Central Queensland Coal Project

Appendix 6c – Groundwater Quality Data Summary

Central Queensland Coal

CQC SEIS, Version 3

October 2020

Central Queensland Coal Project

Groundwater Quality Data Summary Report

Central Queensland Coal

CQC-SCP-RT002, Rev 0

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Author:	Marc Walker
Contact Details:	Orange Environmental Pty Ltd +61 417 791 061 admin@orangeenvironmental.com.au
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Terms and Abbreviations

AWQGs	The Australian Water Quality Guidelines - the Australian & New Zealand Guidelines for fresh & Marine Water quality (ANZG 2018)
CHPP	Coal Handling Preparation Plants
CQC	Central Queensland Coal, the proponent
DES	Queensland Department of Environment and Science
DO	Dissolved Oxygen
EC	Electrical conductivity
EHP	Queensland Department of Environment Heritage Protection
EIS	Environmental Impact Statement
EP Act	Environmental Protection Act 1994
EP Regulation	Environmental Protection Regulation 2019
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPP (Water)	Environmental Protection (Water and Wetland Biodiversity) Policy 2019
ERA	Environmentally Relevant Activity
EV	Environmental Value
GBRMP	Great Barrier Reef Marina Park
GDE	Groundwater Dependent Ecosystem
DGV	Default Guideline Value – terminology from AWQGs that replaces Water Quality Objectives and Trigger Values
LOR	limits of reporting
mg/L	milligrams per litre (or ppm)
MNES	Matters of National Environmental Significance
NATA	National Association of Testing Authorities
NWQMS	National Water Quality Management Strategy
QA/QC	Quality Assurance / Quality Control
QWQGs	The Queensland water quality guidelines (EHP 2013)
RPD	Relative Percent Difference
SEISv2	Previous SEIS version (CDM Smith 2018)
SEISv3	Current version of the SEIS at the time of reporting
SRN	Sample Receipt Notification
TDS	Total Dissolved Solids

TN	Total nitrogen
TP	Total phosphorous
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
VWP	Vibrating Wire Piezometer
WQO	Water Quality Objective
µS/cm	Microsiemens per centimetre

1 Introduction

1.1 Overview

Central Queensland Coal Proprietary Limited (Central Queensland Coal) and Fairway Coal Proprietary Limited (Fairway Coal) (the joint Proponents), propose to develop the Central Queensland Coal Mine Project (the Project). As Central Queensland Coal is the senior proponent, Central Queensland Coal (CQC) is referred to throughout this report.

The groundwater assessments for the Project have been presented in a previous Environmental Impact Statement (EIS) (CDM Smith, 2017) and two Supplementary EIS's (SEISv1 and SEISv2) (CDM Smith, May 2018 and December 2018). Since the completion of the EIS and SEIS, further monitoring and assessments have been undertaken to improve the understanding of groundwater on the site, including a groundwater modelling assessment and Groundwater Dependent Ecosystem (GDE) assessment reports. The site water management system and infrastructure have also been refined.

This technical report has been prepared to provide an overview and summary of the results of the groundwater quality data and monitoring program for the Project to date to support this version (i.e. Version 3) of the Supplementary Environmental Impact Statement (SEIS v3).

1.2 Scope

This report presents the methodology and results of the groundwater quality data for the Project, including:

- An assessment of the groundwater monitoring program and data collection
- Analysis of Project specific water quality data, and
- Description of environmental values and development of site-specific Guideline Values.

2 Relevant Legislation and Guidelines

2.1 Legislation

The key pieces of legislation relating to water quality management in Queensland are as follows:

- Groundwater Dependent Ecosystem (EP Act)
  - Subordinate *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP [Water])
- *Water Act 2000*

In addition, due to the proximity of the project to the coast and the Great Barrier Reef Marine Park area, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is potentially relevant to the project in terms of water quality.

These are described in more detail below.

2.1.1 *Environmental Protection Act 1994* (Qld)

The EP Act provides the key legislative framework for environmental management and protection in Queensland. The object of the EP Act is to 'Protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends' (s3).

The EP Act has a range of subordinate legislation, including the Environmental Protection Regulation 2019 (EP Regulation) and EPP (Water). The EP Regulation controls activities with potential to release contaminants into the environment (Environmentally Relevant Activities [ERAs]), contains referrable wetland requirements, prescribes water contaminants (Schedule 9) and sets Environmental Values (EVs) for wetlands (s 81A). The EP Act and EP Regulation regulate mining and associated ERAs through EA conditions. These conditions provide a means to regulate surface water management for the Project.

With the passing of the *Environmental Protection (Great Barrier Reef Protection Measures) and Other Legislation Amendment Bill 2019*, the EP Act has been amended to address land-based sources of water pollution flowing to the Great Barrier Reef. The new 'Reef protection regulations' came into effect on 1 December 2019 and are to be rolled out over three years, including:

- New, expanded or intensified regulated industrial land use activities such as sewage and water treatment plants, land-based aquaculture or mining in any Reef region must meet new discharge standards to ensure there is no increase in nutrient or sediment pollutant loads from 1 June 2021
- Other primary producer requirements, including compliance with industry specific minimum practice agricultural standards, farm nutrient budgets, environmental authorities for new or expanded cropping or horticulture.

The regulations apply to specific reef regions, with the Project being located in the Fitzroy reef region, in the Styx river basin (no. 127).

2.1.1.1 Environmental Protection (Water and Wetland Biodiversity) Policy 2019

The EPP (Water) seeks to achieve the objectives set within the EP Act in relation to Queensland waters. That is, it seeks to: 'Protect Queensland's waters while allowing for development that is ecologically sustainable' (s3 EP Act).

This purpose of this policy is achieved by:

- Identifying EVs and management goals for Queensland waters.
- Stating water quality guidelines and water quality objectives to enhance or protect the EVs.
- Providing a framework for making consistent, equitable and informed decisions about Queensland waters, and
- Monitoring and reporting on the condition of Queensland waters.

The Styx River basin, including all waters of the basin, Broad Sound and adjacent coastal waters (basin 127 and adjacent to basin 127) are scheduled waters under Schedule 1 to the EPP (Water). EVs and water quality objectives (WQOs) are described for these waters in the document *Styx River, Shoalwater Creek and Water Park Creek Basins Environmental Values and Water Quality Objectives* (EHP 2014), made pursuant to the previous Environmental Protection (Water) Policy 2009. These are shown in Section 5.3 in comparison to the collected data.

Subsequently, draft updated EVs and 'water quality chemistry ranges' have been developed by the Queensland Government as part of consultation materials, which will form the basis for groundwater EVs, WQOs, and mapping for inclusion in the EPP (Water), presented in the *Regional groundwater chemistry zones: Fitzroy-Capricorn-Curtis Coast and Burdekin-Haughton-Don regions: Summary and results* report (McNeil *et al*, 2018).

Both of these guidelines have been considered herein.

2.1.2 Water Act 2000 (Qld)

The Water Act 2000 and subsidiary Water Regulation 2016 provide a framework for the sustainable management of Queensland's water resources, primarily for the planning, allocation and use of groundwater and surface water, provision of a sustainable and secure water supply and demand management, and the management of groundwater impacts due to the exercise of underground water rights by the resources sector. Authorisation under the Water Act is generally required for the taking of water from overland flow, groundwater, a watercourse, lake or spring; for destroying vegetation, excavation or placing fill in a watercourse, lake or spring; or removal of quarry material from a watercourse or lake, unless an exemption applies. For resources activities, the taking or interfering of water in the area of the mineral development licence or mining lease is exempt from further approvals under the Act if it takes place during the course of, or results from, the carrying out of an authorised activity for the licence or lease.

The Water Act provides for the protection of natural ecosystems and security of supply to water users through the development of water resource plans (WRPs), and other activities. Each managed catchment in Queensland has a separate WRP and associated Resource Operations Plan (ROP) to provide a framework to apply (under the Water Act, Chapter 2 Part 6) and regulate water extractions to ensure that they are maintained as a sustainable resource. The Project is located within the Styx River Basin, which is not covered by any WRP or ROP. Should a future catchment-specific water plan be developed, relevant licensing requirements for the Project will need to be considered at that time.

The Act also provides for the identification of watercourses, including downstream limits of defined watercourses.

2.1.3 *Environment Protection and Biodiversity Conservation Act 1999* (Cwth)

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) regulates:

- impacts on Matters of National Environmental Significance (MNES)
- impacts on the environment involving the Commonwealth or Commonwealth land
- killing or interfering with listed marine species and cetaceans (e.g. whales), and
- international trade in wildlife.

Importantly, the Act administers the approval for actions with a significant impact on MNES.

These, and actions by the Commonwealth or involving Commonwealth land with a significant impact on the environment are termed controlled actions and require approval under the Act.

The Project was identified as having the potential to impact on MNES and was determined to be a controlled action (EPBC ref 2016/7851) requiring assessment and approval under the EPBC Act. The controlling provisions are:

- World Heritage properties (sections 12 & 15A)
- National Heritage places (sections 15B & 15C)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (sections 20 & 20A)
- Great Barrier Reef Marine Park (sections 24B & 24C)
- A water resource, in relation to coal seam gas development and large coal mining development (section 24D & 24E).

In terms of water resources for the project, the World Heritage and Great Barrier Reef Marine Park (GBRMP) MNES are potentially triggered, as well as groundwater resources potentially impacted by dewatering activities. Based on the results of other assessments for the Project, it is not anticipated that downstream water quality will be affected by the mine to the extent that they can impact on the GBRMP and world heritage area.

2.2 Applicable Guidelines

The National Water Quality Management Strategy (NWQMS) presents the overarching national approach to improving and managing water quality in Australia's waterways. The Australian & New Zealand Guidelines for Fresh & Marine Water quality (ANZG 2018) (hereafter the Australian Water Quality Guidelines, or AWQG) are a key part of the NWQMS and provide authoritative guidance on the management of water quality in Australia and New Zealand. The AWQGs are implemented through the Water Quality Management Framework - a framework providing a logical process to be followed for the long-term management of receiving water/sediment quality.

The AWQGs provide guidance on developing monitoring programs, selecting relevant indicators, and adopting relevant guideline values to assess change in receiving environments, including a framework for developing locally derived guideline values.

In Queensland, the approach to adopting Guideline Values for receiving waters is:

- EPP (Water) scheduled environmental values (EVs) and water quality objectives (WQOs), unless sufficient local data is available to derive improved local guideline values from appropriate reference sites
- End of catchment anthropogenic pollutant reduction targets in Great Barrier Reef catchments contained in the Great Barrier Reef River Basins, End-of-Basin Load Water Quality Objectives

(DES 2019a), derived from the Reef 2050 Water Quality Improvement Plan 2017–2022 (State of Queensland, 2018)

- Queensland water quality guidelines (EHP 2013) (QWQGs) - in the absence of EPP (Water) scheduled values
- AWQG Default guideline values.

As noted in Section 2.1.1.1, the Styx basin, including groundwaters, is scheduled under the EPP (Water).

The QWQGs provide regional guideline values for Queensland water types and regions, and approaches that complement the AWQGs for Queensland conditions, including a framework for deriving and applying local guideline values.

Water monitoring protocols are contained in the Queensland Monitoring and Sampling Manual (DES 2018).

3 Existing Environment

3.1 Climate

The Project region experiences a sub-tropical climate, with cool winters and hot summers. Mean winter (July) temperatures range between around 8 and 25°C, whilst mean summer (December-January) temperatures range between around 23 and 33°C.

The Study Area experiences a distinct wet season with more rainfall occurring during the summer months (December to March), and drier periods predominating in the winter and early spring months (June to September). The wet season experiences an increased number of storm events leading to relatively short-lived but intense rainfall events and cyclonic rain depressions can develop over the area. The average annual rainfall at Strathmuir (BoM Station 033189) is 759 mm, with the highest average rainfall month (143 mm) being February and the lowest average rainfall month (16 mm) being September (Figure 3-1). Recharge and stream runoff potential is highest during the summer months, when most rainfall occurs, although long lasting rainfall events at other times of the year could also give rise to sustained rates of recharge.

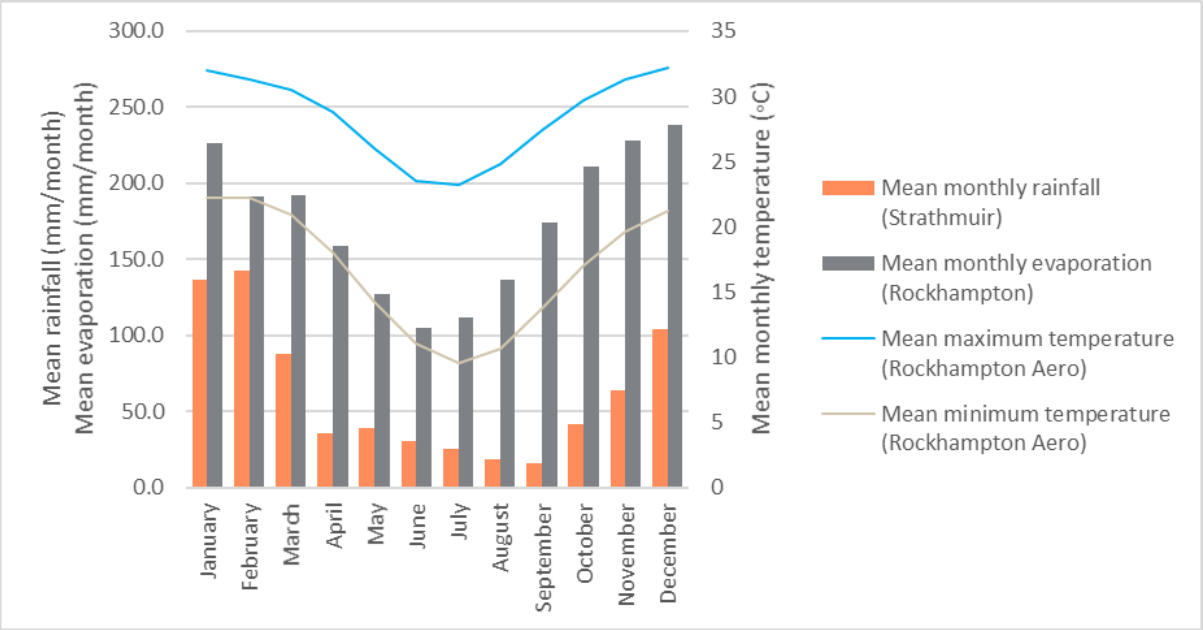


Figure 3-1. Mean climatic conditions

The mean monthly evaporation (calculated from the long-term average daily evaporation at Rockhampton Aero (BoM Station 039083) ranges from a maximum of around 240 mm/month in the summer months to a minimum of around 105 mm/month in the winter months. Total average annual evaporation (around 2,100 mm) is considerably higher than average annual rainfall, and on average evaporation rates exceed rainfall rates in every month of the year (Figure 3-1).

3.1.1.1 Rainfall during water sampling events

Figure 3-2 shows the actual rainfall for the November to May period (which covers wet season events) and full years versus the long-term average annual rainfall from the Mamelon weather station (with some infill rainfall from the St. Lawrence Post Office station - BOM station 033065, May – June 2017).

As can be seen, monitoring has coincided with a range of rainfall periods, from above average (2017) to well below average (2018, 2019).

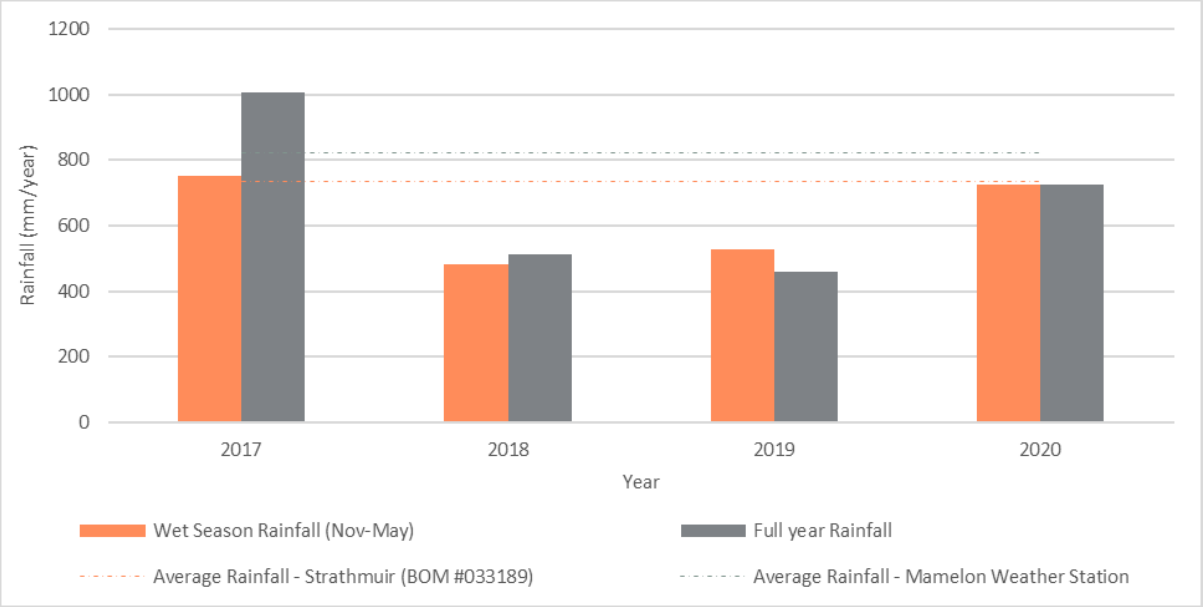


Figure 3-2. Average vs actual annual rainfall – sampling period

3.2 Surface Water Catchments

The Project is located within the North East Coast Drainage Division, within the Styx River basin (Queensland river basin 127), a small basin of around 3,000 km^2 discharging into the Coral Sea adjacent to Rosewood Island (in the vicinity of the Project). Landuse in the basin is predominantly 'Production from relatively natural environments' (91%) – predominantly grazing - followed by 'Conservation and natural environments' (8%) and 'Intensive uses' (1%) which comprise transport and communication, residential and farm infrastructure, services and mining (DES 2019b). The remainder is predominantly water (saline coastal wetland areas, rivers and dams), with minor areas of dryland and irrigated agriculture (0.5%). The Styx basin has been extensively cleared for grazing.

The Styx subbasin comprises several coastal catchments, grouped into three overarching areas, with the Project located within the Southern Styx Freshwaters under the EPP (Water), and in the Tooloombah and Deep Creek sub-catchment areas. These Creeks drain into the Styx River and then into the Styx River and Broadsound Estuaries. The Broad Sound Declared Fish Habitat Area (FHA-047) and a General Use Zone of the Great Barrier Reef Marine Park are located within the Styx River approximately 10km downstream of the Project lease boundary.

3.3 Hydrostratigraphic Units

With reference to the EPP (Water) as shown in Figure 3-3 and EHP (2014), the Project is located within the Styx (03), Uplands (10) and Bison (15) groundwater chemistry zones. However, analysis of the generated water quality statistics indicates relatively high variability within these EHP (2014) groundwater areas, and a general disagreement with the EPP (2014) guideline values for the areas. The draft consultation materials prepared by McNeil et al. (2018) shown in Figure 3-4 updated the groundwater chemistry zones, and groups show much better internal consistency and agreement with draft guideline values (also provided by McNeil et al. 2018).

Table 3-1 shows the adopted hydrostratigraphic units and the descriptive relationship used for the Project (from HA 2020), based on McNeil et al. (2018) and from the groundwater assessment report prepared by HA (2020). The data in Attachment B has been grouped by the below HA (2020) groups, noting the McNeil et al. (2018) zone identifiers (AZ6, CZ2, GZ11 and FZ10).

Table 3-1. Adopted Groundwater Chemistry Zones

McNeil et al. (2018) zones		Adopted Hydrostratigraphic Units (and ID No.) (after HA 2020)
Alluvial zones (AZ6)	Alluvium	Cainozoic Deposits - Quaternary Alluvium (1)
	Alluvium 'near stream'	
Cainozoic deposits overlying the GAB zones (CZ2)	Eastern weathered Cainozoic remnants	Cainozoic Deposits - Quaternary Pleistocene Alluvium / Quaternary Alluvium (lower) / Regolith (2)
Basins partially underlying the GAB zones (GZ11)	Eastern Bowen Coal Measures	Styx Coal Measures (upper) Overburden (and Quaternary Alluvium [Lower]) / Weathered Regolith (3)
		Styx Coal Measures (lower) - Overburden / Coal Seams, Interburden / Coal Seams, Underburden (and Quaternary Alluvium [Lower]) / Weathered Regolith (4)
Fractured Rock (FZ10)	Eastern Fitzroy Trap rocks	Permian Measures - Back Creek Group (and Styx Coal Measures - Underburden) (5)
		Permian Measures – Carmila Beds (and/or Back Creek Group) (6)

3.4 Historical Water Quality

Some historical data is available for the catchment prior to monitoring by the proponent in the Queensland Groundwater Database (GWDB), the records of which have been incorporated into the groundwater water quality database.

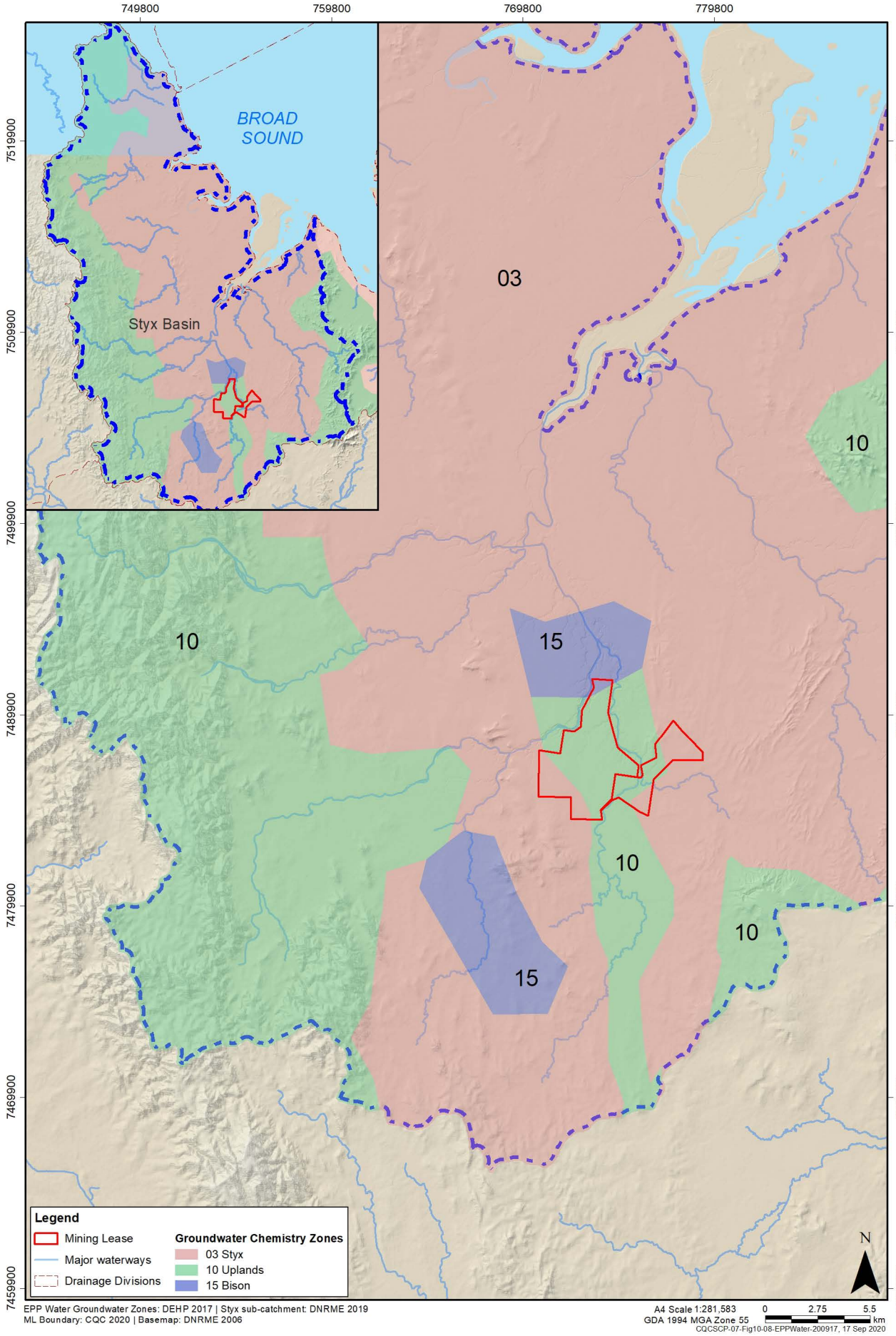
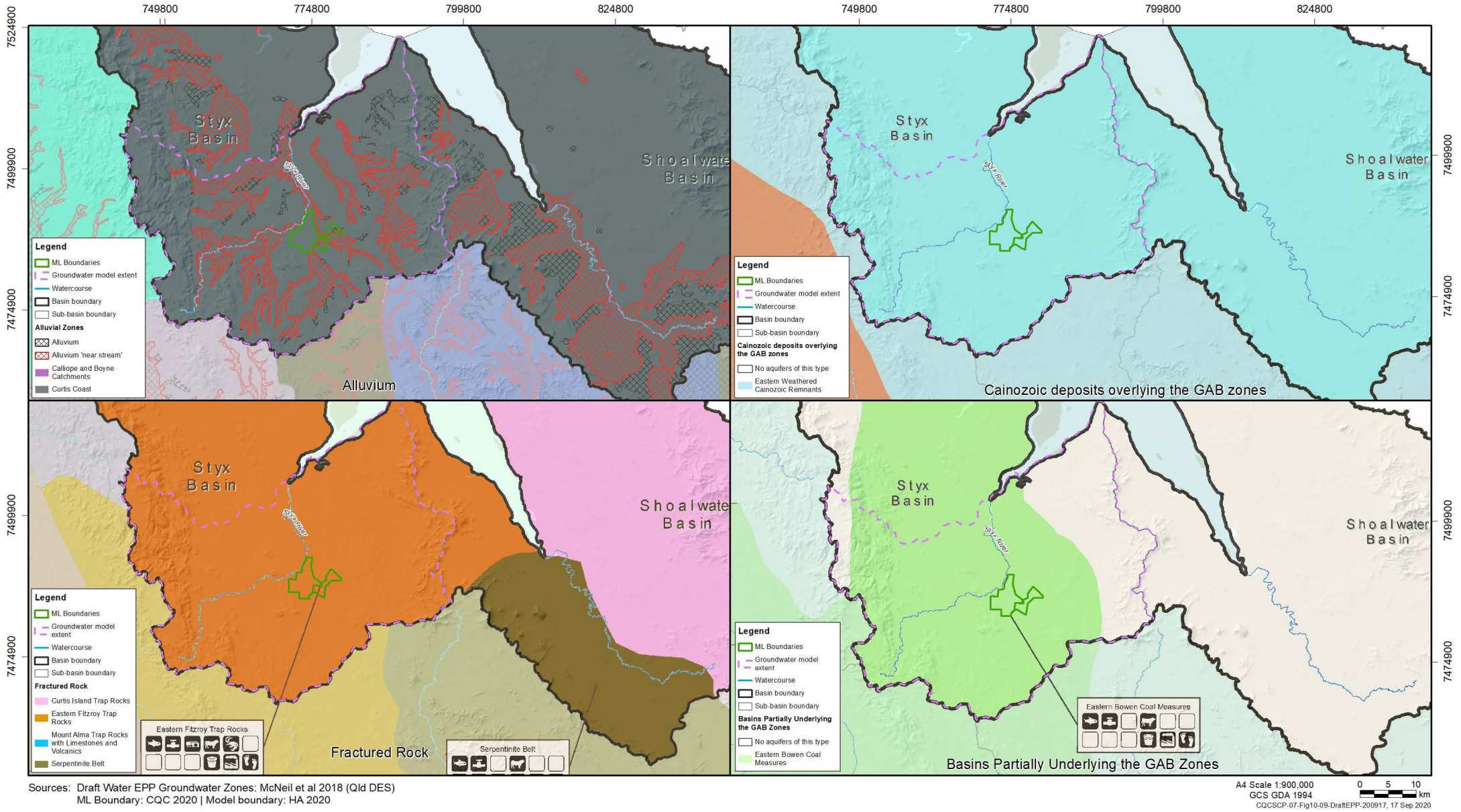


Figure 3-3. EPP (Water) 2014 Groundwater Chemistry Zones (EHP 2014)



Sources: Draft Water EPP Groundwater Zones: McNeil et al 2018 (Qld DES)
ML Boundary: CQC 2020 | Model boundary: HA 2020

A4 Scale 1:900,000
GCS GDA 1994
0 5 10 km
CQCSCP-07-Fig10-09-DraftEPP-200917, 17 Sep 2020

Figure 3-4. Draft 2018 groundwater zones (McNeil et al. 2018)

4 Environmental Values

Specific EVs and WQOs were developed for the Styx River, Shoalwater Creek and Water Park Creek Basins in 2014 under the Environmental Protection (Water) Policy 2009 (EPP Water) in the document *Styx River, Shoalwater Creek and Water Park Creek Basins Environmental Values and Water Quality Objectives* (EHP 2014) as shown in Table 4-1. Draft EVs are also provided in Table 4-1 for the draft updated EVs from McNeil et al. (2018) for the relevant groundwater chemistry zones.

Table 4-1 Environmental Values for Project catchments

Symbol	Environmental Value	2014 EPP (Water) (EHP 2014)	2018 Draft Consultation Materials (McNeil et al. 2018)			
		Styx Groundwaters	Curtis Coast Alluvium	Cainozoic deposits overlying the GAB zones: Eastern weathered Cainozoic remnants	Fractured Rock: Eastern Fitzroy Trap rocks	Basins partially underlying the GAB zones: Eastern Bowen Coal Measures
	Aquatic ecosystems (SMD)	✓	✓	✓	✓	✓
	Irrigation	✓			✓	✓
	Farm supply	✓			✓	
	Stock water	✓			✓	✓
	Aquaculture				✓	
	Human consumer					
	Primary recreation					
	Secondary recreation					
	Visual recreation					
	Drinking water				✓	✓
	Industrial use				✓	✓
	Cultural and spiritual values	✓	✓	✓	✓	✓

5 Groundwater Quality

5.1 Sampling Sites and Events

There was limited groundwater monitoring data available prior to 2017, with only opportunistic data gathered as part of the stygofauna assessment, and from drilling records, as well as some historical data from registered bores within the groundwater model domain (refer SEIS Appendix 6a) from the GWDB. This provided the following data:

- Registered bore network – data from 64 bores from 1965 to August 2019, although at most only two data points per site were available
- Stygofauna surveys – two surveys were conducted – one in November 2011 and another in March 2012, with field water quality of standing water columns and water level available
- Coal exploration drillholes and well installation logs – surface water level data recorded at boreholes drilled by CQC and during installation of monitoring wells.

From 2017 onwards, several groundwater installation programs were undertaken, and monitoring conducted as follows:

- February 2017 – November 2017 monitoring of a select number of existing landholder bores, starting with site visits and field data for a bore census and monthly sampling at seven of the sites over the period (continuing two of these long-term up to the present generally in monthly rounds)
- September 2017 – March 2018 – installation of the WMP02 – WMP15 series of groundwater monitoring wells, monitoring of which commenced in November 2017 and has continued generally in monthly rounds
- September – October 2018 – installation of the WMP16 – WMP29 series of groundwater monitoring wells, monitoring of which commenced in September 2019 and continues generally in monthly rounds.
- December 2019 – installation of WMP31 Vibrating Wire Piezometer (VWP) in the back creek group to the east of the Project
- April 2020 – installation of WMP06D, WMP21B, WMP31B, WMP31C and WMP32.

The sections below outline the key methodology utilised in the above monitoring, an analysis of the data for any perceived bias, comparison with existing guideline values for the relevant groundwater system, and calculation of statistics based on the available data. For the purposes of assessing the data, all of the results from the various sources have been combined, although only sites with 3 or more independent data points were initially assessed.

The monitoring sites are shown in Figure 5-1, and sampling events and monitoring sites are summarised in Table 5-1. Site details and well diagrams are provided in Attachment A.

Table 5-1. Groundwater Monitoring Number of Events by Site

Sites		Feb 2017 – Nov 2017	Nov 2017 – Aug 2019	Sep 2019 - May 2020	Total
Landholder bores	BH01x	5	18	-	23
	BH05x	1	-	-	1
	BH06x	5	2	-	7
	BH07	1	-	-	1
	BH13	5	2	-	7
	BH16	5	18	-	23
	BH29	5	1	-	6
	BH30	5	1	-	6
	BH32	5	1	-	6
WMP02 - 15 series	WMP02	-	23	6	29
	WMP04	-	24	7	31
			Logger installed - SWL		~11 months
	WMP04D	-	24	6	30
	WMP05	-	24	6	30
			Logger installed - SWL		~11 months
	WMP06	-	24	8	32
				Logger installed Jun 2020 - SWL	2 months
	WMP06D	-		1	1
	WMP07	-	22	4	26
	WMP08	-	24	7	31
	WMP08D	-	24	7	31
	WMP09	-	24	9	33
	WMP10	-	24	7	31
	WMP11	-	17	5	22
	WMP11D	-	17	6	23
	WMP12	-	22	5	27
	WMP13	-	21	7	28
	WMP14	-	19	7	26
	WMP15	-	18	8	26
WMP16 - 29 series	WMP16	-	-	5	5
	WMP16D	-	-	6	6
	WMP17	-	1	4	5
	WMP17D	-	-	4	4
	WMP18	-	-	5	5
	WMP18D	-	-	5	5
	WMP19	-	-	8	8
	WMP19D	-	-	8	8
	WMP20	-	1	5	6
	WMP20D	-	-	5	5
	WMP21	-	-	7	7

Sites		Feb 2017 – Nov 2017	Nov 2017 – Aug 2019	Sep 2019 - May 2020	Total
	WMP21B	-	-	2	2
	WMP21D	-	-	7	7
	WMP22A	-	1	7	8
	WMP22B	-	1	7	8
	WMP22C	-	1	7	8
	WMP23A	-	1	8	9
	WMP23B	-	1	8	9
	WMP24	-	-	7	7
	WMP25	-	-	4	4
	WMP26	-	-	7	7
	WMP27	-	-	7	7
	WMP28	-	-	6	6
	WMP29A	-	1	6	7
				Logger installed Oct 2019 - SWL	~10 months
	WMP29B	-	1	6	7
	WMP29C	-	1	6	7
	WMP29D	-	-	6	6
	WMP29E	-	1	6	7
WMP32 - 32 series	WMP30A	-	-	7	7
	WMP30B	-	-	7	7
	WMP30C	-	-	7	7
	WMP31	-	-	1	1
				VWP Logging from Dec 2019 - SWL	~8 months
	WMP31B	-	-	1	1
	WMP31C	-	-	-	0
	WMP32	-	-	1	1

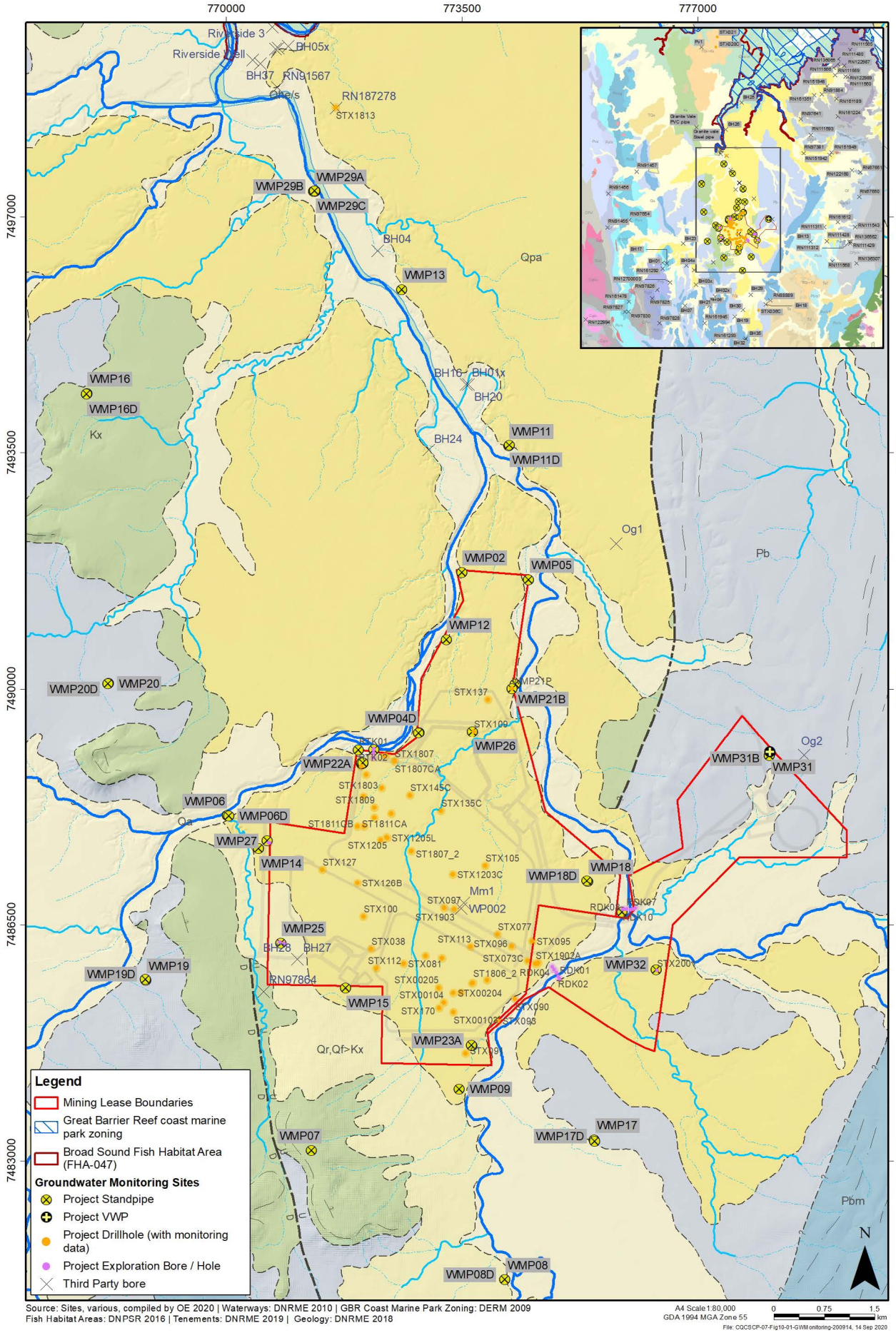


Figure 5-1. Groundwater Monitoring Sites

As can be seen, many of the sites, particularly in the WMP02 - 15 series, have relatively high numbers of samples (~30), above the recommended 24 data points from the ANZG (2018) for derivation of site specific guideline values. For the WMP16 - 29 series, around 6 - 8 data points are available. These provide supporting data but are not, on their own, sufficient for deriving long term guideline values based on ANZG (2018) guidance, nor the QWQG recommended 18 data points. Given the period over which these latter bores have been measured (around 10 months), baseline data covering an additional 10 – 12 monthly samples could be expected to reach a suitable statistical level of confidence, depending on the stability of the parameter being measured.

5.1.1 General Water Quality

In terms of general water quality parameters, all rounds included general physico-chemical parameters (pH, EC, TDS, etc.), and most rounds included nutrients and cations, with the only exceptions being the stygofauna sampling rounds (field data only), the surface-groundwater interaction study (looking at physico-chemical, cations and radioisotopes), and several rounds which were measurements from well installations. Radioisotopes were measured during one round (July 2018).

5.1.2 Toxicants

Excluding the stygofauna and well installation data rounds, which included only field data, the proportion of rounds including toxicant monitoring was as follows:

- Dissolved and total metals – dissolved metals were sampled in most rounds (97% of events), with total metals collected in only 3 (8%) of rounds
- Hydrocarbons – TPH / TRH and BTEX were sampled in 79% of rounds (from 2017 to the end of 2019), with PAHs and phenolic compounds added in November 2018, and again sampled until the end of 2019, corresponding to 31% of events.

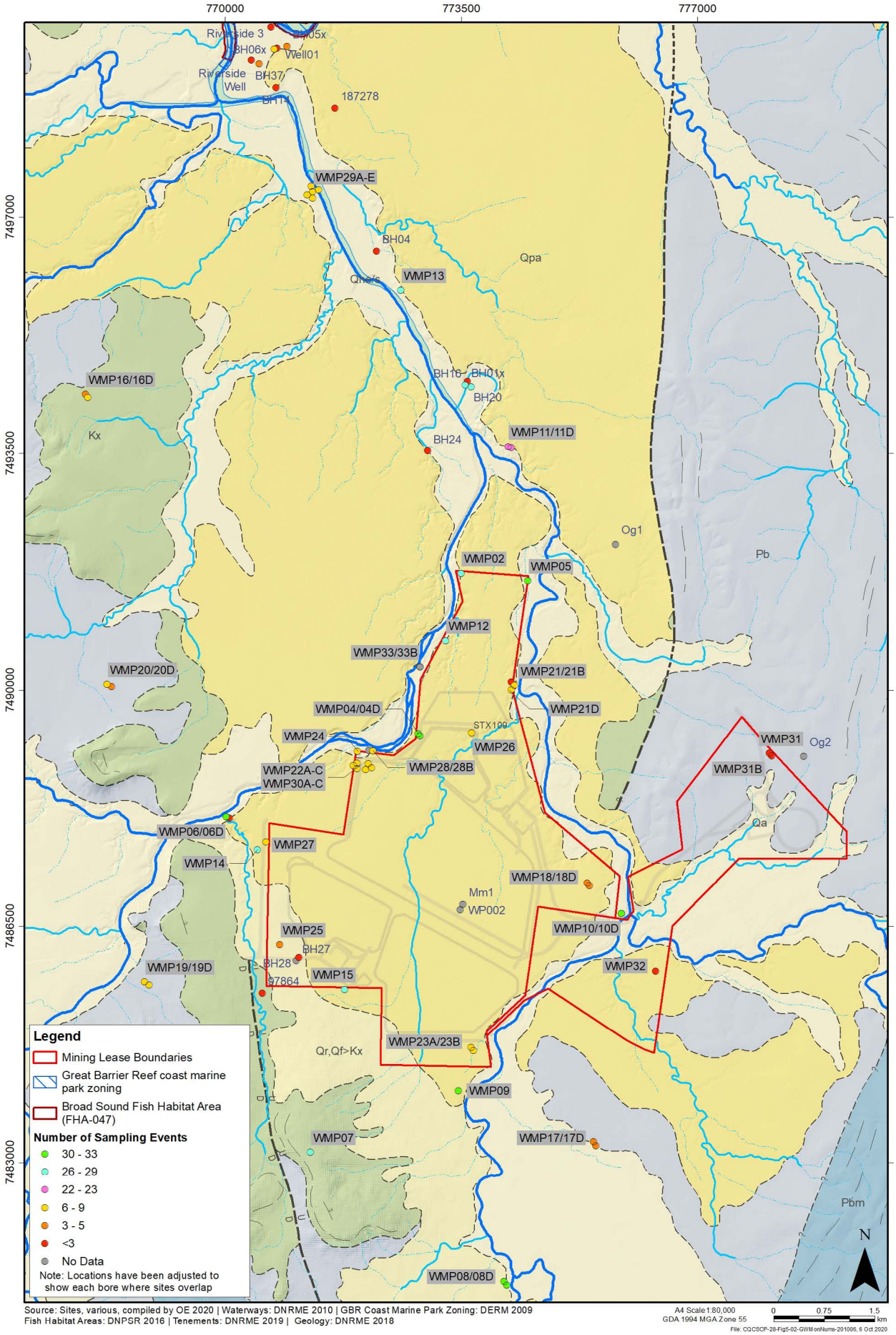


Figure 5-2. Number of events per sampling site

5.2 Methodology

5.2.1 Parameters and analytical methods

In-situ physical water quality measurements were taken while on site and water quality samples were collected for laboratory analysis.

The following physical parameters were tested in-situ using a hand-held water quality meter, with testing before purging and during, including the final purged sample:

- Water temperature (°C)
- pH (pH units)
- Dissolved Oxygen (DO) (mg/L)
- Electrical conductivity (EC) (µS/cm [Microsiemens per centimetre])
- Oxidation-reduction potential (mV (millivolts)), and
- Surface water level – depth from the top of casing to the standing water level.

Turbidity (as NTU (Nephelometric Turbidity Units)) was also measured on a number of rounds (10%).

Water samples for laboratory analysis were tested for the parameters outlined in Table 5-2 using appropriate methods and limits of reporting (LOR).

Table 5-2 Laboratory methods

Parameter	Feb 2017 – Nov 2017	Nov 2017 – Aug 2019	Sep 2019 - May 2020	ALS Method	LOR	Unit
Phys-chem						
Electrical Conductivity @ 25°C	✓	✓	✓	EA010P	1	µS/cm
Total Dissolved Solids (TDS)	✓	✓	✓	EA015	1 - 10	mg/L
Total Suspended Solids (TSS)	✓	-	1 bore, 1 occasion	EA025	5	mg/L
Alkalinity (Hydroxide, Carbonate, Bicarbonate, Total) as $CaCO_3$	✓	✓	✓	ED037P	1	mg/L
Nutrients and Major ions						
Sulfate	✓	✓	✓	ED041G	1	mg/L
Chloride	✓	✓	✓	ED045G	1	mg/L
Ammonia	✓	✓	✓	EK055G	0.01	mg/L
Nitrite	✓	✓	✓	EK057G	0.01	mg/L
Nitrate	✓	✓	✓	EK058G	0.01	mg/L
Nitrate + Nitrite	✓	✓	✓	EK059G	0.01	mg/L
Total Kjeldahl Nitrogen as N	✓	-	✓	EK061G	0.1	mg/L
Total Nitrogen	✓	-	✓	EK062G	0.1	mg/L
Total Phosphorus	✓	-	✓	EK067G	0.01	mg/L
Reactive Phosphorus	✓	✓	✓	EK071G	0.01	mg/L

Parameter	Feb 2017 – Nov 2017	Nov 2017 – Aug 2019	Sep 2019 - May 2020	ALS Method	LOR	Unit
Fluoride	✓	-	-	EK040P	0.1	mg/L
Dissolved Major Cations (Calcium, Magnesium, Sodium & Potassium)	✓	✓	✓	ED093F	1	mg/L
Total Hardness as CaCO3	-	-	3 rounds	ED093F	1	mg/L
Total anions/Cations, Ionic Balance	✓	✓	✓	EN055	0.01	mg/L
Dissolved metals and metalloids						
Aluminium	✓	-	✓	EG020F Dissolved metals by ICP-MS	0.01	mg/L
Arsenic	✓	✓	✓		0.001	mg/L
Barium	✓	-	-		0.001	mg/L
Cadmium	✓	✓	✓		0.0001	mg/L
Chromium	✓	✓	✓		0.001	mg/L
Cobalt	✓	-	-		0.001	mg/L
Copper	✓	✓	✓		0.001	mg/L
Iron	✓	-	-		0.05	mg/L
Lead	✓	✓	✓		0.001	mg/L
Manganese	✓	-	✓		0.001	mg/L
Molybdenum	✓	-	✓		0.001	mg/L
Nickel	✓	✓	✓		0.001	mg/L
Selenium	✓	-	✓		0.01	mg/L
Silver	✓	-	-		0.001	mg/L
Uranium	✓	-	-		0.001	mg/L
Vanadium	✓	-	✓		0.01	mg/L
Zinc	✓	✓	✓		0.005	mg/L
Mercury	✓	✓	✓	EG035F Dissolved Mercury by FIMS	0.0001	mg/L
Total metals and metalloids						
Aluminium	-	-	3 rounds	EG020T: Total Metals by ICP-MS	0.01	mg/L
Arsenic	-	-			0.001	mg/L
Cadmium	-	-			0.0001	
Chromium	-	-			0.001	
Copper	-	-			0.001	mg/L
Iron	-	-			0.05	mg/L
Lead	-	-			0.001	mg/L
Manganese	-	-			0.001	mg/L
Molybdenum	-	-			0.001	mg/L
Nickel	-	-			0.001	mg/L
Selenium	-	-			0.01	mg/L
Vanadium	-	-			0.01	mg/L
Zinc	-	-			0.005	mg/L

Parameter	Feb 2017 – Nov 2017	Nov 2017 – Aug 2019	Sep 2019 - May 2020	ALS Method	LOR	Unit
Mercury	-	-		EG035T Total Mercury by FIMS	0.0001	mg/L
Hydrocarbons						
TPH/TRH	✓	✓	2 rounds	EP080/071	20-100	µg/L
BTEX	✓	✓	2 rounds	EP080	1 - 5	µg/L
Polynuclear Aromatic Hydrocarbons (PAH)	-	✓	2 rounds	EP075(SIM)T B (surrogates)	1.0 0.1%	µg/L %
Phenolic Compounds	-	✓	2 rounds	EP075(SIM)A S (surrogates)	1 - 2 0.1%	µg/L %
Radioisotopes	1 round	-	-	Subcontracted to Environmental Isotopes Pty Ltd	0.1	VSMOW

5.2.2 Sampling and sample handling

Water samples were collected in general accordance with the Queensland Government's *Monitoring and Sampling Manual* (DES 2018, and earlier versions EHP 2009a and DERM 2010). Sample collection generally involved bailing an initial sample for testing (zero purge sample), and then bailing with an aim to purge 3 x well volumes, or until field water quality (regularly taken) stabilised. Following purging, a final sample is taken, representative of the bulk groundwater at the screen depth.

In practice, most wells were only able to practically be purged to around 1 x well volume, with the deeper wells (in excess of 50m) less than 1 x well volume. Looking at the field water quality readings taken during purging, some of the sites did show that readings had stabilised or come close to stabilising from the purging operations (indicating water quality had or was approaching the bulk groundwater quality). Exceptions were BH1x, WMP04 and WMP06, with a number of sites being variable between sampling rounds (some stabilising, some not stabilising prior to sampling), including WMP04D, WMP05, WMP09, WMP16 and WMP19D.

A pumped vs bailed test was conducted in August 2018, finding higher solids in the bailed samples, as would be expected, and generally higher results for some metals (aluminium, chromium, cobalt, manganese, molybdenum, uranium, zinc and iron) and hydrocarbons. Given that cations and anions and EC were relatively similar, and that nutrient differences were well within the normal range of variation seen in QAQC samples, this is likely to be largely due to higher solids content and increased agitation in the sample, due to the mixing and agitation of water when sampling with bailers, rather than any non-representative sampling of aquifers.

Some of the sites were difficult to sample due to their depth requiring high quantities of purging to be undertaken. As such, hydrasleeves[1] have been utilised, which aim to passively take in water from the bulk groundwater allowing for quick recovery when sampling is required. A comparison of hydrasleeve vs bailed samples was undertaken in March 2020 (two rounds), finding variable results, with nutrients (other than phosphorous), dissolved major cations, EC/TDS and sulfate being

1 A collapsed 'hydrasleeve' sleeve is lowered to the sampling depth and left until the well stabilises. On collection, the sleeve is pulled upwards through the screen depth to collect a sample (assuming natural flow through the screen section replenishes the water). Search hydrasleeve on https://www.thermofisher.com

relatively similar, but alkalinity, dissolved metals and phosphorous showing larger differences (up to ~100%), again likely related in part to higher solids levels and agitation of samples.

Given that EC/TDS and nutrients are relatively similar between hydrasleeve and bailed samples indicates that the two methods may be comparable in terms of their access to the bulk groundwater (i.e. their representativeness).

A test of the hydrasleeve against the pump method (the preferred approach) should be conducted to determine how suitable the method may be without the added interference of bailing disturbance.

Samples were collected for laboratory analysis from the final sample. Water was decanted directly into pre-labelled and appropriately preserved sample containers supplied by ALS Laboratory suitable for each analyte. For dissolved metals analysis, samples were pre-filtered through a 0.45 µm disposable filter connected to a disposable, sterile and hand operated syringe.

Samples were placed immediately into an esky on ice and maintained between sampling days in a refrigerator at or below 4°C, as per National Association of Testing Authorities (NATA) guidelines. Samples were transferred with a chain of custody to a NATA accredited lab for analysis.

5.2.3 Quality Assurance / Quality Control

The Quality Assurance / Quality Control (QA/QC) data available was reassessed for the purposes of this report, based on guidance from DES (2018), covering the following general elements:

- Correct bottles and preservation, storage after sampling, and achieving required laboratory holding times
- Chain of custody documentation, and
- Quality control samples.

Collection and Laboratory Submission

Chain of Custody forms were submitted with samples, and Sample Receipt Notification (SRN) documentation were signed and dated by the laboratory to confirm that samples were received in good condition and within acceptable holding times. The analytical methods used for the laboratory's internal QA/QC program are NATA accredited, and detailed in the laboratory documentation.

The laboratory (ALS Environmental) provided quality control interpretive documentation with each batch of samples submitted. Where incorrect preservative and/or field filtering or holding time breaches were recorded, results were coded as a lower confidence, and either weighted down compared to other results, or excluded from the statistical analysis where considered a potential issue.

For the key parameters used in deriving and assessing guideline values in this report, most parameters recorded very low levels of holding time breaches or similar errors (<0.4%). Holding times for laboratory pH results were always exceeded due to the very short holding time (6 hours). However, since field measurements were preferenced over lab results, this only resulted in pH being excluded from 1.4% of samples (one round in August 2018, and one site (WMP30C) in October and November 2019). Other parameters recording time breaches were major cations (1.5% of samples), nitrite and filterable reactive phosphorous (12%) and total phosphorous (0.6%). Given the nature of major cations and the relatively low level of breaches in the overall record (typically only 1 - 2 days over), these are not considered problematic and were not excluded from the dataset.

Nitrite and FRP recorded the highest levels of data quality problems relating to holding time breaches. However, the data are mostly censored (<0.01mg/L), and the breaches do not appear sufficient to change resultant statistics. Regardless, statistics generated on the data were completed with and without these data points to determine their importance.

Dissolved metals recorded 1 - 4% breaches for sample container non-compliances relating to non-filtering in the field and no preservative in bottles, although these were lab filtered and acidified so it is considered that the results would be relatively stable. Given the low rate, it is also unlikely to significantly sway the final statistics.

Sampling, particularly during 2019 – 2020, has involved multiple laboratory batches per event to avoid further holding time breaches.

QA/QC Samples

Based on the Queensland Monitoring and Sampling Manual (DES 2018), the program should aim to include a minimum 10% field QA/QC samples (10 per 100 samples). The available data indicates only around 36% of sampling events adopted QA/QC samples, with the rate averaging 5 per 100 samples (for those events including QA/QC samples).

QA/QC samples averaged a little above 5% during the 2017 - 2018 sampling program, were not collected between November 2018 to November 2019, and averaged around 3% between December 2019 to May 2020.

Field duplicates were assessed using the Relative Percent Difference (RPD) approach from DES (2018), who state that *'As a rule of thumb, a RPD of ≤ 20% may indicate an acceptable result for duplicate aqueous samples (Equation 1), provided the result is five to ten times the limit of reporting (LOR). In those circumstances where the result is close to the LOR, RPD may exceed 20%.'…*

$$RPD = \frac{|C_1 - C_2|}{\left(\frac{C_1 + C_2}{2}\right)} \times 100\% \qquad \textbf{Equation 1}$$

Higher RPDs were found for manganese and total suspended solids (43% and 57% of QA/QC samples respectively); total phosphorous, oxidised nitrogen and ammonia and dissolved iron and zinc (3 - 4 occasions, or 21 - 29% of QA/QC samples); dissolved aluminium, filterable reactive phosphorous and hydrocarbons (2 occasions, or 14% of QA/QC samples); and dissolved copper and molybdenum, total nitrogen, nitrite, sulfate and alkalinity (1 occasion).

Low RPDs were identified in all or most QA/QC samples for EC, total dissolved solids, chloride, most metals, major cations, and as identified above total nitrogen, sulfate and alkalinity. Overall, elevated suspended solids RPDs in more than half of the samples shows the high variability in sampling with bailers in relation to sediments, or perhaps poor sample splitting techniques, and it is not unexpected that some nutrients and metals would be likewise variable, being potentially bound up with sediments in the samples, not to mention correlation between phosphorous, iron and manganese is not unexpected.

An examination of the inherent variability between sample events for nutrients indicates the higher RPD may also be due to natural variability (and perhaps some poor sample splitting).

Overall, the QA/QC samples indicate the ground water data is suitable for use, albeit their collection is below what should be undertaken, and care should be exercised in interpreting some analytes, particularly phosphorous and manganese levels.

5.2.4 Data analysis

Data were coded with a confidence value to indicate potential issues, and further investigated to ensure only reliable data were included. In addition, measurements taken close together at the same sites were combined into a single value by averaging, to ensure reasonably independent events were utilised (results less than 2 weeks apart was used as the cut off).

Statistics were generated from the data based on the AWQG approach, with censored data (results < limit of reporting [LOR]) managed after Helsel (2012) as follows:

- the statistics were generated first assuming all <LOR values were 0 (a lower statistic), and then where all <LOR values were equal to the LOR (an upper statistic)
- where the lower and upper statistics were equal, this was adopted as the relevant statistic
- where they were not, the methods of Helsel (2012) were adopted, with the regression on order statistics imputation method generally utilised, after Table 6.11, Section 6.7.1 of Helsel (2012), where censored observations were not greater than 80%
- these censored statistics were then compared to the lower – upper statistic range, and where the censored statistic fell outside (or other errors were encountered in the censored statistic), the range was instead adopted. For plotting purposes, an average of the range was used, however the range statistic is otherwise retained pending further data.

The result is a set of statistics for each site, based on independent events (or reasonably so), unbiased measurements, suitable to compare to existing guideline values and to develop new ones where relevant. Statistics for the six different groundwater chemistry zones described in Section 3.3 were combined by averaging to provide an overall zone statistic for comparison, with a Standard Error determined based on the methods outlined in the QWQGs to provide an overall statistic for each system.

5.3 Baseline Data

5.3.1 General Water Quality

Key statistics (median, 20^{th} – 80^{th} percentiles, min-max) are shown graphically in Attachment B, along with tabulated medians and 80^{th} percentiles (and 20^{th} to 80^{th} percentile ranges for pH), with an overview of the key parameters in the sections below. The data are compared to the guideline values for the groundwater chemistry zone groups from the draft McNeil et. al. (2018) data, and the graphs in Attachment A2 include health and aesthetic criteria from the Australian Drinking Water Guidelines where available (NHMRC & NRMMC 2018).

5.3.1.1 pH

Most sites are within the ADWG aesthetic range of 6.5 - 8.5 pH units, with the exception of WMP23A, WMP29C and WMP29D from group 4 (medians 12.2, 11.4, 10.6 respectively), WMP22C and WMP29E from group 5 (medians 10 and 12.2 respectively), and WMP23B (median 12.4) from group 6. Examination of the WMP23A data shows pH to have declined between November 2018 to March 2020 to levels consistent with other sites, indicating this may have been due to insufficient well development and contamination of the well column with concrete (dissolved aluminium has also declined).

For the other sites, it is possible that similar well development issues are the cause, given that with the exception of WMP29C all of the other sites are 120 - 200m deep, and all of these sites have been

subject to minimal purging (due to the high pH and/or depths), and have only been sampled between 4 to 6 times each. However, these sites are all located in the Styx Coal measures and RGS (2020) noted high pH in leachate tests which may indicate this could be a natural source in some particular locations due to minerology.

Given these results, calculation of overall group results has excluded these high pH sites.

High results were also recorded at the WMP04 and WMP12 sites (when installed), however these have dropped since to levels consistent with other bores in the area. Other parameters were also inconsistent in these early rounds and as such the first two rounds have been dropped from the overall analysis (results stabilised after these early two rounds). Examination of the data also found anomalous results for WMP15 (April 2018), WMP22B, WMP22C and the WMP29 series (A-E) (November 2018), some of which were noted as still recovering post slug testing. These rounds were also removed.

The resulting data shown in Attachment B does not include the results noted as having been removed above.

5.3.1.2 EC / Total Dissolved Solids

The general pattern shows lower salinity in the alluvium (group 1) and WMP25 (and also though a little higher in WMP19D and WMP20D), and higher in other sites, with three general bands of results:

1. several sites below 1000 uS/cm - BH16, BH29 (group 1), WMP25 (group 2)
2. sites above 1000, but below 3000 uS/cm - BH06x, WMP05 (Group 1), WMP19D, WMP20D (Group 5)
3. Those sites between 1000 and 10000 uS/cm - WMP29A (Group 1), WMP12, 15 (Group 2), WMP06, 08D, WMP28 (Group 4), BH13, BH32, WMP16D, WMP22C (Group 5)
4. Sites above 10000 uS/cm - BH05x (Group 1), WMP02, 04, 08, 09, 29B (Group 2), all of group 3, all of group 4 other than WMP06, 08D, WMP28, WMP29E (Group 5) and WMP23B (Group 6). Three of these sites are in the range of seawater - WMP26 in Group 2, and WMP13 and WMP21D in Group 3.

The Alluvium is close to agreement with the DGV range, with the exception of a couple of sites, and otherwise only some of the group sites are within the relevant range (all others generally above).

Compared to the ADWG aesthetic criteria, only the BH29 site is consistently below, although the BH01x and BH16 sites are often below (median below, and 80th percentile only a little above the criteria).

5.3.1.3 Chloride

Chloride shows a similar trend as shown for EC/TDS, with most sites above the DGV, other than the group 1 alluvium sites, and some individual sites within other groups: WMP12, 15 25 in Group 2, WMP06 and WMP28 in Group 4, WMP19D and WMP20D in Group 5. Results are also generally above the ADWG aesthetic criteria, other than group 1 (with the exception of WMP05 and WMP29A).

5.3.1.4 Sulfate

Sulfate levels very generally follow those for EC/TDS and chloride in Cainozoic sediments (groups 1 and 2), with alluvium generally within the DGVs other than for WMP05 and WMP29A. Group 3 is similar also, but group 4 is instead largely within the DGV range, and in some cases below (WMP06

20th percentile, WMP23A, WMP29D median). Groups 5 and 6 are at a similar level to Group 4 or slightly lower.

Many of the sites recorded a level below the ADWG criteria, including 60% of Cainozoic sites, 65% of group 4, 82% of group 5 - 6 sites (all group 3 sites were above).

5.3.1.5 Alkalinity and cations

Bicarbonate alkalinity is elevated above DGVs in Cainozoic sediments, and similar to for other sites, with some exceptions in some sites. Carbonate alkalinity was generally very low, other than some higher results in WMP22C, WMP29E and WMP29B. Hydroxide alkalinity was only measured in WMP23A, WMP29C WMP29E and WMP23B, and for some samples WMP29D. Total alkalinity is fairly similar across sites, other than elevated levels (and large ranges) at WMP23A, WMP29E and EMP23B.

Calcium, on the other hand, is within the DGV for alluvium, generally above for Cainozoic deposits, mixed for group 3 and 5, and close to the DGV range for groups 5 and 6. Magnesium is very approximately similar to calcium, showing similar more elevated sites in group 3 (WMP13 and BH30), tapering down in group 4 and lowest in groups 5 and 6 and the alluvium. K is generally fairly consistent between sites and low, with the exception of WMP23A, WMP29C, WMP29D, WMP29E and WMP23B. Sodium results were generally above the DGVs and elevated for the group 2 - 4 sites, and lower for groups 1 and 5 - 6, with the lowest in the group 1 alluvium.

5.3.1.6 Fluoride

Levels above the DGV range, and similar between sites, for all Cainozoic sites, within the DGV and generally lower for Styx coal measures sites (Groups 3 and 4), and similar to both of the above for Permian group 5 sites measured.

5.3.1.7 Standing Water Level

Alluvium sites were generally at or below 10mbgl, with CZ2 Cainozoic and group 3 Styx coal measures sites between 10 - 20mgbl. Group 4 sites were also generally in the 10 - 20mbgl range, with the exception of BH30, BH35 and WMP24 (2 - 5mbgl) and WMP07 (always with insufficient water, at 60mbgl). Group 5 - 6 sites were also generally 10 - 20mbgl with the exception of BH32 (5mbgl), WMP29E (7 - 9mbgl) and WMP23B (<3mbgl, at times equal to the top of casing (and overflowing)).

5.3.1.8 Ammonia

Alluvium quite variable, but BH16, BH29, WMP05 in same range as 2, 3; BH01x, BH06x quite high, WMP29A elevated; CZ2 fairly uniform, but for WMP29B a bit high. 3 = similar ranges to CZ2. 4 = higher and generally in same range, other than WMP28 and WMP06 both low (like 2, 3); 5= maybe intermediate between 2/3 and 4

1, 2 and 3 group well together, with the exception of high BH01x, BH06x, and elevated WMP29A, WMP29B. Many sites have less than 10 data points, particularly the Pb and to a lesser extent Kx (4). Groups 1, 2 and 3, plus WMP06, WMP28, WMP19D and WMP20D are below ADWG aesthetic criteria range.

5.3.1.9 Nitrate

DGVs show an increase from groups 1 and 2, through groups 3 and 4 and into groups 5 and 6. However, it appears rather that levels drop in groups 4 - 6, with medians and most 80th percentiles below the 20th percentile DGV level. There appears to be a reasonable amount of variation in results

between sites otherwise, with two clear groups - 1 and 2 (but also including WMP04D and WMP21D in Group 3), and the remainder (Groups 3 - 6)

All results are well below the ADWG Health criteria.

5.3.1.10 Nitrite

It is difficult to determine clear patterns as the results suffer from many non-detects. All are well below the ADWG Health criteria.

5.3.1.11 Filterable Reactive Phosphorous

In general, FRP levels were higher in Cainozoic sediments (groups 1 and 2), other than elevated results in three bores - WMP22B (group 4), BH32 and WMP22C (group 5). Elevated results were recorded in BH01x, BH06x, WMP22B, BH32 and WMP22C, with slightly lower results in WMP05, WMP02, WMP09 and WMP12 - all other results were quite low, with medians being close or only slightly above the limit of reporting. High censoring was found in groups 3 - 6 in general, with groups 1 and 2 generally <30-40%.

5.3.1.12 Total Nitrogen

Most results in the same general range, with elevated results at BH01x, BH06x, WMP12, WMP29C, WMP29D, WMP29E and WMP23B. There are a few sites within the DGV range, most notably group 5 sites (excluding WMP29E, group 3 sites (excluding WMP21D). Four of the group 4 sites and 4 of the Cainozoic sites showed medians or the full range of variation within the DGV range, although all were well above the 20th percentile guideline value.

5.3.1.13 Total Phosphorous

As for TN, most were within the same general range, with higher results at WMP12, and in general higher results in the Cainozoic and group 3 sites than the group 4 - 5 sites, with the lowest at the WMP29E group 5 site and the WMP23B group 6 site. All were above the DGV range, with the exception of WMP08D, and median of WMP11D.

5.3.2 Toxicants

5.3.2.1 Dissolved Metals

Dissolved metals are characterised by relatively high levels of censored (non-detect) results. The following outlines some of the key findings in relation to some of the key elements:

- Aluminium - elevated at WMP29C, WMP29E and WMP23B, some results above the limit of reporting measured at WMP05, WMP15, WMP26, WMP23A
- Arsenic - elevated result at WMP29B, followed by WMP06 and then BH01x, otherwise broadly within the same range (<0.01)
- Barium - elevated results at WMP11 and WMP11D, otherwise quite low
- Cadmium - recorded at a number of sites
- Chromium - recorded at WMP23A, WMP29E, WMP23B
- Copper - higher results at WMP18D
- Molybdenum - low, other than WMP23A, WMP29C, WMP29D, WMP29E, WMP23B - reasonably high
- Nickel - all <0.01 other than a measurement at BH01x, BH16, WMP06 and results at WMP29C

- Uranium - relatively low (<0.01) but detectable at many sites, with WMP13 elevated above all others

5.3.2.2 Hydrocarbons

A smaller selection of sites had sufficient useable data for hydrocarbon levels, however in general there were 11 sites (out of 21) that had a measurable median total recoverable hydrocarbon level above the limit of reporting, with six showing consistent detection (20th to 8^{0th} percentiles above the limit of reporting). No clear pattern is discernible, other than low levels in group 3 (median below LOR, but 80th percentile above) and group 5 (no detection).

Given the nature of the catchment and the persistent detection also in surface waters (not constant, but detected on multiple occasions throughout the assessment period – refer Orange Environmental, 2020), it is unlikely these results reflect anthropogenic sources of pollution, and more likely show natural levels of biogenic and likely coal sourced hydrocarbons in the natural environment.

Follow up monitoring should be conducted to obtain further hydrocarbon fingerprint results to assist in setting an appropriate baseline, and silica gel cleanup (or similar) to provide baseline data demonstrating the source as biogenic.

5.3.3 Summary by Hydrostratigraphic Unit

Based on the data presented in Attachment B and the interpretation provided in the above sections, the following summarises the groundwater quality by Hydrostratigraphic unit (refer Section 3.3). The graphs in the following pages show the relationship graphically for selected parameters.

In general, the Quaternary Alluvium had low salinity, and was found to be suitable for most uses, with various limitations for the other units. The Styx Coal Measures were the most saline of all the units and also recorded the highest sulfate level, followed by the Quaternary Pleistocene Alluvium. For aquatic ecosystem protection, all sites (other than BH29) exceeded the QWQG 80th percentile guideline value, with exceedances against the DGVs for metals at some sites in all units, particularly for aluminium, chromium, copper, zinc, and against the low reliability guideline values for cobalt, iron, molybdenum, uranium and vanadium.

5.3.3.1 Quaternary Alluvium (AZ6)

Water in the surficial aquifers appears suitable for most purposes with only minor limitations, with pH generally neutral, typically low salinity, from 289 – 2,580 µS/cm, other than two sites (BH05x and WMP29A at 13,100 and 8,170 µS/cm respectively, the latter in estuarine sediments). Sulfate was also low.

Nutrients are generally highest in both the Cainozoic sediments, with a wider range than other units, particularly for total nitrogen and total phosphorous. Standing water levels are 2 - 10 mbgl, typically 7 mbgl. Dissolved metals are generally low, or comparable to other units, with the exception of arsenic and iron, which were similar to the Styx Coal Measures (lower).

Other than elevated salinity at two sites (BH05x, WMP29A), around half of the sites were above the taste threshold for drinking water for TDS. Some limitations for drinking water for chloride, sulfate and sodium, elevated ammonia, iron and manganese exist, with all of these being aesthetic criteria, other than manganese at BH01x and BH16 which exceed the health criteria. Based on chloride and sodium levels, waters are likely suitable for sensitive to moderately sensitive crop irrigation, other than WMP29A and WMP05, and some limitations in some sites (particularly BH01x, BH06x) for

fluoride, nitrogen and phosphorous, iron, manganese are present. Phosphorous was high for all sites, also a limitation for long term irrigation.

All sites were above the QWQG EC guideline for aquatic ecosystems, other than BH29, with nutrients above the relevant DGVs at all sites. For metals, the aquatic ecosystem protection DGV was exceeded for copper at BH16, WMP05 and WMP29A; and zinc at WMP05 and WMP29A. The low reliability guideline value was exceeded for cobalt at BH16; iron at BH01, BH06x; and uranium at WMP05.

5.3.3.2 Quaternary Pleistocene Alluvium / Quaternary Alluvium (lower) / Regolith (CZ2)

This unit is much more saline than the above Quaternary Alluvium unit, with only two sites below the stock watering criteria (WMP15, WMP25), and only one below the drinking water taste threshold. Salinity ranges from 4,500 – 48,800, with one site lower at 780 µS/cm. Sulfate is higher than all other units other than the upper Styx Coal Measures (Section 5.3.3.3). pH is similar to the Quaternary Alluvium unit, being neutral, and standing water level is between 9 and 18 mbgl, typically 12 mbgl.

As noted above, nutrients are elevated in both the Cainozoic units, although total nitrogen and ammonia are both low compared to the other units, and nitrate is higher than the Quaternary Alluvium unit units. Metals are low or comparable to the other units, other than slightly elevated levels of uranium compared to other units.

Limitations exist for stock water for salinity, for salinity, chloride, sodium and for elevated nutrients for irrigation, and for salinity, chloride, sulfate, sodium and manganese for drinking water, with one site (WMP08) above the health criteria for manganese.

All sites were above the QWQG EC guideline for aquatic ecosystems, with nutrients above the relevant DGVs at all sites. For metals, the aquatic ecosystem protection DGV was exceeded for aluminium at WMP26; chromium at WMP04 and WMP12; and copper and zinc at most sites. The low reliability guideline value was exceeded for cobalt at WMP08 and WMP09; uranium at most sites; and vanadium at WMP12.

5.3.3.3 Styx Coal Measures - upper (GZ11)

In general, water quality from the coal measures is poor, with the highest salinity, chloride and sulfate recorded in this upper unit. pH is very slightly below neutral, but salinity, with site medians ranging from 18,000 to 47,800 µS/cm, and high chloride, sulfate and sodium precludes its use for stock water, irrigation or drinking water.

Nutrients are lower than the Cainozoic sediments, although nitrate and total phosphorous are slightly higher than the deeper units, and phosphorous is limiting for long term irrigation. Metals are generally low, with the exception of cobalt, manganese and uranium, all of which are the highest of all the units. Iron and manganese exceed the long term irrigation limits at all sites, and the drinking water limits at two sites (WMP13 and WMP21D), with the manganese health limit for drinking water exceeded at the WMP13 site. Standing water levels are similar to the Qpa Alluvium, at 10 - 18 mbgl, averaging 14 mbgl.

All sites were above the QWQG EC guideline for aquatic ecosystems, with nutrients above the relevant DGVs at all sites. For metals, the aquatic ecosystem protection DGV was exceeded for zinc at WMP04D and WMP13. The low reliability guideline value was exceeded for cobalt at WMP10 and WMP13; iron at WMP13; and uranium at all sites.

5.3.3.4 Styx Coal Measures - lower (GZ11)

Salinity and sulfate levels in the lower Styx Coal Measures unit are a little lower than in the upper coal measures unit, but similar to the Qpa Alluvium unit, with an EC range of 5,500 to 39,800 µS/cm. pH and alkalinity remain similar to the upper coal measures and the Alluvium units. Salinity is generally too high for stock watering, irrigation and drinking water, with chloride and sodium also limiting. Nitrogen and phosphorous are also potentially limiting for irrigation, although they are low compared to the other units, and sulfate is elevated for drinking water use, and for stock watering at one site, BH30.

Metals are low with the exception of arsenic, cobalt, barium and iron, with each being the highest of all the units. Molybdenum recorded low overall unit statistics but one site returned a high level, above all the other units. As noted above, several wells within this unit recorded high pH, but this is due to poor well development in at least some of them.

For metals, exceedances of the health criteria for drinking water were identified at WMP11 and WMP11D for barium, WMP23A for chromium, WMP23A, WMP29C and WMP29D for molybdenum and manganese at many of the sites. Aluminium and iron exceeded the aesthetic criteria for drinking water.

Standing water levels are between 2 to 60m, but more typically between 10 and 18 mbgl, averaging 15 mbgl.

All sites were above the QWQG EC guideline for aquatic ecosystems, with pH exceeding the DGVs at the three sites with elevated pH. Nutrients were above the relevant DGVs at all sites. For metals, the aquatic ecosystem protection DGV was exceeded for aluminium at WMP29C and WMP29D; chromium at WMP23A; copper at WMP06, WMP11D, WMP23A, WMP29C; manganese at WMP23A; nickel at WMP29C; and zinc at most sites.

The low reliability guideline value was exceeded for cobalt at WMP06, WMP11, WMP11D; iron at most sites; molybdenum at WMP23A, WMP29C, WMP29D; uranium at most sites tested; and vanadium at WMP29C.

5.3.3.5 Permian Measures - Back Creek Group (FZ10)

Salinity and sulfate are reduced compared to the coal measures, and are instead more similar to the Cainozoic sediments, with EC ranging from 1,880 to 12,900 µS/cm. pH is generally consistent with the other units, being generally neutral, with the exception of two sites (WMP22C and WMP29E) which reported high pH, potentially due to poor well development (refer to Section 5.3.1.1).

In general, this unit remains unsuitable for irrigation and drinking water due to high salinity, chloride and sodium, with high phosphorous, and high nitrogen in WMP29E limiting its use for long term irrigation. Wells WMP16D and WMP29E are unsuitable for stock watering due to salinity. Ammonia is elevated for drinking water, exceeding the aesthetic criteria, and chromium exceeds the health criteria in one well - WMP29E. Two sites exceeded the irrigation and drinking water criteria for iron, and three sites exceeded the health criteria for manganese.

All sites were above the QWQG EC guideline for aquatic ecosystems, with pH exceeding the DGVs at the two sites with elevated pH. Nutrients were above the relevant DGVs at all sites. For metals, the aquatic ecosystem protection DGV was exceeded for aluminium at WMP29E; chromium at WMP29E; copper at WMP16D, WMP19D, WMP20D, WMP29E; and zinc at most sites.

The low reliability guideline value was exceeded for cobalt at BH13; iron at BH13, WMP19D; molybdenum at WMP29E; uranium at BH13 and BH32; and vanadium at WMP29E.

5.3.3.6 Permian Measures - Carmila Beds (FZ10)

Only one site was located in this unit - WMP23B. This site had the shallowest standing water level, as it was recorded at ground level (and at times overflowing). Salinity and chloride were similar to the Quaternary Pleistocene Alluvium units, with sulfate low. pH and alkalinity are the highest of all units, though this is again likely due to poor well development. Ammonia and total nitrogen were elevated, similar to the Quaternary Alluvium unit, but total phosphorous was low. Of the metals, results show the highest aluminium (possibly due to poor well development), high copper and molybdenum.

Water in this bore appears unsuitable for stock watering, irrigation or drinking water, due to elevated salinity, chloride and sodium as well as pH. Ammonia is above the aesthetic threshold for drinking water, and total nitrogen for irrigation, with molybdenum above the criteria for irrigation and stock watering. Chromium and molybdenum are above the drinking water health criteria.

Compared to the aquatic ecosystem protection guideline values, the QWQG EC guideline was exceeded, with pH and nutrients above the relevant DGVs. For metals, the aquatic ecosystem protection DGV was exceeded for aluminium, chromium, copper and zinc.

The low reliability guideline value was exceeded for molybdenum.

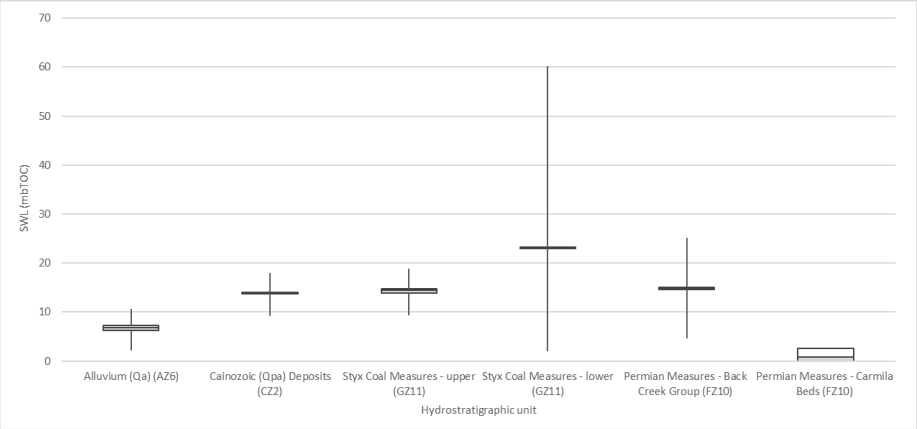


Figure 5-3. Summary of groups by hydrostratigraphic unit - SWL

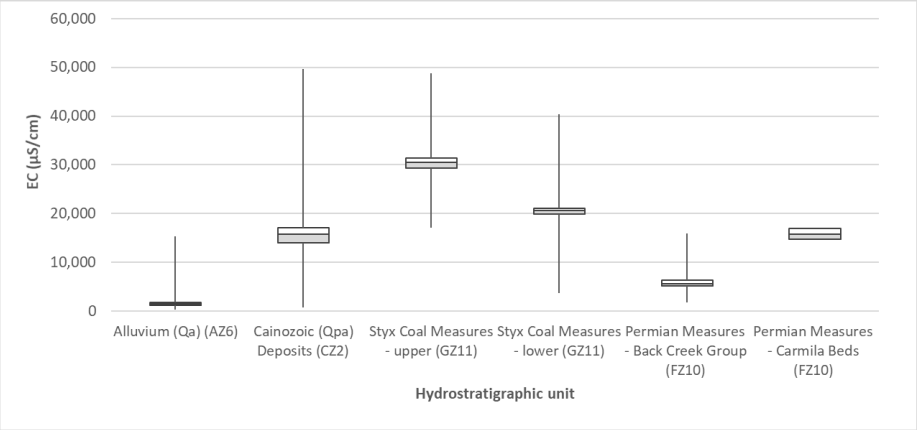


Figure 5-4. Summary of groups by hydrostratigraphic unit – EC

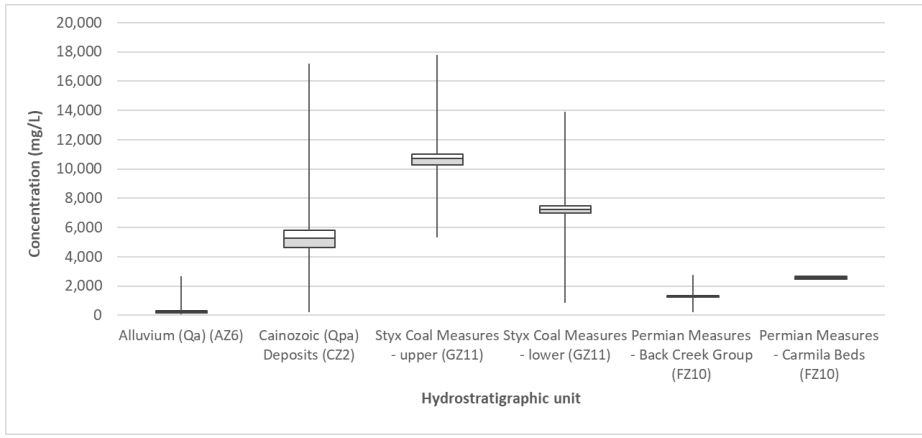


Figure 5-5. Summary of groups by hydrostratigraphic unit - Chloride

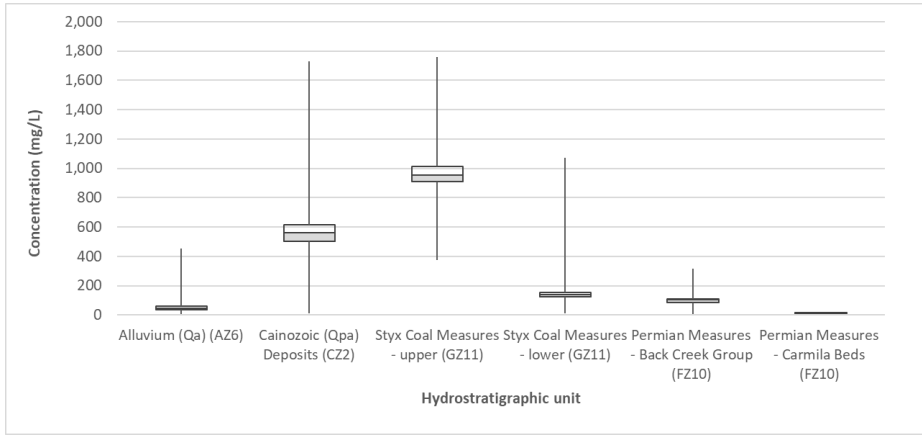


Figure 5-6. Summary of groups by hydrostratigraphic unit – Sulfate

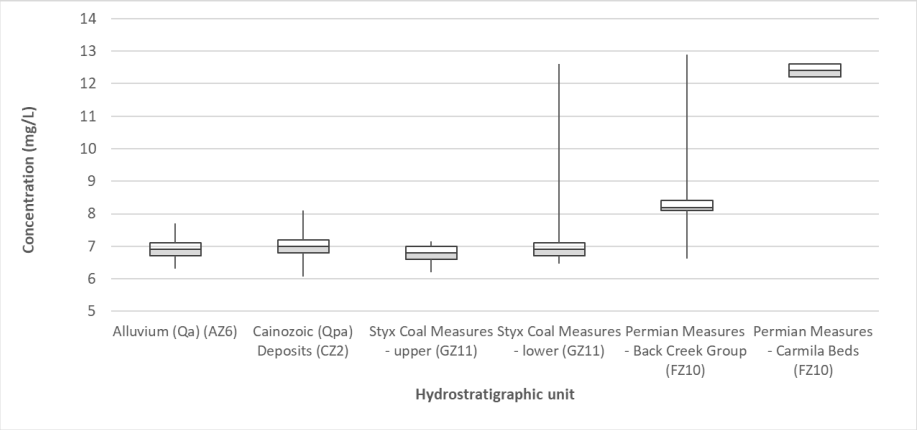


Figure 5-7. Summary of groups by hydrostratigraphic unit – pH

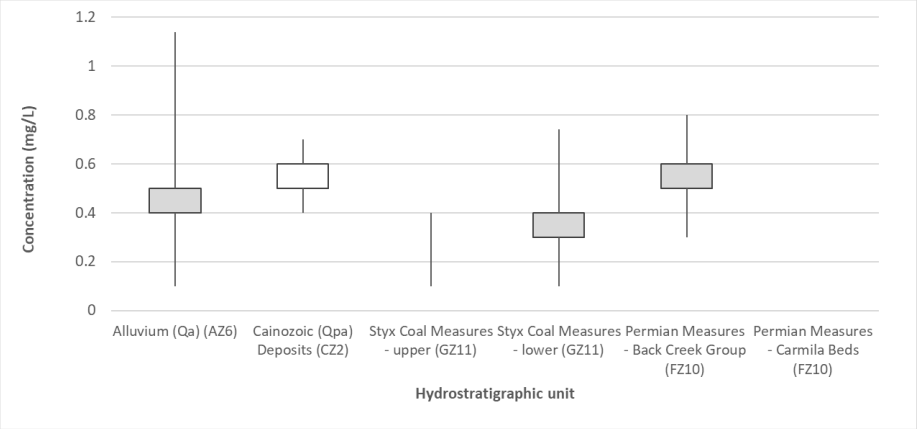


Figure 5-8. Summary of groups by hydrostratigraphic unit – Fluoride

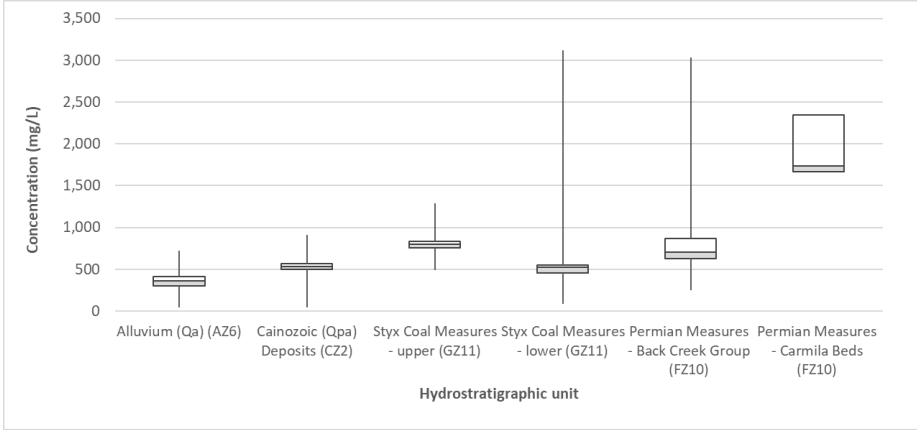


Figure 5-9. Summary of groups by hydrostratigraphic unit – total alkalinity

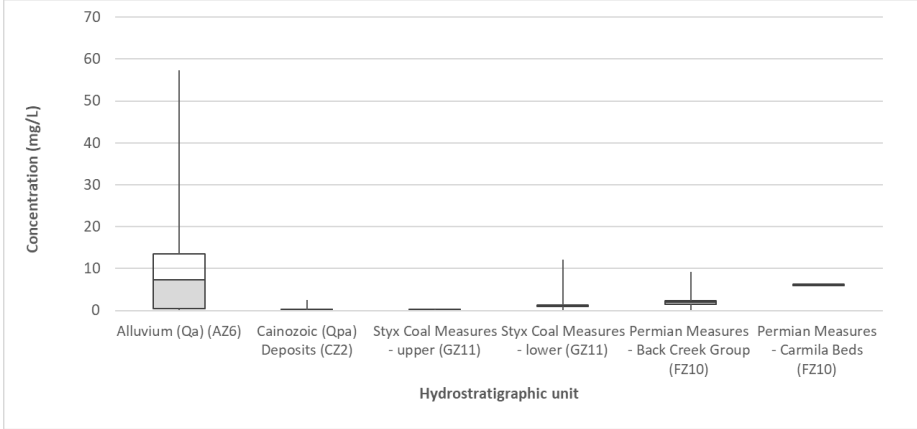


Figure 5-10. Summary of groups by hydrostratigraphic unit – ammonia

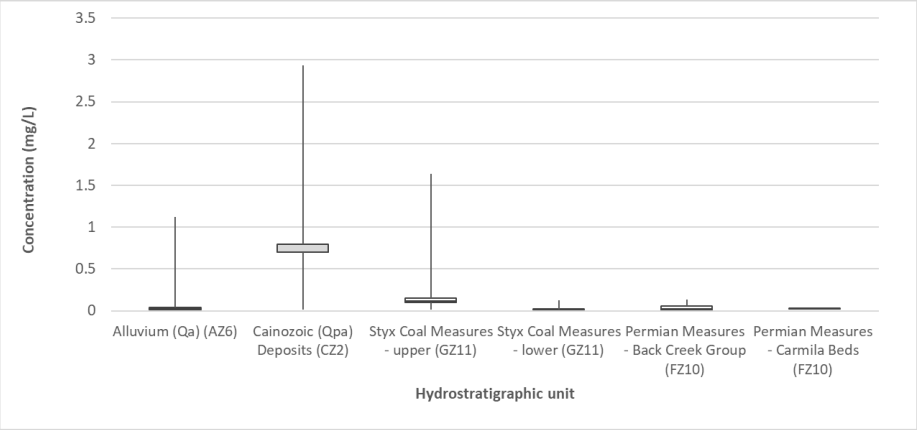


Figure 5-11. Summary of groups by hydrostratigraphic unit – nitrate

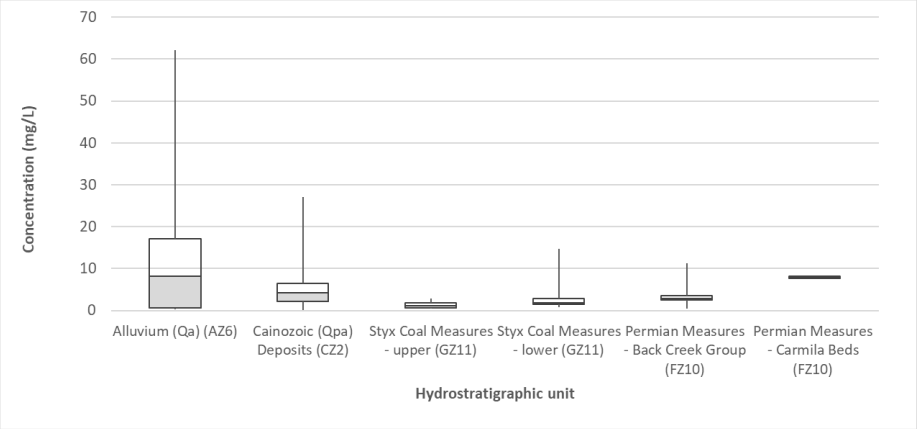


Figure 5-12. Summary of groups by hydrostratigraphic unit – total nitrogen

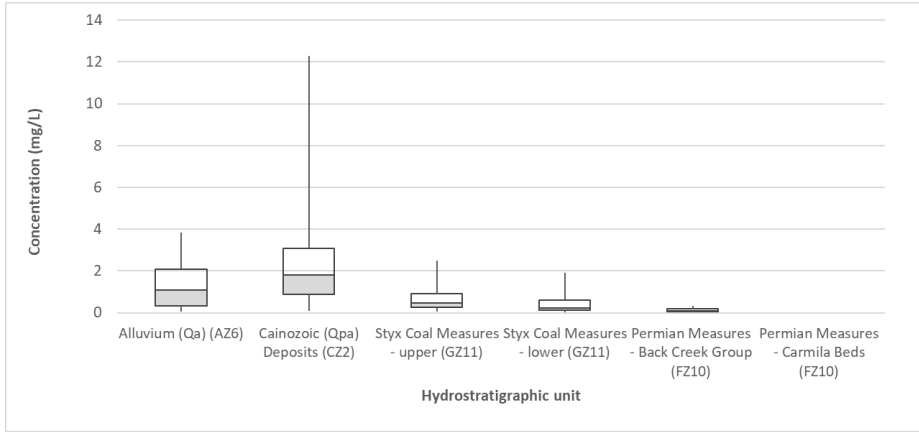


Figure 5-13. Summary of groups by hydrostratigraphic unit – total phosphorous

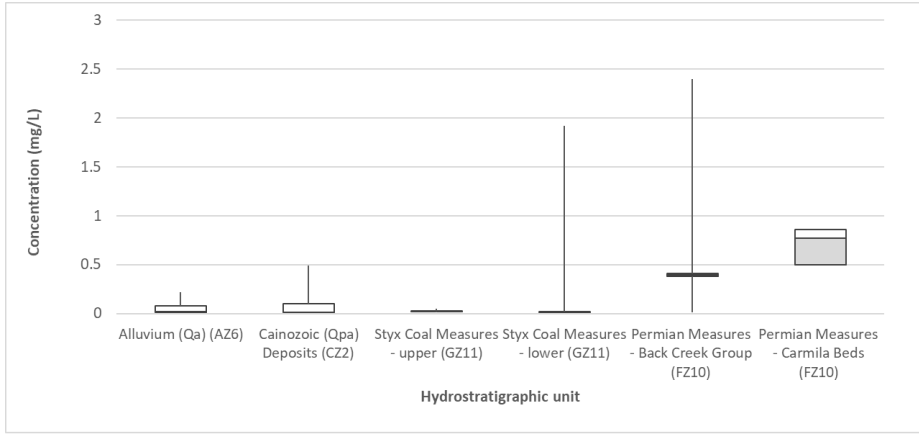


Figure 5-14. Summary of groups by hydrostratigraphic unit – dissolved aluminium

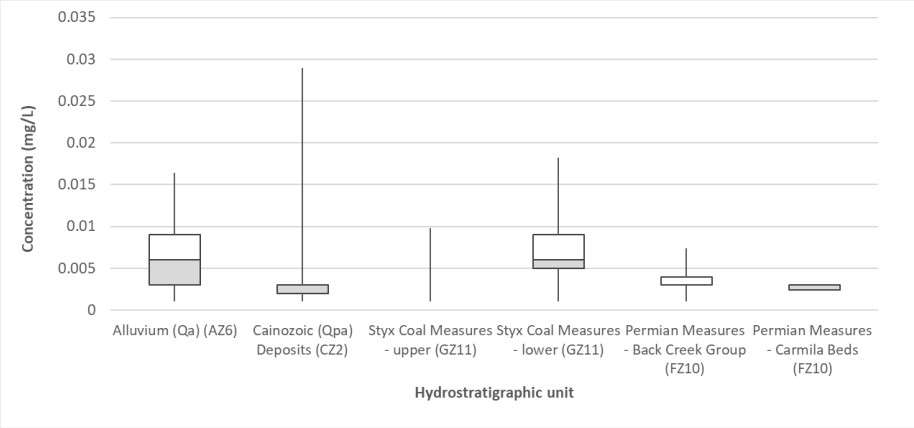


Figure 5-15. Summary of groups by hydrostratigraphic unit – dissolved arsenic

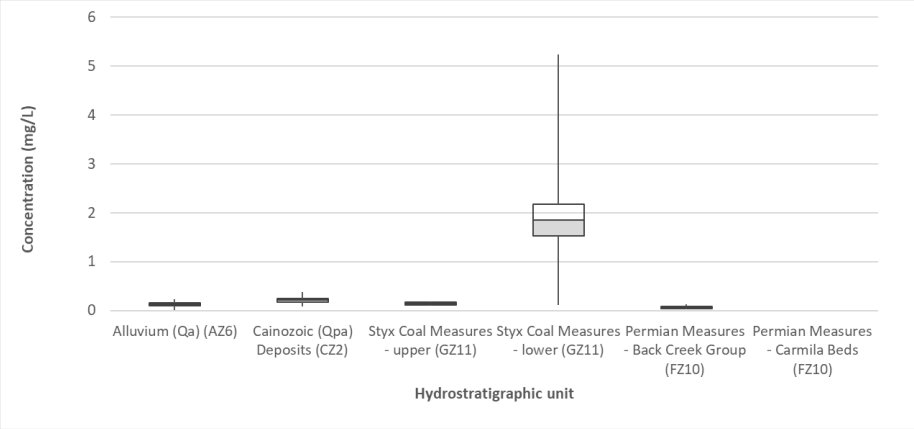


Figure 5-16. Summary of groups by hydrostratigraphic unit – dissolved barium

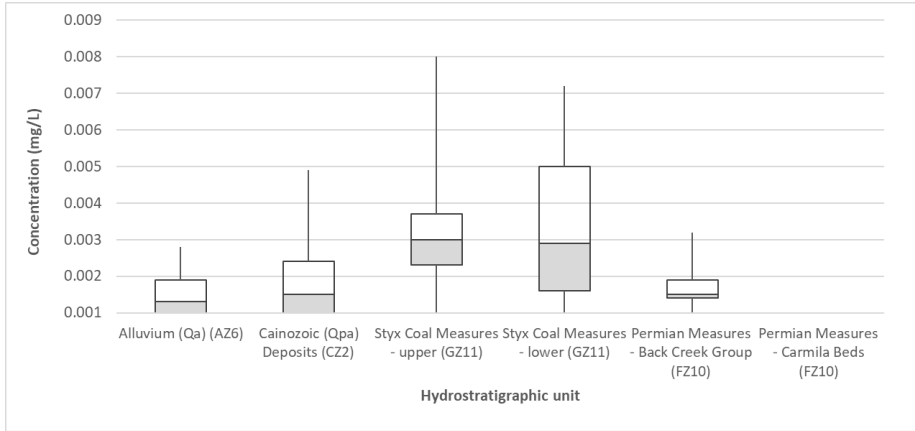


Figure 5-17. Summary of groups by hydrostratigraphic unit – dissolved cobalt

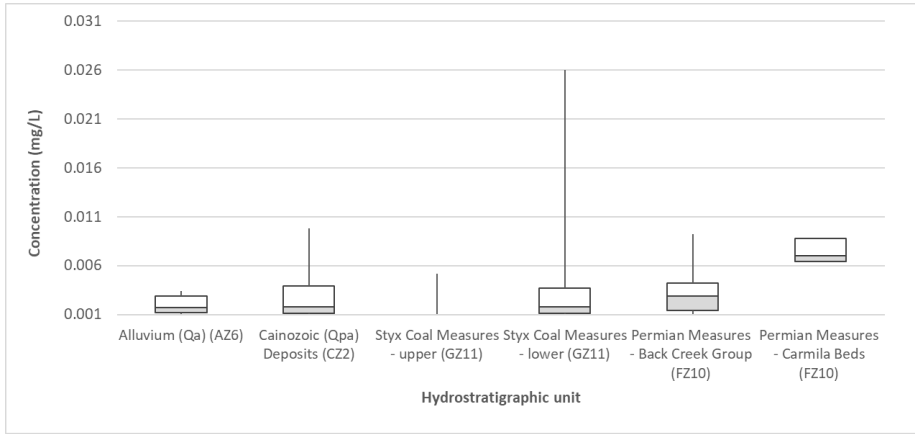


Figure 5-18. Summary of groups by hydrostratigraphic unit – dissolved copper

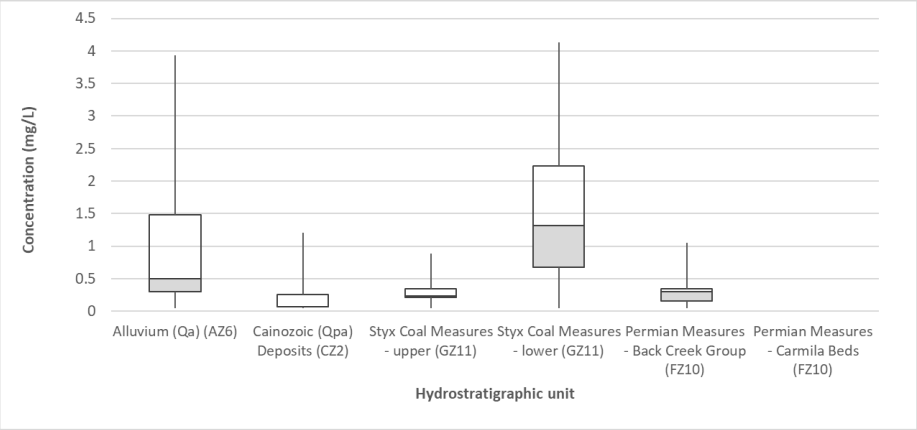


Figure 5-19. Summary of groups by hydrostratigraphic unit – dissolved iron

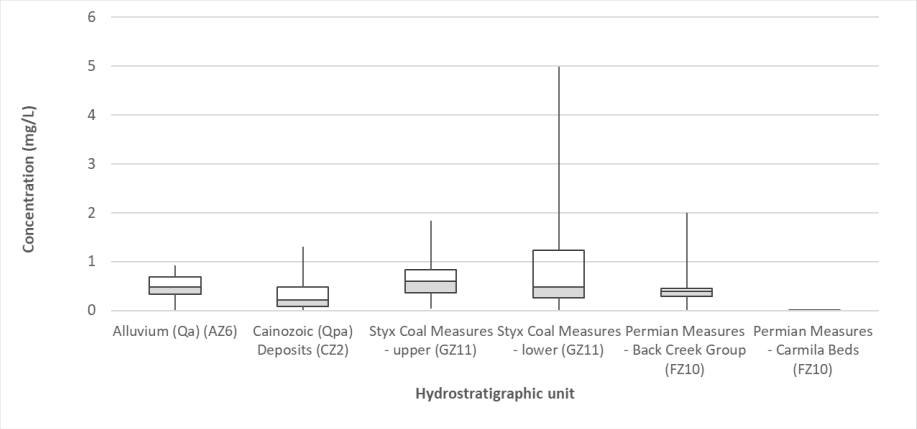


Figure 5-20. Summary of groups by hydrostratigraphic unit – dissolved manganese

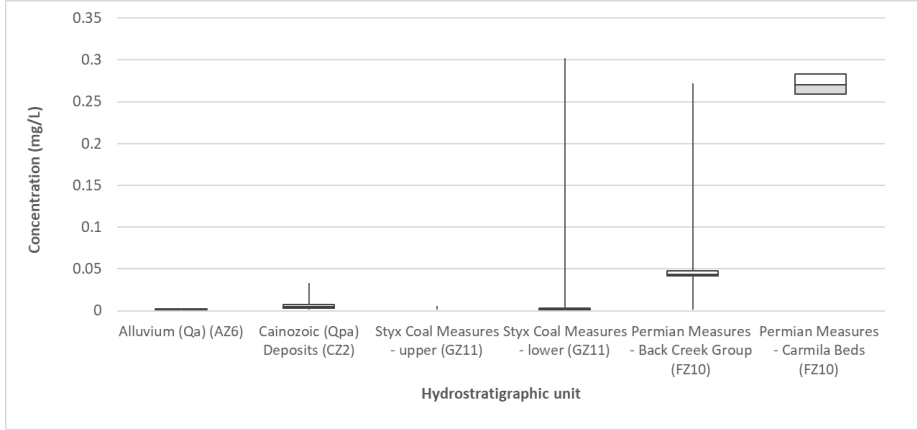


Figure 5-21. Summary of groups by hydrostratigraphic unit – dissolved molybdenum

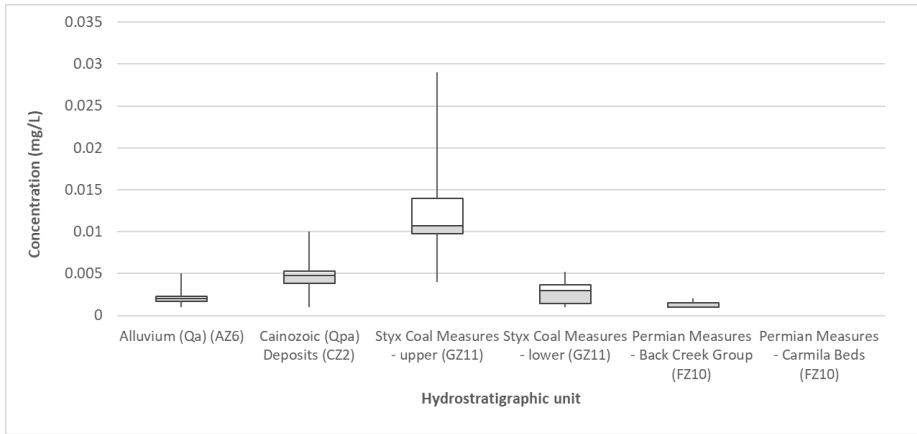


Figure 5-22. Summary of groups by hydrostratigraphic unit – dissolved uranium

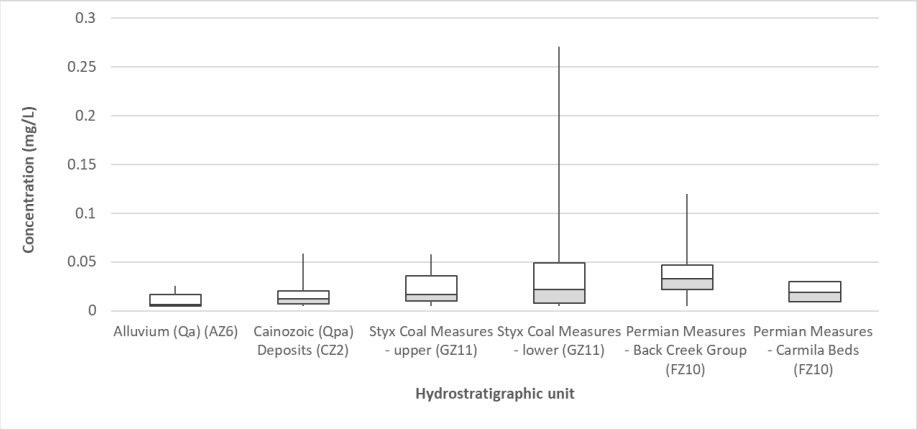


Figure 5-23. Summary of groups by hydrostratigraphic unit – dissolved zinc

6 Bore Census

A census of existing third-party groundwater bores within approximately a 10 km radius of the Project was conducted in 2011. This was repeated by CDM Smith in February 2017 covering the bores identified in the 2011 census, results from the GWDBQ and anecdotal information from landholders. The 2017 census plan included 27 bores, of which 20 could be visited and verified, four could not be accessed and three could not be found (expected to be abandoned/destroyed). An additional six bores were identified during the census, which are expected to be unregistered or location details in the GWDBQ inaccurate.

The GWDBQ was analysed again as part of the desktop data review, identifying an additional bore (RN187278).

The bores identified in the bore census are summarised in Attachment C, summarised as follows:

- A total of 171 bores identified
- 23 bores abandoned and/or destroyed (13%) and
- 19 bores identified as not in use (11%).

Table 6-1 presents statistics sourced from both the GWDBQ and the bore census' concerning the purpose of these bores.

Table 6-1: Bore census – bore purposes

Registered purpose	Count (%)
Water supply (mostly stock)	95 (55%)
Mineral exploration (incl. coal)	7 (4%)
Mine Monitoring	56 (33%)[1]
Water resources investigation	1 (1%)
Not specified	12 (7%)
Total	**171 (100%)**

Table notes

[1] These are the Project monitoring bores

The location of the identified bores is shown in Figure 6-1.

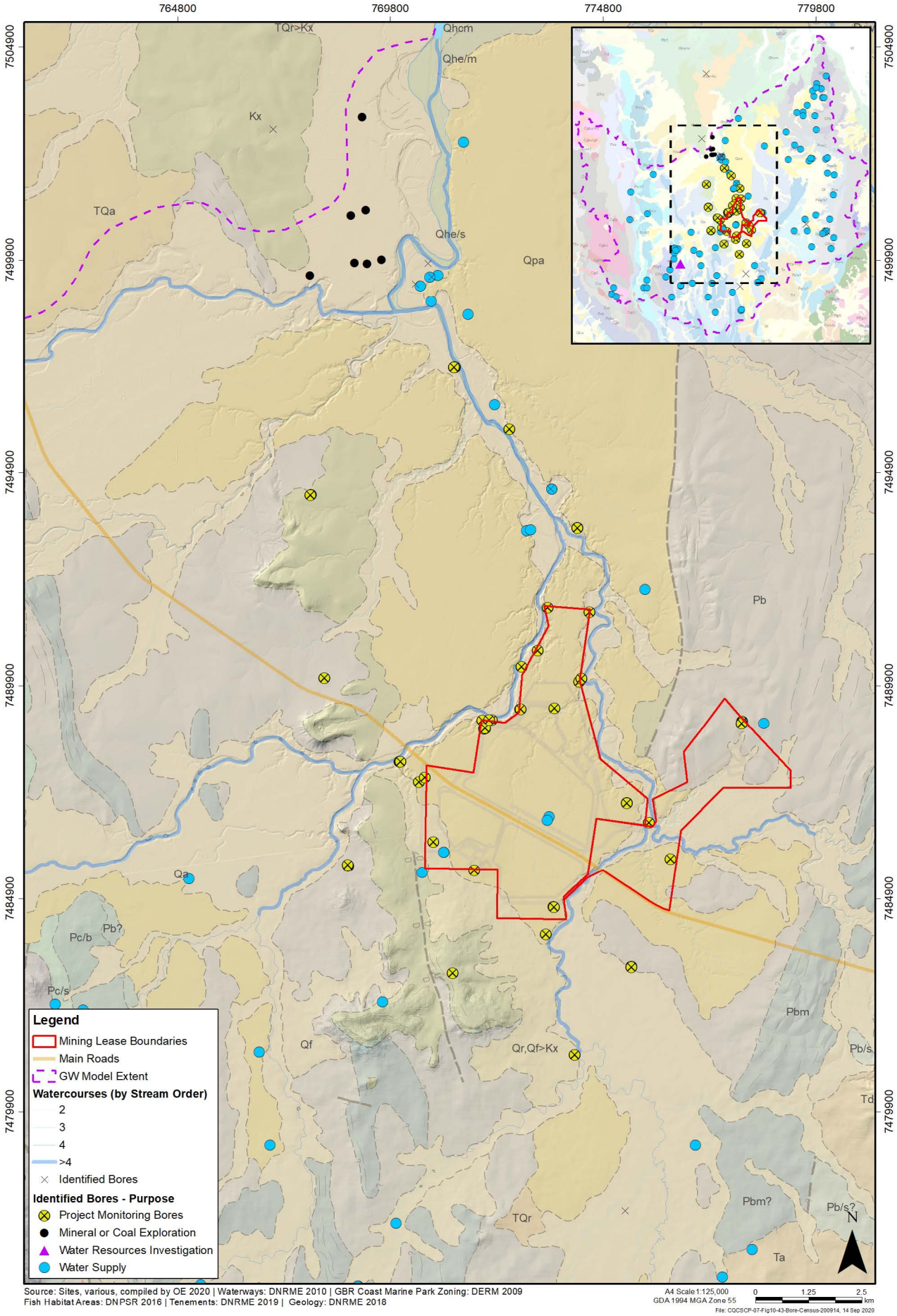


Figure 6-1. Bore census – location of identified bores

7 References

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Attachment A

Site Details

A1 – General Site Information

Table A1. Site Details

Site	Type	Alias	RN	Eastings	Northings	Elevation	Install Date	Diameter	Screened	Depth	Casing Height	Screened Stratigraphy	HSU*
BH01x	Third Party bore	-	-	773561	7494524	11	-	0.124	-	10.5	-	Qa	1
BH05x	Third Party bore	Riverside 2, BH5x	111417	770918	7499541	9	5-Apr-00	0.14	9.14 - 10.97	10.6	-	Qhe / Qa	1
BH06x	Third Party bore	-	-	770732	7499500	8	-	0.14	-	8.9	-	Qhe / Qa	1
BH07	Third Party bore	-	97562	765346	7475831	77	17-Oct-97	-	13.7 - 30.4	30.4	-	Pb	5
BH13	Third Party bore	Lorna Vale	91572	784427	7485608	81.9	25-Oct-92	0.14	18 - 24.5	30.8	-	Pb / Pbm	5
BH16	Third Party bore	-	67652	773592	7494520	9.67	28-Feb-90	0.147	9.2 - 9.5	9.1	-	Qa	1
BH29	Third Party bore	Nov 2011: (Yeats) Ne1,Neerim 1; Feb 17: (CDM Smith) BH32, (CDM Smith SEIS Table 10-73, 73) BH29	-	775322	7477562	55	-	0.14	-	9	-	Qa	1
BH30	Third Party bore	Nov 2011: (Yeats) Ne2, Neerim 2	-	774175	7475211	67	-	0.14	-	30	-	Regolith / Kx [o]	4
BH32	Third Party bore	Nov 2011: (Yeats) Ne3, Neerim 3; Feb 17: (CDM Smith field notes) BH34, (CDM Smith SEIS Table 10-72, 73) BH32	88892	774433	7470634	103	-	0.13	-	16.8	-	Regolith / Pb	5
WMP02	Project Standpipe	-	161686	773497	7491734	25	20-Dec-17	0.125	12 – 18	18.4	0.5	Qa / Qpa / Regolith	2

Site	Type	Alias	RN	Eastings	Northings	Elevation	Install Date	Diameter	Screened	Depth	Casing Height	Screened Stratigraphy	HSU*
WMP04	Project Standpipe	-	161691	772865.29	7489358.7	28.33	12-Nov-17	0.125	12 – 18	18.4	0.9	Qa / Qpa / Regolith	2
WMP04D	Project Standpipe	-	161685	772859	7489351	28.33	29-Sep-17	0.125	18.5 – 36.3	36.5	0.9	Qpa / Regolith / Kx[o]	3
WMP05	Project Standpipe	-	161687	774487.46	7491624.6	17.22	30-Sep-17	0.125	9 – 12	12.4	0.48	Qa	1
WMP06	Project Standpipe	-	187085	770020	7488120	33.98	3-Nov-17	0.125	12 – 18	18.4	0.58	Regolith / Kx[u]	4
WMP06D	Project Standpipe	-	-	770039	7488119	34.06	24-Apr-20	-	38 - 44	47	0.52	Kx [u]	3
WMP07	Project Standpipe	-	161694	771264	7483151	131	16-Oct-17	0.125	48 – 60	60	0.85	Kx [u]	4
WMP08	Project Standpipe	-	161700	774134	7481232	43.49	2-Nov-17	0.125	10 – 16	16	0.58	Qa / Qpa / Regolith	2
WMP08D	Project Standpipe	-	161698	774134	7481232	43.49	2-Nov-17	0.125	24 – 36	36	1	Kx [u]	4
WMP09	Project Standpipe	-	161693	773459	7484062	37.63	14-Oct-17	0.125	7.1 – 15	15.4	1	Qa / Qpa / Regolith	2
WMP10	Project Standpipe	-	161692	775878	7486688	29.26	13-Oct-17	0.125	12 – 18	18.4	1	Kx[o]	3
WMP10D	Project Standpipe	-	-	775877.52	7486688.4	29.27	30-Sep-17	-	-	226	1	Kx [o]	4
WMP11	Project Standpipe	-	161763	774194	7493610	18.75	18-Mar-18	0.125	18 – 24	24	1	Kx[o]	4
WMP11D	Project Standpipe	-	161762	774201	7493623	18.7	17-Mar-18	0.125	30 – 36	36	0.9	Kx[o]	4
WMP12	Project Standpipe	-	187086	773266	7490731	26.37	6-Nov-17	0.125	11 – 17	18	0.9	Qa / Qpa / Regolith	2

Site	Type	Alias	RN	Eastings	Northings	Elevation	Install Date	Diameter	Screened	Depth	Casing Height	Screened Stratigraphy	HSU*
WMP13	Project Standpipe	-	161730	772604	7495931	18.4	12-Jan-18	0.125	12.7 – 19.7	19.7	0.8	Qpa / Regolith / Kx [o]	3
WMP14	Project Standpipe	-	161764	770477	7487637	32.89	19-Mar-18	0.125	9 – 18	18	0.95	Regolith / Kx [o]	3
WMP15	Project Standpipe	-	161765	771774	7485564	43.25	20-Mar-18	0.125	9 - 21	21	1.2	Regolith / Kx [u] / Pb	2
WMP16	Project Standpipe	-	-	767930	7494387	41.91	20-Oct-18	0.05	25.5 – 31.5	31.5	0.65	Pb	5
WMP16D	Project Standpipe	-	-	767923	7494380	41.84	21-Oct-18	0.05	35.7 – 41.7	42	0.75	Pb	5
WMP17	Project Standpipe	-	161902	775465	7483308	42.83	3-Oct-18	0.05	9 - 12	12	0.77	Qa / Qpa / Regolith	2
WMP17D	Project Standpipe	-	161903	775470	7483286	42.83	3-Oct-18	0.05	21 - 24	24	0.53	Kx[o]	4
WMP18	Project Standpipe	-	187039	775366	7487144	30.54	13-Sep-18	0.05	9.2 - 12.2	12.2	0.56	Qa / Qpa / Regolith	2
WMP18D	Project Standpipe	-	187038	775358	7487152	30.62	12-Sep-18	0.05	18.5 - 23.5	23.5	0.44	Kx [o]	4
WMP19	Project Standpipe	-	187029	768808	7485676	41	6-Sep-18	0.05	13.1 - 16.1	16.1	0.64	Regolith / Pb	5
WMP19D	Project Standpipe	-	187030	768801	7485692	41	7-Sep-18	0.05	24.9 - 27.9	28	0.58	Pb	5
WMP20	Project Standpipe	-	-	768251	7490084	42.95	20-Oct-18	0.05	14.5 – 20.5	20.5	0.53	Regolith / Pb	5
WMP20D	Project Standpipe	-	-	768246	7490082	42.98	20-Oct-18	0.05	24 – 30	30	0.5	Pb	5
WMP21	Project Standpipe	-	187035	774294	7490072	23.79	10-Sep-18	0.05	6.9 - 9.9	9.9	0.66	Qa	1

Site	Type	Alias	RN	Eastings	Northings	Elevation	Install Date	Diameter	Screened	Depth	Casing Height	Screened Stratigraphy	HSU*
WMP21B	Project Standpipe	-	-	774294	7490072	27.99	17-Apr-20	-	86 - 92	95	-	Kx [o]	4
WMP21D	Project Standpipe	-	187034	774243	7490004	25.99	10-Sep-18	0.05	14 - 20	22	0.54	Regolith / Kx [o]	3
WMP22A	Project Standpipe	-	187053	772008	7488891	29.67	19-Oct-18	0.078	27 – 30	30	0.35	Kx [o]	4
WMP22B	Project Standpipe	-	187052	772011	7488896	29.74	19-Oct-18	0.1	50 – 56	56	0.3	Kx [Red Seam]	4
WMP22C	Project Standpipe	-	187051	772012	7488900	29.76	19-Oct-18	0.1	200 - 206	206	0.5	Pb	5
WMP23A	Project Standpipe	-	187050	773651	7484701	36.38	6-Oct-18	0.09	48.5 - 54.5	56.5	0.9	Kx [i] [Above Blue]	4
WMP23B	Project Standpipe	-	187049	773638	7484709	36.36	6-Oct-18	0.09	187 - 193	194	0.9	Pb / Pcs	6
WMP24	Project Standpipe	-	187037	771965	7489093	19.36	11-Sep-18	0.05	23.4 - 26.4	26.4	0.48	Kx [o]	4
WMP25	Project Standpipe	-	187031	770812	7486227	44.21	8-Sep-18	0.05	10.1 - 13.1	13.2	0.58	Qa / Qpa / Regolith	2
WMP26	Project Standpipe	-	187033	773655	7489372	27.56	9-Sep-18	0.05	11.5 - 20.5	20.5	0.52	Qa / Qpa / Regolith	2
WMP27	Project Standpipe	-	187032	770606	7487750	33.03	8-Sep-18	0.05	14.5 - 20.5	20.5	0.85	Regolith / Kx [o]	4
WMP28	Project Standpipe	-	187036	772192	7489099	21.91	11-Sep-18	0.05	8.9 - 11.9	12	0.58	Regolith / Kx [o]	4
WMP28B	Project Standpipe	-	-	772128	7489102	21.91	-	-	-	9	-	Qa	1
WMP29A	Project Standpipe	-	187061	771298	7497385	11.97	28-Oct-18	0.1	6.5 – 12.5	12.5	1	Qhe / Qa	1

Site	Type	Alias	RN	Eastings	Northings	Elevation	Install Date	Diameter	Screened	Depth	Casing Height	Screened Stratigraphy	HSU*
WMP29B	Project Standpipe	-	187060	771301	7497385	11.97	28-Oct-18	0.1	16 – 20	20	1	Qa / Qpa / Regolith	2
WMP29C	Project Standpipe	-	187059	771318	7497394	11.97	27-Oct-18	0.1	52 – 58	58	1	Kx [o]	4
WMP29D	Project Standpipe	-	187058	771317	7497387	11.97	1-Nov-18	0.1	115 – 121	121	1	Kx [i] [Above Blue]	4
WMP29E	Project Standpipe	-	187057	771312	7497397	11.97	31-Oct-18	0.1	222.5 – 228.5	228.5	1	Pb	5
WMP30A	Project Standpipe	-	187054	772028	7488896	29.79	19-Oct-18	0.05	27 – 30	30	0.9	Kx [o]	4
WMP30B	Project Standpipe	-	187055	772028	7488900	29.75	19-Oct-18	0.05	50 – 56	56	0.9	Kx [Red Seam]	4
WMP30C	Project Standpipe	-	187056	772029	7488905	29.72	19-Oct-18	0.05	200 – 206	206	0.8	Pb	5
WMP31	Project VWP	-	-	778070	7489063	50.49	15-Dec-19	-	50; 94; 103.5; 171	200	-	Pb	5
WMP31B	Project Standpipe	-	-	778074	7489051	50.24	4-Apr-20	-	33 - 42	45	-	Pb	5
WMP32	Project Standpipe	-	-	776384	7485834	32.31	7-Apr-20	-	57 - 63	66	-	Kx[o]	4
WMP33	Project Standpipe	-	-	772890.1	7490343.8	22.79	1-Apr-20	-	6 - 8	10	-	Qpa	2
WMP33B	Project Standpipe	-	-	772890.1	7490343.8	22.29	1-Apr-20	-	15 - 18	20	-	Kx[o]	3

Table notes:
* HSU – Hydrostratigraphic Unit, After HA (2020) and McNeil et al. (2018) as follows:
1 Cainozoic Deposits - Quaternary Alluvium (AZ6)
2 Cainozoic Deposits - Quaternary Pleistocene Alluvium / Regolith (CZ2)
3 Styx Coal Measures - Overburden (and Quaternary Alluvium [Lower] / Weathered Regolith / Underburden) (GZ11)
4 Styx Coal Measures - Overburden / Coal Seams / Interburden / Underburden (GZ11)

5 Permian Measures - Back Creek Group and/or Styx Coal Measures – Underburden (FZ10)
6 Permian Measures - Back Creek Group and/or Carmila Beds (FZ10)

A2 – Well Details / Logs

Attachment B

Summary Statistics

C1 – Tabulated Statistics

Table B1. Median Statistics and 20th to 80th percentile Default Guideline Values (DGVs) from McNeil et al. (2018)

	Parameters	SWL	EC µS/cm	TDS mg/L	pH pH units	Cl mg/L	SO_4^{2-} mg/L	F mg/L	Ca^{2+} mg/L	Mg^{2+} mg/L	Na^{+} mg/L	K^{+} mg/L	HCO_3 mg/L	Alk mg/L
	Stock Watering DGVs[2]			4000 (Beef)	6.0 – 8.5	-	1000	2	-	-	-	-	-	-
	Irrigation – STV/LTV [3]		Very low <650 Low 650 – 1300 Med 1300 - 2900 High 2900 – 5200 Very High 5200 – 8100 Extreme >8100	-	6.0 – 8.5	175 175 – 350 350 – 700 >700	-	2 / 1	-	-	115 115 – 230 230 – 460 >460	-	-	-
	ADWG Criteria[4]		-	- / 600	6.5 – 8.5	- / 250	- / 250	1.5 / -	-	-	- / 180	-	-	-
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]		440		6.5 - 8.0									
Cainozoic Deposits - Quaternary Alluvium (1)	DGV Ranges[1]		270 - 1025	-	6.2 - 8	41 - 201	5.4 - 47.4	0 - 0.2	4 - 68	5 - 22	32 - 133	-	17 - 279	21 - 232
	BH01x*	6.9	1140 Low	580	6.8	173	11	0.2	40	26	112		305	305
	BH05x	6.8	13100 Extreme	(inferred) **S D**	7.2									
	BH06x	6.6	1600 Medium	869 **D**	7.3	206	40	0.6	99.5	49	138		550	550
	BH16*	5.5	733 Low	440	6.6	127	20	0.2	38	24	79		178	178
	BH29	2.2	289 Very low	203	6.4	38	39	0.1	4	8	50		46	46
	BH37	7.3												
	WMP05*	8.4	2580 Medium	1600 **D**	7.3	499 **D**	104	1	24	35	484 **I D**		608	610
	WMP21	10.6												
	WMP29A	9.4	8170 Extreme	5390 **S D**	7	2530 **I D**	432 **D**		152	161	1380 **I D**		441	441
	*Combined**	6.9 ±0.9	1484 ±560 Medium	873 ±366	6.9 ±0.2	266 ±117	45 ±29.6	0.5 ±0.3	34 ±5	28 ±3	225 ±130		364 ±128	364 ±128
Cainozoic Deposits - Quaternary Pleistocene	DGV Ranges[1]		1007 - 9519		7.2 - 8.1	51 - 2817	7.3 - 172.8	0.1 - 0.43	32 - 99	15 - 200	33 - 1502		100 - 368	85.3 - 448.1
	WMP02*	18	17100 Extreme	11200 **S D**	6.7	5870 **D I**	544 **D**	0.7	287	529	2720 **D I**		430	430
	WMP04*	12.7	16100 Extreme	9590 **S D**	7.7	5630 **D I**	170	0.5	112	235	3250 **D I**		493	494
	WMP08*	11.1	27400 Extreme	18700 **S D**	6.8	9040 **D I**	1600 **S D**	0.5	378	595	5010 **D I**		703	703
	WMP09*	12.3	21800 Extreme	14800 **S D**	6.8	7330 **D I**	850 **D**	0.5	286	517	4000 **D I**		776	776
	WMP12*	17.8	7960 Very high	4290 **S D**	7	2500 **D I**	142	0.4	172	181	1190 **D I**		312	312

	Parameters	SWL	EC µS/cm	TDS mg/L	pH pH units	Cl mg/L	SO_4^{2-} mg/L	F mg/L	Ca^{2+} mg/L	Mg^{2+} mg/L	Na^{+} mg/L	K^{+} mg/L	HCO_3 mg/L	Alk mg/L
	Stock Watering DGVs[2]			4000 (Beef)	6.0 – 8.5	-	1000	2	-	-	-	-	-	-
	Irrigation – STV/LTV [3]		Very low <650 Low 650 – 1300 Med 1300 - 2900 High 2900 – 5200 Very High 5200 – 8100 Extreme >8100	-	6.0 – 8.5	175 175 – 350 350 – 700 >700	-	2 / 1	-	-	115 115 – 230 230 – 460 >460	-	-	-
	ADWG Criteria[4]		-	- / 600	6.5 – 8.5	- / 250	- / 250	1.5 / -	-	-	- / 180	-	-	-
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]		440		6.5 - 8.0									
	WMP15*	11.3	4510 High	2460 **D**	7	1190 **D I**	59	0.6	40	73	807 **D I**		473	475
	WMP17	12.7												
	WMP18	12.7												
	WMP25	10.9	782 Low	600	6.4	238	10		6	8	146		45	45
	WMP26	15.5	48800 Extreme	37300 **S D**	6.9	17100 **D I**	1670 **S D**		557	1330	10200 **D I**		887	887
	WMP29B	9.4	22000 Extreme	15700 **S D**	6.6	7860 **D I**	308 **D**		529	582	3630 **D I**		418	418
	*Combined**	13.9 ±1.3	15812 ±3470 Extreme	10,173 ±2514 **S D**	7 ±0.1	5260 ±1201 **D I**	560.8 ±241.1 **D**	0.5 ±0	212.5 ±51.6	355 ±89	2830 ±661		531 ±71	532 ±71
Styx Coal Measures - Overburden (and Quaternary Alluvium [Lower] / Weathered Regolith / Underburden (3)	DGV Ranges[1]		2005 - 10670		7.5 - 8.2	444 - 4500	69.8 - 896.1	0.1 - 0.8	38 - 248	72 - 433	283 - 1965		277 - 850	207.7 - 705.4
	WMP04D*	12.5	25600 Extreme	16700 **S D**	7	9080 **I D**	396 **D**	0.4	200	569	4740 **I D**		663	663
	WMP10*	11.2	18000 Extreme	11100 **S D**	7	5520 **I D**	760 **D**	0.4	63	246	3720 **I D**		1220	1220
	WMP13*	15.1	47800 Extreme	37200 **S D**	6.4 **D**	17600 **I D**	1700 **S D**	0.1	1340	1980	8020 **I D**		510	510
	WMP14*	18.8												
	WMP21D	15.3	41100 Extreme	30800 **S D**	6.8	14200 **I D**	1410 **S D**		364	1020	8140 **I D**		849	849
	*Combined**	14.4 ±1.7	30467 ±8940 Extreme	21667 ±7933 **S D**	6.8 ±0.2	10733 ±3584 **I D**	952 ±388.5	0.3 ±0.1	534.3 ±404.8	932 ±532	5493 ±1297 **I D**		798 ±216	798 ±216

	Parameters	SWL	EC µS/cm	TDS mg/L	pH pH units	Cl mg/L	SO_4^{2-} mg/L	F mg/L	Ca^{2+} mg/L	Mg^{2+} mg/L	Na^{+} mg/L	K^{+} mg/L	HCO_3 mg/L	Alk mg/L
	Stock Watering DGVs[2]			4000 (Beef)	6.0 – 8.5	-	1000	2	-	-	-	-	-	-
	Irrigation – STV/LTV [3]		Very low <650 Low 650 – 1300 Med 1300 - 2900 High 2900 – 5200 Very High 5200 – 8100 Extreme >8100	-	6.0 – 8.5	175 175 – 350 350 – 700 >700	-	2 / 1	-	-	115 115 – 230 230 – 460 >460	-	-	-
	ADWG Criteria[4]		-	- / 600	6.5 – 8.5	- / 250	- / 250	1.5 / -	-	-	- / 180	-	-	-
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]		440		6.5 - 8.0									
Styx Coal Measures - Overburden / Coal Seams / Interburden / Underburden (4)	BH30	4.6	13900 Extreme	11600 **S D**	6.5	5480 **S I D**	1050 **S D**	0.2	841	986	1630 **I D**		331	331
	BH35	2.2	6400		8									
	WMP06*	17.8	5500	3290 **D**	6.7	1380 **I D**	78	0.5	71	121	900 **I D**		796	796
	WMP07*	59.9												
	WMP08D*	10.7	14500 Extreme	8580 **S D**	7.4	5000 **I D**	207	0.7	104	111	2980 **I D**		272	272
	WMP11*	13.8	31400 Extreme	21900 **S D**	6.7	11400 **I D**	93.5	<0.1	544	724	6040 **I D**		494	494
	WMP11D*	13.4	31300 Extreme	21800 **S D**	6.7	11100 **I D**	181	0.1	536	670	5960 **I D**		524	524
	WMP17D	12.2	39800 Extreme	27400 **S D**	6.9	13600 **I D**	980 **D**		378	636	8440 **I D**		522	522
	WMP18D	15	30800 Extreme	21400 **S D**	6.9	10600 **I D**	660 **D**		166	632	6520 **I D**		890	890
	WMP21B	16.2												
	WMP22A	15.3	24400 Extreme	16200 **S D**	6.9	8220 **I D**	330 **D**		136	436	4440 **I D**		894	894
	WMP22B	15.4	34200 Extreme	23000 **S D**	7.4	12000 **I D**	157		140	488	7200 **I D**		776	797
	WMP23A	11.4	23800 Extreme	13400 **S D**	12.2 **S I D**	4830 **I D**	41		398	<1	3280 **I D**		<1	2400
	WMP24	5.1	23200 Extreme	14000 **S D**	7.2	7740 **I D**	350 **D**		108	257	4660 **I D**		930	944
	WMP27	21.2												
	WMP28	11.1	6340	3980 **D**	6.9	1840 **I D**	51.5		125	156	984 **I D**		542	542
	WMP29C	22.7	19800 Extreme	12000 **S D**	11.4 **S I D**	6950 **I D**	130		207	<1	4230 **I D**		<1	263
	WMP29D	20.6	22000 Extreme	14200 **S D**	10.2 **S I D**	7900 **I D**	26.5		215	12	4120 **I D**		57	99
	WMP30A	15.5												

	Parameters	SWL	EC µS/cm	TDS mg/L	pH pH units	Cl mg/L	SO_4^{2-} mg/L	F mg/L	Ca^{2+} mg/L	Mg^{2+} mg/L	Na^{+} mg/L	K^{+} mg/L	HCO_3 mg/L	Alk mg/L
	Stock Watering DGVs[2]			4000 (Beef)	6.0 – 8.5	-	1000	2	-	-	-	-	-	-
	Irrigation – STV/LTV [3]		Very low <650 Low 650 – 1300 Med 1300 - 2900 High 2900 – 5200 Very High 5200 – 8100 Extreme >8100	-	6.0 – 8.5	175 175 – 350 350 – 700 >700	-	2 / 1	-	-	115 115 – 230 230 – 460 >460	-	-	-
	ADWG Criteria[4]		-	- / 600	6.5 – 8.5	- / 250	- / 250	1.5 / -	-	-	- / 180	-	-	-
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]		440		6.5 - 8.0									
	WMP30B	15.3												
	*Combined**	*23.1 ±9.3*	*20675 ±6431 Extreme*	*13893 ±4720* **S D**	*6.9 ±0.2*	*7220 ±2442* **I D**	*139.9 ±31.9*	*0.4 (0.1 - 0.6)*	*313.8 ±130.8*	*407 ±168*	*3970 ±1247* **I D**		*522 ±107*	*522 ±107*
Permian Measures - Back Creek Group and/or Styx Coal Measures – Underburden (5)[2]	DGV Ranges[1]		1000 - 3191		7.5 - 8.2	129 - 757	29.2 - 107.2	0.22 - 0.6	52 - 138	37 - 128	102 - 360		351 - 615	290 - 510
	BH13*	12.8	5560 *Very high*	3700 **D**	6.7	1600 **I D**	103	0.4	204	330	538 **I D**		494	494
	BH32*	5	3890 *High*	2860 **D**	6.9	1110 **I D**	296 **D**	0.7	274	182	443 **D**		524	524
	WMP16*	22.5												
	WMP16D*	25	8360 *Extreme*	5000 **S D**	7.4	2760 **I D**	13		92	127	1500 **I D**		430	430
	WMP19*	13.8												
	WMP19D*	13.9	1880 *Medium*	1220 **D**	6.8	221	217		141	57	184 **D**		517	517
	WMP20*	19.7												
	WMP20D*	19.6	1970 *Medium*	1240 **D**	7.2	204	52		30	22	404 **D**		762	762
	WMP22C*	10.6	4860 *High*	2660 **D**	10 **S I D**	1400 **I D**	3.5		5.5	2	999 **I D**		49	271
	WMP29E*	7.7	12900 *Extreme*	5130 **S D**	12.5 **S I D**	1600 **I D**	48		87	<1	1850 **I D**		<1	1950
	WMP30C*	12.2												
	*Combined**	*14.8 ±1.9*	*5631 ±1475 Very high*	*3116 ±604* **D**	*8.2 ±0.8*	*1271 ±335* **I D**	*104.6 ±41.9*	*0.6 ±0.2*	*119.1 ±36*	*103 ±46*	*845 ±237*	*23.4 ±17.3*	*397 ±104*	*707 ±214*

	Parameters	SWL	EC µS/cm	TDS mg/L	pH pH units	Cl mg/L	SO_4^{2-} mg/L	F mg/L	Ca^{2+} mg/L	Mg^{2+} mg/L	Na^{+} mg/L	K^{+} mg/L	HCO_3 mg/L	Alk mg/L
	Stock Watering DGVs[2]			4000 (Beef)	6.0 – 8.5	-	1000	2	-	-	-	-	-	-
	Irrigation – STV/LTV [3]		Very low <650 Low 650 – 1300 Med 1300 - 2900 High 2900 – 5200 Very High 5200 – 8100 Extreme >8100	-	6.0 – 8.5	175 175 – 350 350 – 700 >700	-	2 / 1	-	-	115 115 – 230 230 – 460 >460	-	-	-
	ADWG Criteria[4]		-	- / 600	6.5 – 8.5	- / 250	- / 250	1.5 / -	-	-	- / 180	-	-	-
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]		440		6.5 - 8.0									
Permian Measures - Back Creek Group and/or Carmila Beds (6)	WMP23B	0.9	15800 *Extreme*	6580 **S D**	12.4 **S I D**	2560 **I D**	13		160	14	2340 **I D**		<1	1740

Table B1. (cont'd)

Parameters		NH_4-N	NO_3-N	NO_x-N	NO_2-N	FRP-P	TN-N	TP-P	Al	As	Ba	Cd	Cr
Stock Watering DGVs[2]		-	90 - 338	-	9	-	-	-	5	0.5	-	0.01	1
Irrigation – STV/LTV [3]		-	-	-	-	-	25-125 / 5	0.8 – 12 / 0.05	20 / 5	2 / 0.1	-	0.05 / 0.01	1 / 0.1
ADWG Criteria[4]		- / 0.5	50 / -	-	3 / -	-	-	-	- / 0.2	0.01 / -	2 / -	0.002 / -	0.05 / -
Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]		0.02		0.06			0.5	0.05	0.055			0.0002	0.001
Cainozoic Deposits - Quaternary Alluvium (1)	DGV Ranges[1]		0 - 2.6				0 - 0.565	0 - 0					
	BH01x*	21.5 **D**	0.03	0.03	<0.01	0.35	22.4 **I**	2.26 **I**	<0.01	0.011	0.122	<0.0001	<0.001
	BH05x												
	BH06x	31 **D**	0.01	0.01	0.02	0.64	36.5 **I**	3.68 **I**	<0.01	0.004	0.07	<0.0001	<0.001
	BH16*	0.15	0.02	0.02	<0.01	0.01	0.4	0.1 **I**	<0.01	0.002	0.076	<0.0001	<0.001
	BH29	0.04	0.25	0.25	<0.01	0.04	0.4	0.09 **I**	<0.01	<0.001	0.008	<0.0001	<0.001
	BH37												
	WMP05*	0.08	0.04	0.04	<0.01	0.05	1.5	0.89 **I**	0.03	0.004	0.191	<0.0001	<0.001
	WMP21												
	WMP29A	1.97 **D**	0.05	0.05	<0.01	0.01				0.005		<0.0001	<0.001
	*Combined**	7.243 ±7.128 **D**	0.03 ±0.006	0.03 ±0.006	<0.01	0.137 ±0.107	8.1 ±7.157 **I**	1.083 ±0.631 **I**	<0.017 ±0.008	0.006 ±0.003	0.13 ±0.033	<0.0001	<0.001
Cainozoic Deposits - Quaternary Pleistocene Alluvium / Regolith (2)	DGV Ranges[1]		0 - 2.55				0 - 0.554	0.041 - 0.082					
	WMP02*	0.04	2.8	2.8	<0.01	0.12	4.15	1.04 **I**	<0.01	0.002	0.31	<0.0001	<0.001
	WMP04*	0.065	0.125	0.125	<0.01	0.02	1	0.25 **I**	0.01	0.003	0.254	<0.0001	0.006
	WMP08*	0.08	<0.01	<0.01	<0.01	<0.01	0.8	0.58 **I**	<0.01	0.002	0.197	<0.0001	<0.001
	WMP09*	0.04	0.03	0.03	<0.01	0.04	0.389	0.17 **I**	<0.01	0.002	0.095	<0.0001	<0.001
	WMP12*	0.25	0.62	0.82	0.06	0.04	19 **I**	8.68 **I**	0.02	0.004	0.338	<0.0001	0.001
	WMP15*	0.1	<0.01	<0.01	<0.01	0.01	0.5	0.09 **I**	0.02	0.002	0.122	<0.0001	<0.001
	WMP17												
	WMP18												
	WMP25	0.025	0.01	0.01	<0.01	<0.01				0.002		<0.0001	<0.001

	Parameters	NH_4-N	NO_3-N	NO_x-N	NO_2-N	FRP-P	TN-N	TP-P	Al	As	Ba	Cd	Cr
	Stock Watering DGVs[2]	-	90 - 338	-	9	-	-	-	5	0.5	-	0.01	1
	Irrigation – STV/LTV [3]	-	-	-	-	-	25-125 / 5	0.8 – 12 / 0.05	20 / 5	2 / 0.1	-	0.05 / 0.01	1 / 0.1
	ADWG Criteria[4]	- / 0.5	50 / -	-	3 / -	-	-	-	- / 0.2	0.01 / -	2 / -	0.002 / -	0.05 / -
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]	0.02		0.06			0.5	0.05	0.055			0.0002	0.001
	WMP26	0.16	0.56	0.56	<0.01	0.03	3.1	0.89 I	0.12	<0.005		<0.0005	<0.005
	WMP29B	2.3	<0.01	<0.01	<0.01	<0.015				0.026		<0.0001	<0.001
	*Combined**	0.096 ±0.032	0.796 (0.145 - 1.412)	0.631 (0.176 - 1.085)	<0.195 ±0.154	0.039 (0.02 - 0.057)	4.307 ±2.994	1.802 ±1.383 I	0.008 ±0.004	0.003 ±0	0.219 ±0.04	<0.0001	<0.002 ±0.002
Styx Coal Measures - Overburden (and Quaternary Alluvium [Lower] / Weathered Regolith / Underburden (3)	DGV Ranges[1]		0.05 - 7.47				0.011 - 1.624	0 - 0.082					
	WMP04D*	0.05	0.335	0.365	0.02	<0.01	1	0.09 I	<0.01	0.001	0.12	<0.0001	<0.001
	WMP10*	0.08	<0.01	<0.01	<0.01	0.01	1.6	1.18 I	<0.01	0.002	0.142	<0.0001	<0.001
	WMP13*	0.2	<0.01	<0.01	<0.01	<0.01	0.612	0.125 I	<0.05	<0.005	0.171	<0.0005	<0.005
	WMP14*												
	WMP21D	0.15	1.59	1.62	0.02	<0.01	2.4	0.69 I	<0.05	0.007		<0.0005	<0.005
	*Combined**	*0.11 ±0.046*	*<0.118 ±0.109*	*<0.128 ±0.119*	*<0.013 ±0.004*	*<0.01*	*1.071 ±0.287*	*0.465 ±0.358 I*	*<0.023 ±0.014*	*<0.003 ±0.002*	*0.144 ±0.015*	*<0.00023 ±0.00014*	*<0.002 ±0.002*
Styx Coal Measures - Overburden / Coal Seams /	BH30	0.85	<0.01	<0.01	<0.01	<0.01	0.85	0.14 I	<0.01	0.003	0.164	<0.0001	<0.001
	BH35												
	WMP06*	0.15	<0.01	<0.01	<0.01	<0.01	2	0.69 I	<0.01	0.014	0.278	<0.0001	<0.001
	WMP07*												
	WMP08D*	0.83 D	<0.01	<0.01	<0.01	<0.01	1	0.055 I	0.01	0.002	0.118	<0.0001	<0.001
	WMP11*	1.23 D	<0.01	<0.01	<0.01	<0.01	1.5	0.09 I	<0.01	0.003	4.6 D^H	<0.0005	<0.005

	Parameters	NH_4-N	NO_3-N	NO_x-N	NO_2-N	FRP-P	TN-N	TP-P	Al	As	Ba	Cd	Cr
	Stock Watering DGVs[2]	-	90 - 338	-	9	-	-	-	5	0.5	-	0.01	1
	Irrigation – STV/LTV [3]	-	-	-	-	-	25-125 / 5	0.8 – 12 / 0.05	20 / 5	2 / 0.1	-	0.05 / 0.01	1 / 0.1
	ADWG Criteria[4]	- / 0.5	50 / -	-	3 / -	-	-	-	- / 0.2	0.01 / -	2 / -	0.002 / -	0.05 / -
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]	0.02		0.06			0.5	0.05	0.055			0.0002	0.001
	WMP11D*	2.44 D	<0.01	<0.01	<0.01	<0.01	2.6	0.08 I	0.01	0.006	2.38 D[H]	<0.0005	<0.005
	WMP17D	3.63 D	0.03	0.05	0.02	<0.01				<0.005		<0.0005	<0.005
	WMP18D	0.655 D	0.03	0.03	<0.01	<0.01				<0.005		<0.0005	<0.005
	WMP21B												
	WMP22A	1.04 D	<0.01	<0.01	<0.01	<0.01	1.65	0.175 I	<0.01	0.004		<0.0001	<0.001
	WMP22B	4.73 D	<0.01	<0.01	<0.01	0.12	6.65 I	0.325 I	<0.05	<0.005		<0.0005	<0.005
	WMP23A	2.72 D	0.02	0.02	0.01	0.01	4.1	0.1 I	0.045	0.002		<0.0005	0.325 D[H]
	WMP24	2.22 D	0.02	0.02	<0.01	0.01	3.1	0.12 I	0.01	<0.001		<0.0001	<0.001
	WMP27												
	WMP28	0.055	0.02	0.02	<0.01	<0.01				0.004		<0.0001	0.001
	WMP29C	11.2 D	0.02	0.02	<0.01	<0.01	13.5 I	0.23 I	1.64 D	0.003		<0.0001	<0.001
	WMP29D	6.32 D	0.07	0.07	<0.01	0.035 - 0.04	7.9 I	0.28 I	0.06	0.007		<0.0001	<0.001
	WMP30A												
	WMP30B												
	*Combined**	1.16 ±0.48 D	<0.01	<0.01	<0.01	<0.01	1.775 ±0.342	0.229 ±0.154 I	<0.01	0.006 ±0.003	1.844 ±1.053	<0.0003 ±0.00013	<0.003 ±0.002
Permian Measures - Back Creek Group and/or Styx Coal Measures –		DGV Ranges[1]	0.5 - 16.2				0.109 - 3.522	0 - 0					
	BH13	0.47	0.04	0.04	<0.01	<0.01	0.8	0.08 I	<0.01	0.002	0.112	<0.0001	<0.001
	BH32	1.5 D	<0.01	<0.01	<0.01	0.1	1.9	0.13 I	<0.01	<0.001	0.037	<0.0001	<0.001
	WMP16												
	WMP16D	1.28 D	<0.01	<0.01	<0.01	<0.01	2.2	0.09 I	0.02	<0.001		<0.0001	<0.001
	WMP19												
	WMP19D	0.18	<0.01	<0.01	<0.01	<0.01	0.55	0.05 I	<0.01	0.006		<0.0001	0.001

	Parameters	NH_4-N	NO_3-N	NO_x-N	NO_2-N	FRP-P	TN-N	TP-P	Al	As	Ba	Cd	Cr
	Stock Watering DGVs[2]	-	90 - 338	-	9	-	-	-	5	0.5	-	0.01	1
	Irrigation – STV/LTV [3]	-	-	-	-	-	25-125 / 5	0.8 – 12 / 0.05	20 / 5	2 / 0.1	-	0.05 / 0.01	1 / 0.1
	ADWG Criteria[4]	- / 0.5	50 / -	-	3 / -	-	-	-	- / 0.2	0.01 / -	2 / -	0.002 / -	0.05 / -
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]	0.02		0.06			0.5	0.05	0.055			0.0002	0.001
	WMP20												
	WMP20D	0.24	0.03	0.03	<0.01	0.01	0.6	0.07 **I**	<0.01	0.006		0.0001	<0.001
	WMP22C	1.44 **D**	0.012	0.012	<0.01	0.12				0.002		<0.0001	0.001
	WMP29E	8.6 **D**	0.02	0.02	<0.01	<0.01	11.2 **I**	0.02	2.33	0.006		0.0001	0.078 **D^H**
	WMP30C												
	*Combined**	*1.959 ±1.127*	*0.017 (0.009 - 0.024)*	*0.017 (0.009 - 0.024)*	*<0.01*	*0.037 (0.013 - 0.058)*	*2.875 ±1.689*	*0.073 ±0.015*	*0.395 (0.004 - 0.784)*	*0.003 ±0.001*	*0.075 ±0.038*	*<0.0001 ±0.00001*	*<0.012 ±0.012*
Permian Measures - Back Creek Group and/or Carmila Beds (6)	WMP23B	6.15 **D**	0.02	0.02	<0.01	<0.01	7.8 **I**	<0.05	0.77 **D**	0.003		<0.0001	0.085 **D^H**

Table B1. (cont'd)

	Parameters	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
	Stock Watering DGVs[2]	1	1	-	0.1	-	0.002	0.15	1	0.02	-	0.2	-	20
	Irrigation – STV/LTV [3]	0.1 / 0.05	5 / 0.2	10 / 0.2	5 / 2	10 / 0.2	0.002	0.05 / 0.01	2 / 0.2	0.05 / 0.02	-	0.1 / 0.01	0.5 / 0.1	5 / 2
	ADWG Criteria[4]	-	2 / 1	- / 0.3	0.01 / -	0.5 / 0.1	0.001 / -	0.05 / -	0.02 / -	0.01 / -	0.1 / -	0.017 / -	-	- / 3
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]	0.0014[LR]	0.0014	0.3[LR]	0.0034	1.9	0.00006	0.034[LR]	0.011	0.005	0.00005	0.00005[LR]	0.006[LR]	0.008
Cainozoic Deposits - Quaternary Alluvium (1)	DGV Ranges[1]		0 - 0.015	0 - 0.099		0 - 0.19								0.005 - 0.06
	BH01x*	<0.001	0.001	1.27 **I D**	<0.001	0.586 **D^H I**	<0.0001	<0.001	0.002	<0.01	<0.001	<0.001	<0.01	<0.005
	BH05x													
	BH06x	<0.001	0.001	0.41 **I D**	<0.001	0.126 **D**	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	<0.005
	BH16*	0.002	0.002	0.15	<0.001	0.731 **D^H I**	<0.0001	<0.001	0.001	<0.01	<0.001	<0.001	<0.01	0.007
	BH29	<0.001	0.001	<0.05	<0.001	0.006	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.005
	BH37													
	WMP05*	<0.001	0.002	0.07	<0.001	0.126 **D**	<0.0001	0.003	<0.001	<0.01	<0.001	0.004	<0.01	0.010
	WMP21													
	WMP29A		0.002		<0.001		<0.0001		0.004					0.024
	*Combined**	<0.0013 ±0.0004	0.0017 ±0.0003	0.5 ±0.39 **I D**	<0.001	0.481 ±0.182 **I D**	<0.0001	<0.0017 ±0.0008	0.0012 (0.0004 - 0.0016)	<0.01	<0.001	<0.002 ±0.0011	<0.01	0.0064 (0.0026 - 0.0087)
Cainozoic Deposits - Quaternary Pleistocene Alluvium / Regolith (2)	DGV Ranges[1]		-	0.009 - 0.074		0 - 0.075								-
	WMP02*	<0.001	<0.001	<0.05	<0.001	0.022	<0.0001	<0.001	<0.001	<0.01	<0.001	0.006	<0.01	<0.005
	WMP04*	<0.001	0.002	<0.05	<0.001	0.029	<0.0001	0.020	<0.001	<0.01	<0.001	0.002	<0.01	<0.005
	WMP08*	0.003	0.002	<0.05	<0.001	0.616 **D^H I**	<0.0001	0.002	0.001	<0.01	<0.001	0.009	<0.01	0.014
	WMP09*	0.003	0.001	<0.05	<0.001	0.351 **I D**	<0.0001	<0.001	0.002	<0.01	<0.001	0.009	<0.01	0.024
	WMP12*	<0.001	0.003	<0.05	<0.001	0.122 **D**	<0.0001	0.004	0.001	<0.01	<0.001	0.002	0.01	<0.005
	WMP15*	<0.001	0.002	0.19	<0.001	0.119 **D**	<0.0001	0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.028
	WMP17													

	Parameters	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
	Stock Watering DGVs[2]	1	1	-	0.1	-	0.002	0.15	1	0.02	-	0.2	-	20
	Irrigation – STV/LTV [3]	0.1 / 0.05	5 / 0.2	10 / 0.2	5 / 2	10 / 0.2	0.002	0.05 / 0.01	2 / 0.2	0.05 / 0.02	-	0.1 / 0.01	0.5 / 0.1	5 / 2
	ADWG Criteria[4]	-	2 / 1	- / 0.3	0.01 / -	0.5 / 0.1	0.001 / -	0.05 / -	0.02 / -	0.01 / -	0.1 / -	0.017 / -	-	- / 3
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]	0.0014[LR]	0.0014	0.3[LR]	0.0034	1.9	0.00006	0.034[LR]	0.011	0.005	0.00005	0.00005[LR]	0.006[LR]	0.008
	WMP18													
	WMP25		0.0025		<0.001		<0.0001		0.0055					0.021
	WMP26		<0.005	0.11	<0.005	0.451 I D	<0.0001	<0.005	<0.005	<0.05			<0.05	<0.025
	WMP29B		0.002		<0.001		<0.0001		0.007					0.04
	*Combined**	0.0014 (0.0004 - 0.0021)	0.0018 (0.0013 - 0.0021)	<0.07 ±0.03	<0.001	0.21 ±0.095	<0.0001	0.0048 (0.0014 - 0.0081)	0.001 (0.0004 - 0.0014)	<0.01	<0.001	0.0048 (0.0031 - 0.0063)	<0.01	0.0122 (0.0056 - 0.0176)
Styx Coal Measures - Overburden (and Quaternary Alluvium [Lower] / Weathered Regolith / Underburden (3)	DGV Ranges[1]		0 - 0.025	0.01 - 0.197		0 - 0.04								0.01 - 0.161
	WMP04D*	0.001	<0.001	<0.05	<0.001	0.051	<0.0001	<0.001	<0.001	<0.01	<0.001	0.005	<0.01	0.0215
	WMP10*	0.002	0.001	<0.05	<0.001	0.329 I D	<0.0001	0.002	<0.001	<0.01	<0.001	0.007	<0.01	<0.005
	WMP13*	0.006	<0.005	0.58 I D	<0.005	1.42 I D[H]	<0.0001	<0.005	<0.005	<0.05	<0.005	0.02	<0.05	0.0255
	WMP14*													
	WMP21D		<0.005	0.11	<0.005	0.496 I D	<0.0001	<0.005	<0.005	<0.05			<0.05	<0.025
	*Combined**	0.003 ±0.0015	<0.002 ±0.0014	<0.23 ±0.19 I D	≤0.004	0.60 ±0.42 I D	<0.0001	<0.003 ±0.0013	<0.0023 ±0.0014	<0.023 ±0.014	<0.002 ±0.0014	0.011 ±0.005	<0.023 ±0.014	0.017 (0.008 - 0.024)
Styx Coal Measures - Overburden / Coal	BH30	0.001	<0.001	3.85 I D	<0.001	3.28 I D[H]	<0.0001	<0.001	0.002	<0.01	<0.001	0.0015	<0.01	<0.005
	BH35													
	WMP06*	0.003	0.003	0.4 I D	<0.001	0.696 I D[H]	<0.0001	0.003	<0.001	<0.01	<0.001	0.004	<0.01	0.006
	WMP07*													

	Parameters	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
	Stock Watering DGVs[2]	1	1	-	0.1	-	0.002	0.15	1	0.02	-	0.2	-	20
	Irrigation – STV/LTV [3]	0.1 / 0.05	5 / 0.2	10 / 0.2	5 / 2	10 / 0.2	0.002	0.05 / 0.01	2 / 0.2	0.05 / 0.02	-	0.1 / 0.01	0.5 / 0.1	5 / 2
	ADWG Criteria[4]	-	2 / 1	- / 0.3	0.01 / -	0.5 / 0.1	0.001 / -	0.05 / -	0.02 / -	0.01 / -	0.1 / -	0.017 / -	-	- / 3
	Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]	0.0014[LR]	0.0014	0.3[LR]	0.0034	1.9	0.00006	0.034[LR]	0.011	0.005	0.00005	0.00005[LR]	0.006[LR]	0.008
	WMP08D*	<0.001	0.001	0.27 **I**	<0.001	0.178 **I D**	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.013
	WMP11*	0.0045	0.0012	2.56 **I D**	<0.005	0.8 **I D**[H]	<0.0001	0.001	0.001	<0.01	<0.001	0.002	<0.01	0.0455
	WMP11D*	0.0035	0.002	2.01 **I D**	<0.005	0.242 **I D**	<0.0001	0.0022	0.0017	<0.01	<0.001	0.0031	<0.01	0.023
	WMP17D		<0.005		<0.005		<0.0001		<0.005					<0.025
	WMP18D		0.01 - 0.013		<0.005		<0.0001		<0.005					0.036
	WMP21B													
	WMP22A		<0.001	1.5 **I D**	<0.001	0.576 **I D**[H]	<0.0001	0.002	0.0025	<0.01			<0.01	0.0195
	WMP22B		<0.005	<0.05	<0.005	0.236 **I D**[H]	<0.0001	<0.005	<0.005	<0.05			<0.05	<0.025
	WMP23A		0.006	0.16	<0.005	3.05 **I D**[H]	<0.0001	0.088 **I D**[H]	0.002	<0.05			<0.05	0.093
	WMP24		0.001	0.29 **I**	<0.001	0.096	<0.0001	<0.001	0.001	<0.01			<0.01	0.006
	WMP27													
	WMP28		0.001		<0.001		<0.0001		0.0025					0.017
	WMP29C		0.002	0.05	<0.001	0.001	<0.0001	0.247 **I D**[H]	0.012	<0.01			0.01	<0.005
	WMP29D		0.001	<0.05	<0.001	0.035	<0.0001	0.066 **I D**[H]	0.002	<0.01			<0.01	0.104
	WMP30A													
	WMP30B													
	*Combined**	0.0029 (0.0018 - 0.0037)	0.0018 ±0.0005	1.31 ±0.58 **I D**	<0.003 ±0.002	0.479 ±0.157	<0.0001	0.0017 (0.0008 - 0.0023)	0.001 (0.0003 - 0.0014)	<0.01	<0.001	0.003 ±0.0006	<0.01	0.0219 ±0.0086
Permian Measures - Back Creek Group	DGV Ranges[1]		0.01 - 0.05	0 - 0.03		0 - 0.02								0.01 - 0.11
	BH13	0.002	<0.001	0.86 **I D**	<0.001	1.77 **I D**[H]	<0.0001	0.002	0.002	<0.01	<0.001	0.002	<0.01	<0.005
	BH32	<0.001	<0.001	<0.05	<0.001	0.348 **I D**[H]	<0.0001	<0.001	<0.001	<0.01	<0.001	0.001	<0.01	<0.005
	WMP16													

Parameters		Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
Stock Watering DGVs[2]		1	1	-	0.1	-	0.002	0.15	1	0.02	-	0.2	-	20
Irrigation – STV/LTV [3]		0.1 / 0.05	5 / 0.2	10 / 0.2	5 / 2	10 / 0.2	0.002	0.05 / 0.01	2 / 0.2	0.05 / 0.02	-	0.1 / 0.01	0.5 / 0.1	5 / 2
ADWG Criteria[4]		-	2 / 1	- / 0.3	0.01 / -	0.5 / 0.1	0.001 / -	0.05 / -	0.02 / -	0.01 / -	0.1 / -	0.017 / -	-	- / 3
Aquatic Ecosystem Surface Water DGV (EHP 2014)[5]		0.0014[LR]	0.0014	0.3[LR]	0.0034	1.9	0.00006	0.034[LR]	0.011	0.005	0.00005	0.00005[LR]	0.006[LR]	0.008
	WMP16D		0.002	0.05	<0.001	0.134 **I D**[H]	<0.0001	0.001	<0.001	<0.01			<0.01	0.067
	WMP19													
	WMP19D		0.002	0.78 **I D**	<0.001	0.064	<0.0001	<0.001	0.0014	<0.01			<0.01	0.04
	WMP20													
	WMP20D		0.007	<0.05	<0.001	0.071	<0.0001	0.001	0.001	<0.01			<0.01	0.083
	WMP22C		0.001		<0.001		<0.0001		<0.001					0.013
	WMP29E		0.007	<0.05	0.001	<0.001	<0.0001	0.258	0.004	<0.01			0.02	0.023
	WMP30C													
	*Combined**	*<0.0015 ±0.0006*	*0.0029 (0.0016 - 0.004)*	*0.3 (0.11 - 0.47)*	*<0.001*	*0.398 ±0.279*	*<0.0001*	*0.0439 (0.0008 - 0.0868)*	*0.0014 (0.0006 - 0.002)*	*<0.01*	*<0.001*	*0.0015 ±0.0005*	*<0.012 ±0.003*	*0.033 (0.02 - 0.0454)*
Permian Measures - Back Creek Group and/or Carmila Beds (6)	WMP23B		0.007	<0.05	0.001	<0.001	<0.0001	0.27 **I S D**[H]	0.002	<0.01			<0.01	0.019

Table notes:
Red highlighted values are above the DGV range (or for pH, above or below)
Refer below Table B2 for combined table notes

Table B2. 20th to 80th percentile data compared to 20th to 80th percentile DGV data from McNeil et al. (2018)

	Parameters	SWL	EC	TDS	pH	Cl	SO42-	F	Ca2+	Mg2+	Na+	HCO3	Alk
Cainozoic Deposits - Quaternary Alluvium (1)	DGV Ranges[1]	-	270 - 1025	-	6.2 - 8	41 - 201	5.4 - 47.4	0 - 0.2	4 - 68	5 - 22	32 - 133	17 - 279	21 - 232
	BH01x*	6.2 7.1	985 1290	428 660	6.6 7.1	128 212	8 22.8	0.2	33.8 50	22 30	93 137	217 378	217 378
	BH05x	6.7 6.9	11100 15300		7.2 7.3								
	BH06x	6.4 6.7	1410 2160	832 922	7.3 7.7	196 250	37 44	0.5 0.6	89 102	47 50	126 143	483 719	483 719
	BH16*	4.5 5.9	491 1050	301 645	6.4 6.8	54 199	11.6 34.2	0.2	25.8 52	16 30	53 120	150 195	150 195
	BH29	2.1 2.2	268 408	196 219	6.3 6.6	34 52	36 46	0.1	3 4	6 9	44 57	41 52	41 52
	BH37	7.1 7.5											
	WMP05*	7.8 9	2170 2890	1390 1770	7.1 7.5	367 552	95 122	0.7 1.1	20 38.6	26 48	415 552	528 662	534 662
	WMP21	10.5 10.6											
	WMP29A	9.3 9.5	7940 8720	5110 5610	7 7.2	2360 2690	402 453		148 192	158 174	1360 1480	420 446	420 446
	*Combined**	6.2 ±1 7.3 ±0.9	1215 ±498 1743 ±578	706 ±344 1025 ±373	6.7 ±0.2 7.1 ±0.2	183 ±94 321 ±116	38.2 ±28.4 59.7 ±31.3	0.4 ±0.2 0.5 ±0.3	26.5 ±4 46.9 ±4.2	21 ±3 36 ±6	187 ±114 270 ±141	298 ±116 412 ±136	300 ±118 412 ±136
Cainozoic Deposits - Quaternary Pleistocene Alluvium / Regolith (2)	DGV Ranges[1]	-	1007 - 9519	-	7.2 - 8.1	51 - 2817	7.3 - 172.8	0.1 - 0.43	32 - 99	15 - 200	33 - 1502	100 - 368	85.3 - 448.1
	WMP02*	17.9 18	16300 17400	10800 12400	6.5 7	5600 6060	508 585	0.6 0.7	270 305	501 555	2520 2780	406 446	406 446
	WMP04*	12.5 13	12900 21900	7560 14500	7.4 8.1	4250 7820	125 282	0.4 0.6	75.4 190	160 406	2550 4020	448 536	450 539
	WMP08*	11.1 11.4	25000 27800	16600 19800	6.7 7	8410 9270	1440 1720	0.5 0.6	337 424	495 672	4560 5630	659 722	659 722
	WMP09*	12 12.4	21000 22200	14100 15300	6.6 6.9	7050 7620	795 885	0.5 0.5	255 312	490 560	3870 4280	725 800	725 800
	WMP12*	17.6 17.8	4650 8710	2500 5740	6.9 7.3	1380 2800	88.6 152	0.4 0.5	108 185	101 208	734 1290	277 391	284 391

	Parameters	SWL	EC	TDS	pH	Cl	SO42-	F	Ca2+	Mg2+	Na+	HCO3	Alk
	WMP15*	11.2 11.3	4050 4720	2280 2610	6.8 7.2	1020 1230	55.4 61	0.6 0.7	34.4 46	57 78	752 868	445 491	449 491
	WMP17	12.7 12.7											
	WMP18	12.7 14.5											
	WMP25	10.8 11.3	771 801	589 612	6.1 6.7	230 241	9.6 10		5.6 6.4	7 8	144 150	43 46	43 46
	WMP26	15.5 15.6	48400 49700	35700 37500	6.8 7	17000 17200	1620 1730		458 564	1290 1410	9960 10500	788 910	788 910
	WMP29B	9.2 9.5	21400 22500	15200 15800	6.5 6.9	7810 7920	300 330		506 562	564 602	3550 3760	388 421	388 421
	*Combined**	13.7 ±1.3 14 ±1.3	13983 ±3478 17122 ±3593	8973 ±2425 11725 ±2614	6.8 ±0.1 7.2 ±0.2	4618 ±1222 5800 ±1283	502 ±222 614.2 ±253.4	0.5 ±0 0.6 ±0	180 ±50.2 243.7 ±53.6	301 ±88 413 ±94	2498 ±640 3145 ±753	493 ±68 564 ±66	496 ±67 565 ±66
Styx Coal Measures - Overburden (and Quaternary Alluvium [Lower] / Weathered Regolith / Underburden (3)	DGV Ranges[1]	-	2005 - 10670	-	7.5 - 8.2	444 - 4500	69.8 - 896.1	0.1 - 0.8	38 - 248	72 - 433	283 - 1965	277 - 850	207.7 - 705.4
	WMP04D*	12.4 12.8	24900 26400	15900 17700	6.8 7.1	8750 9240	377 417	0.4	164 226	548 597	4550 5010	633 686	633 686
	WMP10*	9.4 12	17100 19000	10500 11800	6.9 7.2	5340 5930	709 858	0.3 0.4	37.4 87.8	234 257	3500 3960	1160 1290	1160 1290
	WMP13*	15 15.2	45800 48700	34400 39600	6.2 6.6	16800 17800	1640 1760	0.1 0.2	1190 1470	1790 2090	7340 8460	490 524	490 524
	WMP14*	18.8 18.9											
	WMP21D	15.2 15.3	40400 42000	21900 31800	6.7 7	14100 14300	1370 1510		329 416	996 1200	7890 8610	779 889	779 889
	*Combined**	13.9 ±2 14.7 ±1.5	29267 ±8568 31367 ±8926	20267 ±7237 23033 ±8457	6.6 ±0.2 7 ±0.2	10297 ±3397 10990 ±3537	908.7 ±378 1011.7 ±395.2	0.3 ±0.1	463.8 ±364.9 594.6 ±439.5	857 ±475 981 ±563	5130 ±1146 5810 ±1359	761 ±204 833 ±233	761 ±204 833 ±233
Styx Coal Measures - Overburden /	BH30	4.5 4.8	12300 17800	10400 12900	6.5 7.7	4930 6820	844 1070	0.2	690 895	802 1120	1340 1700	291 358	291 358
	BH35	1.9 2.4	4250 6760		7.9 8.2								

Parameters	SWL	EC	TDS	pH	Cl	SO42-	F	Ca2+	Mg2+	Na+	HCO3	Alk
WMP06*	17.7 17.9	3760 6120	2180 4000	6.6 6.9	845 1590	43 94	0.4 0.5	55 103	89 148	609 1030	589 886	589 886
WMP07*	59.6 60.2											
WMP08D*	10.5 10.9	14200 14800	8390 8820	7.3 7.5	4930 5160	198 220	0.7	91.2 113	105 116	2910 3170	260 277	261 279
WMP11*	13.7 14	31000 32100	20300 23800	6.5 6.9	11200 11700	76.4 108	<0.1	483 599	661 777	5370 6220	473 506	473 506
WMP11D*	13.3 13.5	30600 31600	20900 23200	6.6 7	10900 11400	175 196	0.1	469 595	614 716	5640 6280	506 541	506 541
WMP17D	12.1 12.2	38700 40400	26500 28000	6.8 7.1	13300 13900	921 988		351 388	622 643	8130 8790	512 525	512 525
WMP18D	14.9 15	30800 31200	20800 22200	6.8 7.3	10500 10900	626 676		142 198	616 635	6270 6620	856 908	856 908
WMP21B	15.8 20.9											
WMP22A	15 15.4	23900 24600	15900 16300	6.8 6.9	8140 8310	328 338		128 180	428 443	4100 4560	874 930	874 930
WMP22B	15.3 15.5	34200 35000	21800 23200	7.2 7.5	11900 12000	101 202		129 220	463 539	7070 7310	762 828	762 828
WMP23A	11.3 11.5	23200 25800	10200 17000	8 12.6	4170 9150	33.8 67.2		192 516	<1 201	3110 5160	<1 189	198 3120
WMP24	4.8 5.2	22200 23200	13700 14300	7.1 7.5	7620 7840	342 366		88.6 137	247 262	4560 4860	914 972	916 972
WMP27	21.1 21.2											
WMP28	10.9 11.3	6090 8350	3670 5620	6.8 6.9	1770 2610	50.2 182		107 165	149 221	952 1200	505 555	505 555
WMP29C	19.6 25	19500 20100	11900 12200	11.3 11.6	6740 7030	122 136		191 236	<1 2.8 - 3.6	4110 4240	<1 5.2 - 6	162 297
WMP29D	17.1 23	20800 22700	13000 14700	9.7 10.7	7380 8230	10 72.6		206 304	4.2 - 4.6 18	3780 4650	24.6 - 25 83	83 103
WMP30A	15.2 15.6											

	Parameters	SWL	EC	TDS	pH	Cl	SO42-	F	Ca2+	Mg2+	Na+	HCO3	Alk
	WMP30B	15.2 15.4											
	*Combined**	23 ±9.2 23.3 ±9.3	19890 ±6650 21155 ±6425	12943 ±4601 14955 ±5032	6.7 ±0.2 7.1 ±0.1	6969 ±2500 7463 ±2471	123.1 ±37.5 154.5 ±31.4	0.3 ±0.1 0.4 (0.1 - 0.6)	274.6 ±116.6 352.5 ±141.2	367 ±156 439 ±178	3632 ±1180 4175 ±1275	457 ±70 553 ±126	457 ±70 553 ±125
Permian Measures - Back Creek Group and/or Styx Coal Measures – Underburden (5)[2]	DGV Ranges[1]	-	1000 - 3191	-	7.5 - 8.2	129 - 757	29.2 - 107.2	0.22 - 0.6	52 - 138	37 - 128	102 - 360	351 - 615	290 - 510
	BH13	12.7 12.8	3580 6160	3310 4150	6.7 7	1560 1700	98 109	0.3 0.4	179 231	302 370	508 585	388 523	388 523
	BH32	4.7 5.4	3710 4400	2640 3490	6.9 7.1	1020 1350	228 315	0.7 0.8	265 305	178 211	424 456	521 532	521 532
	WMP16	22.3 22.5											
	WMP16D	24.9 25.1	8340 8510	4860 5060	7.3 7.5	2750 2780	11 16.4		74.4 110	122 133	1460 1570	395 434	395 434
	WMP19	13.5 13.9											
	WMP19D	13.8 14	1860 1900	1120 1260	6.6 6.9	218 229	198 228		137 156	56 58	177 187	481 531	481 531
	WMP20	19.7 19.8											
	WMP20D	19.6 19.6	1950 2010	1150 1270	7.1 7.5	201 219	49.6 53		27.6 39.2	21 23	388 422	724 784	738 784
	WMP22C	10.5 10.6	4760 5230	2630 2840	9.9 10.1	1350 1440	3 4		4.6 6.4	1 3	953 1040	39 104	251 273
	WMP29E	7.3 9.4	11900 16000	4840 5560	12.2 12.9	1480 1710	19.2 57.2		1.8 154	<1 <1	1660 1880	<1	1640 3030
	WMP30C	12.1 12.4											
Permian Measures - Back Creek Group and/or Carmila Beds (6)	WMP23B	0 2.5	14800 16900	6230 6830	12.2 12.6	2480 2670	12 16.6		108 211	2 38	2270 2470	<1	1670 2350

Table B2. (cont'd)

	Parameters	NH4	NO3	NOx	NO2	FRP	TN	TP	Al	As	Ba	Cd	Cr
Cainozoic Deposits - Quaternary Alluvium (1)	DGV Ranges[1]		0 - 2.6				0 - 0.565	0 - 0					
	BH01x*	0.968 40	0.01 0.04	0.01 0.044	<0.01	<0.01 1.48	1.14 46.9	0.562 3.35	<0.01	0.007 0.016	0.083 0.145	<0.0001	<0.001
	BH05x												
	BH06x	25.7 57.4	0.01	<0.01 0.032	<0.01 0.03	0.38 1.33	33.3 62.2	3.03 3.83	<0.01	0.004 0.004	0.062 0.078	<0.0001	<0.001
	BH16*	0.13 0.18	0.01 0.034	0.01 0.034	<0.01	<0.01 0.034	0.3 0.6	0.08 0.202	<0.01 0.01	<0.001 0.004	0.059 0.096	<0.0001	<0.001
	BH29	0.018 0.092	0.126 1.12	0.126 1.12	<0.01	0.04 0.04	0.28 1.54	0.068 0.132	<0.01	<0.001	0.008 0.011	<0.0001	<0.001
	BH37												
	WMP05*	0.05 0.144	0.01 0.058	0.01 0.058	<0.01	0.032 0.06	0.5 3.6	0.39 2.66	<0.01 0.22	0.002 0.005	0.166 0.224	<0.0001	<0.001 0.002
	WMP21												
	WMP29A	1.9 2.4	0.038 0.056	0.038 0.068	<0.01 0.012 - 0.016	0.01 0.01				0.005 0.006		<0.0001 0.00012 - 0.00016	<0.001
	*Combined**	0.383 ±0.294 13.441 ±13.279	0.01 0.044 ±0.007	0.01 0.045 ±0.007	<0.01 <0.01	<0.017 ±0.008 0.525 ±0.478	0.647 ±0.253 17.033 ±14.958	0.344 ±0.141 2.071 ±0.955	<0.01 0.079 (0.005 - 0.15)	0.003 ±0.002 0.009 ±0.004	0.103 ±0.032 0.155 ±0.037	<0.0001	<0.001 <0.0013 ±0.0004
Cainozoic Deposits - Quaternary Pleistocene Alluvium / Regolith (2)	DGV Ranges[1]	-	0 - 2.55	-	-	-	0 - 0.554	0.041 - 0.082	-	-	-	--	
	WMP02*	0.02 0.05	2.63 2.92	2.63 2.92	<0.01	0.11 0.13	3.8 4.9	0.61 1.48	<0.01 0.01	0.002 0.002	0.282 0.355	<0.0001	<0.001
	WMP04*	0.027 0.15	0.052 0.266	0.052 0.266	<0.01	0.01 0.02	<0.4 3.4	0.106 2.96	<0.01 0.02	0.002 0.004	0.182 0.268	<0.0001	0.003 0.008
	WMP08*	0.06 0.168	<0.01 0.02	<0.01 0.02	<0.01	<0.01 0.01	0.273 1.44	0.34 1.02	<0.01 <0.042	0.002 0.003	0.152 0.218	<0.0001 <0.0005	<0.001 <0.005

	Parameters	NH4	NO3	NOx	NO2	FRP	TN	TP	Al	As	Ba	Cd	Cr
	WMP09*	0.02 0.06	0.02 0.05	0.02 0.05	<0.01	0.026 0.054	0.217 0.76	0.104 0.308	<0.01	0.002 0.002	0.076 0.127	<0.0001	<0.001 <0.001
	WMP12*	0.184 0.366	0.346 1.41	0.41 1.46	0.032 - 0.034 0.104	0.028 0.104	8.98 27.1	4.08 12.3	<0.01 0.064	0.003 0.004	0.228 0.381	<0.0001	0.001 0.001
	WMP15*	0.08 0.11	<0.01	<0.01	<0.01	<0.01 0.02	0.1 0.9	0.08 0.4	0.01 0.49	0.001 0.002	0.108 0.139	<0.0001	<0.001 0.002
	WMP17												
	WMP18												
	WMP25	0.016 0.038	0.01	0.01	<0.01	<0.01 0.008 - 0.014				0.002 0.002		<0.0001	<0.001
	WMP26	0.14 0.224	0.52 0.594	0.52 0.594	<0.01	0.024 - 0.026 0.032	2.98 3.7	0.812 1.11	0.102 0.354	<0.005		<0.0005	<0.005
	WMP29B	2.21 2.49	<0.01 0.012 - 0.018	<0.01 0.012 - 0.018	<0.01	<0.01 0.02				0.024 0.029		<0.0001	<0.001 0.0016 - 0.0022
	*Combined**	0.065 ±0.026 0.151 ±0.047	0.7 (0.08 - 1.296) 0.779 (0.296 - 1.26)	8.569 (0.092 - 31.143) 0.787 (0.302 - 1.271)	<0.126 ±0.102 0.022 (0 - 0.042)	0.031 (0.012 - 0.048) 0.056 ±0.02	2.229 (0.751 - 3.706) 6.417 ±4.189	0.887 ±0.644 3.078 ±1.886	<0.01 0.102 (0.018 - 0.183)	0.002 ±0 0.003 ±0	0.171 ±0.031 0.248 ±0.044	<0.0001 <0.00017 ±0.00008	0.001 (0.0002 - 0.0016) 0.0025 (0.0006 - 0.0042)
Styx Coal Measures - Overburden (and Quaternary Alluvium [Lower] / Weathered Regolith / Underburden (3)	DGV Ranges[1]	-	0.05 - 7.47	-	-	-	0.011 - 1.624	0 - 0.082	-	-	-	-	-
	WMP04D*	0.024 0.07	0.274 0.426	0.294 0.436	0.01 0.03	<0.01 0.01	<0.5 1.56	0.06 0.118	<0.01 0.01	<0.001 0.001	0.095 0.132	<0.0001	<0.001 0.002
	WMP10*	0.05 0.148	<0.01 0.018	<0.01 0.018	<0.01	<0.01 0.02	0.98 2.86	0.648 2.49	<0.01 0.036	0.002 0.002	0.102 0.187	<0.0001	<0.001 0.001
	WMP13*	0.164 0.23	<0.01 0.016	<0.01 0.016	<0.01	<0.01	<0.5 1	0.09 0.16	<0.05 <0.05	<0.005 <0.005	0.125 0.187	<0.0005	<0.005
	WMP14*												

	Parameters	NH4	NO3	NOx	NO2	FRP	TN	TP	Al	As	Ba	Cd	Cr
	WMP21D	0.133 0.256	0.102 1.64	0.118 1.65	<0.01 0.03	<0.01 0.02	2.4 2.88	0.444 0.9	<0.05	<0.005 0.01		<0.0005	<0.005
	*Combined**	0.079 ±0.043 0.149 ±0.046	<0.098 ±0.089 0.153 ±0.136	<0.105 ±0.096 0.157 ±0.14	<0.01 ±0.001 <0.017 ±0.008	<0.01 <0.013 ±0.004	<0.66 ±0.161 1.807 ±0.551	0.266 ±0.191 0.923 ±0.784	<0.023 ±0.014 0.024 (0.004 - 0.044)	<0.003 ±0.002 <0.003 ±0.002	0.107 ±0.009 0.169 ±0.018	<0.00023 ±0.00014 <0.00023 ±0.00014	<0.0023 ±0.0014 0.0019 (0.0004 - 0.0039)
Styx Coal Measures - Overburden / Coal Seams / Interburden / Underburden (4)	BH30	0.802 0.886	<0.01 0.014	<0.01 0.014	<0.01	<0.01	0.76 0.98	0.136 0.156	<0.01	0.003 0.003	0.151 0.165	<0.0001	<0.001
	BH35												
	WMP06*	0.108 0.182	<0.01 0.02	<0.01 0.02	<0.01	<0.01	1.18 4.54	0.39 1.9	<0.01 0.01	0.012 0.018	0.182 0.4	<0.0001	<0.001
	WMP07*												
	WMP08D*	0.796 0.874	<0.01 0.01	<0.01 0.01	<0.01	<0.01	0.8 1.2	0.021 0.09	<0.01 0.026	0.001 0.004	0.108 0.136	<0.0001	<0.001
	WMP11*	1.07 1.39	<0.01 0.01	<0.01 0.01	<0.01	<0.01	1.3 1.8	<0.05 0.25	<0.01 <0.05	0.002 0.004	4.22 5.24	<0.0001 <0.0005	<0.001 <0.005
	WMP11D*	2.19 2.59	<0.01 0.02	<0.01 0.02	<0.01	<0.01	2.4 3.6	<0.05 0.15	<0.01 0.01	0.004 0.011	1.61 2.89	<0.0001 <0.0005	<0.001 <0.005
	WMP17D	3.41 4.15	0.021 0.062	0.038 0.178	0.02 0.116	<0.01				<0.005 <0.005		<0.0005	<0.005
	WMP18D	0.582 0.728	<0.022 0.03	<0.022 0.03	<0.01 0.016 - 0.022	<0.01				<0.0034 <0.005		<0.00034 4e-05 - 5e-04	<0.0034 <0.005
	WMP21B												
	WMP22A	1 1.12	<0.01	<0.01 <0.01	<0.01	<0.01	1.44 1.7	0.156 0.214	<0.01	0.003 0.004		<0.0001	<0.001 0.001
	WMP22B	4.35 4.99	<0.01	<0.01 <0.01	<0.01	0.06 0.29	5.8 7.26	0.246 0.348	<0.05	<0.005 <0.005		<0.0005	<0.005
	WMP23A	2.26 2.97	0.008 - 0.014 0.02	0.012 0.028	0.01	0.01	3.6 4.18	0.051 0.242	<0.03 0.188	0.001 0.011		<0.00012 <5e-04	<0.005 0.391
	WMP24	1.86 2.42	<0.01 0.026	<0.01 0.026	<0.01	0.01	2.92 3.22	0.084 0.156	0.01 0.01	<0.001 <0.001		<0.0001	<0.001 0.002

	Parameters	NH4	NO3	NOx	NO2	FRP	TN	TP	Al	As	Ba	Cd	Cr
	WMP27												
	WMP28	0.046 0.064	<0.01 0.038	<0.01 0.038	<0.01	<0.01				0.003 0.004		<0.0001 8e-05 - 0.00014	0.001
	WMP29C	11 12.1	<0.01 0.048	<0.01 0.048	<0.01	<0.01	13.4 14.7	0.112 0.5	1.09 1.92	0.003 0.005		<0.0001 4e-05 - 0.00012	<0.001 0.002
	WMP29D	5.81 7.27	0.034 0.126	0.034 0.126	<0.01	<0.01 0.078	7.72 8.2	0.172 0.28	0.036 0.09	0.003 0.012		<0.0001 0.00016 - 0.00022	<0.001
	WMP30A												
	WMP30B												
	*Combined**	1.041 ±0.433 1.259 ±0.508	<0.01 0.015 ±0.003	<0.01 0.015 ±0.003	<0.01	<0.01	1.42 ±0.344 2.785 ±0.776	0.116 (0.007 - 0.216) 0.598 ±0.435	<0.01 0.018 (0.007 - 0.033)	0.005 ±0.003 0.009 ±0.003	1.53 ±0.961 2.167 ±1.198	<0.0001 <0.0003 ±0.00013	<0.001 <0.003 ±0.0013
Permian Measures - Back Creek Group and/or Styx Coal Measures – Underburden (5)[2]	DGV Ranges[1]	-	0.5 - 16.2	-	-	-	0.109 - 3.522	0 - 0	-	-	-	-	-
	BH13	0.168 0.672	<0.01 0.128	<0.01 0.142	<0.01 0.014	<0.01 0.004 - 0.012	0.7 0.96	0.076 0.322	<0.01	<0.001 0.002	0.054 0.122	<0.0001	<0.001
	BH32	0.548 3.56	<0.01 0.036	<0.01 0.036	<0.01	0.048 0.238	0.6 3.58	0.058 0.252	<0.01	<0.001	0.033 0.043	<0.0001	<0.001
	WMP16												
	WMP16D	1.22 1.32	<0.01 0.02	<0.01 0.02	<0.01	<0.01 <0.01	1.78 2.32	0.072 0.102	0.014 0.02	<0.001		<0.0001	<0.001 0.003
	WMP19												
	WMP19D	0.15 0.19	<0.01 0.02	<0.01 0.02	<0.01	<0.01 <0.01	0.5 1.2	0.05 0.326	<0.01	0.006 0.007		<0.0001	0.001
	WMP20												

	Parameters	NH4	NO3	NOx	NO2	FRP	TN	TP	Al	As	Ba	Cd	Cr
	WMP20D	0.222 0.252	<0.01 0.05	<0.01 0.05	<0.01	0.01 0.01	0.6 1.44	0.058 0.088	<0.01 0.012 - 0.016	0.005 0.006		0.0001	<0.001 0.002
	WMP22C	1.29 1.52	<0.01 0.036	<0.01 0.036	<0.01	0.084 0.26				0.002 0.003		<0.0001	0.001 0.001
	WMP29E	6.6 9.17	0.01 0.134	0.018 0.138	<0.01 0.012	<0.01 0.008 - 0.016	10.5 11.3	0.014 0.026	2.25 2.4	0.0016 - 0.0018 0.007		0.0001	0.071 0.148
	WMP30C												
Permian Measures - Back Creek Group and/or Carmila Beds (6)	WMP23B	5.92 6.22	0.02 0.032	0.02 0.032	<0.01	<0.01 <0.01	7.6 8.2	<0.05 <0.05	0.5 0.86	0.002 0.003		<0.0001 0.00016	0.06 0.167

Table B2. (cont'd)

	Parameters	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
Cainozoic Deposits - Quaternary Alluvium (1)	DGV Ranges[1]	-	0 - 0.015	0 - 0.099	-	0 - 0.19	-	-	-	-	-	-	-	0.005 - 0.06
	BH01x*	<0.001 0.001	<0.001 0.0034	0.79 3.93	<0.001	0.44 0.807	<0.0001	<0.001	0.0016 0.004	<0.01	<0.001	<0.001	<0.01	<0.005 0.0118
	BH05x													
	BH06x	<0.001	0.001 0.001	0.27 0.45	<0.001	0.119 0.133	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	<0.005 0.0212
	BH16*	0.001 0.0028	0.0016 0.0034	0.08 0.26	<0.001	0.533 0.917	<0.0001	<0.001	0.001 0.002	<0.01	<0.001	<0.001	<0.01	<0.005 0.0146
	BH29	<0.001	0.001	<0.05 <0.05	<0.001 4e-04 - 0.0012	0.006 0.008	<0.0001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.01	0.005 0.005
	BH37													
	WMP05*	<0.001 0.002	<0.001 0.002	<0.05 0.25	<0.001	0.014 0.323	<0.0001	0.002 0.003	<0.001 0.002	<0.01	<0.001	0.003 0.005	<0.01 0.02	<0.005 0.0232
	WMP21													
	WMP29A		0.0014 0.002		<0.001		<0.0001		0.004 0.007					0.0216 0.0252
	*Combined**	<0.001 0.0019 ±0.0005	<0.0012 ±0.0003 0.0029 ±0.0005	0.3 (0.04 - 0.55) 1.48 ±1.22	<0.001	0.329 ±0.16 0.682 ±0.182	<0.0001	<0.0013 ±0.0004 <0.0017 ±0.0008	<0.0012 ±0.0003 0.0027 ±0.0007	<0.01 <0.01	<0.001 <0.001	<0.0017 ±0.0008 <0.0023 ±0.0014	<0.01 <0.013 ±0.004	<0.005 0.0165 ±0.0034
Cainozoic Deposits - Quaternary Pleistocene Alluvium / Regolith (2)	DGV Ranges[1]	-	-	0.009 - 0.074	-	0 - 0.075	-	-	-	-	-	-	-	-
	WMP02*	<0.001 0.002	<0.001 0.0016	<0.05	<0.001	0.004 0.381	<0.0001	<0.001 0.002	<0.001 0.001	<0.01	<0.001	0.0042 0.0068	<0.01	<0.005
	WMP04*	<0.001	<0.001 0.005	<0.05	<0.001	0.003 0.065	<0.0001	0.0138 0.033	<0.001 0.001	<0.01	<0.001	<0.001 0.002	<0.01	<0.005
	WMP08*	0.001 0.0046	0.0013 0.002	<0.05	<0.001 <0.005	0.144 1.3	<0.0001	0.0011 0.003	<0.001 0.002	<0.01 <0.042	<0.001	0.008 0.01	<0.01 <0.042	0.0085 0.0234
	WMP09*	0.002 0.0048	<0.001 0.002	<0.05	<0.001	0.21 0.595	<0.0001	<0.001 0.001	0.001 0.002	<0.01	<0.001	0.0086 0.01	<0.01	0.016 0.0314

	Parameters	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
	WMP12*	<0.001 6e-04 - 0.0014	<0.001 0.0032	<0.05 0.06	<0.001	0.056 0.378	<0.0001	0.002 0.0056	0.001 0.001	<0.01	<0.001	<0.001 0.0024	0.01	<0.005 0.002 - 0.006
	WMP15*	<0.001	<0.001 0.0098	0.16 1.21	<0.001 0.002	0.111 0.129	<0.0001	<0.001 0.002	<0.001 0.002	<0.01	<0.001	<0.001 <0.001	<0.01	0.0114 0.058
	WMP17													
	WMP18													
	WMP25		0.0016 0.0038		<0.001		<0.0001		0.004 0.007					0.0154 0.029
	WMP26		<0.005 0.0078	0.09 0.22	<0.005	0.396 0.601	<0.0001	<0.005	<0.005 <0.005	<0.05			<0.05	<0.025 0.0584
	WMP29B		<0.001 0.0034		<0.001		<0.0001		0.006 0.0088					0.0306 0.0586
	*Combined**	0.0009 (0.0002 - 0.0014) 0.0023 (0.0011 - 0.0032)	<0.0011 ±0.0002 0.0039 ±0.0013	<0.07 ±0.03 <0.25 ±0.2	<0.001 <0.0018 ±0.0008	0.088 ±0.034 0.475 ±0.183	<0.0001	0.0031 (0.0006 - 0.0054) 0.0078 ±0.0051	<0.001 0.0015 ±0.0002	<0.01 <0.015 ±0.006	<0.001	0.0038 (0.0018 - 0.0055) 0.0053 (0.0034 - 0.0071)	<0.01 <0.015 ±0.006	0.0073 (0.0032 - 0.0103) 0.0203 (0.0096 - 0.0301)
Styx Coal Measures - Overburden (and Quaternary Alluvium [Lower] / Weathered Regolith / Underburden (3)	DGV Ranges[1]	-	0 - 0.025	0.01 - 0.197	-	0 - 0.04	-	-	-	-	-	-	-	0.01 - 0.161
	WMP04D*	0.001	<0.001 0.0017	<0.05	<0.001	0.032 0.092	<0.0001	<0.001 0.002	<0.001	<0.01	<0.001	0.004 0.005	<0.01	0.0073 0.058
	WMP10*	<0.001 0.002	<0.001 0.002	<0.05 0.12	<0.001	0.118 0.55	<0.0001	0.002 0.0028	<0.001 0.001	<0.01	<0.001	0.0064 0.008	<0.01	<0.005 0.0116
	WMP13*	<0.005 0.008	<0.005	0.52 0.88	<0.005	0.934 1.84	<0.0001	<0.005	<0.005	<0.05	<0.005	0.019 0.029	<0.05	<0.017 0.038
	WMP14*													
	WMP21D		<0.005	0.09 0.16	<0.005	0.44 0.497	<0.0001	<0.005 0.0036 - 0.0056	<0.005	<0.05			<0.05	<0.025 0.0302 - 0.0502
	*Combined**	<0.0023 ±0.0014 0.0037 ±0.0022	<0.0023 ±0.0014 0.0021 (0.0006 - 0.0039)	<0.21 ±0.17 0.34 (0.05 - 0.62)	<0.0023 ±0.0014 <0.0023 ±0.0014	0.361 ±0.287 0.827 ±0.523	<0.0001	<0.0027 ±0.0013 0.0025 (0.0008 - 0.0042)	<0.0023 ±0.0014 <0.0023 ±0.0014	<0.023 ±0.014 <0.023 ±0.014	<0.0023 ±0.0014 <0.0023 ±0.0014	0.0098 ±0.0047 0.014 ±0.0075	<0.023 ±0.014 <0.023 ±0.014	<0.0098 ±0.0038 0.0359 ±0.0134

	Parameters	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
Styx Coal Measures - Overburden / Coal Seams / Interburden / Underburden (4)	BH30	<0.001 0.0014	<0.001 <0.001 - 0.0014	3.7 4.13	<0.001	3.14 3.36	<0.0001	<0.001	0.0016 0.002	<0.01	<0.001	0.001 0.002	<0.01	<0.005
	BH35													
	WMP06*	<0.001 0.006	0.0016 - 0.0018 0.004	0.11 2.61	<0.001	0.178 2.35	<0.0001	0.002 0.006	<0.001 0.002	<0.01	<0.001	0.0022 0.005	<0.01 0.01	<0.005 0.011
	WMP07*													
	WMP08D*	<0.001 <0.001	<0.001 0.004	0.16 0.35	<0.001	0.089 0.306	<0.0001	<0.001 6e-04 - 0.001	<0.001	<0.01	<0.001	<0.001 0.0014	<0.01	<0.005 0.0278
	WMP11*	0.0033 0.0072	<0.001 0.0029	2.11 3.12	<0.001 <0.005	0.664 1.91	<0.0001	<0.001 0.0029	<0.001 0.0028	<0.01 <0.05	<0.001 <0.005	<0.0014 0.003	<0.01 <0.05	0.0177 0.0786
	WMP11D*	0.0021 0.0062	0.0015 0.0038	0.35 2.82	<0.001 <0.005	0.128 0.379	<0.0001	0.001 0.003	<0.001 0.0038	<0.01 <0.05	<0.001 <0.0034	0.0021 0.0052	<0.01 <0.05	0.0081 0.0794
	WMP17D		<0.005 0.004 - 0.007		<0.005		<0.0001 <0.00026		<0.005					<0.025 <0.025
	WMP18D		<0.005 0.026		<0.0034 <0.005		<0.0001		<0.0034 4e-04 - 0.005					0.028 0.0448
	WMP21B													
	WMP22A		<0.001	1.38 1.6	<0.001	0.53 0.624	<0.0001	0.0016 0.004	0.002 0.003	<0.01			<0.01	0.005 0.022
	WMP22B		<0.005	<0.05	<0.005	0.211 0.267	<0.0001	<0.005 0.0032 - 0.0062	<0.005	<0.05			<0.05	<0.025
	WMP23A		<0.005 0.008	<0.05 1.21	<0.0016 <0.005	<0.0042 4.99	<0.0001 <0.00044	0.016 0.302	0.002	<0.01 <0.05			<0.01 <0.05	0.0126 0.271
	WMP24		<0.001 0.0022	0.28 0.34	<0.001	0.085 0.098	<0.0001	<0.001	0.001	<0.01			<0.01	0.0053 0.0108
	WMP27													

	Parameters	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
	WMP28		<0.001 0.0014		<0.001		<0.0001		0.002 0.0038					0.0126 0.0222
	WMP29C		0.0018 0.0062	0.05	<0.001	0.001 0.001	<0.0001	0.247 0.28	0.0106 0.0144	<0.01			0.01	<0.005 0.0028 - 0.0068
	WMP29D		<0.001 0.0014	<0.05	<0.001	0.027 0.05	<0.0001	0.0576 0.132	0.0012 - 0.0016 0.0024	<0.01			<0.01	0.076 0.166
	WMP30A													
	WMP30B													
	*Combined**	0.0016 (0.0005 - 0.0024) 0.005 (0.0033 - 0.0065)	0.0011 (0.0004 - 0.0015) 0.0037 ±0.0003	0.68 ±0.48 2.23 ±0.63	<0.001 <0.003 ±0.0013	0.265 ±0.134 1.236 ±0.524	<0.0001	0.0011 (0.0003 - 0.0016) 0.0032 (0.002 - 0.0042)	<0.001 0.0023 (0.0014 - 0.003)	<0.01 <0.03 ±0.013	<0.001 <0.0026 ±0.0011	0.0014 (0.0005 - 0.002) 0.0037 ±0.0009	<0.01 <0.03 ±0.013	0.0078 (0.0023 - 0.012) 0.0492 ±0.0175
Permian Measures - Back Creek Group and/or Styx Coal Measures – Underburden (5)[2]	DGV Ranges[1]	-	0.01 - 0.05	0 - 0.03	-	0 - 0.02	-	-	-	-	-	-	-	0.01 - 0.11
	BH13	0.0018 0.0032	<0.001 0.0012	0.12 - 0.13 1.05	<0.001	1.13 2	<0.0001	0.001 0.002	<0.001 0.0022	<0.01	<0.001	<0.001 0.002	<0.01	<0.005 0.0064
	BH32	<0.001	<0.001	<0.05	<0.001	0.341 0.437	<0.0001	<0.001	<0.001	<0.01	<0.001	0.001	<0.01	<0.005
	WMP16													
	WMP16D		<0.001 0.006	<0.05 0.12	<0.001	0.129 0.145	<0.0001	<0.001 0.0046	0.0001 - 0.0012	<0.01			<0.01 <0.01	0.0556 0.12
	WMP19													
	WMP19D		<0.001 0.003	0.7 0.81	<0.001	0.058 0.07	<0.0001	<0.001 0.0048 - 0.0054	<0.001 0.002	<0.01			<0.01	0.028 0.045
	WMP20													
	WMP20D		0.0018 0.0092	<0.05 <0.05	<0.001	0.063 0.073	<0.0001	<0.001 0.0016	0.001	<0.01			<0.01	0.0538 0.1

	Parameters	Co	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	Ag	U	V	Zn
	WMP22C		0.001		<0.001		<0.0001		<0.001					0.0078 - 0.0098 0.0138
	WMP29E		0.0048 0.0084	<0.05 <0.05	0.001	<0.001	<0.0001	0.245 0.272	0.001 0.004	<0.01			0.02 0.026	<0.005 0.0406
	WMP30C													
Permian Measures - Back Creek Group and/or Carmila Beds (6)	WMP23B		0.0064 0.0088	<0.05	<0.001 0.002	<0.001 0.006	<0.0001	0.259 0.283	0.002 0.0026	<0.01			<0.01	0.0096 0.0296

Notes for Tables B1 and B2:

Parameters: EC = Electrical Conductivity (µS/cm),TDS = Total Dissolved Solids (mg/L),pH = pH (pH units),Cl = Chloride (mg/L),SO42- = Sulfate (mg/L),SWL = Standing Water Level (mbgl),F = Fluoride (mg/L),Ca2+ = Calcium (dissolved) (mg/L),Mg2+ = Magnesium (dissolved) (mg/L),Na+ = Sodium (dissolved) (mg/L), K+ = Potassium (dissolved) (mg/L), HCO3 = Bicarbonate Alkalinity (as CaCO3) (mg/L),Alk = Total Alkalinity (as CaCO3) (mg/L),NH4 = Ammonia (as N) (mg/L),NO3 = Nitrate (as N) (mg/L),NOx = Nitrate + Nitrite (as N) (mg/L),NO2 = Nitrite (as N) (mg/L),FRP = Phosphorus filterable reactive (as P) (mg/L),TN = Total Nitrogen (as N) (mg/L),TP = Total Phosphorus as P (mg/L),Al = Aluminium (dissolved) (mg/L),As = Arsenic (dissolved) (mg/L),Ba = Barium (dissolved) (mg/L),Cd = Cadmium (dissolved) (mg/L),Cr = Chromium (dissolved) (mg/L),Co = Cobalt (dissolved) (mg/L),Cu = Copper (dissolved) (mg/L),Fe = Iron (dissolved) (mg/L),Pb = Lead (dissolved) (mg/L),Mn = Manganese (dissolved) (mg/L),Hg = Mercury (dissolved) (mg/L),Mo = Molybdenum (dissolved) (mg/L),Ni = Nickel (dissolved) (mg/L),Se = Selenium (dissolved) (mg/L),Ag = Silver (dissolved) (mg/L),U = Uranium (dissolved) (mg/L),V = Vanadium (dissolved) (mg/L),Zn = Zinc (dissolved) (mg/L)

1 DGV Ranges = 20th to 80th percentiles from McNeil et al. (2018)

2 Stock watering criteria from ANZECC & ARMCANZ (2000). Note that nitrate and nitrite levels have been reduced to nitrate-N and nitrite-N as per ANZECC & ARMCANZ (2000) to match the measurement method from the laboratory

3 Short-term trigger value (STV) / Long-term trigger values (LTV) for Irrigation from ANZECC & ARMCANZ (2000). For EC, water salinity ratings are provided, which relate to plant tolerance as follows – very low = sensitive crops, low = moderately sensitive crops, medium = moderately tolerant crops, high = tolerant crops, very high = very tolerant crops, extreme = generally too saline. Chloride and sodium levels relate to these plant tolerance categories for foliar injury. Where only one value is provided, this relates across plant tolerance levels (i.e. one criterion only applies)

4 Australian Drinking Water Guidelines Criteria - NHMRC & NRMMC (2018). Criteria provided as health / aesthetic criteria. A dash '-' represents no value or insufficient data available to define a threshold

5 EC is from the QWQGs, for the Central Coast north; LR = low reliability guideline value

* Sites with 18 or more independent data points, used to prepared combined statistics for the group

C2 – Water Quality Graphs

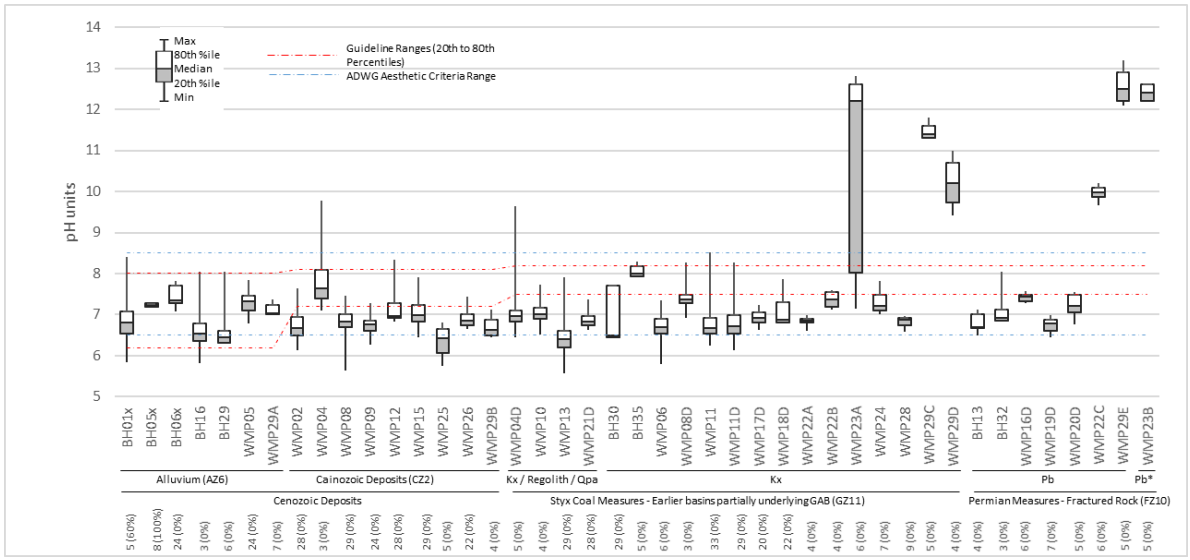

Figure B1. pH summary statistics

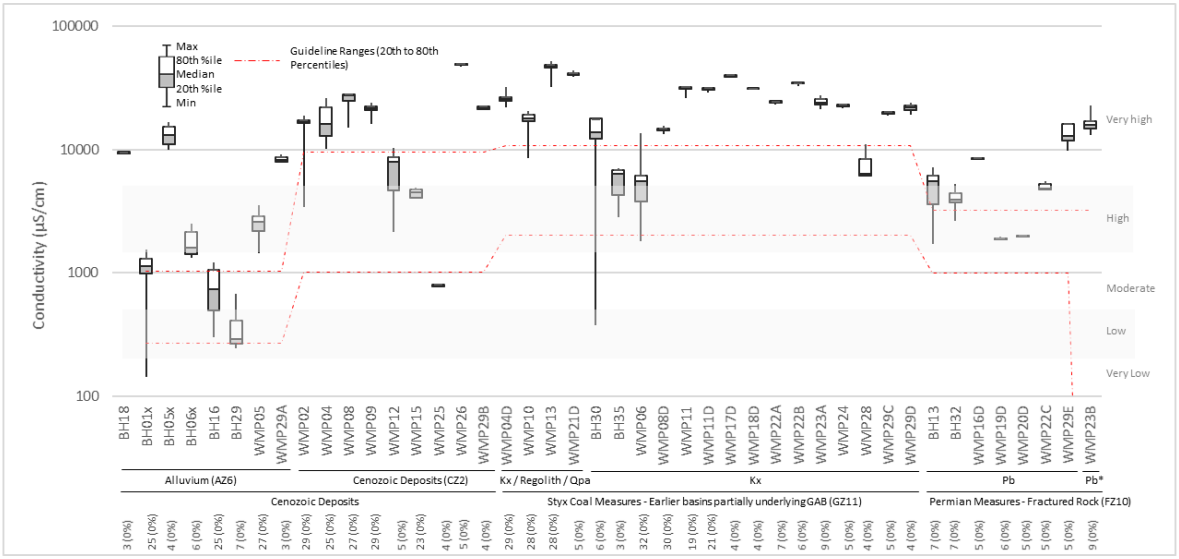

Figure B2. Electrical Conductivity summary statistics

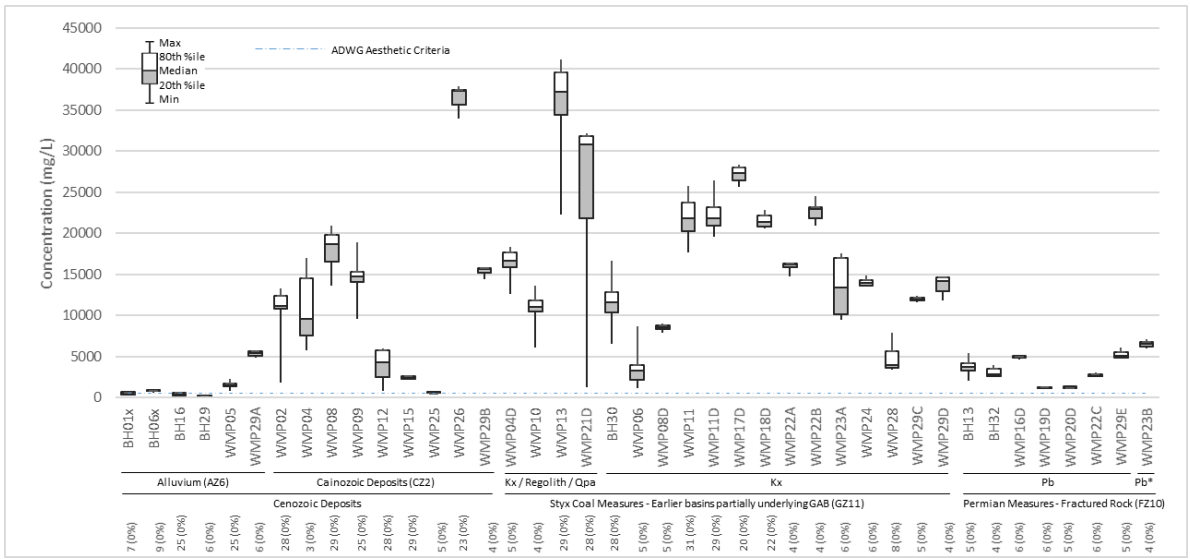

Figure B3. Total Dissolved Solids summary statistics

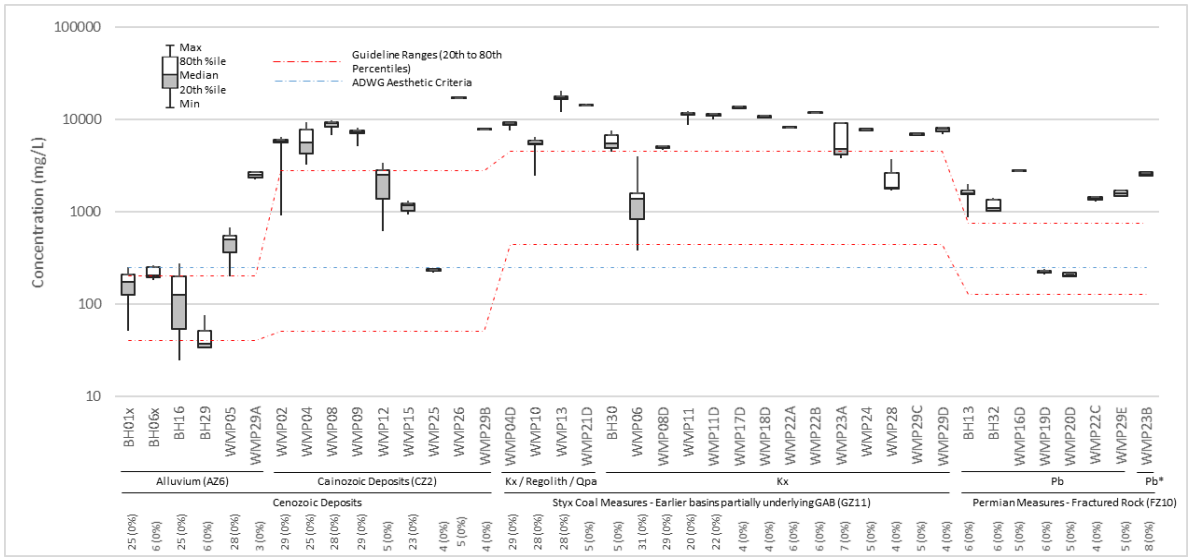

Figure B4. Chloride summary statistics

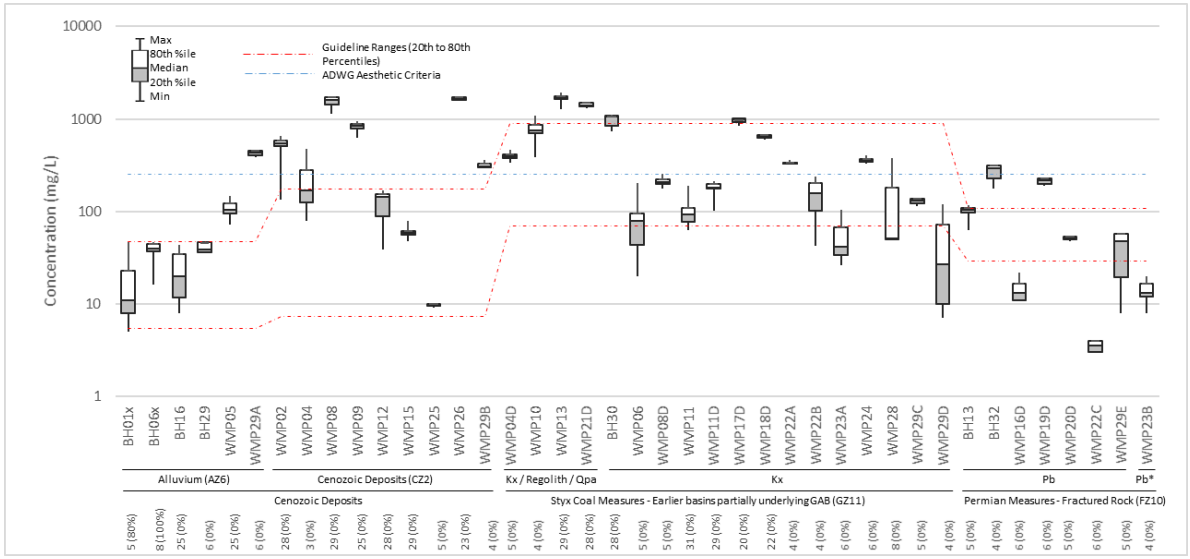

Figure B5. Sulfate summary statistics

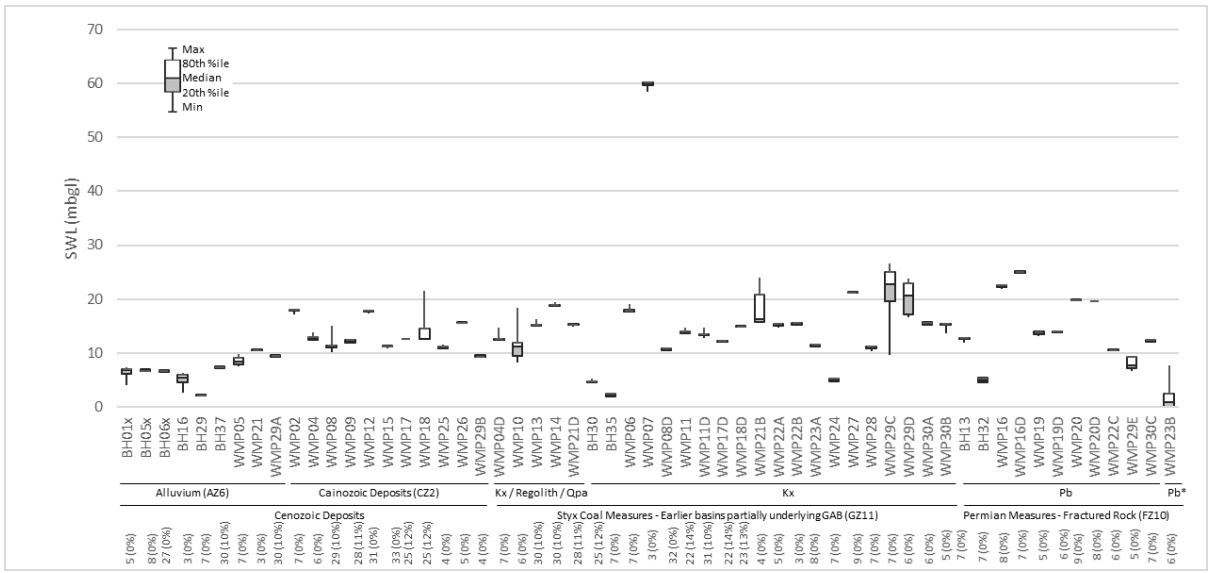

Figure B6. Standing water level summary statistics

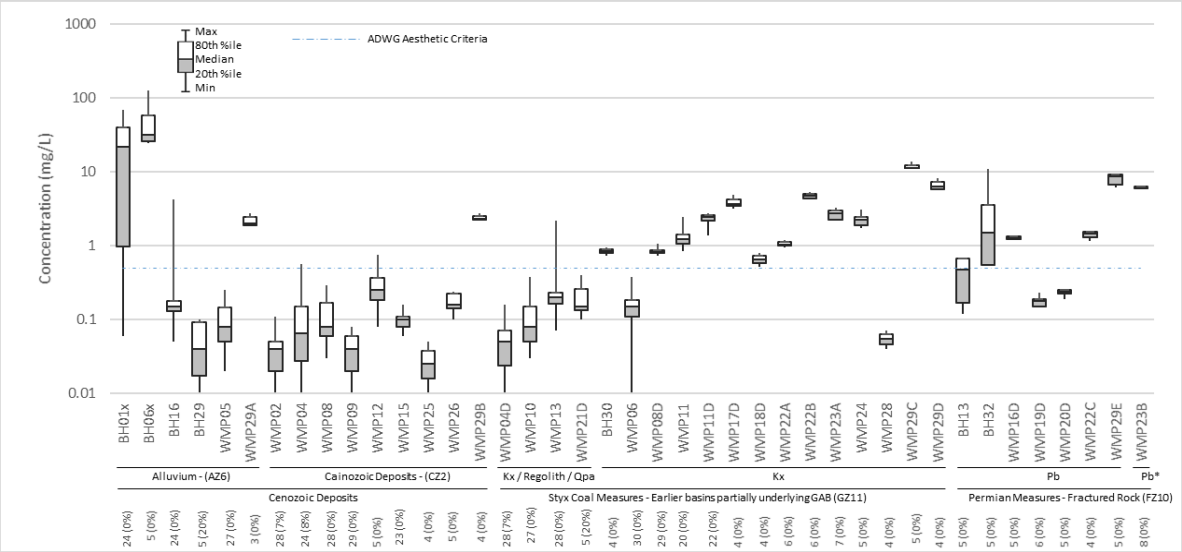

Figure B7. Ammonia summary statistics

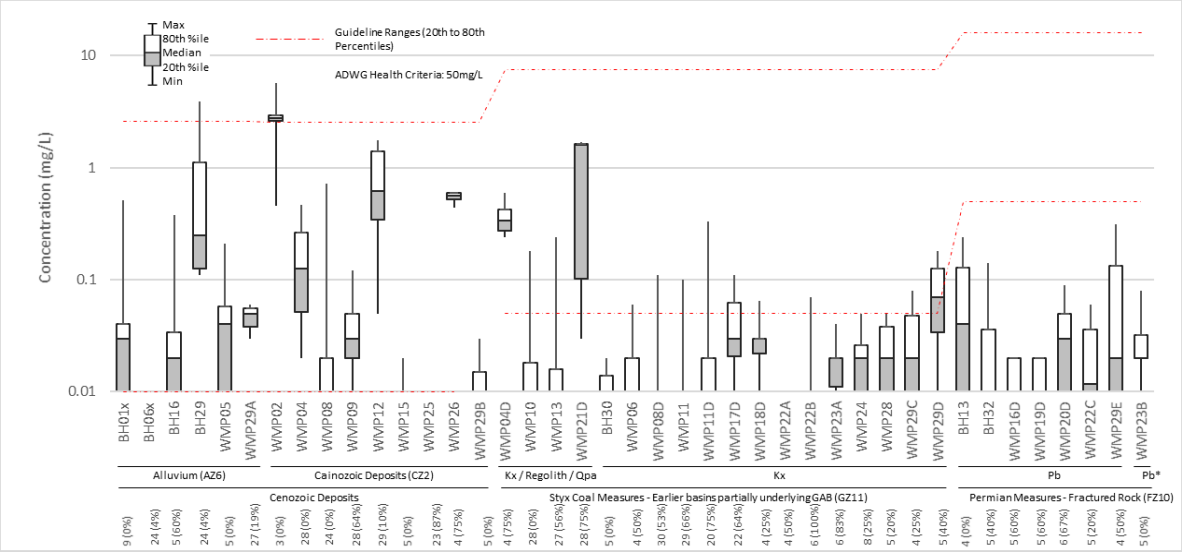

Figure B8. Nitrate summary statistics

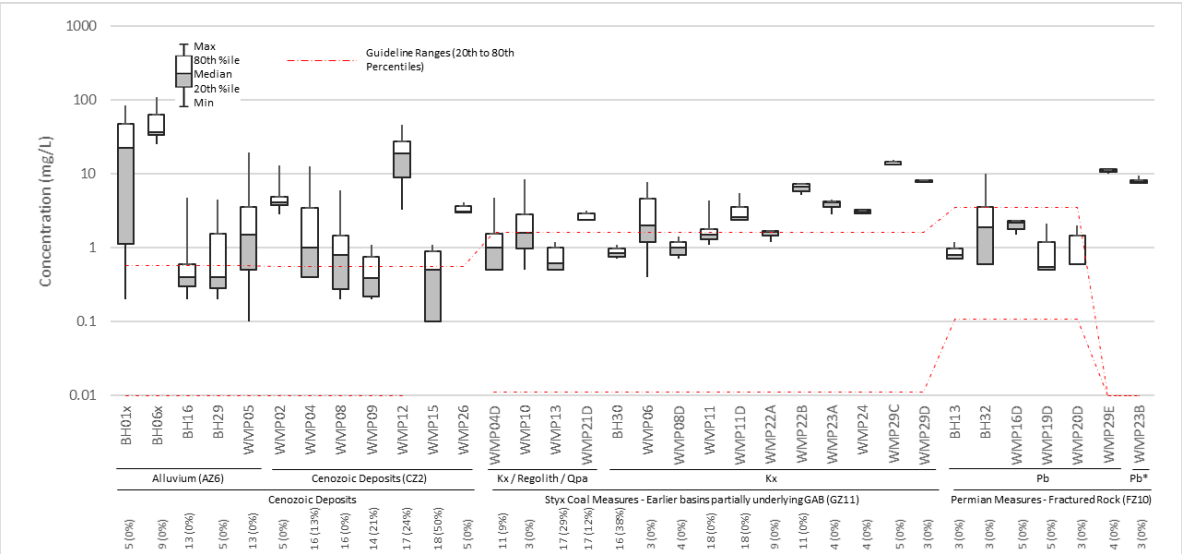

Figure B9. Total Nitrogen summary statistics

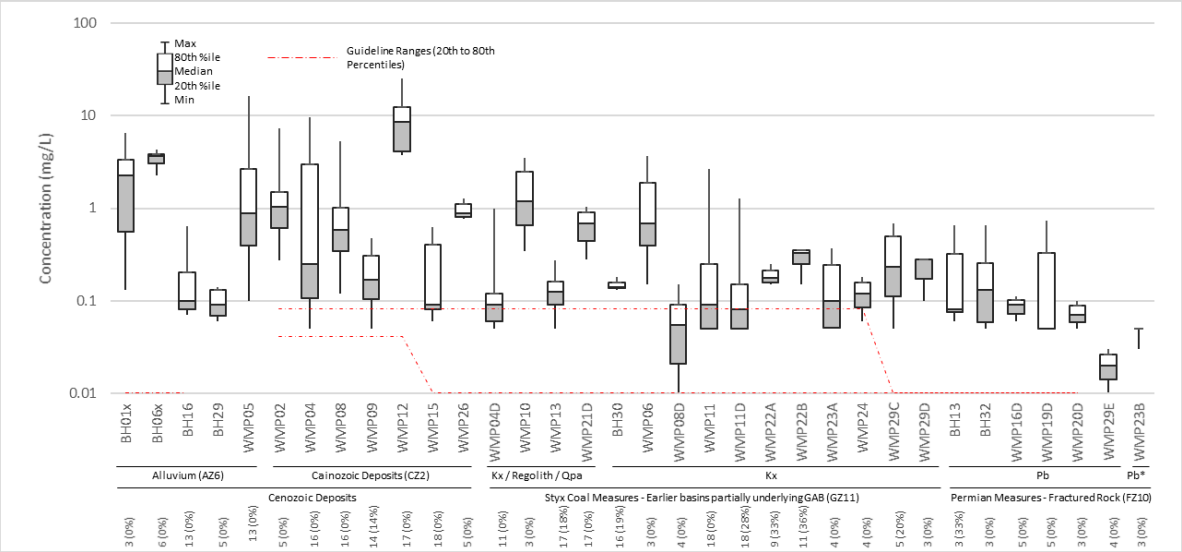

Figure B10. Total Phosphorous summary statistics

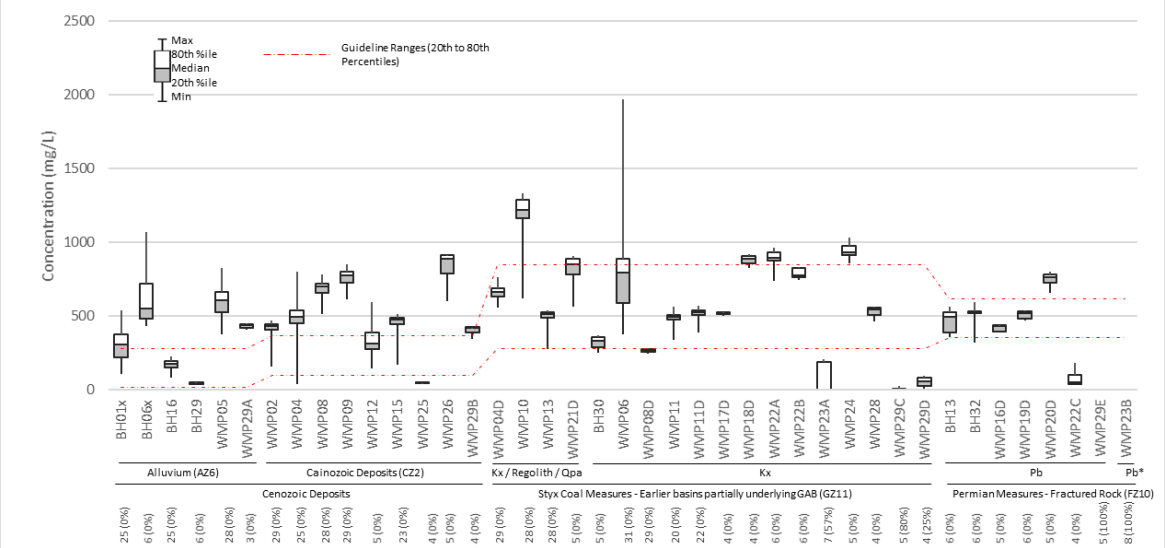

Figure B11. Bicarbonate Alkalinity summary statistics

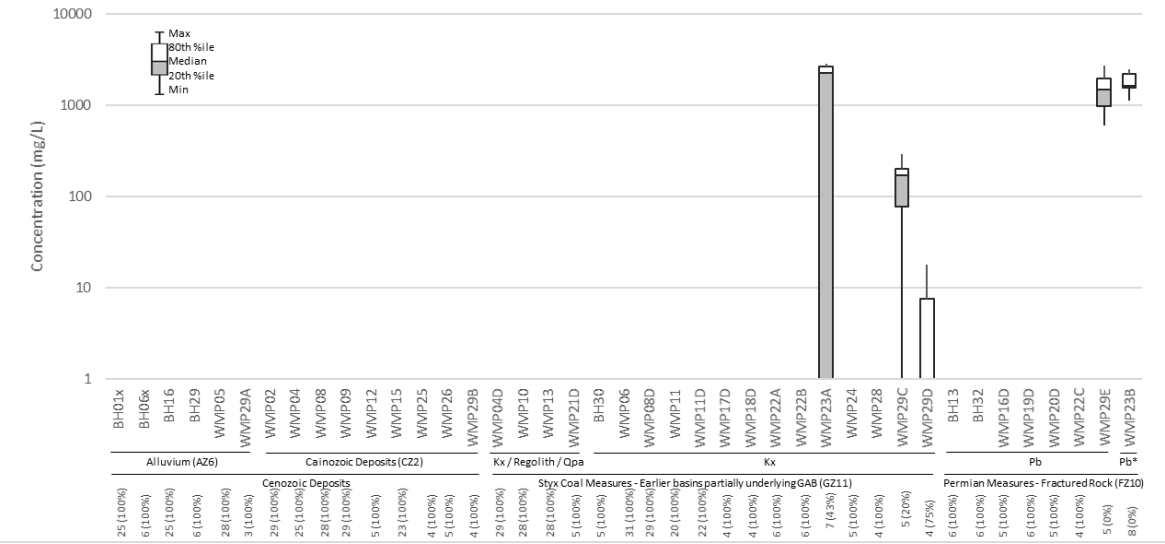

Figure B12. Hydroxide Alkalinity summary statistics

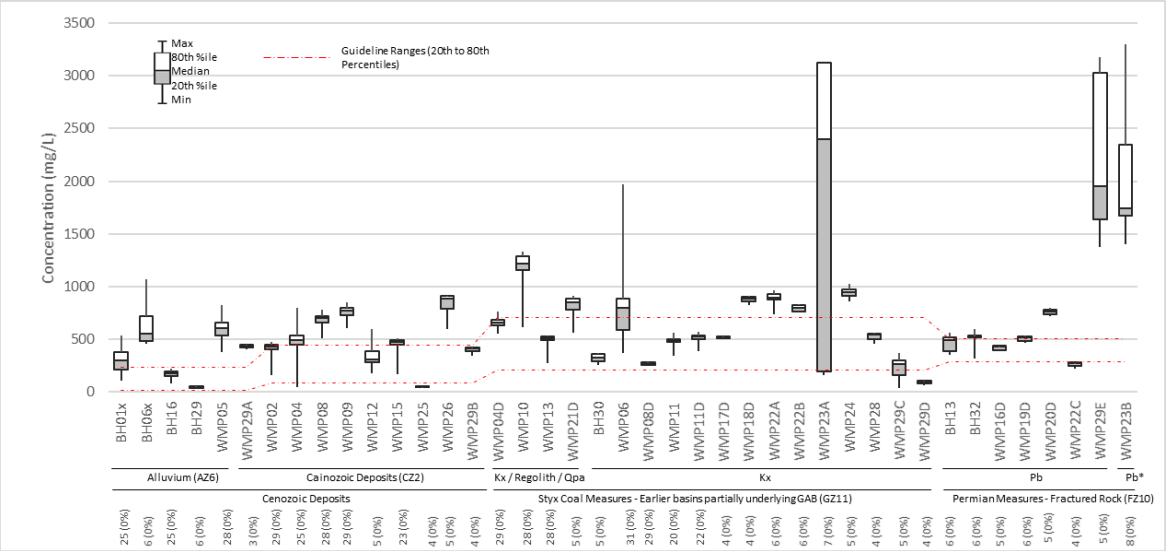

Figure B13. Total Alkalinity summary statistics

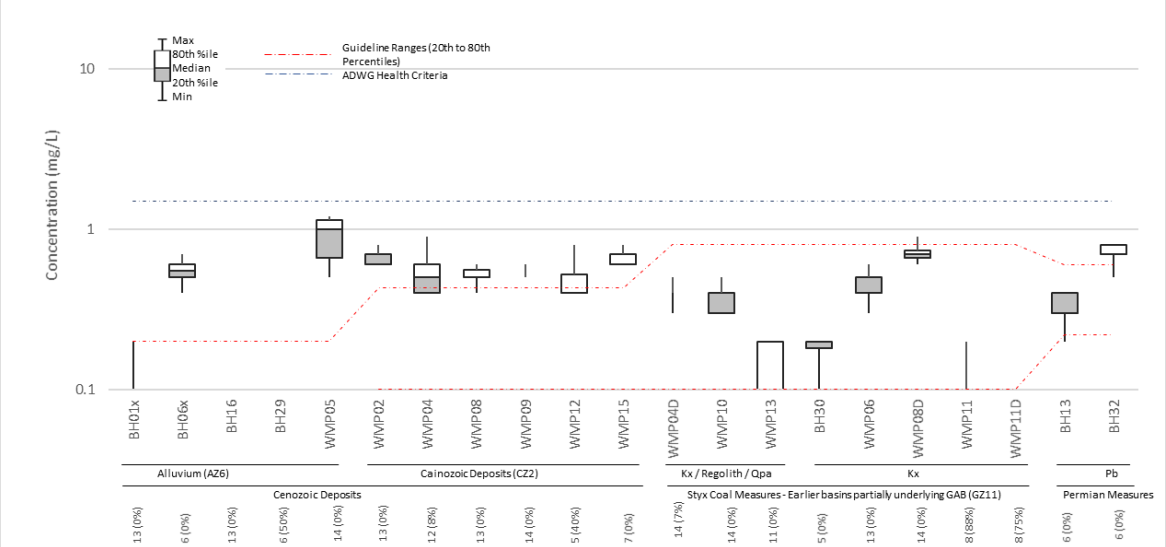

Figure B14. Fluoride summary statistics

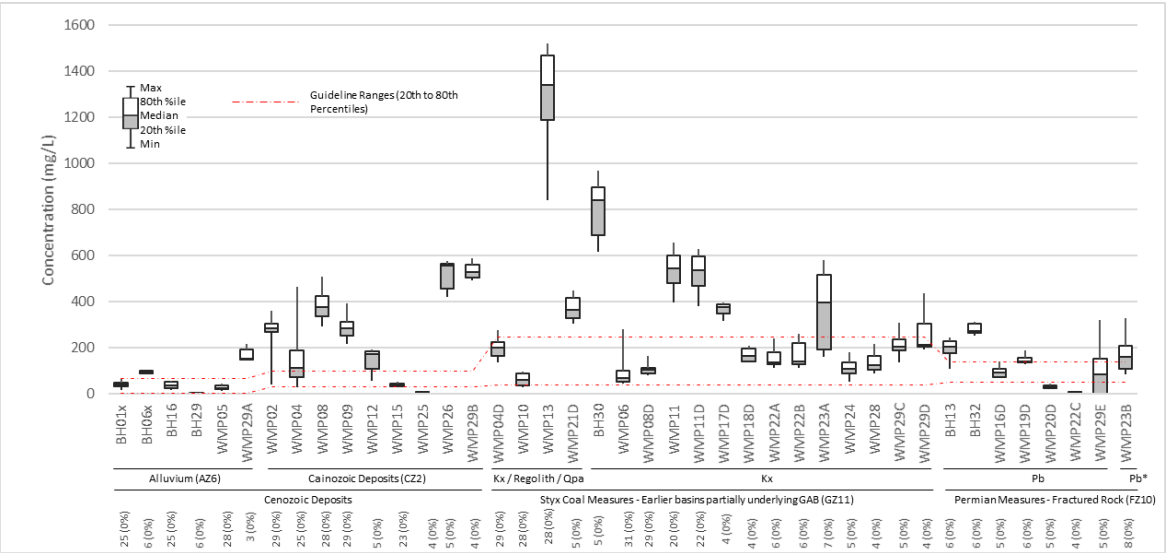

Figure B15. Calcium summary statistics

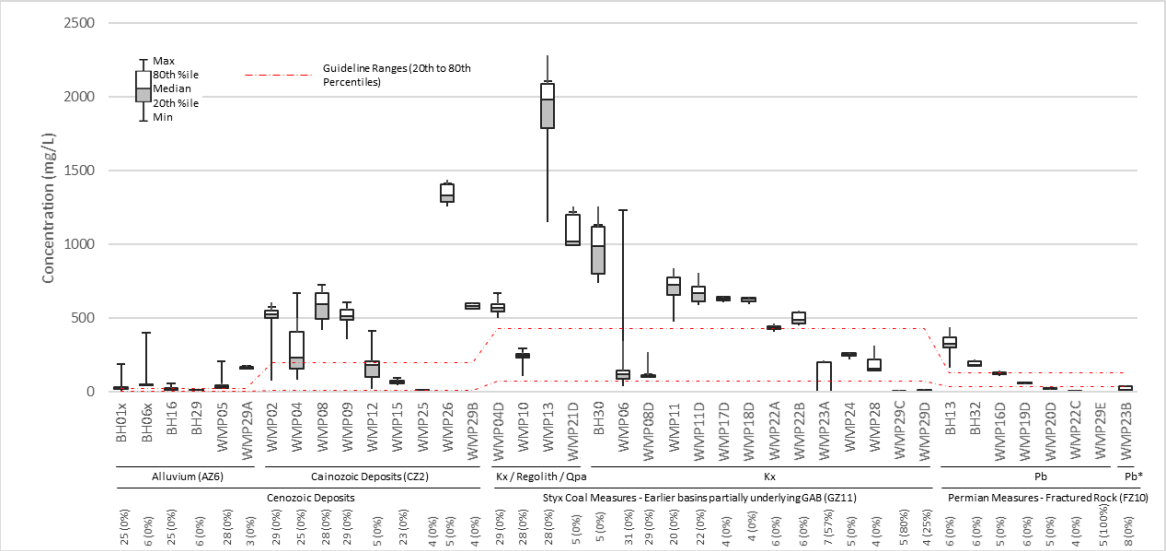

Figure B16. Magnesium summary statistics

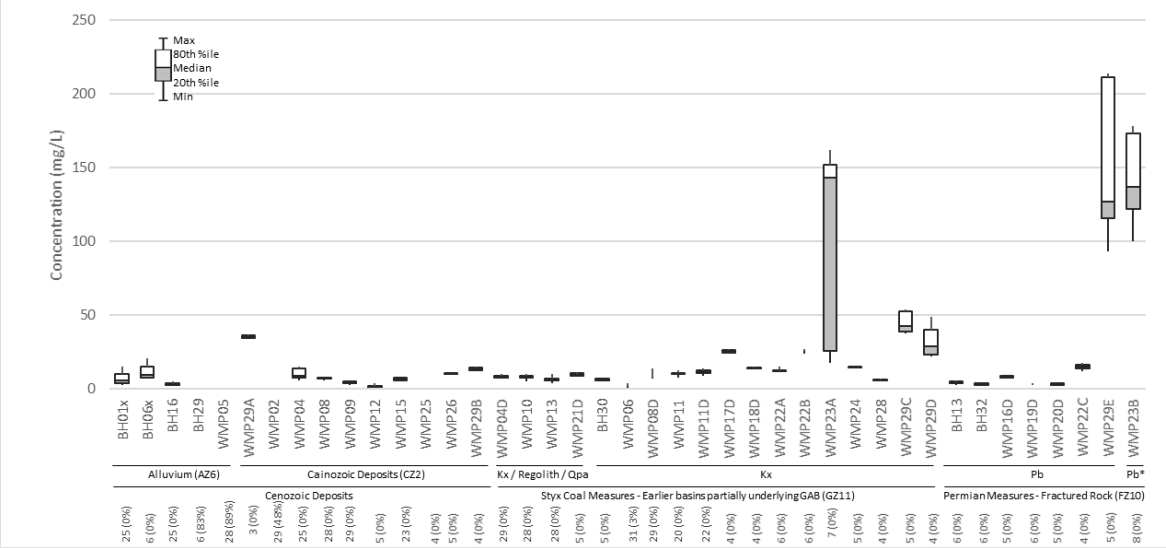

Figure B17. Potassium summary statistics

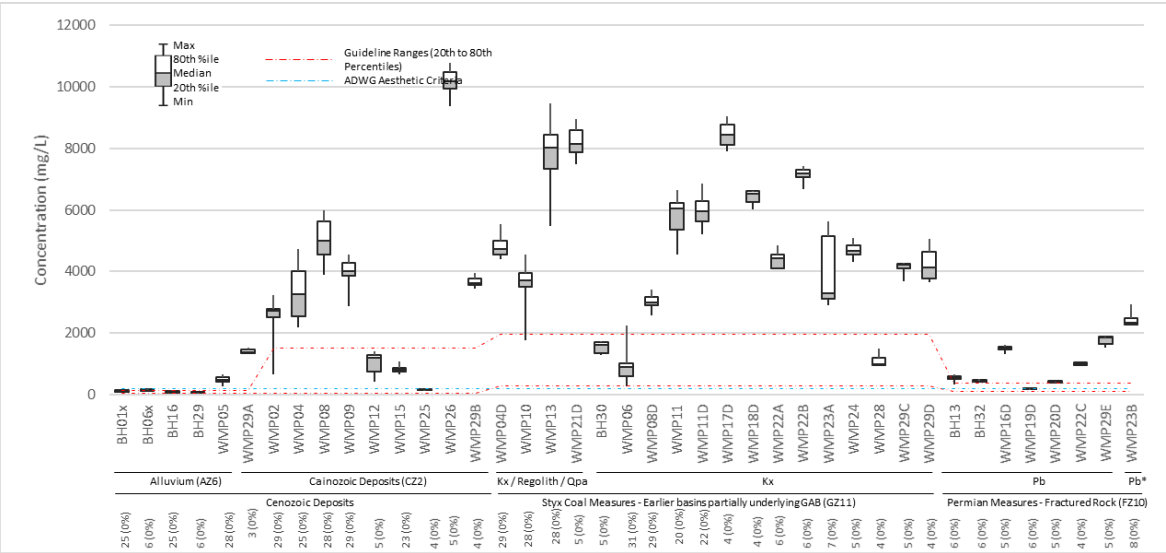

Figure B18. Sodium summary statistics

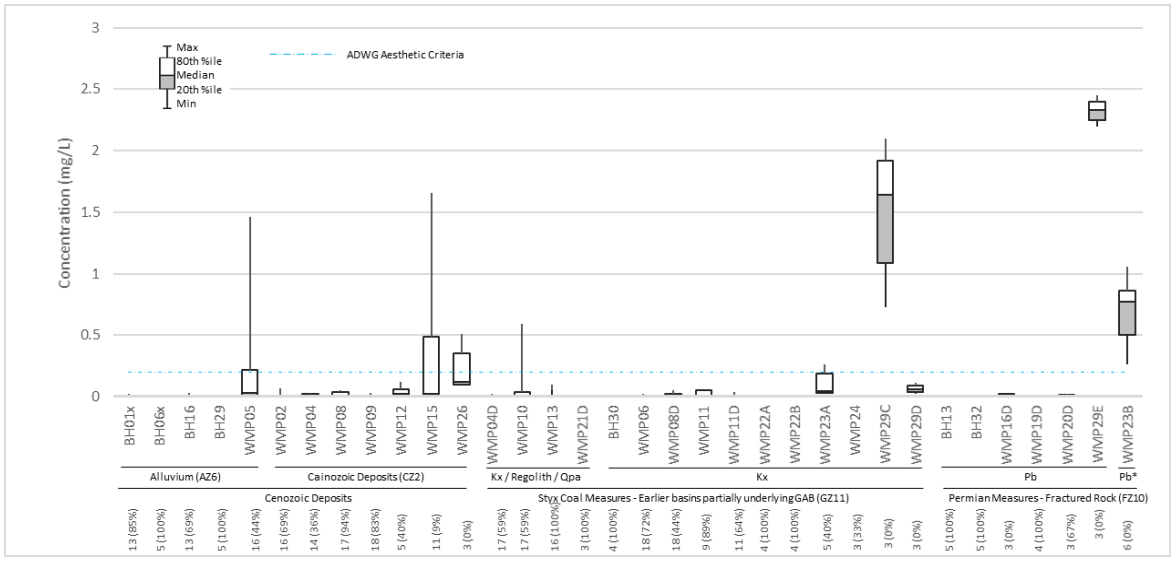

Figure B19. Dissolved aluminium summary statistics

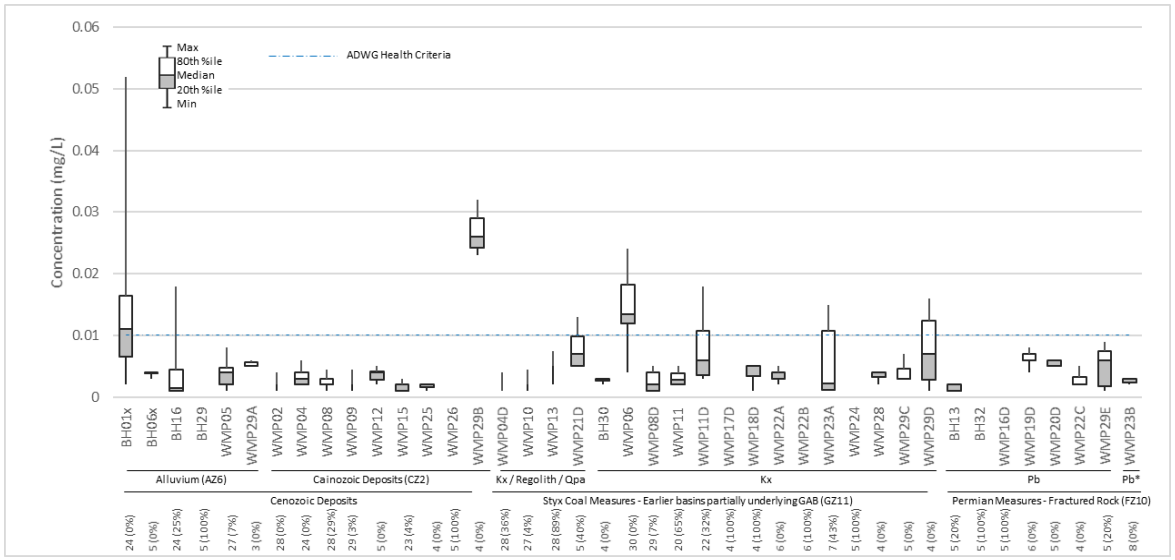

Figure B20. Dissolved Arsenic summary statistics

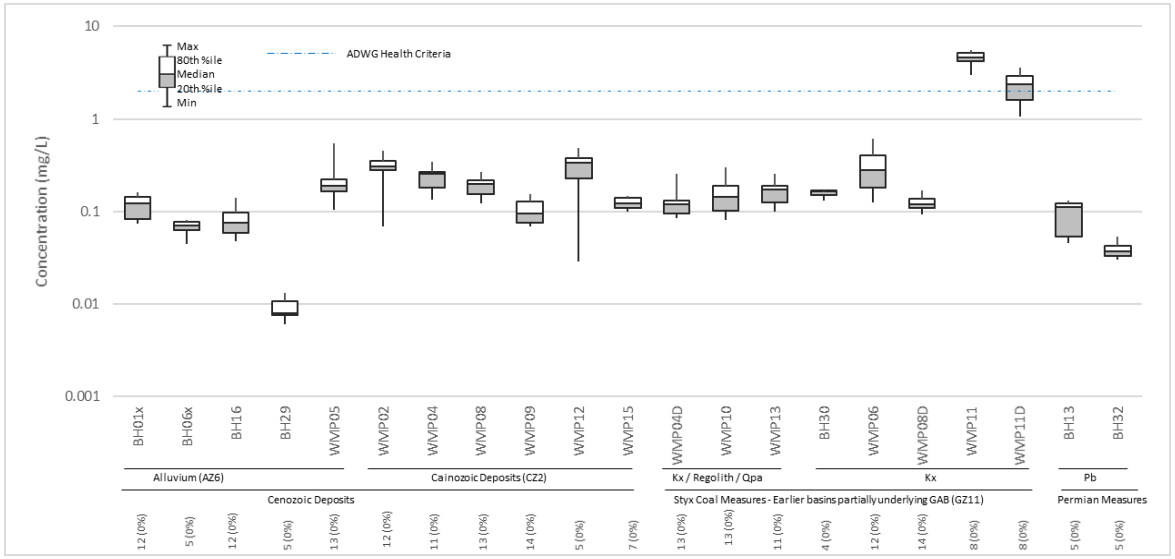

Figure B21. Dissolved Barium summary statistics

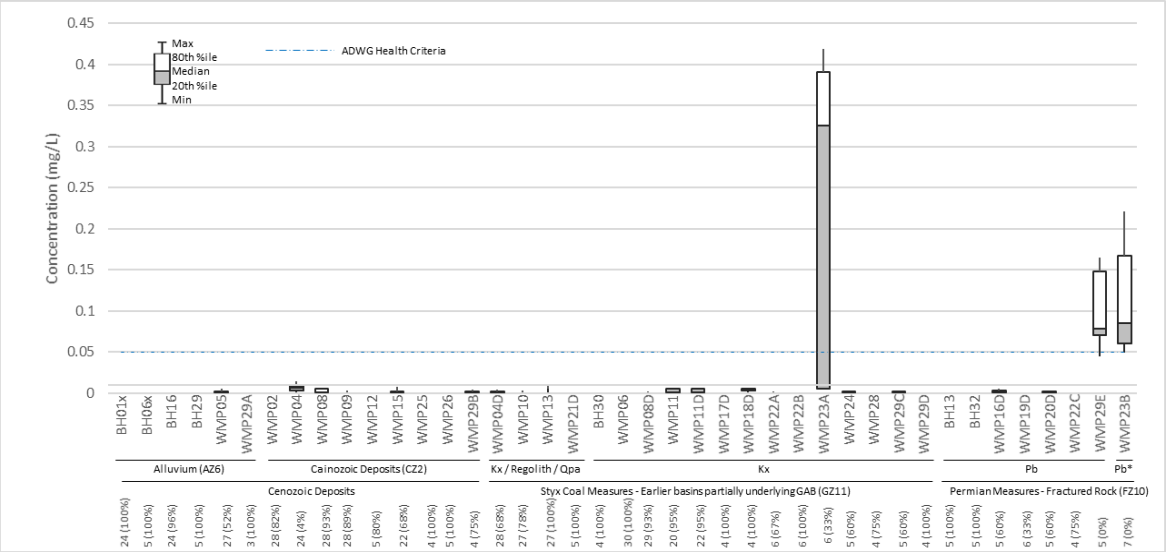

Figure B22. Dissolved Chromium summary statistics

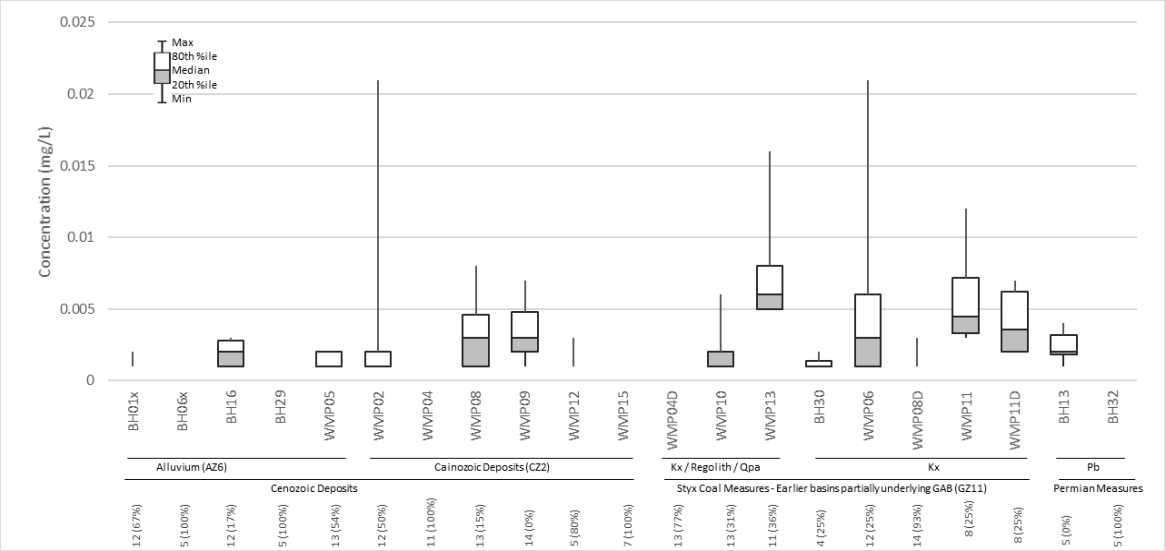

Figure C23. Dissolved Cobalt summary statistics

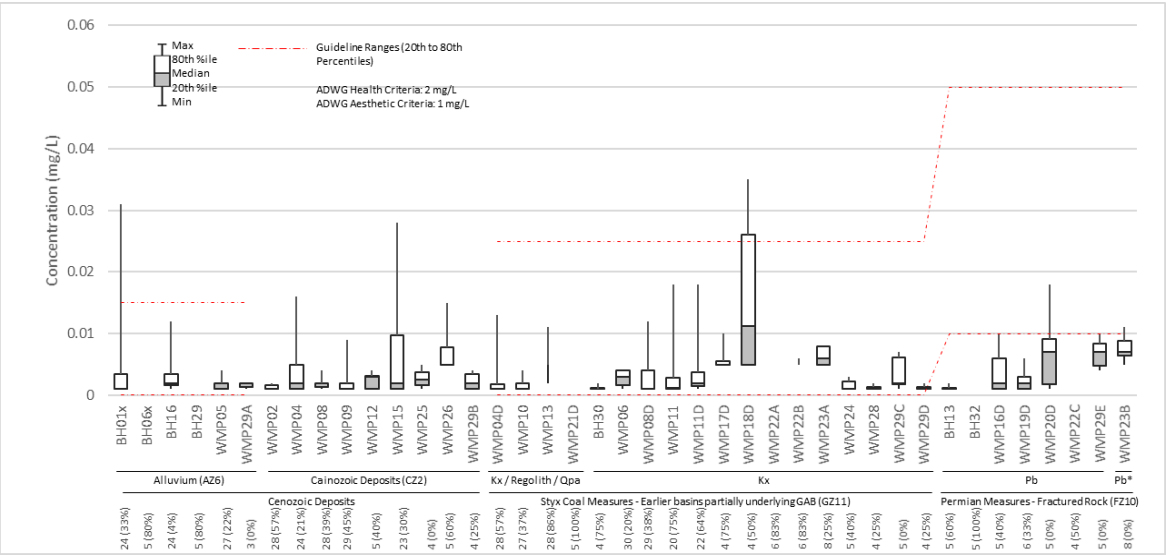

Figure C24. Dissolved Copper summary statistics

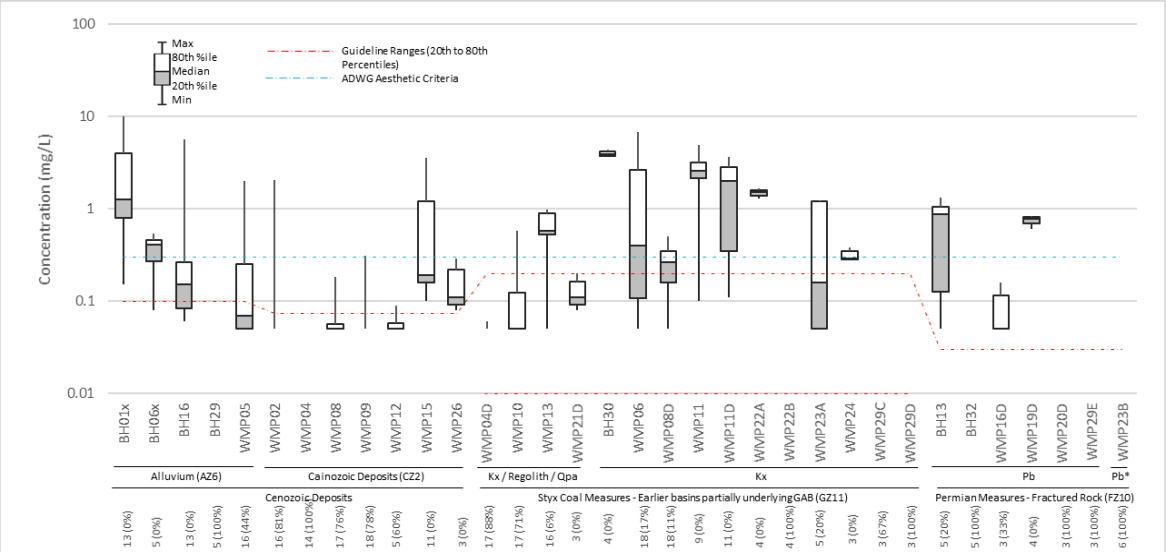

Figure C25. Dissolved Iron summary statistics

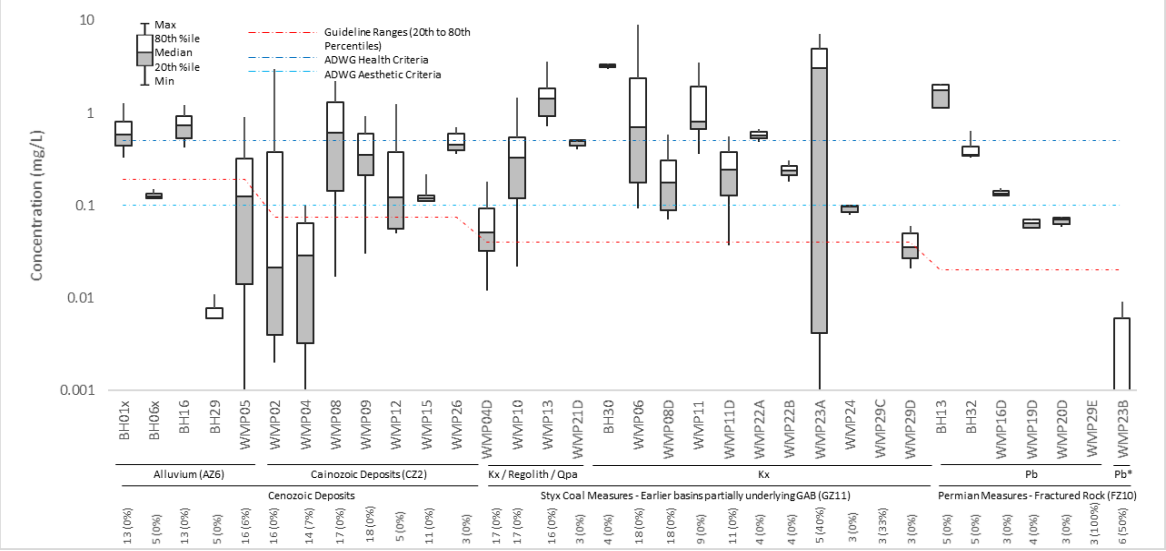

Figure C27. Dissolved Manganese summary statistics

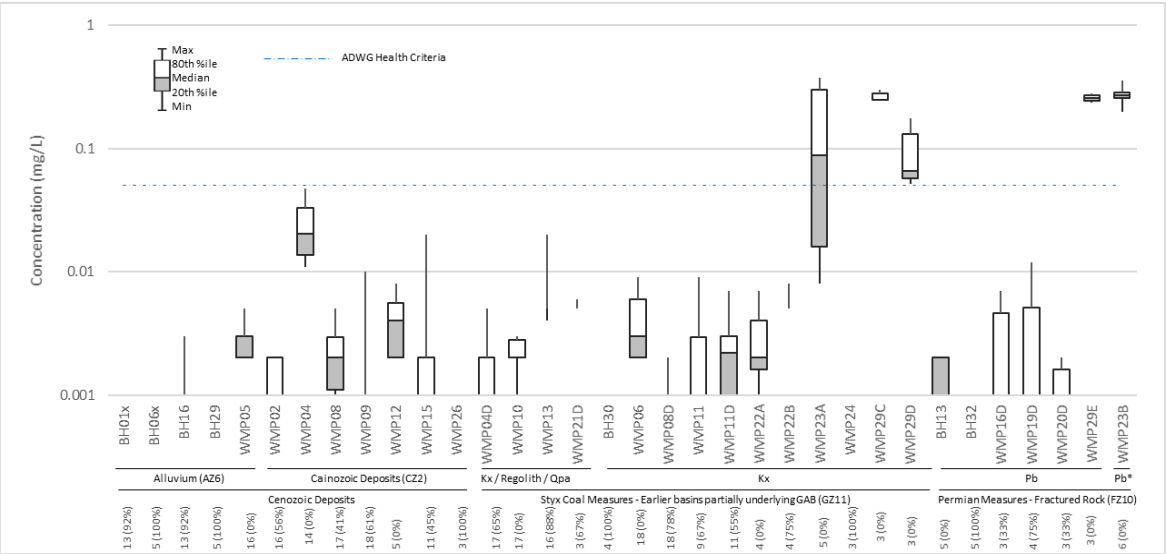

Figure C28. Dissolved Molybdenum summary statistics

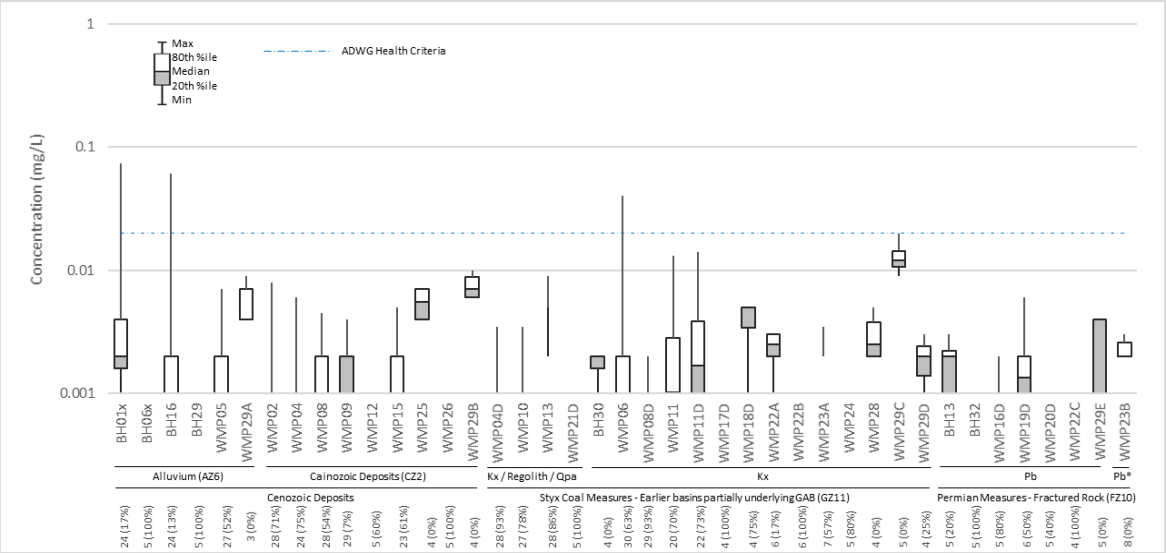

Figure C29. Dissolved Nickel summary statistics

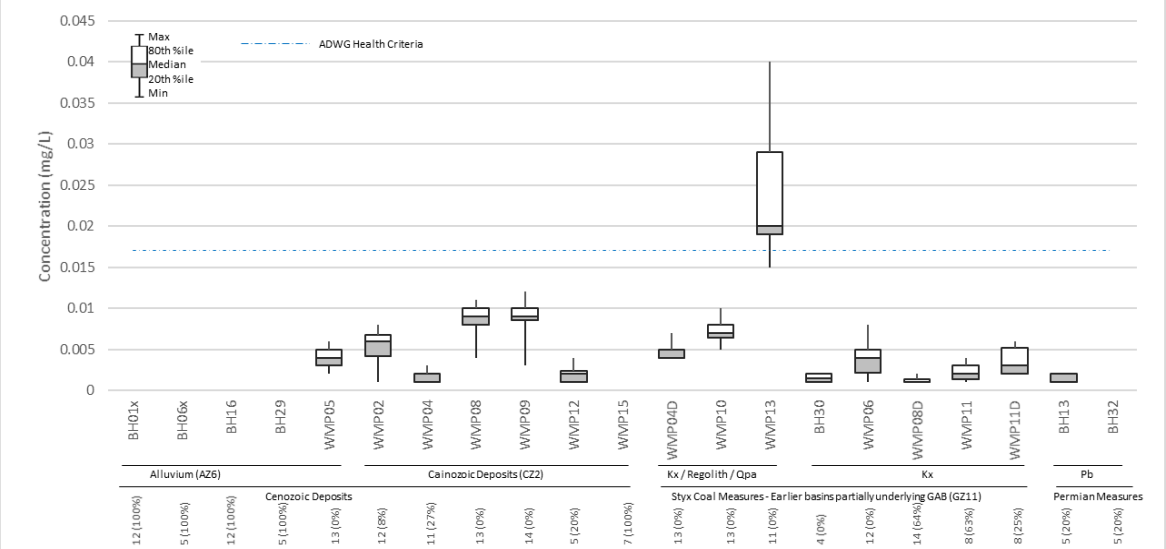

Figure C30. Dissolved Uranium summary statistics

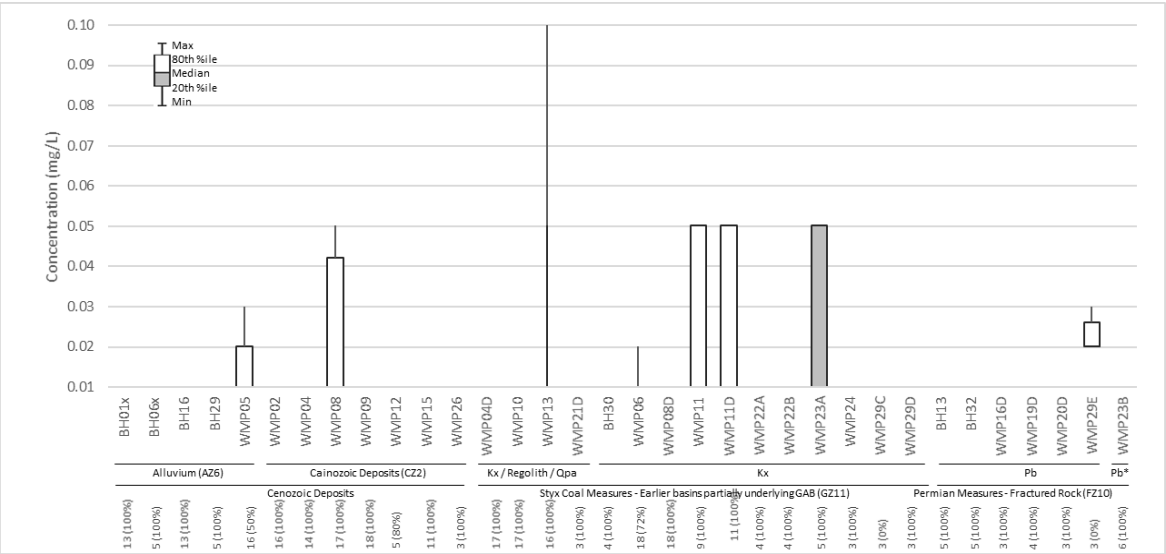

Figure C31. Dissolved Vanadium summary statistics

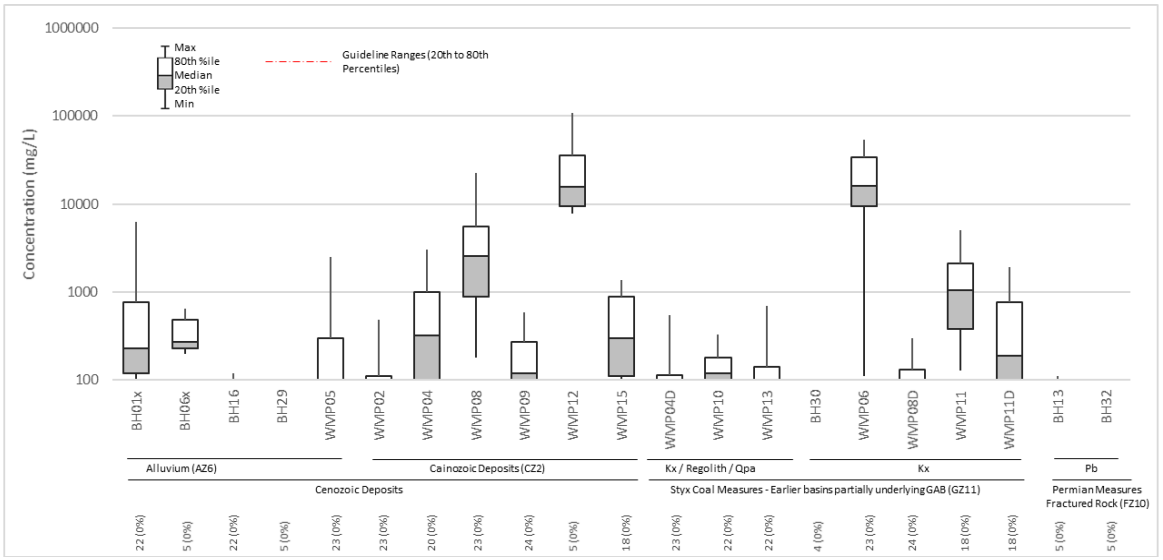

Figure C32. Total Recoverable Hydrocarbons (TRH) summary statistics

Attachment C

Bore Census Results

Table C1: Summary of bore census results

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
BH20	57794	773594	7494522			12-Nov-79	In use		Electric pump	PVC casing, sealed by pump headworks. Pump infrastructure installed and functional	Water Supply	Household use, stock watering as required	Conrad's	9.8		9.4	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73. GIS East, North added false 2m to x and y to differentiate from BH16; Project LiDAR; Douglas Partners, 2011
67650	67650	791794	7492413			16-Feb-90					Water Supply			20.5		98.45918	Registered bore network
67651	67651	791978	7496139			17-Feb-90					Water Supply			40		60.41906	Registered bore network
BH16	67652	773592	7494520			28-Feb-90	Not in use			PVC casing, no cap	Water Supply			9.1		9.67	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Casing height from CDM Smith Sep 18 Field Sheets
BH26	67653	771516	7502680			21-Feb-90		Feb 17: Access not possible			Water Supply	Stock watering		8		12.7	Registered bore network; Elevation from Project LiDAR
BH25	67654	773963	7506776		OLIVE AM OLO	08-Mar-90		Feb 17: Access not possible			Water Supply	Stock watering		7		5.3	Registered bore network; Elevation from Project LiDAR
BH37	67656	770505	7499287	Nov 2011: (Yeats) Riverside 1; May 17: (CDM Smith) labelled "BH33 (should be BH37)"	SOPPA OLO	04-Mar-90	Not in use		Production NO pump attached	PVC casing, steel and cement surface casing, broken stickup, no cap but semi-covered by shelter	Water Supply		Riverside	6.8		10.6	; Douglas Partners, 2011CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Elevation from 2009 Council / ELVIS LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets
BH24	84983	773004	7493545	Nov 2011: (Yeats) BH1	WELL NO 1	01-Jan-60		Feb 17: Access not possible	Windmill	Windmill	Water Supply	Stock watering	Bar H	2.6		10.4	Yeats Consulting Bore Census, Survey; Elevation from Project LiDAR; Douglas Partners, 2011
BH21	88144	769040	7475802		SHANNON or OFFICE LICENCE ONLY?	17-Jun-65	In use / possibly in use		Windmill	Steel casing, open. Windmill equipped, pumps to tank	Water Supply	Stock watering	Mt Bison	14.4		74	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Elevation from 1s SRTM LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
BH22	88145	766718	7481287			17-Jun-65	Abandoned / destroyed				Water Supply			18.3		52.7	Registered bore network; Elevation from 1s SRTM; Casing height from Feb 2017 (CDM Smith) field sheets
BH23	88146	765068	7485360			17-Jun-65	Not in use		Windmill	Steel casing, open, totally overgrown. Windmill equipped, adjacent tank	Water Supply	Stock watering	Mt Bison	27.4		46.4	Elevation from 1s SRTM LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
88889	88889	778302	7476653		ABD BORE 1 OLO	00-Jan-00					Water Supply			13.7		79.744	Registered bore network

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
BH19	88890	772863	7474143		NEW BORE 2 OLO	05-Jul-80	Not in use			PVC casing, cement surface casing, open. Pump infrastructure installed, headworks rusted/broken	Water Supply			17.3		71	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73, Project LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets
BH18	88891	777605	7476010		REPLACES NO.1 BORE	19-Aug-80	Not in use			Cement headworks, sealed. Pump infrastructure installed	Water Supply			14.1		69.1	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Elevation from 1s SRTM LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets
BH32	88892	774433	7470634	Nov 2011: (Yeats) Ne3, Neerim 3; Feb 17: (CDM Smith field notes) BH34, (CDM Smith SEIS Table 10-72, 73) BH32	BORE 4	01-Jan-00	Not in use			PVC casing, cement plinth/surface casing, no cap, strong sulphurous odour	Water Supply		Neerim	16.8	PVC 150	103	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Elevation from 1s SRTM LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
BH35	91191	774560	7470829	Ne4, Neerim 4 (old pump house)	RICHARDSON	16-Dec-93	Not in use		Production with pump attached	PVC casing, steel and cement surface casing, no cap but covered by shed, strong sulphurous odour; Pump infrastructure installed, rusted/broken	Water Supply		Neerim	11.8		101	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Elevation from 1s SRTM LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
91455	91455	753531	7487736		SHANNON NO1 OLO	21-Jun-65					Water Supply			24.2		195.3976	Registered bore network
91456	91456	753686	7492883		SHANNON NO2 OLO	21-Jun-65					Water Supply			16.76		140.0562	Registered bore network
91457	91457	757948	7496212		SHANNON NO3 OLO	21-Jun-65					Water Supply			20.4		47.34674	Registered bore network
BH14	91567	770754	7498930		SOPPA OLO	12-Sep-90	Abandoned / destroyed				Water Supply			8.8		16.345	Registered bore network
BH13	91572	784427	7485608	Lorna Vale	RACKERMANN OLO	25-Oct-92	In use/possibly in use			PVC casing, well cap. Disconnected pump in well	Water Supply	Unknown		30.8		81.9	Field data sheets, 23/2/2017; Elevation from 1s SRTM LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets
BH08	91715	769614	7482476		MCCARTNEY	19-Sep-94		Feb 17: Access not possible			Water Supply			47		142.06	Registered bore network - CDM Smith unable to access; elevation from 2011 Project LiDAR
91746	91746	767912	7499540		NEW HOPE 9013	06-Nov-93	Abandoned / destroyed				Mineral or Coal Exploration						Registered bore network

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
91748	91748	768962	7499842		NEW HOPE 9014	08-Nov-93	Abandoned / destroyed				Mineral or Coal Exploration						Registered bore network
91749	91749	769260	7499822		NEW HOPE 9015	08-Nov-93	Abandoned / destroyed				Mineral or Coal Exploration						Registered bore network
91750	91750	769594	7499914		NEW HOPE 9016	09-Nov-93	Abandoned / destroyed				Mineral or Coal Exploration						Registered bore network
91751	91751	768873	7500948		NEW HOPE 9017	10-Nov-93	Abandoned / destroyed				Mineral or Coal Exploration						Registered bore network
91752	91752	769229	7501075		NEW HOPE 9018	11-Nov-93	Abandoned / destroyed				Mineral or Coal Exploration						Registered bore network
91753	91753	769144	7503266		NEW HOPE 9019	12-Nov-93	Abandoned / destroyed				Mineral or Coal Exploration						Registered bore network
91884	91884	786116	7507974		GALEA OLO	17-Mar-90					Water Supply			24		23.71581	Registered bore network
97381	97381	783371	7499036		GALEA	20-Oct-94					Water Supply			19		25.39053	Registered bore network
BH07	97562	765346	7475831		F G SHANNON	17-Oct-97	In use/possibly in use	Feb 17: Large discrepancy in registered and field coordinates	Pipes in bore; pump connected as required	PVC casing, sealed by pump headworks. Solar pump infrastructure installed and functional, pumps to adjacent tank	Water Supply	Stock watering	Mt Bison	30.4		77	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Elevation from 1s SRTM LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
97641	97641	782947	7504271		GALEA S	01-Jan-93					Water Supply			12.2		21.90071	Registered bore network
97654	97654	756868	7488875		MONTROSE GRAZING CO	06-Nov-97					Water Supply			24		78.33195	Registered bore network
97825	97825	760346	7477026		WHITE (SCRUB DAM BORE)	15-Oct-97					Water Supply			24		335.5497	Registered bore network
97826	97826	761097	7478342		WHITE (OLD MILL BORE)	15-Oct-97					Water Supply			18		127.136	Registered bore network
97827	97827	756185	7474962		WHITE (BULLOCK PAD #2)	20-Jan-94					Water Supply			30		169.427	Registered bore network

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
97828	97828	761427	7473161		WHITE (LANGDALE BORE)	20-Feb-90					Water Supply			26		183.776	Registered bore network
BH17	97829	762574	7482280		WHITE (HOUSE BORE)	18-Feb-90	In use/possibly in use			Cement surface casing, sealed. Pump infrastructure installed and functional, pumps to tank?	Water Supply	Unknown		24.5		63	Elevation from 1s SRTM LiDAR
97830	97830	756763	7474932		WHITE	08-Apr-98					Water Supply			19		144.6868	Registered bore network
97864	97864	770551	7485508		MCCARTNEY	23-Jun-98					Water Supply			55		50.815	Registered bore network
BH06	97866	769036	7475802		SHANNON	22-Jun-98	In use/possibly in use			PVC casing, no cap. Pump infrastructure installed and functional, pumps to tank	Water Supply	Unknown		20.5		74	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Elevation from 1s SRTM LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets
111311	111311	786515	7487853		0	01-Jan-00					Water Supply			12.5		53.94144	Registered bore network
111312	111312	790318	7485613		HALS BORE	01-Jan-67					Water Supply			19.2		75.30087	Registered bore network
BH05x	111417	770918	7499541	Riverside 2, BH5x	SOPPA	05-Apr-00	In use / possibly in use	Feb 17: Damaged during Cyclone Debbie and now destroyed		Bailer does not fit but dipping possible. Pump infrastructure installed and functional	Water Supply	Unknown	Riverside	10.6	PVC 150	9	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
BH04	111418	772246	7496509		SOPPA	05-Apr-00	Not in use			PVC casing, no cap, possible surface ingress (bailer does not fit). Windmill equipped, pumps to tank	Water Supply	Stock Watering		10.2		10	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Casing height from Feb 2017 (CDM Smith) field sheets
111428	111428	786932	7485677		BOWMAN	28-Mar-00					Water Supply			17.07		60.78342	Registered bore network
111429	111429	790416	7485356		BOWMAN	28-Mar-00					Water Supply			27.43		79.00964	Registered bore network
111480	111480	788665	7513347		BERESFORD	06-Apr-00					Water Supply	Stock watering		21.34		14.56777	Registered bore network
111543	111543	791178	7487803		BOWMAN	12-Aug-01			Windmill		Water Supply	Stock watering	Lorna Vale	30.48		94.11135	Registered bore network; Douglas Partners, 2011

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
111559	111559	788152	7510912		VELLA	20-Oct-01					Water Supply			21.34		15.11493	Registered bore network
111560	111560	789766	7510724		VELLA	20-Oct-01					Water Supply			30.48		29.59645	Registered bore network
111565	111565	790451	7514756		VELLA	23-Oct-01					Water Supply			18.29		51.7943	Registered bore network
111566	111566	787920	7512001		VELLA	23-Oct-01					Water Supply			6.1		12.86316	Registered bore network
111568	111568	787721	7482638		FERRIS	19-Oct-01					Water Supply			24.38		86.10982	Registered bore network
111593	111593	784506	7501825		GALEA	23-Oct-01					Water Supply			18.29		35.24813	Registered bore network
122160	122160	790682	7496434		ALICE SPRINGS PASTORAL	18-Oct-04					Water Supply			30		52.63165	Registered bore network
122161	122161	790389	7499115		ALICE SPRINGS PASTORAL	17-Oct-04	Abandoned / destroyed				Water Supply						Registered bore network
122164	122164	790722	7499361		PLATANUS	17-Oct-04	Abandoned / destroyed				Water Supply						Registered bore network
122987	122987	789539	7512400			24-Oct-04					Water Supply			36		37.43314	Registered bore network
122989	122989	790079	7510666			24-Oct-04					Water Supply			24		34.41524	Registered bore network
122994	122994	750200	7473725			20-Oct-04					Water Supply			41		321.2083	Registered bore network
136063	136063	785665	7501020			26-Oct-04	Abandoned / destroyed				Water Supply						Registered bore network
136065	136065	788569	7512572			24-Oct-04	Abandoned / destroyed				Water Supply			16		15.85694	Registered bore network
136307	136307	791426	7482317			21-Aug-03					Water Supply			40		135.0078	Registered bore network
136562	136562	790517	7485598			17-Jun-07			Electric pump with solar panels		Water Supply	Stock watering	Lorna Vale	27		75.08208	Registered bore network; Douglas Partners, 2011
151113	151113	778843	7501608			22-Sep-09	Abandoned / destroyed				Water Supply						Registered bore network
151938	151938	787814	7499184			26-Apr-13	Abandoned / destroyed				Water Supply						Registered bore network
151942	151942	787292	7498795			26-Sep-13					Water Supply			42		42.04633	Registered bore network
151948	151948	786879	7509283		TANDERRA SCRUB	11-Oct-13					Water Supply			30		22.74094	Registered bore network
151949	151949	787573	7499235		WELLINGTON BORE	11-Oct-13					Water Supply			36.6		45.68623	Registered bore network

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
161189	161189	788325	7507322			03-Oct-14					Water Supply			60		57.47841	Registered bore network
161224	161224	788573	7504696			02-Oct-14					Water Supply			24		70.0377	Registered bore network
161292	161292	761934	7481483		HILL PADDOCK BORE	14-Jul-15					Water Supply			30		78.83981	Registered bore network
161293	161293	769606	7470346		WHITE COW PADDOCK BORE	15-Jul-15					Water Supply			24		103	Elevation from 1s SRTM LiDAR
161351	161351	784959	7507900			26-Oct-15					Water Supply			60		21.02866	Registered bore network
161355	161355	786189	7507274			26-Oct-15	Abandoned / destroyed				Water Supply						Registered bore network
161437	161437	751057	7473300			16-Feb-16	Abandoned / destroyed				Water Supply						Registered bore network
161438	161438	750469	7475000			15-Feb-16	Abandoned / destroyed				Water Supply						Registered bore network
161478	161478	756775	7476452			07-Jun-16					Water Supply			30		123.4165	Registered bore network
161612	161612	788564	7488620			27-Apr-17			Windmill		Water Supply	Stock watering	Lorna Vale	19		56.43431	Registered bore network; Douglas Partners, 2011
WMP04D	161685	772859	7489351			29-Sep-17			Project Monitoring Well		Mine Monitoring	Monitoring		36.5		28.33	STX Headers, provided by CQC; Casing height from CDM Smith Sep 18 Field Sheets
WMP02	161686	773497	7491734			01-Oct-17			Project Monitoring Well		Mine Monitoring	Monitoring		18.4		25	STX Headers, provided by CQC; Casing height from CDM Smith Sep 18 Field Sheets
WMP05	161687	774487	7491625			30-Sep-17			Project Monitoring Well		Mine Monitoring	Monitoring		12.4		17.22	DGPS - Hemisphere A325, Omnistar HP, Walton Bore Geophysics Pty Ltd 17 December 2019; casing height from CDM Smith Sep 18 Field Sheets
WMP04	161691	772865	7489359			11-Oct-17			Project Monitoring Well		Mine Monitoring	Monitoring		18.4		28.33	DGPS - Hemisphere A325, Omnistar HP, Walton Bore Geophysics Pty Ltd 17 December 2019; casing height from CDM Smith Sep 18 Field Sheets
WMP10	161692	775878	7486688			13-Oct-17			Project Monitoring Well		Mine Monitoring	Monitoring		18.4		29.26	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP09	161693	773459	7484062			14-Oct-17			Project Monitoring Well		Mine Monitoring	Monitoring		15.4		37.63	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP07	161694	771264	7483151			16-Oct-17			Project Monitoring Well		Mine Monitoring	Monitoring		60		131	STX Headers, provided by CQC; Casing height from CDM Smith Sep 18 Field Sheets
WMP08D	161698	774134	7481232			02-Nov-17			Project Monitoring Well		Mine Monitoring	Monitoring		36		43.49	Casing height from 4/12/17 field sheets

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
WMP08	161700	774134	7481232			02-Nov-17			Project Monitoring Well		Mine Monitoring	Monitoring		16		43.49	STX Headers, provided by CQC; Casing height from CDM Smith Sep 18 Field Sheets
WMP13	161730	772604	7495931			12-Jan-18			Project Monitoring Well		Mine Monitoring	Monitoring		19.7		18.4	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP11D	161762	774201	7493623			17-Mar-18			Project Monitoring Well		Mine Monitoring	Monitoring		36		18.7	STX Headers, provided by CQC; casing height from CDM Smith April 18 Field Sheets
WMP11	161763	774194	7493610			18-Mar-18			Project Monitoring Well		Mine Monitoring	Monitoring		24		18.75	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP14	161764	770477	7487637			19-Mar-18			Project Monitoring Well		Mine Monitoring	Monitoring		18		32.89	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP15	161765	771774	7485564			20-Mar-18			Project Monitoring Well		Mine Monitoring	Monitoring		21		43.25	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP17	161902	775465	7483308			03-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		12		42.83	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP17D	161903	775470	7483286			03-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		24		42.83	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
161945	161945	768322	7473200			17-Nov-18					Water Supply			25		98.5621	Registered bore network
161946	161946	761842	7480427			17-Nov-18	Abandoned / destroyed				Water Supply						Registered bore network
WMP19	187029	768808	7485676			06-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		16.1		41	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP19D	187030	768801	7485692			07-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		28		41	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP25	187031	770812	7486227			08-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		13.2		44.21	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP27	187032	770606	7487750			08-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		20.5		33.03	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP26	187033	773655	7489372			09-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		20.5		27.56	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP21D	187034	774243	7490004			10-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		22		25.99	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP21	187035	774294	7490072			10-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		9.9		23.79	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
WMP28	187036	772192	7489099			11-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		12		21.91	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP24	187037	771965	7489093			11-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		26.4		19.36	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP18D	187038	775358	7487152			12-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		23.5		30.62	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP18	187039	775366	7487144			12-Sep-18			Project Monitoring Well		Mine Monitoring	Monitoring		12.2		30.54	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP23B	187049	773638	7484709			06-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		194		36.36	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP23A	187050	773651	7484701			06-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		56.5		36.38	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP22C	187051	772012	7488900			19-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		206		29.76	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP22B	187052	772011	7488896			19-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		56		29.74	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP22A	187053	772008	7488891			19-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		30		29.67	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP30A	187054	772028	7488896			19-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		30		29.79	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP30B	187055	772028	7488900			19-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		56		29.75	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP30C	187056	772029	7488905			19-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		206		29.72	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP29E	187057	771312	7497397			31-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		228.5		11.97	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP29D	187058	771317	7497387			01-Nov-18			Project Monitoring Well		Mine Monitoring	Monitoring		121		11.97	STX Headers, provided by CQC; Installation date from CDM Smith, SEIS (Dec 2018), Ch10, Table 10-85.; casing height from CDM Smith Sep 18 Field Sheets
WMP29C	187059	771318	7497394			27-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		58		11.97	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP29B	187060	771301	7497385			28-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		20		11.97	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
WMP29A	187061	771298	7497385			28-Oct-18			Project Monitoring Well		Mine Monitoring	Monitoring		12.5		11.97	DGPS - Hemisphere A325, Omnistar HP, Walton Bore Geophysics Pty Ltd 17 December 2019; casing height from CDM Smith Sep 18 Field Sheets
WMP06	187085	770020	7488120			03-Nov-17			Project Monitoring Well		Mine Monitoring	Monitoring		18.4		33.98	STX Headers, provided by CQC; Casing height from CDM Smith Sep 18 Field Sheets
WMP12	187086	773266	7490731			06-Nov-17			Project Monitoring Well		Mine Monitoring	Monitoring		18		26.37	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
187278	187278	771631	7498628			28-Aug-19					Water Supply			21		16.479	Registered bore network
187293	187293	763151	7475329			14-Sep-19	Abandoned / destroyed				Water Supply						Registered bore network
187294	187294	763153	7475407			14-Sep-19	Abandoned / destroyed				Water Supply						Registered bore network
12700003	12700003	763032	7479418			20-Aug-09	Abandoned / destroyed		Electric pump with solar panels		Water Resources Investigation	Stock watering	Mt Bison	172		66.76213	Registered bore network; Douglas Partners, 2011
BH01		761920	7482423		HILL PADDOCK BORE?		Not in use			Cement casing, collapsed / mangled headworks. Windmill	Water Supply					69	CDM Smith SEIS, Ch10, Table 10-72 Third party bores identified during the February 2017 bore census – location, ownership and bore status
BH01x		773561	7494524				Not in use			PVC casing, no cap				10.5		11	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Casing height from CDM Smith Sep 18 Field Sheets
BH02x		769932	7477272				Not in use		Pipes in bore; pump connected as required	PVC casing, no cap. Disconnected pump in well, adjacent tank	Water Supply	Stock watering	Mt Bison	13.3		64	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
BH03x		766972	7479111				In use / possibly in use			PVC casing, sealed by pump headworks. Solar pump infrastructure installed and functional, pumps to adjacent tank	Water Supply	Unknown				59	CDM Smith SEIS, Ch10, Table 10-72 Third party bores identified during the February 2017 bore census – location, ownership and bore status; Casing height from Feb 2017 (CDM Smith) field sheets
BH04x		765542	7482007				In use / possibly in use		Electric pump	PVC casing, partially covered. Pump infrastructure installed and functional	Water Supply	Household use	Mt Bison			56	CDM Smith SEIS, Ch10, Table 10-72 Third party bores identified during the February 2017 bore census – location, ownership and bore status; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
BH06x		770732	7499500				Not in use			PVC casing, with steel monument and concrete block, no cap. Historically had windmill installed but not currently equipped	Water Supply	Industrial		8.9		8	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Casing height from Feb 2017 (CDM Smith) field sheets
BH27		771056	7485987	Nov 2011: (Yeats) Windmill10; WP010 water tank; Feb 2017: (CDM Smith bore census) BH28A	MCCARTNEY?		Not in use		Windmill	Cement casing, open; Windmill / bore + adjacent pump/well. Windmill equipped, rusted, adjacent tank	Water Supply	Stock watering	Mamelon			44.1	Recorded as BH28/5A in CDM Smith field sheets and CDM Smith SEIS, Ch10, Table 10-72, with planned ID BH27. The BH27 notation retained; Elevation from Project LiDAR; Douglas Partners, 2011
BH28		771053	7485988		MCCARTNEY?		Not in use			PVC casing, no cap but covered by shed, obstruction at 1.716m. Pump infrastructure installed, rusted/broken	Water Supply					44	CDM Smith Field data sheets, 21/2/17 (labelled BH28/5); Elevation from Project LiDAR
BH29		775322	7477562	Nov 2011: (Yeats) Ne1,Neerim 1; Feb 17: (CDM Smith) BH32, (CDM Smith SEIS Table 10-73, 73) BH29			Not in use			PVC casing, no cap			Neerim	9	PVC 150	55	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Elevation from Project LiDAR; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
BH30		774175	7475211	Nov 2011: (Yeats) Ne2,Neerim 2			Not in use			PVC casing, no cap			Neerim	30	PVC 150	67	CDM Smith SEIS, Ch10, Table 10-72, details from Table 10-73; Casing height from Feb 2017 (CDM Smith) field sheets; Douglas Partners, 2011
Granite Vale PVC pipe		767044	7502983						Windmill				Granite Vale			19.7	Yeats Consulting Bore Census, Survey; Project LiDAR; Douglas Partners, 2011
Granite vale Steel pipe		767044	7502984						Windmill				Granite Vale			19.7	Yeats Consulting Bore Census, Survey; Project LiDAR; Douglas Partners, 2011
Mm1		773528	7486823							windmill, next to dams	Water Supply		Mamelon			32.082	Yeats Consulting Bore Census, Survey
Og1		775790	7492162							windmill, ogmore connection road	Water Supply					31.419	Yeats Consulting Bore Census, Survey
Og2		778582	7489016							windmill, ogmore connection road, large	Water Supply					54.036	Yeats Consulting Bore Census, Survey

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
										concrete tank with trough nearby							
Pv1		767838	7515168	Nov 2011 (ALS), Mar 2012 (ALS/GHD): Plainvue 1					Production with pump attached	bore, on fence, main road		Production	Plainvue			11.6	Stygofauna survey, ALS (2011, 2012)
Riverside 3		770683	7499827	Feb 2017: (CDM Smith bore census) BH36			Abandoned/destroyed		Monitoring Piezo			Monitoring Piezo	Riverside	est.11.0	PVC 50	8.1	Yeats Consulting Bore Census, Survey; Elevation from Project LiDAR; Douglas Partners, 2011
Riverside Well		770393	7499339						Well				Riverside			10.3	Yeats Consulting Bore Census, Survey; Project LiDAR; Douglas Partners, 2011
Well01		770773	7499515				In use / possibly in use			Concrete well, open		Unknown				9	CDM Smith SEIS, Ch10, Table 10-72 Third party bores identified during the February 2017 bore census – location, ownership and bore status; Casing height from Feb 2017 (CDM Smith) field sheets
WMP06D		770039	7488119			24-Apr-20					Mine Monitoring	Monitoring		47		34.06	CQC - Michael McShane Email, 10 June 2020
WMP10D		775878	7486688			30-Sep-17					Mine Monitoring	Monitoring		226		29.27	CQC Well Collar data
WMP16		767930	7494387			20-Oct-18					Mine Monitoring	Monitoring		31.5		41.91	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP16D		767923	7494380			21-Oct-18					Mine Monitoring	Monitoring		42		41.84	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP20		768251	7490084			20-Oct-18					Mine Monitoring	Monitoring		20.5		42.95	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP20D		768246	7490082			20-Oct-18					Mine Monitoring	Monitoring		30		42.98	STX Headers, provided by CQC; casing height from CDM Smith Sep 18 Field Sheets
WMP21B		774294	7490072			17-Apr-20					Mine Monitoring	Monitoring		95		27.99	CQC - Michael McShane Email, 10 June 2020
WMP28B		772128	7489102								Mine Monitoring	Monitoring					
WMP31		778070	7489063			15-Dec-19					Mine Monitoring	Monitoring		200		50.49	CQC, monitoring plan (23 Dec 2019)
WMP31B		778074	7489051			04-Apr-20					Mine Monitoring	Monitoring		45		50.24	CQC - Michael McShane Email, 10 June 2020
WMP31C		778065	7489011			06-Apr-20					Mine Monitoring	Monitoring		78		48.8	CQC - Michael McShane Email, 10 June 2020
WMP32		776384	7485834			07-Apr-20					Mine Monitoring	Monitoring		66		32.31	CQC - Michael McShane Email, 10 June 2020
WMP33		772890	7490344								Mine Monitoring	Monitoring					Sites.xlsx
WMP33B		772890	7490344								Mine Monitoring	Monitoring					Sites.xlsx
WP002		773486	7486739	2019 (RA) Ringtank					Windmill	windmill next to turkey nest dam	Water Supply	Stock watering	Mamelon			33.5	Yeats Consulting Bore Census, Survey; Project LiDAR; Douglas Partners, 2011

Site	RN	Easting	Northing	Alias / Old Name	Other Name(s)	Date Drilled	Status	Comment	Facility Type	Description	Broad Role	Use	Property	Total Depth (mbgl)	Casing	Elevation (mAHD)	Source
										(overflow to dam) and tank							
DP1		790526	7485590					Lorna Vale	None. No pipes in bore			Stock watering					
DP8		790518	7485592				Not in use; bore has collapsed	Lorna Vale	None. Bore collapsed.								
DP15		773102	7493568					Bar H	Electric pump		Water Supply	Household use, stock watering as required					
DP16		786644	7486877				Not in use; saline bore.	Lorna Vale	None. No pipes in bore								
DP18		776971	7479114					Mt Bison	Pipes in bore; pump connected as required		Water Supply	Stock watering					
DP19		791887	7484390					Lorna Vale	Windmill		Water Supply	Stock watering					
DP20		789752	7485118				Not in use	Lorna Vale	Windmill		Water Supply						
DP24		762189	7481966					Anglewood	Windmill		Water Supply	Household use, stock watering as required					

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH1

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 28-Aug-18

Total Depth (m bgl): 4.2
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 770792 **Northing:** 7486241

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION (LITHOLOGY)	CONSTRUCTION INFO. (FIELD RECORDS)
0		**Silty clay** Grey brown dry clay with 5% sand and ironstone gravel fragments. Minor yellow /orange mottling and ironstone staining. Minor organic content and root material, Very dry.	Cracking clay at surface. Recent alluvium. Fine matted root material in layers Recent clay pan. Minor fine root material Push tube used from 0 to 1.4 mbgl. Core retrieved.
		Plastic clay Grey / grey brown clay with yellow / orange mottling. Moist with minor fine root material.	
1		**Calcrete??** Hard, grey cemented layer.	Basement interface. No root material identified
		Sandstone Grey / white fine grained quartz rich arenite.	
2		**Sandstone** Grey / white fine grained quartz rich arenite. Ironstone gravel with some orange and red iron staining on sandstone grains and fracture surfaces.	Rotary percursion rig with water used from 1.4 to 4.2 mbgl. Not sampled due to the drilling fluids contamination
3		**Sandstone** Fine to medium grained arkosic sandstone. Red iron staining (hematite) in matrix with orange (limonite) staining on fracture surfaces. Some ironstone gravel.	
		Sandstone Fine to medium grained arkosic sandstone. Red iron staining (hematite) in matrix with orange (limonite) staining on fracture surfaces. Some ironstone gravel.	
4		**Sandstone / gravelly sandstone** Fine to medium grained sandstone with strong orange ironstone staining. Rounded gravel and pebble sized clasts of iron stained sandstone and ironstone.	

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH2

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 28-Aug-18

Total Depth (m bgl): 4
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 770858 **Northing:** 7486217

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION LITHOLOGY	CONSTRUCTION INFO. FIELD RECORDS
0		**Silty sand** Grey brown fine grained silty sand. Angular to sub-angular fragments.	Finely dispersed root material in layers, core logging.
		Sandstone Fine grained arenite with yellow and red ironstone staining on grain surfaces.	No root material identified
1		**Sandstone** Weathered fine to medium grained arenite with yellow and red ironstone staining on grain surfaces. Some ironstone gravel	No root material identified
		Sandstone Weathered fine to medium grained arenite with yellow and red ironstone staining on grain surfaces. Some ironstone gravel	Drilled with rotary percussion from 0.45 to 4m. Chips only, not sampled due to contamination of samples by drilling fluids
2		**Sandstone** Grey / white fine to medium grained quartz rich arenite. Fresh with some minor red and yellow ironstaining on grain surfaces.	
3		**Sandstone** Grey / white fine to medium grained quartz rich arenite. Fresh with some minor red and yellow ironstaining on grain surfaces.	
4			

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH3

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 28-Aug-18

Total Depth (m bgl): 14
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 770796 **Northing:** 7486240

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION (LITHOLOGY)	CONSTRUCTION INFO. (FIELD RECORDS)
0		**Silty clay** Grey brown dry clay with 5% sand and ironstone gravel fragments. Minor yellow /orange mottling and ironstone staining. Minor organic content and root material, Very dry.	Cracking clay at surface. Recent alluvium. Fine matted root material in layers
		Plastic clay Grey / grey brown clay with yellow / orange mottling. Moist with minor fine root material.	Recent clay pan. Minor fine root material Push tube used from 0 to 1.4 mbgl. Core retrieved.
1		**Calcrete??** Hard, grey cemented layer.	Basement interface. No root material identified
		Sandstone Grey / white fine grained quartz rich arenite.	
2		**Sandstone** Grey / white fine grained quartz rich arenite. Ironstone gravel with some orange and red iron staining on sandstone grains and fracture surfaces.	
3		**Sandstone** Fine to medium grained arkosic sandstone. Red iron staining (hematite) in matrix with orange (limonite) staining on fracture surfaces. Some ironstone gravel.	
		Sandstone Fine to medium grained arkosic sandstone. Red iron staining (hematite) in matrix with orange (limonite) staining on fracture surfaces. Some ironstone gravel.	
4		**Sandstone / gravelly sandstone** Fine to medium grained sandstone with strong orange ironstone staining. Rounded gravel and pebble sized clasts of iron stained sandstone and ironstone.	
5		**Sandstone / gravelly sandstone** Fine to medium grained sandstone with strong orange ironstone staining. Some larger rounded quartz clasts and inclusions and coal lithic fragments.	
6		**Sandstone / gravelly sandstone** Fine to medium grained sandstone with strong orange staining. Some larger ironstone and rounded quartz clasts and inclusions. Clay beads present	Rotary percursion rig with air used from 1.4 to 14.5 mbgl. Chips recovered
7		**Sandstone / gravelly sandstone** Fine to medium grained sandstone with strong orange and red staining. Arkosic sandstone lithics and ironstone gravel. Clay beads present	

(Continued Next Page)

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH3

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 28-Aug-18

Total Depth (m bgl): 14
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 770796 **Northing:** 7486240

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION (LITHOLOGY)	CONSTRUCTION INFO. (FIELD RECORDS)
8		**Sandstone / gravelly sandstone** *(continued)*	
		Sandstone / gravelly sandstone / clay Fine to medium grained sandstone. Strong orange limonite staining. Kaolin beads present within chips.	Moisture indicated at 8 mbgl
9		**Decomposed / clayey siltstone and minor sandstone** Yellow brown ironstone staining on gravel fragments. Abundant orange kaolin beads present.	
10		**Decomposed / clayey siltstone and minor sandstone** Yellow brown ironstone staining on decomposed siltstone fragments. Abundant orange and dark brown kaolin beads present.	
11		**Decomposed / clayey siltstone** Yellow brown to dark grey-brown siltstone. Abundant dark brown and orange clay beading ironstone staining on decomposed siltstone fragments. Abundant orange and dark brown kaolin beads present.	
12		**Sandstone** Fine to medium grained grey to white quartz arenite with minor limonite staining. Some white kaolin beading.	
13		**Sandstone** Fine to medium grained grey to white quartz arenite with minor limonite staining. Some white kaolin beading.	Aquifer strike at 13.5 mbgl
14		**Sandstone** Limited chip return	

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH4

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 30-Aug-18

Total Depth (m bgl): 4.2
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 770643 **Northing:** 7487718

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION (LITHOLOGY)	CONSTRUCTION INFO. (FIELD RECORDS)
0		**Sandy silt / clay** Grey brown silt clay matrix with fine sand <20% total content. Orange brown mottling. Limited organic matter. Very dry.	Limited fine root material
		Clayey sand Grey / brown clayey sand. 50% fine grained sand with clay matrix. Abundant yellow orange mottling. Very dry.	No root material identified
1		**Clayey sand** Grey / brown clayey sand. 50% fine grained sand with clay matrix. Abundant yellow orange mottling.	No root material identified
2		**Clayey sand** Grey / brown clayey sand. 50% fine grained sand with clay matrix. Abundant yellow orange mottling.	No root material identified Push tube used from 0 to 4.2 mbgl. Core retrieved, except between 2 and 2.5m
3		**Clayey sand** Grey brown with orange limonite mottles. some coarser rounded to sub-angular grains. Fine grained angular to sub-angular quartz / feldspar sand with 20% silty clay matrix	No root material identified
		Clayey sand / sand Orange brown fine to medum grained quartz / feldspar sand. Weakly cemented with clay, <10% clay matrix. Brown with orange limonite mottling.	No root material identified
4		**Clayey Sand** Dark grey / grey brown angular to subangular sand with 40% clay matrix. Strong orange brown (limonite) mottles. Weakly cemented with some moisture.	

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH5

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 30-Aug-18

Total Depth (m bgl): 15
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 770627 **Northing:** 7487717

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION (LITHOLOGY)	CONSTRUCTION INFO. (FIELD RECORDS)
0		**Sandy silt / clay** Grey brown silt clay matrix with fine sand <20% total content. Orange brown mottling. Limited organic matter. Very dry.	Limited fine root material
		Clayey sand Grey / brown clayey sand. 50% fine grained sand with clay matrix. Abundant yellow orange mottling. Very dry.	No root material identified
1		**Clayey sand** Grey / brown clayey sand. 50% fine grained sand with clay matrix. Abundant yellow orange mottling.	No root material identified
2		**Clayey sand** Grey / brown clayey sand. 50% fine grained sand with clay matrix. Abundant yellow orange mottling.	No root material identified Push tube used from 0 to 4.2 mbgl. Core retrieved, except between 2 and 2.5m
3		**Clayey sand** Grey brown with orange limonite mottles. some coarser rounded to sub-angular grains. Fine grained angular to sub-angular quartz / feldspar sand with 20% silty clay matrix	No root material identified
		Clayey sand / sand Orange brown fine to medum grained quartz / feldspar sand. Weakly cemented with clay, <10% clay matrix. Brown with orange limonite mottling.	No root material identified
4		**Clayey Sand** Dark grey / grey brown angular to subangular sand with 40% clay matrix. Strong orange brown (limonite) mottles. Weakly cemented with some moisture.	No root material identified
		Sand / Gravel Fine to medium grained sand and gravel with some lithic sandstone fragments. Possibly base of alluvium / top of Styx coal measures.	Rotary percursion rig with air used from 4.2 to 14.5 mbgl. Chips recovered
5		**Sand / Gravel** Fine to medium grained sand and gravel with lithic sandstone fragments. Likely to be top of the Styx Coal Measures??	
6		**Sandstone** Fine to medium grained quartz arenite with strong red and orange iron staining on grain and fracture surfaces. Some rounded quartz clasts and fragments.	
7		**Sandstone** Fine to medium grained quartz arenite with s orange iron staining on grain and fracture surfaces. Some ironstone gravel and clayey sandstone / silstone clasts mixed with coal fragments	

(Continued Next Page)

Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
111417	Sub-Artesian Facility	Existing	05/04/2000	Rockhampton	4530 - LIVINGSTONE SHIRE COUNCIL

Details

Description			
Parish	4336 - STOODLEIGH		
Original Name	SOPPA		
Driller Name	BOURNE K		
Drill Company	DEPCO		
Const Method	ROTARY		
Bore Line			
D/O File No	520/001/71	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	DNR
Roles	Water Supply		

Location

Latitude	22-35-21	**Basin**	1270
Longitude	149-38-08	**Sub-area**	
GIS Latitude	-22.589244514	**Lot**	197
GIS Longitude	149.635396464	**Plan**	MPH35167
Easting	770957		
Northing	7499555	**Map Scale**	104 - 1: 100 000
Zone	55	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	8852
GPS Accuracy		**Map Name**	MARLBOROUGH
Checked	Yes	**Prog Section**	

Casing

2 ***records for RN*** **111417**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	05/04/2000	1	0.00	10.97	Polyvinyl Chloride	5.900	WT - Wall Thickness	140
A	05/04/2000	2	9.14	10.97	Perforated or Slotted Casing			

Strata Logs

3 ***records for RN*** **111417**

Rec	Top (m)	Bottom (m)	Strata Description

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	7.01	SANDY LOAM
2	7.01	10.36	GRAVEL *
3	10.36	10.97	CLAY

Stratigraphies

0 *records for RN* **111417**

Aquifers

1 *records for RN* **111417**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	7.01	10.36	GRAV - Gravel	05/04/2000	-304.77	N	10000 US/CM	0.76	Y	UC	STYX RIVER ALLUVIUM

Pump Tests Part 1

0 *records for RN* **111417**

Pump Tests Part 2

0 *records for RN* **111417**

Bore Conditions

0 *records for RN* **111417**

Elevations

0 *records for RN* **111417**

Water Analysis Part 1

0 *records for RN* **111417**

Water Analysis Part 2

0 *records for RN* **111417**

Water Levels

0 *records for RN* **111417**

Wire Line Logs

0 *records for RN* **111417**

Field Measurements

1 *records for RN* **111417**

Pipe	Date	Depth (m)	Conduct	pH	Temp	NO3 (mg/L)	DO2	Eh (mV)	Alkalinity	Samp	Method	Samp	Source

From Year:

			(uS/cm)	(C)	(mg/L)	(mV)				
A	05/04/2000	10.90	10000				AI	Air Lifting	GB	Groundwater - from Bore

Special Water Analysis

0 ***records for RN*** **111417**

Bore Report

From Year:

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH5

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 30-Aug-18

Total Depth (m bgl): 15
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 770627 **Northing:** 7487717

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	FIELD RECORDS
		Sandstone *(continued)*	
8		**Sandstone** Grey brown, fine to medium grained sandstone with weathered clay matrix. Angular to sub-angular quartz grains with some yellow -orange ironstone staining. Coal fragments.	
9		**Sandstone** Grey brown, fine to medium grained sandstone with weathered clay matrix. Some orange ironstone staining on grain surfaces and rounded ironstone gravel fragments.	
10		**Sandstone** Grey brown, fine to medium grained sandstone with weathered clay matrix. Some orange ironstone staining on grain surfaces. Carbonaceous siltstone and coal fragments.	
11		**Sandstone** Grey brown, fine to medium grained sandstone with weathered clay matrix. Some orange ironstone staining on grain surfaces. Minor ironstone gravel and fragments with some coal fragments.	
12		**Sandstone** Grey brown, fine to medium grained sandstone with weathered clay matrix. Some orange ironstone staining on grain surfaces. Carbonaceous siltstone and coal fragments.	
13		**Sandstone** Grey brown, fine to medium grained sandstone with weathered clay matrix. Some orange ironstone staining on grain surfaces. Coal fragments.	
14		**Sandstone** Grey brown, fine to medium grained sandstone with weathered clay matrix. Some orange ironstone staining on grain surfaces. Coal fragments.	

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH6

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 29-Aug-18

Total Depth (m bgl): 9.85
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 772191 **Northing:** 7489107

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION (LITHOLOGY)	CONSTRUCTION INFO. (FIELD RECORDS)
0		**Sandy Silt.** Grey / brown fine grained sand. <20% organic matter. Dry,	Abundant fibrous root material
		Sandy Silt. Grey / brown. 30% fine grained sand with silt with <10% organic matter. Very dry.	Large yellow root 0.5cm diameter with some fibrous yellow root matter also evident.
1		**Sandy Silt.** Grey / brown with some fine yellow / orange mottling. 50% fine grained sand with silt. Very dry.	Some matted fine root material and occasional larger yellow roots to 1mm.
		Sandy Silt. Brown to orange brown with some finer orange specs and mottling. 30 fine grained sand with silt. Very dry.	Minor matted fine root material. Larger dead tree root at 2.0m with orange colour.
2		**Silty Sand.** Orange -brown Fine to medium grained sand with some coarser rounded to sub-angular grains. 40% silty clay matrix	Large dead tree root at 2.5m. Strong yellow coloration. Core loss at 2 to 2.5m
3		**Silty Sand.** Orange brown with some stronger bands with orange limonite mottling. 60% rounded to sub-angular quartz grains with 40% silty clay matrix, Very dry.	Fine yellow tree roots recorded at 3.8m
4		**Clayey Sand.** Orange brown with 40% silty clay matrix with fine grained rounded to sub-angular quartz rich sand . Some orange brown (limonite) mottles.	Fine yellow tree roots recorded at 4.5m
		Silty Sand. Mottled grey to orange brown silty sand. Rounded to sub-angular quartz sand with 40% silty clay matrix, Very dry	Fine tree yellow tree roots recorded at 5.5m.
5		**Silty / Clayey sand** Grey brown fine to medium sand with 50% silty clay matrix. Orange brown limonite mottles and staining throughout. Dry.	Fine yellow tree roots recorded at 6.1m
6		**Silty Sand.** Orange / brown fine quarts and with 40% silty clay matrix. Abundant yellow brown limonite mottling and staining with orange coating on sand grains,	Large 0.5 cm tree root from river red gum (probably tree 7a) at 6.5m.
		Silty / Clayey sand Orange grey mottled quartz / feldspar sand with fine angular to rounded grains. 40% silty clay matrix. Strong limonite mottling.	Large 0.5cm tree root from river red gum recorded at 7.5m
7			

(Continued Next Page)

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: BH6

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By:
Drilling Method: Push Tube/Hammer
Bore Diameter:
Date Drilled: 29-Aug-18

Total Depth (m bgl): 9.85
Well Stick Up (m):
Surface Elevation (m AHD):
Static Water Level
Date: **Depth (mbRP):**
Projection: GDA_94
Easting: 772191 **Northing:** 7489107

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION (LITHOLOGY)	CONSTRUCTION INFO. (FIELD RECORDS)
8		**Silty / Sandy clay** Grey brown clay with stong orange mottling. 30% fine quartz sand with 70% silty clay matrix.	
		Sandy clay Gey brown / orange clay. 40% sub-angular quartz / feldspar clay with 60% clay matrix. Cohesve texture with strong limonite mottling throughout.	
		Sandy clay (decomposed sandstone) Brown grey tight sandy clay with lithic sandstone and coal fragments. 80% clay matrix with 20% angular to sub-angular quartz and feldspar sand. Strong limonite mottling,	Top of Styx Coal at 8.6m
9		**Decomposed sandstone with coal lithics** Grey with orange / brown mottles. Medum angular quartz / feldspar sand fragments with tight clay matrix. Strong limonite coating on some fracture surfaces. Coal seams to 3cm thick in some intervals.	Matted fibrous tree roots in coal seam at 9.5m.
		Decomposed dirty / clayey coal seams in sandstone Mostly decomposed coal with interbeds of medium grained sandstone.	EOH due to drill rod refusal in Styx Coal Measures.
		Coal Vitreous coal seams interbedded with decomposed clayet sandstone. Fine to medium grained decomposed clayey sandstone interbeds.	

Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
97562	Sub-Artesian Facility	Existing	17/10/1997	Rockhampton	4530 - LIVINGSTONE SHIRE COUNCIL

Details

Description			
Parish	2794 - LANGDALE		
Original Name	F G SHANNON		
Driller Name	RIDDELL W		
Drill Company	DEPCO		
Const Method	ROTARY		
Bore Line			
D/O File No	515/030/2238	**Polygon**	
R/O File No		**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	22-48-20	**Basin**	1270
Longitude	149-35-52	**Sub-area**	
GIS Latitude	-22.805533452	**Lot**	6
GIS Longitude	149.597877713	**Plan**	MC203
Easting	766679		
Northing	7475663	**Map Scale**	104 - 1: 100 000
Zone	55	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	8852
GPS Accuracy		**Map Name**	MARLBOROUGH
Checked	Yes	**Prog Section**	

Casing

2 ***records for RN*** **97562**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	17/10/1997	1	0.00	30.40	Polyvinyl Chloride	5.900	WT - Wall Thickness	140
A	17/10/1997	2	13.70	30.40	Perforated or Slotted Casing			

Strata Logs

6 ***records for RN*** **97562**

Rec	Top (m)	Bottom (m)	Strata Description

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	0.30	TOP SOIL
2	0.30	3.00	CLAY
3	3.00	7.60	DECOMPOSED COURSE GRAINED VOLC ROCK
4	7.60	9.10	COURSE GRAINED VOLCANIC ROCK
5	9.10	15.24	FRACTURED VOLCANIC ROCK
6	15.24	30.40	FRACTURED VOLCANIC ROCK *

Stratigraphies

0 *records for RN* **97562**

Aquifers

1 *records for RN* **97562**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	15.24	30.40	VOLC - Volcanic	17/10/1997	-13.70	N	COND 4100	5.67	Y	FR	BACK CREEK GROUP - UNDIFF.

Pump Tests Part 1

0 *records for RN* **97562**

Pump Tests Part 2

0 *records for RN* **97562**

Bore Conditions

0 *records for RN* **97562**

Elevations

0 *records for RN* **97562**

Water Analysis Part 1

0 *records for RN* **97562**

Water Analysis Part 2

0 *records for RN* **97562**

Water Levels

1 *records for RN* **97562**

Pipe	Date	Time	Measure (m)	Meas Point	Remark	Meas Type	Coll Auth	Coll Method	Project	Quality

Bore Report

From Year:

Pipe	Date	Time	Measure (m)	Meas	Point	Remark	Meas	Type	Coll Auth	Coll	Method	Project		Quality
A	17/10/1997		-13.70	N	Natural Surface		NR	Not Recorded	NR	NR	Not Recorded		130	Data is of unknown quality

Wire Line Logs

0 *records for RN* **97562**

Field Measurements

1 *records for RN* **97562**

Pipe	Date	Depth (m)	Conduct (uS/cm)	pH	Temp (C)	NO3 (mg/L)	DO2 (mg/L)	Eh (mV)	Alkalinity (mV)	Samp	Method	Samp	Source
A	17/10/1997	30.40	4100							AI	Air Lifting	GB	Groundwater - from Bore

Special Water Analysis

0 *records for RN* **97562**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
91572	Sub-Artesian Facility	Existing	25/10/1992	Rockhampton	4530 - LIVINGSTONE SHIRE COUNCIL

Details

Description	L180 MC412		
Parish	4336 - STOODLEIGH		
Original Name	RACKERMANN OLO		
Driller Name	WEST K		
Drill Company	DEPCO		
Const Method	ROTARY		
Bore Line			
D/O File No	515/030/0074	**Polygon**	
R/O File No	30-0074	**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	22-42-52	**Basin**	1270
Longitude	149-46-06	**Sub-area**	
GIS Latitude	-22.714571723	**Lot**	2
GIS Longitude	149.768285768	**Plan**	RP899662
Easting	784369		
Northing	7485422	**Map Scale**	104 - 1: 100 000
Zone	55	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	8852
GPS Accuracy		**Map Name**	MARLBOROUGH
Checked	Yes	**Prog Section**	

Casing

3 ***records for RN*** **91572**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	25/10/1992	1	0.00	25.00	Polyvinyl Chloride	5.900	WT - Wall Thickness	140
A	25/10/1992	2	18.00	24.50	Perforated or Slotted Casing	2.000	AP - Aperture Size	140
A	25/10/1992	3	25.00	29.00	Open Hole			165

Strata Logs

6 ***records for RN*** **91572**

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	3.00	TOP SOIL & CLAY
2	3.00	18.00	WEATHERED ROCK
3	18.00	29.00	SILTSTONE
902			SWL 25/10/92 12.0M
903			AIR TEST 0.06 L/S 25/10/92
910			DRILLERS COND 25/10/92 1700 MICROS/CM

Stratigraphies

1 *records for RN* **91572**

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	1	0.00		BOOMER FORMATION

Aquifers

1 *records for RN* **91572**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	18.00	24.50	SSTO - Siltstone	25/10/1992	-12.00	N	COND 1700	0.06	Y	FR	BOOMER FORMATION

Pump Tests Part 1

0 *records for RN* **91572**

Pump Tests Part 2

0 *records for RN* **91572**

Bore Conditions

0 *records for RN* **91572**

Elevations

0 *records for RN* **91572**

Water Analysis Part 1

0 *records for RN* **91572**

Water Analysis Part 2

0 *records for RN* **91572**

Bore Report

From Year:

Water Levels	**0** *records for RN* **91572**
Wire Line Logs	**0** *records for RN* **91572**
Field Measurements	**0** *records for RN* **91572**
Special Water Analysis	**0** *records for RN* **91572**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
67652	Sub-Artesian Facility	Existing	28/02/1990	Rockhampton	4530 - LIVINGSTONE SHIRE COUNCIL

Details

Description	MH1308		
Parish	4336 - STOODLEIGH		
Original Name	OFFICE LICENCE ONLY		
Driller Name	RIDDELL W		
Drill Company	DEPCO		
Const Method	ROTARY		
Bore Line			
D/O File No	515/030/1680	**Polygon**	
R/O File No	30-1680	**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	22-38-01	**Basin**	1270
Longitude	149-39-43	**Sub-area**	
GIS Latitude	-22.633776225	**Lot**	43
GIS Longitude	149.661836761	**Plan**	MPH26062
Easting	773589		
Northing	7494573	**Map Scale**	104 - 1: 100 000
Zone	55	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	8852
GPS Accuracy		**Map Name**	MARLBOROUGH
Checked	Yes	**Prog Section**	

Casing

3 ***records for RN*** **67652**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	28/02/1990	1	0.00	9.20	Polyvinyl Chloride	7.000	WT - Wall Thickness	140
A	28/02/1990	2	9.20	9.50	Screen	0.508	AP - Aperture Size	140
A	28/02/1990	3	9.20	9.50	Gravel Pack	4.762	GR - Gravel Size	220

Strata Logs

6 ***records for RN*** **67652**

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	6.00	CLAY
2	6.00	9.50	SANDS & GRAVEL
901			ONE SALTY TEST HOLE
902			SWL 28/2/90 (4.0 M) - 25/3/91 (2.6 M)
903			AIR TEST 28/2/90 - 1.4 L/S
910			WRC COND ADJ BORE: 712 MICROS/CM

Stratigraphies

1 *records for RN* **67652**

Source	Rec	Top (m)	Bottom (m)	Strata Description
DNR	1			STYX RIVER ALLUVIUM

Aquifers

1 *records for RN* **67652**

Rec	Top (m)	Bottom (m)	Lithology	Date	SWL (m)	Flow	Quality	Yield (L/s)	Contr	Cond	Formation Name
1	6.00	9.50	GRAV - Gravel SAND - Sand	25/03/1991	-2.60	N	712 US/CM	1.40	Y	UC	STYX RIVER ALLUVIUM

Pump Tests Part 1

0 *records for RN* **67652**

Pump Tests Part 2

0 *records for RN* **67652**

Bore Conditions

0 *records for RN* **67652**

Elevations

0 *records for RN* **67652**

Water Analysis Part 1

0 *records for RN* **67652**

Water Analysis Part 2

0 *records for RN* **67652**

Bore Report

From Year:

Water Levels

0 ***records for RN*** **67652**

Wire Line Logs

0 ***records for RN*** **67652**

Field Measurements

0 ***records for RN*** **67652**

Special Water Analysis

0 ***records for RN*** **67652**

Bore Report

From Year:

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Bore Report

From Year:

Registered Number	Facility Type	Facility Status	Drilled Date	Office	Shire
88892	Sub-Artesian Facility	Existing	01/01/1900	Rockhampton	4530 - LIVINGSTONE SHIRE COUNCIL

Details

Description	L8 MC265		
Parish	2794 - LANGDALE		
Original Name	BORE 4		
Driller Name			
Drill Company			
Const Method	ROTARY		
Bore Line			
D/O File No	515/030/2132	**Polygon**	
R/O File No	30-2132	**Equipment**	
H/O File No		**RN of Bore Replaced**	
Log Received Date		**Data Owner**	
Roles	Water Supply		

Location

Latitude	22-51-09	**Basin**	1270
Longitude	149-40-12	**Sub-area**	
GIS Latitude	-22.852678381	**Lot**	8
GIS Longitude	149.670020118	**Plan**	MC265
Easting	773994		
Northing	7470308	**Map Scale**	104 - 1: 100 000
Zone	55	**Map Series**	M - Metric Series
Accuracy	SKET	**Map No**	8852
GPS Accuracy		**Map Name**	MARLBOROUGH
Checked	Yes	**Prog Section**	

Casing

2 *records for RN* **88892**

Pipe	Date	Rec	Top (m)	Bottom (m)	Material Description	Mat Size (mm)	Size Desc	Outside Diameter (mm)
A	01/01/1900	1	0.00	25.00	Polyvinyl Chloride			140
A	01/01/1900	2			Perforated or Slotted Casing			

Strata Logs

3 *records for RN* **88892**

Rec	Top (m)	Bottom (m)	Strata Description

Bore Report

From Year:

Rec	Top (m)	Bottom (m)	Strata Description
1	0.00	24.99	NO LOG BOOMER FORM??
903			EST SUPPLY 0.06L/S
910			LANDHOLDER COND 1200 MICROS/CM

Stratigraphies
0 *records for RN* **88892**

Aquifers
0 *records for RN* **88892**

Pump Tests Part 1
0 *records for RN* **88892**

Pump Tests Part 2
0 *records for RN* **88892**

Bore Conditions
0 *records for RN* **88892**

Elevations
0 *records for RN* **88892**

Water Analysis Part 1
0 *records for RN* **88892**

Water Analysis Part 2
0 *records for RN* **88892**

Water Levels
0 *records for RN* **88892**

Wire Line Logs
0 *records for RN* **88892**

Field Measurements
0 *records for RN* **88892**

Special Water Analysis
0 *records for RN* **88892**

Bore Report

From Year:

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP02

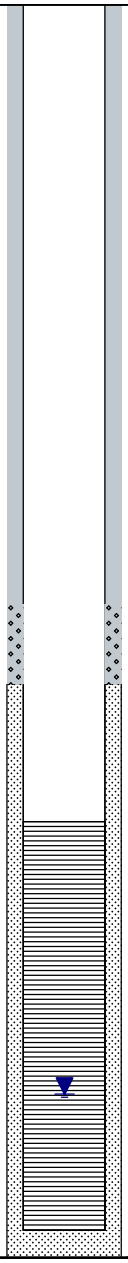
Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 1/10/2017

Total Depth (m bgl): 18.4
Well Stick Up (m): 1.1
Surface Elevation (m AHD): 24.8
Static Water Level
Date: 20/12/2017 **Depth (mbRP):** 17.2
Projection: GDA_94
Easting: 773497 **Northing:** 7491734

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	LITHOLOGY
0	**Alluvium** Soil, medium-dark brown, clayey, C1
	Alluvium Clay, medium buff brown, minor silt, C1
	Alluvium Clay, medium reddish brown, sandy, carbonaceous, C1
	Alluvium Sand, speckled reddish mottled, clayey, minor alluvial, C1
	Alluvium Clay, light greenish buff, silfty, minor gravel, C1
5	**Alluvium** Clay, light-medium, creamish buff, minor silt, C1
	Alluvium Clay, light-medium, reddish buff, C1
	Alluvium Clay, light-brownish buff, minor silt, C1
10	**Alluvium** Sand, light-medium buff, clayey, S1
	Alluvium Sand, medium greenish buff, minor clay, S1
	Alluvium Sand, medium greenish-brown, clayey, minor gravel, alluvial, C1
15	**Alluvium** Gravel, medium mottled yellow, clayey, minor sand, abundant alluvium, C1



WELL DESCRIPTION

0 - 8.8m Cement/bentonite grout
0 - 12m 125mm CL12 PVC blank casing

8.8 - 9.98m Bentonite pellets

9.98 - 18.4m Gravel pack

12 - 18m 125mm CL12 PVC slotted casing, 1mm aperture

EOH @ 18.4m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP04

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 11/10/2017

Total Depth (m bgl): 18.4
Well Stick Up (m): 1.2
Surface Elevation (m AHD): 28.2
Static Water Level
Date: 12/11/2017 **Depth (mbRP):** 12.4
Projection: GDA_94
Easting: 772865 **Northing:** 7489358

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Soil, medium greyish yellow, clayey, oxidised, C1		0 - 8.1m Cement/bentonite grout 0 - 12m 125mm CL12 PVC blank casing
		Alluvium Clay, medium greyish yellow, sandy, clayey nodules, C1		
5				
		Alluvium Clay, medium brownish yellow, gravelly, sandy alluvial, S1		8.1 - 8.4m Sand 8.4 - 9.6m Bentonite pellets 9.6 - 18.4m Gravel pack 12 - 18m 125mm CL12 PVC slotted casing, 1mm aperture
10				
15		**Alluvium** Conglomerate, medium yellowish brown, clayey, sandy, R2		EOH @ 18.4m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP04D

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 29-Sep-17

Total Depth (m bgl): 36.5
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 28.3
Static Water Level
Date: 11/11/2017 **Depth (mbRP):** 12.3
Projection: GDA_94
Easting: 772859 **Northing:** 7489351

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Soil, medium brown, clayey, C1		0 - 14m Cement/bentonite grout 0 - 18.5m 125mm CL12 PVC blank casing
		Alluvium Clay, light-medium brown, sandy, C1		
5		**Alluvium** Sand, light-medium buff brown, clayey, alluvial, S1		
		Alluvium Clay, light-medium buff brown, alluvial, gravelly, C1		
10				
				14 - 16m Bentonite pellets
15				16 - 36.5m Gravel pack
				18.5 - 36.3m 125mm CL12 PVC slotted casing, 1mm aperture
20		**Alluvium** Siltstone, medium yelowish grey, minor gravel, R2		
		Styx Coal Measures - Overburden Claystone, medium-dark mottled brown, minor coal, R1		
25		**Styx Coal Measures - Overburden** Claystone, light-medium brownish grey, fresh, minor siltstone, R2		
		Styx Coal Measures - Overburden Siltstone, light-medium brownish grey, minor sandstone, fresh, R2		
		Styx Coal Measures - Overburden Sandstone, fine grained, dark brownish grey, carbonaceous mudstone and claystone, R3		
30				
		Styx Coal Measures - Overburden Sandstone, medium-coarse grained, light greenish grey, R5		
		Styx Coal Measures - Overburden Siltstone, light greenish grey, minor tuff and coaly wisps, R4		
35		**Styx Coal Measures - Overburden** Siltstone, light greenish grey, coaly wisps, R4		EOH @ 36.5m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP05

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 30/09/2017

Total Depth (m bgl): 12.4
Well Stick Up (m): 1
Surface Elevation (m AHD): 17.2
Static Water Level
Date: 12/11/2017 **Depth (mbRP):** 9.9
Projection: GDA_94
Easting: 774507 **Northing:** 7491639

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Soil, brown, C1		0 - 6.4m Cement/bentonite grout 0 - 9m 125mm CL12 PVC blank casing
		Alluvium Clay, light buff brown, C1		
		Alluvium Clay, light brown, minor silt, C1		
5		**Alluvium** Sand, light-brownish buff, clayey, S1		6.4 - 7m Bentonite pellets
		Alluvium Sand, medium multi-coloured yellow, gravel, alluvium, S1		7 - 12.4m Gravel pack
		Alluvium Gravel, medium multi-coloured yellow, alluvial, S1		9 - 12m 125mm CL12 PVC slotted casing, 1mm aperture
10		**Alluvium** Gravel, medium multi-coloured yellow, clayey, sandy, alluvial, S1		EOH @ 12.4m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP06

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 3/11/2017

Total Depth (m bgl): 18.4
Well Stick Up (m): 0.7
Surface Elevation (m AHD): 33.9
Static Water Level
Date: 10/11/2017 **Depth (mbRP):** 17.7
Projection: GDA_94
Easting: 770020 **Northing:** 7488120

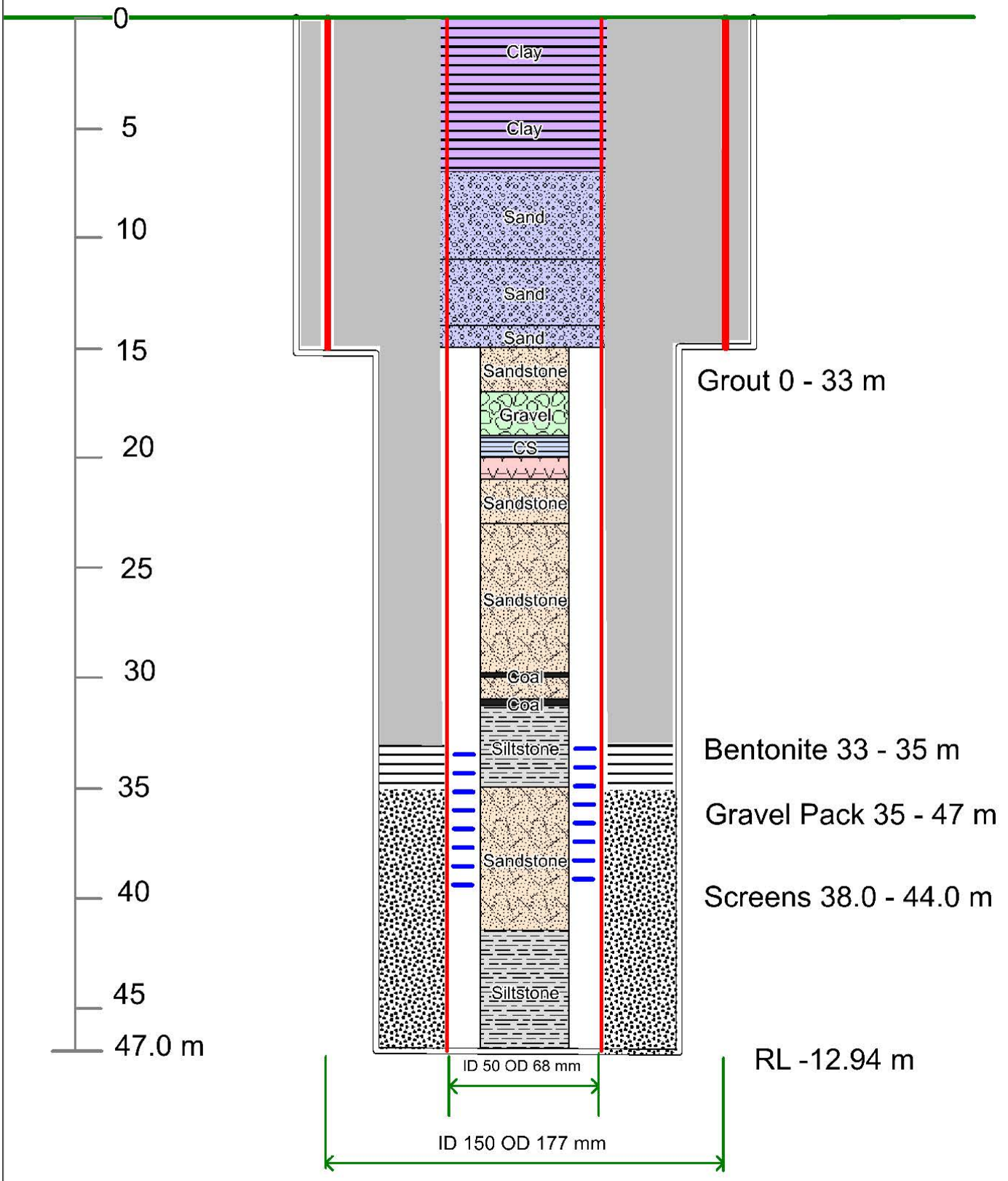
GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Soil, medium reddish-brown, clayey, C1		0 - 6m Cement/bentonite grout 0 - 12m 125mm CL12 PVC blank casing
		Alluvium Clay (brown) C2		
5		**Alluvium** Clay, medium yellowish-brown, sandy, C2		6 - 8.7m Bentonite pellets
		Alluvium Sand, medium-yellow, alluvial, clayey (orange) S1		
		Alluvium Clay, light-yellow, sandy, C2		8.7 - 18.4m Gravel pack
10		**Alluvium** Sand, light-yellow, clayey, S1		12 - 18m 125mm CL12 PVC slotted casing, 1mm aperture
		Alluvium Sand, light reddish yellow, alluvial, sandy, S1		
15		**Alluvium** Gravel, light reddish yellow, alluvial, sandy, S1		
		Styx Coal Measures - Underburden Sandstone, light-yellowish white, quartzose gravel, R3		EOH @ 18.4m

770 039 E, 7 488 119 N

WMP06D

RL 34.06 m



COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP07

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 16/10/2017

Total Depth (m bgl): 60
Well Stick Up (m): 1
Surface Elevation (m AHD): 130.9
Static Water Level
Date: 19/12/2017 **Depth (mbRP):** 60.56
Projection: GDA_94
Easting: 771264 **Northing:** 7483151

DEPTH (m)	GEOLOGICAL DESCRIPTION	CONSTRUCTION INFO.
	LITHOLOGY	WELL DESCRIPTION
0	**Alluvium** Gravel, medium yellowish red, oxidised	0 - 40.3m Cement/bentonite grout 0 - 48m 125mm CL12 PVC blank casing
5	**Styx Coal Measures - Underburden** Siltstone, light reddish cream, possibly chert, R6	
	Styx Coal Measures - Underburden Siltstone, medium yellowish red, oxidised, possibly chert, R6	
10	**Styx Coal Measures - Underburden** Sandstone, fine-medium grained, medium-dark greyish red, oxidised, R5	
	Styx Coal Measures - Underburden Sandstone, fine-medium grained, light grey, fresh rock, quartzose, R5	
15	**Styx Coal Measures - Underburden** Sandstone, fine-medium grained, medium greyish red, quartzose, oxidised, R5	
	Styx Coal Measures - Underburden Sandstone, fine-medium grained, light grey, quartzose, R5	
20	**Styx Coal Measures - Underburden** Claystone, medium grey, high plasticity, R3	
	Styx Coal Measures - Underburden Sandstone, fine-medium grained, grey, minor claystone, R4	
25	**Styx Coal Measures - Underburden** Sandstone, fine-coarse grained, medium reddish grey, quartzose, oxidised, R5	
	Styx Coal Measures - Underburden Sandstone, fine-coarse grained, light whitish grey, quartzose, R5	
30	**Styx Coal Measures - Underburden** Sandstone, fine grained, medium grey, abundant claystone, R5	
	Styx Coal Measures - Underburden Sanstone, fine-medium grained, medium grey, coaly wisps, R5	
35	**Styx Coal Measures - Underburden** Claystone, medium grey, minor siltone, R4	
	Styx Coal Measures - Underburden Sandstone, fine-coarse grained medium brownish grey, minor conglomerate, tuff and siltstone, R4	
40	**Styx Coal Measures - Underburden** Sandstone, lithic, fine-coarse grained, light blackish grey, coaly wisps	40.3 - 40.8m Sand 40.8 - 44.1m Bentonite pellets
	Styx Coal Measures - Underburden Siltstone, dark grey, R6	44.1 - 60m Gravel pack
45	**Styx Coal Measures - Underburden** Siltstone, dark grey, sandstone at base of unit, R6	48 - 60m 125mm CL12 PVC slotted casing, 1mm aperture
50		
55		EOH @ 60m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP08

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

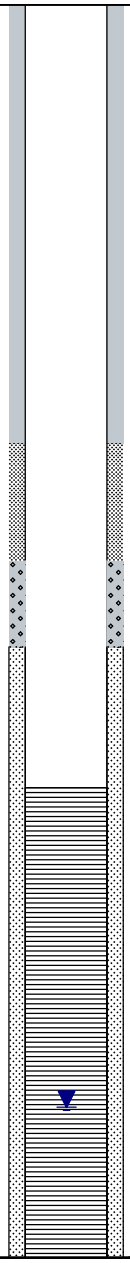
Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 2/11/2017

Total Depth (m bgl): 16
Well Stick Up (m): 1
Surface Elevation (m AHD): 46.9
Static Water Level
Date: 8/11/2017 **Depth (mbRP):** 11.14
Projection: GDA_94
Easting: 774134 **Northing:** 7481232

GEOLOGICAL DESCRIPTION

DEPTH (m)	GRAPHIC LOG	LITHOLOGY
0		**Alluvium** Residual soil, medium pinkish brown, clayey and oxidised, C1
		Alluvium Clays, medium brownish yellow, highly plastic with rare sand, C1
5		**Alluvium** Sand, medium reddish yellow, alluvial, with gravel and clay, S1
		Alluvium Clays, light yellowish grey, highly plastic, weathered, C1
10		
15		

CONSTRUCTION INFO.



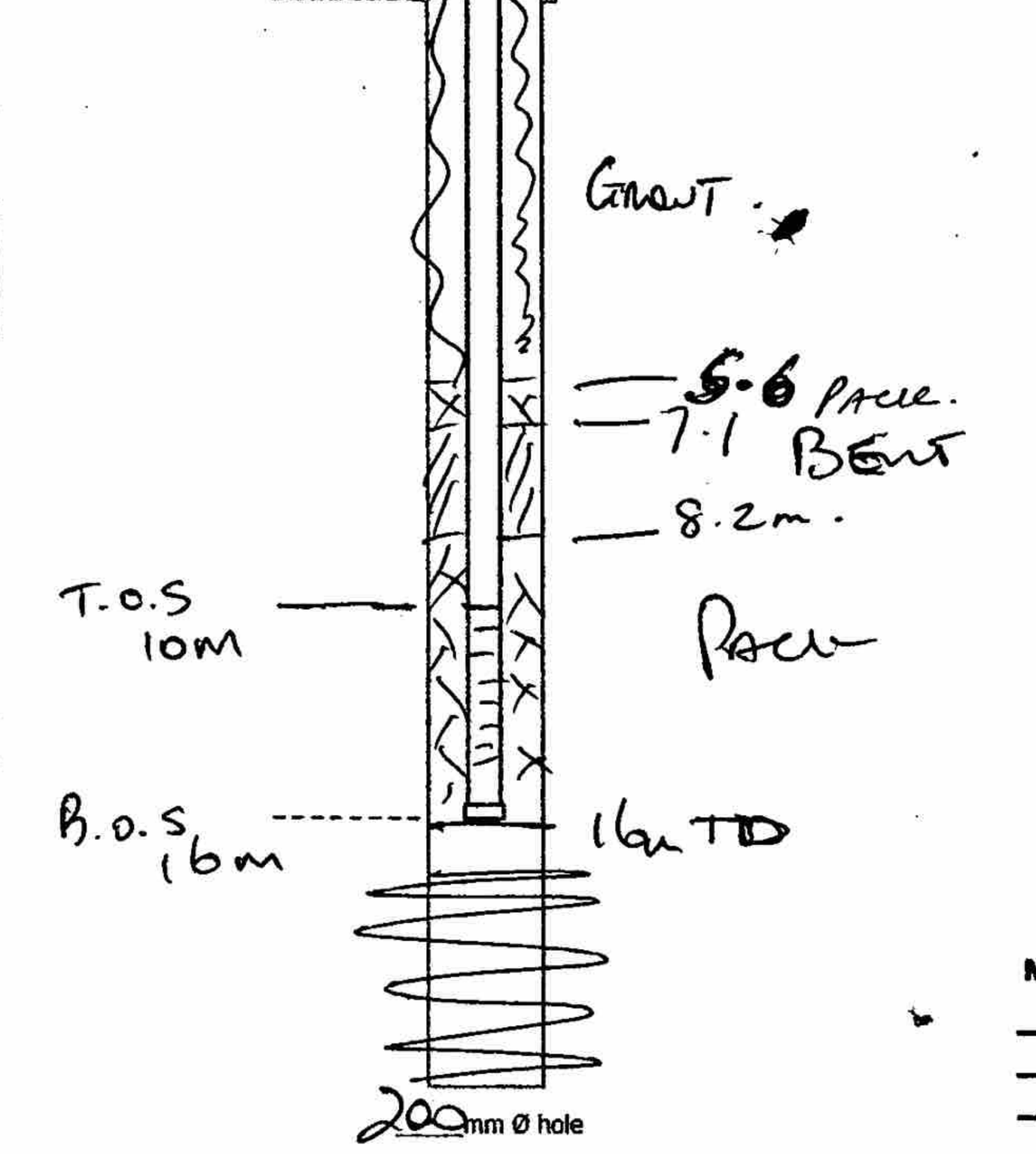
WELL CONSTRUCTION	WELL DESCRIPTION
	0 - 5.6m Cement/bentonite grout 0 - 10m 125mm CL12 PVC blank casing
	5.6 - 7.1m Sand
	7.1 - 8.2m Bentonite pellets
	8.2 - 16m Gravel pack
	10 - 16m 125mm CL12 PVC slotted casing, 1mm aperture
	EOH @ 16m

SITE / HOLE ID: WARATAH COAL

Drilling Details

Drilling Commenced:			Drilling Completed	
From	To	Hole Diam. (mm)	Method	Bit Type
0	16	200	AIR	HAMMER

Bore ID: WMP08 - D



DRY HOLE.

Muds Used (if applicable):

Not to Scale

Consumables

Surface Casing:	NIL	Cement (20 kg bags):	16
Bore Casing:	125mm Cl 12	Bentonite Powder (40 kg Bags):	5kg
Screens:	125mm Cl 12 1.4m	Rapid Set (bucket):	
End caps:	125mm x 2		
Casing Centralisers:	—		
Bentonite Pellets:	1x bucket		
Gravel Pack:	12x bags.		

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP09

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 14/10/2017

Total Depth (m bgl): 15.4
Well Stick Up (m): 1.0
Surface Elevation (m AHD): 37.6
Static Water Level
Date: 11/11/2017 **Depth (mbRP):** 12
Projection: GDA_94
Easting: 773459 **Northing:** 7484062

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Soil, medium-dark greenish brown, sandy, carbonaceous, gravelly, C1		0 - 5.3m Cement/bentonite grout 0 - 7.1m 125mm CL12 PVC blank casing
		Alluvium Clay, medium-dark buff brown, rare gravel, C1		
		Alluvium Gravel, mottled yellow, alluvial, clayey, rare oxidisation, R1		
5				5.3 - 6m Sand 6 - 7.1m Bentonite pellets
		Alluvium Gravel, mottled buff, alluvial, claystone, carbonaceous, alluvial, R1		
		Alluvium Claystone, light yellowish grey, C1		7.1 - 15.4m Gravel pack 7.1 - 15m 125mm CL12 PVC slotted casing, 1mm aperture
10				
		Alluvium Claystone, light yellowish brown, gravelly, carbonaceous, alluvial, C1		
		Alluvium Clay, light yellowish brown, gravelly carbonaceous, alluvial, oxidised, C1		
15				EOH @ 16m
		Alluvium Claystone, light-yellowish brown, C1		

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP10

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 13-Oct-17

Total Depth (m bgl): 18.4
Well Stick Up (m): 0.8
Surface Elevation (m AHD): 29.3
Static Water Level
Date: 11/11/2017 **Depth (mbRP):** 8.95
Projection: GDA_94
Easting: 775878 **Northing:** 7486688

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Soil, medium brownish yellow, sandy, oxidised, C1		0 - 7.2m Cement/bentonite grout 0 - 12m 125mm CL12 PVC blank casing
5		**Alluvium** Sand, medium-coarse grained, medium brownish yellow, alluvial, S1		7.1 - 7.2m Sand 7.2 - 10.3m Bentonite pellets
		Alluvium Gravel, medium yellowish brown, sandy clayey in parts, S1		
10		**Styx Coal Measures - Overburden** Claystone, medium greyish yellow, gravelly, oxidised, R2		10.3 - 18.4m Gravel pack 12 - 18m 125mm CL12 PVC slotted casing, 1mm aperture
15		**Styx Coal Measures - Overburden** Claystone, medium yellowish grey, R2		18 - 18.4m sump EOH @ 18.4m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP11

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 18/03/2018

Total Depth (m bgl): 24
Well Stick Up (m): 1.1
Surface Elevation (m AHD): 18.7
Static Water Level
Date: 11/04/2018 **Depth (mbRP):** 13.66
Projection: GDA_94
Easting: 774194 **Northing:** 7493610

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m) | GRAPHIC LOG | LITHOLOGY | WELL CONSTRUCTION | WELL DESCRIPTION

0

Alluvium
Clay, residual soil, mottled brownish-green, low plasticity, sandy (fine-medium grained)

Alluvium
Clay, light-medium creamy-brown, sand abundant, medium-coarse grained, extremely weathered, C1

5

Alluvium
Clay, light-medium buff brown, abundant fine-medium grained sand, extremely weaterhed, C1

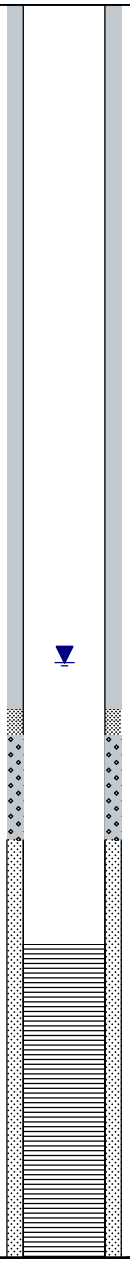
Alluvium
Clay, light-medium brown, minor sand (fine-medium grained) and gravel, extremely weathered, C1

10

15

Styx Coal Measures - Overburden
Siltstone, medium-dark bluish-green with fine-grained sand, fresh rock, R1

20



0 - 13.5m Cement/bentonite grout
0 - 18m 125mm CL12 PVC blank casing

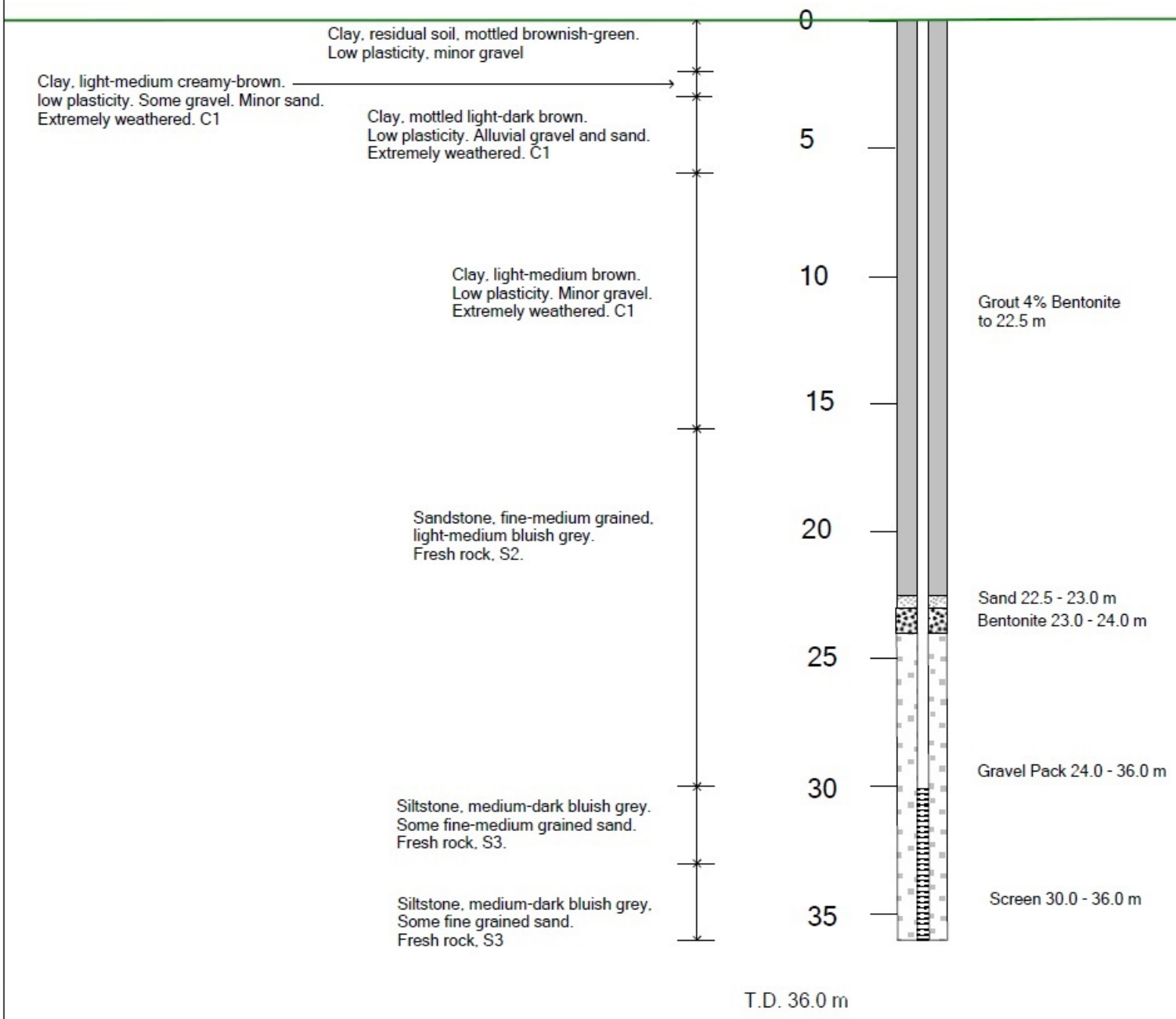
13.5 - 14m Sand
14 - 16m Bentonite pellets

16 - 24m Gravel pack

18- 24m 125mm CL12 PVC slotted casing, 1mm aperture

EOH @ 24m

WMP11D


0
5
10
15
20
25
30
35
Clay, residual soil, mottled brownish-green.
Low plasticity, minor gravel
Clay, light-medium creamy-brown.
low plasticity. Some gravel. Minor sand.
Extremely weathered. C1
Clay, mottled light-dark brown.
Low plasticity. Alluvial gravel and sand.
Extremely weathered. C1
Clay, light-medium brown.
Low plasticity. Minor gravel.
Extremely weathered. C1
Sandstone, fine-medium grained,
light-medium bluish grey.
Fresh rock, S2.
Siltstone, medium-dark bluish grey.
Some fine-medium grained sand.
Fresh rock, S3.
Siltstone, medium-dark bluish grey,
Some fine grained sand.
Fresh rock, S3
Grout 4% Bentonite
to 22.5 m
Sand 22.5 - 23.0 m
Bentonite 23.0 - 24.0 m
Gravel Pack 24.0 - 36.0 m
Screen 30.0 - 36.0 m
T.D. 36.0 m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP12

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 06-Nov-17

Total Depth (m bgl): 18
Well Stick Up (m): 1.1
Surface Elevation (m AHD): 26.4
Static Water Level
Date: 12/11/2017 **Depth (mbRP):** 18
Projection: GDA_94
Easting: 773266 **Northing:** 7490731

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Gravel, medium brownish mottled, alluvial, clayey, low plasticity, C1		0 - 8.3m Cement/bentonite grout 0 - 11m 125mm CL12 PVC blank casing
		Alluvium Clay, light brownish buff, gravelly, alluvial, high plasticitiy C1		
		Alluvium Clay, light-medium brownish buff, high plasticity, C1		
5		**Alluvium** Clay, medium reddish brown, high plasticity, sandy, C1		8.3 - 9.5m Bentonite pellets 9.5 - 18m Gravel pack
10				11 - 17m 125mm CL12 PVC slotted casing, 1mm aperture
		Alluvium Clay, light reddish brown, high plasticity, C1		
15		**Styx Coal Measures - Overburden** Claystone, light-medium creamish brown, clayey, sandy, R1		17 - 18m sump EOH @ 18m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP13

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 12-Jan-18

Total Depth (m bgl): 19.7
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 18.8
Static Water Level
Date: 17/01/2018 **Depth (mbRP):** 14.9
Projection: GDA_94
Easting: 772604 **Northing:** 7495931

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Soil, medium reddish brown, C1		0 - 9.6m Cement/bentonite grout 0 - 12.7m 125mm CL12 PVC blank casing
		Alluvium Clay, medium greyish brown, high plasticity, C1		
5		**Alluvium** Clay, medium, greyish brown, staining, high plasticity, C1		
		Alluvium Clay, medium brownish cream, staining, high plasticity, C2		
		Alluvium Sand, very fine grained medium brownish yellow, S1		9.6 - 11.4m Bentonite pellets
10		**Alluvium** Sand, very fine grained light yellowish cream, quartzose, S1		
		Alluvium Clay, light yellowish cream, staining, moderate plasticity, C2		11.4 - 19.7m Gravel pack
		Alluvium Sand, fine-coarse grained, medium brownish yellow, clayey, low plasticity, S1		12.7 - 19.7m 125mm CL12 PVC slotted casing, 1mm aperture
		Styx Coal Measures - Overburden Siltstone, medium brownish, yellow, sandy, R2		
15		**Styx Coal Measures - Overburden** Siltstone, medium yellow grey, R3		
		Styx Coal Measures - Overburden Sandstone, fine-medium grained, medium greenish grey, fresh rock, R4		EOH @ 19.7m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP14

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 19/03/2018

Total Depth (m bgl): 18
Well Stick Up (m): 1.1
Surface Elevation (m AHD): 32.9
Static Water Level
Date: 10/04/2018 **Depth (mbRP):** 18.83
Projection: GDA_94
Easting: 770477 **Northing:** 7487637

DEPTH (m)	GEOLOGICAL DESCRIPTION	CONSTRUCTION INFO.
	LITHOLOGY	WELL DESCRIPTION
0	**Alluvium** Clay, residual soil, medium brownish-grey, low plasticity, C1	0 - 6m Cement/bentonite grout 0 - 9m 125mm CL12 PVC blank casing
	Alluvium Clay, light-medium greyish buff, low plasticity, minor fine-medium grained sand, weathered, C1	
	Alluvium Sand, light-medium buff orange, minor gravel, weathered, S1	
5	**Alluvium** Sand, fine-medium, grained, medium-dark brown, rare gravel, weathered, S1	6 - 7.1m Bentonite pellets 7.1 - 18m Gravel pack
	Alluvium Sand, fine-medium, grained, medium-dark orangey brown, gravelly with rare coarse sand, weathered, S1	9 - 18m 125mm CL12 PVC slotted casing, 1mm aperture
10	**Alluvium** Sand, fine-medium, grained, speckled orangey buff, alluvial with minor coarse grains, weathered, S1	
	Alluvium Sand, speckled greyish multi-coloured, minor gravel, weathered, S1	
	Styx Coal Measures - Overburden Siltstone, medium to dark bluish-grey, weathered, R1	
15	**Styx Coal Measures - Overburden** Sand, granular to pebbly grained, speckled greyish red, minor gravel, weathered, R1.	EOH @ 18m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP15

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Mitchell Services
Drilling Method: Air Hammer
Bore Diameter: 200mm
Date Drilled: 20-Mar-18

Total Depth (m bgl): 21
Well Stick Up (m): 1.2
Surface Elevation (m AHD): 43.2
Static Water Level
Date: 10/04/2018 **Depth (mbRP):** 11.44
Projection: GDA_94
Easting: 771774 **Northing:** 7485564

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION: LITHOLOGY	CONSTRUCTION INFO.: WELL CONSTRUCTION	CONSTRUCTION INFO.: WELL DESCRIPTION
0		**Alluvium** Clay, medium brownish red, residual soil, commonly pebbly, C1		0 - 2.9m Cement/bentonite grout 0 - 9m 125mm CL12 PVC blank casing
		Alluvium Clay, light brown, weathered, C1		2.9 - 4.7m Bentonite pellets
		Alluvium Clay, light greyish brown, weathered, C1		4.4 - 21m Gravel pack
5		**Alluvium** Clay, light yellowish brown, weatehred, C1		
		Alluvium Clay, light whitish brown, weathered, C1		
		Alluvium Clay, light-dark reddish brown, weathered, C1		9 - 21m 125mm CL12 PVC slotted casing, 1mm aperture
		Alluvium Clay, light brownish white, weathered, C1		
10		**Alluvium** Sand, medium grained, light-medium reddish brown, wethered, S1		
		Alluvium Clay, light brown, weathered, C1		
		Alluvium Clay, light grey, weathered, C1		
		Alluvium Clay, light brown, weathered, C1		
15		**Alluvium** Sand, medium, grained, light brown, weathered, S1		
		Styx Coal Measures - Underburden Sandstone, medium grained, fresh rock, R5		
		Styx Coal Measures - Underburden Siltstone, dark grey, fresh rock, R3		
20				EOH @ 21m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP16

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Rotary Air
Bore Diameter: 5"
Date Drilled: 20-Oct-18

Total Depth (m bgl): 31.5
Well Stick Up (m): 0.65
Surface Elevation (m AHD): 43
Static Water Level
Date: 21/10/2018 **Depth (mbRP):** 22.15
Projection: GDA_94
Easting: 767930 **Northing:** 7494387

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Sandy clay. Low plasticity, reddish-brown, dry, hard. Very sandy, with gravel and cobble lenses. Gravels: rounded to subangular sandstone, diameter is up to 10cm		0 - 22.5m Cement/bentonite grout 0 - 25.5m 50mm CL18 uPVC blank casing, thread jointed
		Alluvium Clayey sand. Reddish-brown, dry. Some gravels present		
5		**Alluvium** Clayey silt with some hard cemented lenses, red/white, dry.		
		Styx Coal Measures - Overburden Silt. (Extremely weathered sandstone). Light brown		
10		**Styx Coal Measures - Overburden** Sandstone. (Highly weathered) Brown/grey, dry. Siltstone lenses		
15		**Styx Coal Measures - Overburden** Siltstone. (Highly weathered) Grey with brown stains, dry.		
20		**Styx Coal Measures - Overburden** Siltstone. Hard competent rock, grey with brown stains. Evidence of weathering in fractures		22.5 - 24.5m Bentonite pellets
		Styx Coal Measures - Overburden Sandstone. Fresh, grey, very hard.		24.5 - 31.5m Gravel pack, (3mm rounded gravels) 25.5 - 31.5m 50mm CL18 uPVC slotted casing, 1mm aperture, thread jointed
25		**Styx Coal Measures - Overburden** Siltstone. Fresh, dark grey.		
30		**Styx Coal Measures - Overburden** Siltstone. Fresh, dark grey, with traces of coal.		EOH @ 31.5m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP16D

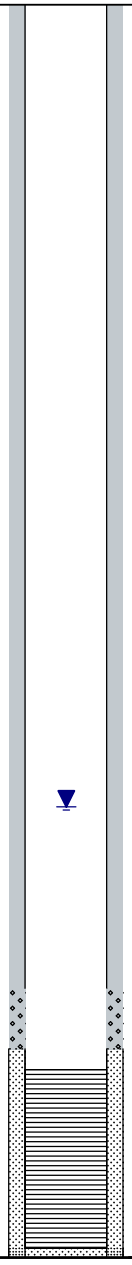
Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 5"
Date Drilled: 21-Oct-18

Total Depth (m bgl): 42
Well Stick Up (m): 0.75
Surface Elevation (m AHD): 43
Static Water Level
Date: 01/11/2018 **Depth (mbRP):** 27.64
Projection: GDA_94
Easting: 767923 **Northing:** 7494380

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	LITHOLOGY
0	**Alluvium** Sandy clay. Low plasticity, reddish-brown, dry, hard. Very sandy, with gravel and cobble lenses. Gravels: rounded to subangular sandstone, diameter is up to 10cm
	Alluvium Clayey sand. Reddish-brown, dry. Some gravels present
5	**Alluvium** Clayey silt with some hard cemented lenses, red/white, dry.
	Styx Coal Measures - Overburden Silt. (Extremely weathered sandstone). Light brown
10	**Styx Coal Measures - Overburden** Sandstone. (Highly weathered) Brown/grey, dry. Siltstone lenses
15	**Styx Coal Measures - Overburden** Siltstone. (Highly weathered) Grey with brown stains, dry.
20	**Styx Coal Measures - Overburden** Siltstone. Hard competent rock, grey with brown stains. Evidence of weathering in fractures
	Styx Coal Measures - Overburden Sandstone. Fresh, grey, very hard.
25	**Styx Coal Measures - Overburden** Gravel. Rounded to sub-angular, well graded, diameter up to 5cm. Various origins, red/brown/grey/white
	Styx Coal Measures - Overburden Siltstone. Fresh, dark grey.
30	**Styx Coal Measures - Overburden** Siltstone. Fresh, dark grey/black, with traces of coal.
	Styx Coal Measures - Overburden Coal/carbonaceous siltstone, black
35	**Styx Coal Measures - Interburden** Altered sandstone. Glauconite? Igneous rock? Grey, stained green, with quartz-filled veins, some pyrite.
40	



WELL DESCRIPTION

0 - 33m Cement/bentonite grout
0 - 35.7m 50mm CL9 uPVC blank casing, bell jointed with glue

33 - 35m Bentonite pellets

35 - 42m Gravel pack, (3mm)
35.7 - 41.7m 50mm CL9 uPVC slotted casing, 1mm aperture, bell jointed with glue

EOH @ 42m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP17

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 03-Oct-18

Total Depth (m bgl): 12
Well Stick Up (m): 0.77
Surface Elevation (m AHD): 39
Static Water Level
Date: 03/11/2018 **Depth (mbRP):** 12.59
Projection: GDA_94
Easting: 775465 **Northing:** 7483308

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty clay. Low plasticity, very stiff, brown, dry		0 - 7m Cement/bentonite grout 0 - 9m 50mm CL18 uPVC blank casing, thread jointed
		Alluvium Clayey silt. Loose cuttings, light brown / gold, dry		
5		**Alluvium** Sandy silt. Loose cuttings, light brown / gold, very fine grained sands		7 - 8m Bentonite pellets 8 - 12m Gravel pack, (2 - 5mm)
		Alluvium Sandy silt. Slightly moist		9 - 12m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed
10		**Alluvium** Clayey silt. Very low plasticity, light brown, slightly moist		EOH @ 12m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP17D

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 03-Oct-18

Total Depth (m bgl): 24
Well Stick Up (m): 0.53
Surface Elevation (m AHD): 39
Static Water Level
Date: 31/10/2018 **Depth (mbRP):** 12.25
Projection: GDA_94
Easting: 775470 **Northing:** 7483286

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION: LITHOLOGY	CONSTRUCTION INFO.: WELL CONSTRUCTION	CONSTRUCTION INFO.: WELL DESCRIPTION
0		**Alluvium** Silty clay. Low plasticity, very stiff, brown, dry		0 - 18.3m Cement/bentonite grout 0 - 21m 50mm CL18 uPVC blank casing, thread jointed
		Alluvium Silty clay. Very silty, light brown		
		Alluvium Clayey silt. Loose cuttings, light brown / gold		
5		**Alluvium** Sandy silt. Loose cuttings, very fine grained sands, light brown / gold, very slight moisture		
		Alluvium Sandy silt. Slightly moist		
		Alluvium Clayey silt. Very low plasticity, light brown, increasing moisture		
10		**Alluvium** Clayey silt. With some fine grained sands		
		Alluvium Silt. (Extremely weathered Siltstone) Grey, slightly moist	▼	
		Styx Coal Measures - Overburden Siltstone. Weathered, grey with trace coal		
		Styx Coal Measures - Overburden Sand. (Extremely weathered sandstone) Light grey, slightly moist		
15		**Styx Coal Measures - Overburden** Clayey sand. Very dense, fine grained, grey, low clay content, slightly moist		
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey, competent rock		18.3 - 19.5m Bentonite pellets
		Styx Coal Measures - Overburden Siltstone. Carbonaceous, black, moist		19.5 - 24m Gravel pack, (2 - 5mm)
20		**Styx Coal Measures - Overburden** Siltstone. Very moist		21 - 24m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey		EOH @ 24m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP18

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

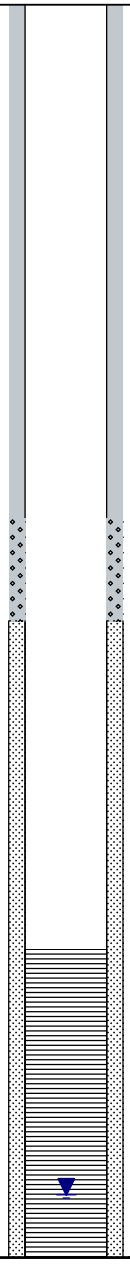
Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 13-Sep-18

Total Depth (m bgl): 12.2
Well Stick Up (m): 0.56
Surface Elevation (m AHD): 34
Static Water Level
Date: 18/09/2018 **Depth (mbRP):** 12.15
Projection: GDA_94
Easting: 775366 **Northing:** 7487144

GEOLOGICAL DESCRIPTION

DEPTH (m)	LITHOLOGY
0	**Alluvium** Clay. Medium plasticity, dark brown, dry
	Alluvium Clay. Medium plasticity, brown, dry
5	**Alluvium** Sand. Fine to medium grained, with trace of fine gravel, pale yellow
	Alluvium Sand. Fine grained, with trace of clay, pale yellow
	Alluvium Clayey sand. Fine to medium grained, light brown-yellow, moist
	Alluvium Clay. Medium plasticity, grey, moist
10	**Alluvium** Clay. Medium plasticity, grey mottled brown, moist

CONSTRUCTION INFO.



WELL DESCRIPTION

0 - 5m Cement/bentonite grout
0 - 9.2m 50mm CL18 uPVC blank casing, thread jointed
5 - 6m Bentonite pellets
6 - 12.2m Gravel pack, (2 - 5mm)
9.2 - 12.2m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed
EOH @ 12.2m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP18D

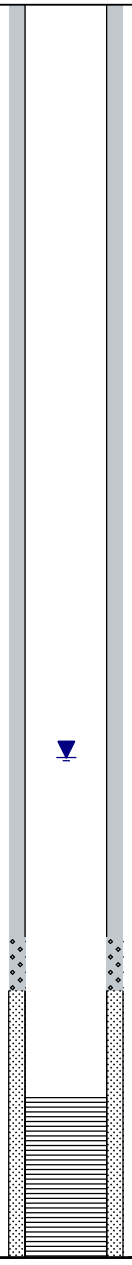
Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 12-Sep-18

Total Depth (m bgl): 23.5
Well Stick Up (m): 0.44
Surface Elevation (m AHD): 33
Static Water Level
Date: 18/09/2018 **Depth (mbRP):** 14.56
Projection: GDA_94
Easting: 775358 **Northing:** 7487152

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	LITHOLOGY
0	**Alluvium** Clay. Medium plasticity, grey-brown, dry
	Alluvium Clay. Low plasticity, brown, dry
5	**Alluvium** Clay. Medium plasticity, grey-brown, dry
	Alluvium Sand. Fine grained, with trace fine gravel (conglomerate), pale yellow, dry
	Alluvium Gravel / Conglomerate. Fine to coarse sized with some fine sand, dry to moist
10	**Alluvium** Clay. Medium plasticity, orange-brown, moist
	Styx Coal Measures- Overburden Mudstone. (Siltstone) Weathered, grey-brown, moist
	Styx Coal Measures- Overburden Siltstone. Weathered, grey, moist
15	**Styx Coal Measures- Overburden** Siltstone. Slightly weathered, grey-brown, moist
	Styx Coal Measures- Overburden Sandstone. Slightly weathered, grey
	Styx Coal Measures- Overburden Sandstone. Slightly weathered, very dark grey
	Styx Coal Measures- Overburden Siltstone. Fresh, with some coal, black
20	**Styx Coal Measures- Overburden** Siltstone. Fresh, grey



WELL DESCRIPTION

0 - 17.5m Cement/bentonite grout
0 - 20.5m 50mm CL18 uPVC blank casing, thread jointed

17.5 - 18.5m Bentonite pellets

18.5 - 23.5m Gravel pack, (2 - 5mm)

18.5 - 23.5m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed

EOH @ 23.5m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP19

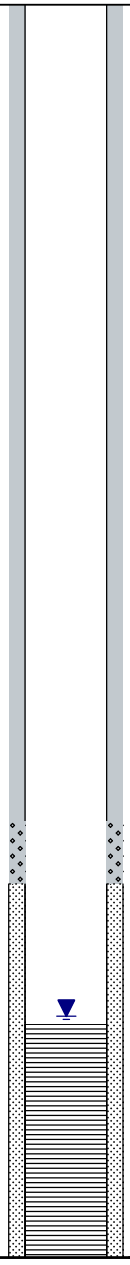
Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 06-Sep-18

Total Depth (m bgl): 16.1
Well Stick Up (m): 0.64
Surface Elevation (m AHD): 46
Static Water Level
Date: 17/09/2018 **Depth (mbRP):** 13.64
Projection: GDA_94
Easting: 768808 **Northing:** 7485676

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	LITHOLOGY
0	**Weathered Basement** Clay. With trace fine gravel, medium plasticity, grey
	Weathered Basement Clay. With trace fine to medium gravel, medium plasticity, grey
	Weathered Basement Clay. With some fine sand and fine gravel, medium plasticity, light brown
5	**Weathered Basement** Sandstone. Weathered, light grey
	Weathered Basement Sandstone. Weathered, grey
	Weathered Basement Siltstone / Sandstone. Weathered, grey
	Weathered Basement Siltstone. With sandstone, laminated, grey
	Weathered Basement Siltstone / Claystone. Weathered, dark grey
10	**Weathered Basement** Siltstone. Fresh, dark grey / black
15	**Weathered Basement** Siltstone. Fresh, carbonated, black



WELL DESCRIPTION

0 - 10.5m Cement/bentonite grout
0 - 13.1m 50mm CL9 uPVC blank casing, thread jointed

10.5 - 11.3m Bentonite pellets

11.3 - 16.1m Gravel pack, (2 - 5mm)

13.1- 16.1m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed

EOH @ 16.1m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP19D

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

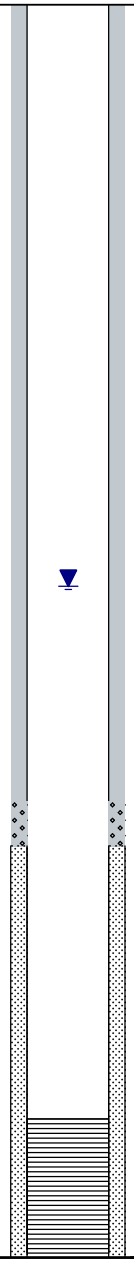
Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 07-Sep-18

Total Depth (m bgl): 28
Well Stick Up (m): 0.58
Surface Elevation (m AHD): 47
Static Water Level
Date: 17/09/2018 **Depth (mbRP):** 13.58
Projection: GDA_94
Easting: 768801 **Northing:** 7485692

GEOLOGICAL DESCRIPTION

CONSTRUCTION INFO.

DEPTH (m)	GRAPHIC LOG	LITHOLOGY
0		**Weathered Basement** Clay. With trace fine gravel, medium plasticity, grey
		Weathered Basement Clay. With trace fine gravel, medium plasticity, light brown
		Weathered Basement Clay. Medium plasticity, light brown
		Weathered Basement Sandstone. Extremely weathered, with some laminated clay, light grey
5		**Weathered Basement** Sandstone. Weathered, with laminated siltstone, light grey
		Weathered Basement Siltstone. Weathered, grey
10		**Weathered Basement** Siltstone. Fresh, grey to dark grey
		Weathered Basement Siltstone. Fresh, very dark grey
		Weathered Basement Siltstone. With lenses of coal and carbonaceous siltstone, carbonated black
15		
20		
25		



WELL DESCRIPTION

0 - 17.8m Cement/bentonite grout
0 - 24.9m 50mm CL9 uPVC blank casing, thread jointed

17.8 - 18.8m Bentonite pellets
18.8 - 28m Gravel pack, (2 - 5mm)

24.9 - 27.9m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed

EOH @ 28m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP20

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Rotary Air
Bore Diameter: 5"
Date Drilled: 20-Oct-18

Total Depth (m bgl): 20.5
Well Stick Up (m): 0.53
Surface Elevation (m AHD): 40
Static Water Level
Date: 01/11/2018 **Depth (mbRP):** 19.68
Projection: GDA_94
Easting: 768251 **Northing:** 7490084

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Styx Coal Measures - Overburden** Silty clay. Low plasticity, very silty, brown, dry, very hard		0 - 11m Cement/bentonite grout 0 - 14.5m 50mm CL18 uPVC blank casing, thread jointed
		Styx Coal Measures - Overburden Sandstone. Highly weathered, brown and grey lenses		
5		**Styx Coal Measures - Overburden** Siltstone. Highly weathered, brown and grey lenses		
		Styx Coal Measures - Overburden Sandstone. Highly weathered, brown and grey lenses		
		Styx Coal Measures - Overburden Fresh, dark grey		
10		**Styx Coal Measures - Overburden** Siltstone. Highly weathered with sandstone lenses, brown and grey		11 - 13m Bentonite pellets 13 - 20.5m Gravel pack, (3mm rounded gravels) 14.5 - 20.5m 50mm CL18 uPVC slotted casing, 1mm aperture, thread jointed
15		**Styx Coal Measures - Overburden** Sandstone. Highly weathered, brown and grey lenses		
		Styx Coal Measures - Overburden Sandstone. Highly weathered, brown with some white infilled veins, oxide stained fractures, potential water cut.		
20		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey, hard		EOH @ 20.5m
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey		

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP20D

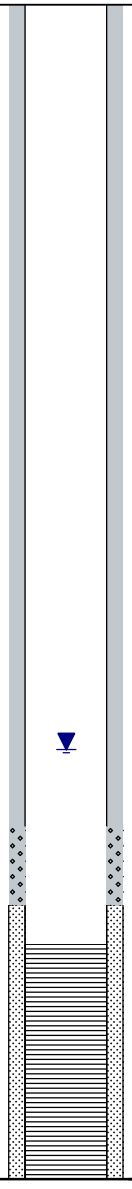
Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Rotary Air
Bore Diameter: 5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 30
Well Stick Up (m): 0.5
Surface Elevation (m AHD): 40
Static Water Level
Date: 02/11/2018 **Depth (mbRP):** 19.53
Projection: GDA_94
Easting: 768246 **Northing:** 7490082

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	LITHOLOGY
0	**Styx Coal Measures - Overburden** Silty clay. Low plasticity, very silty, brown, dry, very hard
	Styx Coal Measures - Overburden Sandstone. Highly weathered, brown and grey lenses
5	**Styx Coal Measures - Overburden** Siltstone. Highly weathered, brown and grey lenses
	Styx Coal Measures - Overburden Sandstone. Highly weathered, brown and grey lenses
	Styx Coal Measures - Overburden Fresh, dark grey
10	**Styx Coal Measures - Overburden** Siltstone. Highly weathered with sandstone lenses, brown and grey
	Styx Coal Measures - Overburden Sandstone. Highly weathered, brown and grey lenses
15	**Styx Coal Measures - Overburden** Sandstone. Highly weathered, brown with some white infilled veins, oxide stained fractures, potential water cut.
	Styx Coal Measures - Overburden Sandstone. Fresh, grey, hard
	Styx Coal Measures - Overburden Siltstone. Fresh, dark grey
20	**Styx Coal Measures - Overburden** Sandstone. Fresh, grey
	Styx Coal Measures - Overburden Siltstone. Fresh, dark grey
	Styx Coal Measures - Overburden Sandstone. Grey with brown weathered lenses. Water cut
25	**Styx Coal Measures - Overburden** Siltstone. Fresh, dark grey
30	



WELL DESCRIPTION

0 - 21m Cement/bentonite grout
0 - 24m 50mm CL18 uPVC blank casing, thread jointed

21 - 23m Bentonite pellets

23 - 30m Gravel pack, (3mm rounded gravels)
24 - 30m 50mm CL18 uPVC slotted casing, 1mm aperture, thread jointed

EOH @ 30m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP21

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

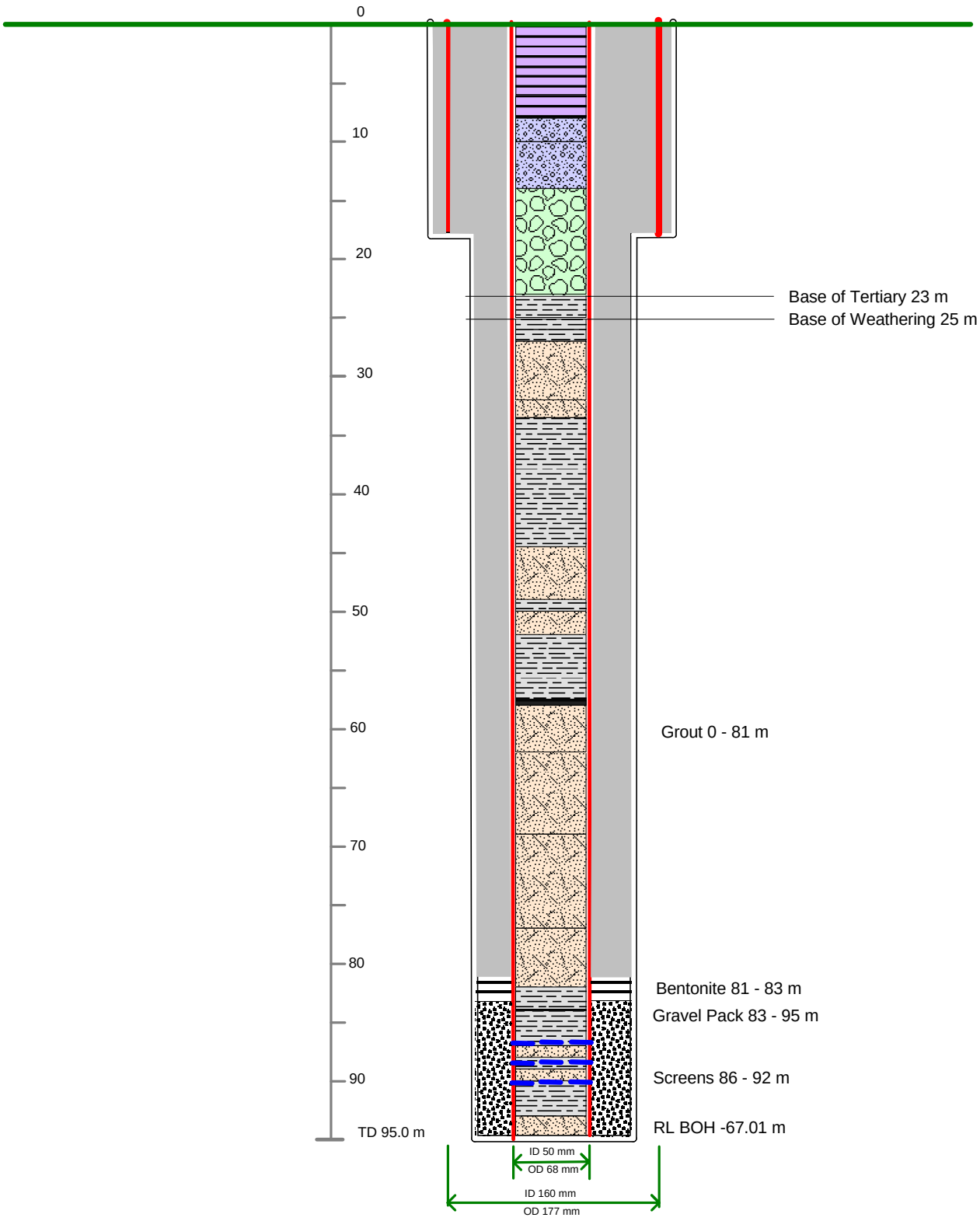
Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 10-Sep-18

Total Depth (m bgl): 9.9
Well Stick Up (m): 0.66
Surface Elevation (m AHD): 12
Static Water Level
Date: 17/09/2018 **Depth (mbRP):** Dry
Projection: GDA_94
Easting: 774294 **Northing:** 7490072

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION: LITHOLOGY	CONSTRUCTION INFO.: WELL CONSTRUCTION	CONSTRUCTION INFO.: WELL DESCRIPTION
0		**Alluvium** Clay. Medium plasticity, brown		0 - 4.3m Cement/bentonite grout 0 - 6.9m 50mm CL18 uPVC blank casing, thread jointed
		Alluvium Clay. With trace fine gravel, medium plasticity, brown		
		Alluvium Clay. With some sand, medium plasticity, light brown		4.3 - 5.25m Bentonite pellets
5		**Alluvium** Sand. Fine grained with trace pebbles, brown		5.25 - 9.9m Gravel pack, (2 - 5mm)
		Alluvium Sand. Fine to medium grained with some pebbles, light brown		6.9 - 9.9m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed
		Alluvium Sand. Medium to coarse grained with some pebbles (conglomerate of nature and colour), light brown, moist		Dry well (17 Sept 2018) EOH @ 9.9m

WMP21B

774 294 mE, 7 490 072 mN, RL 27.99 m



COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP21D

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 10-Sep-18

Total Depth (m bgl): 22
Well Stick Up (m): 0.54
Surface Elevation (m AHD): 26
Static Water Level
Date: 17/09/2018 **Depth (mbRP):** 15.04
Projection: GDA_94
Easting: 774243 **Northing:** 7490004

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	GEOLOGICAL DESCRIPTION	WELL CONSTRUCTION	CONSTRUCTION INFO. WELL DESCRIPTION
0		**Alluvium** Clay. Medium plasticity, brown			0 - 12.6m Cement/bentonite grout 0 - 14m 50mm CL18 uPVC blank casing, thread jointed
		Alluvium Clay. With fine sand, medium plasticity, brown			
5		**Alluvium** Sand. Fine grained with minor layer of pebbles, light brown			
		Alluvium Sand. Fine grained with pebbles, light brown			
		Alluvium Sand. Medium grained with pebbles, light brown			
10		**Alluvium** Sand. Medium to coarse grained with pebbles, light brown			
		Alluvium Clay. Medium plasticity, brown			12.6 - 13.45m Bentonite pellets 13.45 - 22m Gravel pack, (2 - 5mm) 14 - 20m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed
		Alluvium Sand. Coarse grained, yellow-brown			
15		**Alluvium** Gravel / Conglomerate. Fine to coarse sized, subangular to subrounded			
		Styx Coal Measures- Overburden Mudstone. Weathered, grey-brown			
		Styx Coal Measures- Overburden Mudstone. Slightly weathered, grey			20 - 22m Backfilled with gravels (2 - 5mm) EOH @ 22m
20					

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP22A

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 30
Well Stick Up (m): 0.35
Surface Elevation (m AHD): 33
Static Water Level
Date: 01/11/2018 **Depth (mbRP):** 14.90
Projection: GDA_94
Easting: 772008 **Northing:** 7488891

DEPTH (m)	GEOLOGICAL DESCRIPTION	CONSTRUCTION INFO.
0	**Alluvium** Silty clay. Moderate plasticity, very stiff, brown/grey, dry	0 - 23m Cement/bentonite grout 0 - 27m 100mm CL12 uPVC blank casing, jointed with screws and glue
5	**Alluvium** Sandy silt. Loose, very fine grained sands, light brown/orange, dry	
	Alluvium Silty clay. Low to moderate plasticity, very stiff, brown/grey, dry	
10	**Alluvium** Clayey silt. Minimal cohesion, light brown, slightly moist	
	Alluvium Silty clay. Low plasticity, stiff, grey, slightly moist	
15	**Alluvium** Clayey silt. Minimal cohesion, brown, slightly moist	
	Alluvium Sandy silt. Minimal cohesion, Fine grained sands, grey, slightly moist	
	Alluvium Sandy silt. Very sandy, fine to medium grains	
20	**Alluvium** Clayey sand. (Extremely weathered SANDSTONE) Very dense, fine to medium grains, distinct colour change to grey, moist	
	Styx Coal Measures - Overburden Siltstone. Fresh, laminar, black	
	Styx Coal Measures - Overburden Siltstone. Dark grey, with trace of coal	23 - 25m Bentonite pellets
25	**Styx Coal Measures - Overburden** Coal	25 - 30m Gravel pack 27 - 30m 100mm CL12 uPVC slotted casing, jointed with screws and glue
	Styx Coal Measures - Overburden Siltstone. Fresh, dark grey	
30	**Styx Coal Measures - Overburden** Siltstone with trace coal	EOH @ 30m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP22B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 56
Well Stick Up (m): 0.3
Surface Elevation (m AHD): 33
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 14.66
Projection: GDA_94
Easting: 772011 **Northing:** 7488896

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty clay. Moderate plasticity, very stiff, brown/grey, dry		0 - 46m Cement/bentonite grout 0 - 50m 100mm CL12 uPVC blank casing, jointed with screws and glue
5		**Alluvium** Sandy silt. Loose, very fine grained sands, light brown/orange, dry		
		Alluvium Silty clay. Low to moderate plasticity, very stiff, brown/grey, dry		
10		**Alluvium** Clayey silt. Minimal cohesion, light brown, slightly moist		
		Alluvium Silty clay. Low plasticity, stiff, grey, slightly moist	▼	
15		**Alluvium** Clayey silt. Minimal cohesion, brown, slightly moist		
		Alluvium Sandy silt. Minimal cohesion, Fine grained sands, grey, slightly moist		
		Alluvium Sandy silt. Very sandy, fine to medium grains		
20		**Alluvium** Clayey sand. (Extremely weathered SANDSTONE) Very dense, fine to medium grains, distinct colour change to grey, moist		
		Styx Coal Measures - Overburden Siltstone. Fresh, laminar, black		
		Styx Coal Measures - Overburden Siltstone. Dark grey, with trace of coal		
25		**Styx Coal Measures - Overburden** Coal		
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey		
		Styx Coal Measures - Overburden Siltstone with trace coal		
30		**Styx Coal Measures - Interburden** Siltstone with interbedded sandstone lenses		
35				

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP22B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 56
Well Stick Up (m): 0.3
Surface Elevation (m AHD): 33
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 14.66
Projection: GDA_94
Easting: 772011 **Northing:** 7488896

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
40		**Styx Coal Measures - Interburden** *(continued)*		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden Sandstone with trace coal		
45		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		46 - 48m Bentonite pellets
		Styx Coal Measures - Interburden Siltstone with trace coal		
		Styx Coal Measures - Interburden Coal		48 - 56m Gravel pack 50 - 56m 100mm CL12 uPVC slotted casing, jointed with screws and glue
50		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Coal		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey		
55				EOH @ 56m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP22C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.5
Surface Elevation (m AHD): 34
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 10.34
Projection: GDA_94
Easting: 772012 **Northing:** 7488900

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty clay. Moderate plasticity, very stiff, brown/grey, dry		0 - 196m Cement/bentonite grout 0 - 200m 100mm CL12 uPVC blank casing, jointed with screws and glue
5		**Alluvium** Sandy silt. Loose, very fine grained sands, light brown/orange, dry		
		Alluvium Silty clay. Low to moderate plasticity, very stiff, brown/grey, dry	▼	
10		**Alluvium** Clayey silt. Minimal cohesion, light brown, slightly moist		10" hole from 0 to 22m
		Alluvium Silty clay. Low plasticity, stiff, grey, slightly moist		
15		**Alluvium** Clayey silt. Minimal cohesion, brown, slightly moist		
		Alluvium Sandy silt. Minimal cohesion, Fine grained sands, grey, slightly moist		
		Alluvium Sandy silt. Very sandy, fine to medium grains		
20		**Alluvium** Clayey sand. (Extremely weathered SANDSTONE) Very dense, fine to medium grains, distinct colour change to grey, moist		
		Styx Coal Measures - Overburden Siltstone. Fresh, laminar, black		
25		**Styx Coal Measures - Overburden** Siltstone. Dark grey, with trace of coal		
		Styx Coal Measures - Overburden Coal		
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey		
30		**Styx Coal Measures - Overburden** Siltstone with trace coal		6.5" hole from 22 to 206m (EOH)
		Styx Coal Measures - Interburden Siltstone with interbedded sandstone lenses		
35				
40		**Styx Coal Measures - Interburden**		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP22C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.5
Surface Elevation (m AHD): 34
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 10.34
Projection: GDA_94
Easting: 772012 **Northing:** 7488900

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
		Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden *(continued)*		
45		**Styx Coal Measures - Interburden** Sandstone with trace coal		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Siltstone with trace coal		
50		**Styx Coal Measures - Interburden** Coal		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Coal		
55		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Coal		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey, with trace coal		
60		**Styx Coal Measures - Interburden** Coal		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey		
65		**Styx Coal Measures - Interburden** Coal		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey with interbedded sandstone lenses at 72m		
70				
75		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey with coal lenses between 80 and 82m. Trace coal present at 85m		
80				

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP22C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.5
Surface Elevation (m AHD): 34
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 10.34
Projection: GDA_94
Easting: 772012 **Northing:** 7488900

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
85		**Styx Coal Measures - Interburden** *(continued)*		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey with trace coal (Violet Seam) at 90m		
90		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey with interbedded siltstone lenses at 95m		
95		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey		
100				
105		**Styx Coal Measures - Underburden** Sandstone. Very coarse grained, fresh, light grey mottled dark grey diorite appearance. Interbedded siltstone lenses present at 109m		
110		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		
115				
		Styx Coal Measures - Underburden Sandstone. Very coarse grained, fresh, light grey / grey / dark grey. Some cuttings as rounded gravels, not chips.		
120		**Styx Coal Measures - Underburden** Sandstone. With interbedded siltstone lenses, fresh, light grey / dark grey		
125		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey with interbedded siltstone at 130m		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP22C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.5
Surface Elevation (m AHD): 34
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 10.34
Projection: GDA_94
Easting: 772012 **Northing:** 7488900

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
130		**Styx Coal Measures - Underburden** *(continued)*		
		Styx Coal Measures - Underburden Sandstone. Distinct colour change to brown, suspected weathering, potential water cut		
135		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey, with interbedded siltstone with some brown lenses, weathered materials? at 141m		
140				
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		
145				
150				
		Styx Coal Measures - Underburden Siltstone. Dark grey with some brown, drilled quicker, suspected weathered zone, likely water cut.		
		Styx Coal Measures - Underburden Siltstone. Fresh, dark grey with traces of brown at 156m		
155				
160				
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		
		Styx Coal Measures - Underburden Siltstone. Fresh, grey		
165				
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		

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COMPOSITE WELL LOG

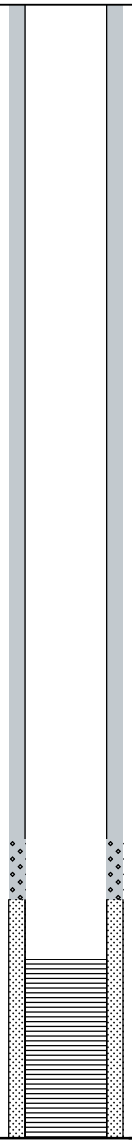
BOREHOLE / WELL NUMBER: WMP22C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.5
Surface Elevation (m AHD): 34
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 10.34
Projection: GDA_94
Easting: 772012 **Northing:** 7488900

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
170		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey		
175		**Styx Coal Measures - Underburden** Igneous rock. Distinct colour change to light grey with green tinge, intrusive igneous rock with interbedded metasiltstone		
180		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey, with sandstone lenses throughout		
185		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey		
190		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey with purple tinge, very hard.		
195				196 - 198m Bentonite pellets 198 - 206m Gravel pack, (2 - 5mm)
200				200 - 206m 100mm CL12 uPVC slotted casing, jointed with screws and glue
205				EOH @ 206m



COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP23A

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 6.5"
Date Drilled: 06-Oct-18

Total Depth (m bgl): 56.5
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 36
Static Water Level
Date: 02/11/2018 **Depth (mbRP):** 11.13
Projection: GDA_94
Easting: 773651 **Northing:** 7484701

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION: LITHOLOGY	CONSTRUCTION INFO.: WELL CONSTRUCTION	CONSTRUCTION INFO.: WELL DESCRIPTION
0		**Alluvium** Silty clay. Low plasticity, brown, dry		0 - 43m Cement/bentonite grout 0 - 48.5m 100mm CL12 uPVC blank casing, jointed with screws and glue
5		**Alluvium** Clayey silt. No plasticity, loose cuttings, brown, dry		
		Alluvium Sandy silt. Loose cuttings, fine grained sands, light brown		
		Alluvium Clayey gravel. Fine to coarse, various origin and colour, grey/brown clay		
10		**Alluvium** Gravelly clay, medium plasticity	▼	
15		**Alluvium** Siltstone. Slightly weathered, brown / grey		
20		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
25		**Styx Coal Measures - Interburden** Siltstone. Fresh, carbonaceous, black with traces of coal		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey, with traces of coal		
		Styx Coal Measures - Interburden Coal lense		
		Styx Coal Measures - Interburden		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP23A

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 6.5"
Date Drilled: 06-Oct-18

Total Depth (m bgl): 56.5
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 36
Static Water Level
Date: 02/11/2018 **Depth (mbRP):** 11.13
Projection: GDA_94
Easting: 773651 **Northing:** 7484701

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION: LITHOLOGY	CONSTRUCTION INFO.: WELL CONSTRUCTION	CONSTRUCTION INFO.: WELL DESCRIPTION
30		Siltstone. Fresh, dark grey, with traces of coal **Styx Coal Measures - Interburden** *(continued)*		
35		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
40		**Styx Coal Measures - Interburden** Sandstone. Fresh, coarse grained, with interbedded siltstone, grey		43 - 45.5m Bentonite pellets
45		**Styx Coal Measures - Interburden** Sandstone. Fresh, coarse grained, grey		45.5 - 54.5m Gravel pack, (5mm rounded river gravel) 48.5 - 54.5m 100mm CL12 uPVC slotted casing, jointed with screws and glue
50		**Styx Coal Measures - Interburden** Sandstone. Fresh, with interbedded siltstone lenses, grey		
55		**Styx Coal Measures - Interburden** Sandstone. Fresh, grey		EOH @ 54.5m 2m collapse at bottom of well
		Styx Coal Measures - Interburden Siltstone. Fresh, carbonaceous, black		

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP23B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 06-Oct-18

Total Depth (m bgl): 194
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 32
Static Water Level
Date: 02/11/2018 **Depth (mbRP):** 7.8
Projection: GDA_94
Easting: 773638 **Northing:** 7484709

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Clay. Medium plasticity, grey		0 - 182m Cement/bentonite grout 0 - 187m 100mm CL12 uPVC blank casing, jointed with screws and glue
		Alluvium Clay. Low-medium plasticity, brown		
5		**Alluvium** Gravel. Fine to coarse grained, mostly subrounded, various origin, various colour	▼	
		Alluvium Clayey gravel. As above, with some grey clay		
10		**Alluvium** Gravel. As above		10" hole from 0 to 18m
		Alluvium Clay. With some fine to medium gravel, medium plasticity, grey		
		Alluvium Clayey gravel. Fine to coarse grained, subangular to subrounded, various origin and colour. With grey-brown clay.		6.5" hole from 18 to 194m (EOH)
15		**Alluvium**		
		Alluvium Siltstone. Slightly weathered, brown to very dark grey		
		Alluvium Siltstone. Fresh, very dark grey		
20		**Styx Coal Measures - Overburden** Sandstone. Slightly weathered, grey to very dark grey		
		Styx Coal Measures - Overburden Siltstone. Slightly weathered, very dark grey		
		Styx Coal Measures - Overburden Siltstone. Fresh, carbonated, with some coal, black		
25		**Styx Coal Measures - Overburden** Siltstone. Fresh, grey to very dark grey		
30		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey		
35		**Styx Coal Measures - Overburden** Siltstone. Fresh, carbonated with trace coal, very dark grey		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP23B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 06-Oct-18

Total Depth (m bgl): 194
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 32
Static Water Level
Date: 02/11/2018 **Depth (mbRP):** 7.8
Projection: GDA_94
Easting: 773638 **Northing:** 7484709

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
40		**Styx Coal Measures - Interburden** Sandstone. Fresh, very dark grey		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
45				
50				
55		**Styx Coal Measures - Interburden** Siltstone. Fresh, carbonated, with some coal, black		
		Styx Coal Measures - Interburden Siltstone. Fresh, with sandy lenses, very dark grey		
		Styx Coal Measures - Interburden Sandstone. Fresh, with interbedded siltstone, grey		
60		**Styx Coal Measures - Interburden** Siltstone. Fresh, carbonated, black		
		Styx Coal Measures - Interburden Siltstone. Fresh, very dark grey		
		Styx Coal Measures - Interburden Siltstone. Fresh, with interbedded sandstone, very dark grey		
65		**Styx Coal Measures - Interburden** Sandstone. Fresh, with interbedded siltstone, grey		
		Styx Coal Measures - Interburden Sandstone. Fresh, dark grey-black		
		Styx Coal Measures - Interburden Sandstone. Slightly weathered, grey. Coal (violet seam)		
70		**Styx Coal Measures - Interburden** Siltstone. Fresh, carbonaceous with trace coal, black (violet seam)		
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		
75				

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP23B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 06-Oct-18

Total Depth (m bgl): 194
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 32
Static Water Level
Date: 02/11/2018 **Depth (mbRP):** 7.8
Projection: GDA_94
Easting: 773638 **Northing:** 7484709

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
80		**Styx Coal Measures - Underburden** *(continued)*		
85				
90		**Styx Coal Measures - Underburden** Siltstone. Fresh, with sandstone lenses, very dark grey		
95				
100		**Styx Coal Measures - Underburden** Sandstone. Fresh, very dark grey **Styx Coal Measures - Underburden** Siltstone. Fresh, very dark grey		
105				
110				
115		**Styx Coal Measures - Underburden** With trace coal		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP23B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 06-Oct-18

Total Depth (m bgl): 194
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 32
Static Water Level
Date: 02/11/2018 **Depth (mbRP):** 7.8
Projection: GDA_94
Easting: 773638 **Northing:** 7484709

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
120		**Styx Coal Measures - Underburden** *(continued)*		
125				
130		**Styx Coal Measures - Underburden** Sandstone. Fresh, light grey		
		Styx Coal Measures - Underburden Siltstone. Fresh, dark grey		
135		**Styx Coal Measures - Underburden** Sandstone. Fresh, coarse grained, with trace coal. Light grey mottled dark grey (Diorite appearance) and some brown chips		
140				
145				
		Styx Coal Measures - Underburden Siltstone. Fresh, with trace coal, dark grey		
150		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey		
155		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey, laminar		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP23B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Air Hammer
Bore Diameter: 10", 6.5"
Date Drilled: 06-Oct-18

Total Depth (m bgl): 194
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 32
Static Water Level
Date: 02/11/2018 **Depth (mbRP):** 7.8
Projection: GDA_94
Easting: 773638 **Northing:** 7484709

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
160		**Styx Coal Measures - Underburden** *(continued)*		
165				
170				
175				
180				182 - 184m Bentonite pellets 184 - 193m Gravel pack, (5mm rounded river gravel)
185				187 - 193m 100mm CL12 uPVC slotted casing, jointed with screws and glue
190		**Styx Coal Measures - Underburden** Siltstone/mudstone. Distinct colour change to lighter grey. Softer rock. No calcareous reaction with acid		EOH @ 193m 1m collapse at bottom of well

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP24

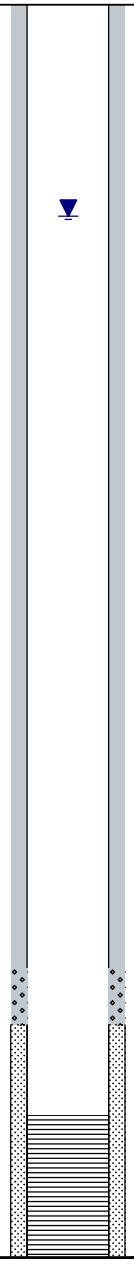
Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 11-Sep-18

Total Depth (m bgl): 26.4
Well Stick Up (m): 0.48
Surface Elevation (m AHD): 20
Static Water Level
Date: 18/09/2018 **Depth (mbRP):** 4.94
Projection: GDA_94
Easting: 771965 **Northing:** 7489093

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	LITHOLOGY
0	**Alluvium** Clay. Medium plasticity, brown, dry
	Alluvium Clay. Medium plasticity, brown-grey, dry
	Alluvium Clay. With trace conglomerate, low plasticity, grey to orange-brown, dry
	Alluvium Conglomerate. Fine to medium size, various colours and origin, dry
5	**Alluvium** Clay. Medium plasticity, grey dry
	Alluvium Calcrete. Brown to red-brown, dry
	Alluvium Clay. Medium plasticity, brown, dry
	Alluvium Siltstone / Sandstone. Laminated, slightly weathered, brown-grey, dry
	Alluvium Gravel / Conglomerate. Fine to coarse grained, mostly red-brown.
10	**Styx Coal Measures- Overburden** Sandstone. With some carbonaceous siltstone, fresh, grey to dark grey
	Styx Coal Measures- Overburden Sandstone. With coal and carbonaceous siltstone, fresh, dark grey
15	**Styx Coal Measures- Overburden** Siltstone. Laminated, fresh, very dark grey
	Styx Coal Measures- Overburden Siltstone. As above, with igneous material
	Styx Coal Measures- Overburden Siltstone. As above with coal, black
	Styx Coal Measures- Overburden Siltstone. Fresh, very dark grey
20	**Styx Coal Measures- Overburden** Siltstone. With some coal and carbonaceous siltstone, fresh, black
	Styx Coal Measures- Overburden Siltstone. Fresh, dark grey
25	



WELL DESCRIPTION

0 - 20.3m Cement/bentonite grout
0 - 23.4m 50mm CL18 uPVC blank casing, thread jointed

20.3 - 21.5m Bentonite pellets

21.5 - 26.4m Gravel pack, (2 - 5mm)

23.4 - 26.4m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed

EOH @ 26.4m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP25

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 08-Sep-18

Total Depth (m bgl): 13.2
Well Stick Up (m): 0.58
Surface Elevation (m AHD): 50
Static Water Level
Date: 17/09/2018 **Depth (mbRP):** 10.78
Projection: GDA_94
Easting: 770812 **Northing:** 7486227

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Clay. With trace fine rootlets, medium plasticity, grey, dry		0 - 7m Cement/bentonite grout 0 - 10.1m 50mm CL18 uPVC blank casing, thread jointed
		Alluvium Sandstone. Highly weathered, brown to red-brown, with lenses of grey clay		
		Alluvium Clay. With some fine sand, medium plasticity, red and pale grey		
		Alluvium Clay. With lenses of sandstone (approximately equal proportion), low-medium plasticity, white.		
5				
		Alluvium Calcrete. 20 - 30cm lens. White		7 - 8m Bentonite pellets
		Alluvium Clay. With calcrete lenses, medium plasticity, light brown		8 - 13.1m Gravel pack, (2 - 5mm)
		Alluvium Clay. Medium plasticity, light brown		10.1 - 13.1m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed
10		**Alluvium** Sandy Clay. Low-medium plasticity, dark brown		
		Alluvium Sand. Fine to medium grained, well sorted, grey		
				EOH @ 13.2m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP26

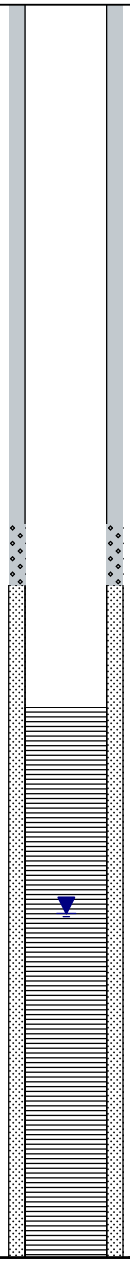
Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 09-Sep-18

Total Depth (m bgl): 20.5
Well Stick Up (m): 0.52
Surface Elevation (m AHD): 31
Static Water Level
Date: 17/09/2018 **Depth (mbRP):** 15.39
Projection: GDA_94
Easting: 773655 **Northing:** 7489372

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	LITHOLOGY
0	**Alluvium** Clay. High plasticity, dark brown
	Alluvium Sandy Clay. Medium plasticity, fine to medium grained sands, light brown
	Alluvium Sandy Clay. Medium plasticity, fine to medium grained sands, grey mottled brown
	Alluvium Sandy Clay. Medium plasticity, fine grained sands, orange-brown mottled grey
5	
	Alluvium Silt. With some clay, brown, dry
	Alluvium Silt. With some clay, brown, moist
10	**Alluvium** Silt. With some clay lenses, brown
	Alluvium Clay & Gravel. Subangular to subrounded, various????? And colour, with trace cobbles
	Alluvium Silt. Brown
15	
	Alluvium Mudstone. (Siltstone / Claystone), highly weathered, grey
20	



WELL DESCRIPTION

0 - 8.5m Cement/bentonite grout
0 - 11.5m 50mm CL18 uPVC blank casing, thread jointed

8.5 - 9.5m Bentonite pellets

9.5 - 20.5m Gravel pack, (2 - 5mm)

11.5 - 20.5m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed

EOH @ 20.5m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP27

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 08-Sep-18

Total Depth (m bgl): 20.5
Well Stick Up (m): 0.85
Surface Elevation (m AHD): 49
Static Water Level
Date: 17/09/2018 **Depth (mbRP):** 20.59
Projection: GDA_94
Easting: 770606 **Northing:** 7487750

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Clay. High plasticity, firm, grey, dry		0 - 11.5m Cement/bentonite grout 0 - 14.5m 50mm CL18 uPVC blank casing, thread jointed
		Alluvium Clay. Medium plasticity, grey-brown, dry		
		Alluvium Clay. Medium plasticity, light grey		
		Alluvium Clay. With trace of fine sand, low-medium plasticity, grey-brown		
5		**Alluvium** Sand. With some clay, fine grained, pale yellow		
		Alluvium Clay. With trace of fine sand, low-medium plasticity, yellow-brown		
		Alluvium Clay. With trace of fine sand, medium plasticity, brown		
10				11.5 - 12.5m Bentonite pellets 12.5 - 20.5m Gravel pack (2 - 5mm)
		Alluvium Sand. With some clay, fine grained, uniformly graded		14.5 - 20.5m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed
15		**Styx Coal Measures - Overburden** Sandstone. Weathered, grey-brown		
		Styx Coal Measures - Overburden Sandstone. Fresh, grey		
20				EOH @ 20.5m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP28

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

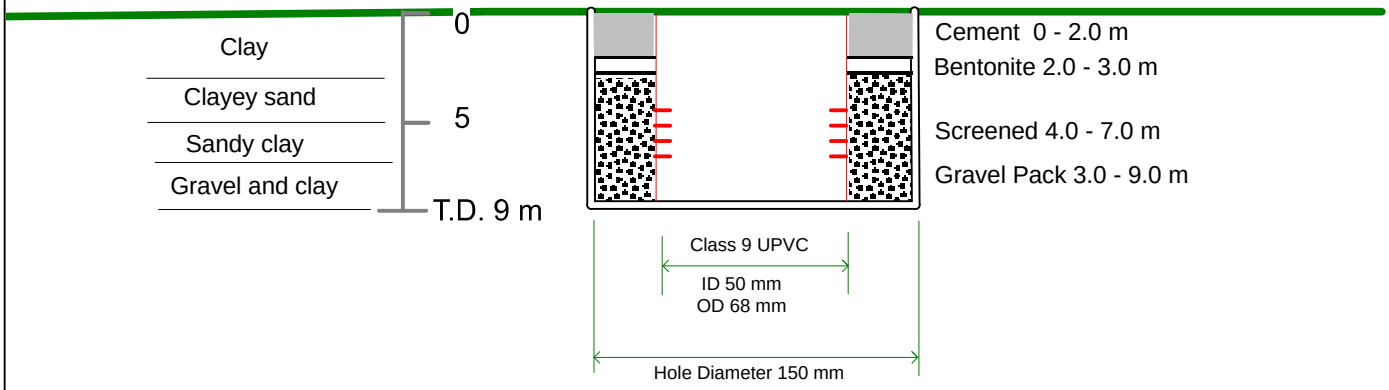
Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Waratah Coal
Drilling Method: Air Hammer
Bore Diameter: 6.75"
Date Drilled: 11-Sep-18

Total Depth (m bgl): 12
Well Stick Up (m): 0.58
Surface Elevation (m AHD): 32
Static Water Level
Date: 18/09/2018 **Depth (mbRP):** 11.47
Projection: GDA_94
Easting: 772192 **Northing:** 7489099

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	GEOLOGICAL DESCRIPTION	WELL CONSTRUCTION	CONSTRUCTION INFO. WELL DESCRIPTION
0		**Alluvium** Clay. Medium plasticity, brown			0 - 6m Cement/bentonite grout 0 - 8.9m 50mm CL18 uPVC blank casing, thread jointed
		Alluvium Clay. With trace fine sand, medium plasticity, brown			
		Alluvium Clay. With some fine to medium grained sand, low plasticity, grey-brown			
		Alluvium Sand. Fine grained with some conglomerate, grey-brown			
5		**Alluvium** Conglomerate. Fine to coarse, brown-yellow			6 - 6.9m Bentonite pellets
		Alluvium Clay. With some sand, low plasticity, brown-yellow			6.9 - 11.9m Gravel pack, (2 - 5mm)
		Alluvium Clay. Highly weathered mudstone, medium plasticity, grey, dry			
		Styx Coal Measures - Overburden Mudstone. Carbonated, black, moist			8.9 - 11.9m 50mm CL18 PVC slotted casing, 2mm aperture, thread jointed
		Styx Coal Measures - Overburden Sandstone. Highly weathered, grey, dry to moist			
10					EOH @ 12m

WMP28B

772 192 mE, 7 489 099 mN, RL 21.91 mAHD



Dry Hole

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29A

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 28-Oct-18

Total Depth (m bgl): 12.5
Well Stick Up (m): 1
Surface Elevation (m AHD): 13
Static Water Level
Date: 03/11/2018 **Depth (mbRP):** 9.65
Projection: GDA_94
Easting: 771298 **Northing:** 7497385

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty sand. Fine to medium grained, loose cuttings, brown, dry		0 - 5m Cement/bentonite grout 0 - 6.5m 100mm CL12 uPVC blank casing, bell jointed with glue and screws
5				5 - 6m Bentonite pellets 6 - 12.5m Gravel pack, (5 - 7mm rounded river gravels)
		Alluvium Gravel. Loose, well graded, sandstone/quartz gravels, angular to sub-angular, various colours (brown/white/red/grey)		6.5 - 12.5m 100mm CL12 uPVC slotted casing, 2mm vertical slots bell jointed with glue and screws
10		**Alluvium** Sandy gravels. As above, more rounded gravels, coarse grained sands		EOH @ 12.5m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 28-Oct-18

Total Depth (m bgl): 20
Well Stick Up (m): 1
Surface Elevation (m AHD): 13
Static Water Level
Date: 03/11/2018 **Depth (mbRP):** 10.35
Projection: GDA_94
Easting: 771301 **Northing:** 7497385

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty sand. Fine to medium grained, loose cuttings, brown, dry		0 - 14.5m Cement/bentonite grout 0 - 16m 100mm CL12 uPVC blank casing, bell jointed with glue and screws
5		**Alluvium** Gravel. Loose, well graded, sandstone/quartz gravels, angular to sub-angular, various colours (brown/white/red/grey)		
		Alluvium Sandy gravels. As above, more rounded gravels, coarse grained sands	▼	
10		**Alluvium** Clay. High plasticity, grey, very soft		
15		**Alluvium** Gravel. Well graded, rounded to angular, various origins (angular, up to 3cm diameter, various colours (brown/white/red/grey/clear)		14.5 - 15.5m Bentonite pellets 15.5 - 20m Gravel pack, (5 - 7mm rounded river gravels) 16 - 20m 100mm CL12 uPVC slotted casing, 2mm vertical slots bell jointed with glue and screws
		Alluvium Clayey gravel. As above, with clay		EOH @ 20m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Mud Rotary, Air Hammer
Bore Diameter: 10", 7"
Date Drilled: 27-Oct-18

Total Depth (m bgl): 58
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 27/10/2018 **Depth (mbRP):** 51
Projection: GDA_94
Easting: 771318 **Northing:** 7497394

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty sand. Fine to medium grained, loose cuttings, brown, dry		0 - 49m Cement/bentonite grout 0 - 52m 100mm CL12 uPVC blank casing, bell jointed with glue and screws
5		**Alluvium** Gravel. Loose, well graded, sandstone/quartz gravels, angular to sub-angular, various colours (brown/white/red/grey)		
10		**Alluvium** Sandy gravels. As above, more rounded gravels, coarse grained sands		10" hole from 0 to 22m
15		**Alluvium** Clay. High plasticity, grey, very soft		
		Alluvium Gravel. Well graded, rounded to angular, various origins (angular, up to 3cm diameter, various colours (brown/white/red/grey/clear)		
20		**Alluvium** Clayey gravel. As above, with clay		
		Styx Coal Measures - Overburden Sandstone. Grey with some brown lenses, slightly weathered		7" hole from 22 to 58m (EOH)
25		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey, dry		
30				
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey, dry		
35		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey, dry		
		Styx Coal Measures - Overburden		

(Continued Next Page)

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Mud Rotary, Air Hammer
Bore Diameter: 10", 7"
Date Drilled: 27-Oct-18

Total Depth (m bgl): 58
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 27/10/2018 **Depth (mbRP):** 51
Projection: GDA_94
Easting: 771318 **Northing:** 7497394

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION: LITHOLOGY	CONSTRUCTION INFO.: WELL CONSTRUCTION	CONSTRUCTION INFO.: WELL DESCRIPTION
40		Siltstone with sandstone lenses. Fresh, dark grey **Styx Coal Measures - Overburden** *(continued)*		
45		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey		
50		**Styx Coal Measures - Overburden** Siltstone. Carbonaceous, very dark grey/black with traces of coal		49 - 51m Bentonite pellets 51 - 58m Gravel pack, (5 - 7mm rounded river gravels) 52 - 58m 100mm CL12 uPVC slotted casing, 2mm vertical slots bell jointed with glue and screws
55		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey, dry		EOH @ 58m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29D

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 01-Nov-18

Total Depth (m bgl): 121
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** >100
Projection: GDA_94
Easting: 771317 **Northing:** 7497387

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty sand. Fine to medium grained, loose cuttings, brown, dry		0 - 112m Cement/bentonite grout 0 - 115m 100mm CL12 uPVC blank casing, bell jointed with glue and screws
5		**Alluvium** Gravel. Loose, well graded, sandstone/quartz gravels, angular to sub-angular, various colours (brown/white/red/grey)		
10		**Alluvium** Sandy gravels. As above, more rounded gravels, coarse grained sands		
15		**Alluvium** Clay. High plasticity, grey, very soft		
		Alluvium Gravel. Well graded, rounded to angular, various origins (angular, up to 3cm diameter, various colours (brown/white/red/grey/clear)		
20		**Alluvium** Clayey gravel. As above, with clay		
		Styx Coal Measures - Overburden Sandstone. Grey with some brown lenses, slightly weathered		
25		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey, dry		
30				
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey, dry		
		Styx Coal Measures - Overburden Sandstone. Fresh, grey, dry		
35				
		Styx Coal Measures - Overburden Siltstone with sandstone lenses. Fresh, dark grey		
40				

(Continued Next Page)

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29D

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 01-Nov-18

Total Depth (m bgl): 121
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** >100
Projection: GDA_94
Easting: 771317 **Northing:** 7497387

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
45		**Styx Coal Measures - Overburden** *(continued)*		
		Styx Coal Measures - Overburden Sandstone. Fresh, grey		
50		**Styx Coal Measures - Overburden** Siltstone. Carbonaceous, very dark grey/black with traces of coal		
		Styx Coal Measures - Overburden Sandstone. Fresh, grey, dry		
55				
60		**Styx Coal Measures - Overburden** Siltstone. Fresh, dark grey		
65		**Styx Coal Measures - Overburden** Coal. Black		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
70		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey with sandstone lenses and coal traces		
75				
80		**Styx Coal Measures - Interburden** Sandstone. Fresh, grey		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29D

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 01-Nov-18

Total Depth (m bgl): 121
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** >100
Projection: GDA_94
Easting: 771317 **Northing:** 7497387

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
85		**Styx Coal Measures - Interburden** Coal. Black		
		Styx Coal Measures - Interburden Siltstone. Carbonaceous, very dark grey/black		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden Siltstone. Carbonaceous, very dark grey/black		
90		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey, slight moisture		
95		**Styx Coal Measures - Interburden** Siltstone. Carbonaceous, very dark grey/dark brown		
100		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
105		**Styx Coal Measures - Interburden** Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden Coal. Black		
110		**Styx Coal Measures - Interburden** Siltstone. Carbonaceous, very dark grey/dark brown		112 - 114m Bentonite pellets 114 - 121m Gravel pack, (5 - 7mm rounded river gravels) 115 - 121m 100mm CL12 uPVC slotted casing, 2mm vertical slots bell jointed with glue and screws
115		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey with sandstone lenses		
120		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		EOH @ 121m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29E

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 7"
Date Drilled: 31-Oct-18

Total Depth (m bgl): 228.5
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 27/10/2018 **Depth (mbRP):** 10.5
Projection: GDA_94
Easting: 771312 **Northing:** 7497397

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty sand. Fine to medium grained, loose cuttings, brown, dry		0 - 220m Cement/bentonite grout 0 - 222.5m 100mm CL12 uPVC blank casing, bell jointed with glue and screws
5		**Alluvium** Gravel. Loose, well graded, sandstone/quartz gravels, angular to sub-angular, various colours (brown/white/red/grey)		
10		**Alluvium** Sandy gravels. As above, more rounded gravels, coarse grained sands	▼	
15		**Alluvium** Clay. High plasticity, grey, very soft		
20		**Alluvium** Gravel. Well graded, rounded to angular, various origins (angular, up to 3cm diameter, various colours (brown/white/red/grey/clear) **Alluvium** Clayey gravel. As above, with clay **Styx Coal Measures - Overburden** Sandstone. Grey with some brown lenses, slightly weathered		
25		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey, dry		
30				
35		**Styx Coal Measures - Overburden** Siltstone. Fresh, dark grey, dry **Styx Coal Measures - Overburden** Sandstone. Fresh, grey, dry		
		Styx Coal Measures - Overburden		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29E

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 7"
Date Drilled: 31-Oct-18

Total Depth (m bgl): 228.5
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 27/10/2018 **Depth (mbRP):** 10.5
Projection: GDA_94
Easting: 771312 **Northing:** 7497397

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
40		Siltstone with sandstone lenses. Fresh, dark grey **Styx Coal Measures - Overburden** *(continued)*		
45		**Styx Coal Measures - Overburden** Sandstone. Fresh, grey		
50		**Styx Coal Measures - Overburden** Siltstone. Carbonaceous, very dark grey/black with traces of coal		
		Styx Coal Measures - Overburden Sandstone. Fresh, grey, dry		
55				
60		**Styx Coal Measures - Overburden** Siltstone. Fresh, dark grey		
65		**Styx Coal Measures - Overburden** Coal. Black		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
70		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey with sandstone lenses and coal traces		
75				
		Styx Coal Measures - Interburden		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29E

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 7"
Date Drilled: 31-Oct-18

Total Depth (m bgl): 228.5
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 27/10/2018 **Depth (mbRP):** 10.5
Projection: GDA_94
Easting: 771312 **Northing:** 7497397

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
80		Sandstone. Fresh, grey **Styx Coal Measures - Interburden** *(continued)*		
		Styx Coal Measures - Interburden Coal. Black		
85		**Styx Coal Measures - Interburden** Siltstone. Carbonaceous, very dark grey/black		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden Siltstone. Carbonaceous, very dark grey/black		
90		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey, slight moisture		
95		**Styx Coal Measures - Interburden** Siltstone. Carbonaceous, very dark grey/dark brown		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey		
100				
105				
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden Coal. Black		
110		**Styx Coal Measures - Interburden** Siltstone. Carbonaceous, very dark grey/dark brown		
115		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey with sandstone lenses		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29E

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 7"
Date Drilled: 31-Oct-18

Total Depth (m bgl): 228.5
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 27/10/2018 **Depth (mbRP):** 10.5
Projection: GDA_94
Easting: 771312 **Northing:** 7497397

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
120		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey with coal traces		
125		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Coal. Black		
130		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey, carbonaceous lens at 134m		
135				
140		**Styx Coal Measures - Interburden** Siltstone. Carbonaceous, very dark grey/dark brown		
145		**Styx Coal Measures - Interburden** Coal. Black		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
150				
155				

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29E

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 7"
Date Drilled: 31-Oct-18

Total Depth (m bgl): 228.5
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 27/10/2018 **Depth (mbRP):** 10.5
Projection: GDA_94
Easting: 771312 **Northing:** 7497397

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
160		**Styx Coal Measures - Interburden** Siltstone. Carbonaceous, very dark grey/dark brown		
		Styx Coal Measures - Interburden Coal. Black		
165		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
170		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey with coal traces		
		Styx Coal Measures - Interburden Coal. Black		
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		
175				
180				
185				
		Styx Coal Measures - Underburden Siltstone. Fresh, dark grey		
190				
195				
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP29E

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 7"
Date Drilled: 31-Oct-18

Total Depth (m bgl): 228.5
Well Stick Up (m): 1
Surface Elevation (m AHD): 14
Static Water Level
Date: 27/10/2018 **Depth (mbRP):** 10.5
Projection: GDA_94
Easting: 771312 **Northing:** 7497397

DEPTH (m)	GRAPHIC LOG	GEOLOGICAL DESCRIPTION: LITHOLOGY	CONSTRUCTION INFO.: WELL CONSTRUCTION	CONSTRUCTION INFO.: WELL DESCRIPTION
200		**Styx Coal Measures - Underburden** *(continued)*		
		Styx Coal Measures - Underburden Siltstone. Fresh, dark grey		
205		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey, slightly moist		
		Styx Coal Measures - Underburden Siltstone. Fresh, dark grey		
210		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey, slightly moist		
215				
		Styx Coal Measures - Underburden Sandstone. Fresh, grey, slightly moist, clay present throughout		
220				220 - 222m Bentonite pellets 222 - 228.5m Gravel pack, (5 - 7mm rounded river gravels) 222.5 - 228.5m 100mm CL12 uPVC slotted casing, 2mm vertical slots bell jointed with glue and screws
		Styx Coal Measures - Underburden Sandstone. Fresh, grey, slightly moist. Colour change to lighter grey/light brown. Loose silty sand cuttings with minimal rock chips		
225				EOH @ 228.5m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP30A

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 30
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 34
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 15.09
Projection: GDA_94
Easting: 772028 **Northing:** 7488896

DEPTH (m)	GEOLOGICAL DESCRIPTION	CONSTRUCTION INFO.
0	**Alluvium** Silty clay. Moderate plasticity, very stiff, brown/grey, dry	0 - 23m Cement/bentonite grout 0 - 27m 50mm CL18 uPVC blank casing, bell jointed with glue and screws
5	**Alluvium** Sandy silt. Loose, very fine grained sands, light brown/orange, dry	
	Alluvium Silty clay. Low to moderate plasticity, very stiff, brown/grey, dry	
10	**Alluvium** Clayey silt. Minimal cohesion, light brown, slightly moist	
	Alluvium Silty clay. Low plasticity, stiff, grey, slightly moist	
15	**Alluvium** Clayey silt. Minimal cohesion, brown, slightly moist	
	Alluvium Sandy silt. Minimal cohesion, Fine grained sands, grey, slightly moist	
	Alluvium Sandy silt. Very sandy, fine to medium grains	
20	**Alluvium** Clayey sand. (Extremely weathered SANDSTONE) Very dense, fine to medium grains, distinct colour change to grey, moist	
	Styx Coal Measures - Overburden Siltstone. Fresh, laminar, black	
	Styx Coal Measures - Overburden Siltstone. Dark grey, with trace of coal	23 - 25m Bentonite pellets
25	**Styx Coal Measures - Overburden** Coal	25 - 30m Gravel pack 27 - 30m 50mm CL18 uPVC slotted casing, 2mm apperture, bell jointed with glue and screws
	Styx Coal Measures - Overburden Siltstone. Fresh, dark grey	
30	**Styx Coal Measures - Overburden** Siltstone with trace coal	EOH @ 30m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP30B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 56
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 34
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 15.05
Projection: GDA_94
Easting: 772028 **Northing:** 7488900

GEOLOGICAL DESCRIPTION | **CONSTRUCTION INFO.**

DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty clay. Moderate plasticity, very stiff, brown/grey, dry		0 - 46m Cement/bentonite grout 0 - 50m 50mm CL18 uPVC blank casing, bell jointed with glue and screws
5		**Alluvium** Sandy silt. Loose, very fine grained sands, light brown/orange, dry		
		Alluvium Silty clay. Low to moderate plasticity, very stiff, brown/grey, dry		
10		**Alluvium** Clayey silt. Minimal cohesion, light brown, slightly moist		
		Alluvium Silty clay. Low plasticity, stiff, grey, slightly moist	▼	
15		**Alluvium** Clayey silt. Minimal cohesion, brown, slightly moist		
		Alluvium Sandy silt. Minimal cohesion, Fine grained sands, grey, slightly moist		
		Alluvium Sandy silt. Very sandy, fine to medium grains		
20		**Alluvium** Clayey sand. (Extremely weathered SANDSTONE) Very dense, fine to medium grains, distinct colour change to grey, moist		
		Styx Coal Measures - Overburden Siltstone. Fresh, laminar, black		
		Styx Coal Measures - Overburden Siltstone. Dark grey, with trace of coal		
25		**Styx Coal Measures - Overburden** Coal		
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey		
		Styx Coal Measures - Overburden Siltstone with trace coal		
30				
		Styx Coal Measures - Interburden Siltstone with interbedded sandstone lenses		
35				

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP30B

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 56
Well Stick Up (m): 0.9
Surface Elevation (m AHD): 34
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 15.05
Projection: GDA_94
Easting: 772028 **Northing:** 7488900

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
40		**Styx Coal Measures - Interburden** *(continued)*		
		Styx Coal Measures - Interburden Sandstone. Fresh, grey		
		Styx Coal Measures - Interburden Sandstone with trace coal		
45		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		46 - 48m Bentonite pellets
		Styx Coal Measures - Interburden Siltstone with trace coal		
		Styx Coal Measures - Interburden Coal		48 - 56m Gravel pack 50 - 56m 50mm CL18 uPVC slotted casing, 2mm apperture, bell jointed with glue and screws
50		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Interburden Coal		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey		
55				EOH @ 56m

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP30C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.8
Surface Elevation (m AHD): 33
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 12.27
Projection: GDA_94
Easting: 772029 **Northing:** 7488905

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
0		**Alluvium** Silty clay. Moderate plasticity, very stiff, brown/grey, dry		0 - 196m Cement/bentonite grout 0 - 200m 50mm CL18 uPVC blank casing, bell jointed with glue and screws
5		**Alluvium** Sandy silt. Loose, very fine grained sands, light brown/orange, dry		
		Alluvium Silty clay. Low to moderate plasticity, very stiff, brown/grey, dry		
10		**Alluvium** Clayey silt. Minimal cohesion, light brown, slightly moist	▼	
		Alluvium Silty clay. Low plasticity, stiff, grey, slightly moist		
15		**Alluvium** Clayey silt. Minimal cohesion, brown, slightly moist		
		Alluvium Sandy silt. Minimal cohesion, Fine grained sands, grey, slightly moist		
		Alluvium Sandy silt. Very sandy, fine to medium grains		
20		**Alluvium** Clayey sand. (Extremely weathered SANDSTONE) Very dense, fine to medium grains, distinct colour change to grey, moist		
		Styx Coal Measures - Overburden Siltstone. Fresh, laminar, black		
25		**Styx Coal Measures - Overburden** Siltstone. Dark grey, with trace of coal		
		Styx Coal Measures - Overburden Coal		
		Styx Coal Measures - Overburden Siltstone. Fresh, dark grey		
30		**Styx Coal Measures - Overburden** Siltstone with trace coal		
		Styx Coal Measures - Interburden Siltstone with interbedded sandstone lenses		
35				
40		**Styx Coal Measures - Interburden**		

(Continued Next Page)

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP30C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.8
Surface Elevation (m AHD): 33
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 12.27
Projection: GDA_94
Easting: 772029 **Northing:** 7488905

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
45		Sandstone. Fresh, grey **Styx Coal Measures - Interburden** *(continued)* **Styx Coal Measures - Interburden** Sandstone with trace coal **Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey **Styx Coal Measures - Interburden** Siltstone with trace coal		
50		**Styx Coal Measures - Interburden** Coal **Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey **Styx Coal Measures - Interburden** Coal		
55		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey **Styx Coal Measures - Interburden** Coal		
60		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey, with trace coal **Styx Coal Measures - Interburden** Coal		
65		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey		
70		**Styx Coal Measures - Interburden** Coal **Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey with interbedded sandstone lenses at 72m		
75				
80		**Styx Coal Measures - Interburden** Siltstone. Fresh, dark grey with coal lenses between 80 and 82m. Trace coal present at 85m		

(Continued Next Page)

COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP30C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.8
Surface Elevation (m AHD): 33
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 12.27
Projection: GDA_94
Easting: 772029 **Northing:** 7488905

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
85		**Styx Coal Measures - Interburden** *(continued)*		
		Styx Coal Measures - Interburden Siltstone. Fresh, dark grey with trace coal (Violet Seam) at 90m		
90		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey with interbedded siltstone lenses at 95m		
95		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey		
100				
105		**Styx Coal Measures - Underburden** Sandstone. Very coarse grained, fresh, light grey mottled dark grey diorite appearance. Interbedded siltstone lenses present at 109m		
110		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey		
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		
115		**Styx Coal Measures - Underburden** Sandstone. Very coarse grained, fresh, light grey / grey / dark grey. Some cuttings as rounded gravels, not chips.		
120		**Styx Coal Measures - Underburden** Sandstone. With interbedded siltstone lenses, fresh, light grey / dark grey		
125		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey with interbedded siltstone at 130m		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP30C

Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.8
Surface Elevation (m AHD): 33
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 12.27
Projection: GDA_94
Easting: 772029 **Northing:** 7488905

GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
130		**Styx Coal Measures - Underburden** *(continued)*		
		Styx Coal Measures - Underburden Sandstone. Distinct colour change to brown, suspected weathering, potential water cut		
135		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey, with interbedded siltstone with some brown lenses, weathered materials? at 141m		
140				
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		
145				
150				
		Styx Coal Measures - Underburden Siltstone. Dark grey with some brown, drilled quicker, suspected weathered zone, likely water cut.		
		Styx Coal Measures - Underburden Siltstone. Fresh, dark grey with traces of brown at 156m		
155				
160				
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		
		Styx Coal Measures - Underburden Siltstone. Fresh, grey		
165				
		Styx Coal Measures - Underburden Sandstone. Fresh, grey		

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COMPOSITE WELL LOG

BOREHOLE / WELL NUMBER: WMP30C

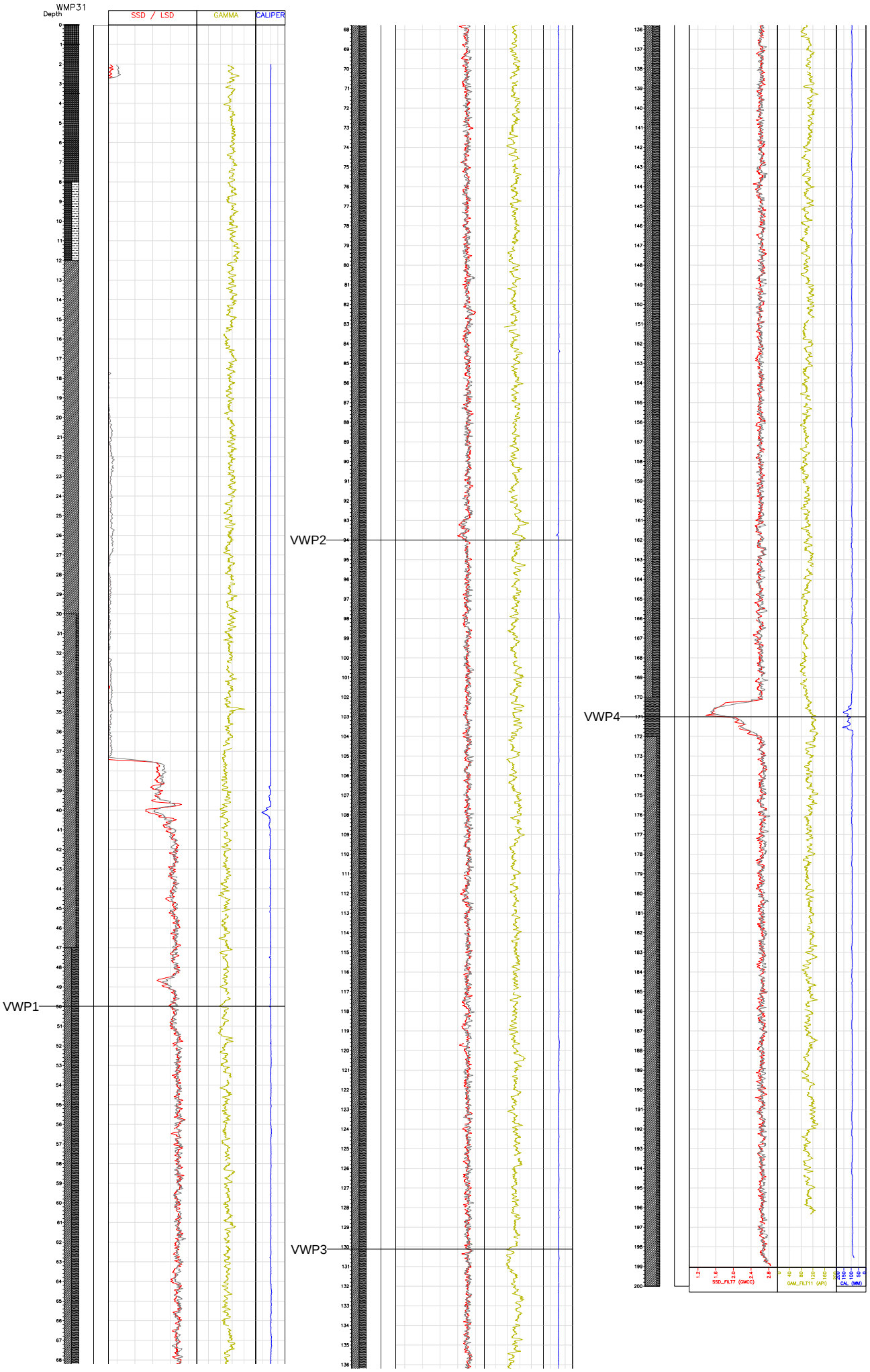
Central Coal Queensland Pty Ltd
&
Fairway Coal Pty Ltd

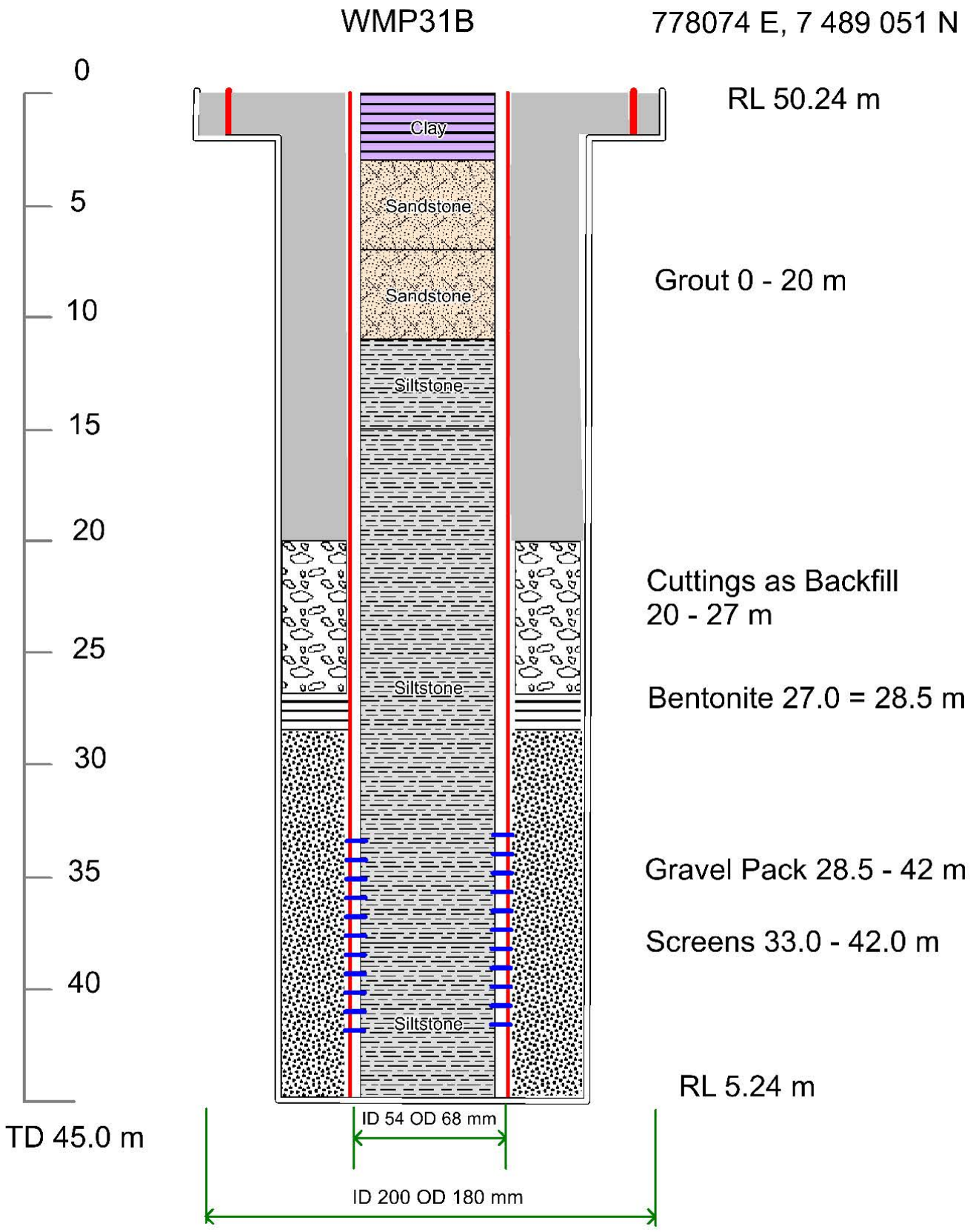
Project Name: Central Queensland Coal Project
Location: Styx Coal Basin
Client: Central Queensland Coal Pty Ltd and Fairway Coal Pty/Ltd
Drilled By: Depco
Drilling Method: Rotary Air
Bore Diameter: 6.5"
Date Drilled: 19-Oct-18

Total Depth (m bgl): 206
Well Stick Up (m): 0.8
Surface Elevation (m AHD): 33
Static Water Level
Date: 05/11/2018 **Depth (mbRP):** 12.27
Projection: GDA_94
Easting: 772029 **Northing:** 7488905

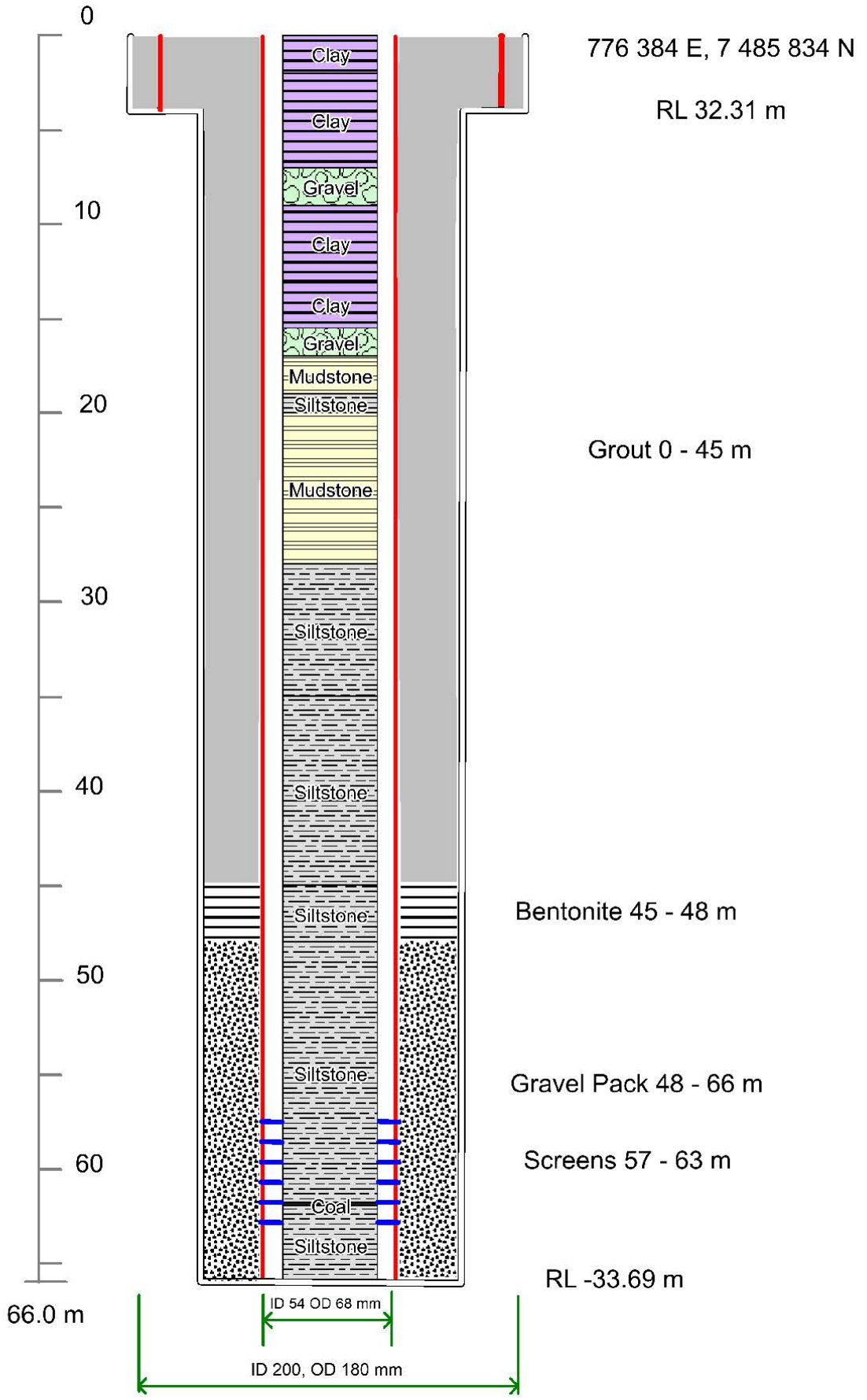
GEOLOGICAL DESCRIPTION			CONSTRUCTION INFO.	
DEPTH (m)	GRAPHIC LOG	LITHOLOGY	WELL CONSTRUCTION	WELL DESCRIPTION
170		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey		
175		**Styx Coal Measures - Underburden** Igneous rock. Distinct colour change to light grey with green tinge, intrusive igneous rock with interbedded metasiltstone		
180		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey, with sandstone lenses throughout		
185		**Styx Coal Measures - Underburden** Sandstone. Fresh, grey		
190		**Styx Coal Measures - Underburden** Siltstone. Fresh, dark grey with purple tinge, very hard.		
195				196 - 198m Bentonite pellets 198 - 206m Gravel pack 200 - 206m 50mm CL18 uPVC slotted casing, 2mm apperture, bell jointed with glue and screws
200				
205				EOH @ 206m

WMP31 VWP


WMP31
Depth
SSD / LSD
GAMMA
CALIPER
VWP1
VWP2
VWP3
VWP4
SSD_FILT7 (GMCC)
GAM_FILT11 (API)
CAL (MM)

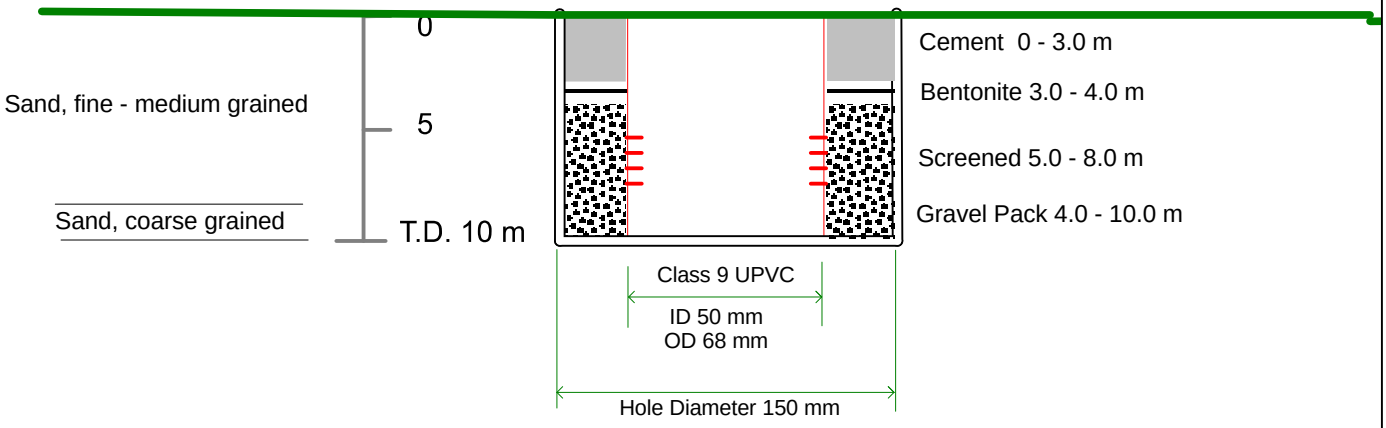

WMP31B
778074 E, 7 489 051 N
0
5
10
15
20
25
30
35
40
TD 45.0 m
RL 50.24 m
Clay
Sandstone
Sandstone
Siltstone
Siltstone
Siltstone
Grout 0 - 20 m
Cuttings as Backfill
20 - 27 m
Bentonite 27.0 = 28.5 m
Gravel Pack 28.5 - 42 m
Screens 33.0 - 42.0 m
RL 5.24 m
ID 54 OD 68 mm
ID 200 OD 180 mm

WMP32


0
10
20
30
40
50
60
66.0 m
Clay
Clay
Gravel
Clay
Clay
Gravel
Mudstone
Siltstone
Mudstone
Siltstone
Siltstone
Siltstone
Siltstone
Coal
Siltstone
776 384 E, 7 485 834 N
RL 32.31 m
Grout 0 - 45 m
Bentonite 45 - 48 m
Gravel Pack 48 - 66 m
Screens 57 - 63 m
RL -33.69 m
ID 54 OD 68 mm
ID 200, OD 180 mm

WMP33

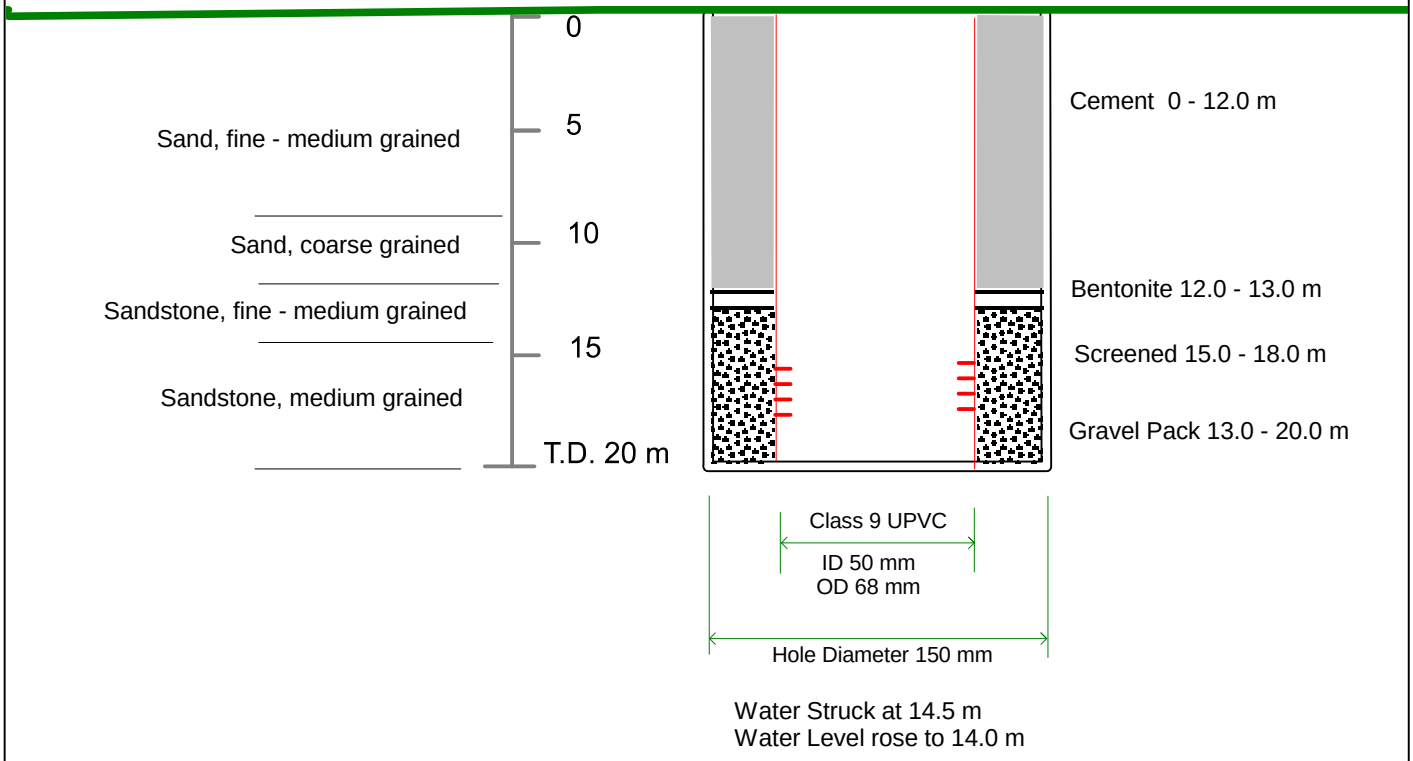
772 900 mE, 7 490 364 mN, RL 22.79 mAHD



Dry Hole

WMP33B

772 905 mE, 7 490 363 mN, RL 22.49 mAHD



Water Struck at 14.5 m
Water Level rose to 14.0 m