface water locations.
- Iron, was detected at very low levels across all locations; with concentrations at the lowest recorded of all historical data.
- Most parameters have decreased since previous monitoring events, indicative of heavy rainfall and stormwater flowing through these locations and diluting metals and inorganics that might otherwise become concentrated under low flow/stagnant conditions; and
- Based on the current monitoring results, the landfill is considered to pose a low risk to downstream receivers.

Recommendations

Further surface water and groundwater monitoring is recommended to enable full trend analysis at some locations, and to support characterisation of potential risks over differing climatic and seasonal conditions.



LIST OF ABBREVIATIONS

Abbreviation	Term	
ANZECC	Australian and New Zealand Environment and Conservation Council	
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand	
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality	
BOD	Biological Oxygen Demand	
BOM	Bureau of Meteorology	
COD	Chemical Oxygen Demand	
DES	Department of Environment and Science	
DNRME	Department of Natural Resources, Mines and Energy	
DO	Dissolved Oxygen	
EA	Environmental Authority	
EC	Electrical Conductivity	
EPP	Environmental Protection Policy	
EV	Environmental Values	
LEMP	Landfill Environmental Monitoring Program	
LOR	Laboratory Limit of Reporting	
μS	Micro-Siemens	
Mbgl	Metres Below Ground Level	
NATA	National Association of Testing Authorities	
QA/QC	Quality Assurance/Quality Control	
QWQG	Queensland Water Quality Guidelines	
RCC	Redland City Council	
SWL	Standing Water Level	
TOC	Total Organic Carbon	
TSS 🔀	Total Suspended Solids	
WQO 📉	Water Quality Objective	
%S	Percent Saturation	

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1.0 INTRODUCTION

1.1 BACKGROUND

Future-Plus Environmental (FPE) were commissioned by Redland City Council (RCC) to undertake environmental monitoring at Coochiemudlo Island Former Landfill (referred to herein as Coochiemudlo landfill) located at Elizabeth Street, Coochiemudlo Island (the site), in accordance with the site's Landfill Environmental Monitoring Program (GHD, December 2016).

The Coochiemudlo landfill was utilised as the main disposal point for municipal waste, including inert/hardfill and green waste, servicing approx. 500 residents on the island from 1972 to 1994. The site is currently used as a waste transfer station and for recreational purposes, including a park, sports field and tennis courts. The site is surrounded by mixed land use, including nearby sensitive receptors (residential lots and a wetland).

1.2 REPORT STRUCTURE & CONTENT

This first quarter report summarises the groundwater and surface water environmental monitoring findings for sampling conducted by FPE on 12 February 2020

This report has been prepared to meet the LEMP reporting requirements and includes the following:

- Details on the monitoring locations, nethodology and data assessment adopted for the quarterly monitoring event;
- Details on the quality assurance/quality controls (QA/QC) for the field sampling;
- Weather and monitoring site conditions during the field sampling events;
- Details on the QA/QC for the monitoring results;
- Results of statistical analysis and exceedances of adopted water quality objectives (WQOs) for the groundwater and surface water sampling results; and
- Results, conclusions and recommendations for the ongoing management of groundwater and surface water at)the site.





2.0 METHODOLOGY

2.1 OVERVIEW

RCC requires a regime of environmental monitoring at the Coochiemudlo Island Former Landfill to meet the requirements of the LEMP, including quarterly monitoring of groundwater and surface water.

Works undertaken during the Quarter 1 (February 2020) monitoring events, as per the LEMP requirements, were comprised of quarterly groundwater and surface water monitoring undertaken on 12 February 2020.

2.2 MONITORING LOCATIONS & REQUIREMENTS

Groundwater and surface water monitoring locations are presented in Appendix Å.

The specific groundwater and surface water environmental monitoring requirements in accordance with the LEMP are presented in **Table 1**.

At each monitoring site field observations are completed and well condition is assessed at each groundwater monitoring site, noting any infrastructure damage, ground disturbance or unusual colour/odour of sampling location.

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Monitoring	Monitoring	Field Analysis	Laboratory Analysis
Aspect Groundwater (Quarterly)	Location Downgradient: GW1, GW2, GW3 Upgradient: GW5, GW6	pH (pH units) Electrical Conductivity (µS/cm) Standing water level (SWL)	Sulphate - (Turbidimetric) as SO4 Major Cations (Na, Mg, K, Ca) Ammonia as N Nitrate Total Phosphorus as P Dissolved metals (Mn, As, Al, Cr, Cu, Cd, Pb, Zn, Fe, Hg, N) Dissolved Mercury) Total Organic Carbon (TOC)
Surface Water (Quarterly)	Background: CISW2, CISW3, CISW4 Downstream: CISW1, CISW5	pH (pH units) Electrical Conductivity (µS/cm) Dissolved Oxygen (ppm and % saturation)	Total Suspended Soils (TSS) Sulphate (Turbidimetric) as SO4 Major Cations (Na, Mg, K, Ca) Ammonia as N Nitrate Total Nitrogen Total Phosphorus as P Discolved metals (Mn, As, Al, Cr, Cu, Cd, Pb, Zn, Fe, Hg, Ni) Total Organic Carbon (TOC) Chemical Oxygen Demand (COD) Biochemical Oxygen Demand (BOD)

Table 1. Environmental Monitoring Requirements

2.2.1 Groundwater Monitoring Locations

Groundwater quality monitoring is required at two upgradient locations and three downgradient locations, which are presented in **Table 2**.

Table 2. Groundwater Monitoring Sites

Location	GPS Coordinates (UTM GDA94)		
	Easting	Northing	
Upgradient Locations			
(GW3)	532940	6950507	
GWB	532940	6950407	
Downgradient Locations			
GW1	533049	6950518	
GW2	533058	6950484	
GW3	533038	6950418	

2.2 Surface Water Monitoring Locations

Surface water quality monitoring is required for three background and two downstream locations and these are presented in **Table 3**.

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Table 3. Surface Water Monitoring Sites

Location	GPS Coordinates (UTM GDA94)		
	Easting	Northing	
Background Locations	Background Locations		
CISW2	533157	6950606	
CISW3	533256	6950606	
CISW4	533255	6950\$51	
Downstream Locations		\sim	
CISW1	533088	6950607	
CISW5	533068	6950440	

2.3 MONITORING RESULTS DATABASE

Results of all groundwater and surface water monitoring field and laboratory analysis have been entered into the ESdat environmental monitoring database, which includes historical monitoring results and allows for comparison of results with adopted water quality objectives (WQOs).

2.4 ENVIRONMENTAL GUIDELINES

The Environmental Protection (Water) Policy 2009 - Moreton Bay environmental values and water quality objectives (Department of Environment and Resource Management (DERM)2, July 2010), [referred to henceforth as EPP (Water)] defines the environmental values (EVs) for surface and groundwater quality within the region. This document also identifies the water quality objectives (WQOs) associated with each EV.

As the Coochiemudlo Island Former Landfill and the Melaleuca Wetland are situated within the coastal freshwater area within Coochiemudlo Island, the site is classified as "Coochiemudlo Island" for the purpose of establishing EVs and associated WQOs (DERM, 2010).

The following EVs and their relevant guidelines apply (as specified in the EPP (water) for Coochiemudlo Island):

- Aquatic Ecosystems (include seagrass) (Groundwater/surface water);
- Inigation (Groundwater);
- Stock Water (Groundwater);
- Human Consumer (include oystering) (Surface water only);

Drinking water (Groundwater only);

Primary/Secondary/Visual Recreation (Surface water only); and

Cultural and Spiritual Values (Surface water only).



The above EVs represent potential receptors of any impacts from Coochiemudlo Island Former Landfill. An assessment of these potential receptors by GHD (GHD, 2019b) identified the following receptors as actual or likely receptors for further assessment, based on characterising actual water use in the area:

- Surface water: aquatic ecosystems (including Wallum frog habitat (GHD, 2018a)), cultural and spiritual values; and
- Groundwater: aquatic ecosystems.

As recommended in the EPP (water), the adopted WQOs were determined from a combination of documents, including the following:

- Environmental Protection (Water) Policy (Department of Natural Resource Management, 2010) corresponding to the following:
 - Physico-chemical WQOs for aquatic ecosystem lowland (freshwater (comprising lowland streams, Wallum/tannin-stained streams and coastal streams)
 - Local WQOs for drinking water supply
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council [ANZECC]/Agriculture and Resource Management Council of Australia and New Zealand [ARMCANZ], 2000 and 2018 revision), corresponding to the following:
 - Protection of slightly to moderately disturbed ecosystems
 - Utilised as the step is in an urbanised environment
 - Protection of 99% species for surface water for metals only
 - Utilised as an indicator of metal concentrations elevated in relation to optimal concentrations for Wallum frog habitat

Site-specific WQOs have also been developed to improve the assessment of potential wallum frog habitats:

GHD 2018 Coochiemudlo Island wetland guideline for the following parameters (GHD, 2018):

pH between 3.53 and 4.61 pH units;

20 µS/cm;

• Tannin acid staining > 9.5 mg/L;

Calcium < 3.02 mg/L; AND

Low levels of monomeric aluminium consistent with siliceous sand and Wallum waters

(refer to Aluminium guideline value from ANZECC FW 99%)

The results from the groundwater and surface water monitoring have been compared against the WQOs.



2.5 DATA ASSESSMENT

2.5.1 Groundwater

Data assessment for groundwater has been undertaken to determine if leachate generated at Coochiemudlo Island Former Landfill is potentially impacting on local groundwater. The following assessment approach has been adopted:

- Identification of statistically significant fluctuations in groundwater quality;
- Comparison of results with published WQOs (refer to Section 2.4);
- Comparison between up gradient and down gradient locations (refer to Section 2.5.2.1); and
- Evaluation of trends in indicator parameter concentrations.

2.5.2 Groundwater Statistical Assessment

Results from each monitoring well were compared to the mean (x) and multiples of standard deviations (x+1s, x+2s and x+3s) of historical results for each specific parameter. Historical data for the Coochiemudlo Island Former Landfill monitoring wells is based on the first eight sampling events conducted at the start of the landfill monitoring program (since June 2017 or April 2018, depending on location and parameter). As such, some locations and parameters require additional monitoring data before control lines can be determined.

The adopted assessment criteria consist of the following exceedances:

- Five consecutive observations greater than the x+1s control line;
- Two consecutive observations greater than the x+2s control line; and
- One observation greater than the +Bs control line

In the case of pH, the control line also applies when pH measurements are less than the mean (i.e. x-1s, x-2s, x-3s). Statistically significant results that are identified are discussed further, to provide comparison with background water quality and provide context regarding any potential impact on the receiving environment

Each parameter for each groundwater well has been graphed and includes the above adopted assessment criteria (Appendix C)

2.5.2.1 Upgradient & Downgradient Well Comparison

Comparison of up-gradient and down-gradient groundwater well data is undertaken by assessment of groundwater trend graphs provided in **Appendix D**.



2.5.3 Surface Water

Data assessment for surface water has been undertaken to determine if leachate generated at Coochiemudlo Island Former Landfill is potentially impacting on local surface water quality. The following assessment approach has been adopted:

- Identification of statistically significant fluctuations in groundwater quality;
- Comparison of results with adopted WQOs (refer to Section 2.4);
- Comparison between upstream and downstream monitoring locations (refer to Section 2.5.3.1); and
- Evaluation of trends in parameter concentrations at specific surface water monitoring locations.

2.5.3.1 Upstream & Downstream Comparison

Comparison of up-stream and down-stream surface water data is undertaken by assessment of surface water trend graphs provided in **Appendix E**.





3.0 QUALITY ASSURANCE & QUALITY CONTROL – FIELD SAMPLING

3.1 GENERAL

The Quality Assurance /Quality Control (QA/QC) program for the field sampling component of the LEM was undertaken in accordance with, but not limited to, the following:

- Monitoring and Sampling Manual Environmental Protection (Water) Policy 2009 (Version 2) (DES, 2018);
- ISO 5667-11 1993 and AS/NZ 5667.11:1998 Water Quality Sampling Guidance on Sampling of Groundwater;
- AS/NZS 5667.6: 1998 Water Quality Sampling Guidance on Sampling of Rivers and Streams;
- Environmental Guidelines: Solid Waste Landfills, Second Edition 2016 (NSW EPA, 2016); and
- Best Practice Environmental Management Siting, Design, Operation and Rehabilitation of Landfills (Publication 788.3) (EPA Victoria, 2015).

QA/QC procedures included:

- Monitoring of climatic conditions likely to be experienced at site;
- Calibration of TPS 90 FLT water meter prior to and following sampling;
- Triple rinse decontamination procedure of all equipment prior to sampling and between sampling points for all environmental monitoripg;
- Use of nitrile disposable gloves for sample collection. Disposable gloves were replaced between sample locations;
- Collection of field duplicate, triple plank and rinsate blank samples;
- Review of QC reports generated by the laboratory of their internal procedures and checks including matrix spikes, surrogate spikes, duplicate analyses, reagent and method blanks;
- Correct cold storage of samples (target <6 degrees °C) and delivery to ALS Global NATA accredited laboratory within recommended holding times (target 24 hrs); and
- Record keeping of transport documentation and use of chain of custody procedures, including sample list forms submitted to the laboratory and laboratory sample receipt documentation.

3.2 FIELD & LABORATORY WATER QUALITY ANALYSIS

Analysis of field parameters was undertaken using a TPS 90FLT water quality meter. Laboratory analysis was undertaken by ALS Global (NATA accredited) laboratory in accordance with the laboratory methods and level of reporting detailed in **Table 4**.



le 4. Water Quality Laboratory Parameters & LOR	
Parameter	LOR (mg/L or as indicated)
Sulphate – (Turbidimetric) as SO ₄	1
Major Cations: Ca, Mg, Na, K	1 (90)
Ammonia as N	0.01
Nitrate	0:01
Dissolved Metals (Mn, As, Al, Cr (III+VI), Cu, Cd, Pb, Zn, Fe, Hg)	Zn: 0.005 Hg: 0.0001 Others: 0.001
Total Organic Carbon (TOC)	
Chemical Oxygen Demand (COD)	10
Biological Oxygen Demand (COD)	2
Total Suspended Solids (TSS)	5
Total Phosphorus	0.01
	<u>)</u>]

3.2.1 **Field Data Quality Assessment**

As part of the QA/QC program, field duplicates, field blank and rinsate samples were prepared and submitted for laboratory analysis.

FPE follow strict sample collection procedures to ensure representative samples are collected and high results integrity achieved.

3.2.2 Field blanks

Field blanks were used to assess the potential for cross contamination during field handling procedures and shipment of the samples to the aboratory and consisted of a sample of deionised water that was supplied by the laboratory.

Field blank samples were submitted for analysis with each batch / esky of samples collected during groundwater and surface water sampling events.

One field blank sample (Sample ID Blank) was analysed for the parameters specified in Appendix C: Coochiemudio Island Closed Landfill of the Environmental Monitoring Plan for the Landfill Environmental Monitoring Program (FPE, 2019).

3,2,3 Rinsate

Equipment rinsate blanks were prepared in order to assess whether equipment decontamination procedures adequately prevented and/or minimised the potential for sample cross-contamination. A



rinsate sample was collected following completion of each sampling event during which sampling equipment (e.g. sampling jug) was utilised for sample collection.

One rinsate blank sample (Sample ID Rinsate) was prepared and submitted to the laboratory for analysis of analytes representative of the sampling undertaken during each sampling event (GW and SW inclusive).

3.2.4 Duplicates

A duplicate sample (SWQA) was taken during each monitoring event (GW and SW inclusive) for analysis and used to indicate if repeatable results are obtained and for the quality of data to be evaluated.

Duplicate samples were submitted for analysis with each batch of samples collected (primary sample CISW3).

A Precision assessment is reported as Relative Percent Difference (RPD) between the two results (sample and duplicate). Where the RPD value is greater than the adopted trigger value, it is identified as an exceedance.





4.0 WEATHER & MONITORING SITE CONDITIONS

4.1 SITE CONDITIONS

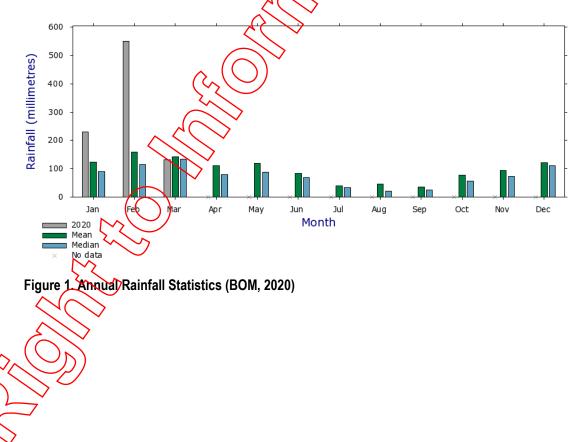
Heavy rainfall occurred on the day of monitoring and saturated ground conditions were noted whilst or site. Long grass around the perimeters of the landfill and vegetation adjoining access tracks was not maintained in some areas, which caused difficulty with accessing some of the monitoring sites. Maintenance of these areas by RCC is recommended to allow ongoing access and monitoring of these areas.

4.2 WEATHER CONDITIONS

Conditions at the time of monitoring on 12 February 2020 have been outlined below. All climate data (except rainfall) was extracted from the Redland (Alexandra Hills) Station No.140007 (Bureau of Meteorology [BOM] 2020). Temperatures ranged from 22.3 to 26.0 °C during sampling.

Annual rainfall statistics were utilised from the BOM Ormistor College Station No. 40770, which is 10.6km from the site and is the closest station with suitable long term date. Large rainfall totals were received the week preceding (342.8mm in 7 days) and during monitoring on the 12 February 2020 (4mm).

Annual rainfall statistics (1988-present) from the Ormiston College Station No. 40770 are displayed in **Figure 1** below.





5.0 QUALITY ASSURANCE & QUALITY CONTROL - SAMPLING RESULTS ((

5.1 LABORATORY QA/QC RESULTS

As part of the QA/QC program, field duplicates, trip blank and rinsate samples were prepared and submitted for laboratory analysis. Laboratory QA/QC Results are provided in **Appendix F**.

FPE follow strict sample collection procedures to ensure representative samples are collected and high results integrity achieved.

The Relative Percentage Difference (RPD) for the field duplicate was acceptable based on the following:

- Below 50% if result was between 10 and 20 times LOR;
- Below 20% if result >20 times LOR; and
- No limit if result <10 times the LOR.

RPD were within acceptable limits outlined above for all field duplicates

No traces of parameters were identified in the Blank or Rinsate samples.

Review of the laboratory QA/QC reporting identified the following;

- No Method Blank value outliers occur;
- No Duplicate outliers occur;
- No Laboratory Control outliers occuc
- No Matrix Spike outliers occur;
- No Surrogate recovery outliers occur;
- No Analysis Holding Time Outliers occur; and
- No Quality Control Sample Frequency Outliers occur.

Based on results above FPE has confidence that the sampling results are representative of the site conditions.



6.0 MONITORING RESULTS

All groundwater and surface water sampling locations were effectively sampled during the Quarter 1 monitoring event. All tabulated groundwater and surface water results from the first quarter monitoring event are provided in **Appendix B**.

6.1 GROUNDWATER RESULTS

6.1.1 Groundwater Levels

Groundwater levels (mAHD) for each groundwater bore are displayed in the **Figure 2** below, from 2017 to 2020. Upgradient bores at the site are GW5 and GW6, while downgradient bores are represented by GW1, GW2 and GW3.



Figure 2. Groundwater levels (mAHD) of monitoring wells at BWF for 2017 to 2020

Groundwater levels all increased during the current monitoring event (except GW6) when compared to the previous monitoring even on 7 November 2019, which is attributed to the large rainfall events within the seven days prior to field monitoring (refer Section 4.2). Groundwater levels varied from 1.78mAHD (GW6) to 4.73mAHD (GW3) and are within the historical range of groundwater levels at GW3 and GW5, whilst GW1 and GW2 have increased above historical levels. Groundwater level at GW6 continues an overall decreasing trend during the current monitoring round.



The SWL at GW3 appears very responsive to rainfall events, as was noted from data recorded in November 2018 (GHD, 2019b), and is again during the current monitoring round following large rainfall events. GW5 typically responds similarly to rainfall events, although is not at apparent as GW3.

6.1.2 Well Condition Review

The condition of all groundwater wells during the most recent monitoring event is provided in Table 5 below.

Table 5. Groundwater Well Condition Review

Monitoring well ID	Condition as of February 2920
Upgradient bores	\sim
GW5	Good
GW6	Good
Downgradient bores	
GW1	C Good
GW2	Good
GW3	Coed
-	

6.1.3 Field Observations

Visual observations of sample material retrieved from all groundwater wells is noted in Table 6 below.

Table 6. Groundwater well location and sample descriptions

Location ID	Location Description	Sample description			
Upgradient bore	Upgradient bores				
GW5	Located 5 m east of the waste transfer	Moderately clear, no suspended			
GVV5	station.	solids, no odour and no sheen.			
GW6	Located 60 m south of the waste	Moderate turbidity, no odour and no			
900	transfer station.	sheen.			
Downgradient be	Downgradient bores				
GW1	Located 10 m west of the waste transfer	Moderately clear, no suspended			
GWI	() station.	solids, no odour and no sheen.			
GW2	Located 10 m west of the closed landfill.	Moderately clear, no suspended			
GWZ 🔨	tocaled 10 m west of the closed landhin.	solids, no odour and no sheen.			
GW3	Located 50 m south-west of the former	Brown, high turbidity, no suspended			
GWG	landfill, adjacent to the tennis court.	solids, no odour or sheen			



6.1.4 Groundwater Statistical Analysis

An assessment of data for the current February 2020 monitoring round against available statistical Control Line data found there were no exceedances of parameters at any groundwater well locations². Trend charts with analytes plotted against control line criteria are provided in **Appendix C**.

6.1.5 Upgradient Monitoring Well Results

WQO exceedances for upgradient sites GW5 and GW6 are summarised in **Table**, below. WQO exceedances at GW5 and GW6 are considered to represent background conditions and are not considered to represent impact from the former landfill.

		AC		Current	
Parameter	Units	EVs	WQOs	Re	sult
		$\land (\bigcirc)$	~	GW5	GW6
рН	рН	GHD 2018 Coochiemudlo Island wetland	3.53-4.61	4.82	N/A
	Units			4.02	
EC	µS/cm	GHD 2018 Coochiemudio Island wetland	90		
		Morton Bay - Schedule 1 EPP (water) -	626	287	2,360
		Wallum/Tannin Freshwater		207	2,300
		Schedule 1 EPP (water) - Drinking Water	1,000		
Nitrate	mg/L	ANZECO FW Slight-mod disturbed system	0.158	1.95	N/A
Aluminium	mg/L	ANZECC FW Slight-mod disturbed system	0.055	N/A	7.6
Iron	mg/L	Schedule 1 EPP (water) - Drinking Water	0.05	N/A	0.11
(Filtered)					
Zinc	mg/L	ANZECC FW Slight-mod disturbed system	0.008	N/A	0.022

Table 7. Exceedances of WQOs at Upgradient Monitoring Sites

*Note: N/A Indicates that the result from that sampling location did not exceed any guidelines and thus not included in the exceedance table.

6.1.6 **Downgradient Monitoring Well Results**

WOO exceedances for downgradient groundwater well sites GW1, GW2 and GW3 are summarised in Table 8 below.

 (\bigcirc)

22 xcluding GW2 - No Control Line data exists for GW2 as additional sample events are required before such data can be determined.



Table 8. Exceedances of WQOs at Downgradient Monitoring Sites								
Parameter	Units	EVs	WQOs	Current Result			6	
Turumeter	Onto			GW1	GW2	GW3		
pН	pН	GHD 2018 Coochiemudlo Island wetland	3.53- 4.61	6.23	6.53	5.9		
P	Units	Morton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	6.5 - 8		3	•••		
EC	µS/cm	GHD 2018 Coochiemudlo Island wetland	90	521	516	N/A		
Ammonia as N	mg/L	Morton Bay - Schedule 1 EPP (water)	Q.02	0.03	N/A	N/A		
Nitrate (as N)	mg/L	ANZECC FW Slight-mod disturbed system	0.158	0.85	0.93	N/A	_	
Aluminium	mg/L	ANZECC FW Slight-mod disturbed system	0.055	0.12	0.30	0.37	_	
Chromium (III+VI)	mg/L	ANZECC FW Shight-mod disturbed	0.001	N/A	0.002	N/A		
Iron (Filtered)	mg/L	Schedule 1 ERP (water) - Drinking Water	0.05	N/A	0.16	0.13		
Zinc	mg/L	ANZECC FW Slight-mod disturbed system	0.008	N/A	0.036	N/A		

*Note: N/A Indicates that the result from that sampling location did not exceed any guidelines and thus not included in the exceedance table.

6.1.6.1 Downgradient well - GW1

All monitored parameters at downgradient GW1 were within the statistical assessment criteria for this quarterly monitoring event.

Concentrations of parameters, including where WQOs were exceeded, were consistent with background concentration ranges and/or with recent concentration trends with the exception of:
 Aluminium (0.12mg/L) has was detected during the current monitoring event and has increased above historical data at this location, representing a new maximum concentration. Aluminium



levels were lower than upgradient well GW6. The adopted WQO is now exceeded at this location;

- Ammonia as N (0.03 mg/L) has increased since the previous monitoring event (29 August 2019) and is only slightly higher than upgradient well GW6. This parameter only just exceeds the adopted WQO and remains within historical data range for this location;
- Calcium (60mg/L) remains higher than all other upgradient and downgradient locations but is within the historical range of data; and
- pH (6.23) remains higher than downgradient locations and it just above historical data for this location, representing a new maximum value. pH has continued to gradually increase since November 2018 and remains outside of the adopted WQOs.

6.1.6.2 Downgradient well – GW2

Concentrations of parameters, including where WQOs were exceeded, were consistent with background concentration ranges and/or with recent concentration trends with the exception of:

- Aluminium (0.3mg/L) was detected during the current monitoring event and has increased above historical data at this location, representing a new maximum concentration; however it is well below upgradient well GW6. The adopted WQQ is now exceeded at this location;
- Chromium (III+VI) (0.002mg/L) has increased above all up-gradient and most down-gradient wells during the current monitoring event. Chromium has increased above historical levels, representing a new maximum at this location. However, the adopted WQO has not been exceeded;
- Nitrate (0.93 mg/L) has increased above historical levels, representing a new maximum at this location. The adopted WQO has been exceeded at this location. However, the Nitrate concentration remains below upgradient well GW5;
- Potassium (20mg/L) is above upgradient wells and has increased above historical levels, representing a new maximum concentration at this location; and
- TOC (10mg/L) is above upgradient wells and has increased above historical levels, representing a new maximum at this location.

6.1.6.3 Downgradient well – GW3

All monitored parameters at downgradient GW3 were within the statistical assessment criteria for this guarterly monitoring event.

Conceptrations of parameters, including where WQOs were exceeded, were consistent with

background concentration ranges and/or with recent concentration trends with the exception of:



 pH (5.9) has increased since the previous event in November 2019 and is now above historical levels, representing a new maximum concentration at this location. The adopted WQOs have been exceeded at this location.

6.1.7 Summary of potential landfill impact on Groundwater

All wells were sampled in February 2020. New maximums were reported at downgradient locations for:

- GW1 for Aluminium and pH;
- GW2 for Aluminium, Chromium (III+VI), Nitrate, Potassium and TOC ; and C
- GW3 for pH;

Whilst concentrations exceeding the adopted WQOs were reported, results were consistent with background data with the exception of:

- GW1 for Aluminium, Ammonia as N, Calcium and pH;
- GW2 for Aluminium, Chromium (III+VI), Nitrate, Potassium, TOC; and
- GW3 for pH.

Ammonia (a key leachate indictor) results continue to fluctuate across most groundwater wells however remain within historical data and low concentrations. The adopted WQO of 0.02mg/L was only exceeded at GW1 during the current event (0.03mg/L) and no other downgradient groundwater location results are indicative of landfill leachate impacts.

Iron (dissolved) concentrations remained low at all upgradient and downgradient groundwater wells. The variability of historical results at GW2 also returned to very low levels (0.16mg/L), exceeding the adopted WQO of 0.05mg/L. Whilst know is another key leachate indictor, these results, in conjunction with the Ammonia results across groundwater wells, are not considered representative of leachate impacts.

pH, an important consideration for acid frog habitat downstream of the former landfill, was noted to be higher at downgradient wells (5.9-6.53) than upgradient wells (3.64-4.82). Historical pH levels appear to fluctuate and be influenced by rainfall events at GW2 and GW3, and to a lesser extent at GW1, suggesting the soil profile at these locations may be more permeable to surface water inputs and/or impacted by historical landfilling on the site.

6.2 SURFACE WATER RESULTS

Monitoring location descriptions

The details of the surface water locations and field observation have been summarised in Table 9.

6.2.1



able 9. Surface water locations and sample descriptions							
Location ID	Location Description	Sample description					
Background surface water monitoring locations							
		Clear, no suspended solids or boor					
CISW2	Background, potential Wallum frog habitat	Tannin-stained colour. Water flow at					
		sample location.					
		Clear, no suspended solids or odour.					
CISW3	Background, potential Wallum frog habitat	Tannin-stained colour. Water flow at					
		sample location.					
		Clear, no suspended solids or odour.					
CISW4	Background	Tannin-stained colour. Water flow at					
		sample location.					
Downstream su	rface water monitoring locations	\bigcirc					
CISW1	Downstream of former landfill	Moderately turbid, no suspended					
0.0001		solids, odour. Turbid colour.					
CISW5	Downstream of former landfill	Moderately turbid, no suspended					
013995		solids, odour. Turbid colour.					

Table 9 Surface water locations and sample descriptions

6.2.2 **Background Surface Water Results**

6.2.2.1 Surface Water Sites - CISW2, CISW3, CISW4

WQO exceedances for background sites CSW2, CISW3 and CISW4 are summarised in Table 10 below. WQO exceedances at CISW2, CISW3 and CISW4 are considered to represent background conditions and are not considered to represent impact from the former landfill but are included for comparative purposes.

	<	$\langle \langle \rangle$				
Parameter	rameter Units	EVs	WQOs	C	Current	
				CISW2	CIS	
N	\square	GHD 2018 Coochiemudlo	3.53-			
2		Island wetland	4.61			

Table 10. Exceedances of WQOs Upstream Surface Water Sites

	Parameter	Units	EVs	WQOs	Current Result		
	arameter			ng03	CISW2	CISW3	CISW4
	Ν	$\sum_{i} O$	GHD 2018 Coochiemudlo	3.53-			
	Z		Island wetland	4.61			
	рҢ∕∕	Units	Morton Bay - Schedule 1		5.8	5.44	6.41
			EPP (water) - Wallum/Tannin	6.5 – 8			
	\sim		Freshwater				
	\bigcirc		Morton Bay - Schedule 1				
00		%Sat	EPP (water) - Wallum/Tannin	85-110	40	78.3	48.9
\sum	$\langle \rangle$		Freshwater				
$^{\prime}$	_						



Parameter	Units	EVs	WQOs	Current Result			(7)
Falametei		EVS		CISW2	CISW3	CISW4	$\langle \rangle$
EC	µS/cm	GHD 2018 Coochiemudlo	90	N/A	117.2	193.1	P
-	1	Island wetland				6/07	1
Nitrogen		Morton Bay - Schedule 1				276	
(total)	mg/L	EPP (water) - Wallum/Tannin	0.5	1.2	0.8	0.6	
(total)		Freshwater			\overline{ON}	>	
		ANZECC 2000 FW 99% -					
	mg/L	applicable to CISW2 and	0.00001	0.002			
Chromium		CISW3 only			0.002	0.002	
(III+VI)		ANZECC 2000 Fresh water					
		Slightly-moderate disturbed	0.001	\mathbb{N}			
		system	(C))			
Iron	ma/l	Schedule 1 EPP (water) -	20.05	0.37	0.31	0.27	
non	mg/L	Drinking Water	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0.57	0.51	0.27	
		ANZECC 2000 FW 99%	07				
		applicable to CISW2 and	0.0024				
Zinc	mg/L	CISW3 only		0.007	, N/A	0.022	
	mg/L	ANZECC 2000 Fresh water		0.007	11/7	0.022	
		Slightly-moderate disturbed	0.008				
		system					

Note: * N/A Indicates that the result from that sampling location did not exceed any guidelines and thus not included in the exceedance table.

Comparison of the current surface water results at CISW2, CISW3 and CISW4 against recent data indicates all parameters were consistent, and were within ranges reported historically with the exception of:

 Nitrate increased above historical data at CISW2 (0.02mg/L) and CISW4 (0.07mg/L) and represent new maximums at these locations. It should be noted that only three previous monitoring results exist for CISW2 and four data points exist for CISW4;

pH increased above historical data for CISW3 (5.44 pH units) and CISW4 (6.41 pH units) and represent new maximums at these locations. It should be noted that only three data points from monitoring events undertaken to date exist for this parameter at both sites. The adopted WQOs for pH were again exceeded at each location; and



 Potassium increased above historical data CISW4 (2mg/L) and represents a new maximum at this location. It should be noted that only three data points from monitoring events undertaken to date exist for this parameter at this site.

6.2.3 Downstream Surface Water Sampling Results

WQO exceedances for downstream surface sites CISW1 and CISW5 are summarised in Table 11 below.

				Current Result	
Parameter	Units	EVs	WQDs	CISW1	CISW5
pН	pH Units	GHD 2018 Coochiemudlo Island wetland Morton Bay - Schedule 1 EPP (water)	3.53 4.61	6.45	6.14
	Grinto	Wallum/Tannin Freshwater	6.5 – 8		
DO	%Sat	Morton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	85-110	50.3	47.6
EC	µS/cm	GHD 2018 Coochiemud of Island wetland	90	92.6	N/A
Nitrogen (total)	mg/L	Morton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	0.5	0.6	N/A
Chromium	mg/L	ANZECC 2000 FW 99% - applicable to CISW2 and CISW3 only	0.00001	0.002	0.003
(III+VI)		ANZECC 2000 Fresh water Slightly- moderate disturbed system	0.001		
Iron	mg/L	Schedule 1 EPP (water) - Drinking Water	0.05	0.69	0.74
Zinc	mg/L	ANZECC 2000 FW 99% - applicable to CISW2 and CISW3 only	0.0024	0.008	0.007

Table 11. Exceedances of WQOs Downstream Surface Water Sites

6.2.3.1 Surface Water Sites – CISW1 and CISW5

An assessment of the above results for surface water sites CISW1 and CISW5 reveal the following: Aluxanium (1.83mg/L CISW5 and 1.85mg/L CISW1) is higher than background locations and in the case of CISW5, has increased above flat-line historical results from the previous five sample events but remains within historical results. The concentration at CISW1 also remains within historical levels;



- Chromium (III+VI) (0.003mg/L CISW5) increased above historical results and represents a new maximum concentration at this location; and
- DO (50.3% CISW1 and 47.6% CISW5) increased above historical levels, representing new maximum concentrations at both sites. The increases are likely associated with heavy rainfall and water flow at the time of sampling. These results still fall short of the adopted WOO criteria.

6.2.4 Summary of potential landfill impact on surface water

Ammonia (a key leachate indicator) was not detected during the current sampling event at any surface water locations. Another leachate indicator, Iron, was detected at very low levels across all locations; with concentrations at the lowest recorded of all historical data. Most parameters have decreased since previous monitoring events, indicative of heavy rainfall and stormwater flowing through these locations and diluting metals and inorganics that might otherwise become concentrated under low flow/stagnant conditions.

Contrary to previous reports (GHD, 2019b), there appears no impact of acid sulphate soils in the current monitoring results, due to the heavy rainfall and conditions onsite at the time of monitoring.



7.0 CONCLUSIONS

7.1 GROUNDWATER

All groundwater monitoring wells were sampled in February 2020, and results have been assessed for their potential for landfill leachate to impact groundwater by comparing results with the WQOs (as per the EVs in the *EPP (Water) 2009*), statistical assessment of the dataset and by comparing the (inferred) up gradient and down gradient groundwater quality results. Statistically significant results (where available) were not reported for any parameters at any of the groundwater monitoring locations.

Adopted WQOs were exceeded at both up and down gradient locations for pH, EC, Mitrate, Aluminium, Iron and Zinc. Ammonia and Chromium (III+VI) were the only parameters that exceeded the adopted WQOs only at down-gradient wells. These parameters will require continued monitoring in future events to determine if further investigations are required.

New maximums were reported for several parameters at the following wells:

- GW1 for Aluminium and pH;
- GW2 for Aluminium, Chromium (III+VI), Nitrate, Potassium and TOC; and
- GW3 for pH.

Ammonia (a key leachate indictor) continues to fluctuate across most groundwater wells; however remains within historical data and low concentrations. The adopted WQO of 0.02mg/L was only exceeded at GW1 during the current event (0.03mg/L) and no groundwater location results are indicative of landfill leachate impacts. Iron concentrations remained low at all upgradient and downgradient groundwater wells. The variable historical results at GW2 also returned to very low levels (0.16mg/L), exceeding the adopted WQO of 0.05mg/L. In light of the above assessment, results from the February 2020 monitoring event indicate a continued low risk of the landfill to identified receptors.

7.2 SURFACE WATER

All surface water locations were sampled in February 2020, and results have been assessed for their potential for landfill leachate by comparing results with the WQOs (as per the EVs in the *EPP (Water)* 2009) and by comparing the upstream and downstream surface water quality results.

Ammonia, a key leachate indicator, was not detected during the current sampling event at any surface water locations. Another leachate indicator, Iron, was detected at very low levels across all locations; with concentrations at the lowest recorded of all historical data. Most parameters have decreased since previous monitoring events, indicative of heavy rainfall and stormwater flowing through these locations and diluting metals and inorganics that might otherwise become concentrated under low flow/stagnant conditions.



Most parameters have been reported below the adopted WQO and/or background concentrations, and results generally very similar between background and downstream locations. Based on the current monitoring results, the landfill is considered to pose a low risk to downstream and downgradient receivers. Exceedances identified in surface water monitoring results will be monitored in the next quarterly monitoring report to determine if there are ongoing trends and if further investigations are warrantee.

Unlike as was previously reported (GHD, 2019b), there appears no impact of acid sulphate soils to the current monitoring results, likely due to the heavy rainfall and conditions onsite at the time of monitoring.



8.0 **RECOMMENDATIONS**

Further surface water and groundwater monitoring is recommended to enable full trend analysis at some locations, and to support characterisation of potential risks over differing climatic and seasonal conditions.

6 April 2020



9.0 **REFERENCES**

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EPA Victoria (2015) Best Practice Environmental Management - Siting, Design, Operation and Rehabilitation of Landfills (Publication 788.3), August 2015

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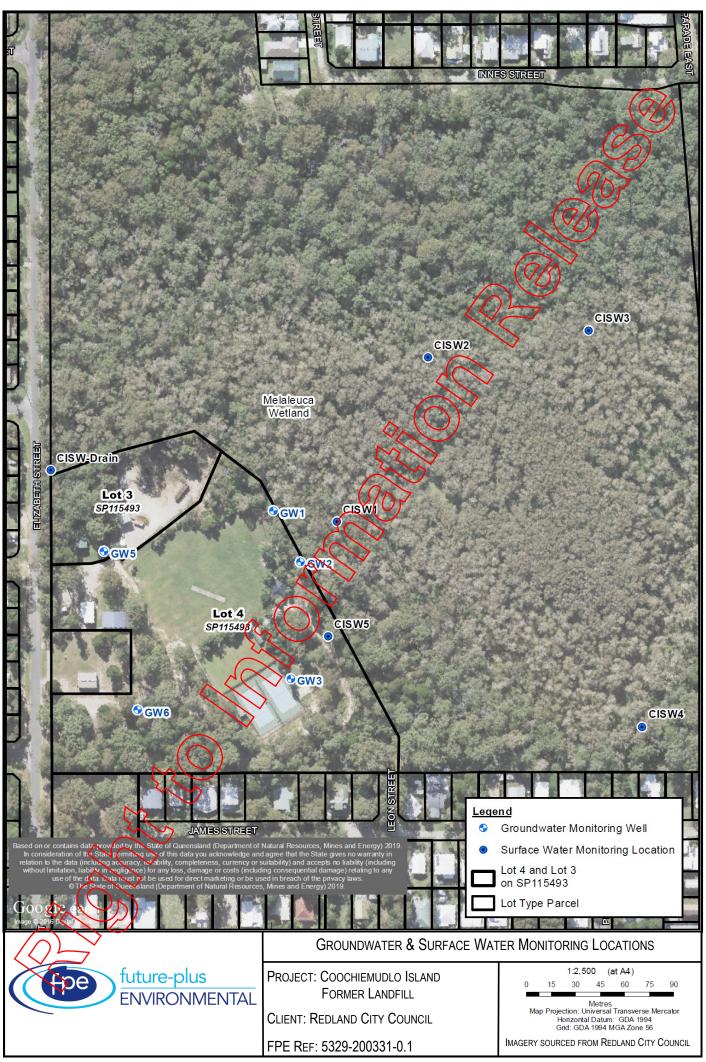
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Appendix A. **Monitoring Locations Plan** 6 April 2020 Coochiemudlo Island Former Landfill -Appendix A





Appendix B. **Results Summary** 6 April 2020 Coochiemudlo Island Former Landfill -Appendix B

	Fie	eld			Inorganics							Me	tals					Inorganic
	pH (Field)	nS/cm	Ammonia as N	Chloride	Nitrate (as N)	Sodium (filtered)	TOC	Aluminium (filtered)	B Zalcium (filtered)	Chromium (hexavalent) (filtered)	g B Chromium (III+VI) T (filtered)	mg Iron (filtered)	Lead (filtered)	Magnesium (filtered)	Ma Nickel (filtered)	Potassium (filtered)	zinc (filtered)	Sulfate as SO4 - Turbidimetric (filtered)
FOI	-	us/till	mg/L 0.01	mg/L	mg/L	mg/L	mg/L	mg/L 0.01	1 1 1	mg/L 0.01	0.001	0.05	mg/L 0.001	mg/L	0.001	mg/L	mg/L 0.005	mg/L
ANZECC 2000 Fresh water Slightly-moderate disturbed system			0.9		0.158			0.055		0.001	0.001	0.05	0.0034		0.011		0.008	<u>+</u>
GHD 2018 Coochiemudlo Island wetland	3.53-4.61	90																
Morton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	6.5-8	626	0.02															
Schedule 1 EPP (water) - Drinking Water		1,000										0.05						

Site ID	Monitoring Zone	Location Code	Date																		
Coochiemudlo Island	DG	GW1	12/02/2020	6.23	521	0.03	21	0.85	21	5	0.12	60	<0.01	< 0.001	<0.05	<0.001	18	<0.001	12	<0.005	133
Coochiemudlo Island	DG	GW2	12/02/2020	6.53	516	0.02	77	0.93	45	10	0.30	29	<0.01	0.002	0.16	<0.001	12	<0.001	20	0.036	38
Coochiemudlo Island	DG	GW3	12/02/2020	5.90	30.6	<0.01	3	0.04	4	5	0.37	<1	<0.01	0.001	0.13	<0.001	<1	<0.001	<1	<0.005	2
Coochiemudlo Island	UG	GW5	12/02/2020	4.82	287	<0.01	61	1.95	48	<1	0.02	<1	<0.01	≤0.00 1	<0.05	<0.001	4	<0.001	<1	<0.005	19
Coochiemudlo Island	UG	GW6	12/02/2020	3.64	2,360	0.02	825	<0.01	373	<1	7.60	3	<0.01	(0.001)	0.11	<0.001	69	0.003	2	0.022	18
Statistics													(0	XV XV							
Number of Results				5	5	5	5	5	5	5	5	5		5	5	5	5	5	5	5	5
Number of Detects				5	5	3	5	4	5	3	5	3		3	3	0	4	1	3	2	5
Minimum Concentratio	n			3.64	30.6	<0.01	3	<0.01	4	<1	0.02	< <u>1</u>	\$0.01	0.001	<0.05	<0.001	<1	<0.001	<1	<0.005	2
Minimum Detect				3.64	30.6	0.02	3	0.04	4	5	0.02	3	ND	0.001	0.11	ND	4	0.003	2	0.022	2
Maximum Concentratio	n			6.53	2,360	0.03	825	1.95	373	10	7.6	60	<0.01	0.002	0.16	<0.001	69	0.003	20	0.036	133
Maximum Detect				6.53	2,360	0.03	825	1.95	373	10	7.6	60	ND	0.002	0.16	ND	69	0.003	20	0.036	133
Average Concentration	*			5.4	743	0.016	197	0.76	98	4.2	1.7	19	0.005	0.001	0.09	0.0005	21	0.001	7	0.013	42
Median Concentration *	*			5.9	516	0.02	61	0.85	45	5	0.3	3	0.005	0.001	0.11	0.0005	12	0.0005	2	0.0025	19
Standard Deviation *				1.2	926	0.011	352	0.8	155 🧹	3.9	3.3	26	0	0.00061	0.062	0	28	0.0011	8.7	0.015	52
95% UCL (Student's-t) *				6.557	1,626	0.0263	533.1	1.515	245.7	7.963	4.839	43.46	0.005	0.00158	0.149	0.0005	47.25	0.00207	15.3	0.0277	92
* A Non Detect Multiplie	er of 0.5 has been applied								~~~ (11											

A NON Detect Multiplier of 0.5 has been applied.

6.557 1,626 0.0263 533.1 1.515 245.7 7,963

					Fi	ield						Inorganics						Metals					
				pH (Field)	EC (field)	Dissolved Oxygen	DO % Saturation (Field)	Ammonia as N	BOD	Chloride	GO	Nitrate (as N)	Nitrogen (Total)	Sodium (filtered)	TOC	ISS	Calcium (filtered)	Chromium (III+VI) (filtered)	Iron (filtered)	Lead (filtered)	Nickel (filtered)		
				-	uS/cm	mg/L	%Sat	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
EQL								0.01	2	1	10	0.01	0.1	1	1	5	1	0.001	0.05	0.001	0.001		
ANZECC 2000 FW 99% -	- applicable to CISW2 and	CISW3 only						0.32				4.9						0.00001		0.001	0.008		
ANZECC 2000 Fresh wa	ter Slightly-moderate distu	urbed system						0.9				0.158						0.001		0.0034	0.011		
GHD 2018 Coochiemud	dlo Island wetland			3.53-4.61	90															1			
Morton Bay - Schedule	1 EPP (water) - Wallum/Ta	annin Freshwater		6.5-8	626		85-110	0.02					0.5										
Schedule 1 EPP (water)	- Drinking Water				1,000														0.05				
Site ID	Monitoring Zone	Location Code	Date																				
Coochiemudlo Island	DS	CISW1	12/02/2020	6.45	92.6	3.65	50.3	<0.01	<2	10	36	0.01	0.6	8	13	14	4	0.002	0.69	< 0.001	< 0.001		
																_	_						

		0																			
Coochiemudlo Island	DS	CISW1	12/02/2020	6.45	92.6	3.65	50.3	<0.01	<2	10	36	0.01	0.6	8	13	14	4	0.002	0.69	<0.001	< 0.001
Coochiemudlo Island	BG	CISW2	12/02/2020	5.8	83.8	3.55	40	<0.01	4	11	94	0.02	1.2	10	39	6	2	0.002	0.37	< 0.001	< 0.001
Coochiemudlo Island	BG	CISW3	12/02/2020	5.44	117.2	5.06	78.3	<0.01	3	22	70	<0.01	0.8	14	31	<5	2	0.002	0.31	< 0.001	<0.001
Coochiemudlo Island	BG	CISW4	12/02/2020	6.41	103.1	4.4	48.9	0.01	2	14	29	0.07	0.6		12	9	5	0.002	0.27	<0.001	< 0.001
Coochiemudlo Island	DS	CISW5	12/02/2020	6.14	65.5	4.13	47.6	<0.01	2	10	54	<0.01	0.5	7	11	34	2	0.003	0.74	<0.001	< 0.001
Statistics														ی ک							
Number of Results				5	5	5	5	5	5	5	5	5	\sim	5	5	5	5	5	5	5	5
Number of Detects				5	5	5	5	1	4	5	5	3	()5	5	5	4	5	5	5	0	0
Minimum Concentration				5.44	65.5	3.55	40	0.01	2	10	29	0.01	0.5	7	11	<5	2	0.002	0.27	<0.001	<0.001
Minimum Detect				5.44	65.5	3.55	40	0.01	2	10	29	0.01	0.5	7	11	6	2	0.002	0.27	ND	ND
Maximum Concentration	า			6.45	117.2	5.06	78.3	0.01	4	22	94	0.07	1.2	14	39	34	5	0.003	0.74	<0.001	<0.001
Maximum Detect				6.45	117.2	5.06	78.3	0.01	4	22	94	0.07	1.2	14	39	34	5	0.003	0.74	ND	ND
Average Concentration *	•			6	92	4.2	53	0.006	2.4	13	57	0.022	0.74	10	21	13	3	0.0022	0.48	0.0005	0.0005
Median Concentration *				6.14	92.6	4.13	48.9	0.005	2 <		54	0.01	0.6	10	13	9	2	0.002	0.37	0.0005	0.0005
Standard Deviation *				0.43	20	0.61	15	0.0022	1.1	5.1	26	0.028	0.28	2.7	13	12	1.4	0.00045	0.22	0	0
95% UCL (Student's-t) *				6.456	111.1	4.742	67.02	0.00813	3,487	18.24	81.69	0.0482	1.006	12.61	33.53	24.94	4.348	0.00263	0.687	0.0005	0.0005
* A Non Detect Multiplier	r of 0.5 has l	been applied			•	•	•	n1				•		•		•		•		-	

A Non Detect Multiplier of 0.5 has been applied

6.456 <u>111.1</u> 4.742 67.02 <u>0.00813</u> 3.487 <u>18.24</u> 81.69

		Inorganic
	Bg Zinc (filtered)	Bulfate as SO4 - MT Turbidimetric (filtered)
		1
EQL	0.005	1
ANZECC 2000 FW 99% - applicable to CISW2 and CISW3 only	0.0024	
ANZECC 2000 Fresh water Slightly-moderate disturbed system	0.008	
GHD 2018 Coochiemudlo Island wetland		
Morton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater		
Schedule 1 EPP (water) - Drinking Water		

Site ID	Monitoring Zone	Location Code	Date		
Coochiemudlo Island	DS	CISW1	12/02/2020	0.008	<1
Coochiemudlo Island	BG	CISW2	12/02/2020	0.007	<1
Coochiemudlo Island	BG	CISW3	12/02/2020	<0.005	6
Coochiemudlo Island	BG	CISW4	12/02/2020	0.022	5
Coochiemudlo Island	DS	CISW5	12/02/2020	0.007	<1
Statistics				-	
Number of Results				5	5
Number of Detects	4	2			
Minimum Concentration				<0.005	<1
Minimum Detect				0.007	5
Maximum Concentration	1			0.022	6
Maximum Detect				0.022	6
Average Concentration *	:			0.0093	2.5
Median Concentration *				0.007	0.5
Standard Deviation *				0.0074	2.8
95% UCL (Student's-t) *				0.0164	5.133

* A Non Detect Multiplier of 0.5 has been applied.

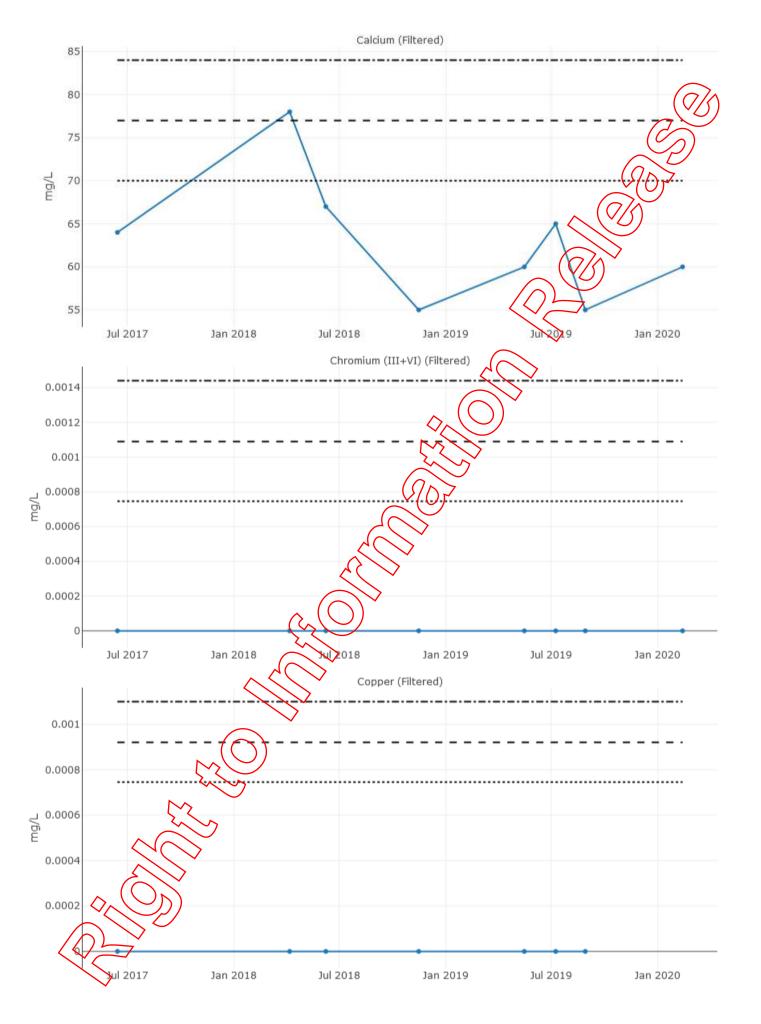




Appendix C. **Groundwater Statistical Charts** 6 April 2020 Appendix C

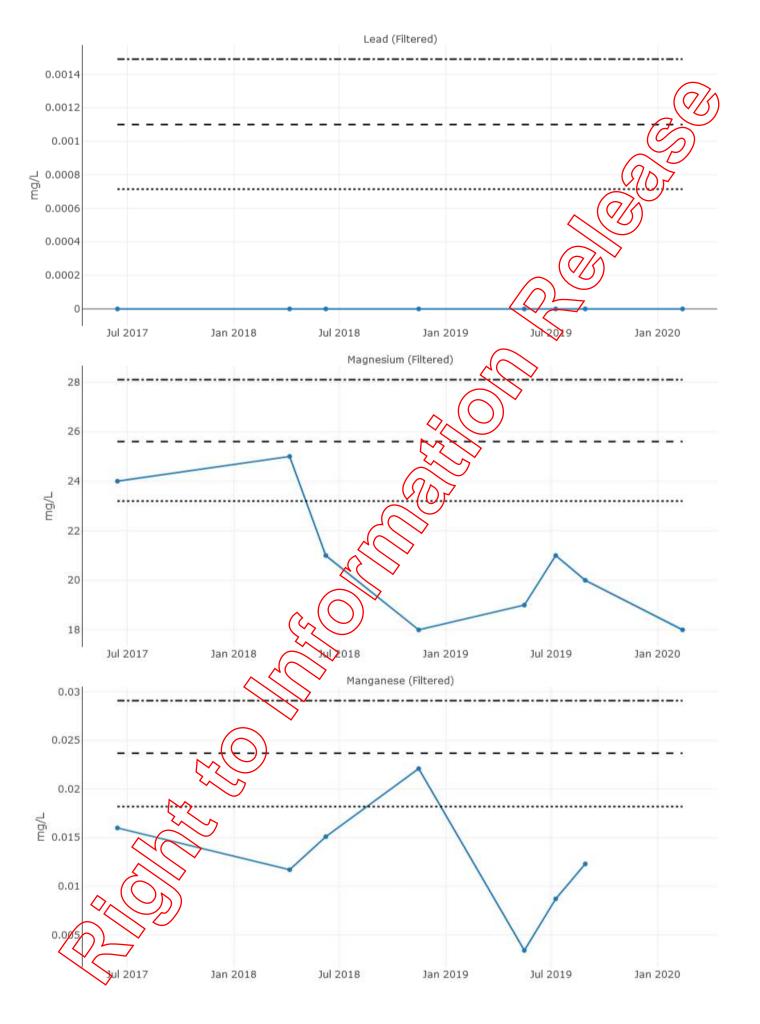


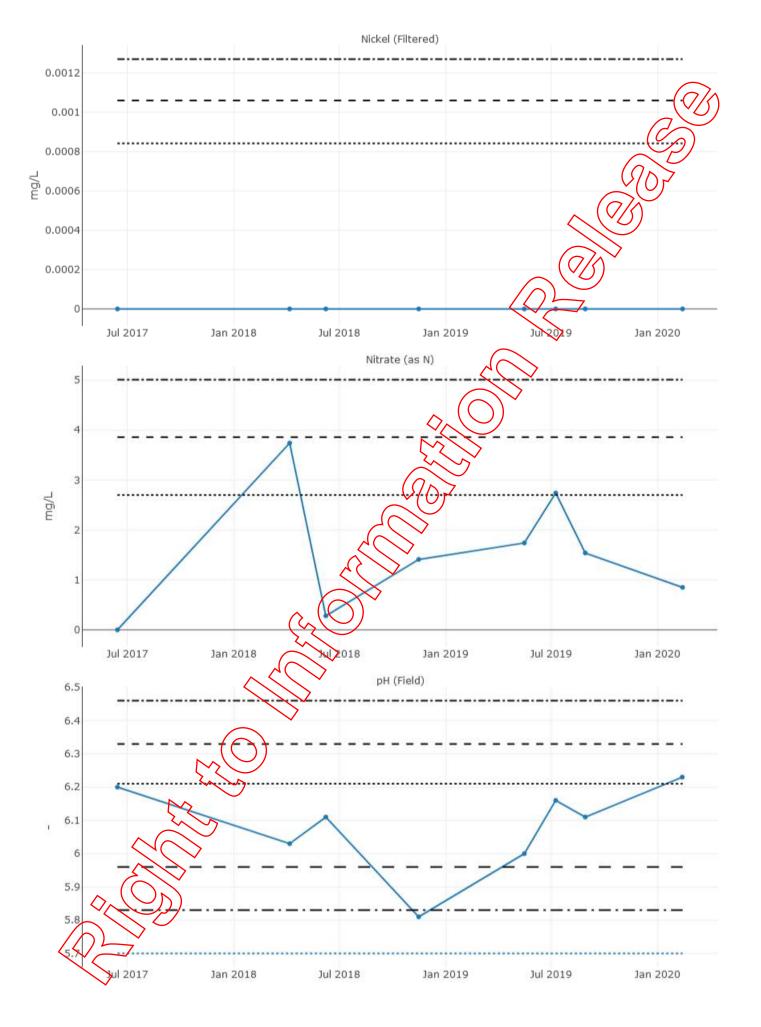
Chemistry Graph

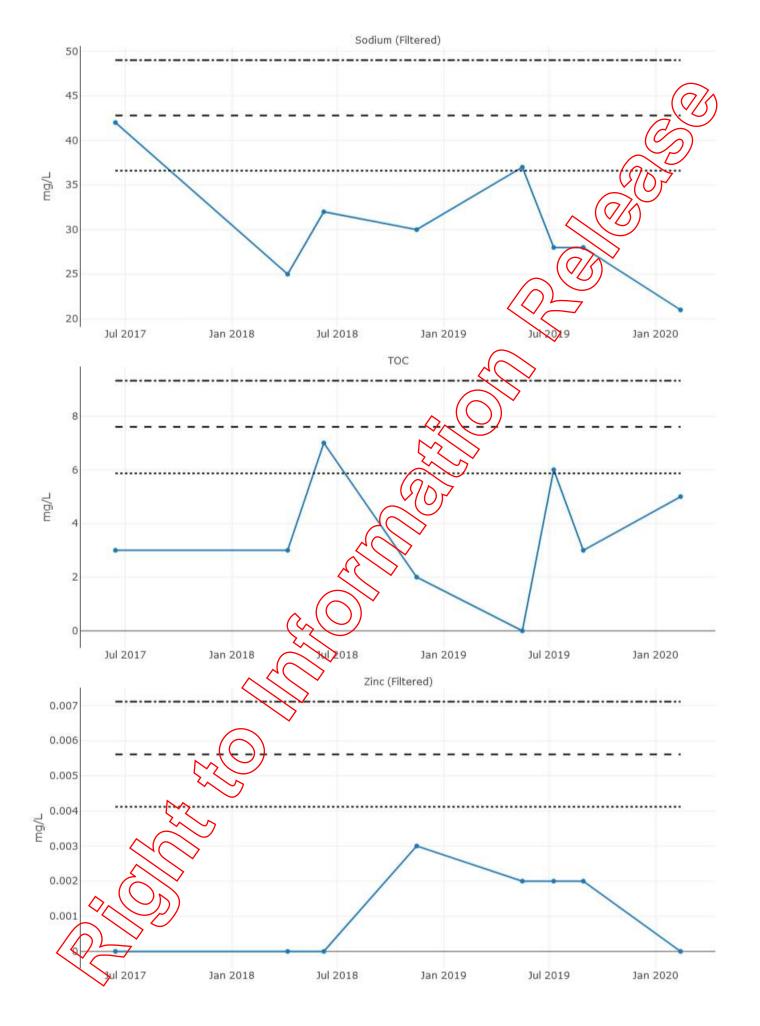




Page 44 of 254 6/04/2020, 1:42 pm







Page 47 of 254 6/04/2020, 1:42 pm

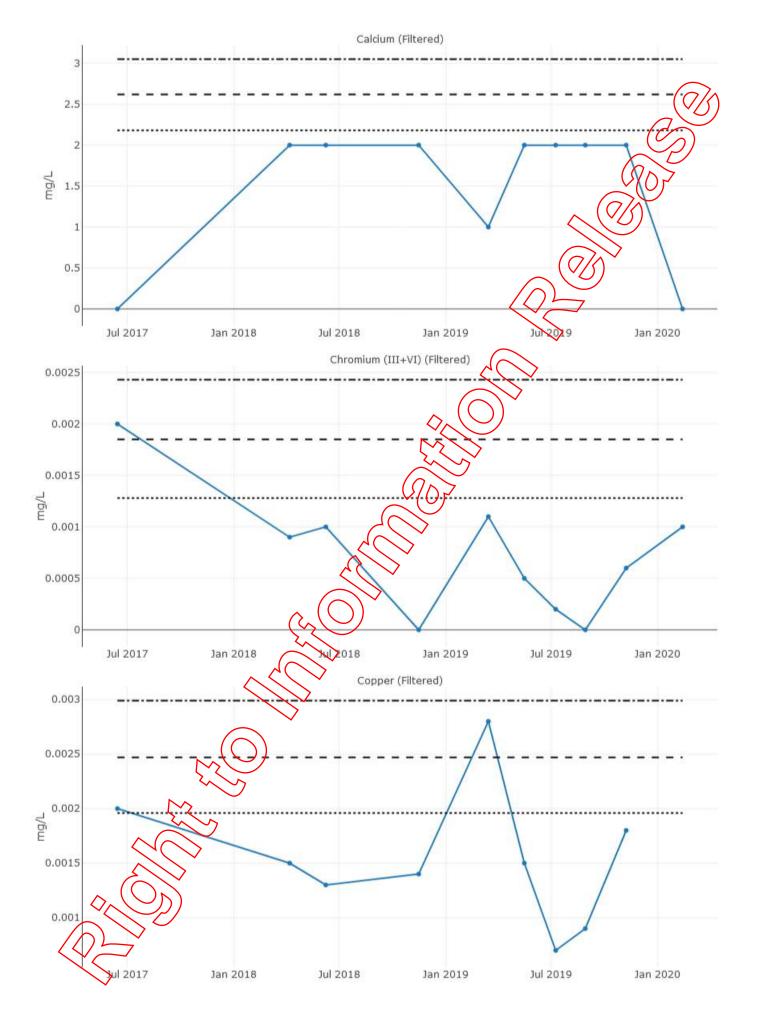
Publication Date: 06 Apr 2020

Well ID: GW1

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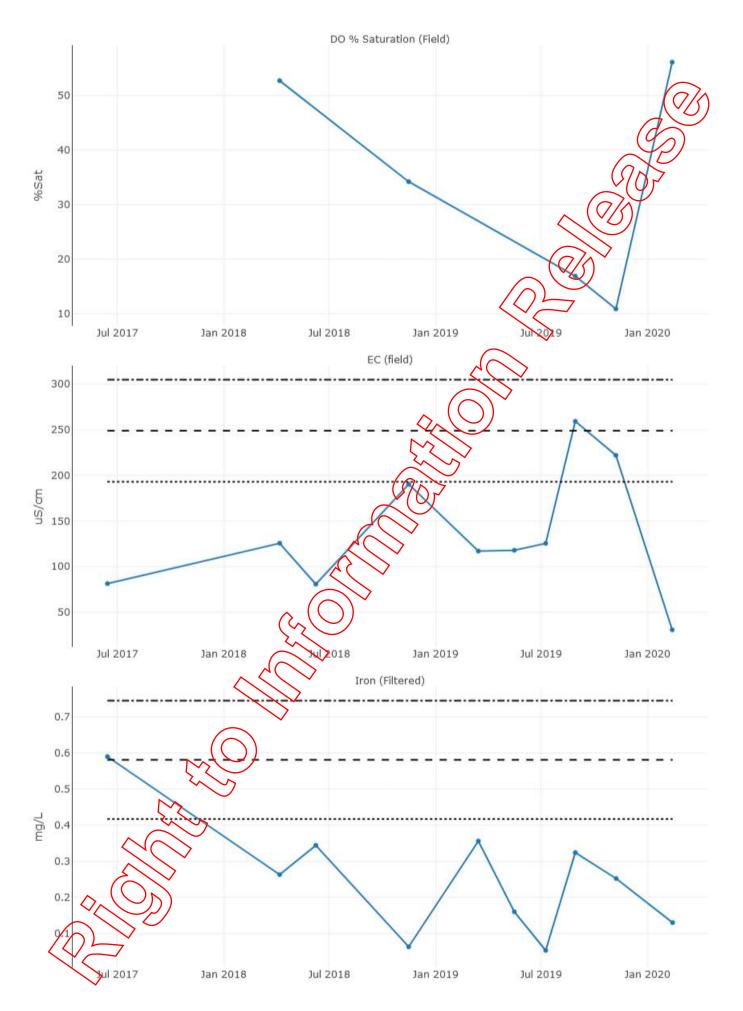


Chemistry Graph

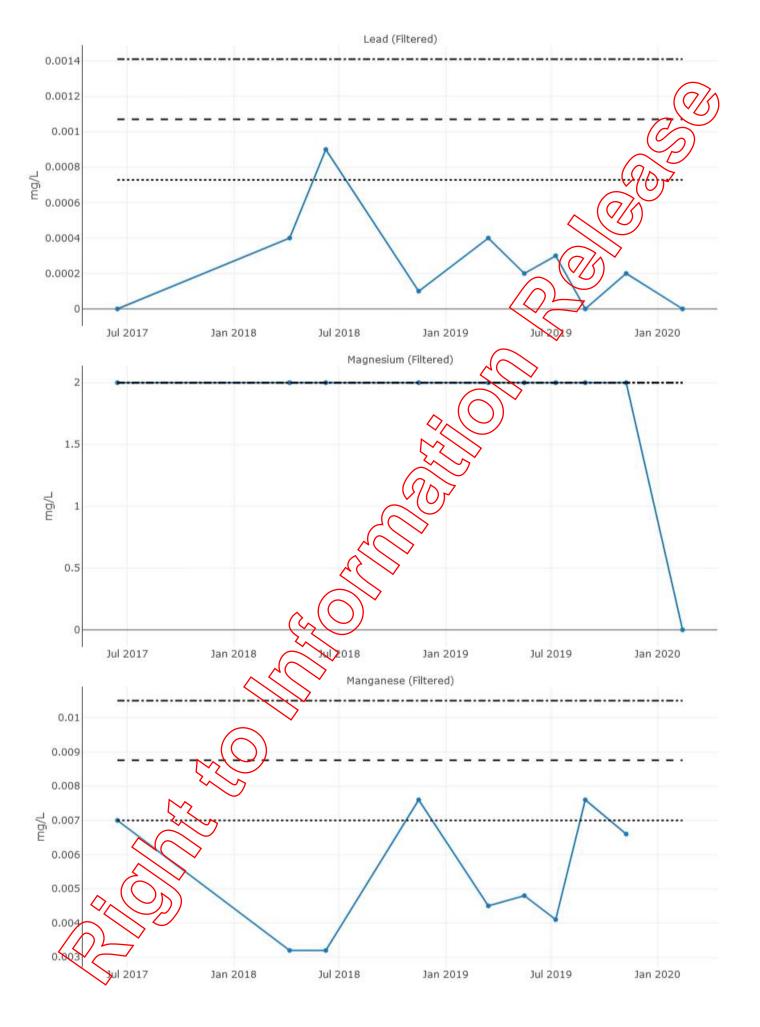


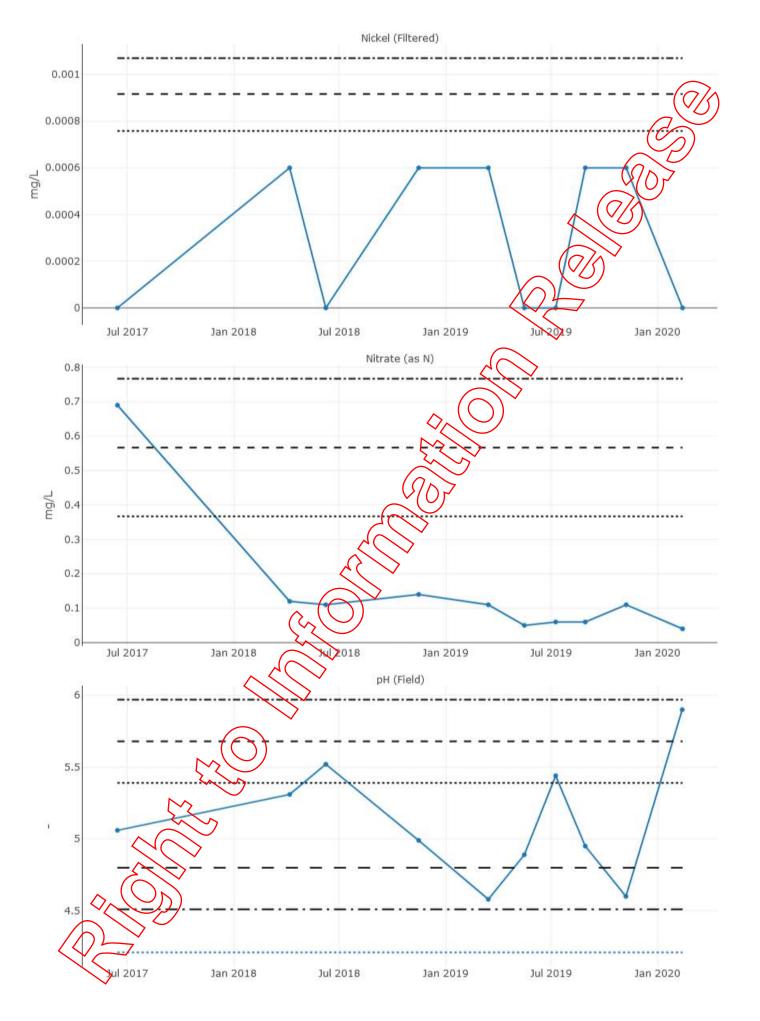
ESdat - Reports: Chemistry Graph

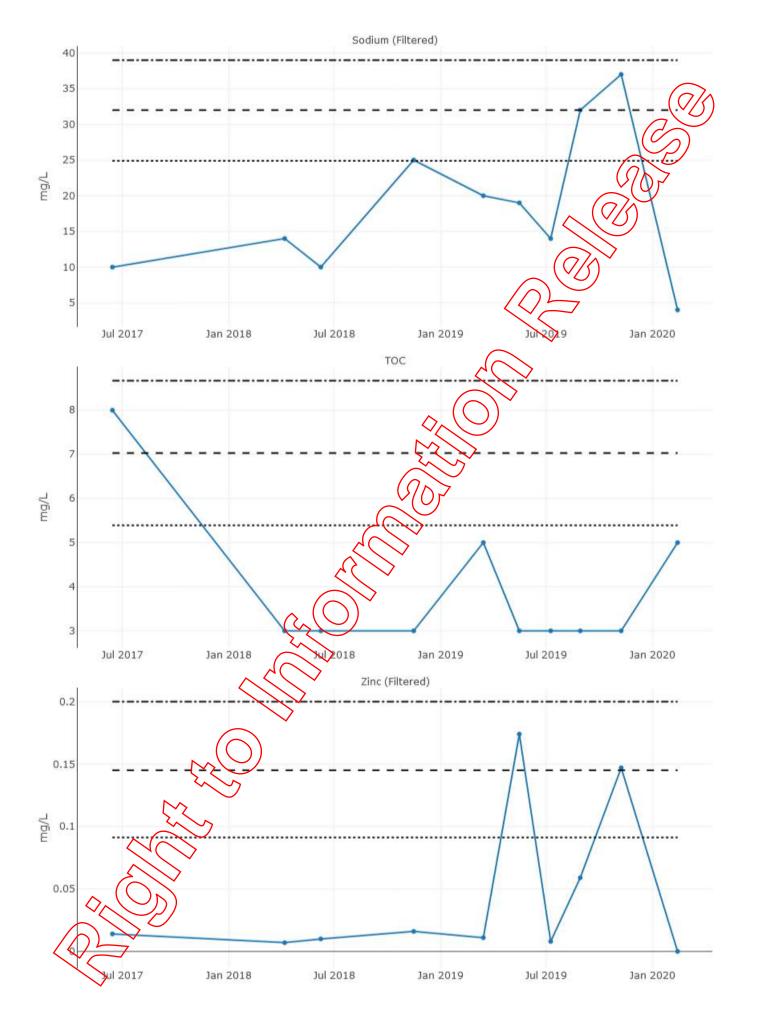
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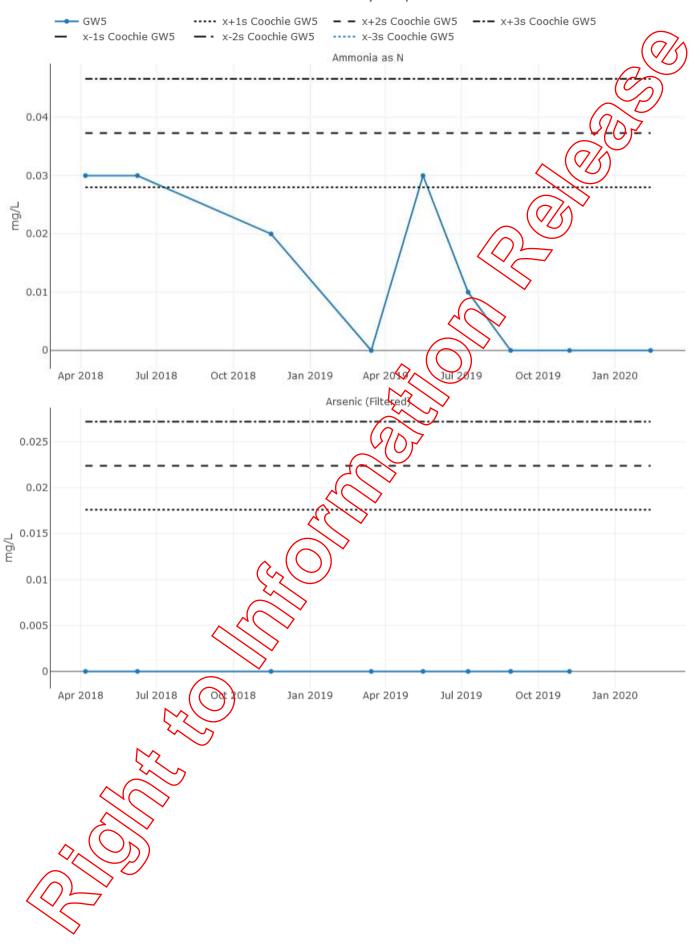
Page 51 of 254 6/04/2020, 1:44 pm



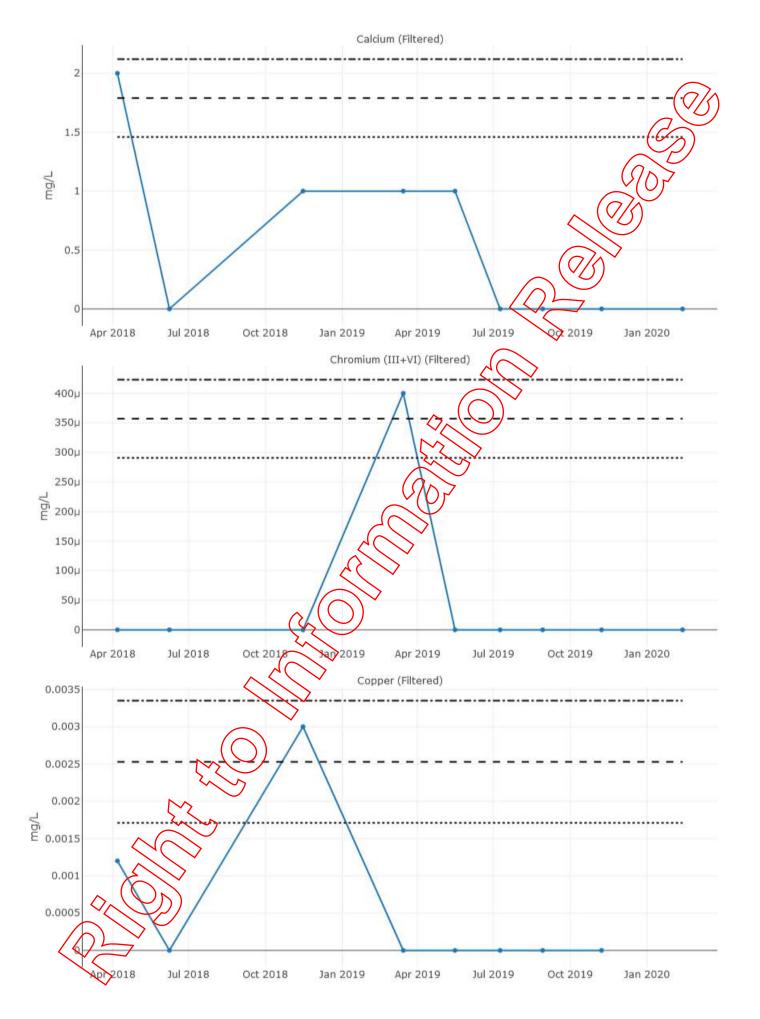


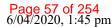


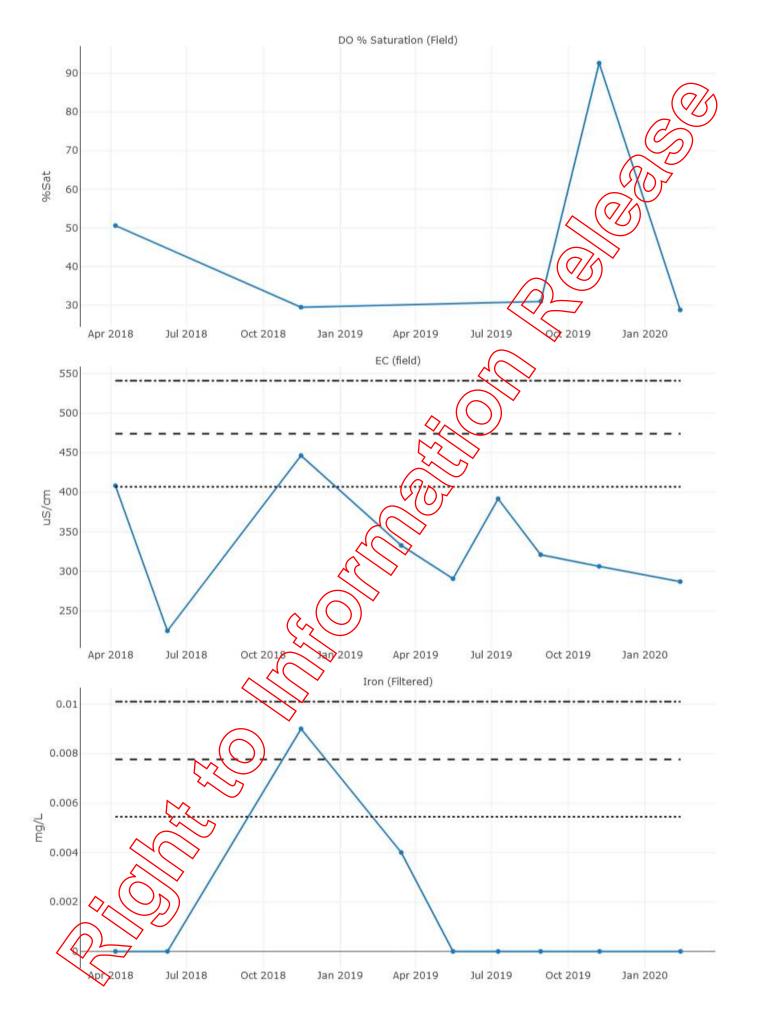
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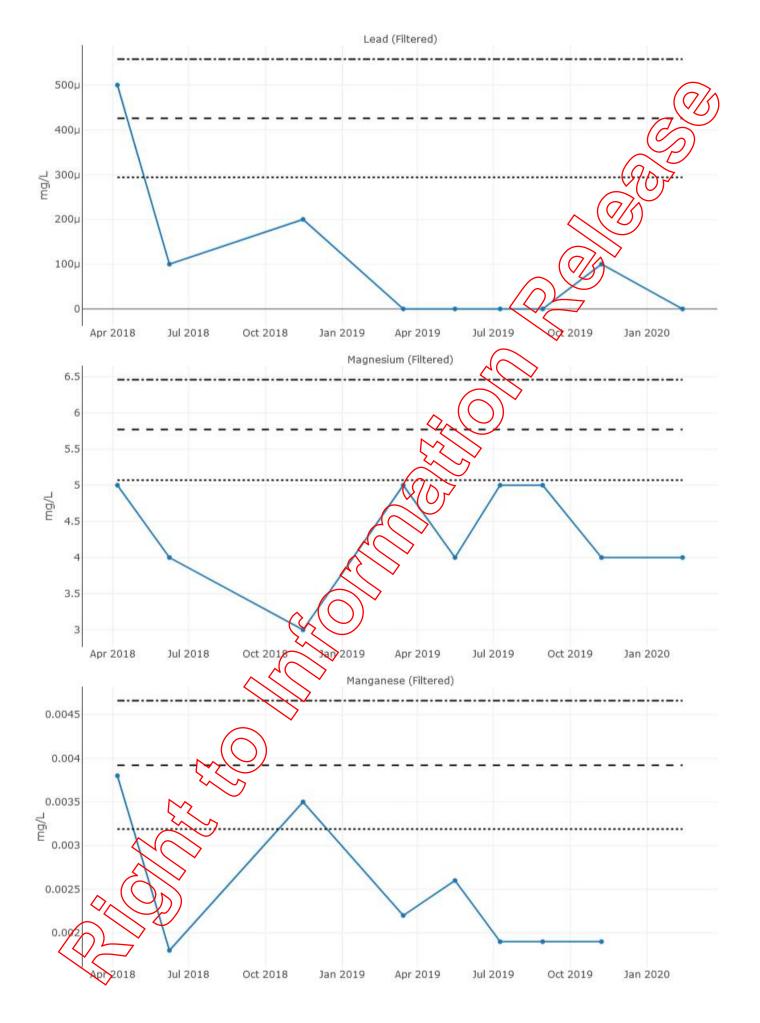


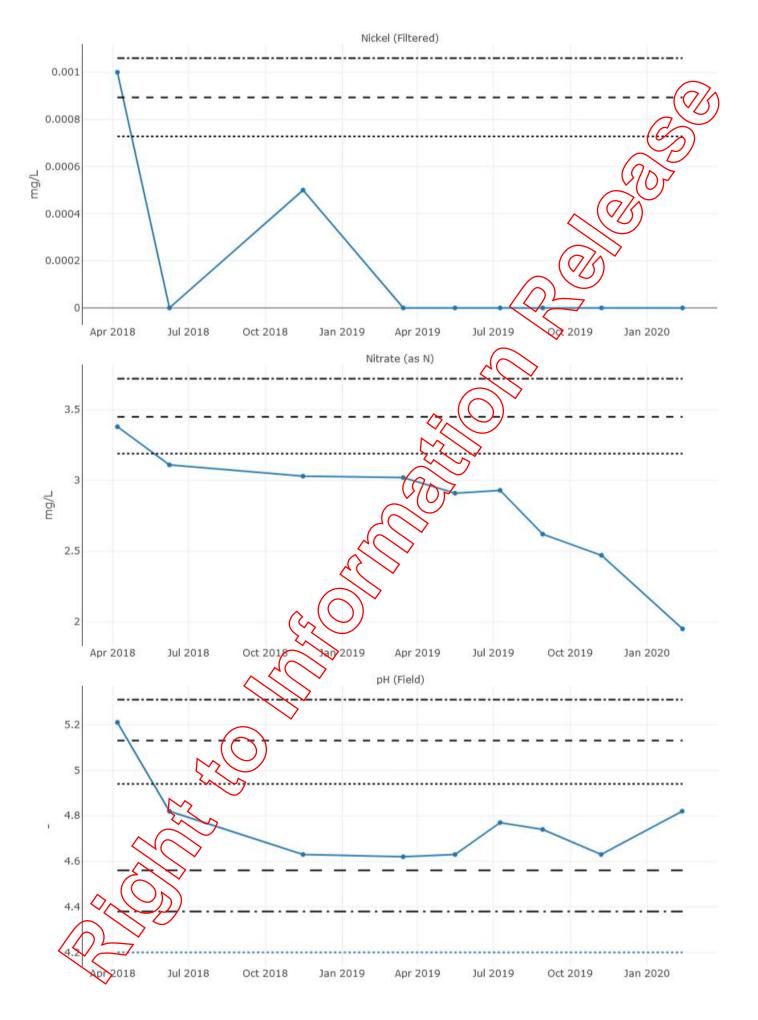
Chemistry Graph

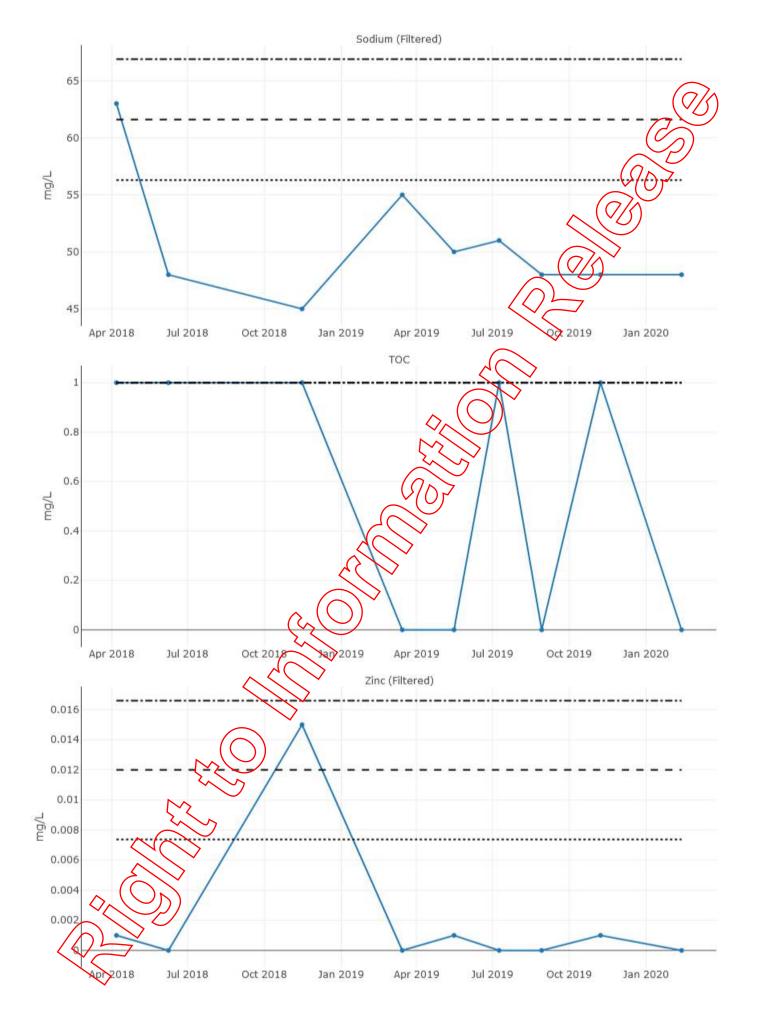








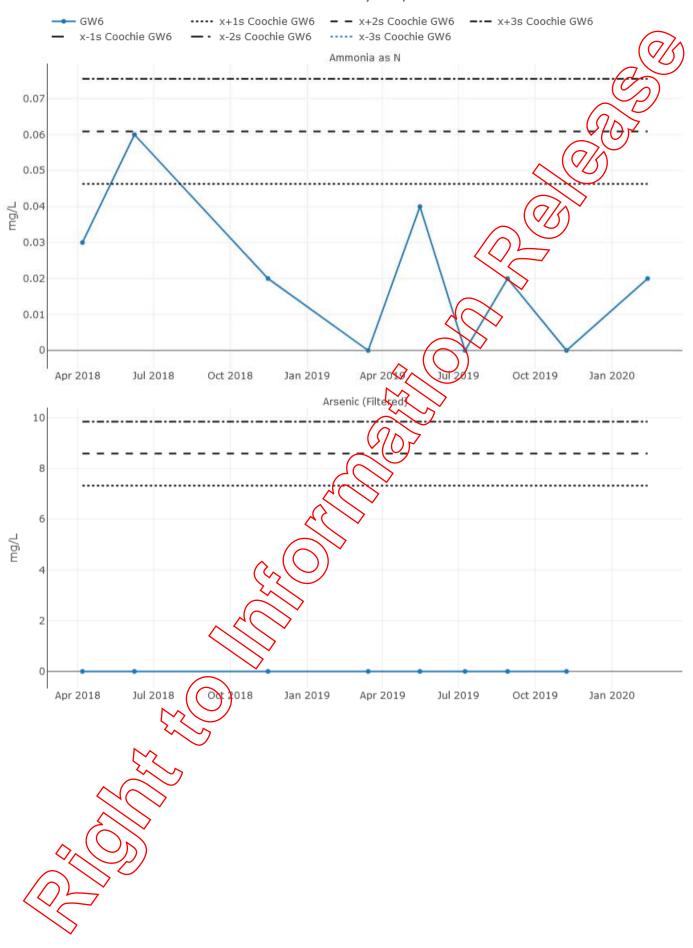




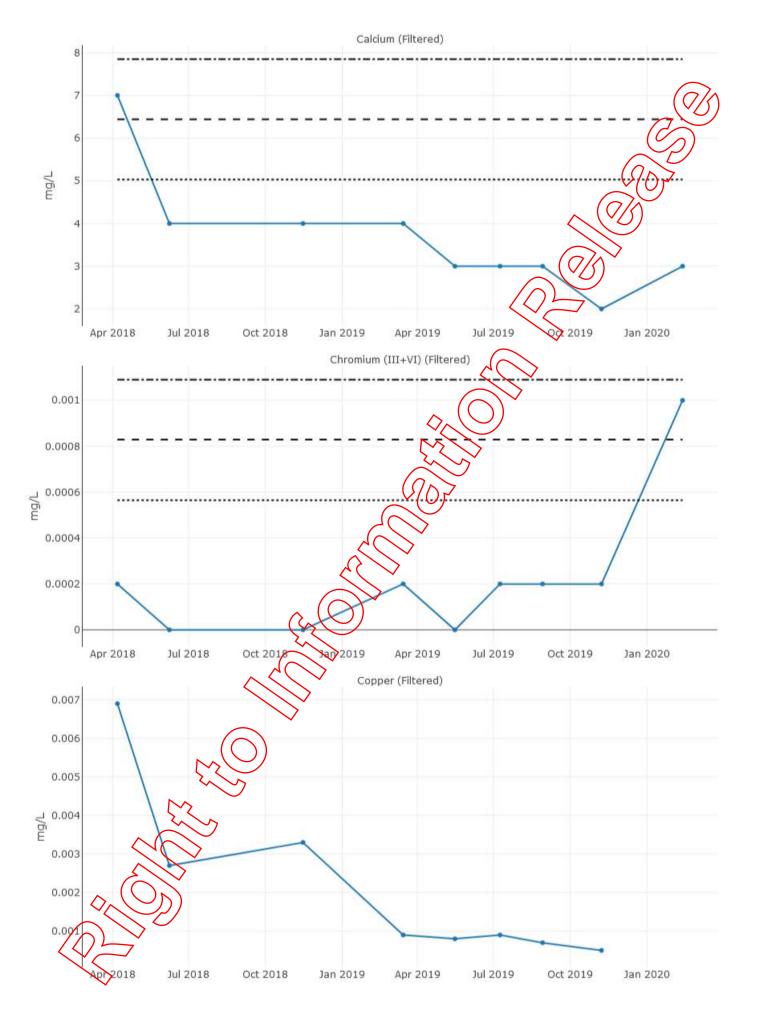
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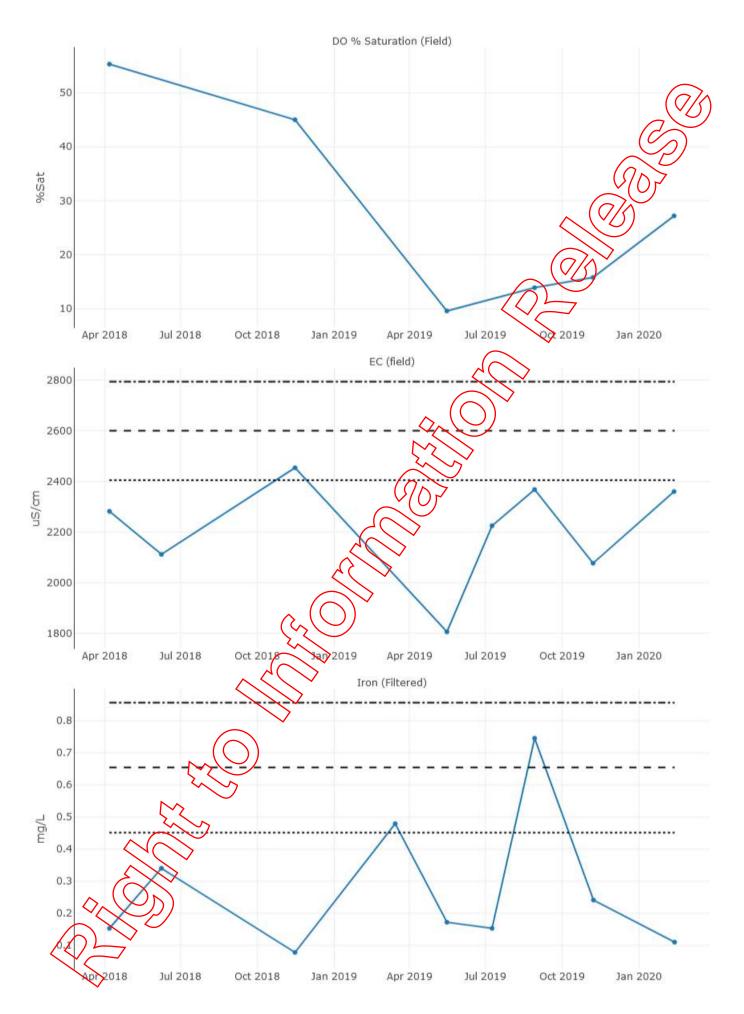
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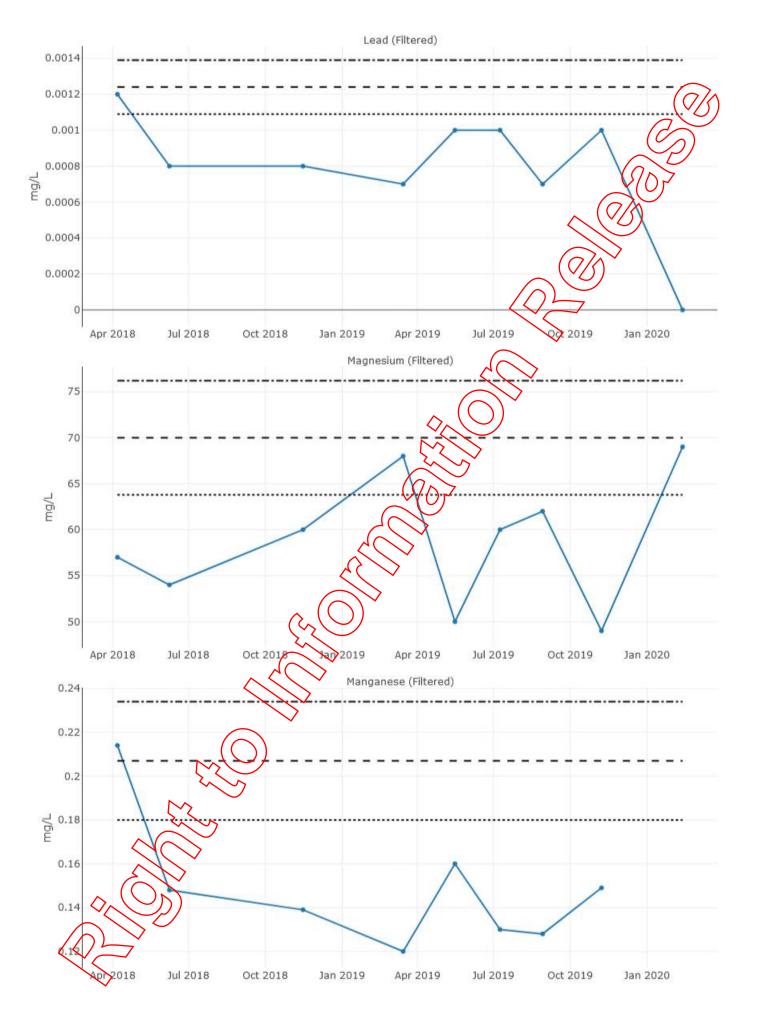
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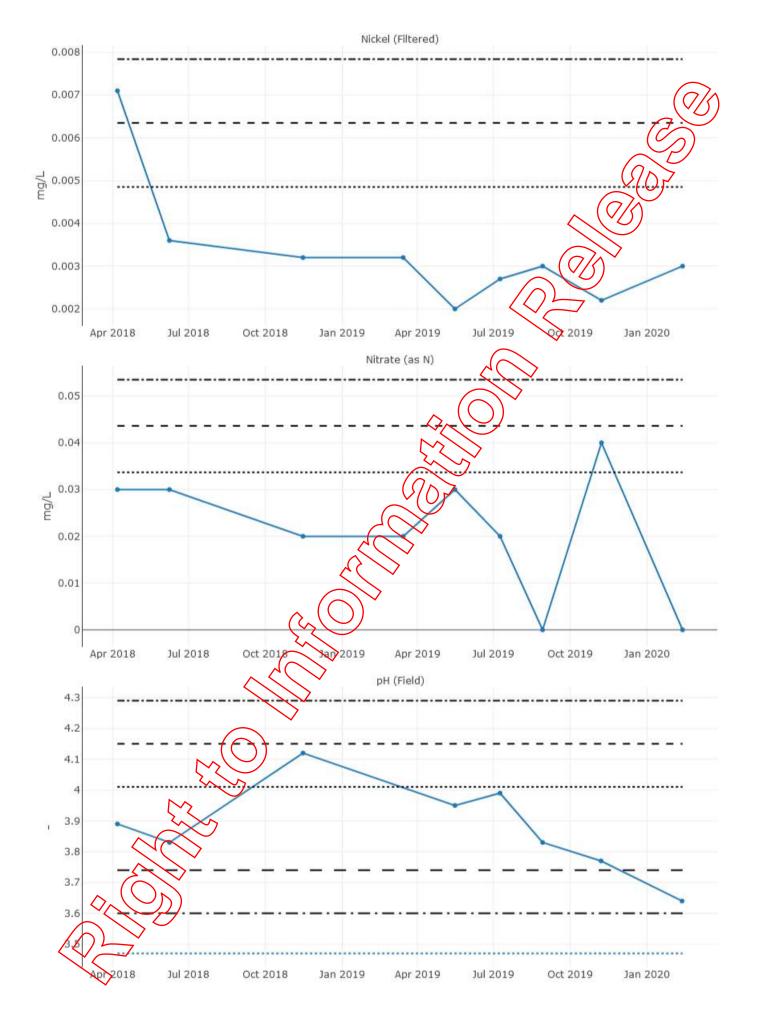


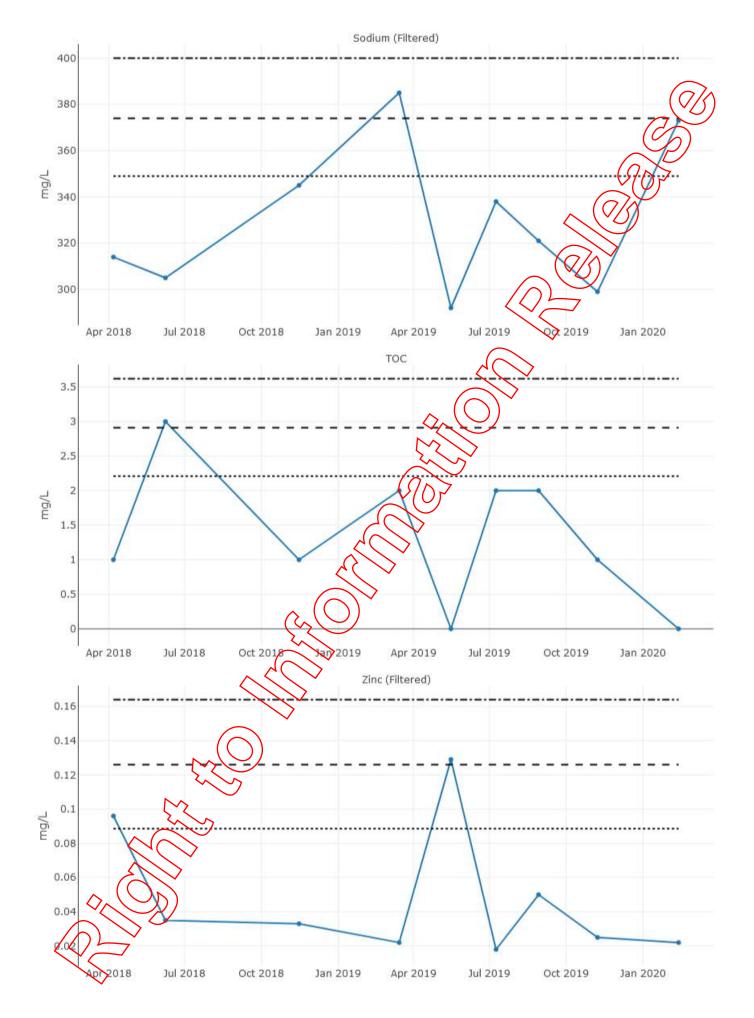
Chemistry Graph











Publication Date: 06 Apr 2020

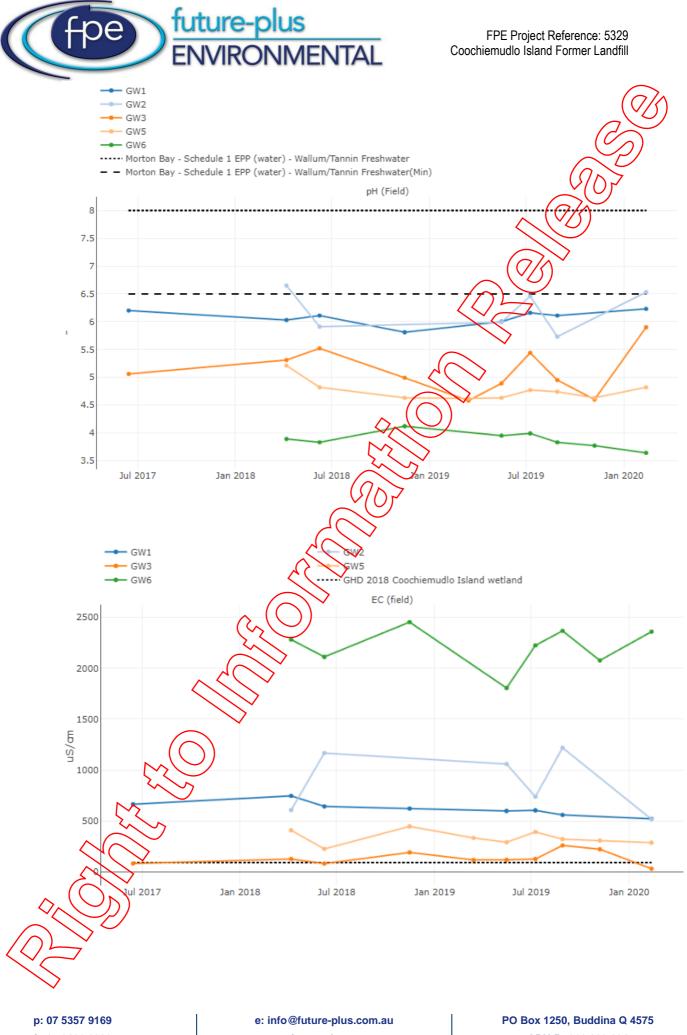
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> Page 69 of 254 6/04/2020, 1:46 pm



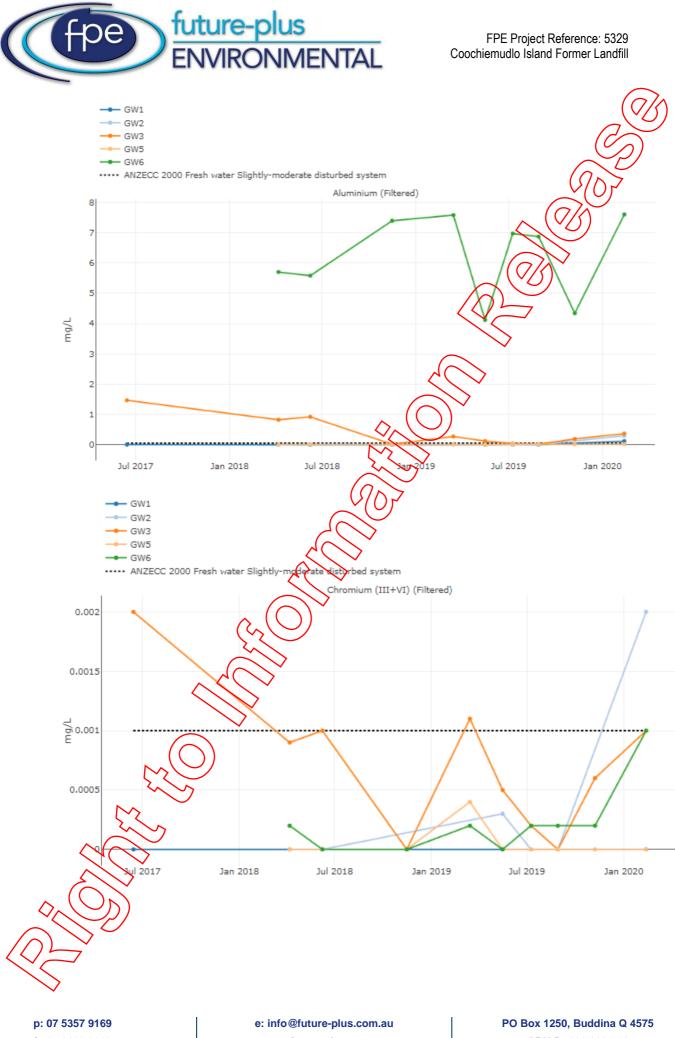
Appendix D. **Groundwater Graphs** 6 April 2020 Coochiemudlo Island Former Landfill -Appendix D



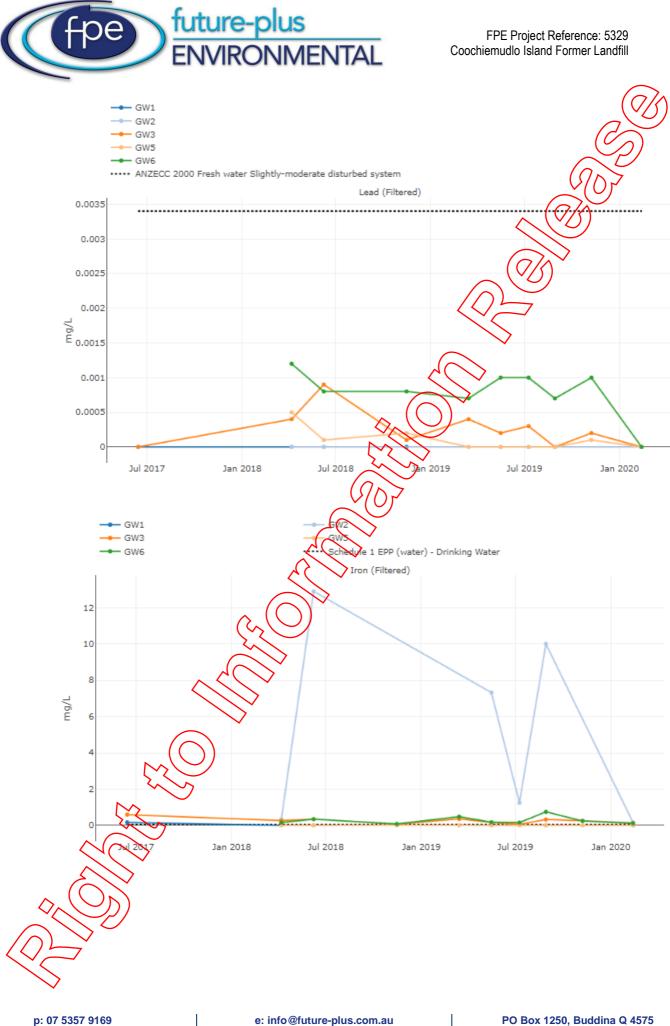
f: 07 3102 9399

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ABN 57 626 889 094



ABN 57 626 889 094

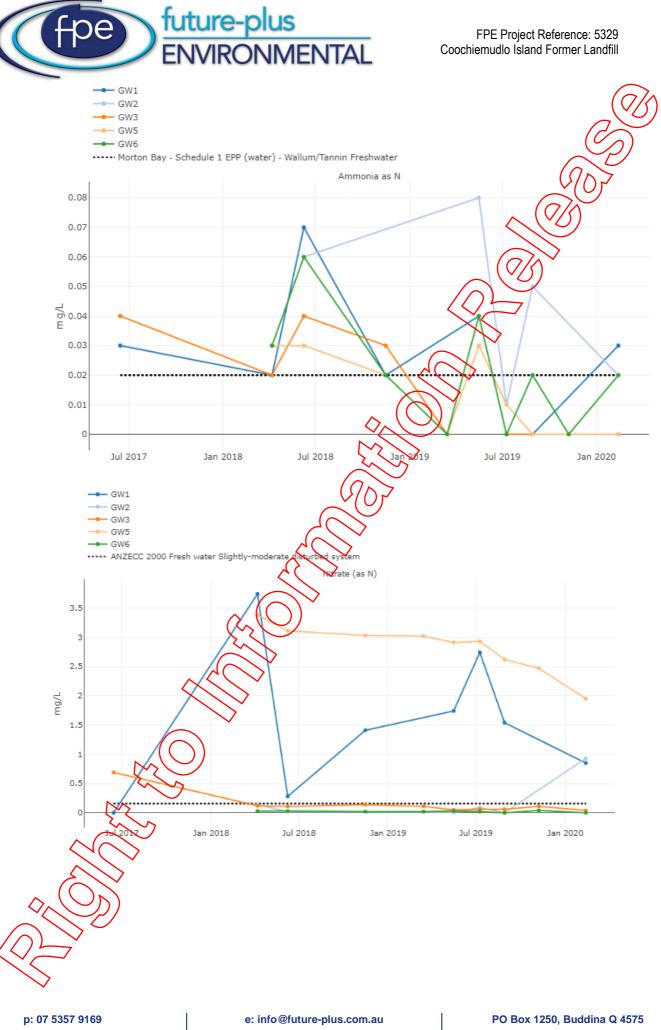


e: info@future-plus.com.au www.future-plus.com.au PO Box 1250, Buddina Q 4575 ABN 57 626 889 094

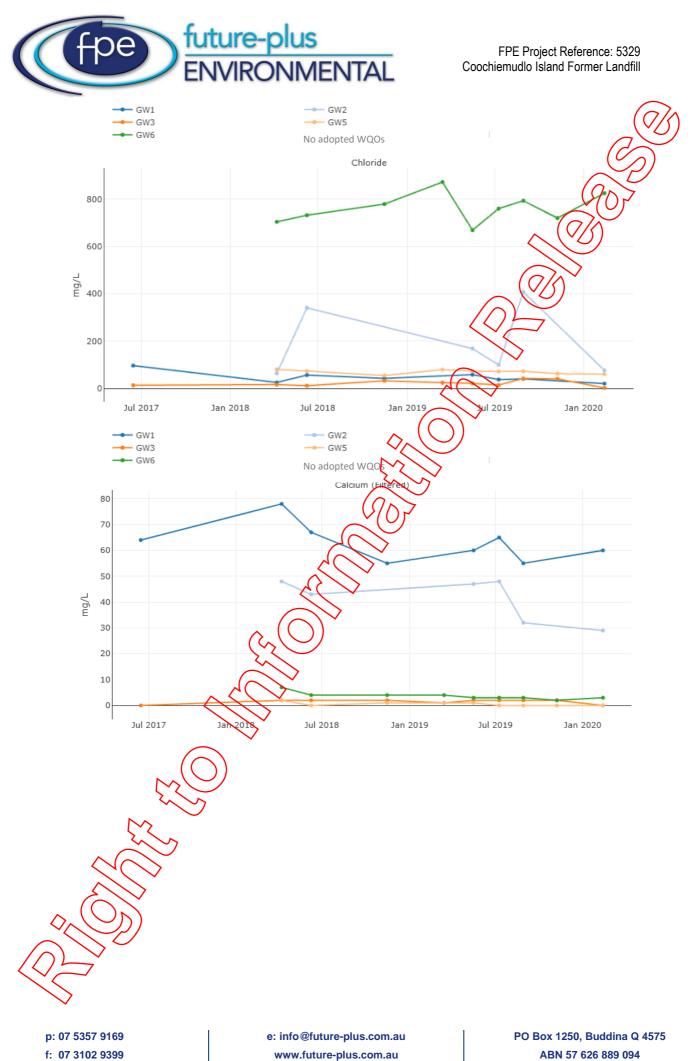


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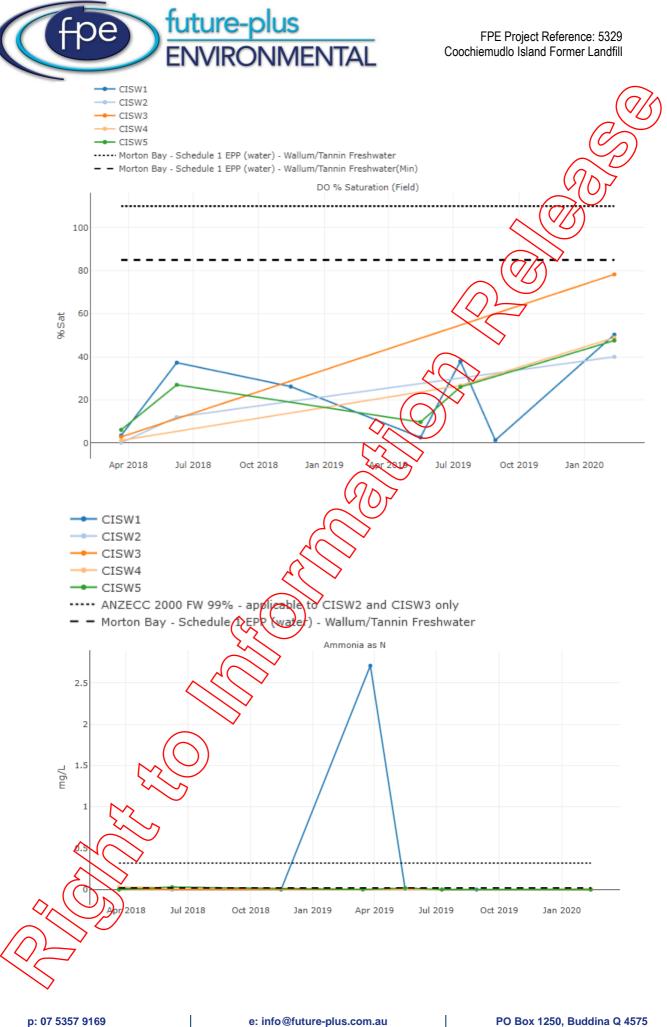


Appendix E. Surface Water Graphs 6 April 2020 Coochiemudlo Island Former Landfill -Appendix E



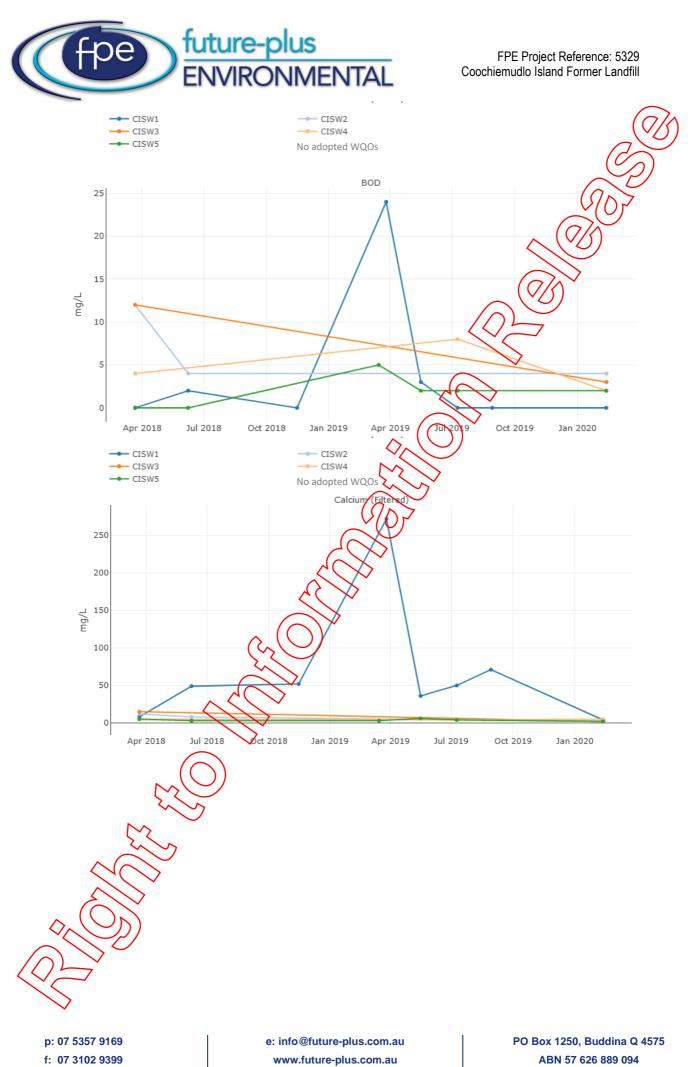
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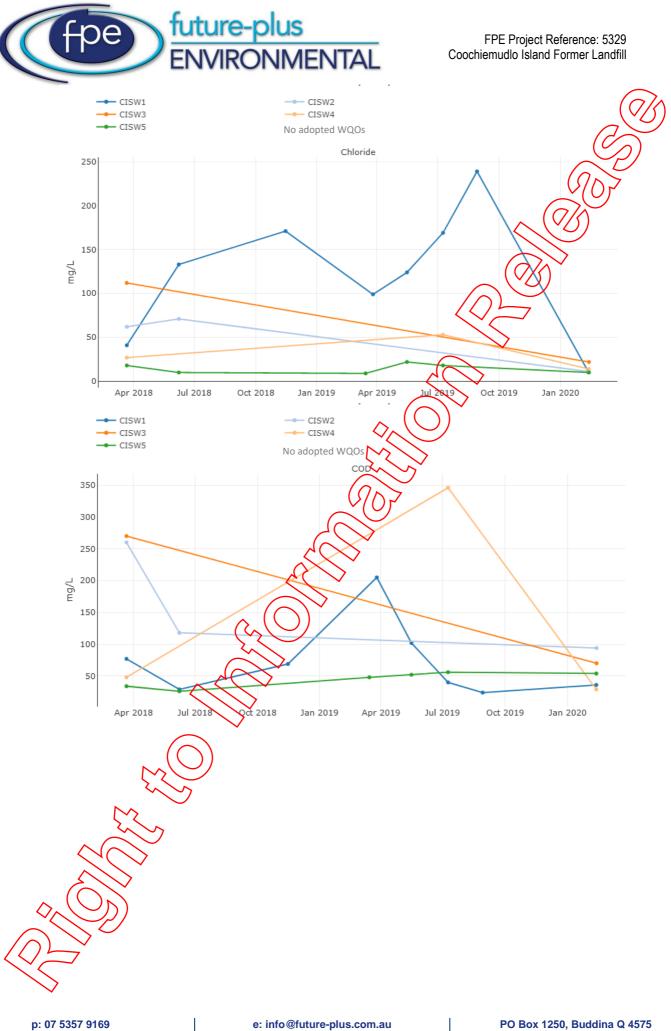


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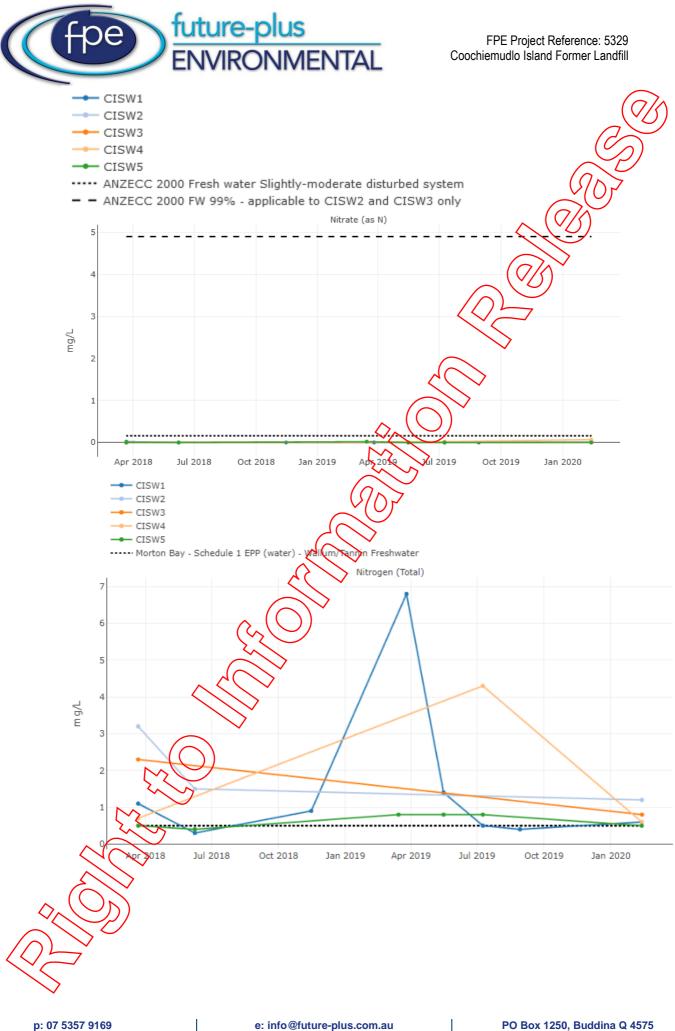


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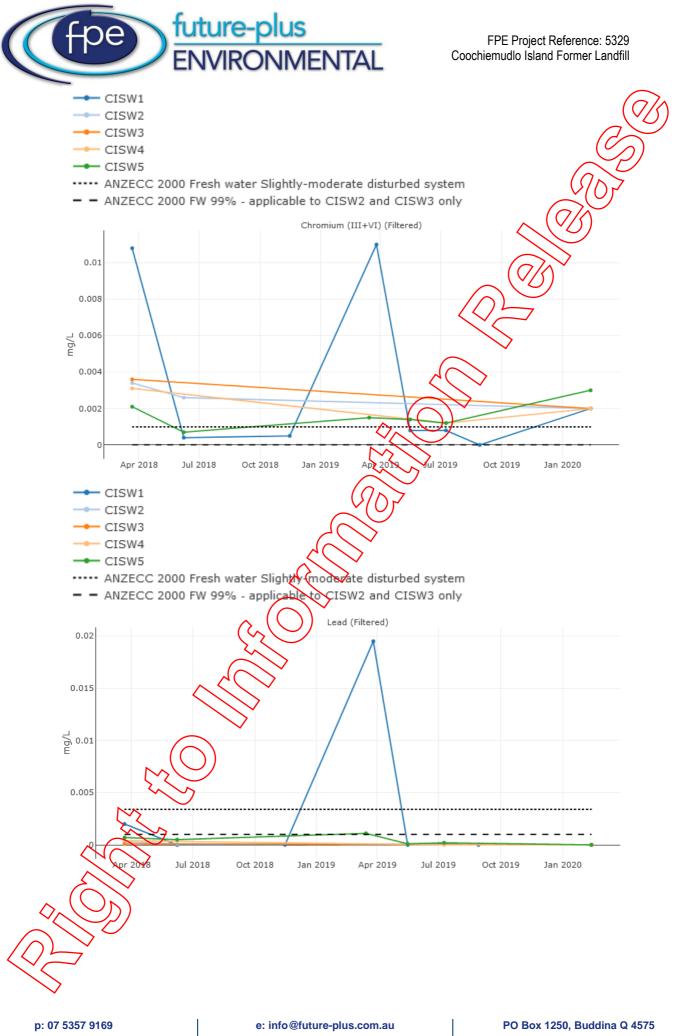
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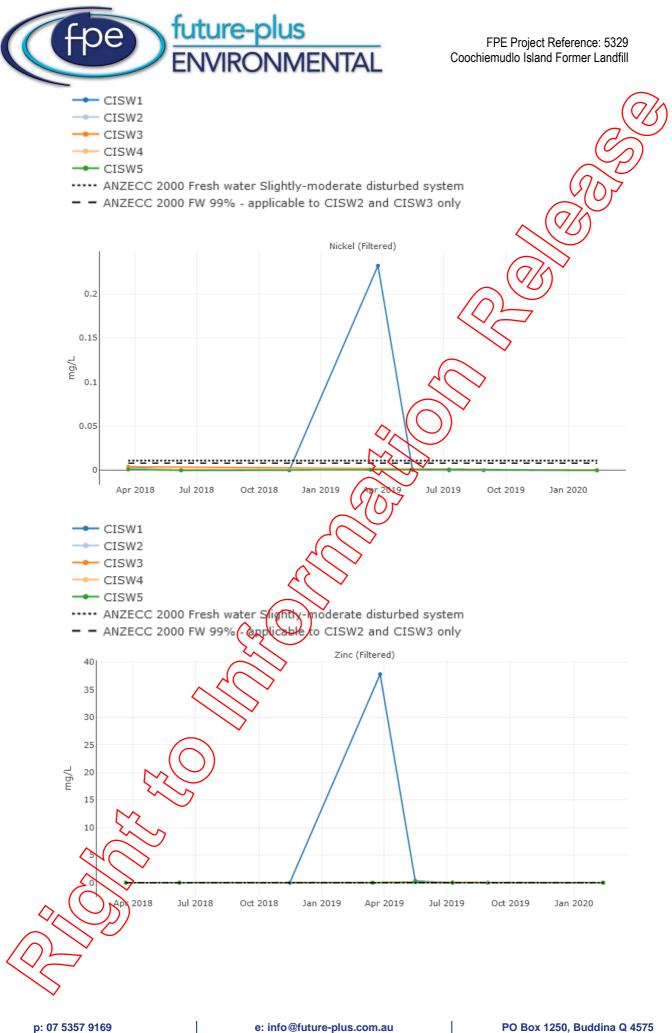


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Appendix F. Laboratory Analysis Results and QA/QC Reports 6 April 2020 Coochiemudlo Island Former Landfill -Appendix F

Quarterly Report (Quarter 1, 2020) Redland City Council Landfill Environmental Monitoring Program Elizabeth Street, Coochiemudlo Island





work order EB2003894 Client EVUTURE-PLUS ENVIRONMENTAL Contact Laboratory Environmental Division Brisbar John Pickering Address E PO BOX 1250 Address 2 Byth Street Stafford OLF Program BUDDINA OLD, AUSTRALIA 4575 Gontact John Pickering Email E Heid 17 5552 8629 Facsimile : 61 07 54502686 Facsimile : 61 7 3552 8629 Facsimile : 61 07 54502686 Facsimile : 61 7 3552 8629 Forgiet : 5329 Rediands Page : 1 0 r 3 Order number : 8255 Oute number : B03 01000 Hevelophov235/18 B V7) CO-C number : 8255 Oute number : B23 0 PC 2020 Date Samples Received : 13-Feb-2020 Scheduled Reporterston : 20-Feb-2020 Date Samples Received : 13-Feb-2020 Scheduled Reporterston : 20-Feb-2020 Date Samples Received : 13-Feb-2020 Scheduled Reporterston : 13-Feb-2020 Date Samples Received : 13-Feb-2020 Scheduled Reporterston : 13-Feb-2020 Date Samples Received : 13-Feb-2020 Scheduled Reporterston : 14'-3, 3.1'C - Ice present <t< th=""><th></th><th>SAMPLE RECEIP</th><th>NOTIFICA</th><th></th></t<>		SAMPLE RECEIP	NOTIFICA	
Contact : NICHOLAS EVANS Address : PO BOX 1250 BAT Contact : John Pickering Address : PO BOX 1250 BUDDINA OLD, AUSTRALIA 4575 400000 Contact : 2 Byth Street Stafford OLD Notratia 4053 400000 Contact : 2 Byth Street Stafford OLD Notratia 40000 Contact : 2 Byth Street Stafford OLD Notratia 40000 Contact : 2 Byth Street Stafford OLD Notratia 40000 Contact : 2 Byth Street Stafford OLD Notratia 40000 Contact : 10000 Contact : 2 Byth Street Stafford OLD Notratia 40000 Contact : 10000 Contact : 2 Byth Street Stafford OLD Notratia 40000 Contact : 10000 Contact : 10000 Contact : 2 Byth Street Stafford OLD Notratia 40000 Contact : 10000 Contact : 100000 Contact : 10000 Contact : 10000 Contact : 10000 Contact : 10000 Co	Work Order :	EB2003894		
 Telephone :: +61 07 54502688 Telephone :: +61 07 54502688 Tracismile :: +61 07 54502688 Facsimile :: +61 7 3552 860 Facsimile :: NEPN 2018 8344 S QC Standard Ochoin number :: EB2019EUPE005181/235/18 B V7) QC Level :: NEPN 2018 83 44 S QC Standard Date Samples Received :: 13-Feb-2020 10:15 Issue Date :: NEPN 2018 83 44 S QC Standard Chirery Details Adde of Delivery :: Carrier Security Vert :: 14', 3.1'C - Ice present No Campet Faceived / analysed :: 13 / 13 General Comments • Summary of Sample(s) and Requested Analysis Proactive Holding Time Report Requested Deliverates Please be advised, in the absence of a metals container submitted as being indicated as field fiftered, ALS has assumed these samples as fillered in-line with the analysis requested. If this is incorrect, please contact client services the Storius protocols 1 weeks for contact with for analysis. Please be advised, in the absence of a metals container submitted as being indicated as field fiftered ALS has assumed these samples as fillered in-line with the analysis requested. If this is incorrect, please contact client services the Storius protocols 1 weeks for contact with for receipt of samples. Analysis will	Contact :	NICHOLAS EVANS PO BOX 1250	Contact	: John Pickering : 2 Byth Street Stafford QLD Apstralia
Order number ::::::::::::::::::::::::::::::::::::	Telephone :		Telephone	
Date Samples Received 13-Feb-2020 10:15 Issue Date 13-Feb-2020 Client Requested Due 20-Feb-2020 Scheduled Reporting Pain 13-Feb-2020 Date Scheduled Reporting Pain 13-Feb-2020 Delivery Details Scheduled Reporting Pain 10-Feb-2020 Wole of Delivery Carrier Security Feel Intact. No. of coolers/boxes 2 Temperature 1.4°, 3.1°C - Ice present No. of coolers/boxes 2 Intact. Intact. Receipt Detail MEDIUM ESKY Nordsander veceived / analysed I 3 / 13 General Comments • Summary of Sample(s) and Requested Analysis Intact. I 3 / 13 • Proactive Holding Time Report . Nordsander veceived / analysed I 3 / 13 • Please be advised, in the absence of a metals container submitted as being indicated as field filtered, ALS has assumed these samples as filtered in-line with the analysis requested. If this is incorrect, please contact client services at ALSEnviro. Brisbane@alsglobal.com • Discounted Package Prices apply only when specific AL Group Codes (W, 'S', 'NT suites) are referenced on COCs. • Please direct any turn around / technigat quents to the reboratory contact designated above. </td <td>CrOrC number : CrOrC number : Site : Sampler :</td> <td>8255 Coochiemudlo Is Closed LF -1 KAINE PRITCHARD, NICHOLAS</td> <td>Quote number</td> <td>: EB2019FUPE0003 (BN/235/18 B V7)</td>	CrOrC number : CrOrC number : Site : Sampler :	8255 Coochiemudlo Is Closed LF -1 KAINE PRITCHARD, NICHOLAS	Quote number	: EB2019FUPE0003 (BN/235/18 B V7)
 Adde of Delivery : Carrier Security Sec	Date Samples Received Client Requested Due			
 This report contains the following information: Sample Container(s)/Preservation Non-Compliances Summary of Sample(s) and Requested Analysis Proactive Holding Time Report Requested Deliverables Please be advised, in the absence of a metals container submitted as being indicated as field filtered, ALS has assumed these samples as filtered in-line with the analysis requested. If this is incorrect, please contact client services at ALSEnviro.Brisbane@alsglobal.com Discounted Package Prices apply only when practific ALS Group Codes ('W', 'S', 'NT' suites) are referenced on COCs. Please direct any turn around / technical queries to the aboratory contact designated above. Sample Disposal - Aqueous (3 weeks), Soid (2 months ± 1 week) from receipt of samples. Analysis will be conducted by ALS Environmental. Brisbane, NATA accreditation no. 825, Site No. 818 (Micro site no. 18958). Breaches in recommended extraction / analysis holding times (if any) are displayed overleaf in the Proactive Holding Time Report table. Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken interporting results. Refer to ALS EnviroMail 85 for ALS	Mode of Delivery No. of coolers/boxes	: 2	Temperature	: 1.4°, 3.1°C - Ice present
	 Sample Contain Summary of Sar Proactive Holdin Requested Deliv Please be advise filtered, ALS has incorrect, please Discounted Package Please direct any turn Sample Disposal - Ac Analysis will be cond Breaches in reco the Proactive Ho Please be aware that analysis, and less that temperature, it should 	er(s)/Preservation Non-Compliances mple(s) and Requested Analysis ng Time Report verables ed, in the absence of a metals cont s assumed these samples as filtere e contact client services at ALSEN Prices apply only when specific ALS Group C n around / technical queries to the aboratory of queous (3 weeks), Solid (2 months ± 1 week) ucted by ALS Environmental, Brisbane, NATA ommended extraction / analysis ho olding Time Report table. t APHA/NEPM recommends water and soil sa an or equal to 10°C but unfrozen for Microbiolo d be taken into sonsideration when interpretin	ed in-line with the and viro.Brisbane@alsg Codes ('W', 'S', 'NT' suites contact designated above from receipt of samples. A accreditation no. 825, S blding times (if any) amples be chilled to less the ogical analysis. Where sa g results. Refer to ALS E	nalysis requested. If this is lobal.com a) are referenced on COCs. b) ite No. 818 (Micro site no. 18958). are displayed overleaf in han or equal to 6°C for chemical amples are received above this nviroMail 85 for ALS

Sample Container(s)/Preservation Non-Compliances

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

ent Chromium by ICP & DA

• No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

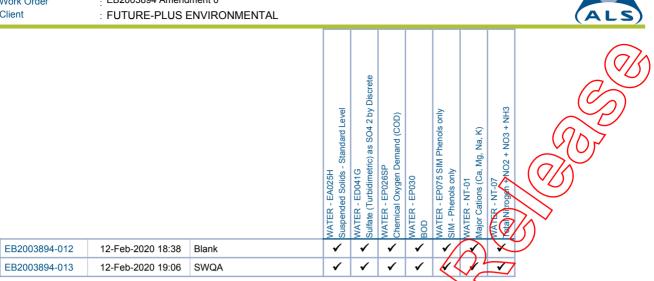
Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

	sampling date wi	g. If no sampling date Il be assumed by the ckets without a time	- ED045G by Discrete Analyser	WATER - EG020F Dissolved Metals by ICP/MS	WATER - EG049G-F Dissolved Trivalent Chromium by	WTER - EG050G-F Dissorved Hexavalent Chromium	55G By Discrete Analy	56G	WATER - EP065 Total Organic Carben Toc
Matrix: WATER			- ED0 by Dis	- EG020F	- EGO	- EGO	PR EK055G	- EK058G	- EPo
Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - ED045G Chloride by Discret	WATER - Dissolved	WATER - EG049G-F Dissolved Trivalent C	Dissolve	VIATER Ammonia	WAVER - EKO	WATER - EP
EB2003894-001	12-Feb-2020 14:02	GW1	1	1	1	X	V	1	1
EB2003894-002	12-Feb-2020 13:38	GW2	1	×	-{(~	√ (1	✓
EB2003894-003	12-Feb-2020 14:51	GW3	1	X	\checkmark	Ś	1	1	✓
EB2003894-004	12-Feb-2020 12:27	GW5	1	$\sqrt{\chi}$	×	7√	1	1	✓
EB2003894-005	12-Feb-2020 15:42	GW6	1	X	S	✓	1	1	✓
EB2003894-006	12-Feb-2020 10:49	CISW1	(5)	IK.	71	✓			✓
EB2003894-007	12-Feb-2020 19:09	CISW2	\prec	Y	1	✓			✓
EB2003894-008	12-Feb-2020 19:03	CISW3	$\left[\times \right]$	71	1	✓			✓
EB2003894-009	12-Feb-2020 11:26	CISW4	Y	✓	✓	✓			✓
EB2003894-010	12-Feb-2020 10:52	CISW5	1	1	1	✓			✓
EB2003894-011	12-Feb-2020 19:00	Rinstate	1	✓	1	✓			✓
EB2003894-012	12-Feb-2020 18:38	Blank	1	✓	1	✓			✓
EB2003894-013	12-Feb-2020 19:06	SWQA	1	1	1	✓			✓
Matrix: WATER Laboratory sample ID	Stient sampling	Client sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - ED041G Sulfate (Turbidimetric) as SO4 2 by Discrete	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - EP075 SIM Phenols only SIM - Phenols only	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-07 Total Nitrogen + NO2 + NO3 + NH3
EB2003894-001	12 Feb-2020 14:02	GW1	<u>S ñ</u>	<u>≥ ज</u> √	3 0	<u>s m</u>	<u>≥ ज</u>	3 ∑	<u>s ř</u>
EB2003894-002	12 Feb-2020 13:38	GW2		✓			✓	✓	
EB2003894-003	12-Feb-2020 14:51	GW3		1			1	1	
EB2003894 004	12-Feb-2020 12:27	GW5		✓			✓	✓	
FB2003894-005	12-Feb-2020 15:42	GW6		✓			1	1	
EB2003894-006	12-Feb-2020 10:49	CISW1	✓	✓	✓	✓	✓	✓	✓
EB2003894-007	12-Feb-2020 19:09	CISW2	✓	✓	1	✓	1	1	✓
EB2003894-008	12-Feb-2020 19:03	CISW3	1	✓	1	✓	1	1	✓
EB2003894-009	12-Feb-2020 11:26	CISW4	✓	1	✓	✓	1	✓	✓
EB2003894-010	12-Feb-2020 10:52	CISW5	1	✓	✓	✓	✓	✓	✓
EB2003894-011	12-Feb-2020 19:00	Rinstate	✓	✓	✓	✓	✓	✓	✓



Issue Date	: 13-Feb-2020
Page	: 3 of 3
Work Order	EB2003894 Amendment 0
Client	: FUTURE-PLUS ENVIRONMENTAL



Ernail

Email

Proactive Holding Time Report

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

Requested Deliverables

INVOICES

- A4 - AU Tax Invoice (INV)

JONO HOOPER

- *AU Certificate of Analysis NATA (COA)
- *AU Interpretive QC Report DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report DEFAULT (Anon QC Rep) NATA (QC)
- A4 AU Sample Receipt Notification Environmental HT (SRM)
- A4 AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format ENMRG (ENMRG)
- EDI Format XTab (XTAB)

KAINE PRITCHARD

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

- NICHOLAS EVANS - *AU Certificate of Analysis - NATA (QOA)
- *AU Interpretive QC Report DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report DEFAULT (Apon QC Rep) NATA (QC)
- A4 AU Sample Receipt Notification Environmental HT (SRN)
- A4 AU Tax Invoice (INV)
- Chain of Custody (CoC) (OOC)
- EDI Format EMMRG (ENMRG)
- EDI Format XTab (XTAB)

SOPHIE BLOND

- *AU Certificate of Analysis NATA (COA)
- Add Interpretive QC Report DEFAULT (Anon QCI Rep) (QCI) *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4- AU Sample Receipt Notification Environmental HT (SRN)
- Chain of Custody (CoC) (COC)

- EDL Format ENMRG (ENMRG)
- ED Format XTab (XTAB)

accounts@future-plus.com.au





CERTIFICATE OF ANALYSIS Work Order Page : EB2003894 : 1 of 9 Amendment :1 Client Laboratory : FUTURE-PLUS ENVIRONMENTAL : Environmental Division Brisbane : NICHOLAS EVANS Contact Contact : John Pickering : 2 Byth Street Stafford QL & Australia 4053 Address Address : PO BOX 1250 **BUDDINA QLD. AUSTRALIA 4575** Telephone +61 07 54502688 Telephone : +61 7 3552 8634 : 13 Feb-2020 10:15 Project Redland LEMP 5329 **Date Samples Received** 13 Feb-2020 Order number Date Analysis Commenced 04-Mar-2020 16:59 C-O-C number 8255 Issue Date Sampler ; KAINE PRITCHARD, NICHOLAS EVANS Site Coochiemudlo Is Closed LF -1 Quote number : BN/235/18 B V7 Accreditation No. 825 : 13 No. of samples received Accredited for compliance with ISO/IEC 17025 - Testing No. of samples analysed : 13 This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted his document shall not be reproduced, except in full. This Certificate of Analysis contains the following information: General Comments Analytical Results Surrogate Control Limits Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with **Quality Review and Sample Receipt Notification.** Signatories This document has been electronically signed by the authorized signal residuation below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11. Signatories Accreditation Category Positio Kim McCabe Serior Inorganic Chemist Brisbane Inorganics, Stafford, QLD 2IC Organic Chemist Minh Wills Brisbane Organics, Stafford, QLD Brisbane Organics, Stafford, QLD Morgan Lennox

General Comments

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

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

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

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

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

purposes.

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

- Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society. LOR = Limit of reporting
 - ^ = This result is computed from individual analyte detections at or above the level of reporting
 - ø = ALS is not NATA accredited for these tests.
 - ~ = Indicates an estimated value.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carciprogenic PAts multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(b+j) & Benzo(a)pyrene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero.
- Amendment (4/3/2020): This report has been amended to adjust the project reference for ESDAT purposes to Reaten the EVIP 5329 as per Jono Hooper.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.

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ED041G: Sulfate (Turbidimetric) as SO4 2- by DASulfate as SO4 - Turbidimetric1480ED045G: Chloride by Discrete Analyser1688Chloride1688ED093F: Dissolved Major Cations744Calcium744Magnesium744Potassium744EG020F: Dissolved Metals by ICP-MS744Aluminium744Cobalt744Lead744Selenium744Silver744Tin744Zinc744EG049F: Dissolved Trivalent Chromium744	Iumber L 08-79-8	sampling date / tim OR Unit 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L	EB2003894-001 Result 133 21 60 18 21 12 0.12 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.0	12-Feb-2020 13:38 EB2003894-002 Result 38 77 29 12 45 20 0:30 0.002 -0.001 <0.001	12-Feb-2020 14:51 EB2003894-003 Result 2 3 -<1 4 <1 0.37 0.001 <0.001 <0.001	12-Feb 2029 12:27 EB2003854-004 Result 19 61 4 48 <1 0.02 <0.001 <0.001 <0.001	12-Feb-2020 15:42 EB2003894-005 Result 18 825 3 69 373 2 7.60 0.001 0.002
ED041G: Sulfate (Turbidimetric) as SO4 2- by DASulfate as SO4 - Turbidimetric1480ED045G: Chloride by Discrete Analyser1688Chloride1688ED093F: Dissolved Major Cations744Calcium744Magnesium744Potassium744EG020F: Dissolved Metals by ICP-MS744Aluminium744Cobalt744Lead744Selenium744Silver744Tin744Zinc744EG049F: Dissolved Metals by ICP-MS744Silver744Silver744Tin744Zinc744Iron745EG049F: Dissolved Trivalent Chromium745	08-79-8 37-00-6 40-70-2 39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 39-92-1 0. 40-02-0 0.	1 mg/L 0 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L	Result 133 21 60 18 21 12 0.12 <0.001 <0.001 <0.001	Result 38 77 29 12 45 0.30 0.001 	Result 2 3 4 4 4 4 4 4 4 1 9.37 0.001 <0.001 <0.001	Result 19 61 4 48 <1 0.02 <0.001 <0.001	Result 18 825 3 69 373 2 7.60 0.001 0.002
Sulfate as SO4 - Turbidimetric148020045G: Chloride by Discrete Analyser1688Chloride16882093F: Dissolved Major Cations744Calcium744Magnesium744Sodium744Potassium744G020F: Dissolved Metals by ICP-MSAluminium744Chromium744Cobalt744Selenium776Silver744Tin744Zinc744Icon745G049F: Dissolved Trivalent Chromium745	37-00-6 40-70-2 39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 40-48-4 0. 40-02-0 0.	1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L	133 21 60 18 21 12 12 0.12 <0.001 <0.001 <0.001	38 77 29 12 45 20 0.30 0.002 -0.001	2 3 <1 4 <1 0.37 0.001 <0.001	19 61 <1 4 48 <1 0.02 <0.001 <0.001	18 825 3 69 373 2 7.60 0.001 0.002
Sulfate as SO4 - Turbidimetric148020045G: Chloride by Discrete Analyser1688Chloride16882093F: Dissolved Major Cations744Calcium744Magnesium744Sodium744Potassium744G020F: Dissolved Metals by ICP-MSAluminium744Chromium744Cobalt744Selenium776Silver744Tin744Zinc744Icon745G049F: Dissolved Trivalent Chromium745	37-00-6 40-70-2 39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 40-48-4 0. 40-02-0 0.	1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L	21 60 18 21 12 0.12 <0.001 <0.001 <0.001	77 29 12 45 20 0.30 20 -0.001	3 <1 4 <1 0.37 0.001 <0.001 <0.001	61 <1 4 48 <1 0.02 <0.001 <0.001	825 3 69 373 2 7.60 0.001 0.002
The initial initia	37-00-6 40-70-2 39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 40-48-4 0. 40-02-0 0.	1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L	21 60 18 21 12 0.12 <0.001 <0.001 <0.001	77 29 12 45 20 0.30 20 -0.001	3 <1 4 <1 0.37 0.001 <0.001 <0.001	61 <1 4 48 <1 0.02 <0.001 <0.001	825 3 69 373 2 7.60 0.001 0.002
Chloride 1688 ED093F: Dissolved Major Cations 744 Magnesium 744 Magnesium 744 Sodium 744 Potassium 744 EG020F: Dissolved Metals by ICP-MS 744 Aluminium 744 Cobalt 744 Lead 744 Selenium 774 Silver 744 Tin 744 Zinc 744 Icon 745 EG049F: Dissolved Trivalent Chromium 745	40-70-2 39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 40-48-4 0. 39-92-1 0. 40-02-0 0.	1 mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L	60 18 21 12 0.12 <0.001 <0.001 <0.001	29 12 45 0.30 0.002 -0.001	0.37 0.001 <0.001	<1 4 48 <1 0.02 <0.001 <0.001	3 69 373 2 7.60 0.001 0.002
TotalCalcium744Magnesium743Sodium744Potassium744Colspolved Metals by ICP-MSAluminium744Chromium744Cobalt744Lead744Silver744Silver744Tin744Zinc744Icon745Codult746Silver746Silver744Zinc744Icon745Codult746Codult746Silver747Silver744Tin745Codult746Codult746Codult747Codult746Codult747 <td>40-70-2 39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 40-48-4 0. 39-92-1 0. 40-02-0 0.</td> <td>1 mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L</td> <td>60 18 21 12 0.12 <0.001 <0.001 <0.001</td> <td>29 12 45 0.30 0.002 -0.001</td> <td>0.37 0.001 <0.001</td> <td><1 4 48 <1 0.02 <0.001 <0.001</td> <td>3 69 373 2 7.60 0.001 0.002</td>	40-70-2 39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 40-48-4 0. 39-92-1 0. 40-02-0 0.	1 mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L	60 18 21 12 0.12 <0.001 <0.001 <0.001	29 12 45 0.30 0.002 -0.001	0.37 0.001 <0.001	<1 4 48 <1 0.02 <0.001 <0.001	3 69 373 2 7.60 0.001 0.002
Calcium 744 Magnesium 743 Sodium 744 Potassium 744 Potassium 744 G020F: Dissolved Metals by ICP-MS 744 Aluminium 744 Cobalt 744 Lead 744 Selenium 778 Silver 744 Tin 744 Iron 744 G049F: Dissolved Trivalent Chromium 745	39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 40-48-4 0. 39-92-1 0. 40-02-0	mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L	18 21 12 0.12 <0.001 <0.001 <0.001	12 45 20 0.002 -0.001	<1 4 <1 0.37 0.001 <0.001	4 48 <1 0.02 <0.001 <0.001	69 373 2 7.60 0.001 0.002
Magnesium 743 Sodium 744 Potassium 744 G020F: Dissolved Metals by ICP-MS 744 Aluminium 744 Chromium 744 Cobalt 744 Selenium 744 Selenium 778 Silver 744 Tin 744 Zinc 744 G049F: Dissolved Trivalent Chromium 745	39-95-4 40-23-5 40-09-7 29-90-5 0 40-47-3 0. 40-48-4 0. 39-92-1 0. 40-02-0	mg/L 1 mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L	18 21 12 0.12 <0.001 <0.001 <0.001	12 45 20 0.002 -0.001	<1 4 <1 0.37 0.001 <0.001	4 48 <1 0.02 <0.001 <0.001	69 373 2 7.60 0.001 0.002
Sodium 744 Potassium 744 Potassium 744 G020F: Dissolved Metals by ICP-MS 744 Aluminium 744 Chromium 744 Cobalt 744 Lead 744 Selenium 776 Silver 744 Tin 744 Icon 744 G049F: Dissolved Trivalent Chromium 745	40-23-5 40-09-7 29-90-5 40-47-3 40-48-4 39-92-1 0. 40-02-0 0.	mg/L 1 mg/L 1 mg/L 001 mg/L 001 mg/L 001 mg/L 001 mg/L	21 12 0.12 <0.001 <0.001 <0.001	45 20 0.002 -0.001	4 <1 0.37 0.001 <0.001	48 <1 0.02 <0.001 <0.001	373 2 7.60 0.001 0.002
Potassium 744 G020F: Dissolved Metals by ICP-MS 742 Aluminium 742 Chromium 744 Cobalt 744 Lead 744 Nickel 744 Selenium 776 Silver 744 Tin 744 Icon 744 G049F: Dissolved Trivalent Chromium 745	40-09-7 29-90-5 40-47-3 40-48-4 39-92-1 40-02-0 0.	1 mg/L .01 mg/L 001 mg/L 001 mg/L 001 mg/L	12 0.12 <0.001 <0.001 <0.001	20 P.30 0.502 -0.001	<1 0.37 0.001 <0.001	<1 0.02 <0.001 <0.001	2 7.60 0.001 0.002
G020F: Dissolved Metals by ICP-MS Aluminium 742 Chromium 744 Cobalt 744 Lead 743 Nickel 744 Selenium 775 Silver 744 Tin 744 Zinc 744 Iron 743 G049F: Dissolved Trivalent Chromium	29-90-5 0 40-47-3 0. 40-48-4 0. 39-92-1 0. 40-02-0 0.	.01 mg/L 001 mg/L 001 mg/L 001 mg/L	0.12 <0.001 <0.001 <0.001	P39 0.392 -0.001	0.37 0.001 <0.001	0.02 <0.001 <0.001	7.60 0.001 0.002
Aluminium 742 Chromium 744 Cobalt 744 Lead 744 Nickel 744 Selenium 778 Silver 744 Tin 744 Iron 744 G049F: Dissolved Trivalent Chromium 743	40-47-3 0. 40-48-4 0. 39-92-1 0. 40-02-0 0.	001 mg/L 001 mg/L 001 mg/L	<0.001 <0.001 <0.001	0.092 <0.001	0.001 <0.001	<0.001 <0.001	0.001 0.002
Aluminium 742 Chromium 744 Cobalt 744 Lead 744 Nickel 744 Selenium 778 Silver 744 Tin 744 Iron 744 G049F: Dissolved Trivalent Chromium 745	40-47-3 0. 40-48-4 0. 39-92-1 0. 40-02-0 0.	001 mg/L 001 mg/L 001 mg/L	<0.001 <0.001 <0.001	0.092 <0.001	0.001 <0.001	<0.001 <0.001	0.001 0.002
Cobalt 744 Lead 744 Nickel 744 Selenium 778 Silver 744 Tin 744 Zinc 744 Iron 744 G049F: Dissolved Trivalent Chromium 745	40-48-4 0. 39-92-1 0. 40-02-0 0.	001 mg/L 001 mg/L	<0.001	0.092 <0.001	<0.001	<0.001	0.002
Lead 743 Nickel 744 Selenium 778 Silver 744 Tin 744 Zinc 744 Iron 744 G049F: Dissolved Trivalent Chromium 745	39-92-1 0. 40-02-0 0.	001 mg/L	<0.001				
Nickel744Selenium776Silver744Tin744Zinc744Iron743G049F: Dissolved Trivalent Chromium	40-02-0 0.			<0.001	<0.001	<0.001	
Selenium 778 Silver 744 Tin 744 Zinc 744 Iron 743 G049F: Dissolved Trivalent Chromium 743		001 mg/L	10 004				<0.001
Silver 744 Tin 744 Zinc 744 Iron 743 G049F: Dissolved Trivalent Chromium			< 9.00 1	<0.001	<0.001	<0.001	0.003
Tin 744 Zinc 744 Iron 743 G049F: Dissolved Trivalent Chromium	32-49-2 0	.01 mg/L		<0.01	<0.01	<0.01	<0.01
Zinc 744 Iron 743 G049F: Dissolved Trivalent Chromium	40-22-4 0.	001 mg/L	2 2 <0.001	<0.001	<0.001	<0.001	<0.001
Iron 743 G049F: Dissolved Trivalent Chromium	40-31-5 0.	001 mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
G049F: Dissolved Trivalent Chromium	40-66-6 0.	005 ng 🕹	0.005	0.036	<0.005	<0.005	0.022
	39-89-6 0	.05 mg/L	<0.05	0.16	0.13	<0.05	0.11
Trivalent Chromium 1600		\frown					
	65-83-1 0	.01 mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
G050F: Dissolved Hexavalent Chromium	521	\bigcirc					
Hexavalent Chromium	40-29-9	.01 mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
K055G: Ammonia as N by Discrete Analyse	\sim						
	34-41 -7 0	.01 mg/L	0.03	0.02	<0.01	<0.01	0.02
K057G: Nitrite as N by Discrete Analysyr							
	97-65-0 0	.01 mg/L	<0.01	0.01	<0.01	<0.01	<0.01
K058G: Nitrate as N by Discrete Analyser							
	97-55-8 0	.01 mg/L	0.85	0.93	0.04	1.95	<0.01
K059G: Nitrite plus Nitrate as N (NOx) by Discre		0					
Nitrite + Nitrate as N		.01 mg/L	0.85	0.94	0.04	1.95	<0.01
EP005: Total Organic Carbon (TOC)		- <u> </u>					5.0.
Total Organic Carbon (TOC)		1 mg/L	5	10	5	<1	<1

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ib-Matrix: GROUNDWATER /latrix: WATER)		Clie	ent sample ID	GW1	GW2	GW3	GW5	GW6
	Clie	ent sampli	ng date / time	12-Feb-2020 14:02	12-Feb-2020 13:38	12-Feb-2020 14:51	12-Feb-2020 13:27	12-Feb-2020 15:42
ompound	CAS Number	LOR	Unit	EB2003894-001	EB2003894-002	EB2003894-003	EB2003894-004	EB2003894-005
				Result	Result	Result	Result	Result
P075(SIM)A: Phenolic Compounds								
Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
2-Nitrophenol	88-75-5	1.0	µg/L	<1.0	<1.0	<10	<1.0	<1.0
2.4-Dimethylphenol	105-67-9	1.0	µg/L	<1.0	<1.0	≤ 1.0	<1.0	<1.0
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.6-Dichlorophenol	87-65-0	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	59-50-7	1.0	µg/L	<1.0		<1.0	<1.0	<1.0
2.4.6-Trichlorophenol	88-06-2	1.0	µg/L	<1.0	240	<1.0	<1.0	<1.0
2.4.5-Trichlorophenol	95-95-4	1.0	µg/L	<1.0		<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2.0	µg/L	<2.0	₹2.0	<2.0	<2.0	<2.0
P075(SIM)S: Phenolic Compound Surro	ogates			\mathcal{A}				
Phenol-d6	13127-88-3	1.0	%	28.0	30.2	28.3	30.2	30.8
2-Chlorophenol-D4	93951-73-6	1.0	%		81.7	75.8	82.2	80.2
2.4.6-Tribromophenol	118-79-6	1.0	%	5 (102)	113	93.6	103	108
P075(SIM)T: PAH Surrogates			\sim	$M \cup$				
2-Fluorobiphenyl	321-60-8	1.0		71.2	75.4	71.7	74.2	75.4
Anthracene-d10	1719-06-8	1.0	\ <u>%</u> \ \	85.9	89.4	85.1	88.4	90.9
4-Terphenyl-d14	1718-51-0	1.0	%	93.5	96.0	91.1	94.2	98.9
E C	AL F)					

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Client	: FUTURE-PLUS ENVIRONMENTAL
Project	: Redland LEMP 5329



Sub-Matrix: SURFACE WATER (Matrix: WATER)		Clie	ent sample ID	CISW1	CISW2	CISW3	CISW4	CISW5
	CI	ient samplir	ng date / time	12-Feb-2020 10:49	12-Feb-2020 19:09	12-Feb-2020 19:03	12-Feb-2029 13:26	12-Feb-2020 10:52
Compound	CAS Number	LOR	Unit	EB2003894-006	EB2003894-007	EB2003894-008	EB2003894-009	EB2003894-010
				Result	Result	Result	Result	Result
A025: Total Suspended Solids drie	d at 104 ± 2°C							
Suspended Solids (SS)		5	mg/L	14	6	<5	9	34
D041G: Sulfate (Turbidimetric) as S	SO4 2- by DA						>	
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	6	5	<1
D045G: Chloride by Discrete Analy	ser					$\langle \langle \rangle \rangle$		
Chloride	16887-00-6	1	mg/L	10	11	22	14	10
D093F: Dissolved Major Cations					$\Diamond_{a}(($			
Calcium	7440-70-2	1	mg/L	4	2	2	5	2
Magnesium	7439-95-4	1	mg/L	2	14	2	2	1
Sodium	7440-23-5	1	mg/L	8		14	11	7
Potassium	7440-09-7	1	mg/L	4	$\langle 0 \rangle$	3	2	2
EG020F: Dissolved Metals by ICP-M	S			G	() () () () () () () () () ()			
Aluminium	7429-90-5	0.01	mg/L	1.85	0.89	0.44	0.36	1.83
Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.002	0.002	0.003
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.991	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	hngxL	<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	0.001	mgYL	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	0.008	0.007	<0.005	0.022	0.007
Iron	7439-89-6	0.05	mg/Ľ	0.69	0.37	0.31	0.27	0.74
EG049F: Dissolved Trivalent Chromi		$\langle \cup \rangle$						
Trivalent Chromium	16065-83-1	201	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EG050F: Dissolved Hexavalent Chro								
Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK055G: Ammonia as N by Discrete								
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	<0.01	0.01	<0.01
K057G: Nitrite as N by Discrete Ar	alvser							
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Ar	nalyser							
Nitrate as N	14797-55-8	0.01	mg/L	0.01	0.02	<0.01	0.07	<0.01
EK059G: Nitrite plus Nitrate as N (N	Ox) by Discrete Ana	lyser						
Nitrite + Nitrate as N		0.01	mg/L	0.01	0.02	<0.01	0.07	<0.01

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Work Order	: EB2003894 Amendment 1
Client	: FUTURE-PLUS ENVIRONMENTAL
Project	: Redland LEMP 5329



Sub-Matrix: SURFACE WATER (Matrix: WATER)		Clie	ent sample ID	CISW1	CISW2	CISW3	CISW4	CISW5
	Clie	ent sampli	ng date / time	12-Feb-2020 10:49	12-Feb-2020 19:09	12-Feb-2020 19:03	12-Feb-2020 1):26	12-Feb-2020 10:52
Compound	CAS Number	LOR	Unit	EB2003894-006	EB2003894-007	EB2003894-008	EB2003894-009	EB2003894-010
				Result	Result	Result	Result	Result
EK061G: Total Kjeldahl Nitrogen By Dis	crete Analyser							
Total Kjeldahl Nitrogen as N		0.1	mg/L	0.6	1.2	0.8	0.5	0.5
EK062G: Total Nitrogen as N (TKN + NO	x) by Discrete Ana	alyser					>	
Total Nitrogen as N		0.1	mg/L	0.6	1.2	0.8	0.6	0.5
EP005: Total Organic Carbon (TOC)						$\langle \langle \rangle \rangle$		
Total Organic Carbon		1	mg/L	13	39	31	12	11
EP026SP: Chemical Oxygen Demand (S	pectrophotometri	c)			\Diamond	\sum		
Chemical Oxygen Demand		10	mg/L	36	94	70	29	54
EP030: Biochemical Oxygen Demand (B	OD)				1172			
Biochemical Oxygen Demand		2	mg/L	<2		3	2	2
EP075(SIM)A: Phenolic Compounds					\sim			
Phenol	108-95-2	1.0	μg/L	<1.0	51.0	<1.0	<1.0	<1.0
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2-Methylphenol	95-48-7	1.0	μg/L	<1.0	<1.0	<1.0	<1.0	<1.0
3- & 4-Methylphenol	1319-77-3	2.0	μg/L	<2.0	<2.0	<2.0	<2.0	<2.0
2-Nitrophenol	88-75-5	1.0	µg/L		<1.0	<1.0	<1.0	<1.0
2.4-Dimethylphenol	105-67-9	1.0	µg/L	< < <1.0	<1.0	<1.0	<1.0	<1.0
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0	<1.0	<1.0
2.6-Dichlorophenol	87-65-0	1.0	Ng/L	<1.0	<1.0	<1.0	<1.0	<1.0
4-Chloro-3-methylphenol	59-50-7	1.0	μgλ	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.6-Trichlorophenol	88-06-2	10	μġ(L	<1.0	<1.0	<1.0	<1.0	<1.0
2.4.5-Trichlorophenol	95-9 5- 4	(10)	µg/Ľ	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	87-86-5	2.0	μg/L	<2.0	<2.0	<2.0	<2.0	<2.0
EP075(SIM)S: Phenolic Compound Surr		\searrow						
Phenol-d6	13 27-88-3	1.0	%	33.1	29.0	27.5	25.5	24.8
2-Chlorophenol-D4	93951-73-6	1.0	%	84.8	81.4	74.4	68.8	76.8
2.4.6-Tribromophenol	118-79-6	1.0	%	116	118	116	103	93.9
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	1.0	%	80.6	79.1	66.4	69.4	74.3
Anthracene-d10	1719-06-8	1.0	%	96.9	89.4	86.5	88.1	87.4
4-Terphenyl-d14	1718-51-0	1.0	%	105	97.0	95.2	99.5	99.2



		0		D		014/04		
Sub-Matrix: SURFACE WATER (Matrix: WATER)		Cile	ent sample ID	Rinstate	Blank	SWQA		<i>e</i>
	Cl	ient sampli	ng date / time	12-Feb-2020 19:00	12-Feb-2020 18:38	12-Feb-2020 19:06	$\wedge (\mathcal{O})$	
Compound	CAS Number	LOR	Unit	EB2003894-011	EB2003894-012	EB2003894-013	$\left(\left(+ \mathcal{O} \right) \right)$	
				Result	Result	Result		
EA025: Total Suspended Solids dried	d at 104 ± 2°C						C IV	
Suspended Solids (SS)		5	mg/L	<5	<5	<5	<u> </u>	
ED041G: Sulfate (Turbidimetric) as S	O4 2- by DA						>	
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	6		
ED045G: Chloride by Discrete Analys	ser					$\langle \langle \rangle \rangle$		
Chloride	16887-00-6	1	mg/L	<1	<1	21		
ED093F: Dissolved Major Cations					$\Diamond_{\lambda}(($			
Calcium	7440-70-2	1	mg/L	<1	<1/	2		
Magnesium	7439-95-4	1	mg/L	<1		2		
Sodium	7440-23-5	1	mg/L	<1		14		
Potassium	7440-09-7	1	mg/L	<1	\sim (0)	3		
EG020F: Dissolved Metals by ICP-MS	3			6	$() \cup ()$			
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.43		
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001		
Cobalt	7440-48-4	0.001	mg/L	50.001	<0.001	<0.001		
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001		
Nickel	7440-02-0	0.001	mg/L	2 < 0.001	<0.001	<0.001		
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01		
Silver	7440-22-4	0.001	IngXL	<0.001	<0.001	<0.001		
Tin	7440-31-5	0.001	mgKL	<0.001	<0.001	<0.001		
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005		
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.31		
EG049F: Dissolved Trivalent Chromi		$\langle \bigcup$						
Trivalent Chromium	16065-83-1	2.01	mg/L	<0.01	<0.01	<0.01		
EG050F: Dissolved Hexavalent Chro		\smile						
Hexavalent Chromium	18540-29-9	0.01	mg/L	<0.01	<0.01	<0.01		
EK055G: Ammonia as N by Discrete	Analyser							
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	<0.01		
EK057G: Nitrite as N by Discrete Ar	alvser							
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01		
EK058G: Nitrate as N by Discrete An	alyser							
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01		
EK059G: Nitrite plus Nitrate as N (NO	Dx) by Discrete Ana	lyser						
Nitrite + Nitrate as N		0.01	mg/L	<0.01	<0.01	<0.01		
L			-					<u> </u>

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Work Order	: EB2003894 Amendment 1
Client	: FUTURE-PLUS ENVIRONMENTAL
Project	: Redland LEMP 5329



Sub-Matrix: SURFACE WATER		Clie	ent sample ID	Rinstate	Blank	SWQA	0	2
(Matrix: WATER)	Clie	ent samplir	ng date / time	12-Feb-2020 19:00	12-Feb-2020 18:38	12-Feb-2020 19:06	\sim	
Compound	CAS Number	LOR	Unit	EB2003894-011	EB2003894-012	EB2003894-013		
Sompound	CAS Number		0	Result	Result	Result		
EK061G: Total Kjeldahl Nitrogen By Dis	crete Analyser						O_{A}	
Total Kjeldahl Nitrogen as N		0.1	mg/L	<0.1	<0.1	0.8		
K062G: Total Nitrogen as N (TKN + NO	x) by Discrete Ana	alvser					$\overline{\mathbf{x}}$	
Total Nitrogen as N		0.1	mg/L	<0.1	<0.1	0.8		
P005: Total Organic Carbon (TOC)								
Total Organic Carbon		1	mg/L	<1	<1	31		
P026SP: Chemical Oxygen Demand (S	pectrophotometric	c)				JV		
Chemical Oxygen Demand		10	mg/L	<10	<10	74		
P030: Biochemical Oxygen Demand (B	OD)				1172			
Biochemical Oxygen Demand		2	mg/L	<2	(\mathcal{T}^2)	4		
P075(SIM)A: Phenolic Compounds					~ 0			
Phenol	108-95-2	1.0	µg/L	<1.0	<1.0	<1.0		
2-Chlorophenol	95-57-8	1.0	µg/L	<1.0	<1.0	<1.0		
2-Methylphenol	95-48-7	1.0	µg/L	<1.0	<1.0	<1.0		
3- & 4-Methylphenol	1319-77-3	2.0	µg/L	<2.0	<2.0	<2.0		
2-Nitrophenol	88-75-5	1.0	µg/L		<1.0	<1.0		
2.4-Dimethylphenol	105-67-9	1.0	µg/L		<1.0	<1.0		
2.4-Dichlorophenol	120-83-2	1.0	µg/L	<1.0	<1.0	<1.0		
2.6-Dichlorophenol	87-65-0	1.0	Ag/A	<1.0	<1.0	<1.0		
4-Chloro-3-methylphenol	59-50-7	1.0	ugXL	<1.0	<1.0	<1.0		
2.4.6-Trichlorophenol	88-06-2	10	HQ(L)	<1.0 <1.0	<1.0	<1.0		
2.4.5-Trichlorophenol Pentachlorophenol	95-95-4	2.0	μg/Ľ	<1.0	<1.0	<1.0		
	87-85-5	2.0	μg/L	~2.0	~2.0	~2.0		
P075(SIM)S: Phenolic Compound Surro Phenol-d6	ogates 13127-88-3		%	26.4	28.8	23.4		
2-Chlorophenol-D4	93951-73-6	1.0	%	72.9	77.6	67.5		
2.4.6-Tribromophenol	118-79-6	1.0	%	72.9	80.2	100		
P075(SIM)T: PAH Surrogates			,,,					1
2-Fluorobiphenyl	321-60-8	1.0	%	73.5	75.5	70.2		
Anthracene-d19	1719-06-8	1.0	%	83.1	87.9	82.4		
4-Terphenyl-d14	1718-51-0	1.0	%	91.5	99.0	93.1		
	1710-31-0		,,,	01.0	00.0			

Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recover	ry Limits (%)
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	72
2-Chlorophenol-D4	93951-73-6	27	130
2.4.6-Tribromophenol	118-79-6	19	181
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137
4-Terphenyl-d14	1718-51-0	36	154
Sub-Matrix: SURFACE WATER		Recover	ry Limits (%)
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	10	72
2-Chlorophenol-D4	93951-73-6	27	130
2.4.6-Tribromophenol	118-79-6	19	181
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	14	146
Anthracene-d10	1719-06-8	35	137 🤇
4-Terphenyl-d14	1718-51-0	36	154
		777	





QA/QC Compliance Assessment to assist with Quality Review

Work Order	EB2003894	Page	: 1 of 9
Amendment	: 1		
Client	: FUTURE-PLUS ENVIRONMENTAL	Laboratory	: Environmental Division Brisbane
Contact	: NICHOLAS EVANS	Telephone	: +61 7 3552,8634
Project	: Redland LEMP 5329	Date Samples Received	: 13-Feb-2020
Site	: Coochiemudlo Is Closed LF -1	Issue Date	: 04-Mar-2020
Sampler	: KAINE PRITCHARD, NICHOLAS EVANS	No. of samples received	: 13
Order number	:	No. of samples analysed	×18

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Nime Compliance

• <u>NO</u> Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

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

Outliers : Frequency of Quality Control Samples

Matrix: WATER					
Quality Control Sample Type	Co	unt	Rate	(%)	Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
PAH/Phenols (GC/MS - SIM)	0	18	0.00	10.00	NEPM 2013 B3 & ALS OC Standard
Matrix Spikes (MS)					$\langle 0 \rangle \langle 0 \rangle$
PAH/Phenols (GC/MS - SIM)	0	18	0.00	5.00	NEPM 2013 B3 & ALS-QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when inter the taken into consideration when interpretence of the taken into a superior of taken intoa superior of taken intoa superior of

provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) s provided herein.

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

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

 $\subset (\mathcal{L})$

Matrix: WATER	-(0)	*		Evaluation	n: × = Holding time	breach ; 🗸 = Withi	n holding time.
Method	Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C	7						
Clear Plastic Bottle - Natural (EA025H) CISW1, CISW2,	12-Feb-2020				19-Feb-2020	19-Feb-2020	~
CISW3, CISW4, CISW5, Rinstate, Blank, SWQA							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) GW1, GW3, GW6, CISW2, CISW2, CISW4, Rinstate, SWQA	12-Feb-2020				13-Feb-2020	11-Mar-2020	*
ED045G: Chloride by Discrete Analyser Clear Plastic Bottle - Netural (ED045G) GW1, GW2, GW3, GW5, GW6, CISW1, CISW2, CISW3, CISW4, CISW5, Rinstate, Blank, SWQA SWQA	12-Feb-2020				13-Feb-2020	11-Mar-2020	*

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Page Work Order Client	3 of 9 EB2003894 Amendment 1 FUTURE-PLUS ENVIRONMENT : FUTURE-PLUS								
Project	Redland LEMP 5329							\sim	ALS
								$\langle \mathcal{C} \rangle$	
Matrix: WATER						Evaluation	n: × = Holding time		in holding time
Method Container / Client Samp			Sample Date		traction / Preparation	F - 1 - 1 - 1		Knalysis	—
				Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved M			1	1		\ \			
GW1,	litric Acid; Filtered (ED093F)	GW2,	12-Feb-2020				18-Feb-2020	11-Mar-2020	1
GW3,		GW5,			\frown	(O)	\mathcal{N}		•
GW6,		CISW1,			$\langle \bigcirc$) (O)			
CISW2,		CISW3,				\sim			
CISW4,		CISW5,			$\backslash \uparrow$	\searrow			
Rinstate,		Blank,			\frown \lor				
SWQA		Diank,		\sim	\frown				
EG020F: Dissolved M	letals by ICP-MS								
	litric Acid; Filtered (EG020B-F)			$\mathcal{P}_{\lambda}((\cdot))$	\checkmark				
GW1,		GW2,	12-Feb-2020	$((\cup))$			18-Feb-2020	10-Aug-2020	 ✓
GW3,		GW5,		$\langle \backslash \backslash \checkmark$					
GW6,		CISW1,		\mathcal{M}					
CISW2,		CISW3,	- 6/2	\sim					
CISW4,		CISW5,	() ())	>					
Rinstate,		Blank,							
SWQA			$\langle \langle \vee \rangle \rangle$						
EG050F: Dissolved H	exavalent Chromium								
Clear Plastic Bottle - N	aOH Filtered (EG050G-F)								
GW1,		GW2, (\(\) \\	12-Feb-2020				14-Feb-2020	11-Mar-2020	✓
GW3,		GW5,							
GW6,		CISW1,							
CISW2,		CISW3,							
CISW4,		CISW5,							
Rinstate,		Blank,							
SWQA									
EK055G: Ammonia as	s N by Discrete Analyser	$\langle \gamma(\zeta) \rangle$							
	Sulfuric Acid (EK055G)	410							
GW1,	$\langle \gamma \rangle$	GW2	12-Feb-2020				13-Feb-2020	11-Mar-2020	✓
GW3,	2 241	GW5,							
GW6,	$(\sqrt{)})$	∕∽sisw1,							
CISW2,	$\sim \sim $	CISW3,							
CISW4,		CISW5,							
Rinstate,	\sim \times (()). \	Blank,							
SWQA	$\sum (())$								
	L 12								

 4 of 9 EB2003894 Amendment 1 FUTURE-PLUS ENVIRONMEI 								
	NTAL							
: Redland LEMP 5329								ALS
					Evaluatior	: × = Holding time	breach; = Withi	in holding time
		Sample Date	Ex	traction / Preparation		$\left(\mathcal{O}\right)$	Knalysis	
e ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
y Discrete Analyser					$\langle \rangle$			
tural (EK057G)					\frown			
		12-Feb-2020			$\langle \sigma \rangle$	13-Feb-2020	14-Feb-2020	 ✓
						\checkmark		
	CISW1,							
	CISW3,							
	CISW5,				\sim			
	Blank,			\frown \lor				
				$(\setminus \setminus$				
litrate as N (NOx) by Discrete Anal	lyser							
	-							
	GW2,	12-Feb-2020	() (-)			13-Feb-2020	11-Mar-2020	 ✓
	GW5,	- <u></u>	$\langle \backslash \backslash \checkmark$					
	CISW1,							
	CISW3,		\sim					
	CISW5.	(\cup)						
		$\langle \rangle \rangle$						
l Nitrogen By Discrete Analyser								
lfuric Acid (EK061G)								
		12-Feb-2020	17-Feb-2020	11-Mar-2020	~	17-Feb-2020	11-Mar-2020	 ✓
	CISW4,							
	Rinstate,							
	SWQA							
Carbon (TOC)								
ric Acid (EP005)	\sim							
		12-Feb-2020				14-Feb-2020	11-Mar-2020	 ✓
	CIŞV(1,							
\sim	CISW3,							
72-25	CISW5,							
	∽Blank,							
\sim								
waer Demand TSpeutruphotometri	ic)							-
Ifuric Acid (EP026SP)								
() () ()	CISW2,	12-Feb-2020				17-Feb-2020	11-Mar-2020	✓
$\mathcal{U} \setminus \mathcal{U}$	CISW4,							
\sim \sim	Rinstate,							
$\backslash \sim$	SWQA							
	I Nitrogen By Discrete Analyser Ifuric Acid (EK061G) Carbon (TOC) ric Acid (EP005)	y Discrete Analyser tural (EK057G) GW2, GW5, CISW1, CISW3, CISW5, Blank, Iitrate as N (NOx) by Discrete Analyser Ifuric Acid (EK059G) GW2, GW2, GW5, CISW1, CISW3, CISW5, Blank, I Nitrogen By Discrete Analyser Ifuric Acid (EK061G) CISW2, CISW4, Rinstate, SWQA CISW5, Blank, CISW4, CISW5, Blank, CISW5, CISW5, CISW4, CISW5, CISW	2/2(s) y) Discrete Analyser tural (EK057C) GW2, GW5, CISW1, CISW3, CISW3, CISW5, Blank, Hirate as N (NOx) by Discrete Analyser Hirate as N (NOx) by Discrete Analyser Ifuric Acid (EK059G) GW2, GW5, CISW1, CISW3, CISW5, Blank, Ifuric Acid (EK059G) GW2, CISW4, Rinstate, SWQA CISW2, CISW4, Rinstate, SWQA CISW2, CISW4, Rinstate, SW3, CISW5, Blank, curve, CISW2, CISW4, Rinstate, SIANA curve, CISW2, CISW4, Rinstate, curve, CISW4, Rinstate, curve, CISW4, Rinstate, CISW2, CISW4, Rinstate, CISW2, CISW4, Rinstate, CISW2, CISW4, Rinstate,	Iterate Date extracted tural (EK057G) GW2, GW5, CISW4, CISW4, CISW4, CISW3, CISW4, CISW5, Blank, 12-Feb-2020 Ntrogen By Discrete Analyser 12-Feb-2020 17-Feb-2020 17-Feb-2020 Ntrogen By Discrete Analyser 12-Feb-2020 17-Feb-2020 Ntrogen By Discrete Analyser 12-Feb-2020 17-Feb-2020	P20(9) Date extracted Due for extraction y Discrete Analyser	Sample Date Extraction / Preparation Image: Converting of the sector of	Sample Date Extraction / Preparation Extraction / Preparation Determinant Determinant Determ	Starpic Date Extraction / Preparation Extraction / Preparation Mark V Discription Analyser Date extraction Performance <

Page Work Order Client Project	5 of 9 EB2003894 Amendment 1 FUTURE-PLUS ENVIRONME Redland LEMP 5329	NTAL							ALS)
Matrix: WATER						Evaluation	: × = Holding time	breach; y = Withi	in holding time.
Method			Sample Date	Ext	traction / Preparation		$(\mathbf{Q},$	Knalysis	
Container / Client Sam	ple ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
	Oxygen Demand (BOD)					$\langle \rangle$			
BOD Bottle Unpreserv CISW1,	ved (EP030)	CISW2,	12-Feb-2020				13-Feb-2020	14-Feb-2020	✓
CISW3,		CISW4,	121 05 2020		\frown	$(\mathcal{O}_{\mathcal{A}})$		11105 2020	v
CISW5,		Rinstate,			$\langle \bigcirc$	$) \setminus O $			
Blank,		SWQA				\searrow			
EP075(SIM)A: Pheno					$\sim \gamma$	~			
Amber Glass Bottle - I GW1,	Unpreserved (EP075(SIM))	GW2,	12-Feb-2020	14-Feb-2020	19-Feb-2020	~	14-Feb-2020	25-Mar-2020	1
GW3,		GW2, GW5,	12-1 05-2020			×	14-1 05-2020	20 Mai 2020	v
GW6,		CISW1,	< <	$\sum (\bigcap)$	\checkmark				
CISW2,		CISW3,	\sim	()					
CISW4,		CISW5,	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	$\left(\right) $					
Rinstate, SWQA		Blank,	(Q, \mathbb{N})	<u>س</u> مر					
		40 m							

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Quality Control Parameter Frequency Compliance

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

Matrix: WATER				Evaluation	n: × = Quality Co	ontrol frequency n	ot within specification; = Quality Control frequency within specification.
Quality Control Sample Type		Сс	ount		Rate (%)		Quality Control Specification
Analytical Methods	Method	00	Reaular	Actual	Expected	Evaluation	$\sim (2)$
Laboratory Duplicates (DUP)						<	$\langle \rangle \langle \rangle$
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	4	32	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	2	14	14.29	10.00		NERM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	16	12.50	10.00	$\langle \langle \rangle \rangle$	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	33	12.12	10.00		NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	14	14.29	10,00		NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	2	17	11.76	10.00		NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	1	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10,00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	18	41.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	0	18	0.00	10.00	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	16	12,50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	1	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2		13.33	10.00	1	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	\mathcal{O}^2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)		1211	$\mathcal{O}\mathcal{I}^{*}$				
Ammonia as N by Discrete analyser	EK0550	$ \sqrt{1} $	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030		32	6.25	5.00	1	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP		14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG0204-F	2	33	6.06	5.00	1	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SQ4 2- by Dissecte Analyser	ED041G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Apalyser	EK061G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Disorete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	32	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	14	7.14	5.00	✓ ✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	16	6.25	5.00		NEPM 2013 B3 & ALS QC Standard
			1	1	1	-	Dava 404 a

PALS

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Matrix: WATER				Evaluation	n: × = Quality Co	ontrol frequency n	ot within specification ; \checkmark = Quality Control frequency within specification.
Quality Control Sample Type	Count		Rate (%)		•	Quality Control Specification	
Analytical Methods	Method	00	Reaular	Actual	Expected	Evaluation	
Method Blanks (MB) - Continued							
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	1	17	5.88	5.00	1	MEPM 2013 B3 & Atts QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓ <	VEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	18	5.56	5.00	4	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	1	18	5.56	5.00		NERM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	6.25	5.00		NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	5.00	5.00		NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	15	6.67	5.00		NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	19	5.26	00, E C	\checkmark	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					4115		
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	14	7,14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	16	6.25	5.00	~	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	6.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Hexavalent Chromium by Discrete Analyser - Dissolved	EG050G-F	1	$\langle \eta \rangle$	5.88	5.00	~	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	~	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	$\left(2\right) \left(2\right)$	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (GC/MS - SIM)	EP075(SIM)	2811	18	0.00	5.00	x	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED0416		16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EKOG1C		15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	ER005		19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
REALE							



Brief Method Summaries

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

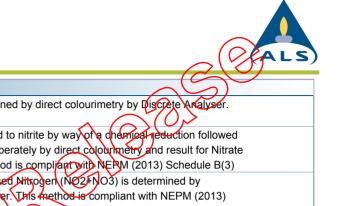
Analytical Methods	Method	Matrix	Method Descriptions	
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to `non-filterable` residue in a aqueous sample. The prescribed GFC (1.2um) it oven dried and weighed prior to analysis. A well-mixed sample is filtered through the residue on the filter paper is dried at 104+/-2C. This method is compliant	ter is rihsed with deionised water, ough a glass fibre filter (1.2um).
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in ions are converted to a barium sulfate suspension in an acetic acid medium v absorbance of the BaSO4 suspension is measured by a photometer and the by comparison of the reading with a standard ourve) This method is complian	vith barium chloride. Light SO4-2 concentration is determined
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl -G. The thiocyanate ion is liberated fi sequestration of mercury by the chloride ion to form non-ionised mercuric chl the librated thiocynate forms highly-coloured ferric thiocynate which is measu seal method 2 017-1-L april 2008	oride.in the presence of ferric ions
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APNA 3120 and 3125; USEPA SW 846 - 6010 and 0 either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Sodiam Adsorption Ratio is calculated from Ca, Mg and Na which determined QWIENED093F. This method is compliant with NEPM (2013) Schedule B(3 Hardness parameters are calculated based on APHA 2340 B. This method is Schedule B(3)	(2013) Schedule B(3) d by ALS in house method)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/E prior to analysis. The ICPMS technique utilizes a highly efficient argon plasm are then passed into a high vacuum mass spectrometer, which separates the mass to charge ratios prior to their measurement by a discrete dynode ion de	na to ionize selected elements. Ions analytes based on their distinct
Dissolved Metals by ICP-MS - Suite B	EG020B-A	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/E prior to analysis. The ICPMS technique utilizes a highly efficient argon plasm are then passed into a high vacuum mass spectrometer, which separates the mass to charge ratios prior to their measurement by a discrete dynode ion de	na to ionize selected elements. Ions analytes based on their distinct
Trivalent Chromium - Dissolved	EG049G-F	WATER	In house: Referenced to APHA 3500 Cr-B & 3120/3125. Trivalent Chromium dissolved and dissolved hexavalent chromium.	is the difference between total
Hexavalent Chromium by Discrete Analyser - Discolved	EG050G-F	WATER	In house: Referenced to APHA 3500 Cr-A & B. Samples are 0.45µm filtered chromium is determined directly on water sample by Descrete Analyser as re colour development using dephenylcarbazide. Each run of samples is measu curve. This method is compliant with NEPM (2013) Schedule B(3)	ceived by pH adjustment and
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by dire This method is compliant with NEPM (2013) Schedule B(3)	ct colorimetry by Discrete Analyser.

Method

Matrix

Method Descriptions

Analytical Methods



Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by way of a chamical reduction followed by quantification by Discrete Analyser. Nitrite is determined separately by direct colournetry and result for Nitrate calculated as the difference between the two results. This method is compliant with NEPM (2013) Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
otal Kjeldahl Nitrogen as N By Discrete Malyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Fotal Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3 This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B. The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	WATER	In house: Referenced to APTIA 5200 D. Samples are digested with a known excess of an acidic potassium dichromate solution using silver sulfate as a catalyst. The chromium is reduced from the Cr (VI) oxidation state to the Cr (III) state (b) the oxygen present in the organic material. Both of these chromium species are coloued and absorb in the visible region of (400nm & 600nm) the spectrum. The oxidisable organic matter can be calculated in terms of oxygen equivalents.
iochemical Oxygen Demand (BOD)	EP030	WATER	In house, Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed-added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM (2013) Schedule B(3)
PAH/Phenols (GC/MS - SIM)	EP075(SM)	WATER	In house: Referenced to USEPA SW 846 - 8270D Sample extracts are analysed by Capillary GC/MS in SIM Mode and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
KN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3). ALS default excludes sediment which may be resident in the container.

SAMPLING Intelligence	Ċ	Environmental Division Brisbane Work Order Reference EB2003894				
Custody Document for Submissions via ALS Compa	iss App	Telephone + 61-7-3243 7222				
Project: REDUAND LANDFILLS Client: RCC	Project Ma	anager: DICHOLAS EVANS				
ALS Compass COC Reference: 8255 # Samples:/3	Sampler: Phone:	Willow as grians				
Turnaround Requirements: Standard SOAY TAT Urgent						
Special Instructions:	maler	HT				
Custody:	<u>}</u>					
Relinquished by: NICHOLAS BVIANS Mischer	Relinquished by:	Received by:				
Date / Time: $\frac{12}{02}/\frac{20200}{20200}$ Date / Time: $\frac{10.145}{13/2}$	Date / Time:	Date / Time:				
RELIGIE						
Right Solutions - Right Partner		alsglobal.com/als-compass				

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	CHAIN OF CUSTODY				RELINQUISHED BY:				D BY:	RE	LINQUISHED BY:	RECEIVED BY:
ALS CO		Laboratory: EB Brisbane			ME:			DATE TIME:		DA	TE TIME:	DATE TIME:
CLIENT:	FUPE - FUTURE-PLUS Redlands Landfill	ENVIRONMENTAL	-									
				TURNARC	DUND REQU	JIREMEN	NTS :	5 Days		LABORATORY USE		$\langle \mathcal{C} \rangle$
SITE:	Coochiemudlo Is Close	d LF -1		Biohazard	infa:					Custody Seal intact?		Yes No N/A
ORDER NO	:		5101102010							pricks present upon receipt		
PROJECT N	/ANAGER: Nicholas Eva	CONTACT			SAMP		BILE: 07 53	0.	-	nperature on Receipt:	c c	
PRIMARY S	AMPLER: Nicholas Eva	ins	QUOTE NO): BN/235	5/18 B V7		/ EB2	2019FUPE0	003	Other comments:	$\sim (2)$	
EMAIL REP	ORTS TO:									<		
EMAIL INVO	DICES TO										$\langle \sim \rangle$	
		SAMPLE DETAILS						ANA			V	
							ο.	0	• >	AILY		
							Table 18: Surface Coochiemudio Is - C WATER	Table 19: Groundw Coochiemudio le O WATER	ALTERMATIVE ANALYSIS	(\bigcirc)		
							iemu v	iemu		$\langle \Psi \rangle$		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surfa dio Is VATE	VATE		ADDITIONAL INFORMATIO		
							ຊິ;ິຊີ ຊີຊີ		ANA			
								lante	LYSI			
						\leq	-	Ş.∠	S			
001	GW1		12/02/2020 02:02 PM	Water	ALS: 6 Non ALS: 0	Ng	\sum	X				
002			12/02/2020	Water	ALS: 6	N	×	x				
			01:38 PM	$\sqrt{\alpha}$	Non ALS: 0							
003	GW3		12/02/2020 02:51 PM	Water	ALS 6 Non ALS: 0	No		×				
004	GW5		12/02/2020 12:27 PM	Water	ALS: 6	No		X				
		<u>A</u>			Non ALS: 0							
005	GW6	٨. ٤٢	2/02/2020 03:42 PM	Water	ALS: 6 Non ALS: 0	No		X				
006	CISW1		12/02/2020	Water	ALS: 7	No	X					
		(VALLY	10:49 AM	14/-/	Non ALS: 0	NI-						
007	CISW2		12/02/2020 07:09 PM	Water	ALS: 7 Non ALS: 0	No						
008	CISW3		12/02/2020 07:03 PM	Water	ALS: 7 Non ALS: 0	No	×					
009	elsv4		12/02/2020 11:26 AM	Water	ALS: 7 Non ALS: 0	No	X					
└─── ┘	<u>↓</u>	· ·	I	L	<u>.</u>	• • • •	• • • • • • •	·				

Wednesday, February 12, 2020 11:38:17 AM

	HAIN OF CUSTO	DDY		RELINQ	JISHED BY:	· ·		RECEIV	ED BY:	REL	INQUISHED BY:	RECEIVED BY:
ALS CO	DC#: 8255 ALS	Laboratory: EB Brisbane		DATE TI	ME:			DATE T	IME:	DAT	E TIME:	
CLIENT:	FUPE - FUTURE-PLU	S ENVIRONMENTAL		1								
PROJECT:	Redlands Landfill			TURNAROUND REQUIREMENTS: 5 Days						LABORATORY USE	DNLY (Circle)	C
SITE:	Coochiemudlo Is Close								Custody Seal intact?		Xes No N/A	
ORDER NO):		Biohazard	info:					Free ice / frozen ice br	icks present upon receipt	Yes No N/A	
PROJECT	MANAGER: Nicholas Ev	ans	CONTACT	FPH: 075	357 9463	SAMP	LER MOE	BILE: 07 5	357	Random Sample Tem	perature on Receipt:	c c
PRIMARY	SAMPLER: Nicholas Eva	ans	QUOTE N	O: BN/235	5/18 B V7		/ EB:	2019FUPE	0003	Other comments:	\sim	
EMAIL REF												
EMAIL INV	JICES TO:	SAMPLE DETAILS						A N /	LL ALYSIS RE		₩	
			1					. · · ·			4	
			DATE /		τοται	ON	Table 18: Surface 1 Coochiemudio Is - C WATER	Table 19: Groundwe Coochiemudio le - Od WATER	ALTERMATIS	ADDITIONAL		
SAMPLE	NAME	DESCRIPTION	TIME	MATRIX	TOTAL BOTTLES	HOLD	rface Water -) Is - Quarterfy .TER	oundwater - He- Odarterly	ALTERWATIN'S ANALYSIS	INFORMATION		
010	CISW5		12/02/2020 10:52 AM	Water	ALS: 7 Norals: 0	Na	XX					
011	Rinstate		12/02/2020 07:00 PM	Water	ALS: 7 Non ALS: 0	No	х					
012	Blank		12/02/2020 06:38 PM	Water	ALS: 7 Non ALS: 0	No	x					
013	SWQA		12/02/2020 07:06 PM	Water	ALS: 7 Non ALS: 0	No	Х					
	February 12, 2020	11:38:17 AM			1	· · ·						2 of 5

	HAIN OF CUSTO	DY	RELINQUISHED BY:	RECE	IVED BY:		RELINQUISI	HED BY:	RECEIVED BY:
LIENT:	C#: 8255 ALS I	Laboratory: EB Brisbane	DATE TIME: DATE TIME:				DATE TIME:		
	Redlands Landfill			<u> </u>		I RY USE ONLY (C			
			TURNAROUND REQUIREMENTS	5 Days		·			
SITE:	Coochiemudio Is Close	d LF -1	Biohazard info:			l intact?		Yes No N/A	
ORDER NO	:					Free_ice / fro	zen ice bricks pres	sent upon receipt?	No N/A
ROJECT	ANAGER: Nicholas Eva	ans CONTAC	T PH: 07 5357 9463 SAMPLER	MOBILE: 07	5357	Random San	nple Temperature	on Receipt:	1 °C
RIMARY S	AMPLER: Nicholas Eva	ans QUOTE I	NO: BN/235/18 B V7	EB2019FUP	E0003	Other comme	ents:	\bigcirc	
EMAIL REP								>	
SAMPLE	SAMPLE NAME	BOTTI	ENAME	VOLUME	BAR		TYPE	FILTERED	REASON
001	GW1	Clear Plastic B	ottle - Sulfuric Acid	60 mL	001010	19034110	Purple	No	
001	GW1	Amber Glass Bo	ottle - Unpreserved	100 mL	700400	19042475	Orange	No	
001	GW1	Amber TOC V	ial - Sulfuric Acid	40 mL	001810	1902 252 5	Purple	No	
001	· GW1	Clear Plastic	Bottle - Natural	250 m/	600705	9194110	Green	No	
001	GW1	Clear Plastic Bottle	60 mL	01201	98009877	Red	Yes		
001	GW1	Clear Plastic Bo	60 m2	001402	19013205	Blue	No		
002	GW2	Clear Plastic Bottle	- Nitric Acid; Filtered	80 mi	001201	98009866	Red	Yes	
002	GW2		tle - NaOH Filtered	60 mL	001402	19012857	Blue	No	
002	GW2	Clear Plastic Bo	ottle - Sulfuric Acid	60 mL	001010	19033991	Purpie	No	
002	GW2		ial - Sulfuric Acity	40 mL	001810	19022608	Purple	No	
002	GW2	· · · · · · · · · · · · · · · · · · ·	ottle - Unpreserved	100 mL	004007	19043972	Orange	No	
002	GW2			250 mL	000705	19194279	Green	No	
003	GW3		Battle - Natural	250 mL	000705	19194144	Green	No	
003	GW3		ottle - Unpreserved	100 mL		19061824	Orange	No	
003	GW3		ottle - Sulfuric Acid	60 mL		19034012	Purple	No	
003	GW3		ial - Sulfuric Acid	40 mL		19022590	Purple	No	
003	GW3		- Nitric Acid; Filtered	60 mL		98009925	Red	Yes	
003	GW3	$- \wedge - \neg \downarrow$	tle - NaOH Filtered	60 mL		19013185	Blue	No	
004	GW5		ottle - Unpreserved	100 mL		19003895	Orange	No	
004	GW5		Bottle - Natural	250 mL		19194195	Green	No	
004	GW5		- Nítric Acid; Filtered	60 mL		98009842	Red	Yes	
004	GW65		ottle - Sulfuric Acid	60 mL		19033374	Purple	No	
004	GWE		tle - NaOH Filtered	60 mL		19019234	Blue	No	
004	8775		ial - Sulfuric Acid	40 mL		19022605	Purple	No	
005	GW6		tle - NaOH Filtered	60 mL		19013224	Blue	No	
005	GW6	Clear Plastic Bottle	- Nitric Acid; Filtered	60 mL	001201	98009929	Red	Yes	

	AIN OF CUSTO)DY	RELINQUISHED BY:	RECE	VED BY:		RELINQUIS	IED BY:	RECEIVED BY:
ALS CO	C#: 8255 ALS I	Laboratory: EB Brisbane	DATE TIME:	DATE	TIME:		DATE TIME:		
CLIENT:	FUPE - FUTURE-PLUS	SENVIRONMENTAL							
PROJECT:	Redlands Landfill		TURNAROUND REQUIREMENTS	: 5 Days		LABORATO	RY USE ONLY (C	ircle)	\mathcal{C}
SITE:	Coochiemudlo Is Close	d L F -1		. o buje		Custody Sea	Lintact?		Kes No N/A
			Biohazard info:					sent upon receipt?	Ves No N/A
ORDER NO	:							$\langle \langle \rangle \rangle$	
	ANAGER: Nicholas Eva			MOBILE: 07			ple Temperature	on Receipt:	- C
PRIMARY S	AMPLER: Nicholas Eva	ans QUOTE	NO: BN/235/18 B V7	EB2019FUP	E0003	Other comme	ents:	$\langle \rangle \rangle$	
EMAIL REP	ORTS TO:						$\langle \rangle$		
							V/L	\sim	
EMAIL INVO					-				1
005	GW6		ottle - Sulfuric Acid	60 mL		9034230	Purple	No	
005	GW6		/ial - Sulfuric Acid	40 mL		9022594	Purple	No	
005	GW6	· · · · · · · · · · · · · · · · · · ·	ottle - Unpreserved	100 mL		9003920	Orange	No	
005	GW6		Bottle - Natural	250 mL		9194150	Green	No	
006	CISW1		ttle - NaOH Filtered	60 mL	$\sim \sim \sim \sim \sim$	9012625	Blue	No	
006	CISW1		e - Nitric Acid; Filtered	60 m/		9043617	Red	Yes	· · · · · · · · · · · · · · · · · · ·
006	CISW1		Unpreserved	258 mL		9194224	Green	No	
006	CISW1		Bottle - Natural	(250 m)		9194120	Green	No	· · · · · · · · · · · · · · · · · · ·
006	CISW1		ottle - Sulfuric Acid	60 mL		9033459	Purple	No	
006	CISW1		/ial - Sulfuric Acid	40 mL		9022536	Purple	No	
006	CISW1		ottle - Unpreserved	100 mL		9043991	Orange	No	·
007	CISW2		Unpreserved	250 mL		9194113	Green	No	
007	CISW2		Bottle - Natural	250 mL	·	9194133	Green	No	
007	CISW2		tle NaOH Filtered	60 mL		9012692	Blue	No	
007	CISW2		ottle - Sulfuric Acid	60 mL		9033400	Purple	No	
007	CISW2		e - Nitric Acid, Filtered	60 mL		9047447	Red	Yes	
007	CISW2		(ial - Sulfuric Acid	40 mL		9022522	Purple	No	
007	CISW2		ottle - Unpreserved	100 mL		9043870	Orange	No	
800	CISW3		e Unpreserved	250 mL		9194232	Green	No	
800	CISW3		Bottle - Natural	250 mL		9194228	Green	No	
800	CISW3	$ \land \land \land \land \land \land \checkmark \frown \frown$	e - Nitric Acid; Filtered	60 mL		9047450	Red	Yes	
800	CISW3		ottle - Sulfuric Acid	60 mL		19033384	Purple	No	
800	CISWS		ttle - NaOH Filtered	60 mL		19012698	Blue	No	
008	CISW3		/ial - Sulfuric Acid	40 mL		9022576	Purple	No	
008	CIEW3	· · · · · · · · · · · · · · · · · · ·	ottle - Unpreserved	100 mL		19043925	Orange	No	
009	CISW4		ttle - NaOH Filtered	60 mL		19012781	Blue	No	
009	CISW4	Clear Plastic Bottl	e - Nitric Acid; Filtered	60 mL	0012024	19047457	Red	Yes	

Wednesday, February 12, 2020 11:38:17 AM

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	HAIN OF CUSTO	DY	RELINQUISHED BY:	RECE	VED BY:	<u> </u>	RELINQUISH	ED BY:	RECEIVED BY:
ALS CO	C#: 8255 ALS I	Laboratory: EB Brisbane	DATE TIME:	DATE	TIME:		DATE TIME:		
CLIENT:	FUPE - FUTURE-PLUS	S ENVIRONMENTAL							
PROJECT:	Redlands Landfill		TURNAROUND REQUIREMENTS :	5 Days		LABORATO	RY USE ONLY (C	rcle)	C
SITE:	Coochiemudlo Is Close	d LF -1				Custody Sea	l intact?	(Yes NO N/A
ORDER NO	:		Biohazard info:			Free ice / fro	zen ice bricks pres	ent upon receipt?	Yes No N/A
	MANAGER: Nicholas Eva		TPH: 07 5357 9463 SAMPLER	MOBILE: 07	5357	Random Sar	nple Temperature d	on Receipt:	C C
	AMPLER: Nicholas Eva			EB2019FUP		Other comm	ents:		
EMAIL REP								S S	
EMAIL INVO								NT.	
009	CISW4		Bottle - Natural	250 mL		19040285	Green	No	
009	CISW4		Unpreserved	250 mL		19194185	Green	No	· · · · · · · · · · · · · · · · · · ·
009	CISW4		ottle - Sulfuric Acid	60 mL		19033083	Purple	No	
009	CISW4		ottle - Unpreserved	100 mL		19081817 19022810	Orange Purple	No	
009	CISW4		/ial - Sulfuric Acid	40 mL 250 mL		9194286	Green	No	
010	CISW5		Buttle - Natural	250 mL		19194258	Green	No	
010	CISW5		e - Nitric Acid; Filtered	60 mL		19047520	Red	Yes	
010	CISW5		ttle - NaOH Filtered	80 mL		19012812	Blue	No	
010	CISW5 CISW5		ottle - Sulfuric Acid	60 mL		19057986	Purple	No	
010	CISW5		ottle - Unpreserved	100 mL		19043836	Orange	No	
010	CISW5		/ial - Sulfuric Acid	40 mL		19022544	Purple	No	
010	Rinstate		ottle - Sulfuric Acid	60 mL	001010	18064008	Purple	No	
011	Rinstate		- Nitric Adid; Filtered	60 mL	001201	98018708	Red	Yes	· · · · · · · · · · · · · · · · · · ·
011	Rinstate		ttle- NaOH Piltered	60 mL	001402	19012833	Blue	No	· · · · · · · · · · · · · · · · · · ·
011	Rinstate	Amber Class B	ottle - Unpreserved	100 mL	004007	19043987	Orange	No	
011	Rinstate	An ber TOC	/ial - Sulfuric Acid	40 mL	001810	19022597	Purple	No	
011	Rinstate	EOD-BOTH	Unpreserved	250 mL	000702	19096268	Green	No	
011	Rinstate	Ciegr Plastic	Bottle - Natural	250 mL	000702	19096171	Green	No	
012	Blank	BOD Bottl	e Unpreserved	250 mL	000705	19194169	Green	No	
012	Blank	Clear Plastic	Bottle - Natural	250 mL	000702	19096065	Green	No	
012	Blank	Clear Piastic Bo	ttle - NaOH Filtered	60 mL	001402	19012436	Blue	No	
012	Blank	Clear Plastic Bottl	e - Nitric Acid; Filtered	60 mL	001201	98018632	Red	Yes	
012	Blank	Clear Plastic B	ottle - Sulfuric Acid	60 mL	001010	18064083	Purple	No	
012	Brank	Amber TOC V	/ial - Sulfuric Acid	40 mL	001810	19003893	Purple	No	
012	Blank	Amber Glass B	ottle - Unpreserved	100 mL		19043574	Orange	No	
013	SWQA	BOD Botti	e Unpreserved	250 mL	000702	19096130	Green	No	

Wednesday, February 12, 2020 11:38:17 AM

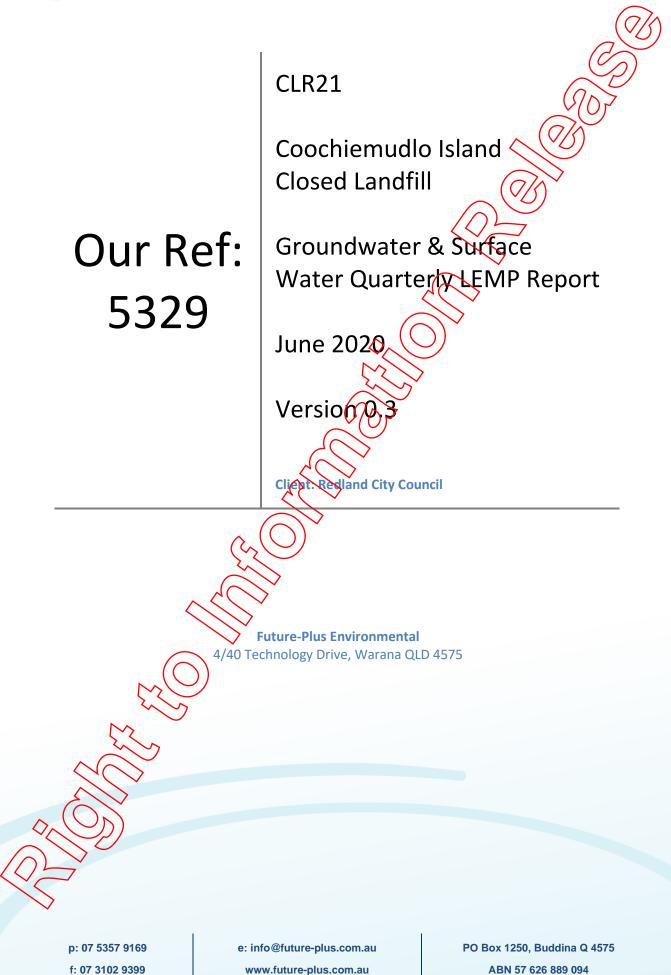
♪ C	HAIN OF CUSTO	DDY	RELINQUISHED BY:	RECEIVE	ED BY:		RELINQUISH	IED BY:	RECEIVED BY:
		Laboratory: EB Brisbane	DATE TIME:	DATE TI	ME:		DATE TIME:		
CLIENT:	FUPE - FUTURE-PLUS	S ENVIRONMENTAL			,				
PROJECT:	Redlands Landfill		TURNAROUND REQUIREMENTS :	5 Days		LABORATOR	Y USE ONLY (C	ircle)	C
SITE:	Coochiemudlo Is Close	d LF -1				Custody Seal i	ntact?	(Yes NO N/A
ORDER NO):		Biohazard info:			Free ice / froze	en ice bricks pres	ent upon receipt?	No N/A
PROJECT	MANAGER: Nicholas Eva	ans CONTAC	L CT PH: 07 5357 9463 SAMPLER M	10BILE: 07 53	357	Random Samp	le Temperature	on Receipt:	° c
PRIMARY	SAMPLER: Nicholas Eva	ans QUOTE I	NO: BN/235/18 B V7 /	EB2019FUPE0	0003	Other commer	its:		
EMAIL REF	PORTS TO:						$\langle \rangle$		
							$\backslash \sim$	>	
EMAIL INV 013	SWQA	Clear Plastic	Bottle - Natural	250 mL	0007021	9096264	Green	No	
013	SWQA		ottle - Sulfuric Acid	60 mL	0010101		Purple	No	
013	SWQA	Clear Plastic Bottle	e - Nitric Acid; Filtered	60 mL	0912019	8018746	Red	Yes	
013	SWQA	Clear Plastic Bo	ttle - NaOH Filtered	60 mL	0014021		Blue	No	
013	SWQA		/ial - Sulfuric Acid	40 mL	0018101		Purple	No	
013	SWQA	L	ottle - Unpreserved	100 mZ	0040071	9043809	Orange	No	
	R		TUT						
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Appendix G. Fieldnotes 6 April 2020 Coochiemudlo Island Former Landfill -Appendix G

Client:	RC	C							Job No.:	532	9		v=[(r ² x1 x1000	
Date:	12/2	2/20							Project:	Kedla	nds.		enno:	
Time	Site	SWL	Depth	Well Volume	Volume Purged	Temp. (°C)	Turbidity (NTU)	Conductivity (uS/cm)	TDS (ppm)	Dissolved Oxygen (ppm)	PH C	Redox (p/V)	Comments	
	CISWS		-	~		23.5	137.6	65.5	42.7	4.13/476		243		
	CISWI		-			23.4	13.7	92.6	60	3.68.003	Spr	222		_
	CISW4		-			23.6	20.6	103.1	67.1	4 4/229	841	185		_
	E E		10 00	1-1-22	8	222	<i>C</i>)	285	186	3.2/476	5.35	203		_
	GW5	4.01	12.06	47.33	(0	23.7	6.1	272	1920	279/27.4	561	233		-
					20	24.1	10.6	200	18 T	216/34.4	4.87	284		-
	1				3032	24	22.6	280		3.43 28.6	4.81	256		
					40	23.8	56.6	700	X2J	2.81/43.1	4.8	262		
		11.02		(sample		23.8	35		187	2.79/28.8	4.82	266		
	GW2	4.02	3.34	(sample		23.8	171	2995	194	3.58146.	6.04	208		~
	002	0.15	3.01		Frit	24.7	912	316	328	3.16/31.5	6.31	186		
				Sample	15	24.8	84.2	316	336	2.97/42.0	6.53	144		
	Gwl	0.69	3	13.6		25.3	59.Q	387	25	4-13/94.8	6.39	157	NG LOCK	
					+Bab	25.6	SE	521	340	1.67/21.9	6.22	164		_
				(sample)	13	22.0	4.0	542	351	2/19.2	6.23	165		_
	GW3	2.56	11.42	52		Eq.1	848	30.9	20.7	4.48/61.3	6.62	100		
		-			10 5	299	74.8	31.4	20	4.06/47.9	6.07	137		
					120	29.2	42.9	32.6	21.6	3.51/48.2	5.93	143		-
					130	29.0	52.8	33.2	21.4	4.77/53.2	5.90	137		-
				¢,	140	28.5	674	28.8	19.0	4.45 56.1	3.90	149		
		1.10	Anon		\$0 \$7	29.2	937	30.6	19.7	4.43.00.1	5.97	162		
	6	4.69	102	SADO	31	216	41.2	7233	1479	2.83/27.7	3.55	252		-
	Giub	9.10	16.23	hyte	10	25.4	241	2296	1522	1.09/15.5	3.55	241		-
					20	25.1	54.2	2332	1498	190/17.9	3.58	312		-
			514	2	30	25.6	1129	2.34ms	1.53ppk		3.63	356		
		15.2	$f(\setminus \setminus \bigvee$		31	255	103.5	2.36ms	1.53ppk	2.18/27.2	3.64	363	31-dry	4
		high				-0,0		6.00 3					recharge same	عاد
	CISIOZ			-	-	25.6	14.4	83.8	54.3	3.55/40.0	5.8	216		
	CIGOB			-	-	24.7	3.6	117.2	76.1	5.06 78.3	5.44	247		
	- YYY	LVC	1											
		\checkmark												
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In preparing this report we have made certain assumptions. We have assumed that all information and documents provided to us by the Client or as a result of a specific request or enquiry were complete, accurate and up-to-date. Where we have obtained information from a government register or database, we have assumed that the information is accurate. Where an assumption has been made, we have not made any independent investigations with respect to the matters the subject of that assumption. We are not aware of any reason why any of the assumptions are incorrect.

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Date: 15 July 2020

Signed on behalf of Future-Plus Environmental Paul Wood Director

15 July 2020

CLR21 Coochiemudlo Island Closed Landfill – GW & SW Quarterly LEMP Report, June 2020 Redland City Council Landfill Environmental Monitoring Program Elizabeth Street, Coochiemudlo Island



DOCUMENT CONTROL INFORMATION

Project Number: 5329

Project Manager: Kaine Pritchard

Client: Redland City Council

Report Title: CLR21 Coochiemudlo Island Closed Landfill - Groundwater & Surface Water Quarterly LEMP

Report, June 2020 - Version 0.3

Project: Redland City Council Landfill Environmental Monitoring Program (LEMR)

Site Address: Elizabeth Street, Coochiemudlo Island, QLD 4184

Project Summary: Quarterly reporting of environmental monitoring undertaken in accordance with the site Landfill Environmental Monitoring Plan (LEMP) at Coochiemudo Island Closed Landfill including groundwater and, surface water monitoring.

Document Version	Document Status	Author	Reviewed By	Approved By
5329-200402-0.1	Draft	Charlotte-Bree Williams	Camille Oliver	Paul Wood
			Jono Hooper	
5329-200402-0.2	Draft	Charlotte-Bree Williams	Jono Hooper	Paul Wood
5329-200402-0.3	Draft	Sophie Blond	Jono Hooper	Paul Wood

Document Review

Issue Approval

Destination	Document Version	Date Dispatched
Redland City Council – Digital Copy	5329-200402-0.1	18 June 2020
Recland City Council – Digital Copy	5329-200402-0.2	25 June 2020
Redland City Council – Digital Copy	5329-200402-0.3	15 July 2020



EXECUTIVE SUMMARY

Future-Plus Environmental (FPE) were commissioned by Redland City Council (RCC) to undertake environmental monitoring in accordance with the *RCC Landfill Environmental Monitoring Program* (LEMP) (GHD, December 2019) at Coochiemudlo Island Former Landfill, located at Elizabeth Street, Coochiemudlo Island (the site).

This report presents the quarterly sampling results of groundwater and surface water environmental monitoring conducted by FPE on 20 May 2020 for Quarter 2, 2020.

In summary, the Quarter 2 monitoring event identified the following:

Groundwater:

- Statistically significant results (where available) were not reported for any parameter at any of the groundwater monitoring locations. New maximums were reported for the following locations and parameters:
 - GW1 for EC;
 - o GW2 for EC and Ammonia; and
 - GW3 for Copper.
- Ammonia as N displayed a sharp increase in downgradient well GW2 when compared to upgradient wells; reaching a new maximum concentration. The adopted WQO was only exceeded at GW2 during the current event;
- Iron (filtered) displayed sharp increase at downgradient well GW2 when compared to other downgradient wells and results of upgradient wells GW5 and GW6;
- Iron levels in conjunction with the Ammonia results at GW2 may indicate potential leachate impact at this location;
- Further in-depth statistical analysis is required to determine if elevated levels of parameters at downgradient locations are statistically different to background levels at upgradient locations. This further analysis is outside the current scope of works; and
- All other results are consistent with historical levels.

Surface water.

Anymonia (a key leachate indicator) was detected during the current sampling at one downstream surface water location CISW1;

15 July 2020



- Ammonia levels were also recorded at upstream locations, indicating that the elevated levels at both upstream and downstream locations could be related to external factors rather than landfill impacts;
- Iron was detected at very low levels across all locations with concentrations increasing slightly when compared to the previous monitoring period;
- Most parameters displayed a slight increase since previous monitoring events, indicative of decreased rainfall that may increase the concentrations of metals and inorganics due to the low flow/stagnant conditions; and
- Based on the current monitoring results, the landfill is considered to pose a low risk to downstream surface water receivers.

Recommendations

Further statistical analysis of the exceedances of key leachate parameters identified in terms of groundwater are recommended to determine if there are significant differences between upgradient and downgradient sampling results and if leachate from the site is potentially impacting on groundwater. Further investigations may be warranted if leachate is found to be impacting on downgradient monitoring locations.

15 July 2020



LIST OF ABBREVIATIONS

Abbreviation	Term
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
BOD	Biological Oxygen Demand
BOM	Bureau of Meteorology
COD	Chemical Oxygen Demand
DES	Department of Environment and Science
DNRME	Department of Natural Resources, Mines and Energy
DO	Dissolved Oxygen
EA	Environmental Authority
EC	Electrical Conductivity
EPP	Environmental Protection Policy
EV	Environmental Values
LEMP	Landfill Environmental Monitoring Program
LOR	Laboratory Limit of Reporting
μS	Micro-Siemens
mBGL	Metres Below Ground Level
NATA	National Association of Testing Authorities
QA/QC	Quality Assurance/Quality Control
QWQG	Queensland Water Quality Guidelines
RCC	Redland City Council
SWL	Standing Water Level
TOC	Total Organic Carbon
TSS	Jotal Suspended Solids
WQO 📉	Water Quality Objective
% S	Percent Saturation
$\prec \sim \sim$	

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1.0 INTRODUCTION

1.1 BACKGROUND

Future-Plus Environmental (FPE) were commissioned by Redland City Council (RCC) to undertake environmental monitoring at Coochiemudlo Island Former Landfill (referred to herein as the site) located at Elizabeth Street, Coochiemudlo Island (the site), in accordance with the site's *Landfill Environmental Monitoring Program* (GHD, December 2016).

The site was utilised as the main disposal point for municipal waste, including mert/hardfill and green waste. It has been recorded that there were 500 residents on the island from 1972 to 1994. As of today, the site is currently used as a waste transfer station and for recreational purposes, including a park, sports field and tennis courts. The surrounding area of the site is mixed land use, including nearby sensitive receptors, which includes a substantial residential area and wetlands.

1.2 REPORT STRUCTURE & CONTENT

This Quarter 2, 2020 report summarises the groundwater and surface water environmental monitoring findings for sampling conducted by FPE on 20 May 2020

This report has been prepared to meet the LEMP reporting requirements and includes the following:

- Details on the monitoring locations, recthodology and data assessment adopted for the quarterly monitoring event;
- Details on the quality assurance/quality controls (QA/QC) for the field sampling;
- Weather and monitoring site conditions during the field sampling events;
- Details on the QA/QC for the monitoring results;
- Results of statistical analysis and exceedances of adopted water quality objectives (WQOs) for the groundwater and surface water sampling results; and
- Results, conclusions and recommendations for the ongoing management of groundwater and surface water at)the site.

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2.0 METHODOLOGY

2.1 OVERVIEW

RCC requires a regime of environmental monitoring at the site to meet the requirements of the REM including quarterly monitoring of groundwater and surface water.

Works undertaken during the Quarter 2 (May 2020) monitoring events, as per the LEMP requirements, were comprised of quarterly groundwater and surface water monitoring undertaken on 20 May 2020.

2.2 MONITORING LOCATIONS & REQUIREMENTS

Groundwater and surface water monitoring locations are presented in Appendix A.

The specific groundwater and surface water environmental monitoring requirements in accordance with the LEMP are presented in **Table 1**.

At each monitoring site field observations are completed and well condition is assessed at each groundwater monitoring site, noting any infrastructure damage, ground disturbance or unusual colour/odour of sampling location.



Monitoring Aspect	Monitoring Location	Field Analysis	Laboratory Analysis				
Groundwater	Upgradient:	pH (pH units)	Sulphate - (Turbidimetric) as SO4				
(Quarterly)	GW5, GW6	Electrical	Major Cations (Na, Mg, K, Ca)				
		Conductivity	Ammonia as N				
	Downgradient:	(µS/cm)	Nitrate Total Phosphorus as P				
	GW1, GW2, GW3	Standing water level	Dissolved metals (Mr. As Al, Cr, Cu,				
		(SWL)	Cd, Pb, Zn, Fe, Hg, Ni				
			Dissolved Mercury				
			Total Organic Carbon (TOC)				
Surface	Upstream	pH (pH units)	Total Suspended Soils (TSS)				
Water	(Background):	Electrical	Sulphate (Turbidimetric) as SO4				
(Quarterly)	CISW2, CISW3,	Conductivity	Major Cations (Na, Mg, K, Ca)				
	CISW4	(µS/cm)	Ammonia as N Nitrate				
		Dissolved Oxygen	Total Nitrogen				
	Downstream:	(ppm and %	Total Phosphorus as P				
	CISW1, CISW5	saturation)	Dissolved metals (Mn, As, Al, Cr, Cu,				
			Cd, Pb, Zn, Fe, Hg, Ni)				
		$(\mathcal{V}/\mathcal{O})$	Total Organic Carbon (TOC)				
			Chemical Oxygen Demand (COD)				
			Biochemical Oxygen Demand (BOD)				

Table 1. Environmental Monitoring Requirements

2.2.1 Groundwater Monitoring Locations

Groundwater quality monitoring is required at two upgradient locations and three downgradient locations, which are presented in **Table 2**.

Table 2. Groundwater Monitoring Sites

Location	GPS Coordinates (UTM GDA94)						
Location	Easting	Northing					
Upgradient Locations							
(GW3)	532940	6950507					
GWB	532940	6950407					
Downgradient Locations							
GW1	533049	6950518					
GW2	533058	6950484					
GW3	533038	6950418					

2.2 Surface Water Monitoring Locations

Surface water quality monitoring is required for three upstream (background) and two downstream locations and these are presented in **Table 3**.



Table 3. Surface Water Monitoring Sites

Location	GPS Coordinate	es (UTM GDA94)
Location	Easting	Northing
Upstream (Background) Loca	tions	(
CISW2	533157	6950606
CISW3	533256	6950606
CISW4	533255	6950351
Downstream Locations		\sim
CISW1	533088	6950607
CISW5	533068	6950440

2.3 MONITORING RESULTS DATABASE

Results of all groundwater and surface water monitoring field and laboratory analysis have been entered into the ESdat environmental monitoring database, which includes historical monitoring results and allows for comparison of results with adopted WQOs.

2.4 ENVIRONMENTAL GUIDELINES

The Environmental Protection (Water) Policy 2009 - Moreton Bay environmental values and water quality objectives (Department of Environment and Resource Management (DERM)2, July 2010), [referred to henceforth as EPP (Water)] defines the environmental values (EVs) for surface and groundwater quality within the region. This document also identifies the WQOs associated with each EV.

As the site and the Melaleuca Wetland are situated within the coastal freshwater area within Coochiemudlo Island, the site is classified as "Coochiemudlo Island" for the purpose of establishing EVs and associated WQOs (DERM, 2010).

The following EVs and their relevant guidelines apply (as specified in the EPP (water) for Coochiemudlo Island):

- Aquatic Ecosystems (include seagrass) (Groundwater/surface water);
- Irrigation (Groundwater);
- \$tock Water (Groundwater);
- Human Consumer (include oystering) (Surface water only);
- Drinking water (Groundwater only);
- Rrimary/Secondary/Visual Recreation (Surface water only); and

Cultural and Spiritual Values (Surface water only).

The above EVs represent potential receptors of any impacts from Coochiemudlo Island Former Landfill. An assessment of these potential receptors by GHD (GHD, 2019b) identified the following receptors as actual or likely receptors for further assessment, based on characterising actual water use in the area:



- Surface water: aquatic ecosystems (including Wallum frog habitat (GHD, 2018a), cultural and spiritual values; and
- Groundwater: aquatic ecosystems.

As recommended in the EPP (water), the adopted WQOs were determined from a combination of documents, including the following:

- Environmental Protection (Water) Policy (Department of Natural Resource Management, 2010) corresponding to the following:
 - Physico-chemical WQOs for aquatic ecosystem lowland freshwater (comprising lowland streams, Wallum/tannin-stained streams and coastal streams)
 - Local WQOs for drinking water supply
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Environment and Conservation Council [ANZESC]/Agriculture and Resource Management Council of Australia and New Zealand [ARMCANZ], 2000 and 2018 revision), corresponding to the following:
 - Protection of slightly to moderately disturbed ecosystems
 - Utilised as the site is in an urbanised environment
 - Protection of 99% species for surface water for metals only
 - Utilised as an indicator of metal concentrations elevated in relation to optimal concentrations for Wallum frog habitat

Site-specific WQOs have also been developed to improve the assessment of potential wallum frog habitats:

- GHD 2018 Coochiemond Island wetland guideline for the following parameters (GHD, 2018):
 - o pH between 3.53 and 4.61 pH units;
 - EC < 90 μS/cm;
 - Tannin acid staining > 9.5 mg/L;
 - Calcium + 3.02 mg/L; AND
 - Low Jevels of monomeric aluminium consistent with siliceous sand and Wallum waters

(refer to Aluminium guideline value from ANZECC FW 99%)

The results from the groundwater and surface water monitoring have been compared against the

WOO

2.5 DATA ASSESSMENT

2.5.1 Groundwater

Data assessment for groundwater has been undertaken to determine if leachate generated at the site is potentially impacting on local groundwater. The following assessment approach has been adopted:

- Identification of statistically significant fluctuations in groundwater quality;
- Comparison of results with published WQOs (refer to Section 2.4);
- Comparison between up gradient and down gradient locations (refer to Section 2.5.2.1); and
- Evaluation of trends in indicator parameter concentrations.

2.5.2 Groundwater Statistical Assessment

Results from each monitoring well were compared to the mean (x) and multiples of standard deviations (x+1s, x+2s and x+3s) of historical results for each specific parameter. Historical data for the site monitoring wells is based on the first eight sampling events conducted at the start of the landfill monitoring program (since June 2017 or April 2018, depending on location and parameter). As such, some locations and parameters require additional monitoring data before control times can be determined.

The adopted assessment criteria consist of the following exceedances:

- Five consecutive observations greater than the x+1s control line;
- Two consecutive observations greater than the x+2s control line; and
- One observation greater than the x+3s control line

In the case of pH, the control line also applies when pH measurements are less than the mean (i.e. x-1s, x-2s, x-3s). Statistically significant results that are identified are discussed further, to provide comparison with background water quality and provide context regarding any potential impact on the receiving environment.

Each parameter for each groundwater well has been graphed and includes the above adopted assessment criteria (Appendix C).

2.5.2.1 Upgradient & Downgradient Well Comparison

Comparison of up-gradient and down-gradient groundwater well data is undertaken by assessment of groundwater trend graphs provided in **Appendix D**.

2.5.3 Surface Water

pata assessment for surface water has been undertaken to determine if leachate generated at the site is potentially impacting on local surface water quality. The following assessment approach has been adopted:

Identification of statistically significant fluctuations in groundwater quality;



- Comparison of results with adopted WQOs (refer to Section 2.4);
- Comparison between upstream and downstream monitoring locations (refer to Section 2.5.3.1); and
- Evaluation of trends in parameter concentrations at specific surface water monitoring ocations

2.5.3.1 Upstream & Downstream Comparison

Comparison of up-stream and down-stream surface water data is undertaken by assessment of surface water trend graphs provided in **Appendix E**.



3.0 QUALITY ASSURANCE & QUALITY CONTROL – FIELD SAMPLING

3.1 GENERAL

The Quality Assurance /Quality Control (QA/QC) program for the field sampling component of the LEM was undertaken in accordance with, but not limited to, the following:

- Monitoring and Sampling Manual Environmental Protection (Water) Policy 2009 (Version 2) (DES, 2018);
- ISO 5667-11 1993 and AS/NZ 5667.11:1998 Water Quality Sampling Guidance on Sampling of Groundwater;
- AS/NZS 5667.6: 1998 Water Quality Sampling Guidance on Sampling of Rivers and Streams;
- Environmental Guidelines: Solid Waste Landfills, Second Edition 2016 (NSW EPA, 2016); and
- Best Practice Environmental Management Siting, Design, Operation and Rehabilitation of Landfills (Publication 788.3) (EPA Victoria, 2015).

QA/QC procedures included:

- Monitoring of climatic conditions likely to be experienced at site;
- Calibration of TPS 90 FLT water meter prior to and following sampling;
- Triple rinse decontamination procedure of all equipment prior to sampling and between sampling points for all environmental monitoripg;
- Use of nitrile disposable gloves for sample collection. Disposable gloves were replaced between sample locations;
- Collection of field duplicate, trible blank and rinsate blank samples;
- Review of QC reports generated by the laboratory of their internal procedures and checks including matrix spikes, surrogate spikes, duplicate analyses, reagent and method blanks;
- Correct cold storage of samples (target <6 degrees °C) and delivery to ALS Global NATA accredited laboratory within recommended holding times (target 24 hrs); and
- Record keeping of transport documentation and use of chain of custody procedures, including sample list forms submitted to the laboratory and laboratory sample receipt documentation.

3.2 FIELD & LABORATORY WATER QUALITY ANALYSIS

Analysis of field parameters was undertaken using a TPS 90FLT water quality meter. Laboratory analysis was undertaken by ALS Global (NATA accredited) laboratory in accordance with the laboratory methods and level of reporting detailed in **Table 4**.



Table 4. Water Quality Laboratory	Parameters & LOR
-----------------------------------	------------------

Parameter	LOR (mg/L or as indicated)
Sulphate – (Turbidimetric) as SO ₄	1
Major Cations: Ca, Mg, Na, K	1 (97)
Ammonia as N	0.01
Nitrate	0.01
Dissolved Metals (Mn, As, Al, Cr (III+VI), Cu, Cd, Pb, Zn, Fe, Hg)	Zn: 0.085 Hg: 0.0001 Others: 0.001
Total Organic Carbon (TOC)	
Chemical Oxygen Demand (COD)	10
Biological Oxygen Demand (COD)	2
Total Suspended Solids (TSS)	5
Total Phosphorus	0.01

3.2.1 Field Data Quality Assessment

As part of the QA/QC program, field duplicates, field blank and rinsate samples were prepared and submitted for laboratory analysis.

FPE follow strict sample collection procedures to ensure representative samples are collected and high results integrity achieved.

3.2.2 Field blanks

Field blanks were used to assess the potential for cross contamination during field handling procedures and shipment of the samples to the laboratory and consisted of a sample of deionised water that was supplied by the laboratory.

Field blank samples were submitted for analysis with each batch / esky of samples collected during groundwater and surface water campling events.

One field blank sample (Sample ID Blank) was analysed for the parameters specified in Appendix C: Coochiemudlo Island Closed Landfill of the Environmental Monitoring Plan for the Landfill Environmental Monitoring Program (FPE, 2019).

3.2.3 Rinsate

Equipment rinsate blanks were prepared in order to assess whether equipment decontamination procedures adequately prevented and/or minimised the potential for sample cross-contamination. A rinsate sample was collected following completion of each sampling event during which sampling equipment (e.g. sampling jug) was utilised for sample collection.



One rinsate blank sample (Sample ID Rinsate) was prepared and submitted to the laboratory for analysis of analytes representative of the sampling undertaken during each sampling event (GW and SW inclusive).

3.2.4 Duplicates

A duplicate sample (SWQA) was taken during each monitoring event (GW and SW inclusive) for analysis and used to indicate if repeatable results are obtained and for the quality of data to be evaluated.

Duplicate samples were submitted for analysis with each batch of samples collected (primary sample CISW4).

A Precision assessment is reported as Relative Percent Difference (RPD) between the two results (sample and duplicate). Where the RPD value is greater than the adopted trigger value, it is identified as an exceedance.



4.0 WEATHER & MONITORING SITE CONDITIONS

4.1 SITE CONDITIONS

Light rainfall occurred on the day of monitoring; however, the ground conditions were not saturated. Surface water points CISW1 and CISW2 were difficult to access due to long vegetation within the wetland. The remaining sample locations were readily accessible.

4.2 WEATHER CONDITIONS

Conditions at the time of monitoring on 20 May 2020 have been outlined below. All climate data (except rainfall) was extracted from the Redland (Alexandra Hills) Station No.140007 (Bureau of Meteorology [BOM] 2020). Temperatures ranged from 15.4 to 22.8 °C during sampling.

Annual rainfall statistics were utilised from the BOM Ormiston College Station No. 40770, which is 10.6km from the site and is the closest station with suitable long-term data. Minor rainfall totals were received the week preceding (13.6 mm in 7 days) and during monitoring event on the 20 May 2020 (6.0 mm).

Annual rainfall statistics (1988-present) from the Ormiston College Station No. 40770 are displayed in **Figure 1** below.

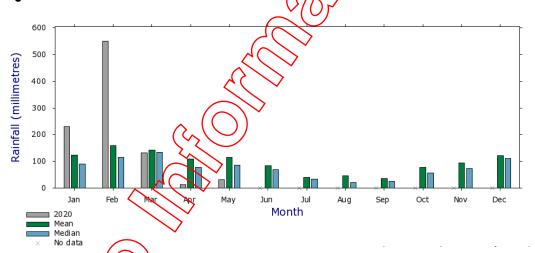


Figure 1. Annual Rainfall Statistics (BOM, 2020).



5.0 QUALITY ASSURANCE & QUALITY CONTROL - SAMPLING RESULTS (

5.1 LABORATORY QA/QC RESULTS

As part of the QA/QC program, field duplicates, trip blank and rinsate samples were prepared and submitted for laboratory analysis. Laboratory QA/QC Results are provided in **Appendix F**.

FPE follow strict sample collection procedures to ensure representative samples are collected and high results integrity achieved.

The Relative Percentage Difference (RPD) for the field duplicate was acceptable based on the following:

- Below 50% if result was between 10 and 20 times LOR;
- Below 20% if result >20 times LOR; and
- No limit if result <10 times the LOR.

RPD were within acceptable limits outlined above for all field duplicates

Traces of parameters TOC, COD and BOD were identified in the Blank sample, whilst traces of BOD was detected in the Rinsate sample, however this is not considered to impact the outcome of results.

Review of the laboratory QA/QC reporting identified the following:

- No Method Blank value outliers occur;
- No Duplicate outliers occur;
- No Laboratory Control outliers occur;
- Matrix Spike outliers exist for Phosphorus, as the background level was greater than or equal to 4x spike level;
- No Surrogate recovery outliers occur;
- No Analysis Holding Time Outliers occur; and
- No Quality Control Sample Frequency Outliers occur.

Based on results above FPE has confidence that the sampling results are representative of the site

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conditions.



6.0 MONITORING RESULTS

All groundwater and surface water sampling locations were effectively sampled during the Quarter 2 monitoring event. All tabulated groundwater and surface water results from the Quarter 2 monitoring event are provided in **Appendix B**.

6.1 GROUNDWATER RESULTS

6.1.1 Groundwater Levels

Groundwater levels (mAHD) for each groundwater bore are displayed in the **Figure 2** below, from 2017 to 2020. Upgradient bores at the site are GW5 and GW6, while downgradient bores are represented by GW1, GW2 and GW3.

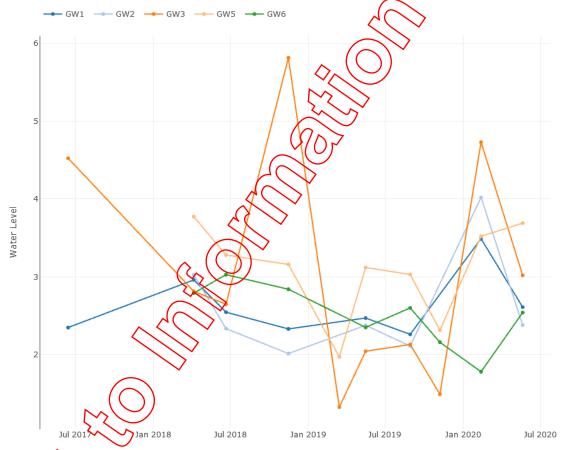


Figure 2. Groundwater levels (mAHD) of monitoring wells at Coochiemudlo Island Closed Landfill from 2017 to 2020

Groundwater levels have decreased at all downgradient locations during the current monitoring event when compared to the previous monitoring event, which is likely attributed to the less than average rainfall during the months April and May 2020 (refer Section 4.2). Groundwater levels slightly increased at upgradient locations GW5 and GW6 during the May 2020 sampling event. Groundwater levels varied from



2.38mAHD (GW2) to 3.69mAHD (GW5) and all locations are within the historical range of groundwater levels.

6.1.2 Well Condition Review

The condition of all groundwater wells during the most recent monitoring event is provided in **Table 5** below.

Table 5. Groundwater Well Condition Review

Monitoring well ID	Condition as of May 2020
Upgradient bores	\sim
GW5	Good
GW6	Good
Downgradient bores	$\langle \langle \rangle$
GW1	Good
GW2	Good
GW3	Good

6.1.3 Field Observations

Visual observations of sample material retrieved from al groundwater wells is noted in Table 6 below.

Table 6. Groundwater well location and sample descriptions

Location ID	Location Description	Sample description							
Upgradient bores									
GW5	Located 5 m east of the waste transfer	Clear, no suspended solids or odour.							
GW6	Located 60 m south of the waste	Organic/Sulphur odour, cloudy with small particles.							
Downgradient be	Downgradient bores								
GW1	Located 10 m west of the waste transfer station.	Clear, small particles present and no odour.							
GW2	Located 10 m west of the closed landfill.	Strong odour of Sulphur and Hydrocarbons.							
GW3	Landfill, adjacent to the tennis court.	Orange/brown in colour, highly turbid and no odour.							



6.1.4 Groundwater Statistical Analysis									((
				Sar	npling D	ate				
Monitori ng Well	Paramet er	Unit s	14/05/19	20/08/19	13/11/19	17/02/20	19/05/20	X+ 1s	X+2s	()+3s //
GW5	тос	mg/ L	1	<1	1	<1	2	1 (75	1
GW3	Copper	mg/ L	0.00 7	0.000 9	0.001 8	N/A	0.01 < 2	6.0819 6	070024 7	0.00298 7
GW6	Iron	mg/ L	0.15 3	0.745	0.241	0.11	4	0.4512 6	0.6535 2	0.85579 0

6.1.4 Groundwater Statistical Analysis

Note: N/A – parameter not analysed in February 2020

A review of the statistically significant results and WQO exceedences reported during the May 2020 monitoring period within up and down gradient monitoring wells is summarised in the following sections.

Trend charts with analytes plotted against control line criteria are provided in Appendix C.

6.1.5 Upgradient Monitoring Well Results

WQO exceedances for upgradient sites GW5 and GW6 are summarised in **Table 7** below. WQO exceedances at GW5 and GW6 are considered to represent background conditions and are not considered to represent impact from the former landfill.

Table 1. Exceedances of with 5 at apgradient monitoring ones	Table 7. Exceedances	of WQOs at Upgradient Monitor	ring Sites
--	----------------------	-------------------------------	------------

	Parameter	Units	Units EVs			rent sult
		\bigcirc			GW5	GW6
	рН	RH	GHD 2018 Coochiemudlo Island wetland	3.53-4.61		
	E.	Units	Moreton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	6.5-8	4.73	3.72
	EC	µS/cm	GHD 2018 Coochiemudlo Island wetland	90		
5			Moreton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	626	334	2724
	$\overline{\mathbf{v}}$		Schedule 1 EPP (water) - Drinking Water	1,000		



				Curi	Z	
Parameter	Units	EVs	WQOs	GW5	sult GWS	$\widetilde{\mathcal{D}}$
Nitrate	mg/L	ANZECC FW Slight-mod disturbed system	0.158	1.56	SMO7	
Aluminium	mg/L	ANZECC FW Slight-mod disturbed system	0.055	N/A	6.05	
Iron (Filtered)	mg/L	Schedule 1 EPP (water) - Drinking Water	0.05	NA	1.49	
Manganese	mg/L	Schedule 1 EPP (water) - Drinking Water	0.05	N/A	0.138	
Phosphorus	mg/L	Moreton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	0.05	N/A	0.16	
Zinc	mg/L	ANZECC FW Slight-mod disturbed system	0.008	N/A	0.014	

*Note: N/A Indicates that the result from that sampling location did not exceed any guidelines and thus not included in the exceedance table.

The majority of monitored parameters at both upgradient locations and not exceed the statistical assessment criteria, except for the following:

- GW5 TOC (2 mg/l) exceeded the X+2s and X+3s control line criteria;
- GW6 Iron (1.49 mg/l) exceeded the X+3s control line criteria.

6.1.6 Downgradient Monitoring Well Results

WQO exceedances for downgradient groundwater well sites GW1, GW2 and GW3 are summarised in **Table 8** below.

Parameter	Units	EVs	WQOs	Current Result		
raiameter				GW1	GW2	GW3
		GHD 2018 Coochiemudlo Island	3.53-	6.33	6.07	5.4
pH ~	Units	wetland	4.61			
		Moreton Bay - Schedule 1 EPP (water)	6.5 – 8			
		- Wallum/Tannin Freshwater	0.0 - 0			
	µS/cm	GHD 2018 Coochiemudlo Island	90		1403	N/A
		wetland		751		
		Moreton Bay - Schedule 1 EPP (water)	626	131		
\square		- Wallum/Tannin Freshwater				
<u> </u>	1					

Table 8. Exceedances of WQOs at Downgradient Monitoring Sites



Parameter	Units	EVs	WQOs	Current Result			(V)
				GW1	GW2	GNO	$\widetilde{\mathcal{O}}$
		Schedule 1 EPP (water) - Drinking Water	1000				
Ammonia as N	mg/L	Moreton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	0.02	N/A		N/A	
Nitrate (as N)	mg/L	ANZECC FW Slight-mod disturbed system	0.158	0.36	N/A	N/A	
Aluminium	mg/L	ANZECC FW Slight-mod disturbed system	0.055	N/A	0.06	0.21	
Copper	mg/L	ANZECC FW Slight-mod disturbed system	0.0014	N/A	N/A	0.012	
Iron (Filtered)	mg/L	Schedule 1 EPP (water) - Drinking Water	0.05	N/A	9.99	0.11	
Phosphorus	mg/L	Moreton Bay - Schedule 1 BPP (water) - Wallum/Tannin Preshwater	0.05	N/A	0.17	1.35	
Zinc	mg/L	ANZECC FW Slight-mod disturbed	0.008	N/A	N/A	0.012	

*Note: N/A Indicates that the result from that sampling location did not exceed any guidelines and thus not included in the exceedance table.

6.1.6.1 Downgradient well - GW1

All monitored parameters at downgradient GW1 were within the statistical assessment criteria for this quarterly monitoring event.

Concentrations of parameters, including where WQOs were exceeded, were consistent with background concentration ranges and/or with recent concentration trends with the exception of:

pH levels (6.33 pH units) slightly increased during the current monitoring event when compared to February 2020 (6.23 pH units). pH has continued to gradually increase since November 2018 and exceeded the adopted WQOs;

E levels (751 μ /S) increased during the current sampling event when compared to the February 2020 (521 μ /S). This result is a new maximum concentration event and exceeded the adopted WQOs;



 Nitrate levels (0.36 mg/L) remained higher than the background levels of GW6 (0.0mg/L) and below background levels of GW5 (1.56 mg/L). However, the result is within the historical range of data.

6.1.6.2 Downgradient well – GW2

All monitored parameters at downgradient GW2 were within the statistical assessment criteria for this quarterly monitoring event.

Concentrations of parameters, including where WQOs were exceeded, were consistent with background concentration ranges and/or with recent concentration trends with the exception of:

- pH levels (6.07 pH units) slightly decreased during the current monitoring event when compared to February 2020 (6.53 pH units), however, exceeded the adopted WQOs;
- EC levels (1403 μ/S) sharply increased during the current sampling event when compared to the February 2020 (516 μ/S). This result is a new maximum concentration event and exceeded the adopted WQOs, however, remained below the background levels of GW6 (2724 μ/S);
- Ammonia levels (0.1 mg/L) sharply increased during the surrent sampling event, reaching a new maximum concentration and exceeding the adopted WQOs and background levels at both upgradient locations;
- Aluminium levels (0.06mg/L) slightly decreased during the current sampling event when compared to the February 2020 (0.3 mg/L) monitoring event. The results remained well below the background levels at upgradient well GW6, however, exceeded the adopted WQO;
- Iron (filtered) levels (9.99 mg/L) displayed a sharp increase when compared to the previous monitoring event (0.16 mg/L). This result remains consistent with previous results at this location and continues to be several orders of magnitude greater than upgradient locations. This result also exceeds the adopted WQOs;
- Phosphorus levels (0.17mg/L) have increased when compared to November 2019 levels (0.01 mg/L). The result exceeded background levels at upgradient well GW5 (0.0 mg/L) and exceeded the adopted WQOs.

6.1.6.3 Downgradjent well – GW3

The majority of monitored parameters at downgradient GW3 did not exceed the statistical assessment criteria, except for the following:

Copper (0.012mg/L) exceeded the X+3s control line criteria.

Concentrations of parameters, including where WQOs were exceeded, were consistent with background concentration ranges and/or with recent concentration trends with the exception of:

pH levels (5.4 pH units) slightly decreased since the previous event in February 2020 (5.9 pH units), however, exceeded the adopted WQOs.



- Aluminium levels (0.21 mg/L) slightly decreased during the current sampling event when compared to the February 2020 (0.37 mg/L) monitoring event. The results remained well below the background levels at upgradient well GW6, however, exceeded the adopted WQO;
- Copper levels (0.012 mg/L) sharply increased when compared to the November 2019 (0.0018 mg/L) monitoring event. This result is a new maximum concentration and far exceeds background levels at GW5 (0.00 mg/L) and GW6 (0.00 mg/L);
- Iron (filtered) levels (0.11 mg/L) decreased when compared to the previous monitoring event (0.13 mg/L). The result remains below the background levels at upgradient well GW6 (1.49 mg/L), however, exceeds the adopted WQOs;
- Phosphorus levels (1.35 mg/L) have increased when compared to November 2019 levels (0.01 mg/L). The result exceeded background levels at upgradient wells GW5 (0.00 mg/L) and GW6 (0.16 mg/L), exceeding the adopted WQOs.
- Zinc levels (0.012 mg/L) have slightly increased when compared to February 2020 levels (0.00 mg/L) and exceeded background levels at upgradient well GW6 (0.014 mg/L).

6.1.7 Summary of potential landfill impact on Groundwates

All wells were sampled in May 2020. New maximums were reported at downgradient locations for:

- GW1 for EC;
- GW2 for EC and Ammonia; and
- GW3 for Copper.

Whilst concentrations exceeding the adopted WQOs were reported, results were consistent with background data with the exception of

- GW2 for Ammonia; and
- GW3 for Copper.

Ammonia as N displayed a sharp increase in downgradient well GW2 when compared to upgradient wells, reaching a new maximum concentration. Ammonia levels at this location have displayed variation in concentrations when looking at historical levels, indicating that this sharp increase may be related to natural variation, rather than landfill impacts.

Iron (filtered) displayed a sharp increase at downgradient well GW2 when compared to other downgradient wells and upgradient wells GW5 and GW6. The variability of results at GW2 continues, as Iron concentrations have fluctuated here in the past. Iron is considered another key leachate indicator, and these results, in conjunction with the Ammonia results at GW2, might indicate potential leachate impacts.



pH, an important consideration for acid frog habitat downstream of the former landfill, was noted to be higher at downgradient wells (5.4-6.33) than upgradient wells (3.72-4.73). Historical pH levels appear to fluctuate and be influenced by rainfall events at GW2 and GW3, and to a lesser extent at GW1, suggesting the soil profile at these locations may be more permeable to surface water inputs and/or impacted by historical landfilling on the site.

6.2 SURFACE WATER RESULTS

6.2.1 Monitoring location descriptions

The details of the surface water locations and field observation have been summarised in Table 9.

Location ID	Location Description	Sample description
Background sur	face water monitoring locations	\bigcirc
CISW2	Background, potential Wallum frog habitat	Tanoin-stained colour. Large particle present, with no odour.
CISW3	Background, potential Wallum frog habitat	Tannin-stained colour. Large particle present, with no odour.
CISW4	Background	Low water level, with an oily film. Light brown in colour, with no odour.
Downstream sur	face water monitoring locations	
CISW1	Downstream of former landfill	Light brown in colour, with small- medium particles.
CISW5	Downstream of former landfill	Light brown in colour, with small particles.

Table 9. Surface water locations and sample descriptions

6.2.2 Background Surface Water Results

6.2.2.1 Surface Water Sites – CISW2, CISW3, CISW4

WQO exceedances for background sites CISW2, CISW3 and CISW4 are summarised in **Table 10** below. WQO exceedances at CISW2, CISW3 and CISW4 are considered to represent background conditions and are not considered to represent impact from the former landfill but are included for comparative

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purposes



Parameter	Units	EVs	WQOs	C	urrent Res	ult
Falametei	Units	LVS	11005	CISW2	CISW3	CISW4
		GHD 2018 Coochiemudlo	3.53-			(70)
		Island wetland	4.61		6	7/0
pН	pH	Moreton Bay - Schedule 1		6.25	5.59	6.70
	Units	EPP (water) - Wallum/Tannin	6.5 – 8		\overline{O}	
		Freshwater				
		Moreton Bay - Schedule 1		$\neg \Diamond$		
DO	%Sat	EPP (water) - Wallum/Tannin	85-110	49.4	37.3	38.3
		Freshwater		\bigcirc		
50		GHD 2018 Coochiemudlo		2224	204	240
EC	µS/cm	Island wetland	90	331	304	340
		Moreton Bay - Schedule 1				
Ammonia	mg/L	EPP (water) - Wallum/Tannin	0.02	N/A	0.08	N/A
		Freshwater	~~~			
		ANZECC 2000 FW 89% -	9			
		applicable to CISW2 and	0.027			
Aluminium	ma/l	CISW3 only		0.19	0.34	N/A
Aluminium	mg/L	ANZECC 2000 Fresh water		0.19	0.34	N/A
		Slightly-moderate disturbed	0.055			
		system				
		ANZECC 2000 FW 99% -				
Arsenic	mg/L	applicable to CISW2 and	0.0008	0.001	0.001	N/A
		CISW3 only				
Nitrogen		Moreton Bay - Schedule 1				
(total)	_mg/L	EPP (water) - Wallum/Tannin	0.5	2.4	4.0	1.4
		Freshwater				
- 50	2	ANZECC 2000 FW 99% -				
$\langle \langle \rangle$,	applicable to CISW2 and	0.00001			
Chromium	mg/L	CISW3 only		0.002	0.002	0.003
	IIIY/L	ANZECC 2000 Fresh water		0.002	0.002	0.005
$\leq \mathcal{O}$		Slightly-moderate disturbed	0.001			
7		system				

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Parameter	Units	EVs	WQOs	C	urrent Res	ult
i arameter	Onits	LVS	ngos	CISW2	CISW3	CISW4_7
Iron	mg/L	Schedule 1 EPP (water) -	0.05	2.98	7.36	14.5
IIOII	mg/L	Drinking Water	0.00	2.30	7.50	(707
		Moreton Bay - Schedule 1			. ((77
Phosphorus	mg/L	EPP (water) - Wallum/Tannin	0.05	0.17	0.26	0.10
		Freshwater			an	
		ANZECC 2000 FW 99% -			NO N	
		applicable to CISW2 and	0.0024			
Zinc	mg/L	CISW3 only		0.007	N/A	0.025
Ziilt	ing/L	ANZECC 2000 Fresh water		0.001	IN/A	0.025
		Slightly-moderate disturbed	0.008			
		system	$\sim (C$)		

Note: * N/A Indicates that the result from that sampling location did not exceed any guidelines and thus not included in the exceedance table.

Comparison of the current surface water results at 2502, CISW3 and CISW4 against recent data indicates all parameters were consistent, and were within ranges reported historically with the exception of:

- Ammonia increased above historical data at CISW3 (0.08mg/L) and represent new maximums at these locations, thereby exceeded the adopted WQOs;
- EC increased above historical data for CISW4 (340 μ/S) reaching a new maximum at this location and exceeding the adopted WQOs;
- Iron increased above historical data for CISW4 (14.5 mg/L) and represent new maximums at this location. The adopted WQOs for Iron were again exceeded at this location;
- pH increased above historical data for CISW3 (5.59 pH units) and represent new maximums at these locations. The adopted WQOs for pH were again exceeded this location;
- Phosphorus increased above historical data for CISW3 (0.26 mg/L) and represent new maximums at these locations. The result exceeded the adopted WQOs for Phosphorus; and
- Nitrogen increased above historical data for CISW3 (4 mg/L) and represent new maximums at these locations. The result exceeded the adopted WQOs.

New maximum concentrations were also recorded at CISW3 for COD (452 mg/L) and TSS (129 mg/L) and CISW4 for Magnesium (8 mg/L), Manganese (0.046 mg/L), Nickel (0.002 mg/L) and TSS (42 mg/L). Despite these parameters reaching new maximum concentrations, their levels were below the adopted WQOs and therefore are not considered a risk at this stage.



6.2.3 Downstream Surface Water Sampling Results

WQO exceedances for downstream surface sites CISW1 and CISW5 are summarised in Table 11 being

Table 11. Exceedances of	of WQOs Downstream	Surface Water Sites
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Parameter	Units	EVs	WQOs	Current	Result
rarameter	Units	LV3	11603	CISWY	CISW5
рН	pH Units	GHD 2018 Coochiemudlo Island wetland Moreton Bay - Schedule 1 EPP (water) -	3.53- 4.61	0.56	5.85
		Wallum/Tannin Freshwater	6.5-8		
DO	%Sat	Moreton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	85-110	34.9	34.9
EC	µS/cm	GHD 2018 Coochiemudlo Island wetland Moreton Bay - Schedule 1 ERP (water) - Wallum/Tannin Freshwater	90 626	916	180.5
Ammonia	mg/L	Moreton Bay - Schedule 1 EPR (water) - Wallum/Tannin Freshwater	0.02	0.04	N/A
Aluminium	mg/L	ANZECC 2000 Fresh water Slightly- moderate disturbed system	0.055	N/A	0.87
Nitrogen (total)	mg/L	Moreton Bay Schedule 1 EPP (water) - Wallum/Tannin Freshwater	0.5	0.6	0.6
Copper	mg/L	ANZECC 2000 Fresh water Slightly- moderate disturbed system	0.0014	0.002	0.002
Iron	mg/L	Schedule Y EPP (water) - Drinking Water	0.05	0.88	0.53
Zinc	mg/L	ANZECC 2000 Fresh water Slightly- moderate disturbed system	0.008	N/A	0.022

6.2.3.1 Surface Water Sites – CISW1 and CISW5

An assessment of the above results for surface water sites CISW1 and CISW5 reveal the following:

Aluminium levels (0.87mg/L CISW5) decreased when compared to the previous monitoring period (1.83 mg/L CISW5), however, is higher than background locations CISW2, CISW3 and CISW4. The concentration at CISW1 remains within historical levels;

Ammonia levels (0.04 mg/L CISW1) have increased since the previous monitoring period, however remained below levels at upstream location CISW3;



- Copper levels (0.002 mg/L) displayed an increase when compared the previous monitoring period, however, this parameter has not been sampled since July 2019. This result exceeded the levels at all upstream locations and the adopted WQOs;
- DO (34.9% CISW1 and CISW5) decreased when compared to the February 2020 (50.3% CISW) and 47.6% CWIS5) monitoring event. These results still fall short of the adopted WQQ enteria.
- EC levels (916 µS/cm CISW1 and 180.5 µS/cm CISW5) displayed a slight increase when compared to the previous monitoring period. The EC level at CWIS5 (180.5 µS/cm) reached a new maximum during the current sampling event. EC levels at CISW1 exceeded levels at all upstream locations. Both locations exceeded the adopted WQOs this monitoring period;
- Iron (filtered) levels, remained consistent with historical limits, however, exceeded the adopted WQOs;
- pH increased above historical data for CISW1 (6.66 pH units) and represents a new maximum at this location. The adopted WQOs for pH were exceeded for both downstream locations; and
- Zinc levels slightly increased when compared to the previous monitoring period, exceeding the adopted WQOs.

6.2.4 Summary of potential landfill impact on surface water

Ammonia (a key leachate indicator) was detected during the current sampling at one downstream location CISW1. The elevated levels could possibly be related to the to external factors that may be affecting upstream location CISW3, which also recorded elevated levels of Ammonia. Another leachate indicator, Iron, was detected at very low levels across all locations, with concentrations increasing slightly when compared to the previous monitoring period. Most parameters displayed a slight increase since previous monitoring events, indicative of decreased rainfall, which may increase the concentrations of metals and inorganics due to the low flow/stagnant conditions.

A soluble sulfate ratio (CI:SO₄²) of less than 2 was detected during the current sampling round (0.3), with 36mg/L chloride and (24mg/L sulfate detected at GW1. All other sites monitored were greater than 2. The *State Planning* Policy 2/02 *Guideline Acid Sulfate Soils (ASS)* (Queensland Government 2002) outlines that where there is an elevated level of sulfate ions relative to chloride ions, these results may indicate the presence of ASS. However, the soluble sulfate ratio becomes less predictive as the water becomes less brackish. Water at GW1 had an EC of 751 μ S/cm, which indicates freshwater is present. pH at GW1 was also not less than 6 and aluminium was below the limit of reporting. Therefore, contrary to previous reports (GHD, 2019b), there appears no impact of acid sulphate soils in the current monitoring results.



7.0 CONCLUSIONS

7.1 GROUNDWATER

All groundwater monitoring wells were sampled in May 2020, and results have been assessed for their potential for landfill leachate to impact groundwater by comparing results with the WQOs (as per the EVs in the *EPP (Water) 2009*), statistical assessment of the dataset and by comparing the (inferred) up gradient and down gradient groundwater quality results.

Statistically significant results were reported in the downgradient groundwater locations² for the following parameters:

- GW3 for Copper;
- GW5 for TOC; and
- GW6 for Iron.

Adopted WQOs were exceeded at both up and down gradient locations for pH, EC, Aluminium, Iron, Nitrogen, Phosphorus and Zinc . Ammonia and Copper were the only parameters that exceeded the adopted WQOs only at down-gradient wells. These parameters will require continued monitoring in future events to determine if further investigations are required.

New maximums were reported for several parameters at the following wells:

- GW1 for EC;
- GW2 for EC and Ammonia; and
- GW3 for Copper;

Ammonia as N displayed a sharp increase in downgradient well GW2 when compared to upgradient wells; reaching a new maximum concentration. Due to Ammonia being considered a key leachate indicator it is recommended that this parameter is closely monitored during the next sampling event. Iron (filtered) displayed sharp increase at downgradient well GW2 when compared to other downgradient wells and upgradient wells GW5 and GW6. Fluctuations in Iron concentration continue at this well, as is observed from historical results and the peak detected in this sampling event could be related to natural variation within the site. However, as Iron is considered another key leachate indictor, these results, in conjunction with the Ammonia results at GW2, might indicate potential leachate impacts. Further monitoring of these parameters is needed to determine if increased concentration of these parameters is related to landfill impacts or other external factors upstream of the site.

Where Control Line statistical data is available. GW2 require data from eight sample events before Control Line data can be determined.



pH, an important consideration for acid frog habitat downstream of the former landfill, was noted to be higher at downgradient wells (5.4-6.33) than upgradient wells (3.72-4.73). Historical pH levels appear to fluctuate and be influenced by rainfall events at GW2 and GW3, and to a lesser extent at GW1, suggesting the soil profile at these locations may be more permeable to surface water inputs and/or impacted by historical landfilling on the site.

7.2 SURFACE WATER

All surface water locations were sampled in May 2020, and results have been assessed for their potential for landfill leachate by comparing results with the WQOs (as per the EVs in the EPP (Water) 2009) and by comparing the upstream and downstream surface water quality results.

Ammonia (a key leachate indicator) was detected during the current sampling at one downstream surface water location CISW1. The elevated levels could possibly be related to external factors that appear to be effecting upstream location CISW3, which also recorded elevated levels of Ammonia. Another leachate indicator, Iron, was detected at very low levels across all locations; with concentrations increasing slightly when compared to the previous monitoring period. Most parameters displayed a slight increase since previous monitoring events, indicative of decreased rainfall, which may increase the concentrations of metals and inorganics due to the low flow/stagnant conditions.

There was no indication of ASS impact on downstream surface water during the current monitoring round.

In conclusion, EA conditions WA3 and WA4 have been met as quarterly surface water monitoring of the required parameters (pH, Electrical Conductivity (EC), Dissolved Oxygen (DO), COD, BOD, Total Suspended Solids (TSS), Calcium, Sodium, Sulphate, Iron, Copper, Lead, Nickel, Magnesium, Manganese, Zinc, Ammonia (As W), Aluminium, Arsenic, Nitrate (As N), Total Organic Carbon (TOC), Chromium and Total Phospher(is) was completed in May 2020.



8.0 RECOMMENDATIONS

Further statistical analysis of the exceedances of key leachate parameters identified in terms of groundwater are recommended to determine if there are significant differences between upgradient and downgradient sampling results and if leachate from the site is potentially impacting on groundwater. Further investigations may be warranted if leachate is found to be impacting on downgradient monitoring locations.



9.0 REFERENCES

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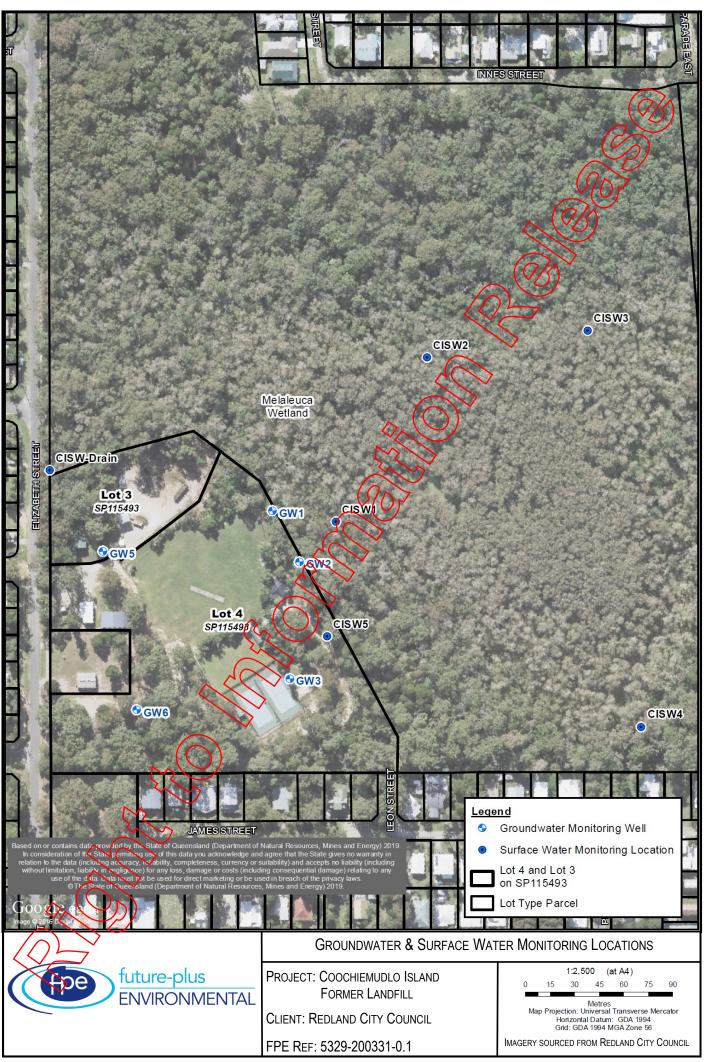
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Appendix A. **Monitoring Locations Plan** 15 July 2020 Coochiemudlo Island Former Landfill -Appendix A





Appendix B. **Results Summary** 15 July 2020 Coochiemudlo Island Former Landfill -Appendix B Quarterly Report (Quarter 2, 2020)

Redland City Council Landfill Environmental Monitoring Program Elizabeth Street, Coochiemudlo Island

	Fie	ld			Inorga	nics										Metals						-	
	pH (Field)	EC (field)	Ammonia as N	Chloride	Nitrate (as N)	Sodium (filtered)	Sulfate as SO4 - Turbidimetric (filtered)	TOC	Aluminium (filtered)	Arsenic (filtered)	Cadmium (filtered)	Calcium (filtered)	Chromium (III+VI) (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Magnesium (filtered)	Manganese (filtered)	Mercary (filtered)		Phosphorus	Potassium (filtered)	Zinc (filtered)
	-	μS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/	mg/L	rig/k	mgL	mg/L	mg/L	mg/L	mg/L
EQL			0.01	1	0.01	1	1	1	0.01	0.001	0.0001	1	0.001	0.001	0.05	0.001	1	0.001	0.0001	0.001	0.01	1	0.005
ANZECC 2000 Fresh water Slightly-moderate disturbed system			0.9		0.158				0.055	0.013	0.0002		0.001	0.0014		0.0034	L L	1.9		0.011			0.008
GHD 2018 Coochiemudlo Island wetland	3.53-4.61	90									3.02					$\langle \rangle$		\sim					
Moreton Bay - Schedule 1 EPP (water) - Wallum/Tannin Freshwater	6.5-8	626	0.02														ト	X			0.05		
Schedule 1 EPP (water) - Drinking Water		1,000													0.05	1		0.05					
Site ID Monitoring Zone Location Code Date														$\langle \langle \rangle$	72	C							

Site ID	Monitoring Zone	Location Code	Date														$\wedge \vee$	12	\sim							
Coochiemudlo Island	Downgradient	GW1	20/05/2020	6.33	751	< 0.01	36	0.36	26	124	5	< 0.01	< 0.001	< 0.0001	71	< 0.001	<0.001	<0.05	0.001	21	0.014	< 0.0001	< 0.001	0.01	13	< 0.005
Coochiemudlo Island	Downgradient	GW2	20/05/2020	6.07	1,403	0.1	332	0.02	136	15	7	0.06	0.002	< 0.0001	38	< 0.001	<0.001	9.99	<0.001	32	0.002	< 0.0001	< 0.001	0.17	8	< 0.005
Coochiemudlo Island	Downgradient	GW3	20/05/2020	5.4	51.3	0.02	12	0.02	9	4	8	0.21	< 0.001	< 0.0001	1	0.801	0.012	0.11	< 0.001	1	0.003	< 0.0001	< 0.001	1.35	<1	0.012
Coochiemudlo Island	Upgradient	GW5	20/05/2020		334	< 0.01	74	1.56	52	21	2	0.02	< 0.001	< 0.0001	<1	-0,001	<0.001	<0.05	< 0.001	4	0.001	< 0.0001	< 0.001	< 0.01	<1	< 0.005
Coochiemudlo Island	Upgradient	GW6	20/05/2020	3.72	2,724	< 0.01	770	< 0.01	336	15	2	6.05	< 0.001	< 0.0001	3	<0.001	<0.001	1.49	< 0.001	56	0.138	< 0.0001	0.002	0.16	2	0.014
	*														\sim		$\overline{\mathbf{x}}$									

Statistics												\sim	$\langle \rangle \rangle$	>									
Number of Results	5	5	5	5	5	5	5	5	5	5				5	5	5	5	5	5	5	5	5	5
Number of Detects	5	5	2	5	4	5	5	5	4	A .	× 1 '		0	1	3	0	5	5	0	1	4	3	2
Minimum Concentration	3.7	51.3	<0.01	12	<0.01	9	4	2	<0.01	0.001	<0.0001		<0.001	<0.001	<0.05	<0.001	1	0.001	<0.0001	<0.001	0.01	<1	<0.005
Minimum Detect	3.7	51.3	0.02	12	0.02	9	4	2	0.02	0.002	ND	1	ND	0.012	0.11	ND	1	0.001	ND	0.002	0.01	2	0.012
Maximum Concentration	6.3	2,724	0.1	770	1.56	336	124	8	6.05	0.002	<0.0002		<0.001	0.012	9.99	<0.001		0.138	<0.0001	0.002	1.35	13	0.014
Maximum Detect	6.3	2,724	0.1	770	1.56	336	124	8	6.05		ND	71	ND	0.012	9.99	ND	56	0.138	ND	0.002	1.35	13	0.014
Average Concentration *	5	1,053	0.027	245	0.39	112		4.8	12/	9.0008	0.00005		0.0005	0.0028	2.3	0.0005		0.032	0.00005	0.0008	0.34	4.8	0.0067
Median Concentration *	5.4	751	0.005	74	0.02	52	15	6	0.06	0.0005	0.00005		0.0005	0.0005	0.11	0.0005		0.003	0.00005	0.0005	0.16	2	0.0025
Standard Deviation *	1.1	1,064	0.041	320	0.67	134		-2.6	27	0,00067	0	31	0	0.0051	4.3	0	22	0.06	0	0.00067	0.57	5.5	0.0058
95% UCL (Student's-t) *	6.26	2,067	0.0664	550.2	1.031	240		7.446		0.00144	0.00005			0.0077	6.455				0.00005	0.00144		10.07	0.0122
* A Non Detect Multiplier of 0.5 has been applied.		1	u			0	$\left(\right) $			L	1		1	1						1		-	
		$\langle \rangle$		E			7)																
5 ET	\bigcirc)	72																				
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					Field	d					Inorganics												Metals					<u> </u>	-	
				DO % Saturation (Field)	EC (field)	pH (Field)	Ammonia as N	BOD	Chloride	сор	Nitrate (as N)	Nitrogen (Total)	Sodium (filtered)	TOC	TSS	Aluminium (filtered)	Arsenic (filtered)	Cadmium (filtered)	Calcium (filtered)	Chromium (III+VI) (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Magnesium (filtered)	Mangarese (filtered)	Mocury	Nickehfiltereal	Phosphorus	Potassium (filtered)	Zinc (filtered)
				%Sat	μS/cm	-	mg/L	mg/L	mg/L	~	mg/L	mg/L	mg/L	mg/L	mg/L	5	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	me	mg/L	mg/L	mg/L	mg/L
EQL							0.01	2	1	10	0.01	0.1	1	1	5	0.01	0.001	0.0001	1	0.001	0.001	0.05	0.001		0,001	0.0001	0.001	0.01	1	0.005
	licable to CISW2 and CISW3 or						0.32				4.9					0.027	0.0008	0.00006		0.00001	0.001		0.001			0.00006	0.008			0.0024
	ightly-moderate disturbed sys	tem					0.9				0.158					0.055	0.013	0.0002		0.001	0.0014		0.0034	\mathbf{X}	11		0.011		I	0.008
GHD 2018 Coochiemudlo Isla					90	3.53-4.61												3.02					\sim						I	1
Moreton Bay - Schedule 1 EP	PP (water) - Wallum/Tannin Fr	eshwater		85-110	626	6.5-8	0.02					0.5											\mathbf{N}	\sim				0.05		(
Schedule 1 EPP (water) - Drin	nking Water				1,000																\langle	0.05	\sim		0.05					(
Site ID	Monitoring Zone	Location Code	Date																			17	\mathcal{T}	V						
Coochiemudlo Island	Downstream	CISW1	20/05/2020	34.9	916	6.66	0.04	3	151	44	< 0.01	0.6	67	17	6	0.03	< 0.001	< 0.0001	39	<0.001	Ø.007	0.88	\$0.001	31	0.013	< 0.0001	< 0.001	0.01	18	< 0.005
Coochiemudlo Island	Downstream	CISW5	20/05/2020	34.9	180.5	5.85	< 0.01	7	29	30	0.02	0.6	22	11	7	0.87	0.002	< 0.0001	5	0.001	0.002	0.53	<0.001	2	0.031	< 0.0001	< 0.001	0.04	3	0.022
Coochiemudlo Island	Upstream	CISW2	20/05/2020	49.4	331	6.25	0.01	3	81	307	< 0.01	2.4	40	43	74	0.19	0.001	< 0.0001	6	0.002	0.001	2.58	< 0.001	5	0.014	< 0.0001	< 0.001	0.17	10	0.007
Coochiemudlo Island	Upstream	CISW3	20/05/2020	37.3	304	5.59	0.08	<2	75	452	< 0.05#1	4.0	38	59	129	0.34	0.001	< 0.0001	6	0.002	0.001	7.36	< 0.001	5	0.029	< 0.0001	< 0.001	0.26	8	< 0.005
Coochiemudlo Island	Upstream	CISW4	20/05/2020	38.3	340	6.70	< 0.01	<2	53	76	< 0.01	1.4	33	28	42	0.20	0.004	< 0.0001	8	0.003	<0.001	14.5	< 0.001	8	0.046	< 0.0001	0.002	0.10	2	0.025
Statistics		<u>.</u>	;															\langle	$\overline{\frown}$											

Coochiemudlo Island	Upstream	CISW4	20/05/2020	38.3 340	6.70	<0.01	<2 53	76	<0.01	1.4 33		42 0	20 0.004	<0.0001		0.003	<0.001	14.5	< 0.001	8	0.046	< 0.0001	0.002	0.10	2 0	.025
														1			V									
Statistics														_ \	$\langle \rangle$	$\langle \rangle$										
Number of Results				5 5	5		5 5			5 5			5 5	5		V 5	5	5	5	5	5	5	5			5
Number of Detects				5 5	5		3 5	5		5 5		5 !				4	3	5	0	5	5	0	1	5		3
Minimum Concentration Minimum Detect				34.9 180.5 34.9 180.5			<2 29 3 29			0.6 22			03 0.001 03 0.001	<0.0001	5	0.001	0.001	0.53	<0.001 ND	2	0.013	<0.0001 ND	<0.001 0.002			0.005 .007
Maximum Concentration				49.4 916	6.7		7 151			4 67		29 0.	0.004	<0.0001		0.003	0.001	14.5	<0.001	31	0.046	<0.0001	0.002			.025
Maximum Detect				49.4 916	6.7	0.08	7 151			4 67	59 1	29)0.	87 🖌 👌 0.004	IND	39	0.003	0.002	14.5	ND	31	0.046	ND	0.002	0.26	18 0	.025
Average Concentration *				39 414	6.2		3 78			1.8 40	32	52 0.	3 0.0017			0.0017	0.0012		0.0005	10	0.027	0.00005	0.0008	0.12		.012
Median Concentration * Standard Deviation *				37.3 331 6 288	6.25 0.49	0.01	3 75	76	0.005	1.4 38	28	12 0	.2 0.001	0.00005	6 15	0.002	0.001	2.98	0.0005	5 12	0.029 0.014	0.00005	0.0005			.007 .011
95% UCL (Student's-t) *				44.7 688.6		0.059 5	335 121.4	361.4	0.0213 3	.168 55.85	50.25		32 0.0014 34 0.00303	0.00005		0.00263		10.82				0.00005			14.32 0.	
* A Non Detect Multiplier of 0.5	5 has been applied.			<u></u>		1					\sim	()	>		1			1 -0.0- 1		1 1						
Comments #1 Reported Analyte LOR is high	her than Requested Anal	lyte LOR		£2(51																	
	~																							Pa	ge 158	8 of 2

																														_(Q
									In	organics														Metals						\sim	<u>~</u> //
				Sulfate as SO4 - Turbidimetric (filtered)	Nitrite + Nitrate as N	Ammonia as N	BOD	Chloride	COD	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total)	Sodium (filtered)	TOC	TSS	Aluminium (filtered)	Arsenic (filtered)	Cadmi um (filtered)	Calcium (filtered)	Chromium (III+VI) (filtered)	Copper (filtered)	Iron (filtered)	Lead (filtered)	Magnesium (filtered)	Manganese (filtered)	Mercury (filtered)	blicker (filter et l	Phosenforus	Potassum (filtered)	Zinc (filtered)
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L	mg/L	mg/L
EQL				1	0.01	0.01	2	1	10	0.1	0.01	0.01	0.1	1	1	5	0.01	0.001	0.0001	1	0.001	0.001	0.05	0.001	1	0.001	0.0001	0.001	0.01	1	0.005
Lab Report Number	Field ID	Date	Matrix Type																							Z	\mathcal{O}				
EB2013449	CISW4	20/05/2020	SW	8	< 0.01	< 0.01	<2	53	76	1.4	< 0.01	< 0.01	1.4	33	28	42	0.20	0.004	< 0.0001	8	0.003	< 0.001	14.5	<0,001	8	0.046	< 0.0001	0.002	0.10	2	0.025
EB2013449	SWQA	20/05/2020	SW	8	< 0.01	< 0.01	6	52	108	1.6	< 0.01	< 0.01	1.6	33	28	36	0.18	0.004	< 0.0001	8	0.003	< 0.001	14.2	< 0.001	8	0.045	<0.0001	0.001	0.11	2	0.025
RPD				0	0	0	100	2	35	13	0	0	13	0	0	15	11	0	0	0	0	9	2	0	0	2	0	67	10	0	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

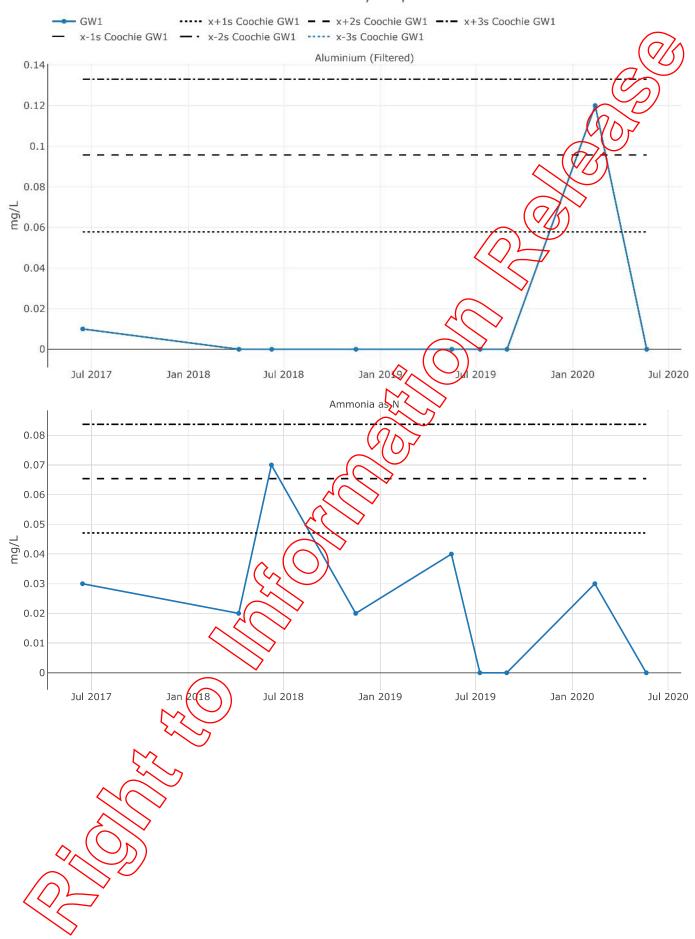
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory white the limit of the limit of



Appendix C. **Groundwater Statistical Charts** 15 July 2020 Coochiemudlo Island Former Landfill -Appendix C

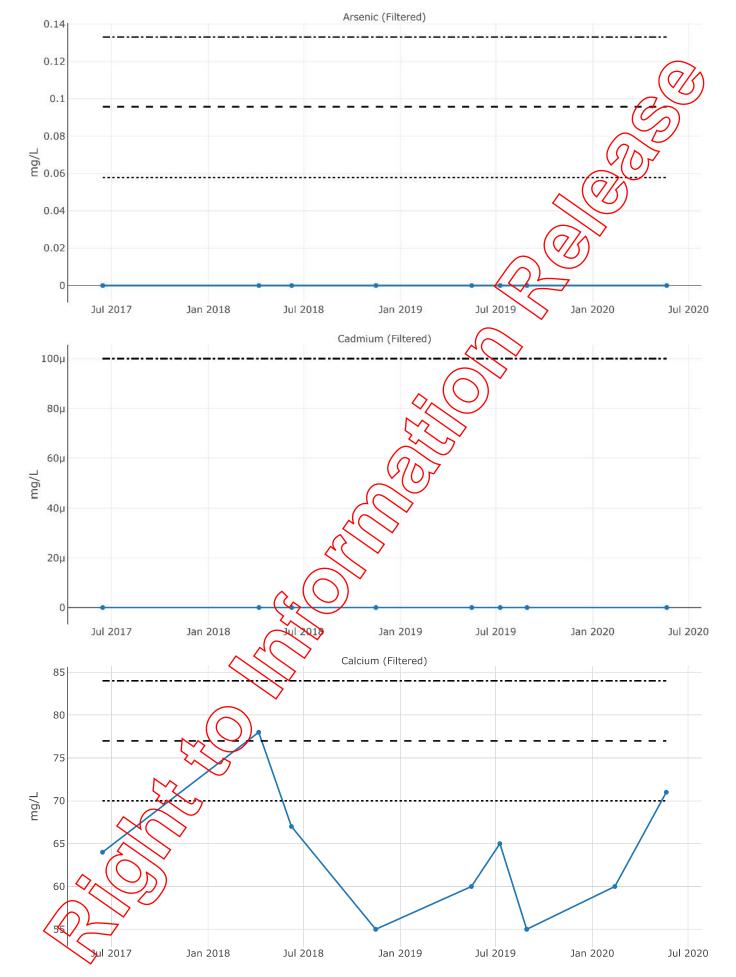
Quarterly Report (Quarter 2, 2020) Redland City Council Landfill Environmental Monitoring Program Elizabeth Street, Coochiemudlo Island

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Chemistry Graph









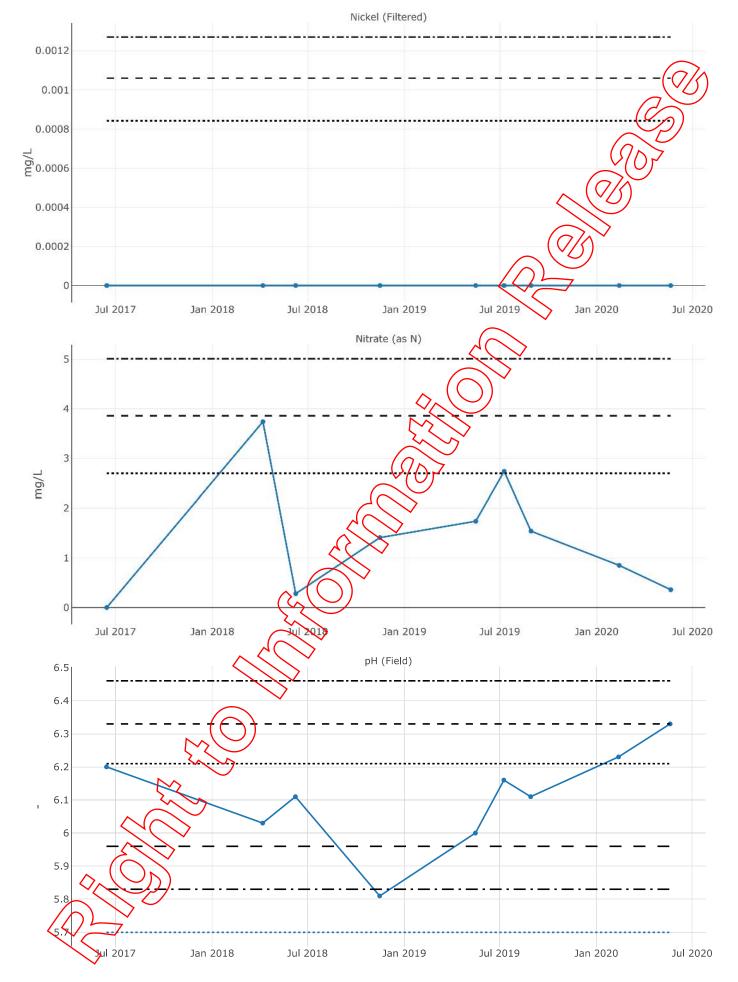




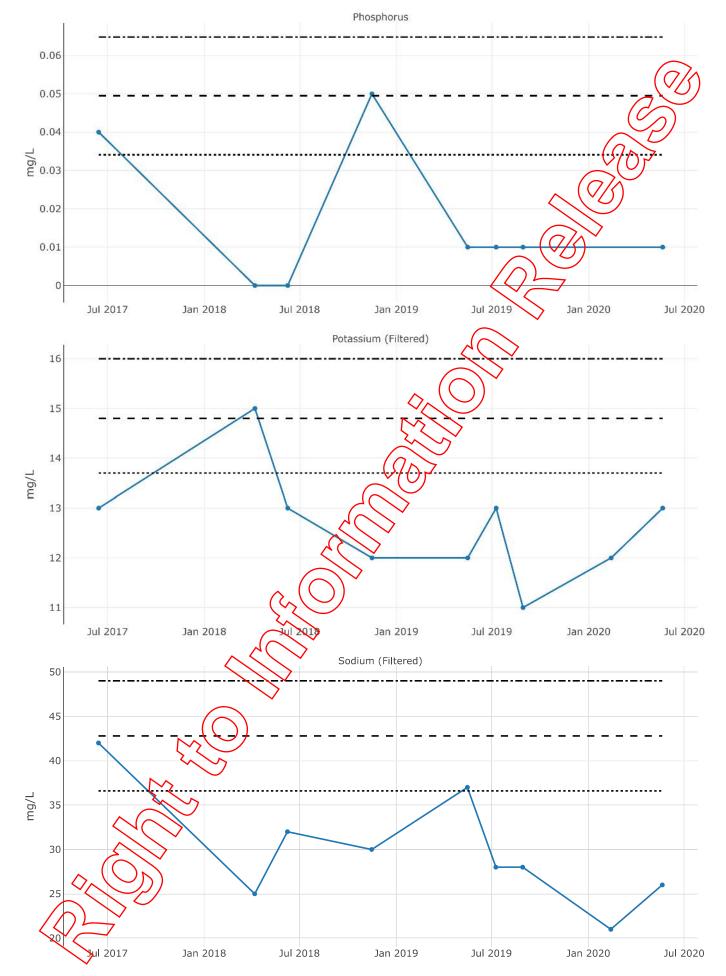


Magnesium (Filtered) 28 26 24 mg/L 22 20 18 Jan 2018 Jul 2018 Jul 2019 Jan 2020 Jul 2017 Jan 2019 Jul 2020 Manganese (Filtered) 0.03 0.025 0.02 Ч∕бш 0.015 0.01 0.005 Jul 2017 Jan 2018 Jan 2019 Jul 2019 Jan 2020 Jul 2020 Mercury (Filtered) 160µ 140µ 120µ -----100µ mg/L 80µ 60µ 40µ 20µ 2017 Jan 2018 Jul 2018 Jan 2019 Jul 2019 Jan 2020 Jul 2020











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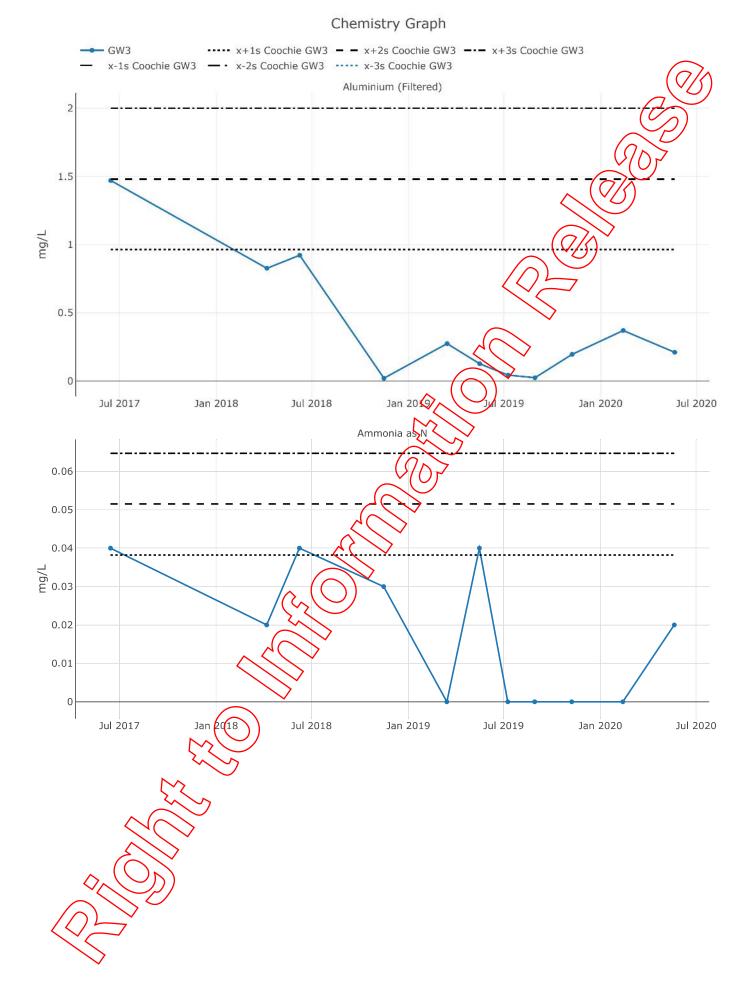
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N),Calcium,Chloride,Magnesium,Potassium,Sodium,Sulphate,Phosphorus,Manganese,Arsenic,Cadmium,Aluminium,Chronium (III+VI),Copper,Lead,Zinc,Mercury,Nickel,Iron",

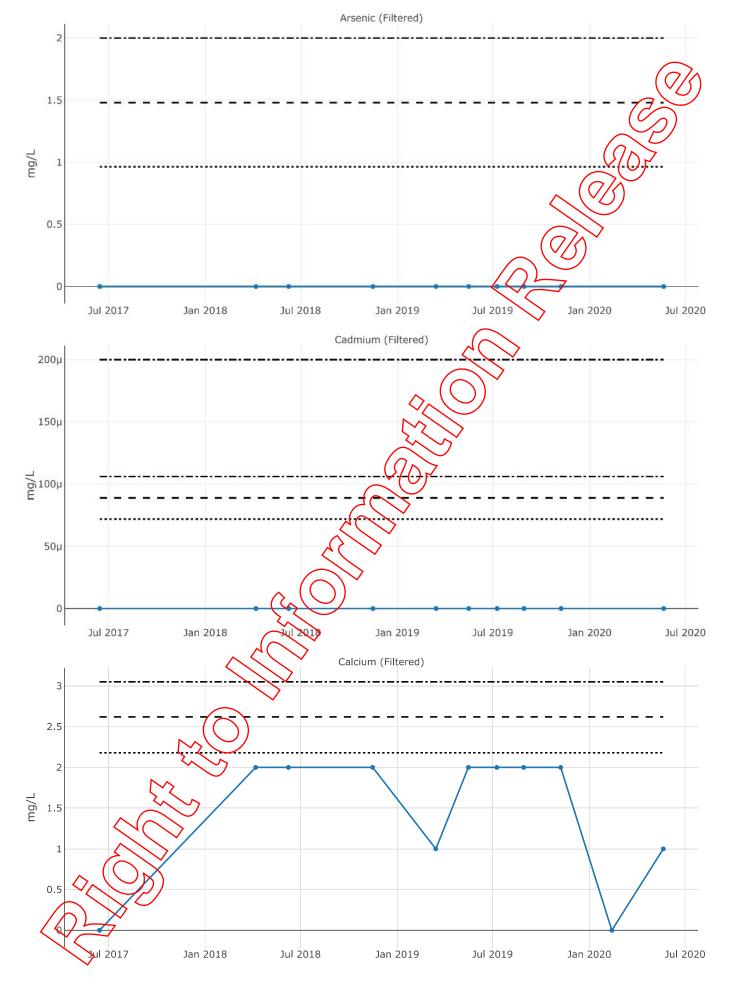
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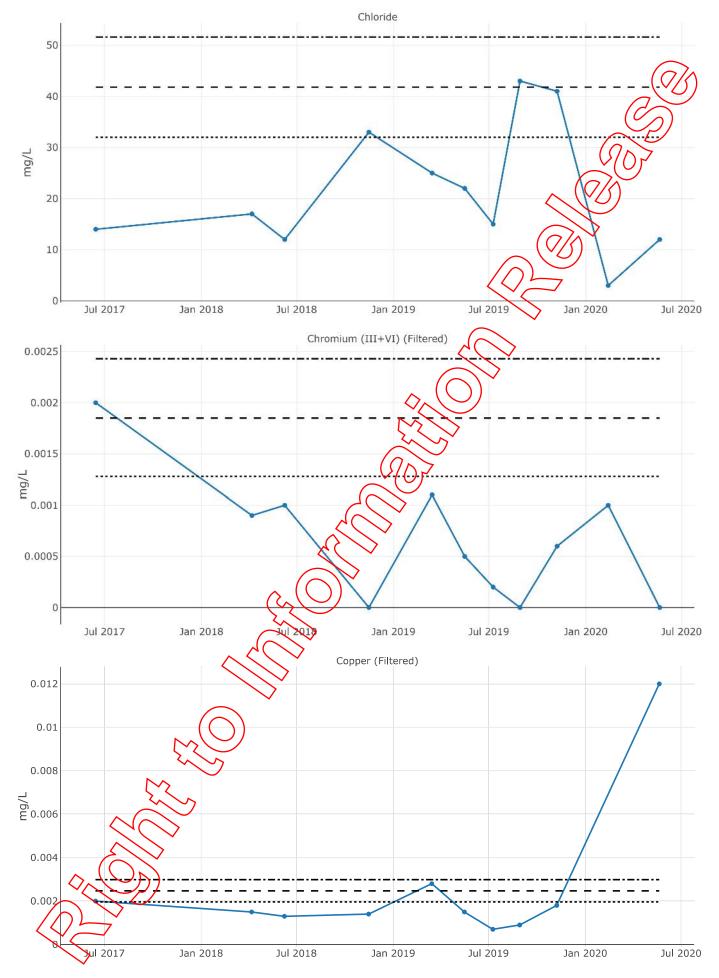
Date between "01 Jan 2010" and "31 May 2020"

Publication Date: 17 Jun 2020

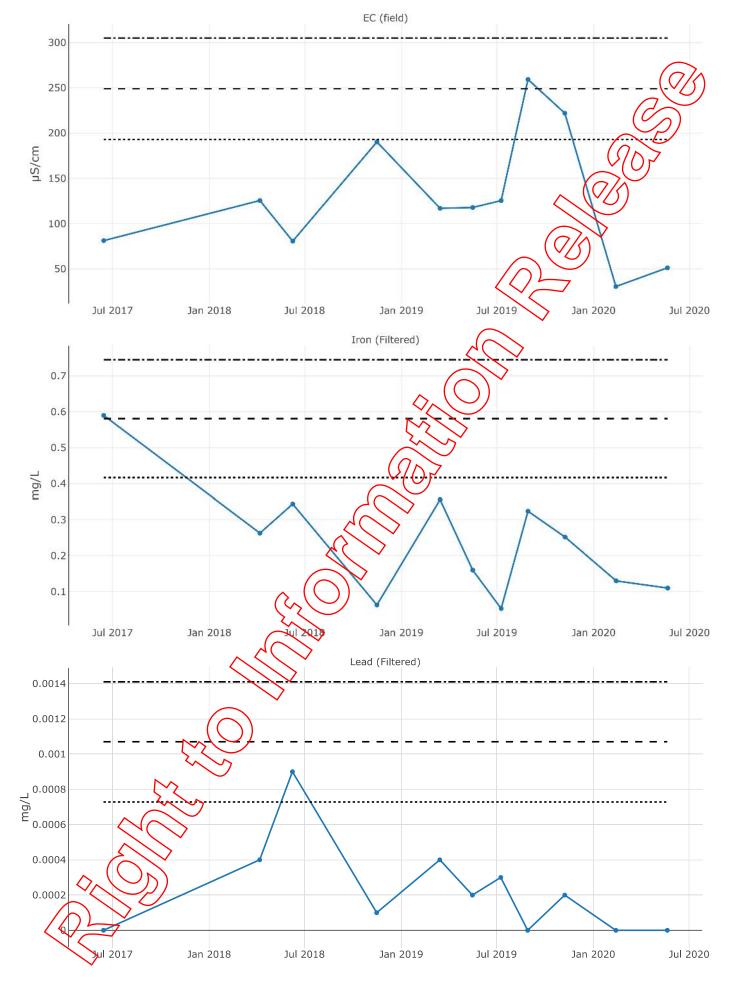


https://online.esdat.net/DataView/Graph/chem_result#filter=%5B%7B"Field"%3A"ChemistryLookup.Code","Operator"%3A"in","Value"%3A%5B"E, 1/9 Page 170 of 254

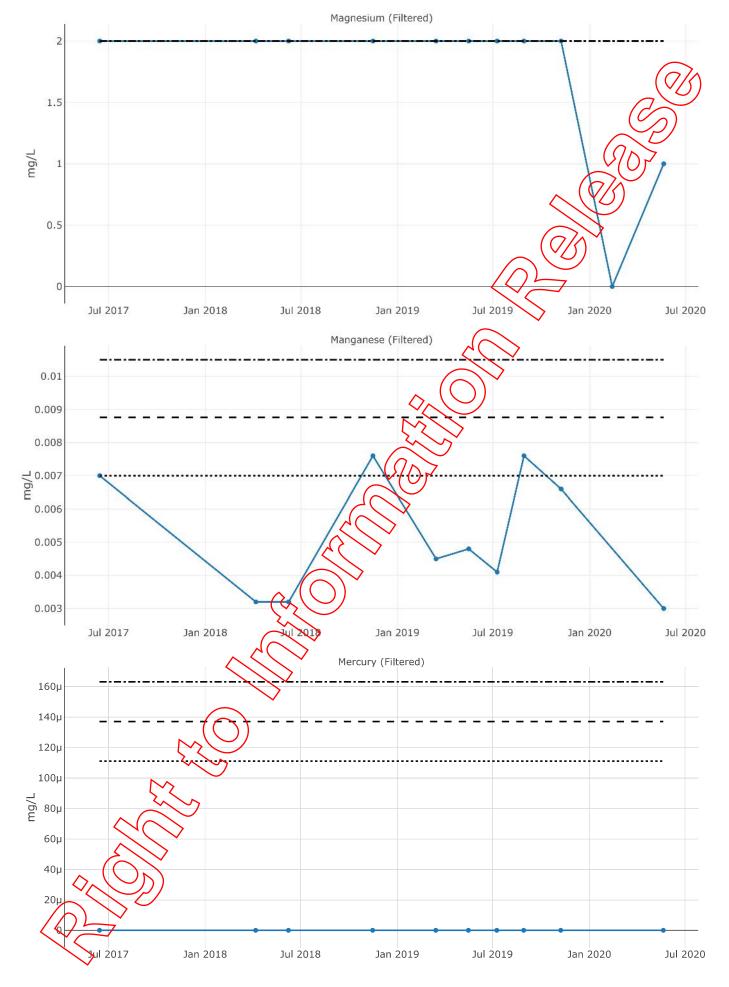




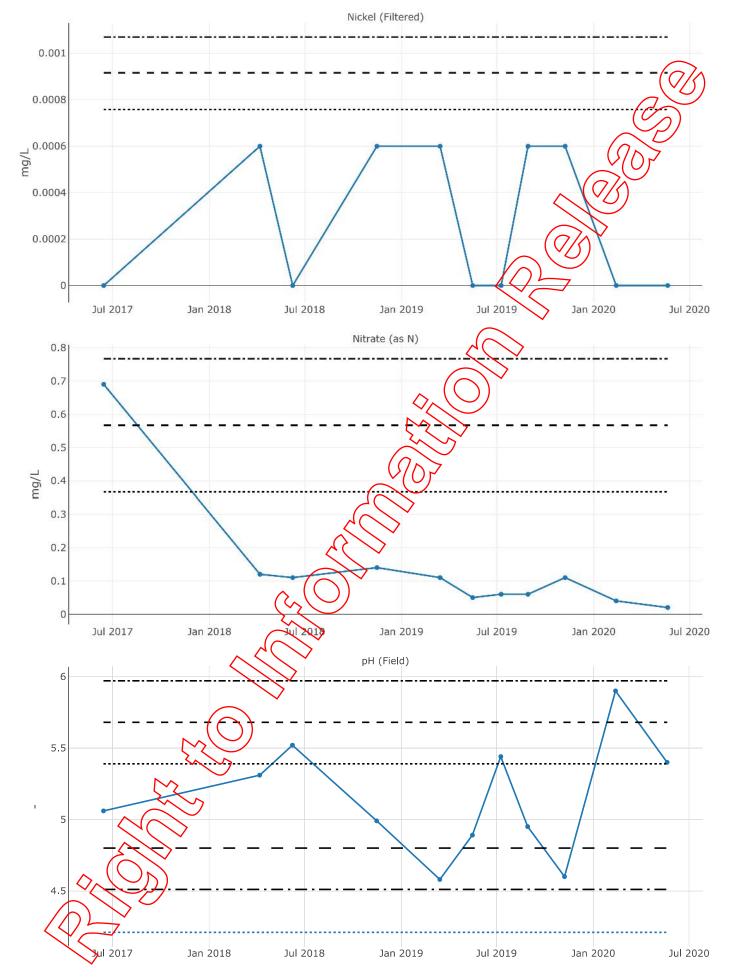


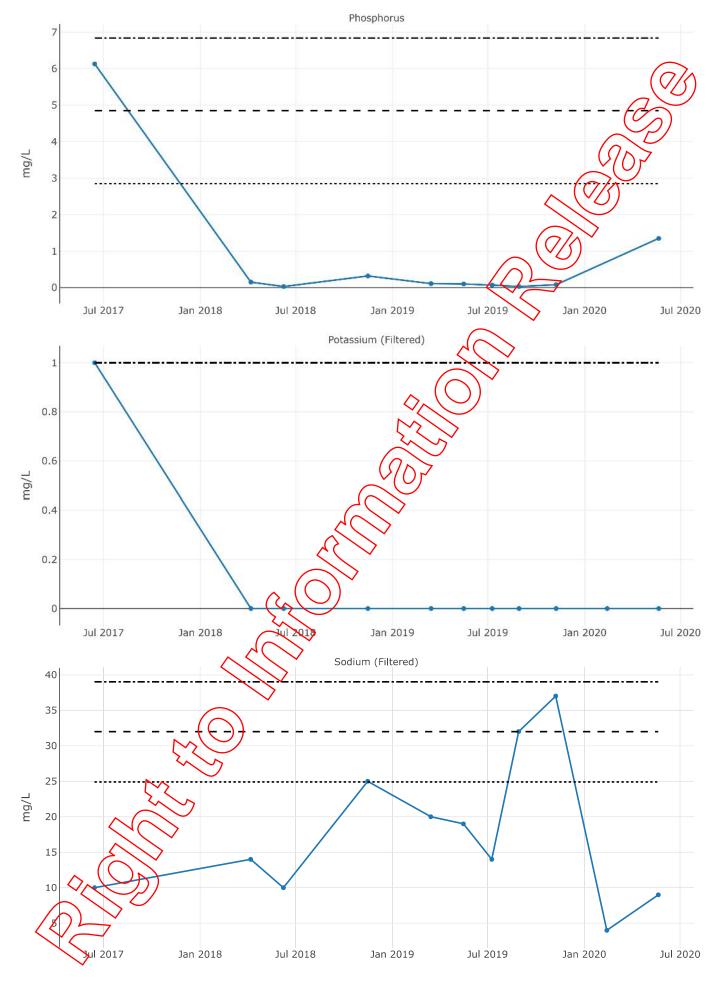


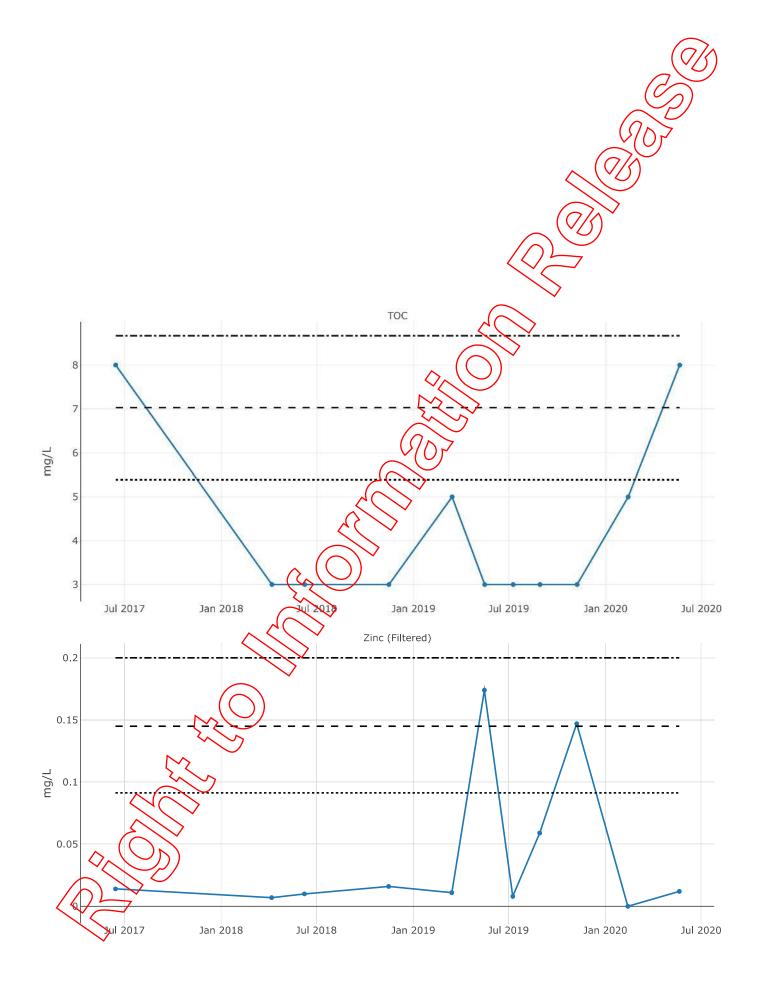












https://online.esdat.net/DataView/Graph/chem_result#filter=%5B%7B"Field"%3A"ChemistryLookup.Code","Operator"%3A"in","Value"%3A%5B"E, 8/9 Page 177 of 254

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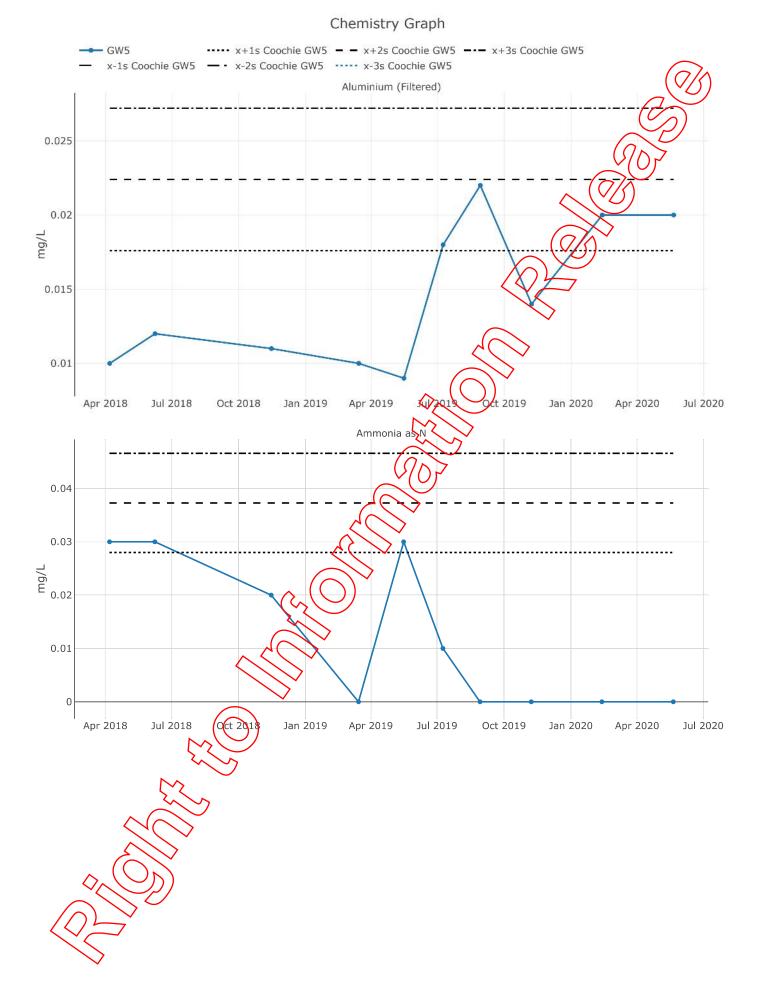
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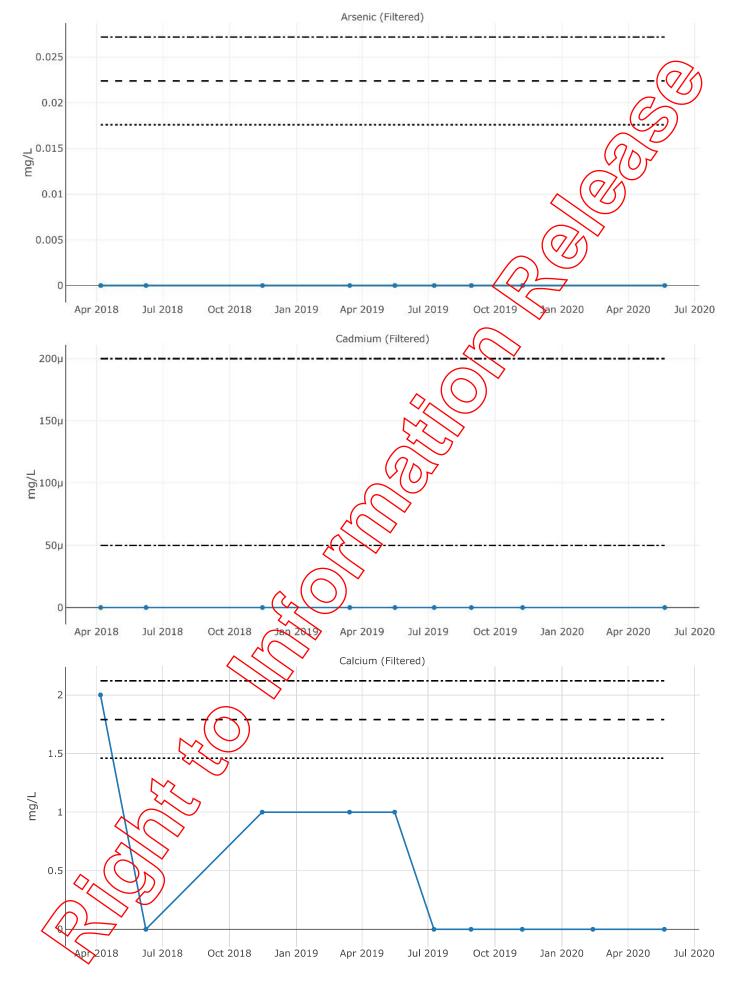
N), Calcium, Chloride, Magnesium, Potassium, Sodium, Sulphate, Phosphorus, Manganese, Arsenic, Cadmium, Aluminium, Chronium (III+VI), Copper, Lead, Zinc, Mercury, Nickel, Iron",

Locations In "undefined",

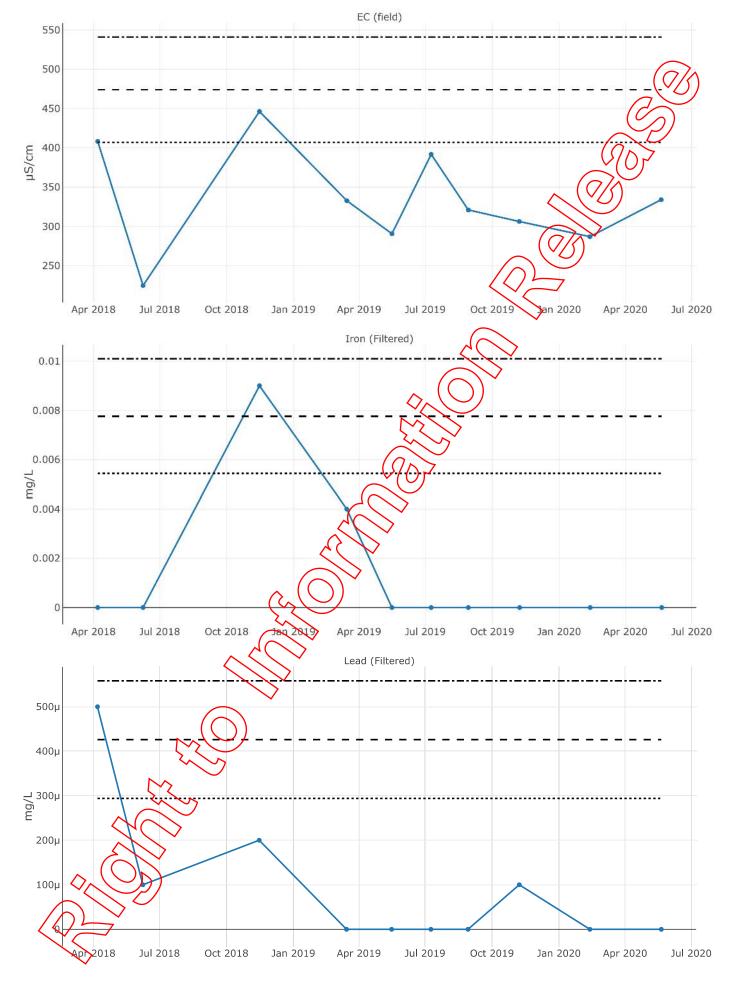
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Publication Date: 17 Jun 2020



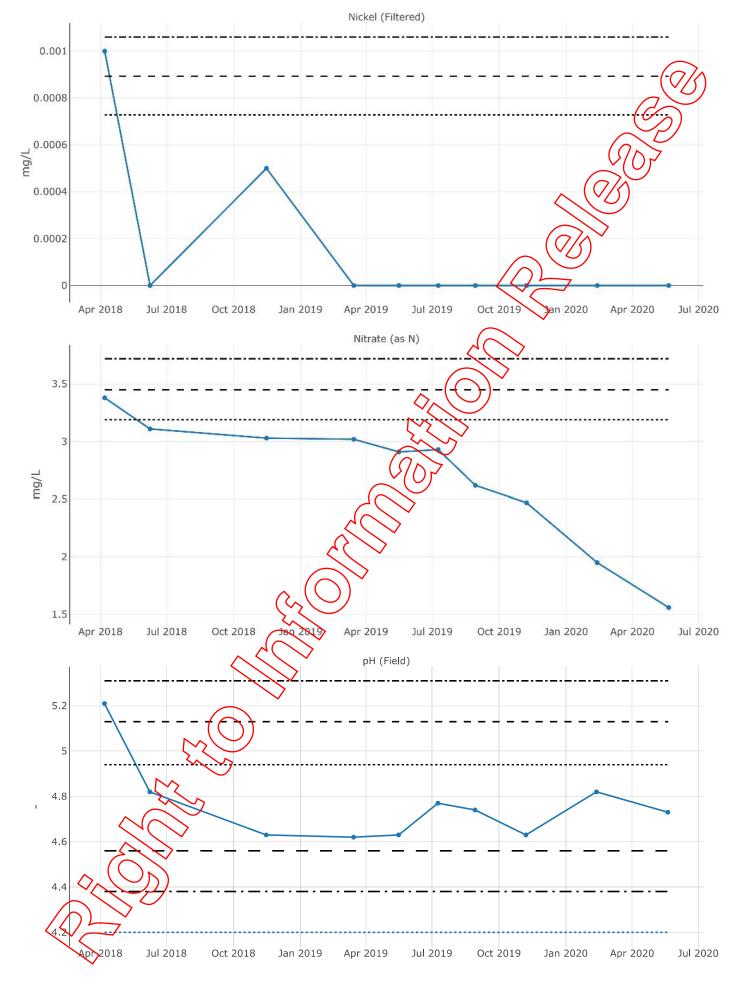


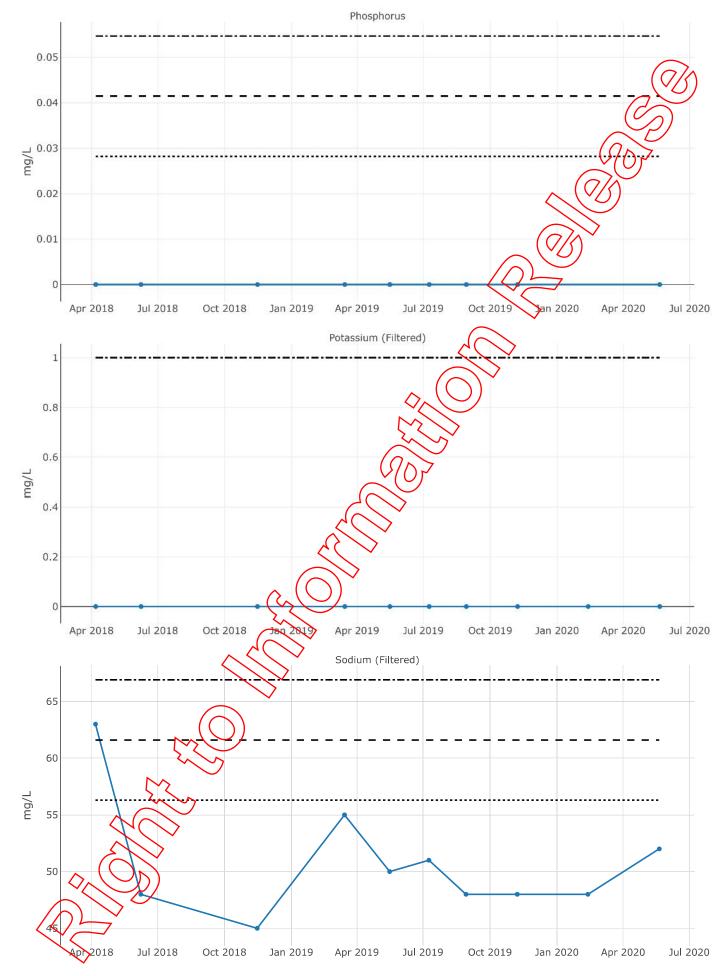


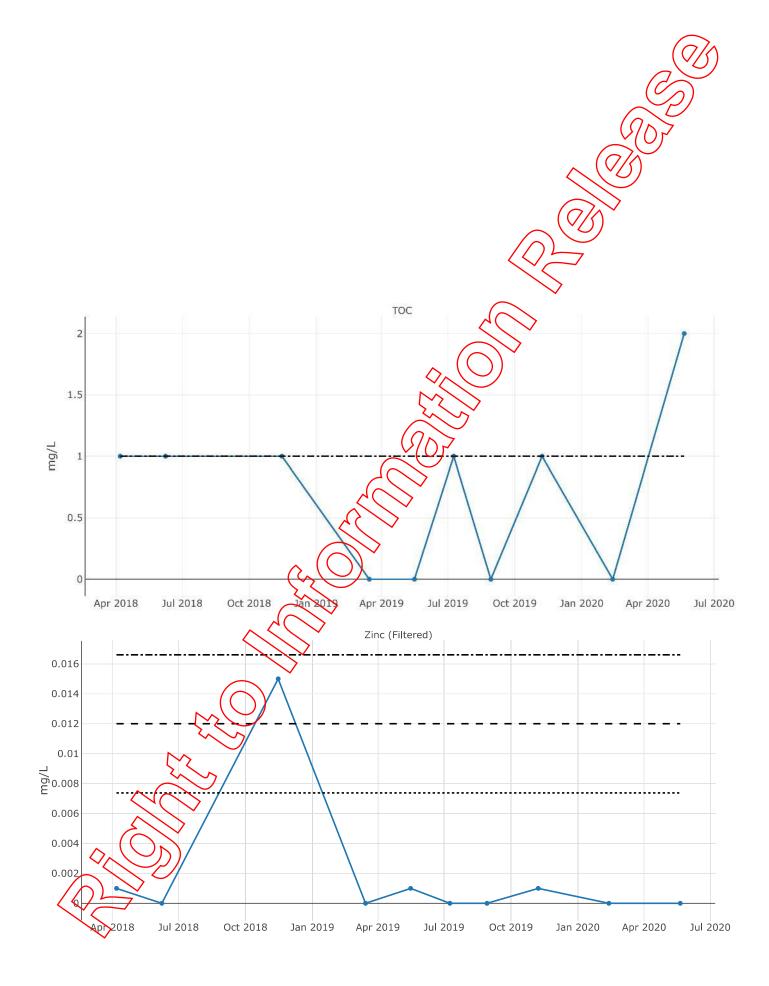












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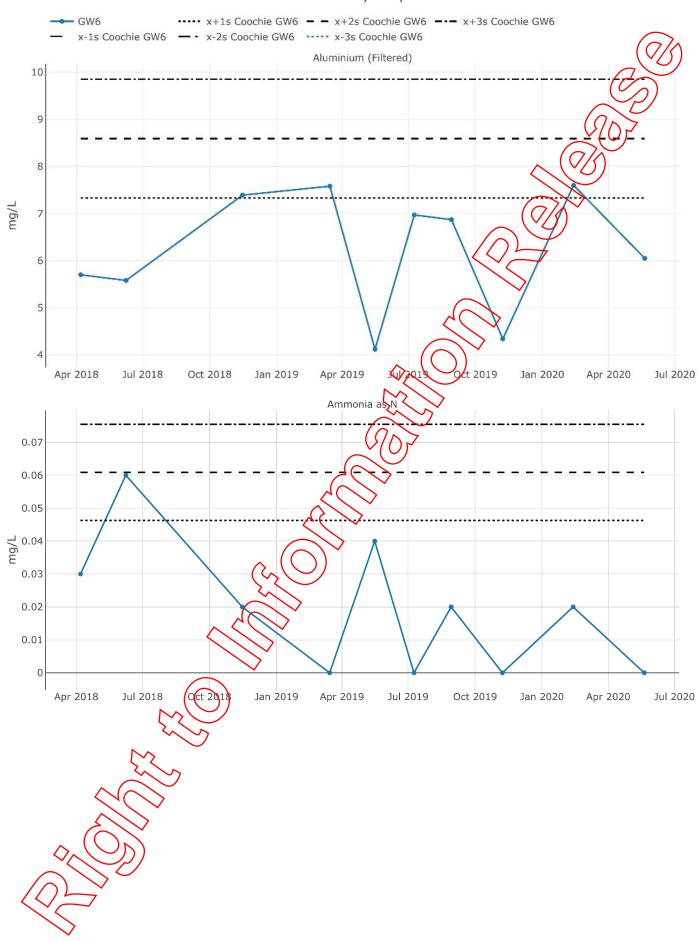
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Publication Date: 17 Jun 2020

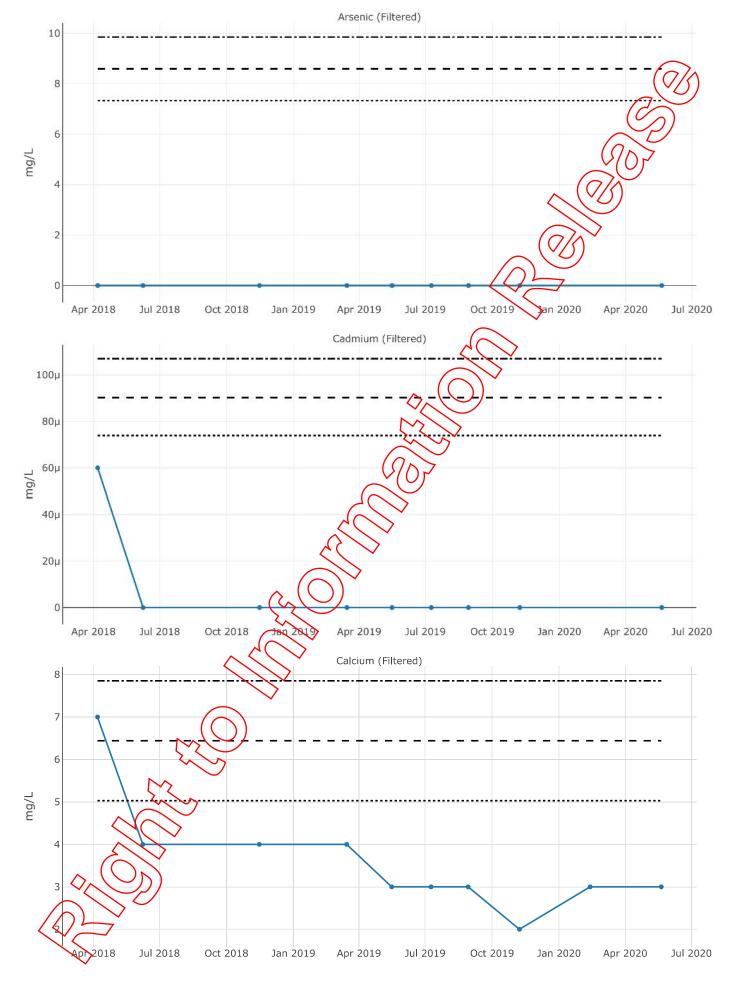
N),Calcium,Chloride,Magnesium,Potassium,Sodium,Sulphate,Phosphorus,Manganese,Arsenic,Cadmium,Aluminium,Chronijum (III+VI),Copper,Lead,Zinc,Mercury,Nickel,Iron",

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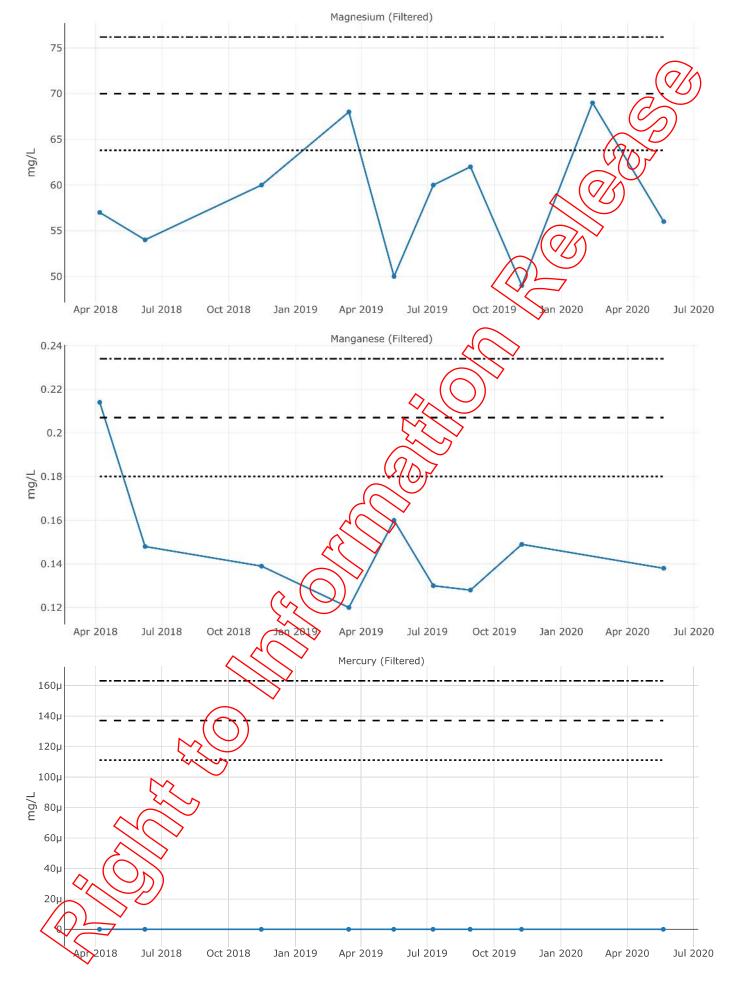


Chemistry Graph

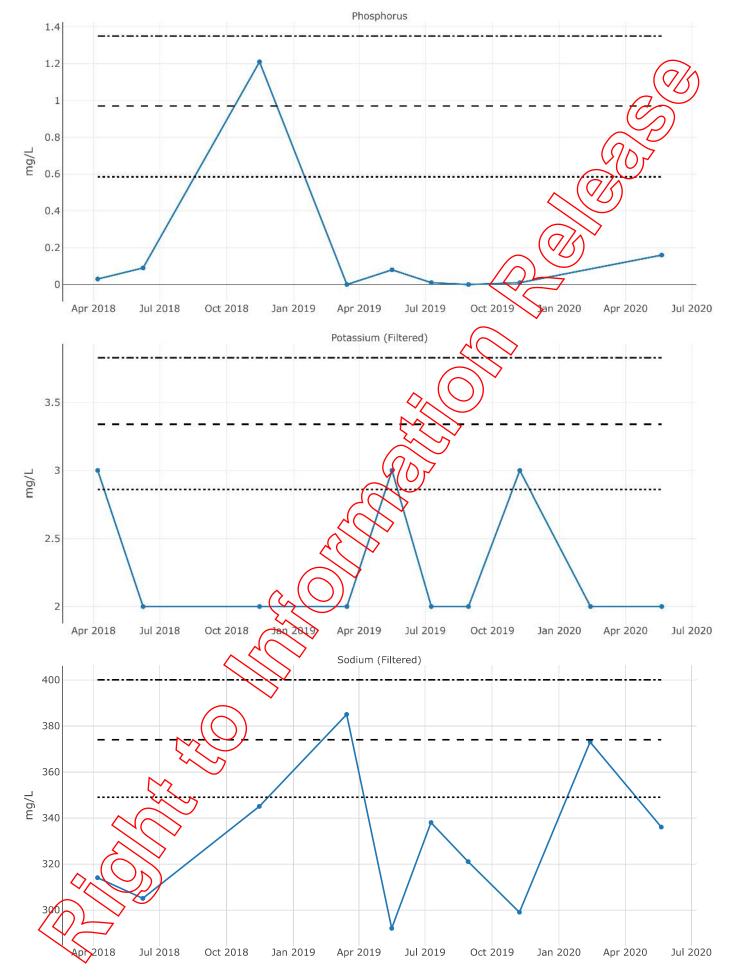


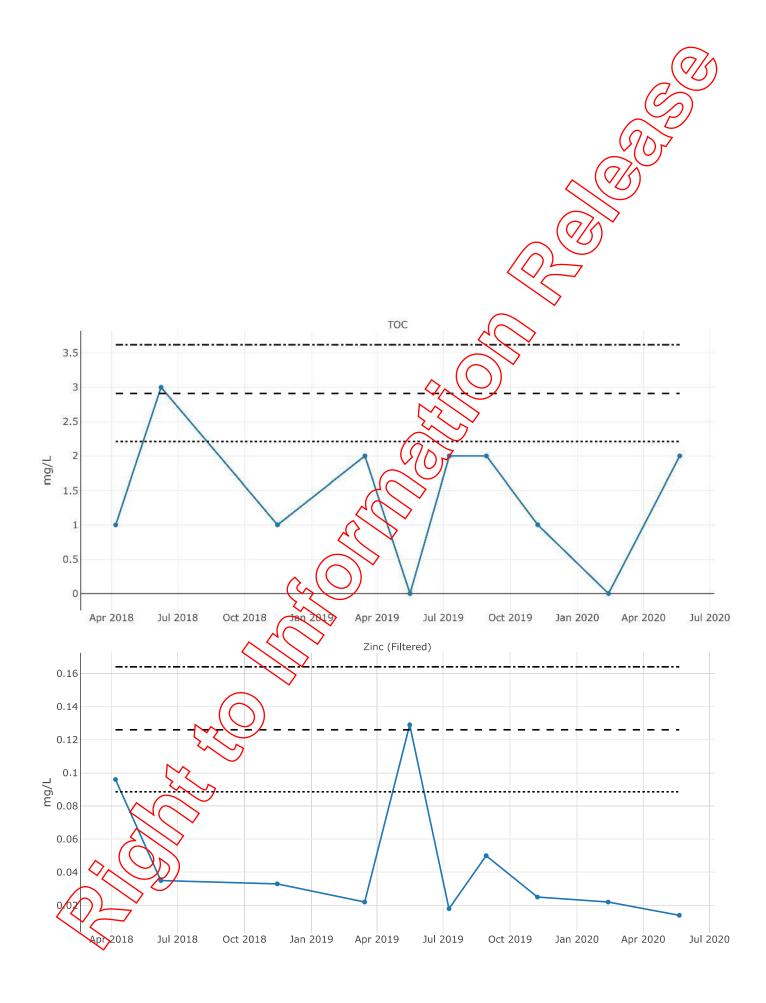












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Locations In "undefined",

Date between "01 Jan 2010" and "31 May 2020"

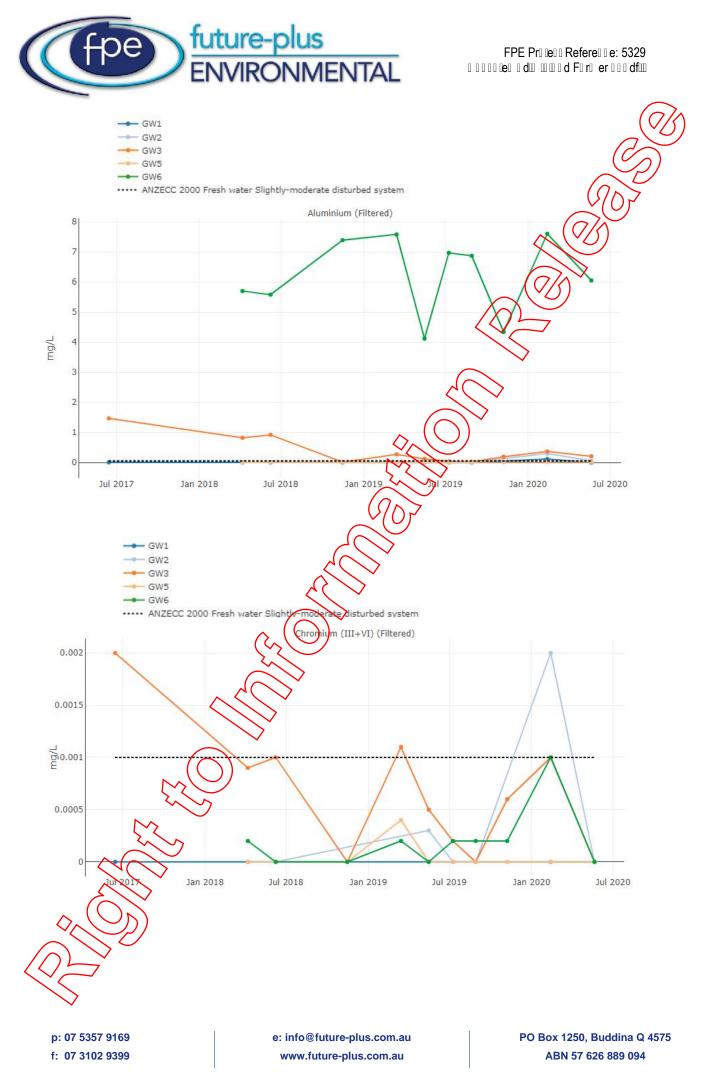
Publication Date: 17 Jun 2020

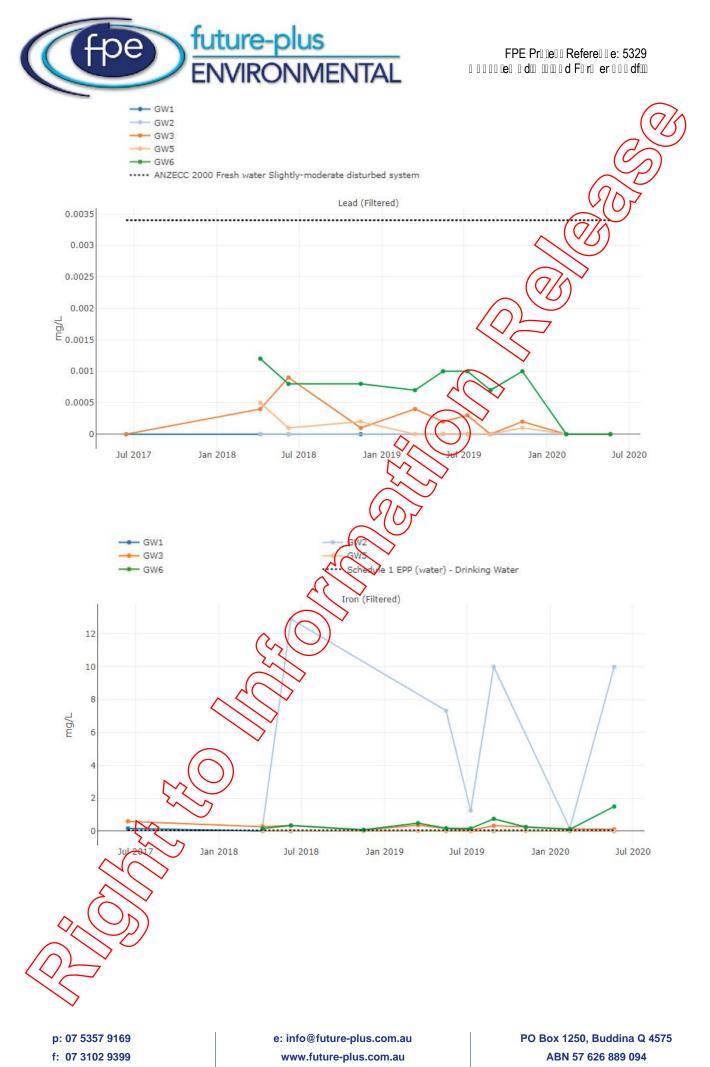


Appendix D. **Groundwater Graphs** 15 July 2020 Coochiemudlo Island Former Landfill -Appendix D

Quarterly Report (Quarter 2, 2020) Redland City Council Landfill Environmental Monitoring Program Elizabeth Street, Coochiemudlo Island





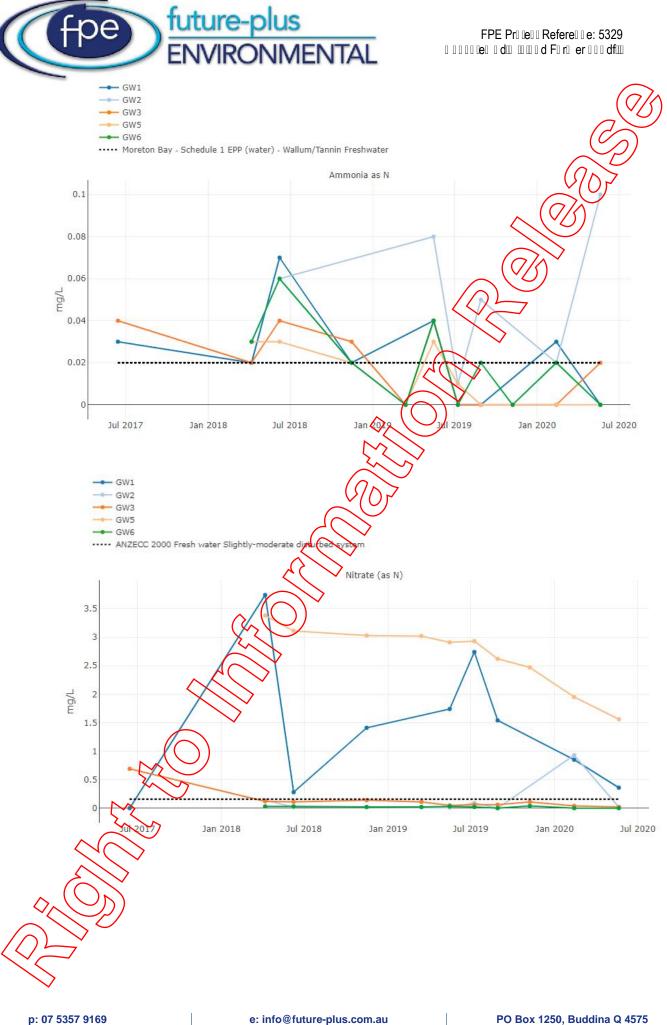


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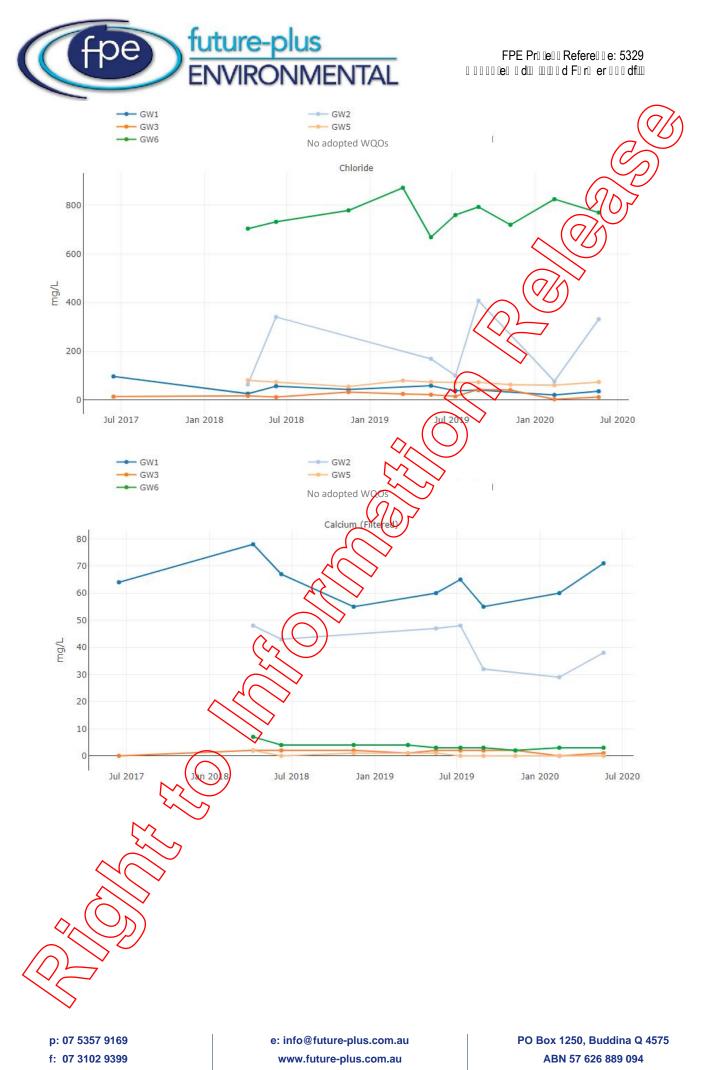
FPE Pr0 @00 Refere0 0 e: 5329



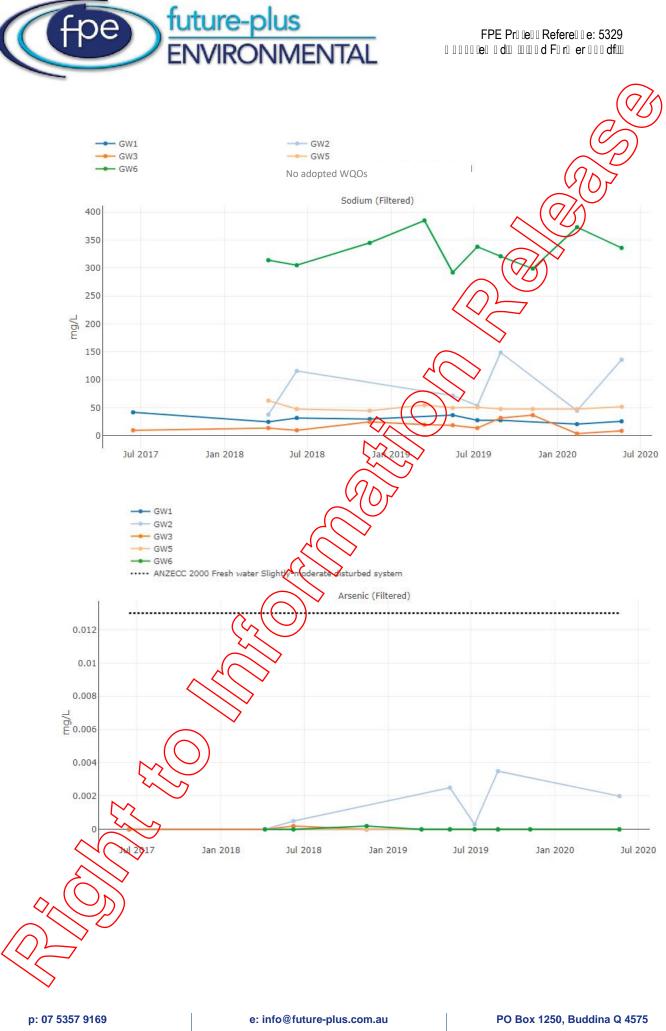


f: 07 3102 9399

e: info@future-plus.com.au www.future-plus.com.au

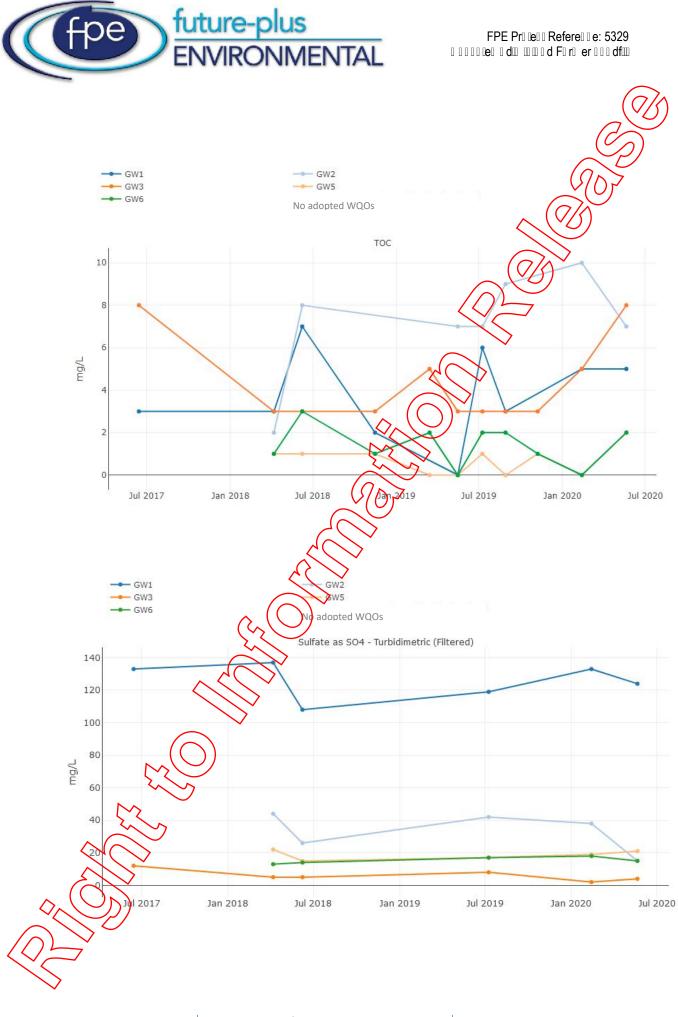


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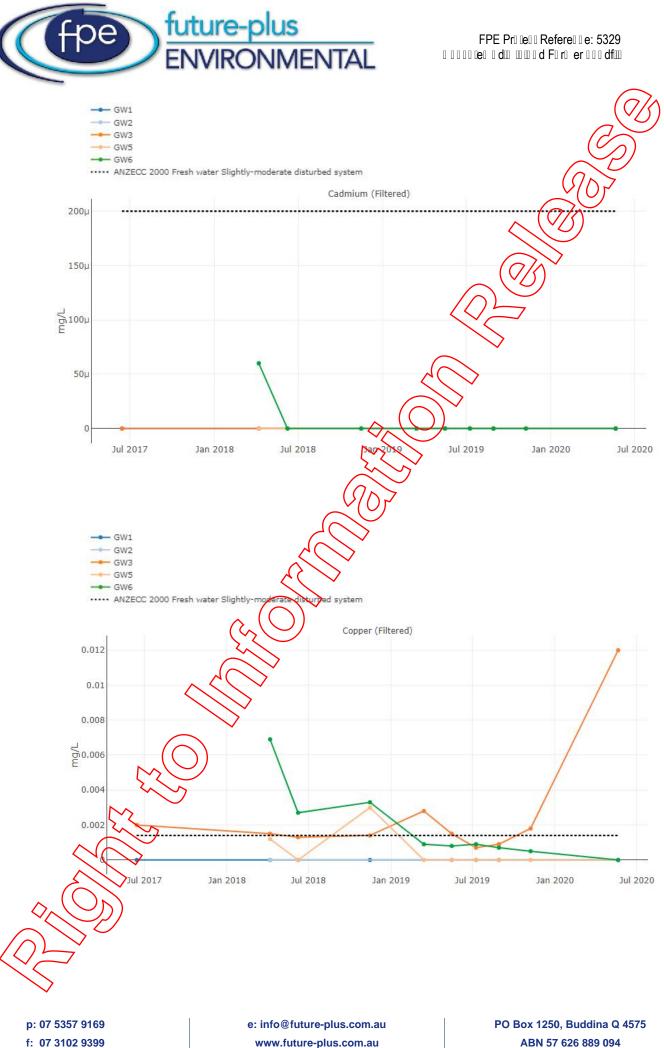


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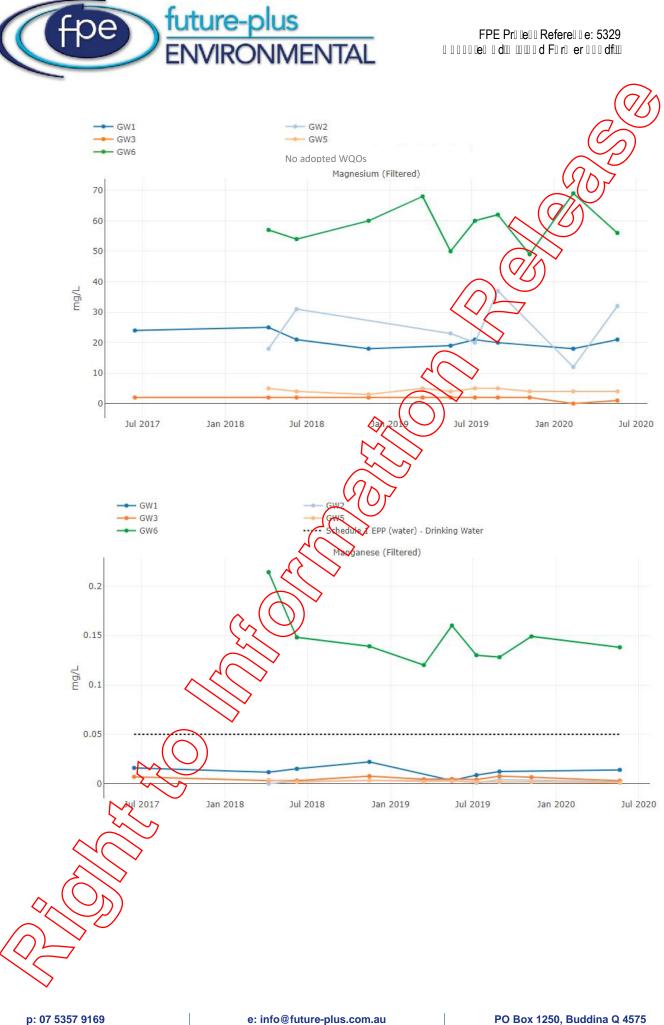
ABN 57 626 889 094



p: 07 5357 9169 f: 07 3102 9399 e: info@future-plus.com.au www.future-plus.com.au



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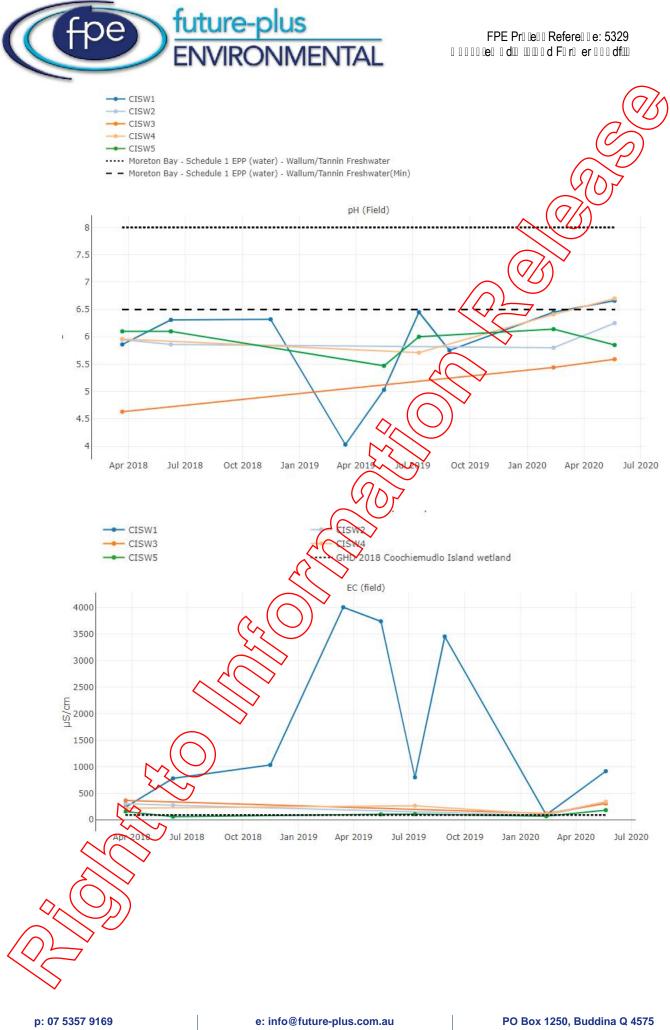
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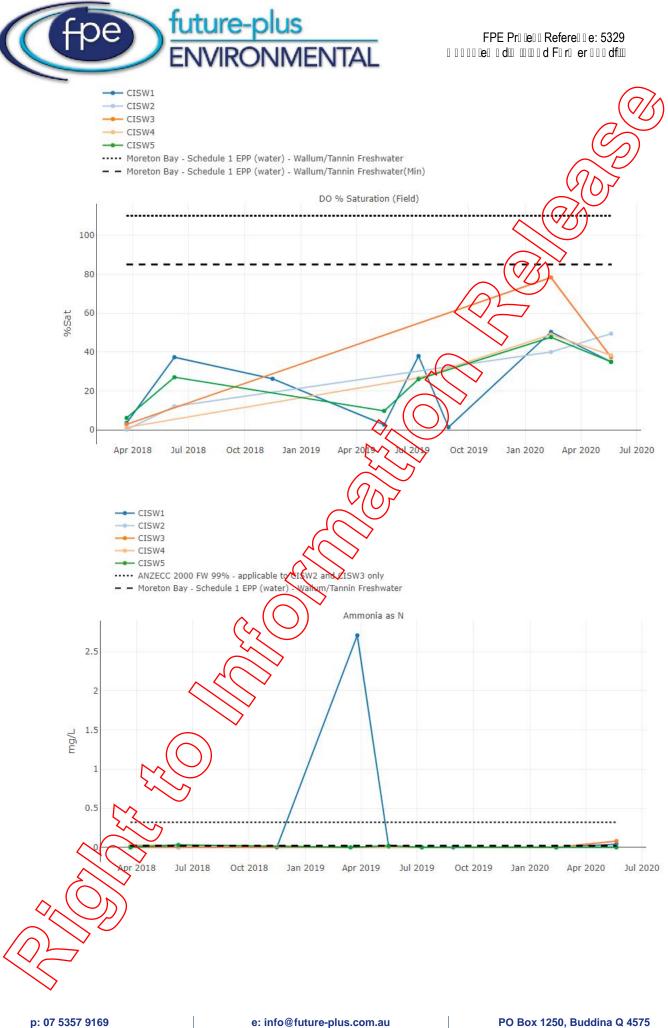
Appendix E. **Surface Water Graphs** 15 July 2020 Coochiemudlo Island Former Landfill -Appendix E



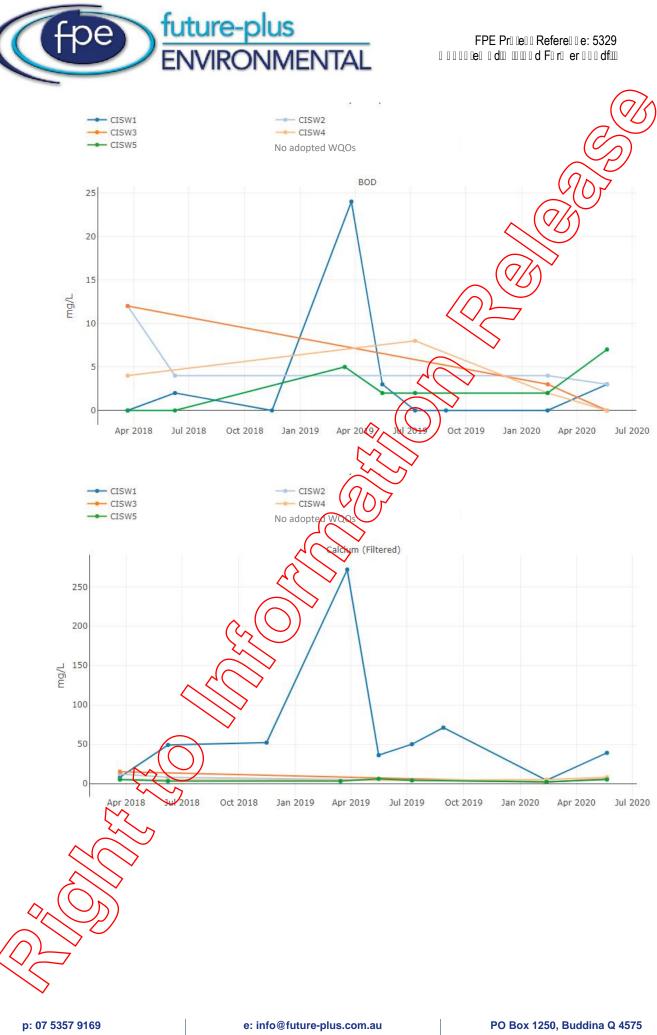
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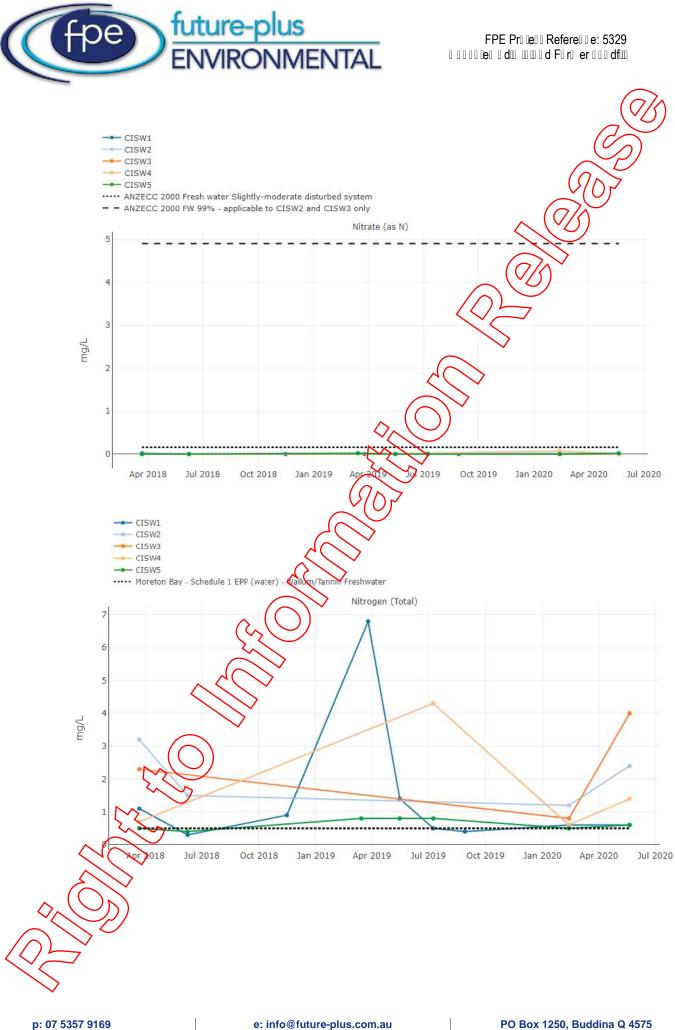
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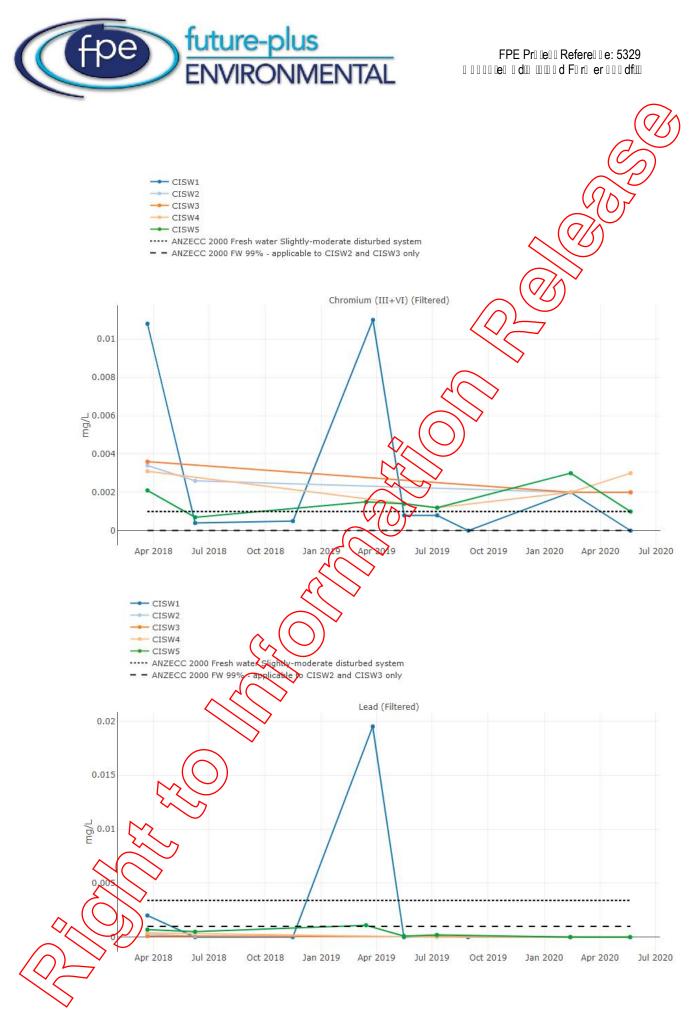


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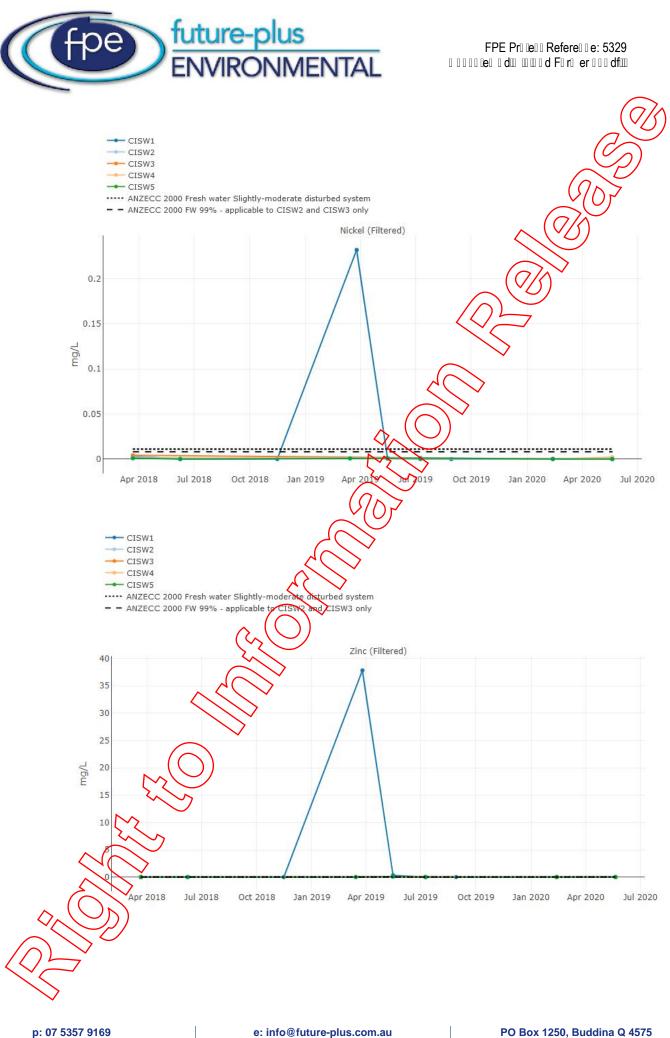
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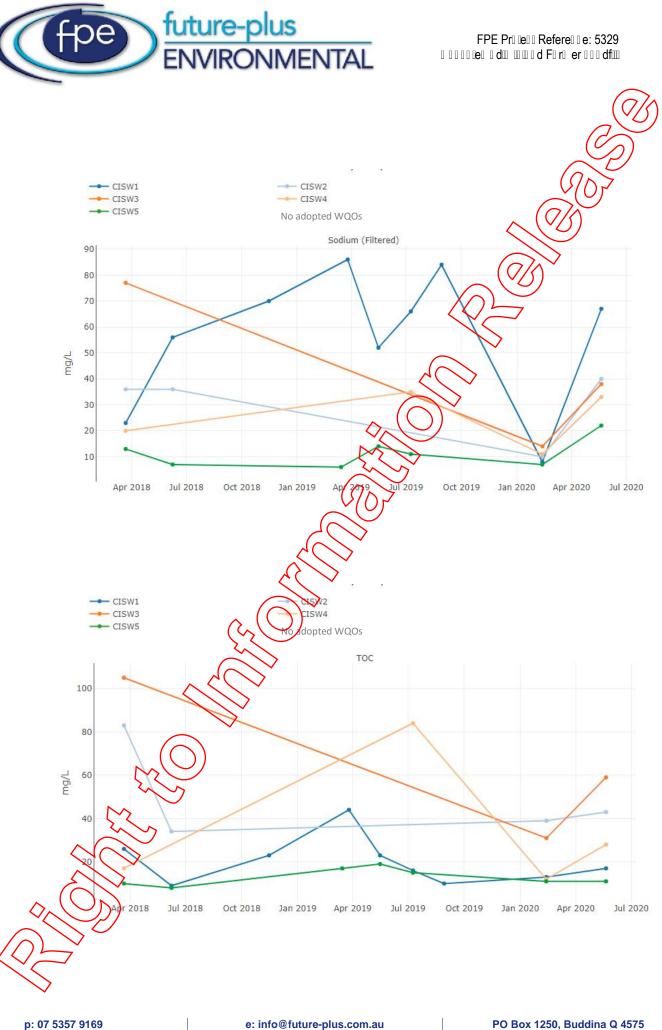


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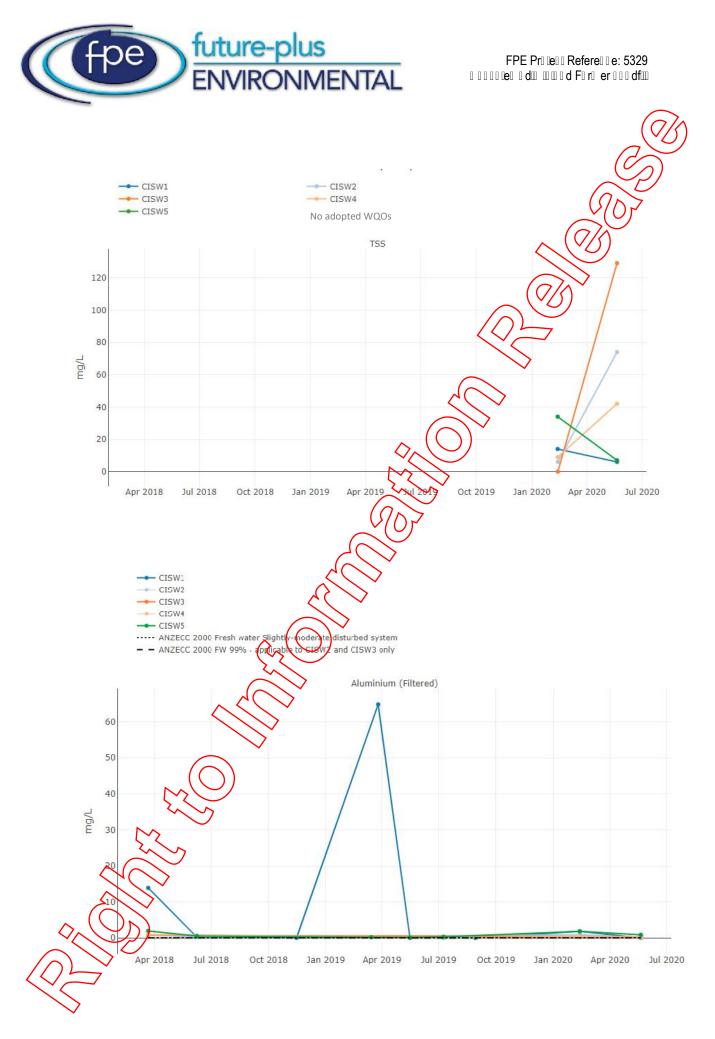


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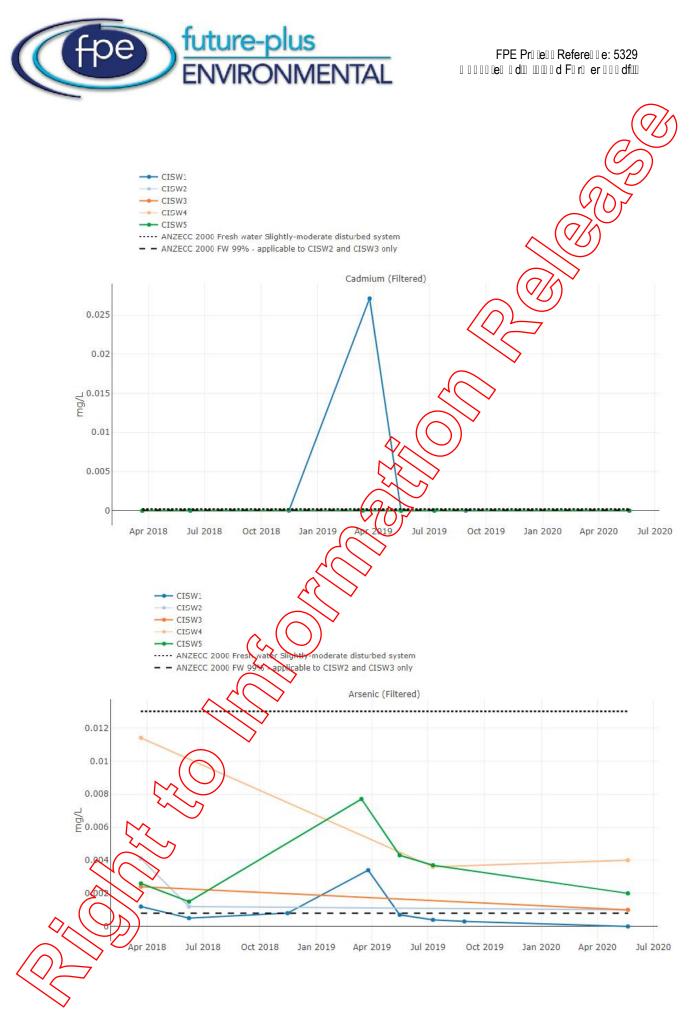
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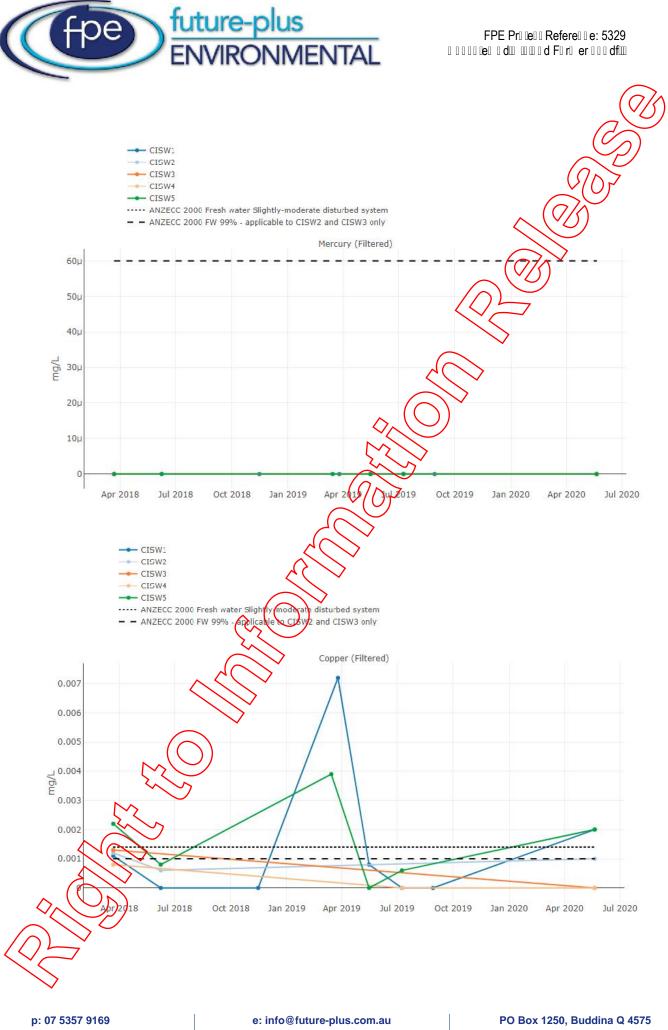
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p: 07 5357 9169 f: 07 3102 9399 e: info@future-plus.com.au www.future-plus.com.au



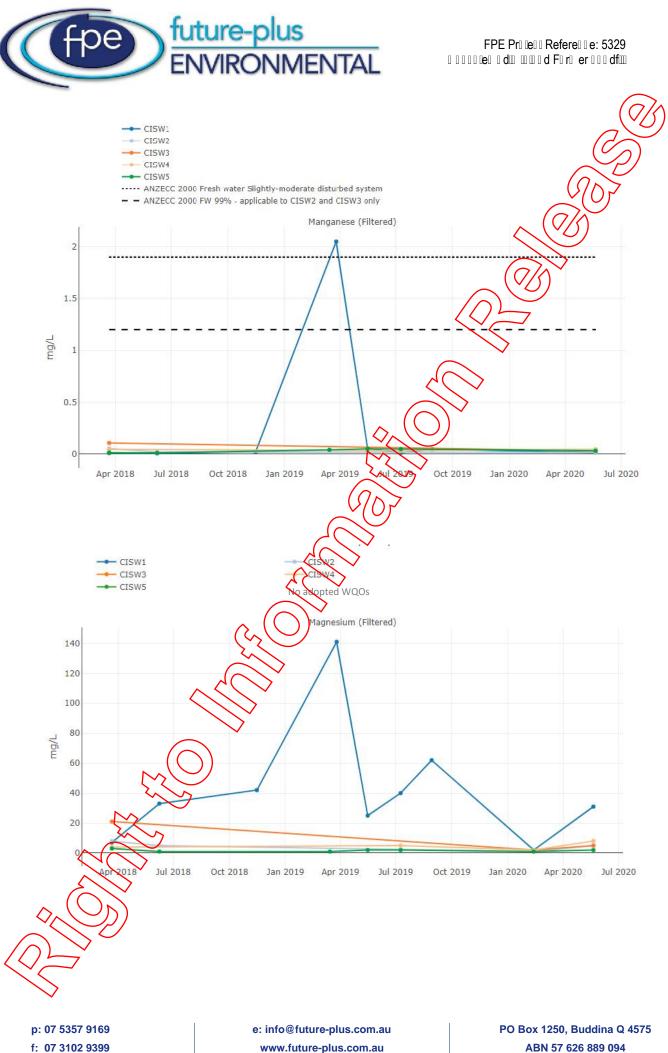
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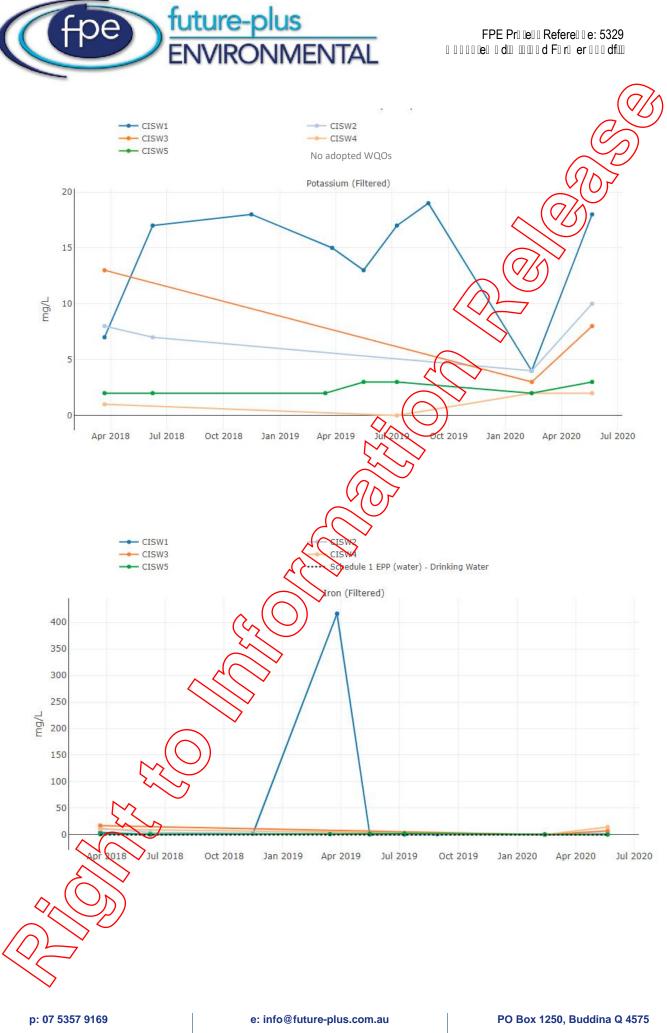
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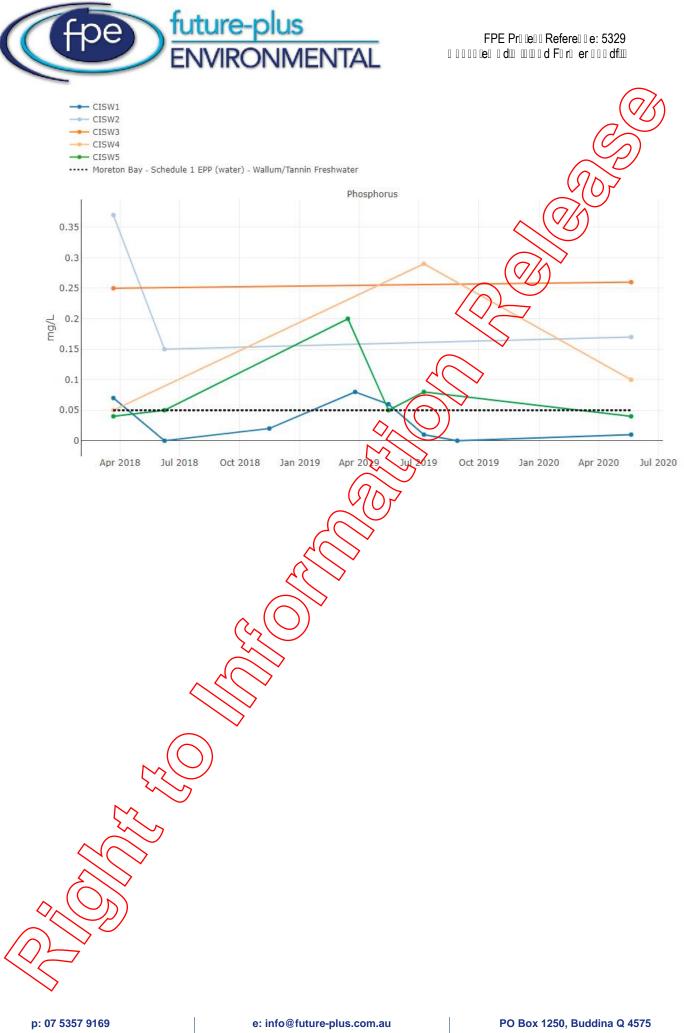
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Appendix F. Laboratory Analysis Results and QA/QC Reports 15 July 2020 Coochiemudlo Island Former Landfill -Appendix F

Quarterly Report (Quarter 2, 2020) Redland City Council Landfill Environmental Monitoring Program Elizabeth Street, Coochiemudlo Island

				zek		
SAMPLING Intelligence				ALS	Brist	ronmental Division Dane ork Order Reference B2013449
Custody Document						
ALS USE ONLY (Circle)						
Custody Seal Intact?	YES	NO	N/A			
Free ice / frozen ice bricks present upon receipt?	YES	NO	N/A		Telepho	ne : + 61-7-3243 7 <u>222</u>
Random Sample Temperature on receipt		°C			$\sum_{i=1}^{n}$	
Project: Redlands Client: RCC			Project	Manager:	Kaine	Pritchard
Landfils Landfils # Samples: 13	. 1		Phone: Sample Phone:))\``(er:	Sophie	
Turnaround RequiremerStandard <u>Stay TAT</u> Urgent						· · ·
Special Instructions:		70				HT
Custody:		•				
Relinquished by: Received by:		Relinquish	ed by:		Received by:	
Sophie Blondy Kirsten						
Date / Time:		Date / Tim	e:	·	Date / Time:	
Date / Time: 21/05/2020 10:30				<u>.</u>		
Right Solutions - Right Partner		- martin		0.440 0	alsglobal.	com/als-compass

	HAIN OF CUSTO	DDY	1	RELINQ	JISHED BY:			RECEN	/ED BY:		RELI	NQUISHED BY:	RECEIVED BY:
		Laboratory: EB Brisbane			ME:			DATE 1	IME:		DATE	TIME:	DATE TIME:
CLIENT:	FUPE - FUTURE-PLU	S ENVIRONMENTAL	L										
PROJECT:	Redlands Landfill		· · · ·	TURNAR		JIREME	NTS :	5 Days		LABORATOR	RY USE O	NLY (Circle)	
SITE:	May2020 Coochiemud	o Is Closed LF						-		Custody Seal	intact?		Yes No N/A
ORDER NO):			Biohazard	info:					Free ice / froz	en ice bric	cks present upon receip	I? Yes No N/A
PROJECT	MANAGER: Nicholas Ev	ans	CONTACT	PH: 075	357 9463	SAMP	LER MOE	3ILE: 07 5	357	Random Sam	ple Tempe	erature on Receipt:	c
PRIMARY S	SAMPLER: Nicholas Eva	ans	QUOTE N	0: BN/23	5/18 B V12		/ EB:	2019FUPE	0003	Other comme	nts:		
EMAIL REP													
EMAIL INVO	OICES TO:											è ·	
ļ,		SAMPLE DETAILS						r	ALYSIS RE				
							Table 18: Surface Coochiemudlo Is - C WATER	Table 19. Coochiemud W	ALTERNATION	O			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	urface Waler - lo Is - Quatterly ATER	Table 19: Government	ANALYSIS		TIONAL MATION		
001	GW1		20/05/2020 09:23 AM	Water	ALS: 4 Nort ALS: 0	NO		X					
002	GW2		20/05/2020 09:36 AM	Water	NON ALS: 0	N6		x					
003	GW3		20/05/2020 10:02 AM	Water	ALS: 4 Non ALS: 0	No		×					
004	GW5		20105/2020 05:55 PM	Water	ALS: 4 Non ALS: 0	No		x					
005	GW6	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	20/05/2020 19:34 AM	Water	ALS: 4 Non ALS: 0	No		x					
006	CISW1		20/05/2020 11:28 AM	Water	ALS: 5 Non ALS: 0	No	х						
007	CISW2		20/05/2020 12:10 PM	Water	ALS: 5 Non ALS: 0	No	Х						
008	CISW3	25)	20/05/2020 12:10 PM	Water	ALS: 5 Non ALS: 0	No	X						
009	els#4		20/05/2020 11:01 AM	Water	ALS: 5 Non ALS: 0	No	Х						
	∇											-	
Wednesday.	May 20, 2020	8:00:50 PM											1 of 4

	AIN OF CUSTO			RELINQU	JISHED BY:			RECEN	VED BY:		RELIN	QUISHED BY:	RECEIVED BY:
AL3 CO		Laboratory: EB Brisbane			ME:			DATE	ÎME:		DATE	TIME:	DATE TIME:
CLIENT: PROJECT:	FUPE - FUTURE-PLUS Redlands Landfill	S ENVIRONMENTAL	ŀ					E Dava		LABORATO		NLY (Circle)	
SITE:	May2020 Coochiemudl	o Is Closed LF			OUND REQI	JIRENIEI	15:	5 Days		Custody Seal		,	Yes No N/A
ORDER NO:	:			Biohazard	info:							ks present upon receit	T? Yes No N/A
	IANAGER: Nicholas Ev				5357 9463 5/18 B V12	SAMP		31LE: 07 \$ 2019FUPE		Random Sam Other comme		erature on Receipt:	°,
EMAIL REP		ans	QUOTEN	U. BIN/235	0/18 8 V12		/ ED	2019F0PE	0003			D. Br	
EMAIL INVC	ICES TO:	SAMPLE DETAILS					· .	ΔN	ALYSIS RE			\rightarrow	····
		SAMPLE DETAILS	,				2				\rightarrow		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Table 18: Surface Water - Coochiemudio Is - Quatterly WATER	Table 19: Groundwater - Coochiemudibus- Quartery WATER	AL TERMATIVE ANALYSIS		TIONAL		
010	CISW5		20/05/2020 11:29 AM	Water	ALS: 5 Non ALS: 0	NO	×						
011	Rinstate		20/05/2020 06:04 PM	Water	ALS 5 Non ALS: 0		х						
012	Blank		20/05/2020 05:58 PM	Water	ALS: 5 Non ALS: 0	No	X						
013	SWQA		29 /05/ 2020 11:82 AM	Watter	ALS: 5 Non ALS: 0	No	Х	· · · ·					
Wednesday, I	R	8:00:50 PM		•						, ,		•	2 of 4

	HAIN OF CUSTO	DY	RELINQUISHED BY:	RECE	IVED BY:		RELINQUIS	HED BY:	RECEIVED BY:	
		Laboratory: EB Brisbane	DATE TIME:	DATE	TIME:		DATE TIME:		DATE TIME:	
LIENT:	FUPE - FUTURE-PLUS	S ENVIRONMENTAL								
PROJECT:	Redlands Landfill		TURNAROUND REQUIREMENTS	: 5 Days	1	LABORATO	ORY USE ONLY (Circle)			
SITE:	May2020 Coochiemudk	o Is Closed LF				Custody Sea	Seal intact? Yes No N/A			
ORDER NO			Biohazard info:			Free ice / fro:	/ frozen ice bricks present upon receipt? (res No N/A			
								\wedge (\bigcirc)		
	MANAGER: Nicholas Eva			MOBILE: 07		Other comme		le Temperature on Receiver C		
PRIMARY S	AMPLER: Nicholas Eva	ins QUOTE	NO: BN/235/18 B V12	/ EB2019FUP	E0003	Other comme		(2)		
EMAIL REP								>		
SAMPLE	SAMPLE NAME	BOTT	LE NAME	VOLUME	BARC		TYPE	FILTERED	REASON	
001	GW1	Clear Plastic	Bottle - Natural	250 mL	0007111	9137052	Green	No		
001	GW1	Clear Plastic B	ottle - Sulfuric Acid	60 mL	0010051		Purple	No		
001	GW1	Clear Plastic Bottl	e - Nitric Acid; Filtered	60 mL	0012000	2095542	Red	Yes		
001	GW1	Amber TOC \	/ial - Sulfuric Acid	40 ml	0018101	9040349	Purple	No		
002	GW2	Clear Plastic	: Bottle - Natural	250 mL	00071119	9137065	Green	No		
002	GW2	Clear Plastic B	ottle - Sulfuric Acid	Julie Color	00100519		Purple	No		
002	GW2	Amber TOC \	/ial - Sulfuric Acid	40 m	00181019	9055653	Purple	No		
002	GW2	Clear Plastic Bottl	e - Nitric Acid; Filtered	60 mL	00122002		Red	Yes		
003	GW3		: Bottle - Natural	250 mL	0007111		Green	No		
003	GW3		ottle - Sulfuric Acid	60 mL	00100519		Purple	No		
003	GW3		e - Nitric Acid; Filtered	60 mL	00122002		Red	Yes		
003	GW3		(ia) - Suthiric Acid	40 mL	0018101		Purple	No		
004	GW5		Bottle - Natural	250 mL	0007111		Green	No		
004	GW5		e - Nitric Acid; Filtered	60 mL	0012200;		Red	Yes		
004	GW5		ottle - Sulfuric Acid	60 mL	0010051		Purple	No		
004	GW5		/ial - Sulfuric Acid	40 mL	0018101		Purple	No		
005	GW6		Bottle - Natural	250 mL	0007111		Green	No		
005	GW6		/lal - Sulfuric Acid	40 mL	0018101		Purple	No		
005	GW6		ottle - Sulfuric Acid	60 mL 60 mL	0010051		Purple Red	Yes		
005	GW6 CISW1		e - Nitric Acid; Filtered	250 mL	0012200		Green	No		
006	elsw1		: Bottle - Natural	250 mL	0007111		Green	No		
006	CISW1		/ial - Sulfuric Acid	40 mL	0018101		Purple	No		
006	CISW1 CHSW1		ottle - Sulfuric Acid	60 mL	0010051		Purple	No		
000	CIEW1		e - Nitric Acid; Filtered	60 mL	0012200		Red	Yes		
	1 million 1				0007111		Green	No		

	HAIN OF CUSTO	DY	RELINQUISHED BY:	RECE	IVED BY:		RELINQUISH	IED BY:	RECEIVED BY:
ALS CO	C#: 10929 ALS I	Laboratory: EB Brisbane	DATE TIME:	DATE	TIME:		DATE TIME:		
CLIENT:	FUPE - FUTURE-PLUS	SENVIRONMENTAL							$\langle \rangle$
PROJECT:	Redlands Landfill			5 Davie		LABORATO	RY USE ONLY (C	ircle)	$\mathcal{C}(\mathcal{O})$
	May 2020 Casabiana di		TURNAROUND REQUIREMENTS :	5 Days				,	
SITE:	May2020 Coochiemudio	D IS CIOSED LF	Biohazard info:			Custody Sea		(Yes No N/A
ORDER NO	:						zen ice bricks pres	$\wedge ()$	Yes No N/A
PROJECT N	ANAGER: Nicholas Eva	ans CONTAC	TPH: 07 5357 9463 SAMPLER I	MOBILE: 07	5357	Random Sar	nple Temperature	on Receipt:	° c
PRIMARY S	AMPLER: Nicholas Eva	ans QUOTE	NO: BN/235/18 B V12 /	EB2019FUP	E0003	Other comm	ents:	\sum	
EMAIL REP	ORTS TO:							STY -	
							VVL		
EMAIL INVO	DICES TO:							>	
007	CISW2		Unpreserved	250 mL		19137037	Green	No	
007	CISW2	Clear Plastic B	ottle - Sulfuric Acid	60 mL		19062988	Purple	No	
007	CISW2		e - Nitric Acid; Filtered	60 mL		02025585	Red	Yes	
007	CISW2		ial - Sulfuric Acid	40 mL		19055564	Purple	No	
008	CISW3		Unpreserved	250 mL		1913 703 9	Green	No	
008	CISW3		Bottle - Natural	250 mL		9137061	Green	No	
008	CISW3		e - Nitric Acid; Filtered	60 mL		02097078	Red	Yes	
008	CISW3		bttle - Sulfuric Acid			19062768	Purple	No	· · · · · · · · · · · · · · · · · · ·
008	CISW3		ial - Sulfuric Acid	40 ml		19055628	Purple	No	
009	CISW4		Bottle - Natural	250 mL		19019052	Green	No	
009	CISW4		Unpreserved	250 mL		19137066	Green	No	
009	CISW4		ottle - Sulfuric Akid	60 mL	l	19062840	Purple Red	No Yes	
009	CISW4		e - Nitric Acid, Filtered	60 mL 40 mL		02097116	Purple	No	
009	CISW4		al Selfunc Abid	250 mL		19035612	Green	No	
010	CISW5 CISW5		Bottle - Natural	250 mL		19018987	Green	No	
010 010	CISW5		bottle - Sulfuric Acid	60 mL		19062799	Purple	No	
010	CISW5		e - Nitric Acid; Filtered	60 mL		02097120	Red	Yes	·····
010	CISW5		lal - Sulfuric Acid	40 mL		19055644	Purple	No	
010	Rinstate		Unpreserved	250 mL		19019089	Green	No	
011	Rinstate	$\Delta \Delta \Delta$	Bottle - Natural	250 mL		19019018	Green	No	
011	Rinstate	Clear Plastic B	ottle - Sulfuric Acid	60 mL	001005	19063002	Purple	No	
011	Rinstate		e - Nitric Acid; Filtered	60 mL	001220	02097118	Red	Yes	•
011	Rinstate	Amber TOC V	ial - Sulfuric Acid	40 mL	001810	19040250	Purple	No	
012	Blank	BOD Bottle	Unpreserved	250 mL	000711	19137036	Green	No	
012	Blank	Clear Plastic	Bottle - Natural	250 mL	000711	19137053	Green	No	
012	Blank	Clear Plastic B	ottle - Sulfuric Acid	60 mL	001005	19062902	Purple	No	·

Wednesday, May 20, 2020

8:00:50 PM

∧ c	HAIN OF CUSTO	DDY	RELINQUISHED BY:	RECEI	VED BY:	R	ELINQUISHED BY:	RECEIVED BY:
		Laboratory: EB Brisbane	DATE TIME:	DATE T	ſIME:	D.	ATE TIME:	DATE TIME:
	FUPE - FUTURE-PLUS Redlands Landfill		TURNAROUND REQUIREMENTS :	5 Days		LABORATORY US		
SITE:	May2020 Coochiemudl	lo Is Closed LF	Biohazard info:			Custody Seal intact Free ice / frozen ice	? e bricks present upon re	eceipt? Yes No N/A
PROJECT	MANAGER: Nicholas Ev SAMPLER: Nicholas Eva			MOBILE: 07 5 EB2019FUPE		Random Sample Te Other comments:	emperature on Receipt:	c
EMAIL RE	PORTS TO:					<	R	S
012	Blank	Clear Plastic Bottl	e - Nitric Acid; Filtered	60 mL	0012200	2005546	V	íes
012	Blank		/ial - Sulfuric Acid	40 mL			·	10
013	SWQA		e Unpreserved	250 mL				No
013	SWQA		Bottle - Natural	250 mL				
013	SWQA		e - Nitric Acid; Filtered	60 mL				Vo
013	SWQA		/ial - Sulfuric Acid	40 m	0018401			No
	RH		TUTION					·
Wednesday	/, May 20, 2020	8:00:50 PM						





Work Order	: EB2013449		
Client Contact Address	 FUTURE-PLUS ENVIRONMENTAL NICHOLAS EVANS 4/40 TECHNOLOGY DRIVE WARANA QUEENSLAND 4575 	Laboratory Contact Address	 Environmental Division Brisbane John Pickering 2 Byth Street Stafford QLD Australia 4053
E-mail Telephone Facsimile	: +61 07 54502688 : +61 07 54502686	E-mail Telephone Facsimile	: +61 7 3552 8684 : +61-7-3243 7218
Order number C-O-C number Site	 Redlands Landfill - 10929 May2020 Coochiemudlo Is Closed LF KAINE PRITCHARD, NICHOLAS EVANS, SOPHIE BLOND 	Page Quote number QC Level	: 1 of 3 : EB2019FUPE0003 (BN/235/18 B V12) : NEPM 2018 B3 & ALS QC Standard
Dates Date Samples Received Client Requested Due Date	d : 21-May-2020 10:30 : 28-May-2020	Issue Date	: 21-May-2020 28-May-2020
Delivery Details Mode of Delivery No. of coolers/boxes Receipt Detail	: Carrier : 4 : SMALL & MEDIUM HARD ESKY	Security Seal Temperature No. of sentingles receiv	: Intact. : 3.1°C, 0.1°C, 7.3°C, 0°C - Ice present ved / analysed : 13 / 13
 Sample Conta Summary of S Proactive Hold Requested Dete *SRN Reissued 21 Discounted Packag Please direct any tristication Sample Disposal - Analysis will be cor Breaches in ret the Proactive I Please be aware the analysis, and less the temperature, it sho 	ains the following information: niner(s)/Preservation Non-Compliances cample(s) and Requested Analysis ding Time Report	des ('W', 'S', 'NT' suites) a intact designated above. om receipt of samples. accreditation no. 825, Site ding times (if any) a ples be chilled to less that pical analysis. Where samp results. Refer to ALS Envi	No. 818 (Micro site no. 18958). re displayed overleaf in n or equal to 6°C for chemical oles are received above this roMail 85 for ALS

Sample Container(s)/Preservation Non-Compliances

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

• No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

			- ED04 by Dis	- EGO d Meta	- EKO a as N	- EKO	R EK06 Phosphor	- EPC ganig	р-М -
Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - ED04 Chloride by Dis	WATER - EG02 Dissolved Meta	WATER - EK05 Ammonia as N	WATER - EK05 litrate & N by	VATER Fotal Pho	NAVER - EP00 Total Organic C	WATER - W-02 8 Metals
EB2013449-001	20-May-2020 09:23	GW1	✓	✓	1	X	\mathbf{i}	✓	<u>> ∞</u>
EB2013449-002	20-May-2020 09:36	GW2	1	×		3	1	✓	✓
EB2013449-003	20-May-2020 10:02	GW3	1	\mathcal{A}	\checkmark	J	1	✓	✓
EB2013449-004	20-May-2020 17:55	GW5	1	∇	×	71	1	✓	✓
EB2013449-005	20-May-2020 10:34	GW6	1	X	J	1	1	✓	1
EB2013449-006	20-May-2020 11:28	CISW1	(5	IK.	7			✓	✓
EB2013449-007	20-May-2020 12:10	CISW2	$\dot{\langle}$	Y				1	✓
EB2013449-008	20-May-2020 12:10	CISW3	(\times)	\mathbf{y}				✓	✓
EB2013449-009	20-May-2020 11:01	CISW4	×	√				✓	✓
EB2013449-010	20-May-2020 11:29	CISW5	×.	✓				✓	1
EB2013449-011	20-May-2020 18:04	Rinstate	√	✓				✓	✓
EB2013449-012	20-May-2020 17:58	Blank	✓	✓				✓	1
EB2013449-013	20-May-2020 11:02	SWQA	✓	✓				✓	✓
	<		evel	2 by Discrete	(Q			NH3 + Total P	
	Client sampling	Client sample ID	.TER - EA025H spended Solids - Standard Level	.TER - ED041G fate (Turbidimetric) as SO4 2 by Discrete	.TER - EP026SP smical Oxygen Demand (COD)	.TER - EP030 D	.TER - NT-01 or Cations (Ca, Mg, Na, K)	NO2 + NO3 + NH3 + Total	
Laboratory sample	date / time		WATER - EA025H Suspended Solids - Standard Level	WATER - ED041G Sulfate (Turbidimetric) as SO4	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - NT-01 Major Cations (Ca, Mg,	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total F	
Laboratory sample ID EB2013449-001	date / time 20-May-2020 09:23	GW1		WATER - ED041G Sulfate (Turbidimetric) as SO4	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - NT-01 Major Cations (Ca, Mg,	NO2 + NO3 + NH3 + Total	•
Laboratory sample ID EB2013449-061 EB2013449-062	date / time 20-May-2020 09:23 20-May-2020 09:36	GW1 GW2		WATER - ED041G Sulfate (Turbidimetric) as SO4	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	Major Cations (Ca, Mg,	NO2 + NO3 + NH3 + Total	•
Laboratory sample ID EB2013449-001 EB2013449-002 EB2013449-003	date / time 20-May-2020 09:23 20-May-2020 09:36 20-May-2020 10:02	GW1 GW2 GW3		Image: Matter - ED041G Image: Sulfate (Turbidimetric) as SO4	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	 ▲ ▲ Major Cations (Ca, Mg. 	NO2 + NO3 + NH3 + Total	· · · ·
Laboratory sample ID EB2013449-001 EB2013449-002 EB2013449-003 EB2013449-004	date / time 20-May-2020 09:23 20-May-2020 09:36 20-May-2020 10:02 20-May-2020 17:55	GW1 GW2 GW3 GW5		 MATER - ED041G Sulfate (Turbidimetric) as SO4 	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	 ▲ ▲ ▲ WATER - NT-01 Major Cations (Ca, Mg, 	NO2 + NO3 + NH3 + Total	• • •
Laboratory sample ID EB2013449-001 EB2013449-002 EB2013449-003 EB2013449-004 EB2013449-005	date / time 20-May-2020 09:23 20-May-2020 09:36 20-May-2020 10:02 20-May-2020 17:55 20-May-2020 10:34	GW1 GW2 GW3 GW5 GW6	WATER - EA025H	Image: Solution of the second seco			 ▲ ▲ ▲ ▲ WATER - NT-01 Major Cations (Ca, Mg, 	WATER - NT-08 Wrater - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total	
Laboratory sample ID EB2013449-001 EB2013449-002 EB2013449-003 EB2013449-004 EB2013449-005 EB2013449-006	date / time 20-May-2020 09:23 20-May-2020 09:36 20-May-2020 10:02 20-May-2020 17:55 20-May-2020 10:34 20-May-2020 11:28	GW1 GW2 GW3 GW5 GW6 CISW1	WATER - EA025H	 ▲ ▲ ▲ ▲ ▲ Buffate (Turbidimetric) as SO4 		✓	 ▲ ▲	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total	· · · · · · · · · · · · · · · · · · ·
ID EB2013449-061 EB2013449-002 EB2013449-003 EB2013449-004 EB2013449-006 EB2013449-006 EB2013449-007	date / time 20-May-2020 09:23 20-May-2020 09:36 20-May-2020 10:02 20-May-2020 17:55 20-May-2020 10:34 20-May-2020 11:28 20-May-2020 12:10	GW1 GW2 GW3 GW5 GW6 CISW1 CISW2	WATER - EA025H	 Image: Second sec	✓ ✓	✓ ✓	 ▲ ▲	MATER - NT-08 MATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total	
Laboratory sample ID EB2013449-001 EB2013449-003 EB2013449-003 EB2013449-004 EB2013449-005 EB2013449-006 EB2013449-007 EB2013449-008	date / time 20-May-2020 09:23 20-May-2020 09:36 20-May-2020 10:02 20-May-2020 17:55 20-May-2020 10:34 20-May-2020 11:28 20-May-2020 12:10 20-May-2020 12:10	GW1 GW2 GW3 GW5 GW6 CISW1 CISW2 CISW3	WATER - EA025H	 ▲ ■ ■	✓ ✓ ✓	✓ ✓ ✓	 ▲ ₩ATER - NT-01 ₩	VATER - NT-08 Virtal Nitrogen + NO2 + NO3 + NH3 + Total	
Laboratory sample ID EB2013449-001 EB2013449-002 EB2013449-003 EB2013449-004 EB2013449-006 EB2013449-006 EB2013449-007	date / time 20-May-2020 09:23 20-May-2020 09:36 20-May-2020 10:02 20-May-2020 17:55 20-May-2020 10:34 20-May-2020 11:28 20-May-2020 12:10 20-May-2020 12:10 20-May-2020 11:01	GW1 GW2 GW3 GW5 GW6 CISW1 CISW2 CISW2 CISW3 CISW4	WATER - EA025H	· ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ►	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓	 ▲ ▲	▲ ▲ ▲ WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total Total Nitrogen + NO2 + NO3 + NH3 + Total	
Laboratory sample ID EB2013449-001 EB2013449-002 EB2013449-003 EB2013449-005 EB2013449-005 EB2013449-006 EB2013449-007 EB2013449-008	date / time 20-May-2020 09:23 20-May-2020 09:36 20-May-2020 10:02 20-May-2020 17:55 20-May-2020 10:34 20-May-2020 11:28 20-May-2020 12:10 20-May-2020 12:10	GW1 GW2 GW3 GW5 GW6 CISW1 CISW2 CISW3	WATER - EA025H	 ▲ ■ ■	✓ ✓ ✓	✓ ✓ ✓	 ▲ ₩ ₩	VATER - NT-08 Virtal Nitrogen + NO2 + NO3 + NH3 + Total	



screte Analyser

By Discrete Analyser

55G

screte Analyser als by ICP/MS

20F

145G

Discrete Analyser

58G

Issue Date	21-May-2020
Page	: 3 of 3
Work Order	EB2013449 Amendment 0
Client	: FUTURE-PLUS ENVIRONMENTAL



		WATER - EA025H Suspended Solids - Standard Level	WATER - ED041G Sulfate (Turbidimetric) as SO4 2 by Discrete	WATER - EP026SP Chemical Oxygen Demand (COD)	WATER - EP030 BOD	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-08 Total Nitrogen + NO2 + NO3 + NH3 + Total P	
EB2013449-012 20-May-2020	17:58 Blank	1	✓	✓	✓	1/	$\overline{\mathcal{A}}$	
EB2013449-013 20-May-2020) 11:02 SWQA	1	✓	✓	✓	64		

Émail

Fmail

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Email

Proactive Holding Time Report

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

Requested Deliverables

ESDAT RESULTS

- EDI Format - ESDAT (ESDAT)

INVOICES

- A4 - AU Tax Invoice (INV)

JONO HOOPER

- *AU Certificate of Analysis NATA (COA)
- *AU Interpretive QC Report DEFAULT (Anon QCI Rep) (QC)
- *AU QC Report DEFAULT (Anon QC Rep) NATA (QC)
- A4 AU Sample Receipt Notification Environmental HT
- A4 AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format ENMRG (ENMRG)
- EDI Format XTab (XTAB)

KAINE PRITCHARD

- *AU Certificate of Analysis NATA (COA)
- *AU Interpretive QC Report DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report DEFAULT (Anon QC Rep) NAJA (QC)
- A4 AU Sample Receipt Notification Equironmental HT (SRN)
- A4 AU Tax Invoice (INV)
- Chain of Custody (CoC) (COC)
- EDI Format ENMRG (ENMRG)
- EDI Format XTab (XTAB)

NICHOLAS EVANS

- *AU Certificate of Analysis NATA (COA)
- *AU Interpretive QC Report DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report DEFAULT (Anon QC Rep) NATA (QC)
- A4 AU Sample Receipt Notification Environmental HT (SRN)
- A4 AU Tax Invoice (INV)
- Chain of Custody (Coc) (COC)
- EDI Format ENMRG (ENMRG)
- EDI Format XTab (XTAB)
- SOPHIE BLOND
 - *AU Certificate of Analysis NATA (COA)
- AU Interpretive QC Report DEFAULT (Anon QCI Rep) (QCI) AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 AU Sample Receipt Notification Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format ENMRG (ENMRG)
- EDI Format XTab (XTAB)

future-plus@esdat.com.au

accounts@future-plus.com.au

jonoh@future-plus.com.au jonoh@future-plus.com.au jonoh@future-plus.com.au jonoh@future-plus.com.au jonoh@future-plus.com.au jonoh@future-plus.com.au jonoh@future-plus.com.au

kainep@future-plus.com.au kainep@future-plus.com.au kainep@future-plus.com.au kainep@future-plus.com.au kainep@future-plus.com.au kainep@future-plus.com.au kainep@future-plus.com.au

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sophie.blond@future-plus.com.au sophie.blond@future-plus.com.au sophie.blond@future-plus.com.au sophie.blond@future-plus.com.au sophie.blond@future-plus.com.au sophie.blond@future-plus.com.au



	CERTIFICA	TE OF ANALYSIS	
Vork Order	EB2013449	Page	: 1 of 7
Client	: FUTURE-PLUS ENVIRONMENTAL	Laboratory	Environmental Division Brispane
ontact	: NICHOLAS EVANS	Contact	: John Pickering
ddress	: 4/40 TECHNOLOGY DRIVE	Address	: 2 Byth Street Stafford QLD Australia 4053
	WARANA QUEENSLAND 4575		
elephone	: +61 07 54502688	Telephone	: +61 7 3552 8634
roject	: Redlands Landfill	Date Samples Received	: 21-May-2020 10:30
rder number	:-	Date Analysis Commenced	: 21-May-2020
-O-C number	: 10929	Issue Date	28 May-2020 12:22
ampler	: KAINE PRITCHARD, NICHOLAS EVANS, SOPHIE BLOND		ACTINATION OF THE REAL NAT
te	: May2020 Coochiemudlo Is Closed LF	\Diamond (C	
uote number	: BN/235/18 B V12		Accreditation No. 8
o. of samples received	: 13	-//53	Accredited for compliance wi
o. of samples analysed	: 13	GILAN	ISO/IEC 17025 - Testi
	ny previous report(s) with this reference. Results apply to the sample(s) is contains the following information:	as submitted. This document sha	all not be reproduced, except in full.
	the following information.	$\sim \sim $	
General Comme			
General CommeAnalytical Result	ts	Mn-	
General Comme Analytical Resul dditional information	ts	parate attachments: Quality	Control Report, QA/QC Compliance Assessment to assist wi
General Comme Analytical Resul dditional information uuality Review and Sam Signatories	ts pertinent to this report will be found in the following se uple Receipt Notification.	·	
General Comme Analytical Resul dditional information uality Review and Sam Signatories his document has beer	ts pertinent to this report will be found in the following sa ple Receipt Notification. n electronically signed by the authorized signatories below. Electronic signatories below.	gning is carried out in compliance	with procedures specified in 21 CFR Part 11.
General Comme Analytical Resul ditional information uality Review and Sam fignatories his document has been ignatories	ts pertinent to this report will be found in the following sa ple Receipt Notification. a electronically signed by the authorized signatories below. Electronic signatories below. Electronic signatories below.	gning is carried out in compliance Accreditation Cate	with procedures specified in 21 CFR Part 11.
General Comme Analytical Resul dditional information uality Review and Sam Signatories ave Gitsham	ts pertinent to this report will be found in the following se pele Receipt Notification. a electronically signed by the authorized signatories below. Electronic signatories Position Metals Instrument Chemist	gning is carried out in compliance Accreditation Categ Brisbane Inorgan	with procedures specified in 21 CFR Part 11.
General Comme Analytical Resul dditional information uality Review and Sam Signatories his document has been ignatories lave Gitsham im McCabe	ts pertinent to this report will be found in the following se pelectronically signed by the authorized signatories below. Electronic signatories Position Metals Instrument Chemist Senior Inorganic Chemist	gning is carried out in compliance Accreditation Categ Brisbane Inorgan Brisbane Inorgan	with procedures specified in 21 CFR Part 11.
General Comme Analytical Result Additional information Quality Review and Sam Signatories	ts pertinent to this report will be found in the following se pele Receipt Notification. a electronically signed by the authorized signatories below. Electronic signatories Position Metals Instrument Chemist	gning is carried out in compliance Accreditation Categ Brisbane Inorgan	e with procedures specified in 21 CFR Part 11. gory nics, Stafford, QLD nics, Stafford, QLD cs, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In the set developed procedures are fully validated and are often at the client request.

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

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

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

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

purposes.

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

- Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society. LOR = Limit of reporting
 - ^ = This result is computed from individual analyte detections at or above the level of reporting
 - ø = ALS is not NATA accredited for these tests.
 - \sim = Indicates an estimated value.
- ED041G (Sulfate as SO4 2-) / EK057G (Nitrite as N): Sample EB2013449_008 (CISW3) was diluted due to matrix interference. Koradiusted elsevordingly.
- EP030 (BOD): The analytical BOD run containing samples from this work order recovered all certified reference standards within the acceptable criteria except for the dilution water blank which was elevated above 0.20 mg/L.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg.relative to the assumption that <LOR is equivalent to the LOR concentration.

Page : 3 of 7 Work Order : EB2013449 Client : FUTURE-PLUS ENVIRONMENTAL Project : Redlands Landfill



Sub-Matrix: GROUNDWATER (Matrix: WATER)		Clie	ent sample ID	GW1	GW2	GW3	GW5	GW6
	Cl	ient sampli	ng date / time	20-May-2020 09:23	20-May-2020 09:36	20-May-2020 10:02	20-May-2020 13:55	20-May-2020 10:34
Compound	CAS Number	LOR	Unit	EB2013449-001	EB2013449-002	EB2013449-003	EB2013449-004	EB2013449-005
				Result	Result	Result	Result	Result
D041G: Sulfate (Turbidimetric) as \$	SO4 2- by DA						VIV	
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	124	15	4	21	15
D045G: Chloride by Discrete Analy	vser						>	
Chloride	16887-00-6	1	mg/L	36	332	12	74	770
D093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	71	38	$\neg \land \land \lor$	<1	3
Magnesium	7439-95-4	1	mg/L	21	32		4	56
Sodium	7440-23-5	1	mg/L	26	130	9	52	336
Potassium	7440-09-7	1	mg/L	13	82	<1	<1	2
G020F: Dissolved Metals by ICP-M	s				CUU			
Aluminium	7429-90-5	0.01	mg/L	<0.01	9:06	0.21	0.02	6.05
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.002	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	< 9.00 1	<0.001	0.012	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	(<0.00)	<0.001	<0.001	<0.001	0.002
Lead	7439-92-1	0.001	mg/L	< <0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.012	<0.005	0.014
Manganese	7439-96-5	0.001	ngxL (0.014	0.002	0.003	0.001	0.138
Iron	7439-89-6	0.05	mg/L	<0.05	9.99	0.11	<0.05	1.49
G035F: Dissolved Mercury by FIMS	5	\frown	$ \setminus \setminus \lor$					
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K055G: Ammonia as N by Discrete	Analyser	$> \bigcirc$						
Ammonia as N	7664-41-7	9.01	mg/L	<0.01	0.10	0.02	<0.01	<0.01
K057G: Nitrite as N by Discrete Ar		\bigcirc						
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
K058G: Nitrate as N by Discrete A	nalvser							
Nitrate as N	14797-55-8	0.01	mg/L	0.36	0.02	0.02	1.56	<0.01
K059G: Nitrite plus Nitrate as N (M								
Nitrite + Nitrate as N		0.01	mg/L	0.36	0.02	0.02	1.56	<0.01
K067G: Total Nhosphorus as P by	Discrete Analyser							
Total Phosphorus as P	Discrete Analysei	0.01	mg/L	0.01	0.17	1.35	<0.01	0.16
EP005: Total Organic Carbon (TOC)								
Total Organic Carbon (TOC)		1	mg/L	5	7	8	2	2
			iiig/L	5	,	0	2	

Page : 4 of 7 Work Order : EB2013449 Client : FUTURE-PLUS ENVIRONMENTAL Project : Redlands Landfill



	Clie	ent sample ID	CISW/1	CISW2	CISW3		CISW5
	- Chic		CIGWI	010112	0.0443	CISW4	CISWS
Cl	ient sampliı	ng date / time	20-May-2020 11:28	20-May-2020 12:10	20-May-2020 12:10	20-May-2020 11:01	20-May-2020 11:29
CAS Number	LOR	Unit	EB2013449-006	EB2013449-007	EB2013449-008	EB2013449-009	EB2013449-010
			Result	Result	Result	Result	Result
at 104 ± 2°C						Vav	
	5	mg/L	6	74	129	42	7
04 2- by DA						>	
14808-79-8	1	mg/L	110	3	<5	8	24
ər					$\langle \langle \rangle \rangle$		
16887-00-6	1	mg/L	151	81	75	53	29
				\Diamond ((
7440-70-2	1	mg/L	39	6	6	8	5
7439-95-4	1	mg/L	31	55	5	8	2
7440-23-5	1	mg/L	67	40	38	33	22
7440-09-7	1	mg/L	18		8	2	3
			\subset	$n \cup \mathcal{O}$			
7429-90-5	0.01	mg/L	0.03	0.19	0.34	0.20	0.87
7440-38-2	0.001	mg/L	<0.001	0.001	0.001	0.004	0.002
7440-43-9	0.0001	mg/L	\$8.0004	<0.0001	<0.0001	<0.0001	<0.0001
7440-47-3	0.001	mg/L	(< (< 0.00)	0.002	0.002	0.003	0.001
7440-50-8	0.001	mg/L	0.092	0.001	<0.001	<0.001	0.002
7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	0.002	<0.001
7439-92-1	0.001	hogy (<0.001	<0.001	<0.001	<0.001	<0.001
7440-66-6	0.005	mgxL	<0.005	0.007	<0.005	0.025	0.022
7439-96-5	0.001	mg/L	0.013	0.014	0.029	0.046	0.031
7439-89-6	0.05	mg/L	0.88	2.98	7.36	14.5	0.53
	$> \bigcirc$						
7439-97-8	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
nalyse	\smile						
7664-41-7	0.01	mg/L	0.04	0.01	0.08	<0.01	<0.01
vsvr							
14797-65-0	0.01	mg/L	<0.01	<0.01	<0.05	<0.01	<0.01
lvser							
14797-55-8	0.01	mg/L	<0.01	<0.01	<0.05	<0.01	0.02
	lvser						
	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.02
iscrete Analyser		J. J					
	0.1	mg/L	0.6	2.4	4.0	1.4	0.6
	CAS Number at 104 ± 2°C 4 2- by DA 14808-79-8 er 16887-00-6 7440-70-2 7439-95-4 7440-23-5 7440-23-5 7440-23-5 7440-23-5 7440-38-2 7440-38-2 7440-38-2 7440-38-2 7440-43-3 7440-50-8 7440-50-8 7440-50-8 7440-66-6 7439-92-1 7440-66-6 7439-92-1 7440-66-8 7439-97-8 nalyse 7664-21-7 ysvr 14797-65-0 IVver 14797-55-8	Client samplin CAS Number LOR at 104 ± 2°C 5 14808-79-8 1 14808-79-8 1 16887-00-6 1 7440-70-2 1 7440-70-2 1 7440-23-5 1 7440-23-5 1 7440-38-2 0.001 7440-43-9 0.0001 7440-60-8 0.001 7440-60-8 0.001 7440-60-8 0.001 7440-66-6 0.005 7439-92-1 0.001 7439-96-5 0.004 7439-97-8 0.001 7439-97-8 0.001 7439-97-8 0.001 7439-97-8 0.001 7439-97-8 0.001 7439-97-8 0.001 7439-97-8 0.001 7439-97-8 0.001 7439-97-8 0.01 Vsvr 14797-65-0 0.01 vsvr 14797-55-8 0.01 vsvr 1	at 104 ± 2°C 5 mg/L A4 2- by DA 14808-79-8 1 mg/L 16887-00-6 1 mg/L 7440-70-2 1 mg/L 7440-70-2 1 mg/L 7440-23-5 1 mg/L 7440-23-5 1 mg/L 7440-38-2 0.001 mg/L 7440-47-3 0.001 mg/L 7440-47-3 0.001 mg/L 7440-50-8 0.001 mg/L 7440-66-6 0.005 mg/L 7439-92-1 0.001 mg/L 7440-66-6 0.005 mg/L 7439-97-8 0.001 mg/L 7439-96-5 0.001 mg/L 7439-97-8 0.001 mg/L 7439-97-8 0.001 mg/L 7439-97-9 0.001 mg/L 7439-97-8 0.001 mg/L 7439-97-9 0.001 mg/L 7439-97-8 0.001 mg/L 7439-97-8 0.01 mg/L 7439-97-8 0.01 mg/L 7439-97-8 0.01 mg/L 7439-97-8 0.01 mg/L 7439-97-55-8 0.01 mg/L 14797-65-0 0.01 mg/L 147	Client sampling date / time 20-May-2020 11:28 CAS Number LOR Unit EB2013449-006 Result Result Result at 104 ± 2°C mg/L 6 5 mg/L 6 // 2- by DA mg/L 110 14808-79-8 1 mg/L 110 7440-70-2 1 mg/L 39 7439-95-4 1 mg/L 31 7440-70-2 1 mg/L 67 7440-70-2 1 mg/L 67 7440-70-2 1 mg/L 67 7440-09-7 1 mg/L 67 7440-09-7 1 mg/L 6001 7440-09-7 1 mg/L 0.03 7440-38-2 0.001 mg/L 0.001 7440-43-9 0.0001 mg/L 0.001 7440-50-8 0.001 mg/L 0.001 7439-92-1 0.001 mg/L 0.001 7439	Client sampling date / time 20-May-2020 11:28 20-May-2020 12:10 CAS Number LOR Unit EB2013449-006 EB2013449-007 at 104 ± 2°C Result Result Result 14808-79-8 1 mg/L 6 74 42 - by DA 110 3 3 7440-70-2 1 mg/L 110 3 7440-70-2 1 mg/L 39 6 7440-70-2 1 mg/L 31 5 7440-70-2 1 mg/L 31 5 7440-70-2 1 mg/L 6 7 7440-73 0.01 mg/L 6 7 7440-73 0.001 mg/L 6 7 7440-73 0.001 mg/L 400 0.001 7440-73 0.001 mg/L 40.001 0.001 7440-73 0.001 mg/L 40.001 0.001 7440-638 0.001 mg/L 40.001	Client sampling date / time 20-May-2020 11:28 20-May-2020 12:10 20-May-2020 12:10 CAS Number LOR Unit EE2013449-006 EE2013449-007 EE2013449-008 at 104 ± 2°C	Client sampling dif / lime 20-May-2020 11:28 20-May-2020 12:10 20-May-2020 12:10 </td

Page	5 of 7
Work Order	: EB2013449
Client	: FUTURE-PLUS ENVIRONMENTAL
Project	: Redlands Landfill



ub-Matrix: SURFACE WATER Natrix: WATER)	Clie	nt sample ID	CISW1	CISW2	CISW3	CISW4	CISW5
	Client samplin	g date / time	20-May-2020 11:28	20-May-2020 12:10	20-May-2020 12:10	20-May-2020 11:01	20-May-2020 11:29
compound	CAS Number LOR	Unit	EB2013449-006	EB2013449-007	EB2013449-008	EB2013449-009	EB2013449-010
			Result	Result	Result	Result	Result
K062G: Total Nitrogen as N (TKN + NC							
Total Nitrogen as N	0.1	mg/L	0.6	2.4	4.0	1.4	0.6
K067G: Total Phosphorus as P by Disc						>	
Total Phosphorus as P	0.01	mg/L	0.01	0.17	0.26	0.10	0.04
P005: Total Organic Carbon (TOC)					$\langle \langle \rangle \rangle$		
Total Organic Carbon	1	mg/L	17	43	53	28	11
P026SP: Chemical Oxygen Demand (S							
Chemical Oxygen Demand	10	mg/L	44	307	452	76	30
P030: Biochemical Oxygen Demand (E				- Shill	-		
Biochemical Oxygen Demand	2	mg/L	3		<2	<2	7
			C OFF	JLL .			
	<u>{</u>	777	A OFF				

Page : 6 of 7 Work Order : EB2013449 Client : FUTURE-PLUS ENVIRONMENTAL Project : Redlands Landfill



		Clie	ent sample ID	Rinstate	Blank	SWQA		\sim
Sub-Matrix: SURFACE WATER (Matrix: WATER)		One	in sample ib	Rilistate	Dialik	SWQA		<u> </u>
	Cl	ient sampli	ng date / time	20-May-2020 18:04	20-May-2020 17:58	20-May-2020 11:02	$\wedge (\mathcal{D})$	
Compound	CAS Number	LOR	Unit	EB2013449-011	EB2013449-012	EB2013449-013		
				Result	Result	Result		
EA025: Total Suspended Solids dried	d at 104 ± 2°C							
Suspended Solids (SS)		5	mg/L	<5	<5	36	<u> </u>	
ED041G: Sulfate (Turbidimetric) as S	04 2- by DA						>	
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	8		
ED045G: Chloride by Discrete Analys	ser					$\langle \langle \rangle \rangle$		
Chloride	16887-00-6	1	mg/L	<1	<1	52		
ED093F: Dissolved Major Cations						710		
Calcium	7440-70-2	1	mg/L	<1	<1/1	8		
Magnesium	7439-95-4	1	mg/L	<1		8		
Sodium	7440-23-5	1	mg/L	<1		33		
Potassium	7440-09-7	1	mg/L	<1	\sim (A)	2		
EG020F: Dissolved Metals by ICP-MS	3			\sim	in lor			
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.18		
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.004		
Cadmium	7440-43-9	0.0001	mg/L	\$8.0004	<0.0001	<0.0001		
Chromium	7440-47-3	0.001	mg/L	< < (<0.00) </td <td><0.001</td> <td>0.003</td> <td></td> <td></td>	<0.001	0.003		
Copper	7440-50-8	0.001	mg/L	<	<0.001	<0.001		
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.001		
Lead	7439-92-1	0.001	hogy (<0.001	<0.001	<0.001		
Zinc	7440-66-6	0.005	mgxL	<0.005	<0.005	0.025		
Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.045		
Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	14.2		
EG035F: Dissolved Mercury by FIMS		$\langle \cup \rangle$						
Mercury	7439-97-8	0.0001	mg/L	<0.0001	<0.0001	<0.0001		
EK055G: Ammonia as N by Discrete	Analyse							
Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	<0.01		
EK057G: Nitrite as N by Discrete A	alystr							
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01		
EK058G: Nitrate as N by Oiscrete An	nalyser							
Nitrate as N	14797-55-8	0.01	mg/L	<0.01	<0.01	<0.01		
EK059G: Nitrite plus Nitrate as N (No	Ox) by Discrete Ana	lyser						
Nitrite + Nitrate as N		0.01	mg/L	<0.01	<0.01	<0.01		
EK061G: Total Kjeldanl Nitrogen By I	Discrete Analyser							
Total Kjeldahl Nitrogen as N		0.1	mg/L	<0.1	<0.1	1.6		
			Ĵ					

Page	: 7 of 7
Work Order	: EB2013449
Client	: FUTURE-PLUS ENVIRONMENTAL
Project	Redlands Landfill



Sub-Matrix: SURFACE WATER (Matrix: WATER)		Client sample ID	Rinstate	Blank	SWQA		
	Client sam	pling date / time	20-May-2020 18:04	20-May-2020 17:58	20-May-2020 11:02	\wedge ($-$)	
Compound	CAS Number LOR	Unit	EB2013449-011	EB2013449-012	EB2013449-013		
			Result	Result	Result		
EK062G: Total Nitrogen as N (TKN + NO	x) by Discrete Analyser						
^ Total Nitrogen as N	0.1	mg/L	<0.1	<0.1	1.6	<u> </u>	
EK067G: Total Phosphorus as P by Disc						>	
Total Phosphorus as P	0.01	mg/L	<0.01	<0.01	0.11		
EP005: Total Organic Carbon (TOC)					$\langle \langle \rangle \rangle$		
Total Organic Carbon	1	mg/L	<1	6	28		
EP026SP: Chemical Oxygen Demand (S							
Chemical Oxygen Demand	10	mg/L	<10	15	108		
EP030: Biochemical Oxygen Demand (B				61.1			
Biochemical Oxygen Demand	2	mg/L	18		6		
RHOI							
\bigtriangledown							



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EB2013449	Page	: 1 of 9
Client	: FUTURE-PLUS ENVIRONMENTAL	Laboratory	: Environmental Division Brisbane
Contact	: NICHOLAS EVANS	Telephone	: +61 7 3552 8634
Project	: Redlands Landfill	Date Samples Received	: 21-May-2020
Site	: May2020 Coochiemudlo Is Closed LF	Issue Date	: 28-May-2820
Sampler	KAINE PRITCHARD, NICHOLAS EVANS, SOPHIE BLOND	No. of samples received	: 13
Order number	:-	No. of samples analysed	: 13

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Three Compliance

• NO Analysis Holding Thme Outliers exist.

Outliers : Frequency of Quality Control Samples

<u>NO</u> Quality control Sample Frequency Outliers exist.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EK067G: Total Phosphorus as P by Discrete Analyser	EB2012877002	Anonymous	Total Phosphorus as P	 D	Not etermined		MS recovery not determined, background level greater than or
					$\langle \rangle$	$) \setminus O$	equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

Holding times for <u>VOC in soils</u> vary according to analytes of interest. Vinyl Chloride and Styrene holding time is vary there was a breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concerned to a should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key anal

Matrix: WATER	-(0)	>		Evaluation	: × = Holding time	breach ; ✓ = Withi	n holding time
Method 🦯	Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) CISW1, CISW3, CISW4,	20-May-2020				21-May-2020	27-May-2020	~
CISW5, Rinstate, Blank, SWQA							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA					<u> </u>		<u> </u>
Clear Plastic Bottle - Natural (ED041G) GW1, GW3, GW6, GW6, GW6,	20-May-2020				22-May-2020	17-Jun-2020	1
CISW2, CISW4, Rinstate, SWQA							
ED045G: Chloride by Discrets Analyser							
Clear Plastic Bottle - Natural (€D045G) GW1, GW3, GW6, GW6, GW6, GW6, GW2, GW5, CISW1,	20-May-2020				22-May-2020	17-Jun-2020	~
CISW2, CISW4, Rinstate, Blank,							
SWQA							

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Client	: FUTURE-PLUS ENVIRONMENTAL
Project	: Redlands Landfill

Client : FUTU)13449 JRE-PLUS ENVIRONMENTAL ands Landfill					Q	ALS
						C	
Matrix: WATER					ion: × = Holding time		n holding tin
Method		Sample Date		action / Preparation	- $(?)$	Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cation					VIL C		
Clear Plastic Bottle - Nitric Acid; F		20 May 2020			25-May-2020	17 Jun 2020	,
GW1,	GW2,	20-May-2020		\overline{O}	25-IVIAy-2020	17-Jun-2020	✓
GW3,	GW5,				7~		
GW6,	CISW1,						
CISW2,	CISW3,			$\langle \rangle$			
CISW4,	CISW5,			\sim			
Rinstate,	Blank,		\sim				
SWQA			<u> </u>				
EG020F: Dissolved Metals by ICF	P-MS		\sim				
lear Plastic Bottle - Nitric Acid; F			人(())	\checkmark			
GW1,	GW2,	20-May-2020			25-May-2020	16-Nov-2020	✓
GW3,	GW5,		$(\land \land \frown)$				
GW6,	CISW1,		$\nabla \mathcal{V}$				
CISW2,	CISW3,		\smile				
CISW4,	CISW5,						
Rinstate,	Blank,						
SWQA							
EG035F: Dissolved Mercury by F	IMS						
lear Plastic Bottle - Nitric Acid; I							
GW1,	GW2,	(🤇 (()) 💛 20-May-2020			25-May-2020	17-Jun-2020	✓
GW3,	GW5,						
GW6,	CISW1,						
CISW2,	CISW3,	$\langle \langle \rangle$					
CISW4,	CISW5,						
Rinstate,	Blank,						
SWQA							
	\wedge						
K055G: Ammonia as N by Discr							
lear Plastic Bottle - Sulfuric Acid		20-May-2020			26 May 2020	17-Jun-2020	,
GW1,	GW2	20-May-2020			26-May-2020	17-Jun-2020	✓
GW3,	GW5,						
GW6,	CISW1,						
CISW2,	CISW3,						
CISW4,	CISW5,						
Rinstate,	Blank,						
SWQA	$\langle \checkmark \rangle$						
$\langle \langle \rangle \rangle$							
$\langle \rangle \sim$							
\checkmark							

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Work Order	: EB2013449									\frown	
Client	: FUTURE-PLUS ENVIRONM	IENTAL								(\circ)	ALS
Project	: Redlands Landfill										TLS
Matrix: WATER								Evaluation	: × = Holding time	breach;) = With	in holding time
Method					Sample Date	Ex	traction / Preparation		$\left(\mathcal{O}\right)$	Knalysis	
Container / Client Sam	ple ID(s)					Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK057G: Nitrite as N	by Discrete Analyser							$ \land $	(\mathcal{O})		
Clear Plastic Bottle -	Natural (EK057G)							\frown	\mathcal{N}		
GW1,		GW2,			20-May-2020			(\overline{a})	22-May-2020	22-May-2020	✓
GW3,		GW5,							\sim		
GW6,		CISW1,									
CISW2,		CISW3,									
CISW4,		CISW5,						\sim			
Rinstate,		Blank,					\frown \lor				
SWQA						\sim	$(\setminus \setminus$				
EK059G: Nitrite plus	Nitrate as N (NOx) by Discrete Ar	nalyser									
	Sulfuric Acid (EK059G)					ふ(つ)	\checkmark				
GW1,		GW2,			20-May-2020	(1)			26-May-2020	17-Jun-2020	✓
GW3,		GW5,			-2.4	$(\land) \smile$					
GW6,		CISW1,				$\nabla \nabla$					
CISW2,		CISW3,				\smile					
CISW4,		CISW5,		_	$\sim (0)$						
Rinstate,		Blank,			$(\land \lor)$						
SWQA		Diami		\neg	$\backslash \lor$						
	ahl Nitrogen By Discrete Analyser			_ < < / >	\checkmark						
	Sulfuric Acid (EK061G)		\wedge	\sim							
CISW1,		CISW2,	(5)	$) \vee$	20-May-2020	25-May-2020	17-Jun-2020	1	25-May-2020	17-Jun-2020	✓
CISW3,		CISW4,	~ / / > 、	\bigcirc							
CISW5,		Rinstate,									
Blank,		SWQA	$\langle \langle \langle \langle \rangle \rangle \rangle$								
	ohorus as P by Discrete Analyser										
	Sulfuric Acid (EK067G)										
CISW1,		CISW2,			20-May-2020	25-May-2020	17-Jun-2020	1	25-May-2020	17-Jun-2020	✓
CISW3,		CISW4									
CISW5,		Rinstate,	- <u>-</u>								
Blank,	\sim	SWQA									
Clear Plastic Bottle -	Sulfuric Acid (EK067G) 💦 🕺	$\langle \bigcirc$									
GW1,		GW2,			20-May-2020	27-May-2020	17-Jun-2020	1	27-May-2020	17-Jun-2020	 ✓
GW3,	$\langle \rangle \rangle$	GW5,									
GW6											
	219r										

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Matrix: WATER					n: × = Holding time		in holding tin
Method		Sample Date	Extraction / Pre			Knalysis	
Container / Client Sample ID(s)			Date extracted Due for ext	traction Evaluation	Date analysed	Dre for analysis	Evaluation
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) GW1,) GW2,	20-May-2020	·····		25-May-2020	17-Jun-2020	~
GW3,	GW2, GW5,	20 may 2020		$\sim (2)$			v
GW6,	CISW1,			$\langle \gamma \rangle \langle \gamma \rangle$	· ·		
CISW2,	CISW1, CISW3,			$\sqrt{2}$			
CISW2, CISW4,	CISW5,			$\backslash \frown $			
Rinstate,	Blank,		\frown				
SWQA	Dialik,		$\langle \langle \rangle \rangle$	~			
EP026SP: Chemical Oxygen Demand (Clear Plastic Bottle - Sulfuric Acid (EP0			$\mathcal{O}(\mathcal{O})$				
CISW1,	CISW2,	20-May-2020			26-May-2020	17-Jun-2020	1
CISW3,	CISW4,		$\langle \rangle / \langle \checkmark \rangle$				· ·
CISW5,	Rinstate,						
Blank,	SWQA	(\mathcal{I}_{λ})	\bigcirc				
EP030: Biochemical Oxygen Demand							
BOD Bottle Unpreserved (EP030)							
CISW1,	CISW2,	20-May-2020			22-May-2020	22-May-2020	1
CISW3,	CISW4,	$\langle \langle \rangle \rangle$					
CISW5,	Rinstate,						
Blank,	SWQA	$(\& (()) \lor$					
R							

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Project	: Redlands Landfill



Quality Control Parameter Frequency Compliance

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

Matrix: WATER				Evaluation	: × = Quality Co	ontrol frequency n	ot within specification; = Quality Control frequency within specification.
Quality Control Sample Type		Co	ount		Rate (%)	•	Quality Control Specification
Analytical Methods	Method	OC	Reaular	Actual	Expected	Evaluation	$\sim (2/2)$
Laboratory Duplicates (DUP)						<	$\langle \rangle$
Ammonia as N by Discrete analyser	EK055G	2	13	15.38	10.00	 Image: A second s	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	2	19	10.53	10.00		NERM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	$\langle \langle \rangle \rangle$	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	15	13.33	10.00		NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	36	11.11	10,00		NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	34	11.76	10.00	$\sqrt{1}$	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	20	10.00	10.00	1	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	2	20	10,00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓ ✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓ ✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	20	10,00	10.00	1	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	12	10.53	10.00	✓ ✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	4	36	11.11	10.00		NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)		C (C				_	
Ammonia as N by Discrete analyser	EK055G	121	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP03	-41/	20	5.00	5.00	1	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SR		19	10.53	10.00		NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G		20	10.00	10.00	1	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG036F	1	15	6.67	5.00	1	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG0204-F	2	36	5.56	5.00	<u> </u>	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	34	5.88	5.00	· ·	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	1	NEPM 2013 B3 & ALS QC Standard
Nitrite as N by Discrete Analyser	EK057G	1	20	5.00	5.00		NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser,	ED041G	2	20	10.00	10.00	· ·	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	20	15.00	15.00	1	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	<u> </u>	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	19	10.53	10.00		NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	36	5.56	5.00		NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)	2						
Ammonia as N by Discrete analyser	EK055G	1	13	7.69	5.00	1	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demane (BOD)	EP030	1	20	5.00	5.00	 ✓	NEPM 2013 B3 & ALS QC Standard
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	19	5.26	5.00	 ✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00		NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	15	6.67	5.00	 ✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	36	5.56	5.00		NEPM 2013 B3 & ALS QC Standard
	LOUZUAI		20	0.00	5.00	₩	Page 247

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ality Control Sample Type nalvtical Methods ethod Blanks (MB) - Continued		Со							
		C			Rate (%)		Quality Control Specification		
ethod Blanks (MB) - Continued	Method	00	Reaular	Actual	Expected	Evaluation			
ajor Cations - Dissolved	ED093F	2	34	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
trite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
trite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	1	MEPM 2013 B3 & ALS QC Standard		
Ifate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓ 	VEPM 2013 B3 & ALS QC Standard		
ispended Solids (High Level)	EA025H	1	20	5.00	5.00	 ✓ 	NEPM 2013 B3 & ALS QC Standard		
tal Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	20	5.00	5.00	4	NEPM 2013 B3 & ALS QC Standard		
tal Organic Carbon	EP005	1	19	5.26	5.00		NERM 2013 B3 & ALS QC Standard		
tal Phosphorus as P By Discrete Analyser	EK067G	2	36	5.56	5.00	-1417	NEPM 2013 B3 & ALS QC Standard		
atrix Spikes (MS)					0 (0	J/17 ~			
nmonia as N by Discrete analyser	EK055G	1	13	7.69	5.00))>	NEPM 2013 B3 & ALS QC Standard		
nemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	1	19	5.26	<u>/ 69,6 </u>		NEPM 2013 B3 & ALS QC Standard		
nloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
ssolved Mercury by FIMS	EG035F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
ssolved Metals by ICP-MS - Suite A	EG020A-F	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
trite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	20	6.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
trite as N by Discrete Analyser	EK057G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
Ifate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
tal Kjeldahl Nitrogen as N By Discrete Analyser	EK061G		20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
tal Organic Carbon	EP005	$(\lambda ($	12	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
tal Phosphorus as P By Discrete Analyser	EK067G	221	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard		
Total Organic Carbon EP005 Cl () 19 5.26 5.00 🗸 NEPM 2013 B3 & ALS QC Standard									



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions	
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employe `non-filterable` residue in a aqueous sample. The prescribed GFC 11.2 oven dried and weighed prior to analysis. A well-mixed sample is filtered The residue on the filter paper is dried at 104+/-2C. This method is comp	n) filter is phsed with deionised water, Through a glass fibre filter (1.2um).
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sufface is determinions are converted to a barium sulfate suspension in an acatic acid media absorbance of the BaSO4 suspension is measured by a photometer and by comparison of the reading with a standard ourve. This method is compared by a photometer and by comparison of the reading with a standard ourve.	um with barium chloride. Light the SO4-2 concentration is determined
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberate sequestration of mercury by the chloride ion to form non-ionised mercuric the librated thiocynate forms highly-coloured ferric thiocynate which is me seal method 2 017-1-L april 2008	c chloride in the presence of ferric ions
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APNA 3120 and 3125; USEPA SW 846 - 6010 a either ICP-AES or ICP-MS techniques. This method is compliant with NE Sodiam Adsorption Ratio is calculated from Ca, Mg and Na which determ QVIIENED093F. This method is compliant with NEPM (2013) Schedule Hardness parameters are calculated based on APHA 2340 B. This method Schedule B(3)	EPM (2013) Schedule B(3) nined by ALS in house method B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-E prior to analysis. The ICPMS technique utilizes a highly efficient argon p are then passed into a high vacuum mass spectrometer, which separates mass to charge ratios prior to their measurement by a discrete dynode io	lasma to ionize selected elements. lons s the analytes based on their distinct
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (Sm Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated A bromate/bromide reagent is used to oxidise any organic mercury comp mercury is reduced online to atomic mercury vapour by SnCl2 which is th Quantification is by comparing absorbance against a calibration curve. T (2013) Schedule B(3)	flameless atomic absorption technique. ounds in the filtered sample. The ionic ten purged into a heated quartz cell.
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH3 G Ammonia is determined by This method is compliant with NEPM (2013) Schedule B(3)	direct colorimetry by Discrete Analyser.
Nitrite as N by Discrete Analyser	EK057G	WATER	In house: Referenced to APHA 4500-NO2- B. Nitrite is determined by dir This method is compliant with NEPM (2013) Schedule B(3)	rect colourimetry by Discrete Analyser.
Nitrate as N by Discrete Analyser	EK058G	WATER	In house: Referenced to APHA 4500-NO3- F. Nitrate is reduced to nitrite by quantification by Discrete Analyser. Nitrite is determined seperately b calculated as the difference between the two results. This method is com	y direct colourimetry and result for Nitrate



Analytical Methods	Method	Matrix	Method Descriptions
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Appropriate strained colorimetrically by discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3 This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al (1976), Zhang et al (2006). This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tarrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM (2013) Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B. The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with NEPM (2013) Schedule B(3)
Chemical Oxygen Demand (COD) (Spectrophotometric)	EP026SP	WATER	In house: Referenced to APHA 5220D. Samples are digested with a known excess of an acidic potassium dichromate solution using silver sulfate as a catalyst. The chromium is reduced from the Cr (VI) oxidation state to the Cr (III) state (b) the oxygen present in the organic material. Both of these chromium species are coloued and absorb in the visible region of (400nm & 600nm) the spectrum. The oxidisable organic matter can be calculated in terms of oxygen equivalents.
Biochemical Oxygen Demand (BOD)	EP030	WATER	In nouse, Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM (2013) Schedule B(3)
Preparation Methods	Methor.	Matrix	Method Descriptions
TKN/TP Digestion	EK061/2K067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM (2013) Schedule B(3)
REST	JIG		



Appendix G. **Fieldnotes & Calibration Form** 15 July 2020 Coochiemudlo Island Former Landfill -Appendix G

Quarterly Report (Quarter 2, 2020) Redland City Council Landfill Environmental Monitoring Program Elizabeth Street, Coochiemudlo Island

Client:	RCC		. <u>.</u>						Job No.:	5329			v=∏r ² xtx 1000
Date:	20/0	55/20							Project:	Redlands Land	fills - Coochiem	udlo	200
Time	Site	SWL	Depth	Well Volume	Volume Purged	Temp. (°C)	Turbidity (NTU)	Conductivity (uS/cm)	TDS (ppm)	Dissolved Oxygen (ppm)	PH	Redox(Inv)	Comments
	GW5	3,84	12.06	48.33	l	13.1	11.4	402	200	3.31/41.4	5.62	105	Clear, no
					10	13.2	17.7	282	130	3.42/24.5	E 22	163	suspended solids or
					20 30	13,9	12.7	221	162	3.31/257	4.69	206	odour
						15,1	9.9	336	167	2.58/29.4		224	
					40	15.4	12.1	334	1576	3. 51/21.4	4.73	230	
					(sample)								
			~	and the second s		10.11	01	-144	(36)	D CIRLUC 2	6.06	165	Close small
	GWI	1.57	3	8.4	13:41	13,4	2.6	752	33	2.98/45.3 3.75/326	6.33	132	Clear, small particles, no
					(sample)	No.O		- Art		3. 10/0200	6.00		odour
					(Sur pre)		(D_{λ}					
	GW2	2.39	3.34	5.58	Ì	14.4	107	(MR	712	2.70/46,3	6.05	-22	Odour (strong)
					5.5	15.4	1888	1403	712	3.19/26.2	6.07	-51	Bulphur, Nydrocarbon
					(sample)			1					nyarocarbon
	6.3	4.27	11:42	42.02		143	1345	93.5	41.1	6.85/75.4	6.69	8	Orange thrown
	GW3	4.61	11.42	42.02	10 5	563	285	62.2	270	6:76/58.1	5.99	8 46 59	Orange/brawn turbid, no
				-	20	(19)	694	61.7	27.0 27.3	5:56/65.2	5.99	59	odour, turbid
					30	17.4	1236	51.8	22.5	5.26/47.8	5,56	79	
					LAZ /	16.3	OVR	51.3	22.8	4.83/51.4	5,40	120	
					(sample)								
		6 011	11 02	4815		15.0	33.8	2628	1375	2.07/17.4	3,85	139	Organic/sulphur
	GW6	8.34	16.55	(pp. 1)	10	15.3	29.0	2773	1450	1.04/14.2	3,71	132	adour
····			- 1	1	20	15.6	34.3	2.8/ms		2.19/12.1	3.72	108	Cloudy/small
			5		30	15.5	35.6	2759	1443	0.90/15.6	3.72 3.69	151	particles
					40	14.6	295	2724	1425	3.54/31.1	3.72	158	Dry @ 40
			VVV		Sample				<u> </u>				
	and the second second	$\mathbb{K}(\mathbb{O})$	\bigwedge			111.7	48.7	340	162	2.60/38.3	6.70	76	QA/R/B
	CISLOY) lan		~		14.2	40.1		ater (eve	el. Oily	Gim 1	ght bre	two colour
	+		1		-			NO or		T- 213 -		J. W	
	+			. <u> </u>									
L													

Client:	RCC								Job No.:	5329			v=∏r ² x I x 1000)
Date:	20/0	5/20							Project:	Redlands Land	fills - Coochiem	udlo	20	
Time	Site	SWL	Depth	Well Volume	Volume Purged	Temp. (°C)	Turbidity (NTU)	Conductivity (uS/cm)	TDS (ppm)	Dissolved Oxygen (ppm)		Redox(I)V)	Commer	
	CISWS	6000gp.			සාකා	13.6	18,6	180.5	83.3	4.16/34.9 COLOCER.	5.85	4	NO OD	lour
						13.6 Light I	prown	-70	Innia.	colour.	Small	parti	les.	
	CISWI	4.5mgaza	بالاقتورين.		ধ্বমায়ত	13.4	34.2	916	405	3.55/3449 hall -	0.00	-32	ticles	
						Light	5 brown							
	-			4 ⁰⁰⁰⁰⁰⁰⁰⁰⁰	engentatio	13.5	20.4	331	1540	600/49.4	6.25	- 26		
	CIS2	Chanter	CONTRACTOR OF CO	*CONTRACT/S		Dark	tanr	ins 11	age i	6.00/49.4 partici	es, no	odou	r	
						Line			$\left(\begin{array}{c} \\ \\ \end{array} \right) \right) $					
	CIS3	(Bottanio	,Rappellar,		 	14.0	28.1	304	LEF1	3.20/37.3 Hicles/	5.59	-73		
						Park	tanni	25 Var	pe pa	ticles/	po od	par		
								$\mathcal{O}_{\Lambda} \cup$						
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Calibration Record

Instrument: TPS 90 FLT

		Calibration Record									
	Date Calibrated:	8/05	5/2020								
Analyte	Standard	Completed (Y/N)	Shift								
Temp	-	Y	11.1°C								
рН	pH 4	Y	96.60%								
	pH 6.88	Y	97.00%								
TDS	Oppk	Y	2.77ppm								
	36ppk	Y	13.1k								
EC	0uS	Y	0uS 🗸 🔇								
	2760uS	Y	12.4K								
DO	100% (Air)	Y	89.50%								
	0%	Y	5.80%								
Turbidity	0 NTU	Y	-427								
	90 NTU	Y	103.40%								

JB

Calibrated by: