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MOUNT PLEASANT OPERATION

GROUNDWATER MANAGEMENT PLAN

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1 INTRODUCTION

The Mount Pleasant Operation (MPO) is located in the Upper Hunter Valley of New South Wales (NSW), approximately 3 kilometres (km) north-west of Muswellbrook and approximately 50 km north-west of Singleton (Figure 1). The village of Aberdeen and locality of Kayuga are also located approximately 5 km north-northeast and 1 km north of the MPO boundary, respectively (Figure 1). MACH Energy purchased the MPO from Coal & Allied Operations Pty Ltd (Coal & Allied) in 2016.

MACH Mount Pleasant Operations Pty Ltd is the manager of the MPO as agent for, and on behalf of, the unincorporated Mount Pleasant Joint Venture between MACH Energy Australia Pty Ltd (MACH Energy) (95 per cent [%] owner) and J.C.D. Australia Pty Ltd (5% owner). This Groundwater Management Plan (GWMP) is implemented at the MPO by MACH Energy.

The initial development application for the MPO was made in 1997. This was supported by an Environmental Impact Statement (EIS) prepared by Environmental Resources Management (ERM) Mitchell McCotter (ERM Mitchell McCotter, 1997). On 22 December 1999, the then Minister for Urban Affairs and Planning granted Development Consent DA 92/97 to Coal & Allied. This allowed for the "Construction and operation of an open cut coal mine, coal preparation plant, transport and rail loading facilities and associated facilities" at the MPO. The consent allowed for operations 24 hours per day seven days per week and the extraction of 197 million tonnes (Mt) of run-of-mine (ROM) coal over a 21 year period, at a rate of up to 10.5 Mt of ROM coal per year.

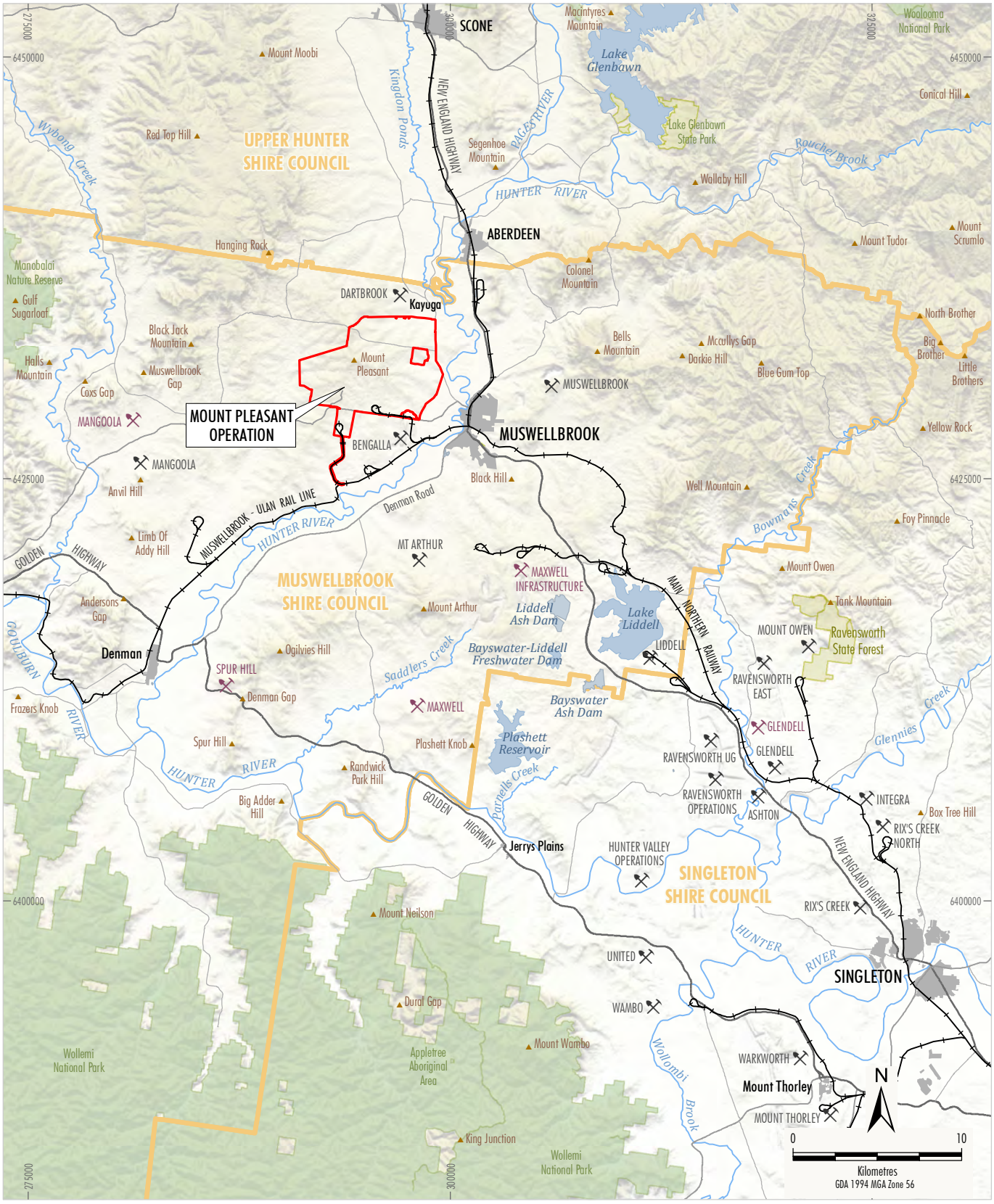
The Mount Pleasant Project Modification (MOD 1) was submitted on 19 May 2010 with a supporting Environmental Assessment (EA) prepared by EMGA Mitchell McLennan (EMGA Mitchell McLennan, 2010). MOD 1 included the provision of an infrastructure envelope for siting the mine infrastructure, the provision of an optional conveyor/service corridor linking the MPO facilities with the Muswellbrook-Ulan Rail Line and modification of the existing Development Consent DA 92/97 boundaries to accommodate the optional conveyor/service corridor and minor administrative changes. MOD 1 was approved on 19 September 2011.

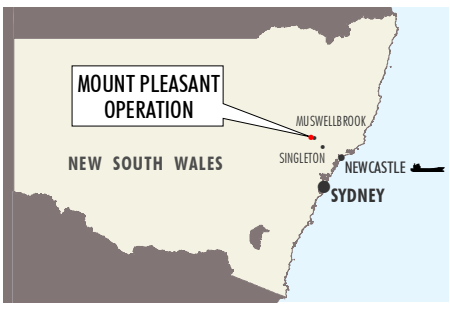
The MPO South Pit Haul Road Modification (MOD 2) was submitted on 30 January 2017 with a supporting EA prepared by MACH Energy (MACH Energy, 2017a). MOD 2 proposed to realign an internal haul road to enable more efficient access to the South Pit open cut, with no other material changes to the approved MPO. MOD 2 was approved on 29 March 2017.

The MPO Mine Optimisation Modification (MOD 3) was submitted on 31 May 2017 with a supporting EA prepared by MACH Energy (MACH Energy, 2017b). MOD 3 comprised an extension to the time limit on mining operations (to 22 December 2026) and extensions to the South Pit Eastern Out of Pit Emplacement to facilitate development of an improved final landform. MOD 3 was approved on 24 August 2018.

The MPO Rail Modification (MOD 4) was submitted on 18 December 2017 with a supporting EA prepared by MACH Energy (MACH Energy, 2017c). MOD 4 proposed the following changes:

- duplication of the approved rail spur, rail loop, conveyor and rail load-out facility and associated services;
- duplication of the Hunter River water supply pump station, water pipeline and associated electricity supply that followed the original rail spur alignment; and
- demolition and removal of the redundant approved infrastructure within the extent of the Bengalla Mine, once the new rail, product loading and water supply infrastructure has been commissioned and is fully operational.





LEGEND

- Mining Operation
- Proposed Mining Operations (Application Lodged)
- Railway
- Local Government Boundary
- State Forest/Reserve
- National Parks and Wildlife Estate
- Mining Lease Boundary (Mount Pleasant Operation)

Source: NSW Spatial Services (2020)

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Project Location

Figure 1

MAC-18-03 MP2020_ Figure 1_ Rev B

MOD 4 was approved on 16 November 2018 by the Secretary of the NSW Department of Planning and Environment (under Delegation). Appendix 2 of the modified Development Consent DA 92/97 illustrates the Conceptual Project Layout Plan of the approved MPO at 2021 and 2025, Approved Surface Disturbance Plan and Conceptual Final Landform (Attachment 1) incorporating the MOD 4 infrastructure relocations.

1.1 STRUCTURE OF THE GROUND WATER MANAGEMENT PLAN

Consistent with the requirements of Condition 28(d), Schedule 3 of Development Consent DA 92/97, the remainder of the GWMP is structured as follows:

- Section 2: Outlines the statutory obligations relevant to this GWMP.
- Section 3: Describes the existing groundwater environment present at the MPO.
- Section 4: Provides a description of the baseline data available for the GWMP.
- Section 5: Describes the management strategy proposed for the final voids (including development of detailed plans).
- Section 6: Describes the groundwater model predictions and validation (including contemporary groundwater modelling).
- Section 7: Outlines the groundwater impact trigger levels.
- Section 8: Describes the groundwater monitoring program proposed for the MPO.
- Section 9: Describes the review process for MPO documentation, including in particular for this GWMP.
- Section 10: Outlines the reporting procedures for MPO documentation.
- Section 11: Provides a list of the references cited in this report.

2 STATUTORY OBLIGATIONS

MACH Energy's statutory obligations are contained in:

- the conditions of Development Consent DA 92/97 (as modified);
- the conditions of the Commonwealth Approval EPBC 2011/5795;
- relevant licences (including Environment Protection Licence [EPL] 20850), permits and mining leases (MLs) (ML 1645, ML 1708, ML 1709, ML 1713, ML 1750 and ML 1808); and
- other relevant legislation.

Obligations relevant to this GWMP are described below.

2.1 PURPOSE AND SCOPE

This GWMP has been prepared by MACH Energy to satisfy the requirements under Development Consent DA 92/97 and specifically Condition 28(d), Schedule 3.

The GWMP applies to all employees and contractors at the MPO and covers all areas within the MPO boundary. The GWMP applies to the life of the MPO, including (but not limited to) the period of mining operations specified in Development Consent DA 92/97, which currently permits mining until 22 December 2026. As required by Condition 5, Schedule 2 of Development Consent DA 92/97, the GWMP will continue to apply (excluding mining operations) beyond 22 December 2026, as required, until the rehabilitation and any additional undertakings (required by the Secretary of the NSW Department of Planning, Industry and the Environment [DPIE], or the Department of Mining, Exploration and Geoscience [MEG] within the Department of Regional NSW) have been carried out satisfactorily.

This GWMP has been prepared to monitor and manage potential groundwater related impacts (through groundwater model validation and the development of trigger levels) associated with the MPO, including open cut mining.

Response protocols in the event of an exceedance of trigger levels from this GWMP and appropriate measures to prevent, minimise, mitigate, compensate and/or offset such adverse impacts are described separately in the Surface and Ground Water Response Plan.

2.2 DEVELOPMENT CONSENT DA 92/97

The conditions of Development Consent DA 92/97 relevant to the content and structure of this GWMP are described below. A comprehensive list of all conditions in Development Consent DA 92/97 relevant to water resources (in general) is provided in the Water Management Plan (WMP).

2.2.1 GWMP Requirements

Condition 28(d), Schedule 3 of Development Consent DA 92/97 requires the preparation of a GWMP (refer Table 1).

Table 1
Groundwater Management Plan Development Consent DA 92/97 Condition

MPO Development Consent DA 92/97 Schedule 3	Section where addressed in this GWMP Document
28. The Applicant must prepare a Water Management Plan for the development to the satisfaction of the Secretary. This plan must be prepared in consultation with DoI Water and EPA, and be submitted to the Secretary for approval by 30 June 2019, unless otherwise agreed by the Secretary. *The plan must include:* *…* *(d) a Groundwater Management Plan, which must include:*	
• *detailed plans, including design objectives and performance criteria, for the design and management of the proposed final voids;*	Section 5
• *detailed baseline data of groundwater levels, yield and quality in the region, and privately-owned groundwater bores, that could be affected by the development;*	Section 4
• *groundwater impact assessment criteria including trigger levels for investigating any potentially adverse groundwater impacts;*	Section 7
• *a program to monitor and assess:* – *groundwater inflows to the mining operations;* – *impacts on regional and local (including alluvial) aquifers;* – *impacts on the groundwater supply of potentially affected landowners;* – *impacts on groundwater dependent ecosystems and riparian vegetation;*	Section 8

2.2.2 Management Plan (General) Requirements

Condition 2, Schedule 5 of Development Consent DA 92/97 outlines the general management plan requirements that are applicable to the preparation of the GWMP.

Table 2 presents these requirements and indicates where each is addressed within this GWMP.

Table 2
General Development Consent DA 92/97 Conditions

MPO Development Consent DA 92/97 Schedule 5	Section where addressed in this GWMP Document
2. The Applicant must ensure that the management plans required under this consent are prepared in accordance with any relevant guidelines, and include:	
(a) detailed baseline data;	Section 4
(b) a description of: • *the relevant statutory requirements (including any relevant consent, licence or lease conditions);*	Section 2
• *any relevant limits or performance measures/criteria;*	Section 7
• *the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;*	Section 7
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Section 5
(d) a program to monitor and report on the: • *impacts and environmental performance of the development;* • *effectiveness of any management measures (see c above);*	Sections 7 and 8
(e) a contingency plan to manage any unpredicted impacts and their consequences;	Surface and Ground Water Response Plan
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 9
(g) a protocol for managing and reporting any: • *incidents;* • *complaints;* • *non-compliances with statutory requirements; and* • *exceedances of the impact assessment criteria and/or performance criteria; and*	Section 10
(h) a protocol for periodic review of the plan. *Note: The Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans.*	Section 9

2.3 LICENCES, PERMITS AND LEASES

Water management at the MPO is conducted in accordance with a number of licences, permits and leases. Key licences, permits and leases relating to water at the MPO include:

- Water Access Licences (WALs) issued under the NSW *Water Management Act, 2000*.
- Discharge credits (46 held under the NSW *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation, 2002.*
- ML 1645, ML 1708, ML 1709, ML 1713, ML 1750 and ML 1808 issued under Part 5 of the NSW *Mining Act, 1992* and approved by the Minister for Mineral Resources in December 2010.
- EPL 20850 issued under Part 3 of the NSW *Protection of the Environment Operations Act, 1997* by the NSW Environment Protection Authority (EPA).
- Mining Operations Plan/Rehabilitation Management Plan (MOP/RMP) approved by the MEG.

2.4 OTHER LEGISLATION / POLICY / PLANS

Other NSW Acts and Regulations that may be applicable to the GWMP for the MPO are discussed in the following sub-sections.

2.4.1 Water Management Act, 2000

The NSW *Water Management Act, 2000* aims to provide sustainable and integrated management of the water sources of NSW for the benefit of both present and future generations.

Under the NSW *Water Management Act, 2000*, the MPO is regulated under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009* and the *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources, 2016*.

The following groundwater sources are relevant to the MPO (Figure 2):

- *Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources, 2016:*
  - Sydney Basin – North Coast;
  - New England Fold Belt Coast; and
  - Liverpool Ranges Basalt Coast.
- *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009*:
  - Hunter Regulated River Alluvial Water Source;
  - Unnamed alluvium within the Muswellbrook Water Source; and
  - Unnamed alluvium within the Dart Brook Water Source.
- *Water Sharing Plan for the Hunter Regulated River Water Source, 2016:*
  - Hunter Regulated River Water Source.

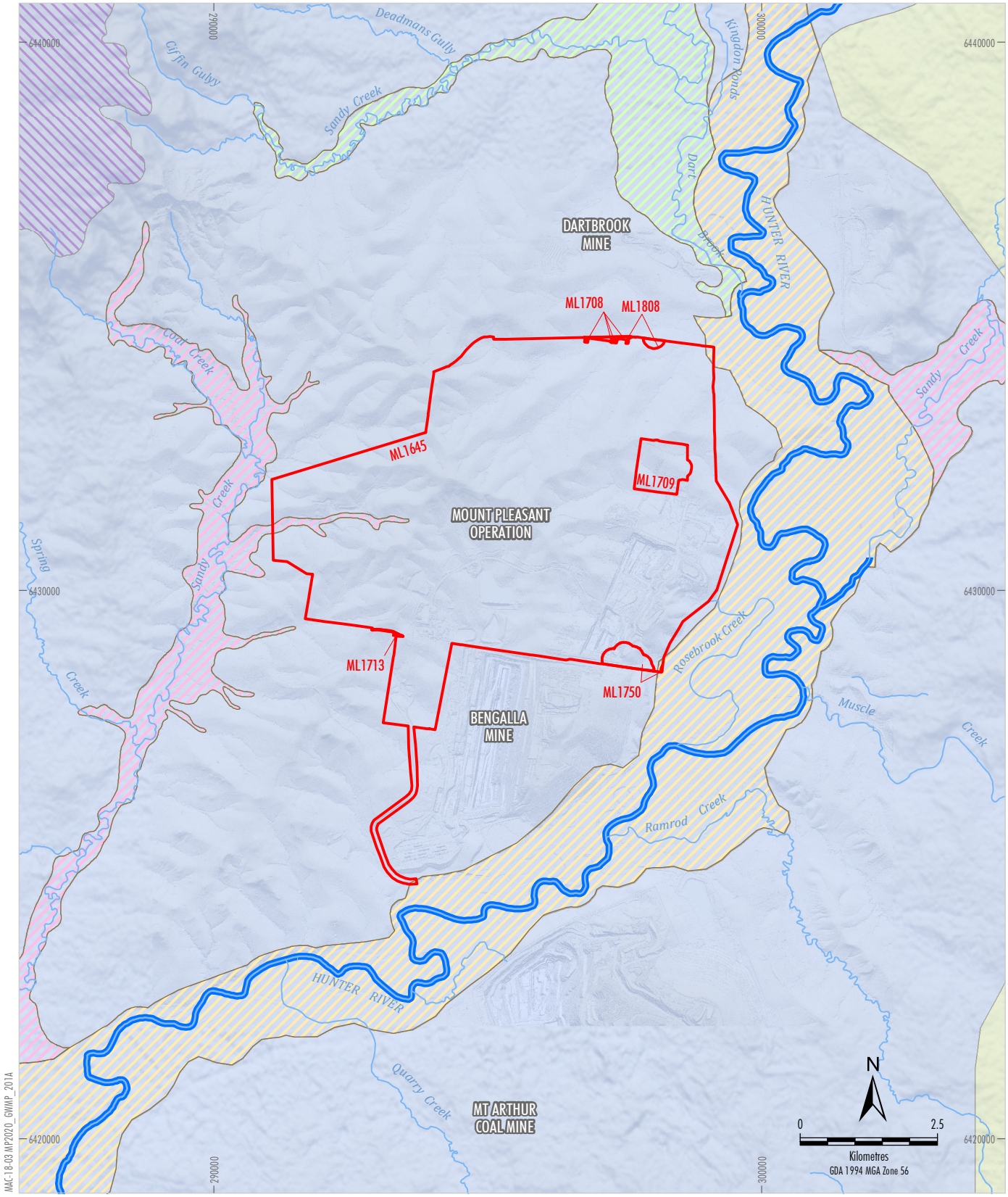
A summary of licences held by MACH Energy is provided in Tables 3 and 4.

Table 3
Water Access Licences – Groundwater Sources

Water Access Licence	Water Source	Shares (units)
18253	Hunter Regulated River Alluvial Water Source	74
18266	Hunter Regulated River Alluvial Water Source	68
18206	Hunter Regulated River Alluvial Water Source	24
18199	Hunter Regulated River Alluvial Water Source	5
18122	Hunter Regulated River Alluvial Water Source	33
18131	Hunter Regulated River Alluvial Water Source	60
21503	Hunter Regulated River Alluvial Water Source	21
18177	Hunter Regulated River Alluvial Water Source	5
18154	Hunter Regulated River Alluvial Water Source	5
23935	Muswellbrook Water Source	41
41437	Sydney Basin - North Coast Groundwater Source	640
40298	Sydney Basin - North Coast Groundwater Source	90
18336	Krui River Water Source	12
	Aquifer Subtotal	**1078**

Table 4
Water Access Licences – Surface Water Sources

Water Access Licence	Water Source	Type	Shares (units)
879	Hunter Regulated River Water Source	Regulated River (High Security)	243
880	Hunter Regulated River Water Source	Regulated River (High Security)	124
1113	Hunter Regulated River Water Source	Regulated River (High Security)	366
973	Hunter Regulated River Water Source	Regulated River (High Security)	3
638	Hunter Regulated River Water Source	Regulated River (High Security)	225
		High Security Subtotal	**961**
639	Hunter Regulated River Water Source	Regulated River (General Security)	134
974	Hunter Regulated River Water Source	Regulated River (General Security)	210
988	Hunter Regulated River Water Source	Regulated River (General Security)	156
1229	Hunter Regulated River Water Source	Regulated River (General Security)	480
1227	Hunter Regulated River Water Source	Regulated River (General Security)	99
992	Hunter Regulated River Water Source	Regulated River (General Security)	75
7808	Hunter Regulated River Water Source	Regulated River (General Security)	36
702	Hunter Regulated River Water Source	Regulated River (General Security)	267
993	Hunter Regulated River Water Source	Regulated River (General Security)	265
604	Hunter Regulated River Water Source	Regulated River (General Security)	183
662	Hunter Regulated River Water Source	Regulated River (General Security)	9
10775	Hunter Regulated River Water Source	Regulated River (General Security)	243
41438	Hunter Regulated River Water Source	Regulated River (General Security)	455
1074	Hunter Regulated River Water Source	Regulated River (General Security)	5
8406	Hunter Regulated River Water Source	Regulated River (General Security)	168
10531	Hunter Regulated River Water Source	Regulated River (General Security)	120
8598	Hunter Regulated River Water Source	Regulated River (General Security)	3
		General Security Subtotal	**2,908**
975	Hunter Regulated River Water Source	Domestic and Stock	8
989	Hunter Regulated River Water Source	Domestic and Stock	8
1230	Hunter Regulated River Water Source	Domestic and Stock	8
605	Hunter Regulated River Water Source	Domestic and Stock	8
677	Hunter Regulated River Water Source	Domestic and Stock	24
663	Hunter Regulated River Water Source	Domestic and Stock	16
13785	Hunter Regulated River Water Source	Domestic and Stock	1
1259	Hunter Regulated River Water Source	Supplementary Water	33.2
1258	Hunter Regulated River Water Source	Supplementary Water	5
1307	Hunter Regulated River Water Source	Supplementary Water	37.5
1260	Hunter Regulated River Water Source	Supplementary Water	5
1308	Hunter Regulated River Water Source	Supplementary Water	15.1
1338	Hunter Regulated River Water Source	Supplementary Water	17.5
8445	Hunter Regulated River Water Source	Supplementary Water	12.6
		Other Subtotal	**198.9**



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LEGEND

Mining Lease Boundary (Mount Pleasant Operation)

Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016

- Liverpool Ranges Basalt Coast
- New England Fold Belt Coast
- Sydney Basin - North Coast

Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009

- Unnamed Alluvium within Dart Brook Water Source
- Hunter Regulated River Alluvial Water Source
- Unnamed Alluvium within Muswellbrook Water Source

Water Sharing Plan for the Hunter Regulated River Water Source 2016

- Hunter Regulated River Water Source

Source: NSW Spatial Services (2020); NSW Department of Primary Industries - Water (2019)

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Relevant Groundwater Sources

Figure 2

In addition to licensing requirements, the NSW *Water Management Act, 2000* includes the concept of ensuring "no more than minimal harm". Minimal impact considerations have been developed in the *NSW Aquifer Interference Policy* (Department of Primary Industries [DPI], 2012) (Section 2.4.3).

2.4.2 Water Act, 1912

As water sharing plans have been commenced under the NSW *Water Management Act, 2000* for all groundwater and surface water systems that the MPO is predicted to take water from, the *Water Act, 1912* is not relevant to licensing considerations for the MPO.

2.4.3 NSW Aquifer Interference Policy

The *NSW Aquifer Interference Policy* has been developed by the NSW Government as a component of the *NSW Government's Strategic Regional Land Use Policy*.

The *NSW Aquifer Interference Policy* applies State-wide and details water licence and impact assessment requirements. The *NSW Aquifer Interference Policy* has been developed to ensure equitable water sharing between various water users and proper licensing of water taken by aquifer interference activities such that the take is accounted for in the water budget and water sharing arrangements. The *NSW Aquifer Interference Policy* also enhances existing regulation, contributing to a comprehensive framework to protect the rights of all water users and the environment in NSW.

The *NSW Aquifer Interference Policy* includes minimal impact considerations relating to water table and groundwater pressure drawdown and changes in groundwater and surface water quality. Where relevant, these minimal impact considerations have informed the groundwater impact trigger levels (i.e. more than 2 metres [m] drawdown) (Section 7). The *NSW Aquifer Interference Policy* establishes minimal impact considerations for groundwater categories of both 'highly productive' and 'less productive' groundwater. 'Highly productive groundwater' is defined by the *NSW Aquifer Interference Policy* as groundwater which (NSW Government, 2012):

> *...is defined in this Policy as a groundwater source that is declared in the Regulations and will be based on the following criteria:*
>
> *a) has total dissolved solids of less than 1,500 mg/L, and*
>
> *b) contains water supply works that can yield water at a rate greater than 5 L/sec.*

The NSW Government's classification of the productivity of the various Groundwater Sources in this area is discussed in Section 3.

3 EXISTING GROUNDWATER ENVIRONMENT

A Water Management Study, including a regional groundwater investigation, was undertaken for the Mount Pleasant EIS by PPK Environment & Infrastructure (1997). A number of subsequent studies have been undertaken as part of mining planning and feasibility studies for the MPO as well as development applications for neighbouring mines (e.g. Bengalla Mine). A summary of the existing groundwater environment described by PPK Environment & Infrastructure (1997) is provided below.

Consistent with the relevant water sharing plans under the NSW *Water Management Act, 2000* (Section 2.4.1), the two key groundwater systems identified are the:

- **Alluvial groundwater system** – associated with the alluvial plains of the Hunter River and its tributaries.
- **Hard (fractured and porous) rock groundwater system** – including the Permian aged Wittingham Coal measures.

The regional geology of the MPO area is shown on Figure 3.

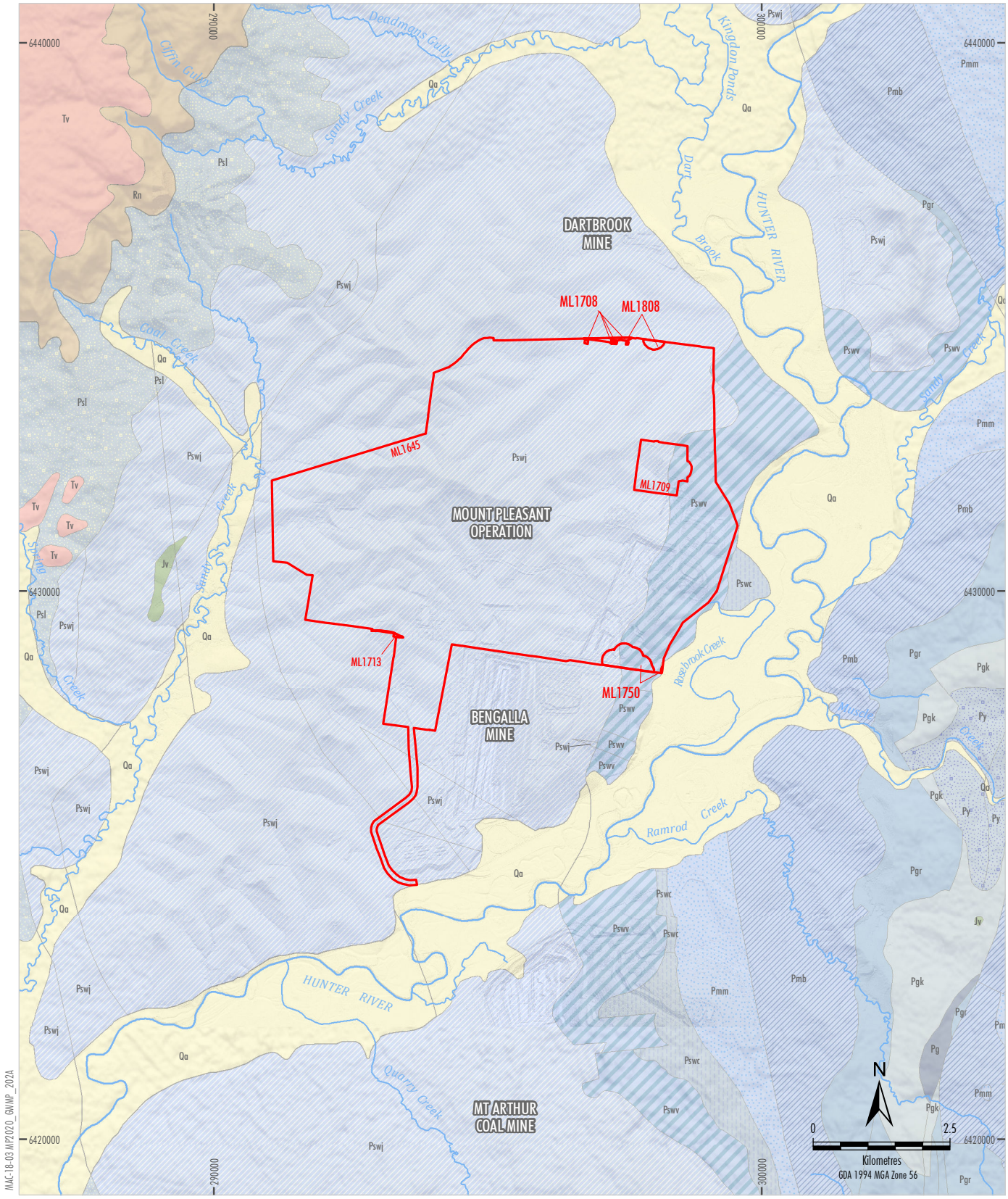
3.1 HARD (FRACTURED AND POROUS) ROCK GROUNDWATER SYSTEM

The MPO coal resource is located in the Permian Wittingham Coal measures of the Singleton Supergroup. Lithologies comprise mostly sandstones, siltstones and coal measures with minor conglomerates and tuffs. Coal seams amenable to open cut mining occur in eight correlated seams and include the Upper Piercefield (Warkworth) Seam to the lowermost Edderton Seam.

The sequence of stratigraphic units, focussing on the seams targeted at the MPO, is as follows:

Table 5
MPO Stratigraphic Units

Coal Measure	Subgroup	Coal Seam
Wittingham Coal Measures	Jerrys Plains Subgroup	Warkworth seam
		Interburden #1
		Mount Arthur seam
		Interburden #2
		Piercefield seam
		Interburden #3
		Vaux seam
		Interburden #4
		Broonie seam
		Interburden #5
		Bayswater seam
	Archerfield Sandstone	
	Vane Subgroup	Interburden #6
		Wynn seam
		Interburden #7
		Edderton seam
	Saltwater Creek Formation	
Maitland Group	Mulbring Sandstone / Branxton Formation	



LEGEND

Mining Lease Boundary (Mount Pleasant Operation)

GEOLOGY MAPPING

Quaternary
- Qa: Silt, Sand, Gravel

Tertiary
- Tv: Basalt

Jurassic
- Jv: Basalt

Triassic
- Rn: Hawkesbury Sandstone and Narrabeen Group

Permian
- Pswj: Denman Formation and Jerry Plains Subgroup
- Pswv: Archerfield Sandstone and Vane Subgroup
- Pswc: Saltwater Creek Formation
- Pmm: Mulbring Siltstone
- Pmb: Branxton Formation
- Pg: Greta Coal
- Pgr: Greta Coal Measures (coal seams, siltstone and sandstone)
- Pgk: Greta Coal measures (pellet claystone, siltstone and chert)
- Psl: Wollombi Coal Measures
- Py: Gyarran Volcanics

Source: NSW Spatial Services (2020); Department of Planning and Environment (2019)

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Regional Geology

Figure 3

The coal seams are recognised as the main aquifer zones within the hard rock groundwater system, providing storage and transmission within cleats and joints.

The interburden is mainly comprised of sandstones and siltstones with very low permeabilities and porosities, which limits the rate of groundwater transmission. The interburden zones often act as aquitards, effectively impeding or constraining the vertical exchange of groundwaters.

Higher aquifer pressures within the coal measures and a regional gradient towards the alluvium result in pressure driving groundwater movement towards the Hunter River. It is likely groundwater seeps naturally from the hard (fractured and porous) rock groundwater system into the alluvial groundwater system.

The hard (fractured and porous) rock groundwater system is considered ‘less productive’ under the *NSW Aquifer Interference Policy* (Section 2.4.3). The exception to this is the 'highly productive' Liverpool Ranges Basalt, which is about 8 km from the MPO.

3.2 ALLUVIAL GROUNDWATER SYSTEM

Alluvial sediments associated with the Hunter River are located to the east of the MPO. Alluvial sediments associated with Sandy Creek are located to the west of the MPO (Figures 2 and 3).

The Hunter River alluvium comprises silt underlain by sands and gravels, reaching a thickness of up to 30 m. The Hunter River alluvium is classified as a highly productive groundwater source. These alluvial sediments offer increased groundwater storage when compared to the hard (fractured and porous) rock groundwater system due to their higher porosity. Gravel zones within the alluvium are capable of providing the highest storage and permeability when compared to sand, silt and clay zones.

Recharge to the Hunter Alluvium is also significantly controlled by surface water flows in the Hunter River. The Hunter River is perennial due to releases from Glenbawn Dam. Groundwater levels within the alluvium have remained relatively stable over time, despite periods of below average rainfall, indicating recharge from surface water flows. Groundwater flow within the Hunter River alluvium generally follows the direction of surface water flow, in a south to south-easterly direction (HydroSimulations, 2019).

Groundwater take from the Hunter Regulated River Alluvial Water Source will be reported as part of the Annual Review, where relevant.

4 BASELINE DATA

Groundwater monitoring was undertaken from 1994 to 1995 to inform the Mount Pleasant EIS Water Management Study. The results of this monitoring are presented in PPK Environment & Infrastructure (1997). The collection of baseline groundwater monitoring data at the MPO resumed in 2003. The baseline period of record has been taken up until August 2018. Mining activities have been undertaken prior to August 2018, however, these activities have been minor in nature and are not anticipated to have caused propagation at monitoring sites.

Bores in the MPO groundwater monitoring network are shown on Figure 4 and summarised in Table 6.

Table 6
Groundwater Monitoring Network

Bore	Bore Group	Bore Depth/Screened Interval (mBG)	Aquifer/Unit Monitored	Baseline Period of Record
MPBH1	Eastern	Screen 12.6 – 18.6	Hunter Alluvium	Jan 2003 – Aug 2018
MPBH1-C	Eastern	Screen 68.77 – 74.77	Coal Seam	Drilled Nov 2019/Jan 2020, no data yet.
MPBH1-HR	Eastern	Screen 48.8 – 50.8	Interburden	Drilled Nov 2019/Jan 2020, no data yet.
MPBH2	Eastern	Screen 11.5 – 17.5	Hunter Alluvium	Jan 2003 – Aug 2018
MPBH2-C	Eastern	Screen 66.5 – 76.5	Coal Seam	Drilled Nov 2019/Jan 2020, no data yet.
MPBH2-HR	Eastern	Screen 46.2 – 52.2	Interburden	Drilled Nov 2019/Jan 2020, no data yet.
MPBH3*	Eastern	Depth 14.0	Hunter Alluvium	Historical (Jan 2003 – Dec 2010)
MPBH3b	Eastern	Depth 14.0	Hunter Alluvium	Jan 2011 – Aug 2018
MPBH4 (formerly A1)	Eastern	Screen 6.0 – 12.0	Hunter Alluvium	Drilled Feb 2018, no data yet.
MPBH4-C	Eastern	Screen 71.9 – 81.9	Coal Seam	Drilled Nov 2019/Jan 2020, no data yet.
MPBH4-HR	Eastern	Screen 45.15 – 51.15	Interburden	Drilled Nov 2019/Jan 2020, no data yet.
MPBH5 (formerly B1)	Eastern	Screen 5.8 – 8.8	Hunter Alluvium	Drilled Feb 2018, no data yet.
MPBH5-C	Eastern	Screen 27.5 – 33.5	Coal Seam	Drilled Nov 2019/Jan 2020, no data yet.
MPBH5-HR	Eastern	Screen 19.5 – 22.5	Interburden	Drilled Nov 2019/Jan 2020, no data yet.
MPBH6	Eastern	Screen 10.63 – 16.63	Hunter Alluvium	Drilled Nov 2019/Jan 2020, no data yet.
MPBH6-C	Eastern	Screen 105.68 – 115.68	Coal Seam	Drilled Nov 2019/Jan 2020, no data yet.

Table 6 (Continued)
Groundwater Monitoring Network

Bore	Bore Group	Bore Depth/Screened Interval (mBG)	Aquifer/Unit Monitored	Baseline Period of Record
MPBH6-HR	Eastern	Screen 58.4 – 64.4	Interburden	Drilled Nov 2019/Jan 2020, no data yet.
MPBH7	Western	Screen 4.1 – 10.1	Hunter Alluvium	Drilled Nov 2019/Jan 2020, no data yet.
MPBH7-C	Western	Screen 71.45 – 74.45	Coal Seam	Drilled Nov 2019/Jan 2020, no data yet.
Melody Bore	Central	Depth 43.8	Unknown	Mar 2017
3500B500S*	Central	Depth 21.43	Interburden #1	Historical (Oct 2011 – Aug 2018)
3500B500L*	Central	Depth 175.36	Bayswater Seam	Historical (Jan 2003 – Aug 2017)
3500C500S	Central	Depth 28.48	Interburden #1	Jan 2003 – Aug 2018
3500C500L	Central	Depth 86.77	Mount Arthur Seam	Oct 2011 – Aug 2018
3500E000U*	Central	Screen 50 – 55	Warkworth Seam	Historical (Aug 2012 – May 2016)
3500E000M*	Central	Screen 120 – 125	Piercefield Seam/ Interburden #3	Historical (Aug 2012 – May 2016)
3500E000L*	Central	Screen 180 – 186	Vaux Seam	Historical (Aug 2012 – May 2016)
4500F000	Central	Depth 121.24	Vaux Seam	Jan 2003 – Aug 2018
5000A500*	Central	Screen 56 – 65	Vaux Seam	Historical (Pre-EIS Only)
5000D000	Central	Depth 171.35	Wynn/Edderton Seams	Jan 2003 – Aug 2018
5500D000*	Central	Screen 130 – 136	Interburden #7/Wynn Seam	Historical (Jan 2003 – Aug 2018)
6000C000S*	Central	Depth 51.27	Wynn Seam	Historical (Oct 2011 – Dec 2017)
6000C000L*	Central	Depth 20.69	Interburden #2	Historical (Jan 2003 – Dec 2017)
6500F500U	Central	Depth 35.10	Interburden #4/Broonie Seam	Jan 2003 – Aug 2018
6500F500M	Central	Depth 77.30	Interburden #6/Wynn Seam	Jan 2003 – Aug 2018
6500F500L	Central	Depth 115.20	Maitland Group	Jan 2003 – Aug 2018
6500F625	Central	Depth 36.30	Permian	Jan 2003 – Mar 2017
7000D000U*	Central	Depth 12.89	Interburden #7/Edderton Seam	Historical (Jan 2003 – Aug 2018)
7000D000L*	Central	Depth 98.73	Maitland Group	Historical (Nov 2014 – Aug 2018)
7500F000	Central	Depth 182.80	Edderton Seam	Jan 2003 – Aug 2018

Table 6 (Continued)
Groundwater Monitoring Network

Bore	Bore Group	Bore Depth/Screened Interval (mBG)	Aquifer/Unit Monitored	Baseline Period of Record
WRA1U	Western	Depth 6.50	Alluvium/Regolith	Jan 2007 – Aug 2018
WRA1L	Western	Depth 19.40	Warkworth/Permian	Jan 2003 – Aug 2018
WRA2U*	Western	Depth 5.50	Alluvium/Regolith	Historical (Jan 2007 – Aug 2018)
WRA2L*	Western	Depth 18.95	Warkworth/Permian	Historical (Jan 2003 – Aug 2018)
WRA3U	Western	Depth 6.75	Alluvium/Regolith	Jan 2003 – Aug 2018
WRA3L	Western	Depth 22.19	Warkworth/Permian	Jan 2003 – Aug 2018
WRA5U*	Western	Screen 1.64 – 7.64	Alluvium/Regolith	Historical (Jan 2003 – Feb 2018)
WRA5L*	Western	Screen 13.40 – 19.30	Warkworth/Permian	Historical (Jan 2003 – Feb 2018)
WRA6U	Western	Depth 18.98	Alluvium/Regolith	Jan 2003 – Aug 2018
WRA6L	Western	Depth 9.27	Warkworth/Permian	Jan 2003 – Aug 2018

Note:

mBG = metres below grade.

* Bore decommissioned. MPBH3 was replaced by MPBH3B in 2011; 3500E000 was unable to be located during the 2017 Bore Census (MACH Energy, 2017d); and the remaining sites have been disturbed by mining operations.

Sites with U, M and L suffixes refer to 'upper', 'middle' and 'lower' (depths), but sites with S and L suffixes usually refers to piezometer diameter (small and large), which may be unrelated to the depth.

4.1 GROUNDWATER LEVELS

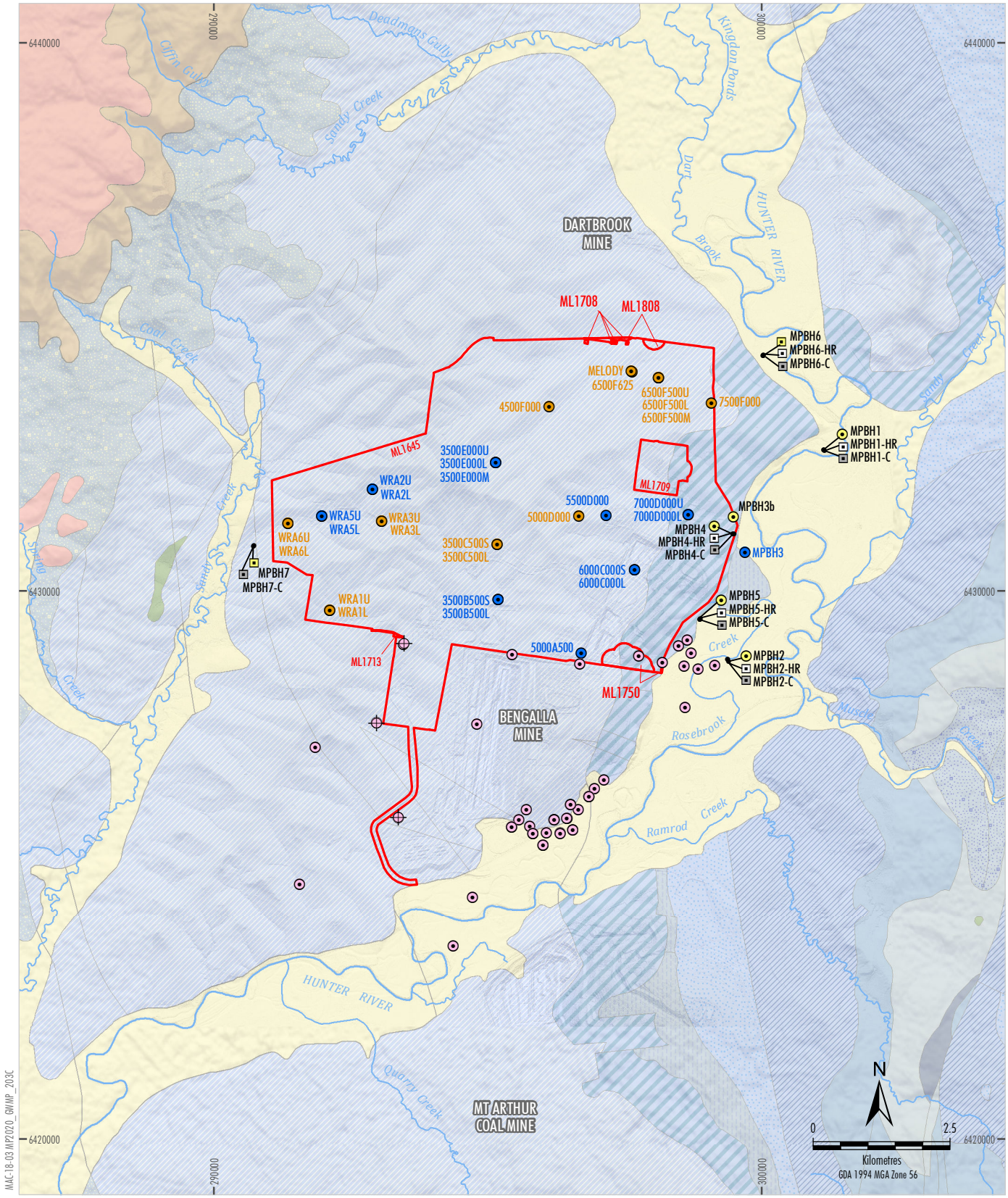
Baseline groundwater levels are presented as hydrographs in Attachment 2. Depending on the bore location, the baseline period may include groundwater level effects from neighbouring Bengalla and Dartbrook mines.

4.1.1 Eastern Domain

The alluvium bores MPBH1, 2, 3 and 3b show fairly static groundwater levels, varying by only 1-2 m, supporting the concept that these are controlled by nearby Hunter River stage elevation. MPBH1-2 both show a period of greater variation in 2009-10, which could have been caused by local bore pumping.

4.1.2 Central Domain

Some of the bores monitoring the hard rock units, e.g. 3500B500L and 3500B500S show a response to historical mining at Bengalla Mine. 3500B500L and 3500B500S are about 1.5 km north of Bengalla Mine and the deeper bore 3500B500L shows about 35 m of drawdown from 2002 to 2013-16, while about 25-30 m drawdown was observed at 3500C500L, which is a further 1 km north. The shallow (S) piezometers at these locations do not exhibit the same response to Bengalla Mine, indicating that there is only a weak connection (due to low permeability) between the deep and shallow units.



LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)

Newly Established Mount Pleasant Monitoring

- Standpipe - Coal Seam
- Standpipe - Interburden
- Standpipe - Alluvium

Mount Pleasant Monitoring

- Standpipe
- Standpipe - Alluvium
- Standpipe - Historical

Bengalla Monitoring

- Bengalla Standpipe
- Bengalla Vibrating Wire Piezometer

Source: MACH (2020); Bengalla Mining Company (2015); NSW Spatial Services (2020)

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MOUNT PLEASANT OPERATION

Groundwater Monitoring Network

Figure 4

4.1.3 Western Domain

Bores in the west (e.g. WRA1U, WRA3U, WRA5U and WRA6U) show a higher degree of correlation to rainfall trends, and even some of the deeper piezometers exhibit the same (e.g. WRA3L, WRA5L and WRA6L). Generally, these bores also show consistent head separation between upper/shallow and lower piezometers, with the exception of WRA5U and WRA6U. The reason for the lack of head separation at these two bores is not yet known, but will be assessed further as part of on-going Contemporary Groundwater Modelling for the Project.

4.2 GROUNDWATER QUALITY

Baseline groundwater quality data is provided in Attachment 3 and a summary is provided in Table 7.

Table 7
Groundwater Quality Summary

Bore Group	Groundwater System Monitored	Median pH	Median Electrical Conductivity (EC) (µS/cm)
Eastern Groundwater Site (MPBH1 and MPBH2)	Alluvium	6.9	790
Eastern Groundwater Site (MPBH3)	Alluvium	6.8	1,005
Eastern Groundwater Site (MPBH3b)	Alluvium / Permian regolith	7.6	3,860
Central Groundwater Site	Hard (Porous and Fractured) Rock	6.9	5,210
Western Groundwater Site	Hard (Porous and Fractured) Rock	7.2	5,690

Note: µS/cm = microsiemens per centimetre.

Median pH in both the alluvial and hard (porous and fractured) rock aquifer systems are neutral. The range of data shown in Attachment 3 indicate the pH is quite stable across both groundwater systems.

Groundwater within the alluvium is generally fresh to slightly brackish (median of 540 – 1,005 µS/cm), as recorded at MPBH1, MPBH2 and MPBH3. Bore MPBH3b intersects the basal alluvium and weathered Permian coal measures, resulting in more brackish water quality. Groundwater within the Permian coal measures (Central and Western groundwater sites) is generally brackish to moderately saline.

4.3 AQUIFER PARAMETERS/GROUNDWATER YIELD

A number of investigations into aquifer parameters have been undertaken at the MPO and neighbouring Bengalla and Mt Arthur mines.

A summary of these investigations is provided in the sub-sections below.

4.3.1 MPO Investigations

As part of the Water Management Study undertaken for the Mount Pleasant EIS (PPK Environment & Infrastructure, 1997), a suite of groundwater testing, including injection, pump out and packer tests, were undertaken at the site.

Groundwater testing of the hard rock aquifers involved injection, slug and packer testing, and indicated very low rates of flow. A range of <0.0001 metres per day (m/day) to 0.84 m/day was determined for the hydraulic conductivity of the aquifer, with a global median value (omitting extreme values) of 0.015 m/day across all testing types.

In contrast to the hard rock coal measures, the alluvial aquifer regime was found to be highly transmissive, with an average hydraulic conductivity of 20.3 m/day, and an overall range of 8.8 m/day to 33.2 m/day.

Data obtained from the groundwater testing undertaken for the Mount Pleasant EIS (PPK Environment & Infrastructure, 1997) is provided in Attachment 4.

4.3.2 Investigations at Neighbouring Mines

Various groundwater tests have been undertaken in the vicinity of the MPO area, including at the Bengalla Mine directly to the south of the MPO, and the Mt Arthur Coal Mine to the south-east.

Pumping tests were undertaken as part of the Bengalla Mine EIS (Mackie Martin and Associates, 1993) on the alluvial aquifer bordering the Hunter River, to the south-east of the MPO. These tests found a transmissivity ranging from 100 square metres per day (m^2/day) to 700 m^2/day. Assuming a saturated thickness of 10 m (which is typical, based on nearby bore logs), this equates to a hydraulic conductivity ranging from 10 m/day to 70 m/day (AGEC, 2013).

Pumping tests were also undertaken on five bores bordering the Hunter River to the south of the MPO boundary, as part of the *Mt Arthur North Groundwater Management Studies* (Mackie Environmental Research, 2000). These tests indicated that basal gravel in the aquifer had a moderate to high hydraulic conductivity, which ranged from 5 m/day to 40 m/day, with a median value of 8.2 m/day.

Overall, available data in the area to the south of the MPO indicates a generally high but spatially variable hydraulic conductivity in the alluvial aquifer regime bordering the Hunter River (Australasian Groundwater and Environmental Consultants, 2013).

In the Wittingham Coal Measures to the south of the MPO, various tests were undertaken as part of the Bengalla Mine EIS (HLA-Envirosciences, 1993) which found a transmissivity range of 0.2 m^2/day to 10 m^2/day.

Australian Groundwater Consultants (AGC) (1979) and Laurie, Montgomerie and Petit Pty Ltd (LM&P) (1982) undertook groundwater testing in the Wittingham Coal Measures at the Mt Arthur Coal Mine to the south of the MPO boundary. The outcomes of these tests are summarised in Attachment 4, which indicate a large variation in the hydraulic conductivities of coal seams in the area (AGEC, 2013).

4.4 PRIVATELY-OWNED GROUNDWATER BORES

MACH Energy has conducted a census of privately-owned groundwater bores in the vicinity of the MPO (MACH Energy, 2017d).

The census involved:

- Characterisation of existing groundwater bores through collation and review of the NSW Department of Planning, Industry and Environment – Water (DPIE – Water) (former Department of Industry – Water).
- DPIE – Water registered bore database and other regional information (e.g. 1:25,000 topographic maps).
- Site visits with local landholders to confirm the location and use of groundwater bores on their property.
- Opportunistic collection of baseline data where practical (e.g. water levels and basic water quality parameters).

Groundwater bores, wells and springs identified on privately-owned land during the census are shown on Figures 5a, 5b and 5c. A number of bores were also visited on mine-owned land during the census (e.g. monitoring bores). PINNEENA records are shown for properties that were not visited (e.g. due to distance from the MPO mining areas).

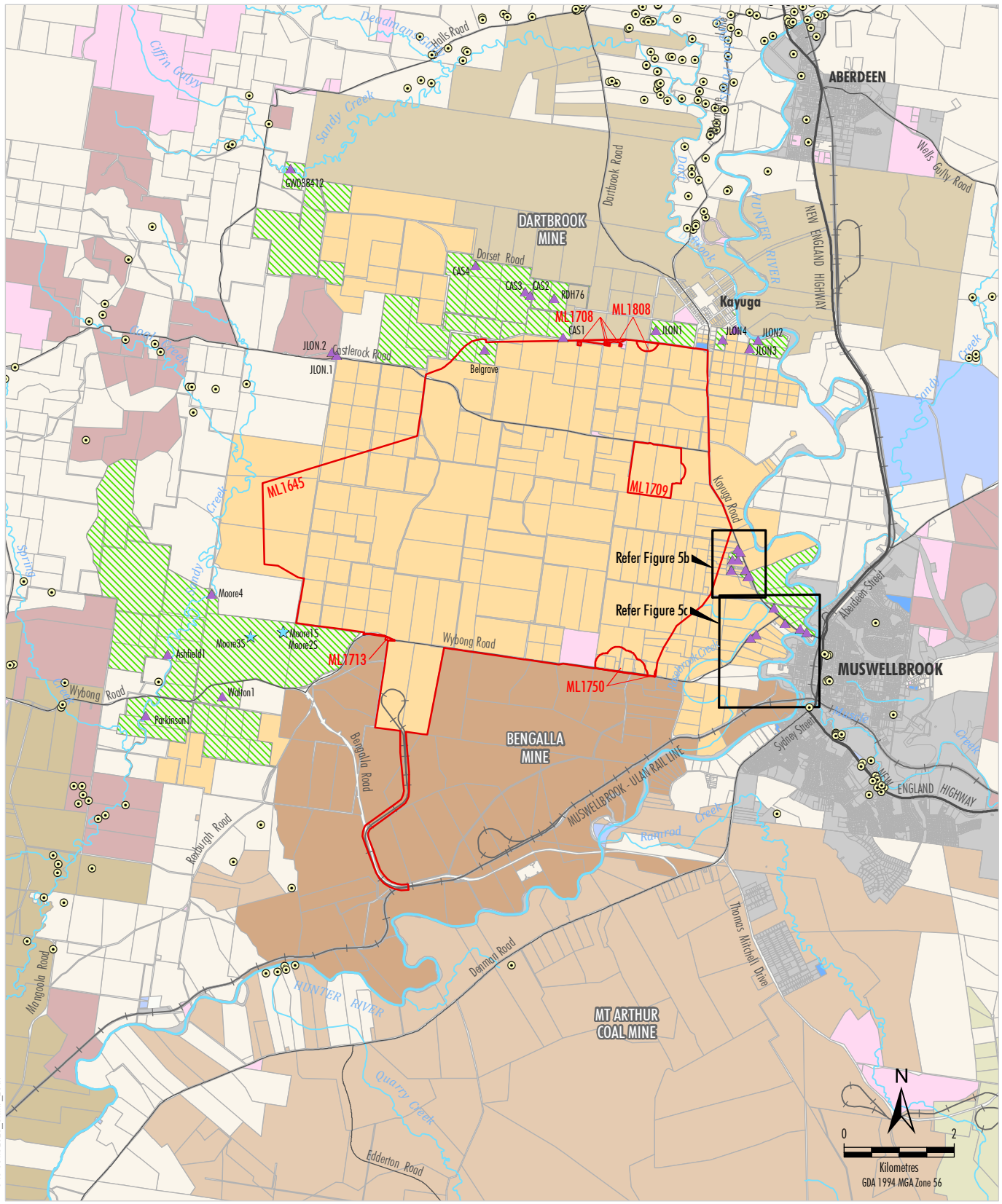
A summary of the results of the bore census is provided in Attachment 5.

MACH Energy wrote to landholders that participated in the bore census in May 2020 to confirm recorded information regarding groundwater bores, wells and known seeps across the MPO ML and neighbouring properties remained correct and contemporary.

4.5 METEOROLOGICAL DATA

Meteorological data is collected from a number of Bureau of Meteorology (BoM) stations in the vicinity of the MPO. Average monthly rainfall for each of these stations is summarised in Table 8.

Data from the Aberdeen (Main Road) (1900 – 1960) and Muswellbrook (Lindisfarne) (1961 – 2018) has been aggregated to develop a rainfall residual mass curve shown on Figure 6 and has been used on the groundwater hydrographs in Attachment 2. This curve is used as it allows easy identification of short or long periods of below average rainfall (downward gradient) or above average rainfall (upward gradient), as well as periods of roughly average rainfall (flat). Comparison of this curve with groundwater level hydrographs indicates whether groundwater levels are responding to dry or wet conditions, or potentially to some other mechanism (e.g. groundwater pumping, mining).



MAC-18-03 MP2020_GWMP_204A

LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)
- Mount Pleasant-controlled
- Bengalla-controlled
- Dartbrook-controlled
- Mangoola-controlled
- Muswellbrook Coal-controlled
- Mt Arthur-controlled
- Other Mining/Resource-controlled
- Crown
- The State of NSW
- Muswellbrook Shire Council
- Upper Hunter Shire Council
- Privately-owned Land
- Muswellbrook and Upper Hunter LEPs Zones B2, B5, IN1, SP2, R2, R5, RE1, RE2 and W1
- Relevant Privately-owned Land
- Bore/Well on Privately-Owned Land
- Spring on Privately-owned Land
- PINNEENA Record

Source: MACH Energy (2020); NSW Department of Industry - Water (2016); NSW Spatial Services (2020)

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MOUNT PLEASANT OPERATION

Groundwater Bores, Wells and Springs Identified during the Bore Census

Figure 5a

MAC-18-03 MP2020_GWMP_2044A

LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)
- Mount Pleasant-controlled
- Privately-owned Land
- Muswellbrook and Upper Hunter LEPs Zones B2, B5, IN1, SP2, R2, R5, RE1, RE2 and W1
- Relevant Privately-owned Land
- Bore/Well on Privately-Owned Land

Source: MACH Energy (2020); NSW Department of Industry - Water (2016); NSW Spatial Services (2020)

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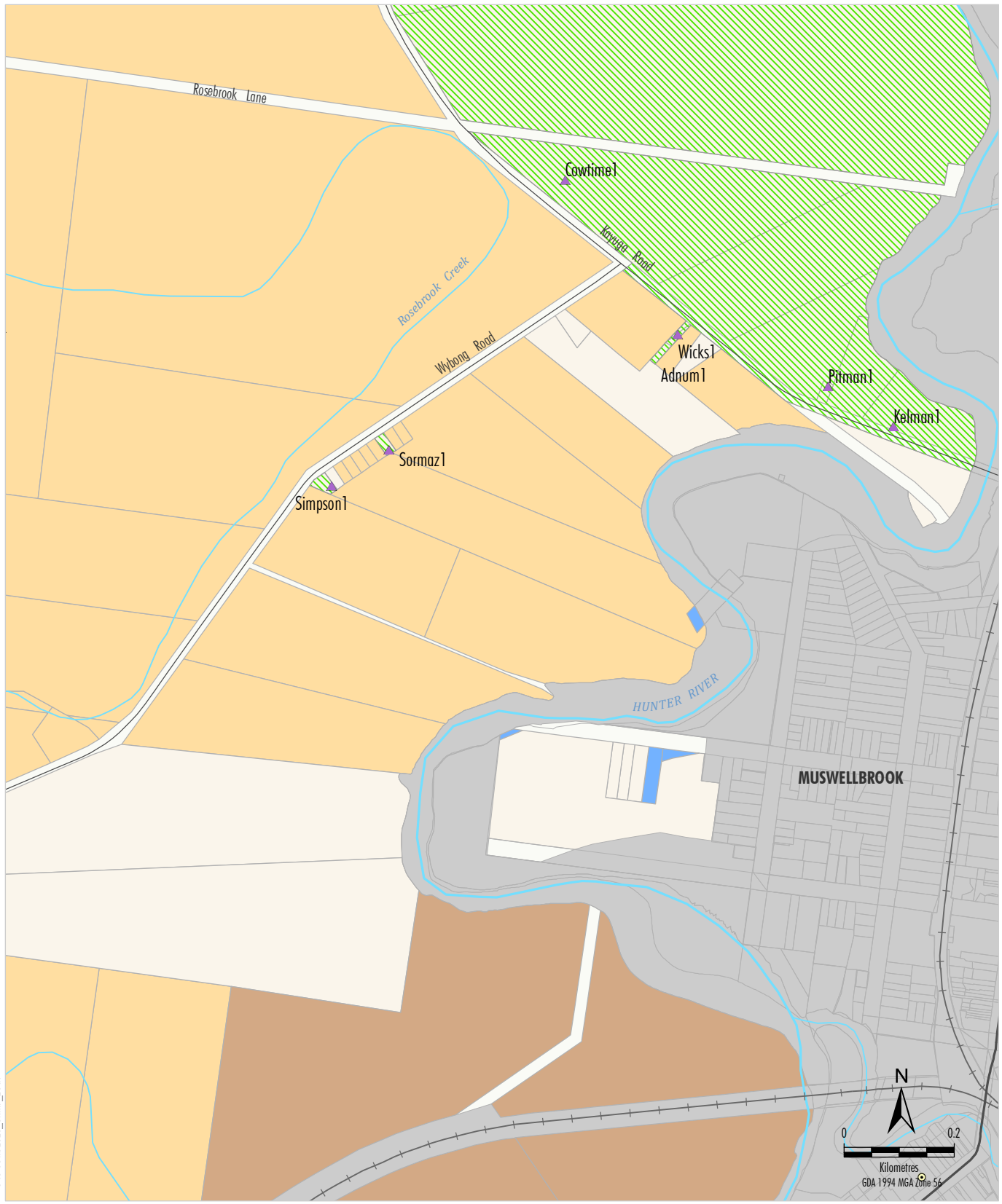
MOUNT PLEASANT OPERATION

Groundwater Bores, Wells and Springs Identified during the Bore Census

Figure 5b



LEGEND

- Mount Pleasant-controlled
- Bengalla-controlled
- Crown
- The State of NSW
- Muswellbrook Shire Council
- Privately-owned Land
- Muswellbrook and Upper Hunter LEPs Zones B2, B5, IN1, SP2, R2, R5, RE1, RE2 and W1
- Relevant Privately-owned Land
- Bore/Well on Privately-Owned Land
- PINNEENA Record

Source: MACH Energy (2020); NSW Department of Industry - Water (2016); NSW Spatial Services (2020)

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MOUNT PLEASANT OPERATION

Groundwater Bores, Wells and Springs Identified during the Bore Census

Figure 5c

Table 8
Average Monthly Rainfall in the Vicinity of the MPO

Parameter	Muswellbrook (St Heliers)	Aberdeen (Main Road)	Muswellbrook (Lindisfarne)	Muswellbrook (Spring Creek, Castle Vale)
Station Information				
Station Number	061374	61000	61168	61192
Period of Record	1992 – 2018	1894 – 2007 and 2013	1960 – 2018	1960 – 2016
Average Monthly Rainfall (mm)				
January	60.0	73.5	77.9	90.5
February	62.2	62.2	61.0	68.5
March	59.3	51.6	58.7	68.7
April	37.1	40.2	37.1	46.5
May	42.5	41.5	41.1	48.1
June	51.9	44.5	38.3	42.9
July	37.2	40.6	30.6	33.3
August	40.5	36.5	30.2	36.8
September	45.7	39.1	39.4	36.8
October	44.9	49.3	49.7	53.9
November	75.0	50.9	57.7	66.9
December	63.8	66.1	63.9	76.5
Annual Average Rainfall (mm)	***620.1***	***601.4***	***596.2***	***663.1***

Note: Data current as of 18 October 2018.

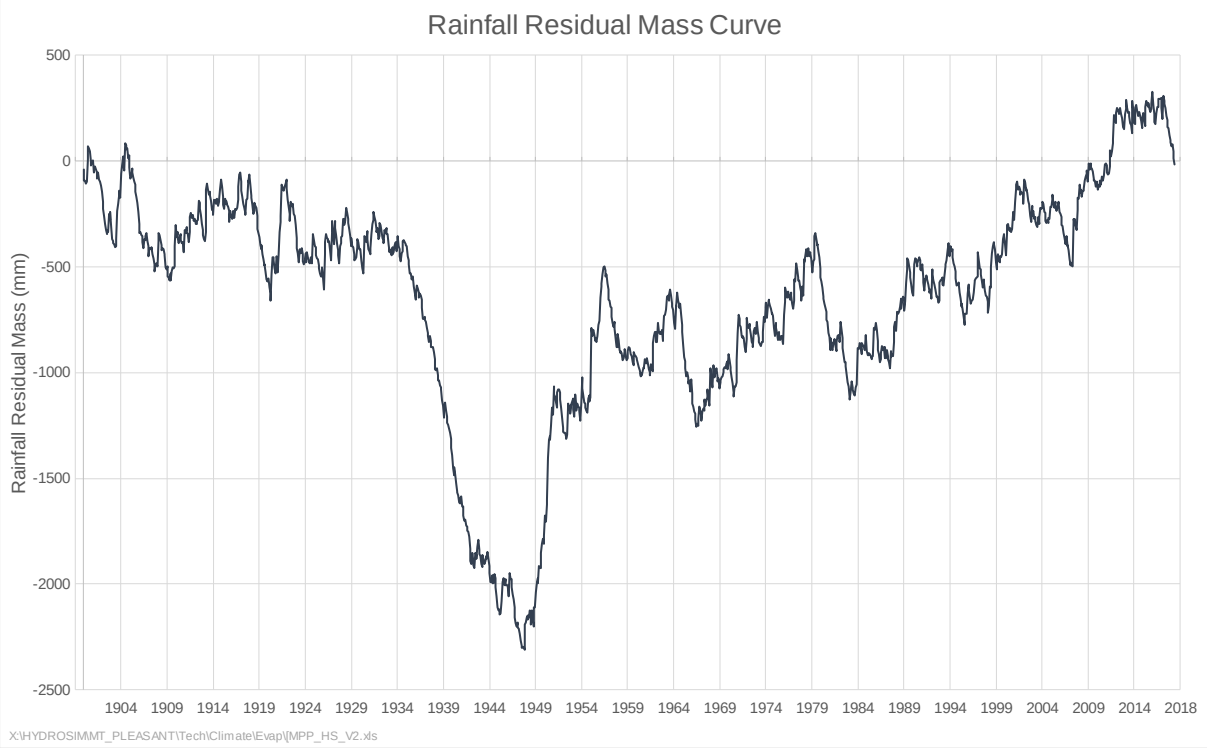


Figure 6: Rainfall Residual Mass Curve – Aberdeen and Muswellbrook

4.6 FLOW MONITORING DATA

Baseline flow monitoring data in the vicinity of the MPO is described in the Surface Water Management Plan (SWMP).

4.7 GEOCHEMISTRY DATA

Metal concentrations in overburden and coal reject materials was assessed by RGS Environmental Pty Ltd (2013) in the *Continuation of Bengalla Mine Geochemical Impact Assessment*. This data is considered to be representative of the overburden and coal reject materials at the MPO, which is located in the same geology as the Bengalla Mine (Figure 3). RGS Environmental Pty Ltd (2013) conclude:

- the concentration of trace metals and sulfate in run-off and seepage from overburden will be low;
- the concentration of trace metals and sulfate from most coal rejects will be low; and
- coal reject materials from the Wynn seam have the potential to generate elevated concentrations of some metals (Al, Cd, Co, Cu, As, Ni, Se and Zn) if exposed to oxidising conditions.

On this basis, the potential for elevated metals to be present in groundwater seepage is considered low.

5 FINAL VOID WATER MANAGEMENT

As part of the MOD 3 EA, MACH Energy developed revisions to the final landform to reflect a less engineered profile that is more consistent with the surrounding natural environment. Construction of the final landform would involve a range of earthworks to push down areas of the final highwalls and low walls, the outcome being a single void remaining in the south with a relatively natural looking shape (Figure 7).

Once mining operations cease, groundwater inflows to the final void would no longer be collected and pumped out. As a result, the final void would gradually fill with water. Inflows into the final void would comprise incident rainfall, runoff within the final void catchment area and groundwater.

The final void catchment would incorporate batter slope and drainage principles as described in the MOD 3 EA (MACH Energy, 2017b). The design of the final void would be refined as required to ensure that the final void would not spill to the environment and would provide a groundwater sink.

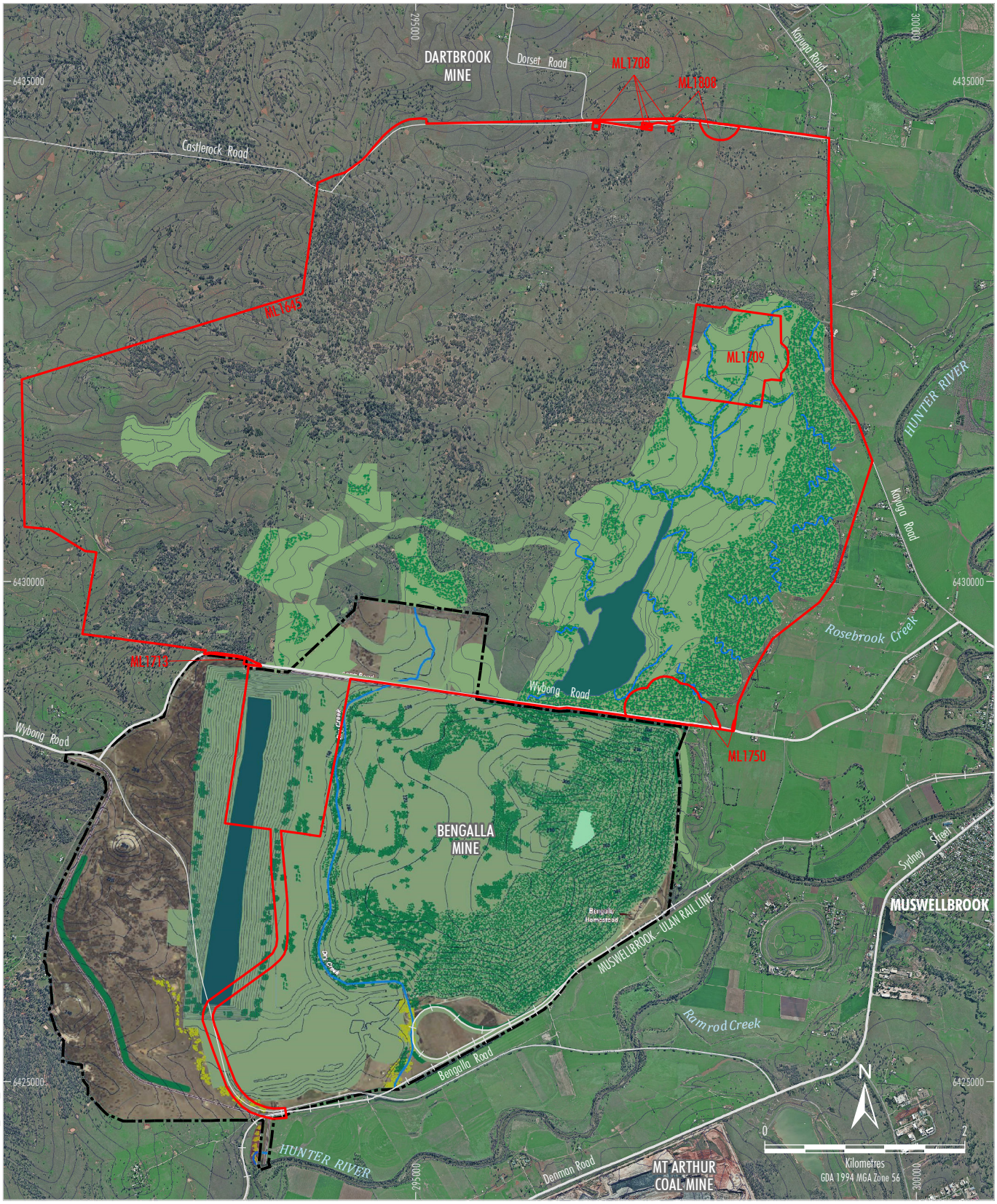
In consultation with the Division of Resources and Geoscience (now MEG) and the Muswellbrook Shire Council, MACH Energy has developed the following Provisional Post-Mining design objectives for the final void:

- The residual final void will form a waterbody.
- The final void (and associated drainage network) will be shaped to reflect a less engineered profile that is more consistent with the surrounding natural environment.
- The final void will typically act as a groundwater sink.
- The final void could provide long-term use for recreational or industrial activities.

The final void landform will be rehabilitated with vegetation species appropriate for the complex landform. The highwall will be rehabilitated using the best reasonable and feasible rehabilitation technologies available and revegetated with species that are appropriate for its steepness and aspect. Design alternatives for the final void will be continually evaluated and prepared as part of the closure planning process at the MPO and will be subject to ongoing regulatory consultation.

Relevant geotechnical studies will be undertaken to assess the stability and provide guidance on measures to minimise instability. Appropriate measures will be used to limit access to steep areas around the final void to restrict cattle, pedestrian and vehicle access. These measures may include large rock placement, landform shaping, or fencing, as agreed with relevant government authorities prior to closure.

MACH Energy will refine the design objectives of the final void over the life of the MPO in the relevant MOP/RMP. In addition, MACH Energy will develop performance criteria relevant to the design and management of the final void in the next MOP/RMP.



MAC-18-03 MP2020_GWMP_208A

LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)
- Final Void
- Final Rehabilitation
- Bengalla Mine Conceptual Final Landform *
- Project Boundary (Appendix 2 of Development Consent SSD-5170) (Dated 23 December 2016)
- Dry Creek
- Final Void Lake
- Rehabilitation
- Rehabilitation Class III
- Indicative Tree Screens (or equivalent)
- Treed Rehabilitation
- Indicative Restorative Area

** Digitised from Appendix 9 of Development Consent (SSD-5170) and amended in the Mount Pleasant Operation CHPP area.*

Source: MACH (2017); NSW Spatial Services (2020); Department of Planning and Environment (2016) Orthophoto: MACH Energy (Jul 2018)

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MOUNT PLEASANT OPERATION

Conceptual Final Landform (2026)

Figure 7

6 GROUNDWATER PREDICTIONS AND VALIDATION

6.1 PREDICTED GROUNDWATER IMPACTS

Groundwater modelling was undertaken for the Mount Pleasant EIS by PPK Environment & Infrastructure (1997).

A number of subsequent groundwater modelling exercises have been undertaken as part of mine planning and feasibility studies for the MPO as well as development applications for neighbouring mines (e.g. Bengalla Mine).

6.1.1 Groundwater Inflows

HydroSimulations (2016) has undertaken a desktop review of these studies in order to conservatively estimate the MPO groundwater pit inflows and associated licensing requirements. As described in Section 6.2, contemporary groundwater modelling is being undertaken for the MPO to validate that the groundwater inflow estimates are conservative.

The maximum predicted inflow rate for the MPO was derived by averaging the maximum predicted inflow rates in each of the studies that were reviewed. This results in a maximum inflow rate of 400 megalitres per annum (ML/a) (HydroSimulations, 2016).

The maximum inflow rate of 400 ML/a was then pro-rated according to pit inflows for the various mine development stages described in the Mount Pleasant Water Management Studies (PPK Environment & Infrastructure, 1997). The pro-rated progressive pit inflow rates are shown in Table 9.

Table 9
Predicted Pit Inflows

Mine Development Stage	Pit Inflow Rate (ML/a)
Year 2	40
Year 5	125
Year 10	250
Year 15	320
Year 20	380
Year 21	400

Source: HydroSimulations (2016).

6.1.2 Groundwater Quality

Depressurisation of the coal seams is expected to have little impact on groundwater quality. In some cases, a slight improvement in water quality may occur due to increased rainfall infiltration (PPK Environment & Infrastructure, 1997).

On cessation of mining, groundwater seepage to the final void is expected to result in a recovery of groundwater levels. Ultimately, if void water levels recover to levels above the elevation of groundwater levels in the alluvium, the pre-mining upward leakage of water from the hard rock groundwater system to the alluvial groundwater system will resume. While the quality of water in the backfilled material may be poorer than the pre-mining quality of the hard rock groundwater system, the reduced rate of leakage relative to pre-mining is expected to result in negligible changes to the rate of salt migration to the alluvium (PPK Environment & Infrastructure, 1997).

6.1.3 Licensing Requirements

The full groundwater take from the hard rock is anticipated to derive from the Sydney Basin – North Coast Groundwater Source, within *the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources, 2016*. The take from the other two hard rock groundwater sources in the region (i.e. the New England Fold Belt Coast and the Liverpool Ranges Basalt Coast Groundwater Sources) was assumed to be negligible given the large distance between these sources and the open cut (HydroSimulations, 2016).

The estimate of maximum alluvial groundwater take was derived following a similar approach for the maximum groundwater inflows, but conservatively applied to obtain a higher estimate of alluvial take. This resulted in a maximum alluvial groundwater take of 60 ML/a (HydroSimulations, 2016).

The estimated alluvial groundwater take was assigned to the sources described in Section 2.4.1 based on their distance from the active open cut. It was conservatively assumed that the maximum alluvial licensing requirement and maximum hard rock licensing requirement would occur at separate times and as a result there would be no offsetting effect of the take from the hard rock and alluvial water sources (HydroSimulations, 2016).

The estimated groundwater licensing requirements for the MPO are summarised in Table 10.

Table 10
Recommended Groundwater Licensing Requirements

Water Sharing Plan	Water Source	Distance from Open Cut	Year 1 - 2 Extraction from Water Source (ML/a)	Maximum Predicted Extraction Year 1 – 5 (ML/a)	Maximum Extraction from Water Source (ML/a)
Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources, 2016	Sydney Basin – North Coast Groundwater Source	Within MPO tenements / open cut	40	125	400
	New England Fold Belt Coast Groundwater Source	5.4 km north-east	Negligible	Negligible	<5
	Liverpool Ranges Basalt Coast Groundwater Source	8.5 km north-west	Negligible	Negligible	Negligible
Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009	Hunter Regulated River Alluvial Water Source	400 m east	6	25	40
	Unnamed Alluvium in the Dart Brook Water Source	1 km north	Negligible	5	15
	Unnamed Alluvium in the Muswellbrook Water Source	5 km west to main channel at Sandy Creek and 1.5 km west to finger of alluvium associated with tributary	Negligible	Negligible	5

Source: HydroSimulations (2016).

MACH Energy has acquired sufficient licences in the Sydney Basin – North Coast Groundwater Source (730 units).

6.2 CONTEMPORARY GROUNDWATER MODELLING

MACH Energy has engaged specialist hydrogeologists to undertake contemporary groundwater modelling for the MPO.

The contemporary groundwater model will be consistent with the Australian Groundwater Modelling Guidelines prepared by the National Water Commission in June 2012 (Barnett *et al*., 2012).

MODFLOW-USG will be used for groundwater simulation with GIS, AlgoMesh and Groundwater Vistas as the interface software. MODFLOW-USG is a recent version of the popular MODFLOW code developed by the United States Geological Survey. MODFLOW-USG is able to simulate variably saturated flow and can handle desaturation and re-saturation of multiple aquifers without the “dry cell” problems of standard-MODFLOW, and has the advantage of using ‘unstructured’ meshes, which allows more focus on the areas where detail is warranted and coarsening of the mesh in areas where detail is not required.

The GWMP will be updated to include the outcomes of the contemporary groundwater modelling, once complete.

6.3 GROUNDWATER MODEL VALIDATION

The contemporary groundwater model described in Section 6.2 would be used as a management tool for the periodic review and calibration of predicted groundwater impacts through the life of the MPO.

This review would be undertaken at least every five years over the life of the MPO.

The results of the groundwater monitoring program would inform progressive refinement of the groundwater model as each of the open cut mining areas are developed. Revised outputs from the groundwater model would be reported in the Annual Review, as relevant over the life of the MPO and used to inform regular site water balance reviews.

7 GROUNDWATER IMPACT TRIGGER LEVELS

Groundwater trigger levels have been developed for the MPO based on the *NSW Aquifer Interference Policy* and *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council [ANZECC] and Agriculture and Resource Management Council of Australia and New Zealand [ARMCANZ], 2000).

7.1 GROUNDWATER LEVELS

MACH Energy will evaluate the environmental performance of the MPO against the predictions of impacts made by the contemporary groundwater modelling, once complete (Section 6.2).

In the interim, and in accordance with the *NSW Aquifer Interference Policy*, groundwater trigger levels will focus on potential effects of mining on:

- the groundwater supply of potentially affected landowners;
- High Priority groundwater dependent ecosystems (GDEs); and
- High Priority culturally significant sites.

There are no High Priority GDEs or High Priority culturally significant sites in the vicinity of the MPO described in the relevant water sharing plans.

A review of the DPIE – Water registered bore database and other regional information indicates the majority of private groundwater users are accessing the alluvial groundwater system to the east of the MPO and registered bores within the MPO tenements are sparse. This lower groundwater use reflects the relatively poorer quality and lower expected bore yield of the hard rock groundwater systems in the vicinity of the MPO (Section 4.2).

Based on the above, groundwater level triggers have been established to monitor for potential impacts on the alluvial groundwater system to the east associated with the Hunter River. Water level triggers have been developed for the alluvial monitoring bores listed in Table 11 in order to identify trends that could potentially lead to a private bore being impacted (i.e. experiencing greater than 2 m drawdown). These water level triggers have been set at 2 m below the 80th percentile water level reported during the baseline monitoring period to date.

Table 11
Groundwater Triggers – Water Level

Bore	Screened Interval (mbgl)	Observed Groundwater Level (mbgl)		Trigger Level (mbgl)
		Minimum	80th percentile	
MPBH1	12.6 – 18.6	8.8	9.7	11.7
MPBH2	11.5 – 17.5	11.6	12.2	14.2
MPBH3b	Well to 14 m	11.6	12.0	Dry (or 14.0 m)

7.2 GROUNDWATER QUALITY

The Australian and New Zealand *Guidelines for Fresh and Marine Water Quality* (ANZECC & ARMCANZ, 2000) apply to the quality of both surface waters and groundwaters since they have been developed to protect environmental values relating to above-ground uses such as irrigation and stock use.

ANZECC & ARMCANZ (2000) recommends that wherever possible site-specific data be used to define trigger values for physical and chemical factors which can adversely impact the environment, rather than using default trigger values. For pH triggers however, a single trigger range of 6 – 8.5 was applied to all bores. This decision was made as the proposed 20th to 80th percentile trigger ranges proved to be too narrow to allow inaccuracy in pH measurement. The adopted range of 6 – 8.5 pH units is consistent with the pH recommended by ANZECC & ARMCANZ (2000) to prevent corrosion of infrastructure associated with the groundwater, as well as the recommend range for drinking water as outlined in the *Australian Drinking Water Quality Guidelines* (National Health and Medical Research Council [NHMRC] & National Resource Management Ministerial Council [NRMMC], 2011).

Baseline groundwater monitoring results indicate that baseline values of EC in the vicinity of the MPO vary across a wide range and can be outside of the ANZECC & ARMCANZ (2000) guideline values for ecosystem protection. Therefore, site-specific trigger levels based on the baseline data have been developed for monitoring the effect of the MPO.

The *NSW Aquifer Interference Policy* sets out the minimal impact considerations for aquifer interference activities for groundwater sources, including:

> *Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity;*

The water sharing plans that regulate groundwater use in the vicinity of the MPO do not describe beneficial use categories for the groundwater sources. However, the *National Land and Water Resources Audit* (Murray Darling Basin Commission, 2005) specified groundwater quality ranges for beneficial use categories based on salinity (Table 12).

Table 12
Groundwater Quality Categories – EC

Beneficial Use	Quality Range	Description
Potable	Up to 800 µS/cm (500 mg/L TDS)*	Suitable for all drinking water and uses.
Marginal Potable	800-2,350 µS/cm (500-1,500 mg/L TDS)*	At the upper level this water is at the limit of potable water, but is suitable for watering of livestock, irrigation and other general uses.
Irrigation	2,350-7,800 µS/cm (1,500-5,000 mg/L TDS)*	At the upper level, this water requires shandying for use as irrigation water or to be suitable for selective irrigation and watering of livestock.
Saline	7,800-22,000 µS/cm (5,000-14,000 mg/L TDS)*	Generally unsuitable for most uses. It may be suitable for a diminishing range of salt-tolerant livestock up to about 6,500mg/L [~10,150 µS/cm] and some industrial uses.
Highly Saline	> 22,000 µS/cm (14,000 mg/L TDS)*	Suitable for coarse industrial processes up to about 20,000 mg/L [~31,000 µS/cm].

Source: *National Land and Water Resources Audit* (Murray Darling Basin Commission, 2005).

Notes:

mg/L = milligrams per litre; and

TDS = Total Dissolved Solids.

* Approximate EC ranges derived from TDS ranges, with conversion Factor of 1.5625 applied.

Beneficial use categories have been assigned to each monitoring bore based on its 80th percentile baseline EC and the EC ranges specified in the table above, with the exception of bores 5500D000, 6500F500L and 4500F000. These bores have been experiencing sustained increases in salinity since approximately 2012, leading to data collected since 2016-2017 being greater than the beneficial use category that would be otherwise designated by their respective 80th percentile EC value. Salinity in bores 5500D000, and 4500F000 stabilised around 2017, however, data indicates that bore 6500F500L is still becoming progressively more saline. It is believed that the salinity recorded at these bores indicates a new equilibrium and EC is not expected to return to values recorded pre-2012. Therefore, the beneficial use category allocated to these three bores has been assigned to complement the more saline measurements recorded in the previous two years and do not necessarily reflect the 80th percentile baseline EC value.

Should a measured EC value exceed the upper limit of the beneficial use quality range for EC at a particular bore for three successive monitoring rounds, the groundwater investigation protocol, as detailed in the Surface and Ground Water Response Plan, would be initiated.

The water quality triggers for each bore are presented in Table 13.

Table 13
Groundwater Triggers – Water Quality

Site	pH		pH Trigger Range	EC		
	20th %ile	80th %ile		80th %ile (µS/cm)	Beneficial Use Category	Trigger (µS/cm)
3500B500U	7.2	9.6*	6 – 8.5	3,530	Irrigation	7,800
3500B500L	7.1	7.4		5,826	Irrigation	7,800
3500C500U	7.1	7.4		5,664	Irrigation	7,800
3500C500L	7.2	7.4		5,590	Irrigation	7,800
4500F000	6.5	6.9		6,904	Saline	22,000
5000D000	6.7	7.0		703	Potable	800
5500D000	6.4	6.9		1,570	Irrigation	7,800
6000C000U	6.4	7.1		4,984	Irrigation	7,800
6000C000L	7.0	7.2		5,474	Irrigation	7,800
6500F500U	6.8	7.0		5,778	Irrigation	7,800
6500F500M	6.9	7.2		2,804	Irrigation	7,800
6500F500L	6.5	7.0		1,526	Irrigation	7,800
6500F625	6.7	7.0		4,086	Irrigation	7,800
7000D000U	6.6	7.6		6,730	Irrigation	7,800
7000D000L	6.6	6.8		1,370	Marginal Potable	2,350
7500F000	6.7	7.6		5,918	Irrigation	7,800
WRA1U	-	-		-	-	-
WRA1L	7.2	7.7		4,496	Irrigation	7,800
WRA2U	6.7	7.0		4,108	Irrigation	7,800
WRA2L	7.0	7.3		6,086	Irrigation	7,800
WRA3U	7.1	7.5		9,020	Saline	22,000
WRA3L	6.6	6.9		16,734	Saline	22,000
WRA5U	7.1	7.4		4,772	Irrigation	7,800
WRA5L	7.1	7.8		7,034	Irrigation	7,800

Table 13 (Continued)
Groundwater Triggers – Water Quality

Site	pH		pH Trigger Range	EC		
	20th %ile	80th %ile		80th %ile (µS/cm)	Beneficial Use Category	Trigger (µS/cm)
WRA6U	6.8	7.0	6 – 8.5	11,240	Saline	22,000
WRA6L	7.2	7.7		5,970	Irrigation	7,800
MPBH1	6.8	7.1		590	Potable	800
MPBH2	6.8	7.1		930	Marginal Potable	930**
MPBH3	6.6	6.9		1,083	Marginal Potable	1,083**
MPBH3b	7.4	7.7		4,420	Irrigation	7,800
MPBH4 (formerly A1)^	-	-		-	-	-
MPBH5 (formerly B1)^	-	-		-	-	-
Melody Bore^	-	-		-	-	-

Notes:

* pH values for bore 3500B500S exceed the pH trigger range of 6 – 8.5 however, this bore was mined through in August 2018.

** Existing 80th percentile values have been adopted for these bores given the baseline water quality is close to potable and these sites are representative of the Hunter River alluvium.

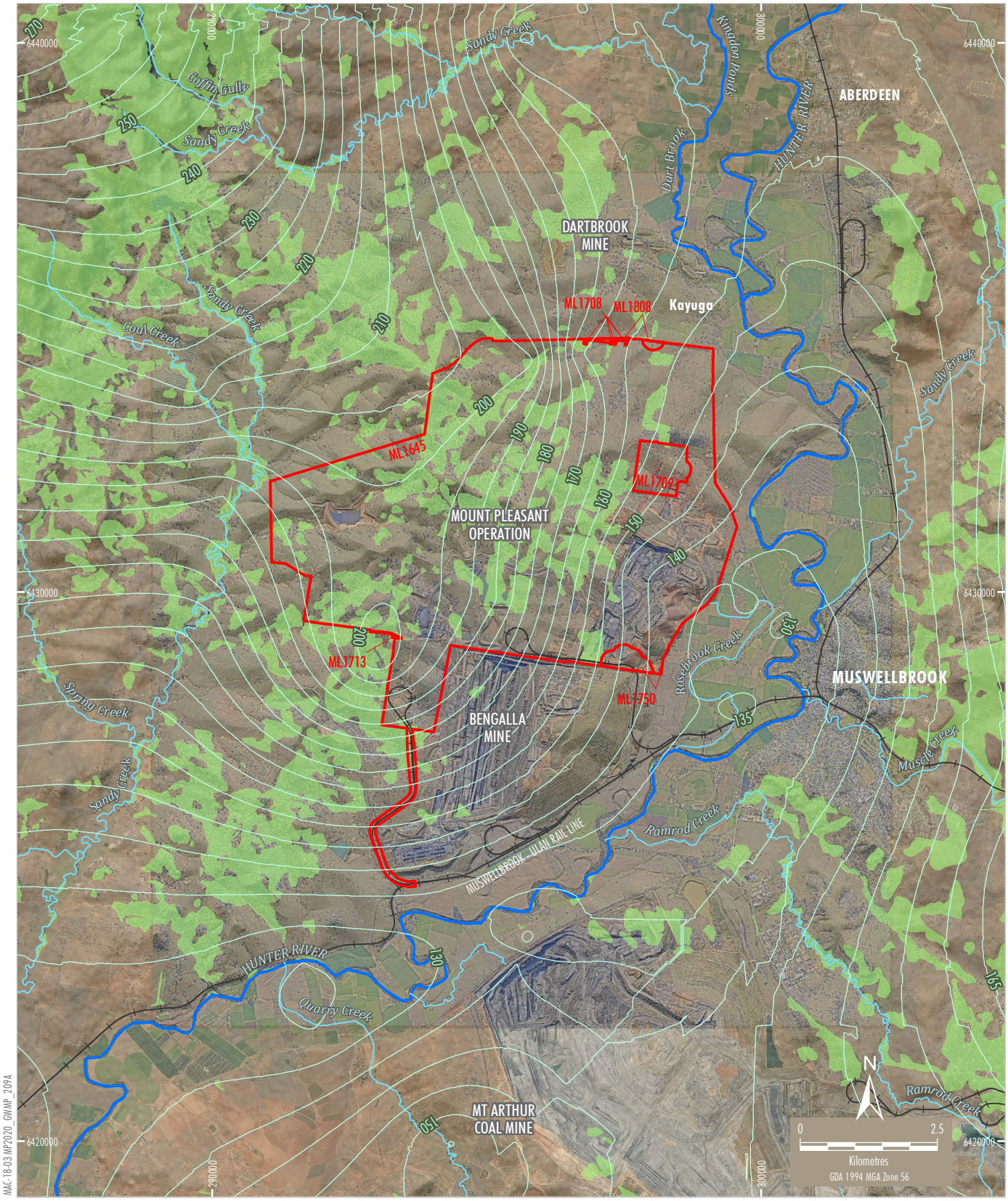
^ Sufficient data is not yet available to develop baseline trigger ranges for new alluvial bores MPBH4 and MPBH5, or Melody Bore. This table will be revised with the appropriate values once the data becomes available. For more information on these bores refer to Section 8.6.

Sufficient data is not yet available to develop baseline trigger ranges for the new bores that have been established to the east and west of the MPO. The trigger ranges for the bores will be established once sufficient data becomes available. Further information regarding the newly established bores is presented in Section 8.6.

7.3 GROUNDWATER DEPENDENT ECOSYSTEMS

Potential GDEs mapped in the *National Atlas of Groundwater Dependent Ecosystems* (BoM, 2016) are presented on Figure 8, along with the interpreted water table based on baseline water level monitoring (Section 4.1).

Figure 8 indicates that none of the potential GDEs are likely to be groundwater dependent, due to the significant depth to groundwater in these areas. The trees that are located in the gullies running north/south through the MPO are thought to rely on ephemeral surface water flows down the gullies rather than on groundwater. On this basis, GDEs are likely restricted to the trees on the bank of the Hunter River, with the historic GDE vegetation on the main floodplain out from the river banks having been cleared for farming. Accordingly, the triggers established for alluvial groundwater levels (Section 7.1) are considered to be sufficient for monitoring potential effects on GDEs.



MAC-18-03-MP2020_GWMP_209A

LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)
- Groundwater Level Contour (5 m Intervals)

Potential Aquatic Groundwater Dependent Ecosystems

- High Potential GDE

Potential Terrestrial Groundwater Dependent Ecosystems

- Low Potential GDE

Source: MACH (2020); BOM Atlas (2019); NSW Spatial Services (2020)
Orthophoto: MACH Energy (July 2020)

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Potential Groundwater Dependent Ecosystems

Figure 8

8 GROUNDWATER MONITORING PROGRAM

Groundwater monitoring bores within the MPO monitoring network cover all major hydrogeological units and are broadly distributed across the project area (Figure 4).

The groundwater monitoring network is listed in Table 6.

8.1 WATER LEVEL

All non-historical bores listed in Table 6 will be monitored manually on a quarterly basis. Monitoring at bore locations within mine disturbance areas will be discontinued when mined by the advancing open cut.

The elevation at the additional monitoring bores to be established (refer Section 8.6) will be surveyed by a registered surveyor with water levels reported in Australian Height Datum and depth in the Annual Review. Electronic data of these monitoring results will be made available to DPIE upon request.

Data from the MPO monitoring program will be supplemented with data available from the Bengalla Mine monitoring bores in the region, as required for comparison.

Privately-owned bores (shown in Figure 5) will be monitored on a regular basis to ensure that mining related drawdown of greater than 2 m has not occurred (as described in Section 8.4).

8.2 WATER QUALITY

All non-historical bores listed in Table 6 will be sampled quarterly for pH and EC. MACH Energy will consider additional water quality bores once final landform, including voids and waste emplacements, is determined.

The potential for elevated metals to be present in groundwater seepage is considered low (Section 4.7). Notwithstanding, samples will be sent for laboratory analysis annually for the suite of parameters listed in Table 14.

Table 14
Parameters for Laboratory Analysis

Parameters			
EC	TDS	Total Hardness as $CaCO_3$	Carbonate alkalinity as $CaCO_3$
Total alkalinity as $CaCO_3$	pH	Calcium	Magnesium
Sodium	Potassium	Chloride	Sulfate as SO_4
Aluminium	Arsenic	Boron	Nitrite as N
Cadmium	Copper	Ionic Balance	Lead
Zinc	Mercury	Nickel	Selenium
Total Cations	Ammonia as N	Beryllium	Reactive Silica
Antimony	Hydroxide Alkalinity as $CaCO_3$	Nitrate as N	Total Phosphorous as P
Nitrate & Nitrite as N	Total Anions	Bicarbonate Alkalinity as CaCO3	Acidity as $CaCO_3$

8.3 GROUNDWATER INFLOWS (PIT DEWATERING / EXTRACTION)

Groundwater extraction for mining activities from all pumping bores will be monitored by means of a flow meter attached to the bore headworks or installed in the discharge pipeline as required under the conditions of the relevant water licences. The MPO Environmental Superintendent (or delegate) will be responsible for monitoring and recording of volumes extracted.

Volumes of water pumped directly from the open cut pits will be monitored by means of flow meters fitted to pipelines or recording of pumping times and rates. Water reporting to the open cut pits may include both groundwater seepage inflows and incident rainfall and runoff.

Where appropriate for comparison, estimates of seepage inflows to the open cut will be determined using the contemporary groundwater model (once complete). The rainfall runoff component estimates will also be determined where appropriate for comparison using the rainfall records and the existing site water balance model.

Operational water balance reviews will be conducted regularly as described in the Site Water Balance.

8.4 GROUNDWATER SUPPLY OF POTENTIALLY AFFECTED LANDOWNERS

MACH Energy conducted a census of privately-owned bores in the vicinity of the MPO (MACH Energy, 2017d) (Section 4.4). MACH Energy wrote to landholders that participated in the bore census in May 2020 to confirm recorded information regarding groundwater bores, wells and known seeps across the MPO ML and neighbouring properties remained correct and contemporary.

Trigger levels have been established at three alluvial bores (Table 11) to monitor the potential effects of the MPO on the groundwater resource in the Hunter Alluvium. In the event that a trigger is exceeded, the groundwater investigation protocol, as detailed in the Surface and Ground Water Response Plan, will be initiated.

The bore census (MACH Energy, 2017d) concluded that there were a number of privately-owned bores to the east, north and west of the MPO mining tenements. Bores to the east lie generally within 1-1.5 km of the proposed area of initial mining. Bores to the north and west are nominally 5-6 km from early mining, however they are also situated close to mining at the Bengalla Mine (western bores) and the Dartbrook Mine (northern bores).

In order to satisfy the requirements of the *NSW Aquifer Interference Policy,* groundwater monitoring at bores located between the MPO and bores owned by potentially affected landowners will occur on a regular basis to ensure that mining related drawdown of greater than 2 m has not occurred, including:

- for the monitoring bores to the east of the MPO, monitoring of the groundwater levels will occur at a higher frequency (quarterly) to ensure that a suitable baseline record is obtained and to detect whether initial mining is affecting water levels at these bores; and
- for the monitoring bores to the north and west of the mining tenements a lower frequency of monitoring will occur (6-monthly) to obtain a suitable baseline dataset, until mining at MPO progresses closer to those areas.

In order to satisfy the requirements of the *NSW Aquifer Interference Policy*, monitoring of groundwater levels around potentially affected landowners is necessary to ensure that drawdown greater than 2 m has not occurred. The existing network of monitoring bores will be utilised to assess drawdown extents. Monitoring of water levels at these bores is intended to occur quarterly. This frequency is considered appropriate to identify any mining related drawdown which may affect groundwater supply at landowner bores.

8.5 GROUNDWATER DEPENDENT ECOSYSTEMS AND RIPARIAN VEGETATION

As described in Section 7.3, GDEs are likely restricted to the trees on the bank of the Hunter River, with the historic GDE vegetation on the main floodplain out from the river banks having been cleared for farming.

Accordingly, the water level and quality monitoring programme for the alluvium (described in Sections 7.1 and 7.2) are considered to be adequate for monitoring potential effects on GDEs.

Specific monitoring of riparian vegetation is described in the SWMP.

8.6 AUGMENTATIONS TO THE GROUNDWATER MONITORING PROGRAM

MACH Energy reviewed the groundwater monitoring program at the MPO as a component of the contemporary groundwater modelling (Section 6.2). Following this review, MACH Energy has established the following additional groundwater monitoring bores in November 2019 and January 2020 (Figure 4):

- A new nested site to the north-east of the MPO that includes an alluvial and hard rock monitoring bore (i.e. MPBH6).
- Two additional sites to the east of the MPO as part of an alluvial investigation program. These bores, MPBH4 and MPBH5 (see Figure 4), were drilled by ENRS in February 2018 (ENRS, 2018).
- New hard rock monitoring bores at two of the existing alluvial sites to the east of the MPO (i.e. MPBH1 and MPBH2).
- A new site to the west of the MPO (i.e. MPBH7).

Details regarding the newly established bores are included in Table 6.

Trigger levels will be established for these new monitoring bores when sufficient monitoring data is available.

It was previously proposed to include two additional sites to the east of the MPO identified during the bore census (i.e. ME11 and ME22). This is no longer considered to be necessary due to the installation of nested standpipes (sampling the alluvium, interburden and coal seam) at the nearby sites MPBH4, MPBH5 and MPBH2.

9 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

9.1 ANNUAL REVIEW

In accordance with Condition 3, Schedule 5 of Development Consent DA 92/97 MACH Energy will review and evaluate the environmental performance of the MPO by the end of March each year (for the preceding calendar year) or other such timing as agreed by the Secretary of the DPIE.

In relation to water, the Annual Review will:

- include a comprehensive review of the groundwater monitoring results at the MPO over the past year, which includes a comparison of the results to evaluate compliance against:
  - relevant statutory requirements, limits or performance measures/criteria (refer Sections 2 and 7);
  - monitoring results of the previous years; and
  - relevant predictions in the EIS and MOD 1, MOD 2, MOD 3 and MOD 4 EAs;
- identify any groundwater-related non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the groundwater monitoring data over the life of the MPO;
- identify any discrepancies between the predicted and actual groundwater impacts of the MPO, and analyse the potential cause of any significant discrepancies; and
- describe what groundwater-related measures will be implemented over the next year to improve the environmental performance of the MPO.

The Annual Review will be made publicly available on the MACH Energy website (https://machenergyaustralia.com.au/) in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

The Annual Review will also include reporting on elevation at each bore with water levels being presented in Australian Height Datum and depth.

9.2 GROUND WATER MAGEMENT PLAN REVISION

In accordance with Condition 4, Schedule 5 of Development Consent DA 92/97, this GWMP will be reviewed, and if necessary revised to the satisfaction of the Secretary of the DPIE, within three months of the submission of:

- an Annual Review (Condition 3, Schedule 5);
- an incident report (Condition 7, Schedule 5);
- an Independent Environmental Audit (Condition 9, Schedule 5); and
- any modification to the conditions of Development Consent DA 92/97.

Within 4 weeks of conducting any such review, the Secretary of the DPIE will be advised of the outcomes of the review and any revised documents submitted to the Secretary for approval.

In accordance with Condition 4A, Schedule 5 of Development Consent DA 92/97, MACH Energy may submit a revised GWMP for the approval of the Secretary at any time, and may also submit any revision to this GWMP required under Development Consent DA 92/97 on a staged basis.

If agreed with the Secretary of the DPIE, a revision to this GWMP required under Development Consent DA 92/97 may be prepared without undertaking consultation with all parties nominated under the relevant Condition of Development Consent DA 92/97.

This GWMP will be made publicly available on the MACH Energy website (https://machenergyaustralia.com.au/), in accordance with Condition 11, Schedule 5 of Development Consent DA 92/97.

9.3 INDEPENDENT ENVIRONMENTAL AUDIT

In accordance with Condition 9, Schedule 5 of Development Consent DA 92/97, an independent environmental audit of the MPO will be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary of the DPIE.

The independent environmental audit will assess the environmental performance of the MPO and review the adequacy of this GWMP. If necessary, appropriate measures or actions to improve the environmental performance of the MPO or this GWMP will be recommended.

10 REPORTING PROCEDURES

In accordance with Condition 2, Schedule 5 of Development Consent DA 92/97, MACH Energy has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in Section 5 of the WMP.

In accordance with Condition 8, Schedule 5 of Development Consent DA 92/97, MACH Energy will provide regular reporting on the environmental performance of the MPO on the MACH Energy website (https://machenergyaustralia.com.au/).

11 REFERENCES

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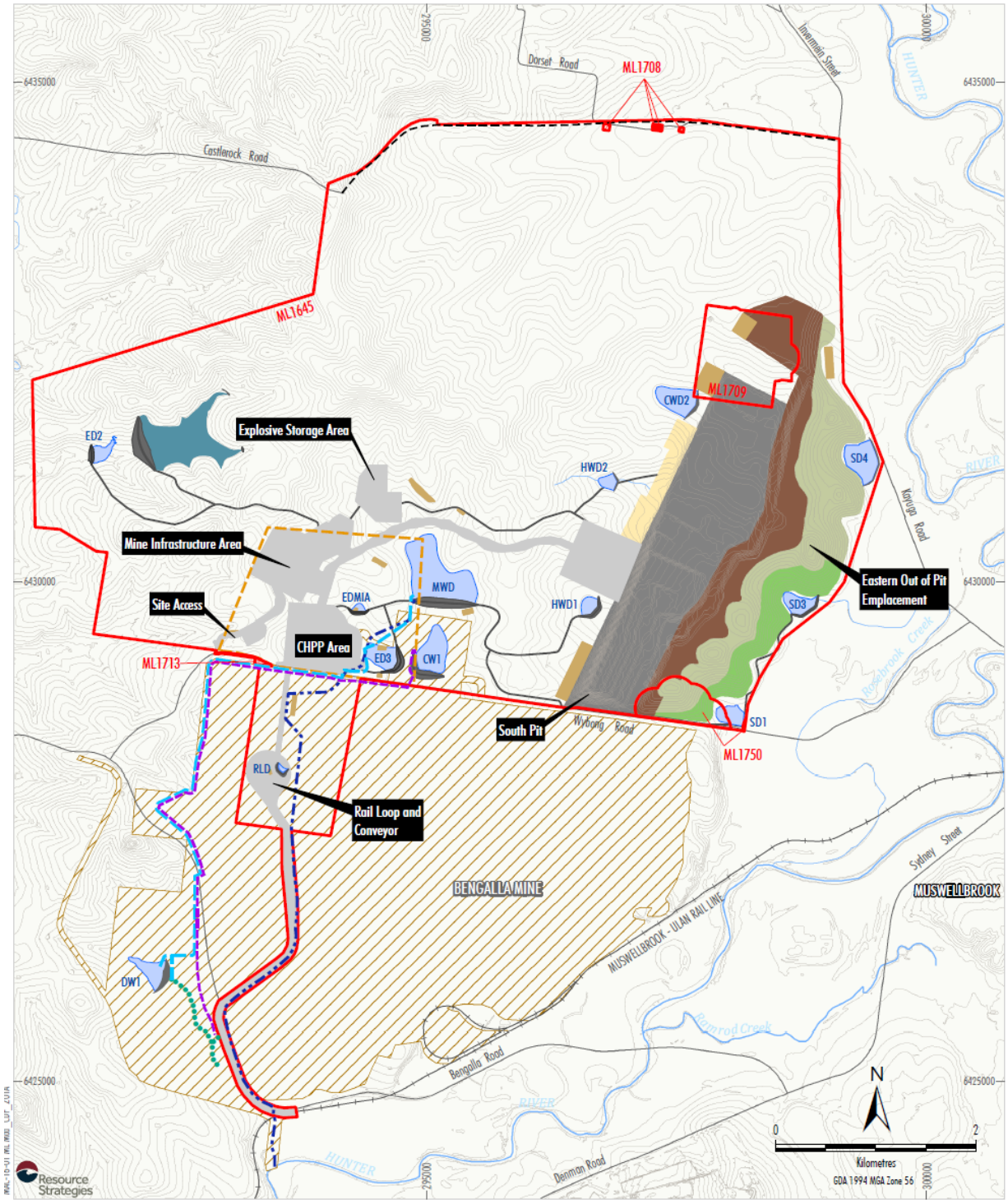
ATTACHMENT 1

APPENDIX 2 OF DEVELOPMENT CONSENT DA 92/97

APPENDIX 2
FIGURE 1 - CONCEPTUAL PROJECT LAYOUT PLAN AT 2021



LEGEND

- Mining Lease Boundary
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Infrastructure Area Envelope
- Active Stripping Area
- Active Mining Area
- Active Overburden Emplacement Area
- Topsoil Stockpile
- Initial Rehabilitation
- Established Rehabilitation
- Infrastructure and Borrow/Stockpile Area
- Access Road
- Northern Link Road

Indicative Water Pipeline Alignment

- MPO Hunter River Supply Pipeline
- MPO DW1 Pipeline (Bi-directional)
- Bengalla Mine CW1 Pipeline
- Approximate Extent of Scour Protection
- Water Dam
- Fines Emplacement Area

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2017); MACH Energy (2017)

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FIGURE 2 - CONCEPTUAL PROJECT LAYOUT PLAN AT 2025

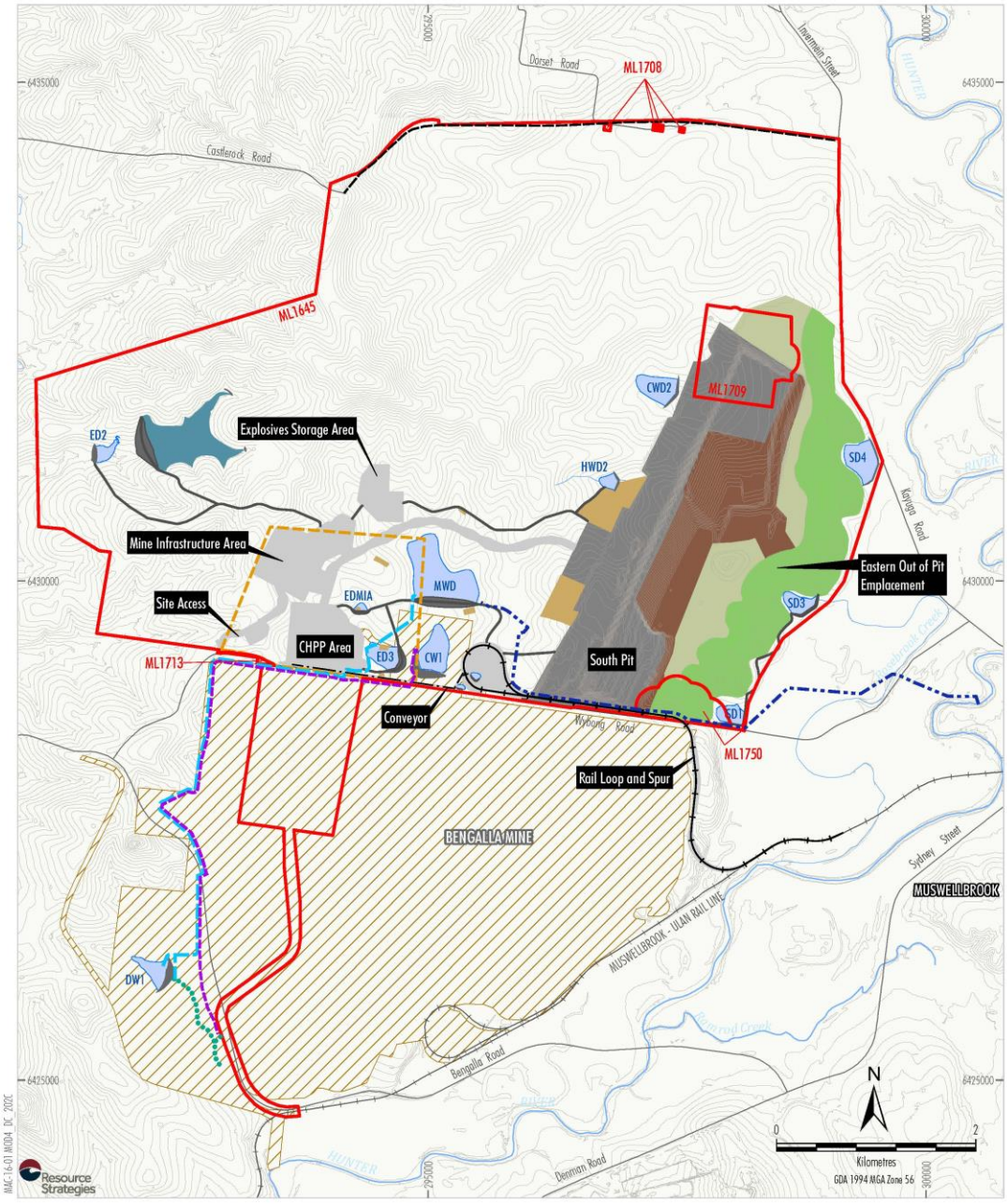
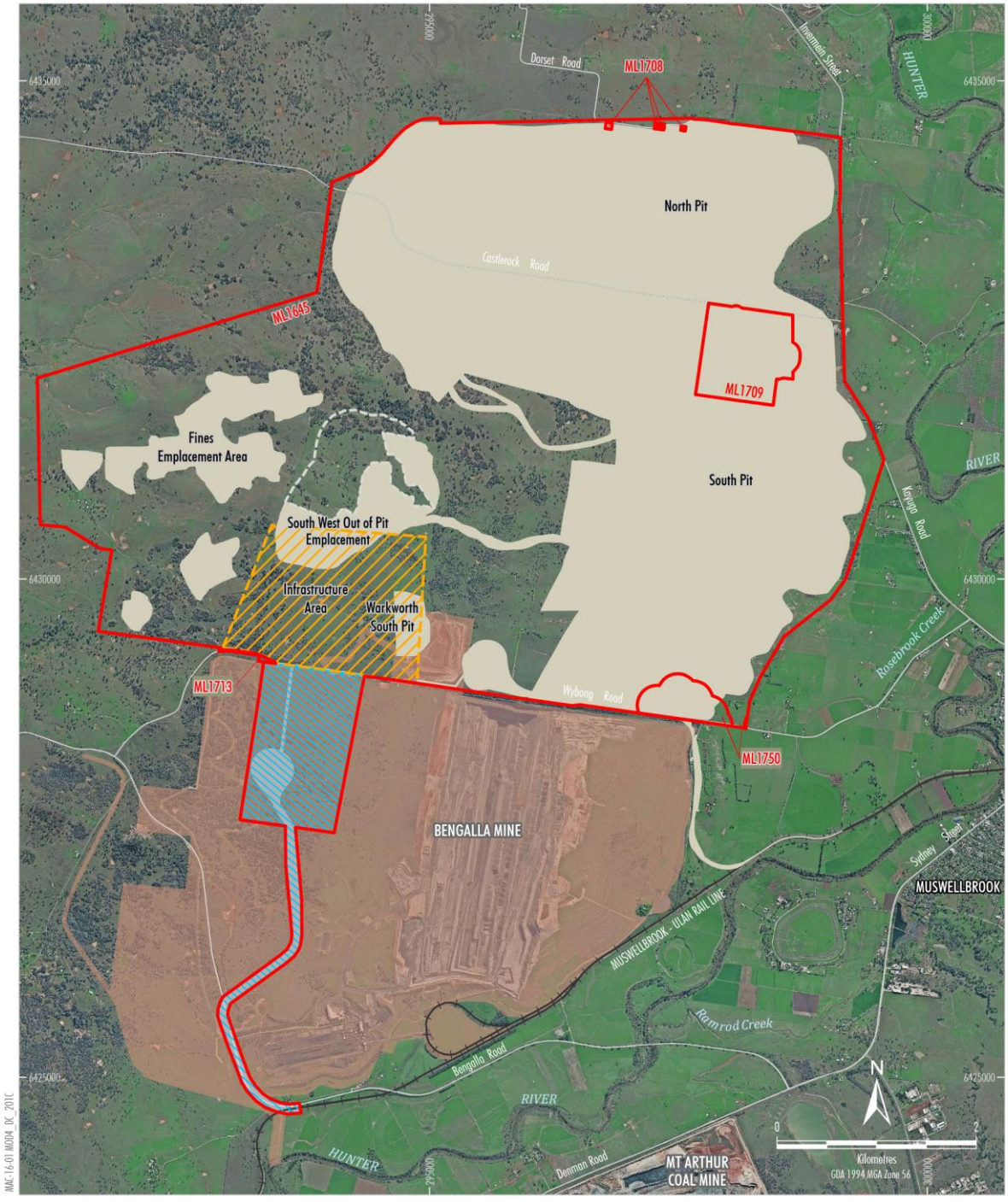


FIGURE 3 - APPROVED SURFACE DISTURBANCE PLAN



LEGEND

- Mining Lease Boundary
- Approximate Extent of Approved Surface Development [1]
- Area Relinquished for Overburden Emplacement and Major Infrastructure
- Infrastructure Area Envelope
- Infrastructure to be removed under the Terms of Condition 37, Schedule 3
- Indicative Existing Coal Transport Infrastructure
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)

NOTE

1. Excludes some project components such as water management infrastructure, infrastructure within the Infrastructure Area Envelope, offsite coal transport infrastructure, road diversions, access tracks, topsoil stockpiles, power supply, temporary offices, signalling, other ancillary works and construction disturbance.

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2018); Department of Planning and Environment (2016); MACH Energy (2017)
Orthophoto: MACH Energy (Aug 2016)

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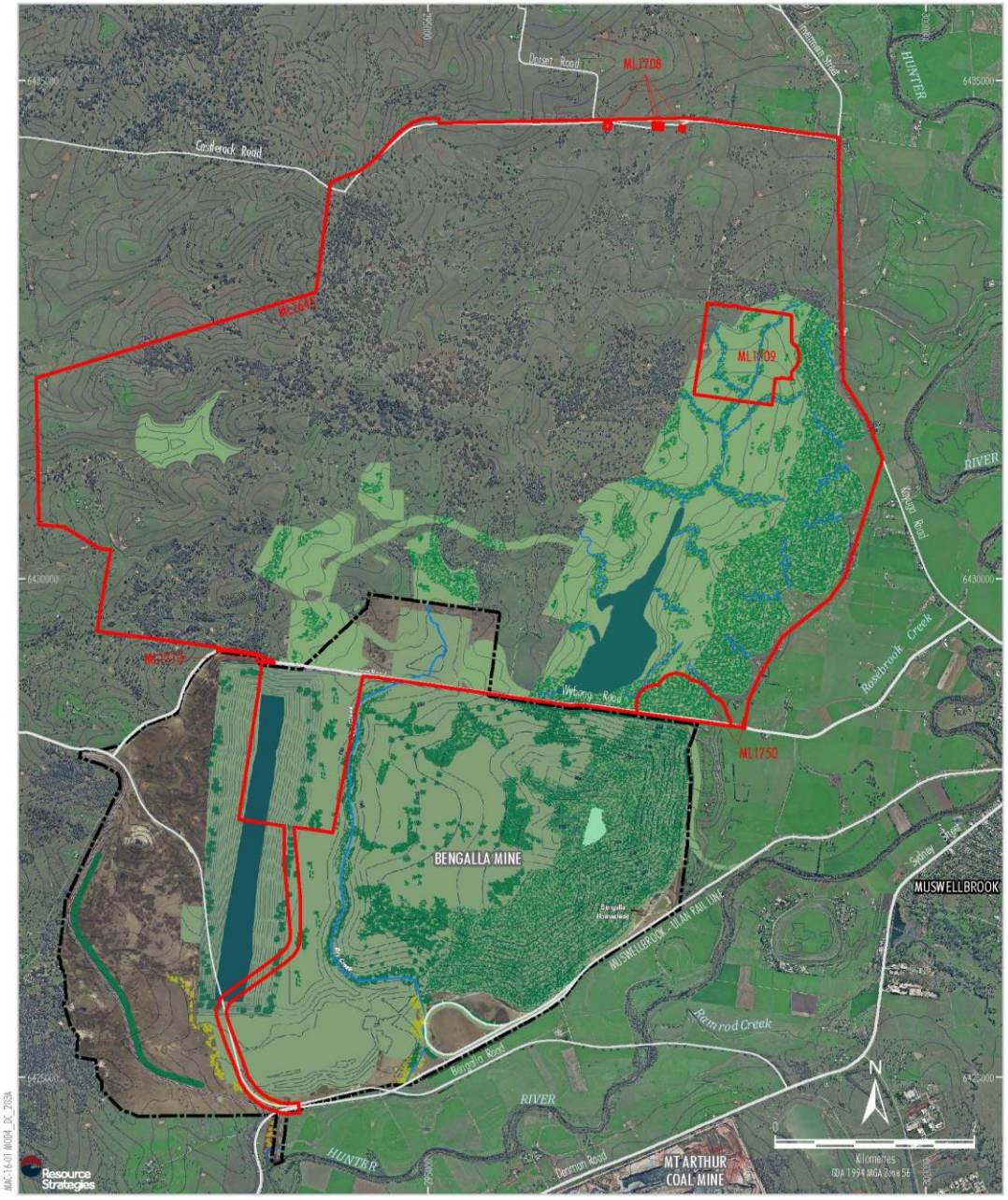
MOUNT PLEASANT OPERATION
Approved Surface Disturbance Plan

FIGURE 4 - CONCEPTUAL FINAL LANDFORM

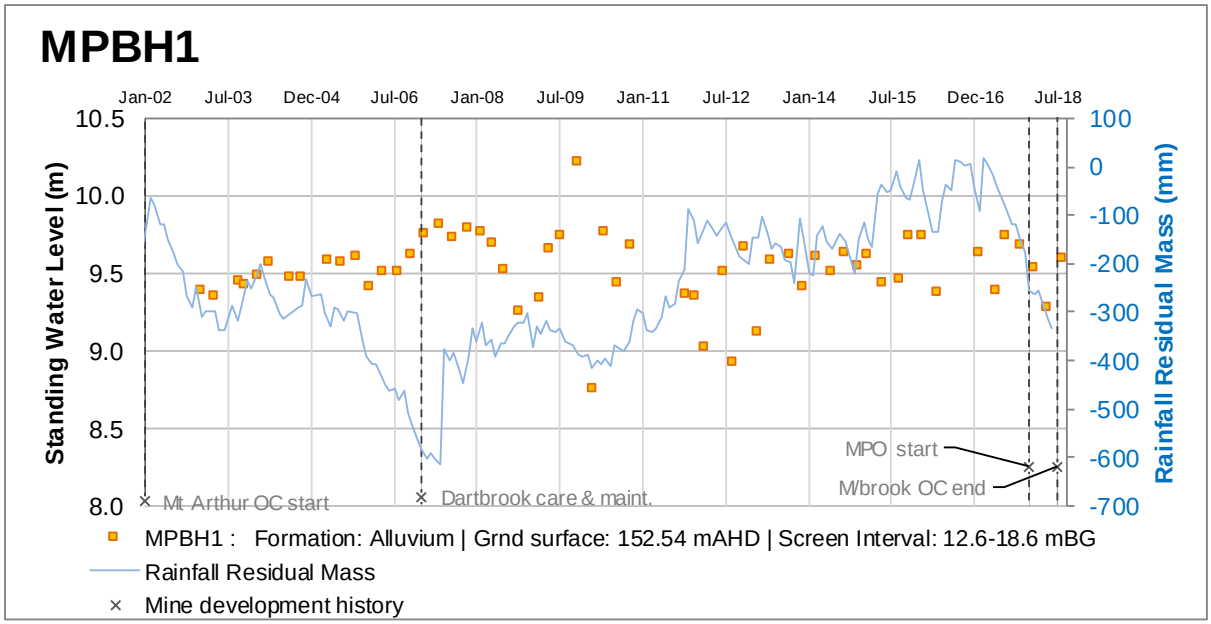


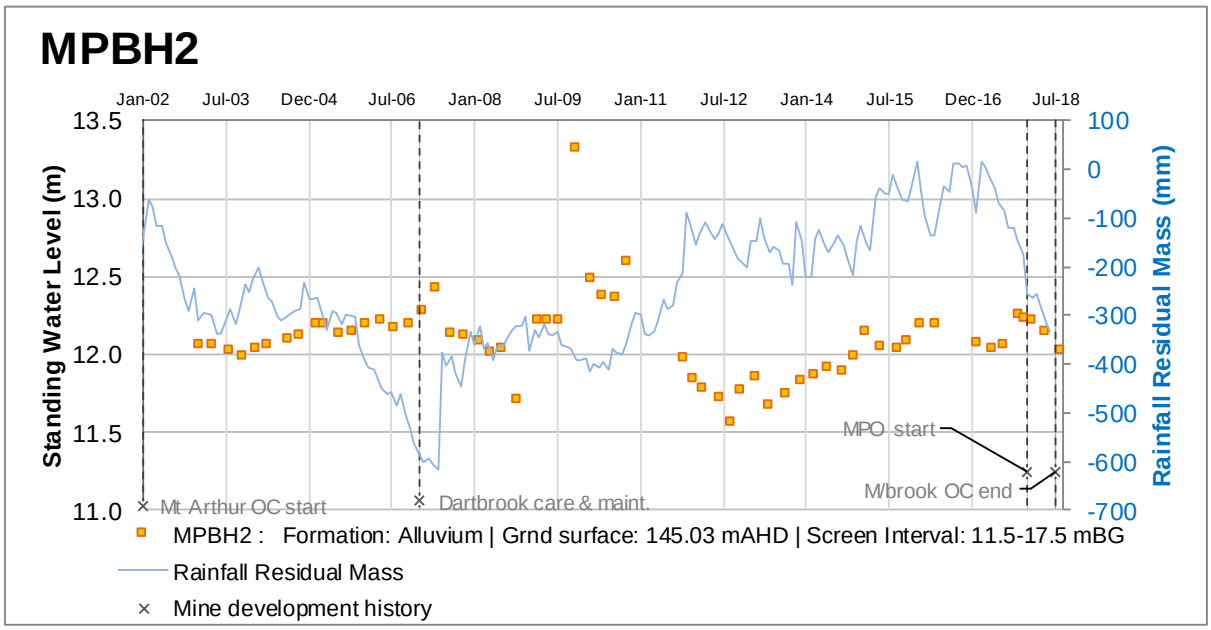
ATTACHMENT 2

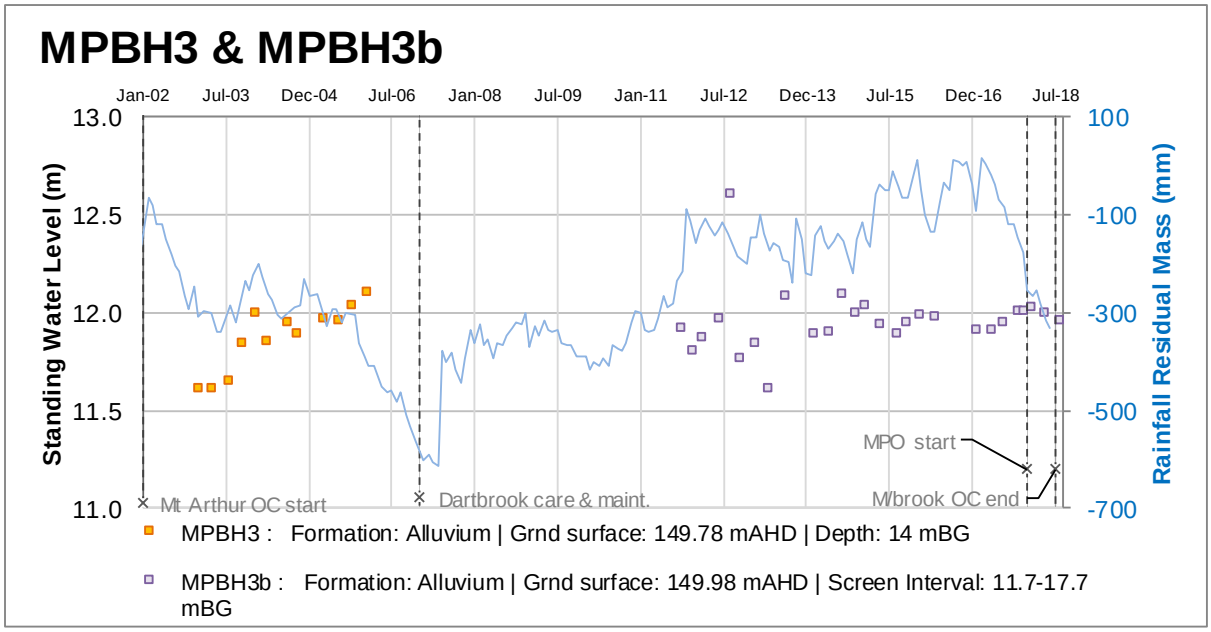
GROUNDWATER HYDROGRAPHS

BELOW GROUND WATER LEVEL AND RAINFALL RESIDUAL MASS

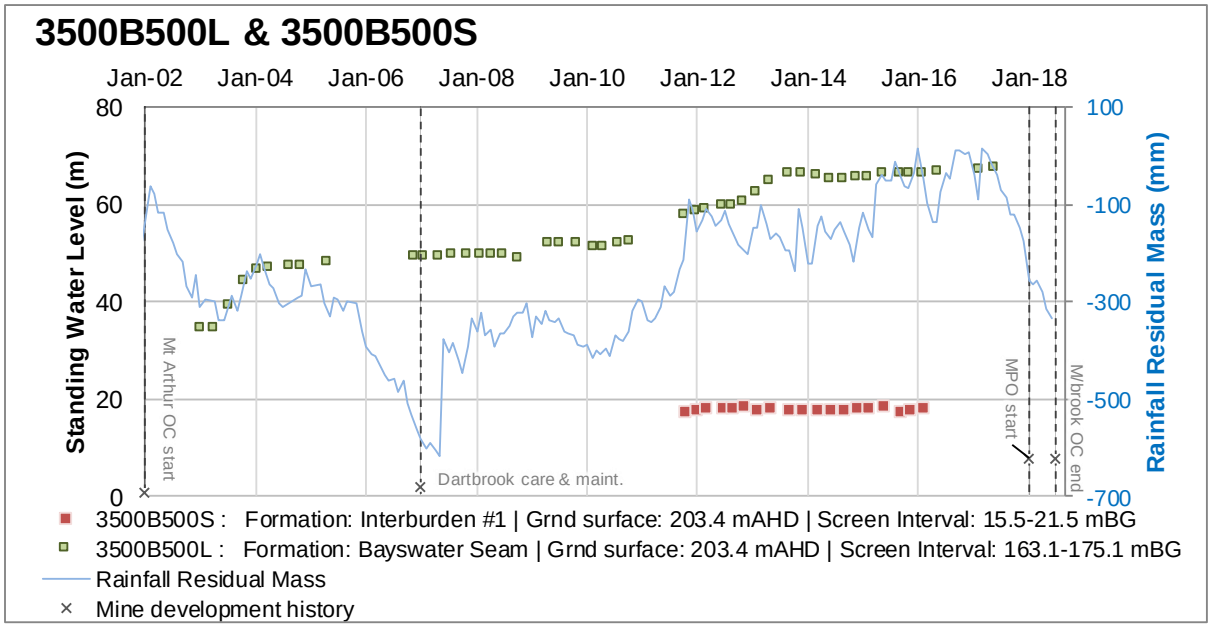
Eastern Bores

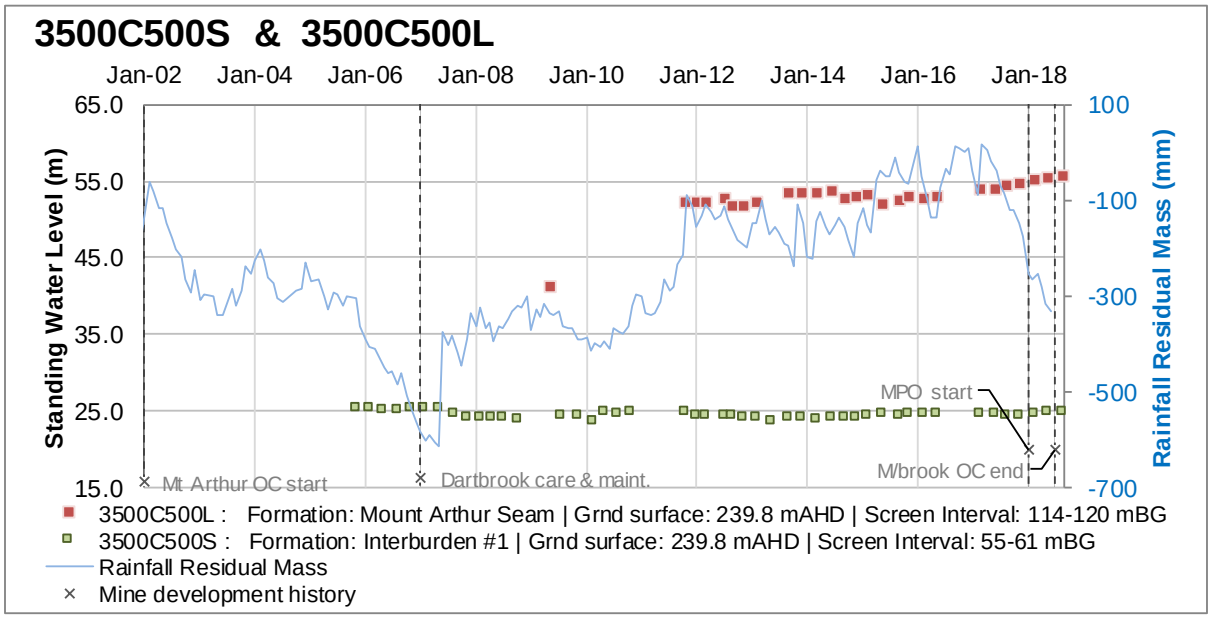


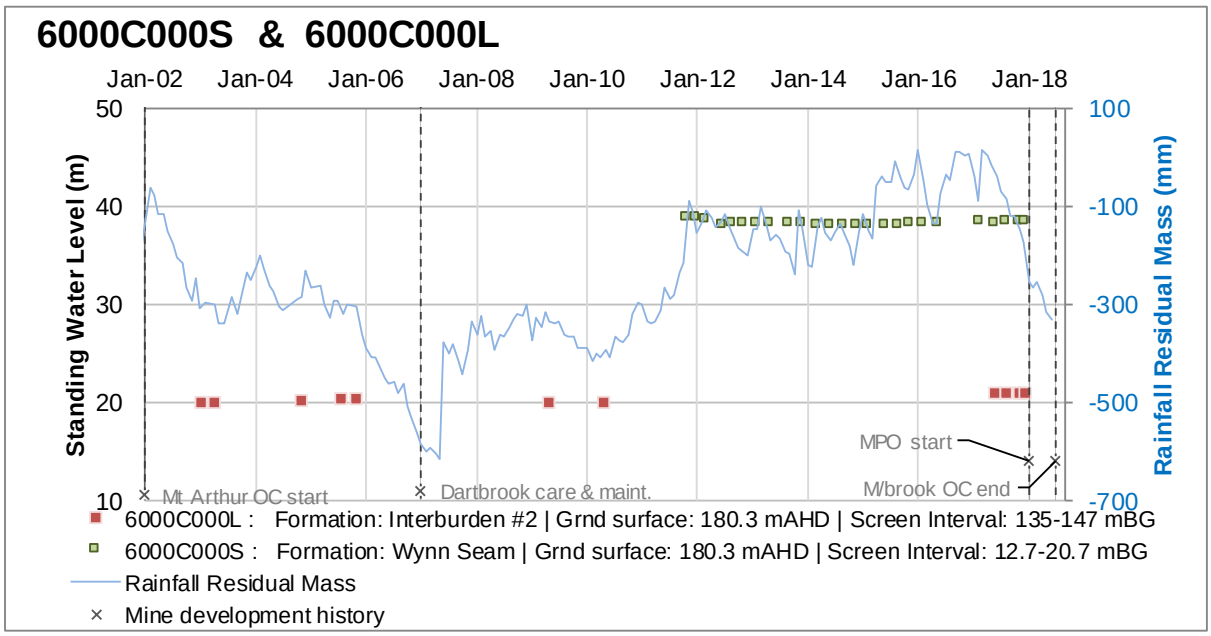


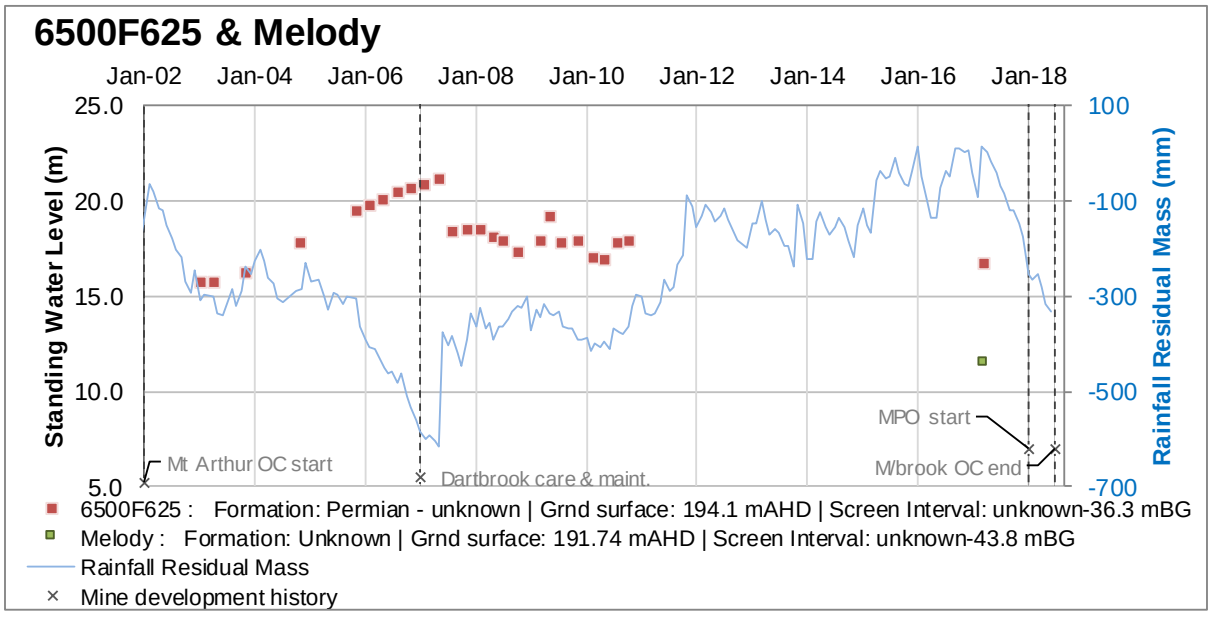

MPBH3 & MPBH3b
Jan-02
Jul-03
Dec-04
Jul-06
Jan-08
Jul-09
Jan-11
Jul-12
Dec-13
Jul-15
Dec-16
Jul-18
13.0
12.5
12.0
11.5
11.0
Standing Water Level (m)
100
-100
-300
-500
-700
Rainfall Residual Mass (mm)
MPO start
Mt Arthur OC start
Dartbrook care & maint.
M'brook OC end
MPBH3 : Formation: Alluvium | Grnd surface: 149.78 mAHD | Depth: 14 mBG
MPBH3b : Formation: Alluvium | Grnd surface: 149.98 mAHD | Screen Interval: 11.7-17.7 mBG

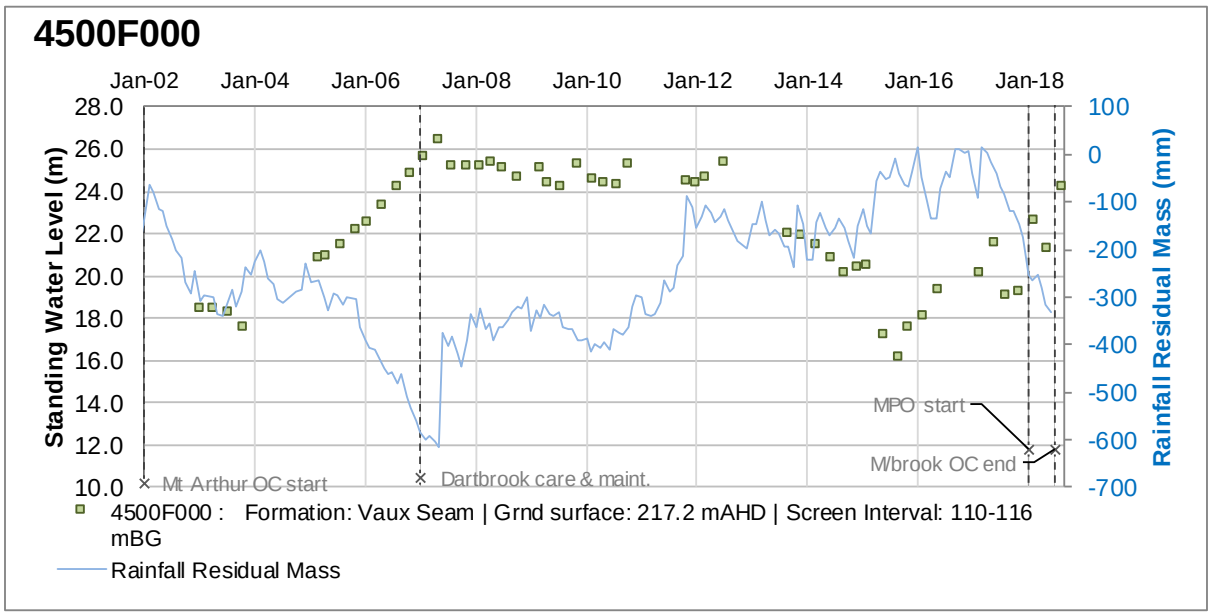
Central Bores

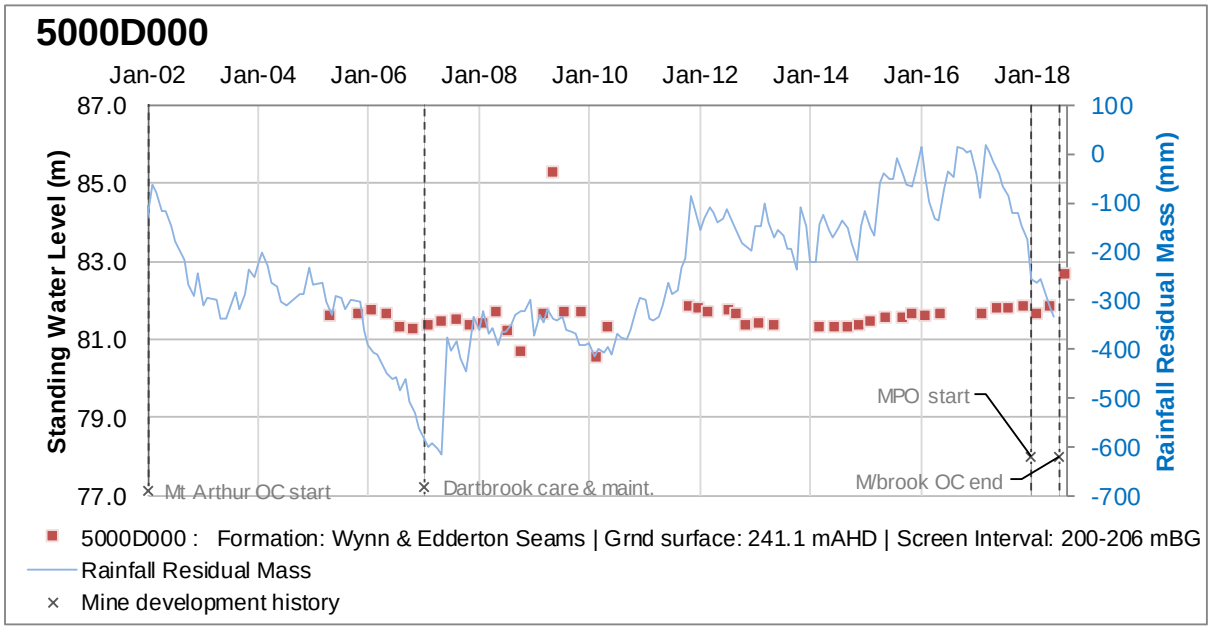


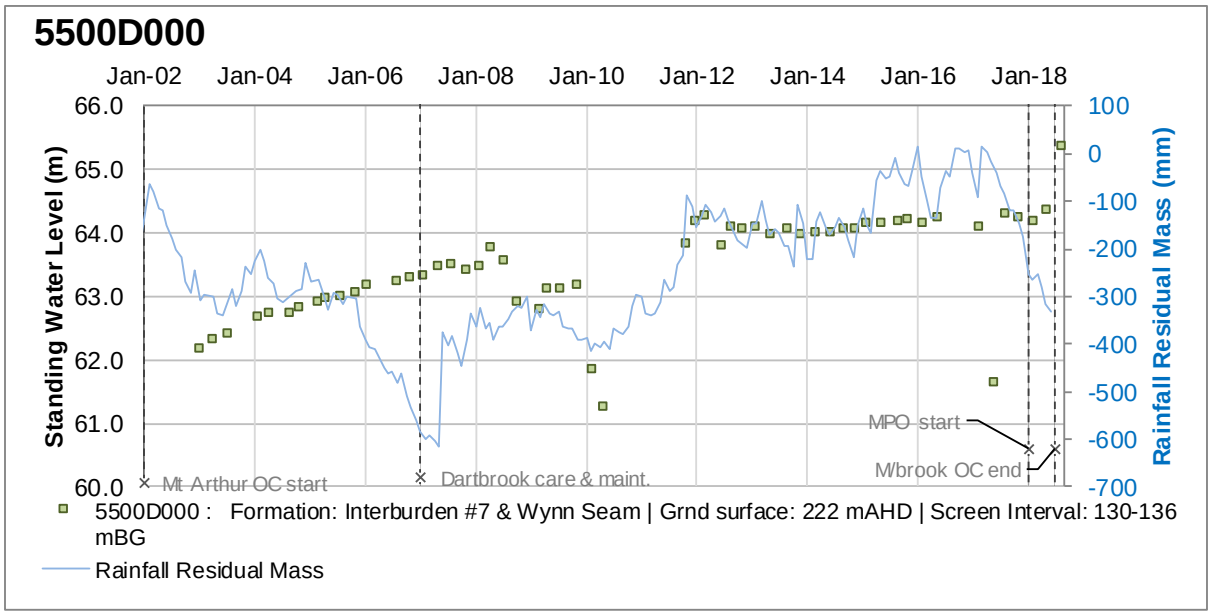


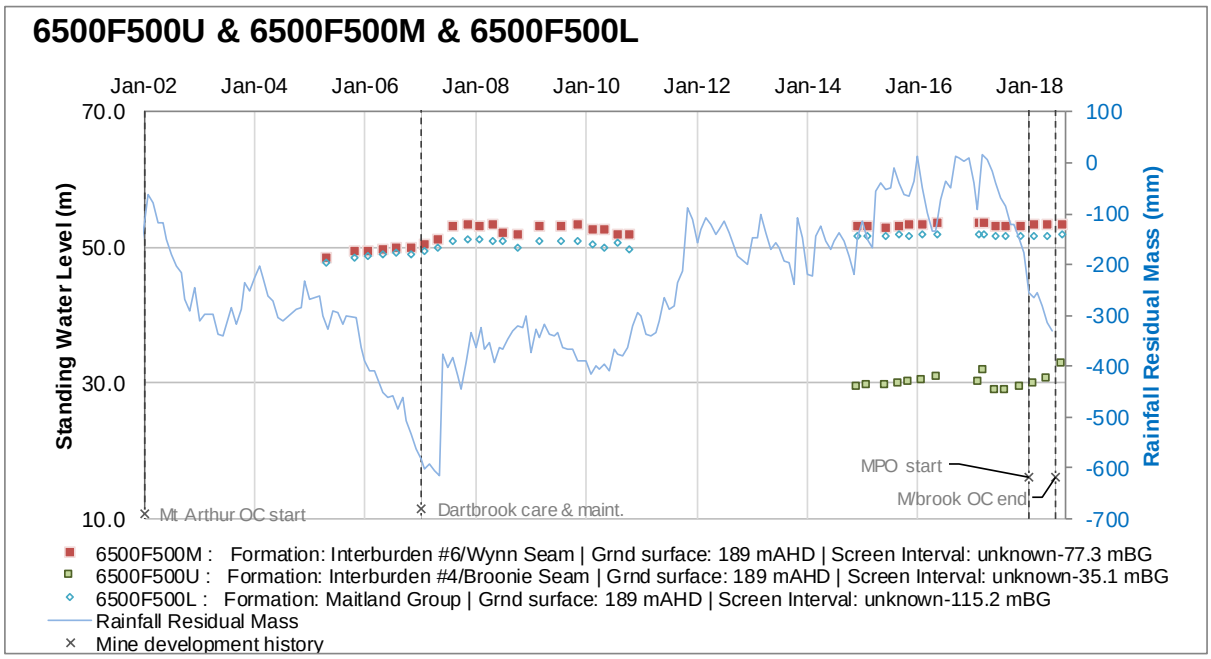

6000C000S & 6000C000L
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Standing Water Level (m)
50
40
30
20
10
Rainfall Residual Mass (mm)
100
-100
-300
-500
-700
MPO start
M/brook OC end
Mt Arthur OC start
Dartbrook care & maint.
6000C000L : Formation: Interburden #2 | Grnd surface: 180.3 mAHD | Screen Interval: 135-147 mBG
6000C000S : Formation: Wynn Seam | Grnd surface: 180.3 mAHD | Screen Interval: 12.7-20.7 mBG
Rainfall Residual Mass
Mine development history

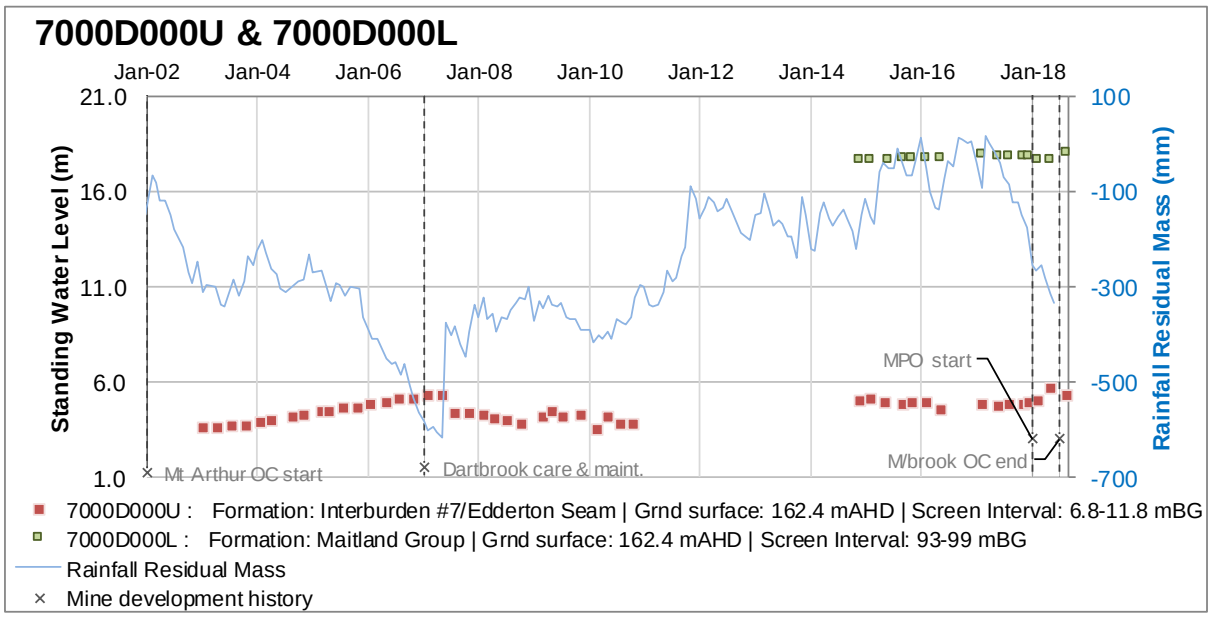

6500F625 & Melody
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Standing Water Level (m)
25.0
20.0
15.0
10.0
5.0
Rainfall Residual Mass (mm)
100
-100
-300
-500
-700
MPO start
M/brook OC end
Mt Arthur OC start
Dartbrook care & maint.
6500F625 : Formation: Permian - unknown | Grnd surface: 194.1 mAHD | Screen Interval: unknown-36.3 mBG
Melody : Formation: Unknown | Grnd surface: 191.74 mAHD | Screen Interval: unknown-43.8 mBG
Rainfall Residual Mass
Mine development history

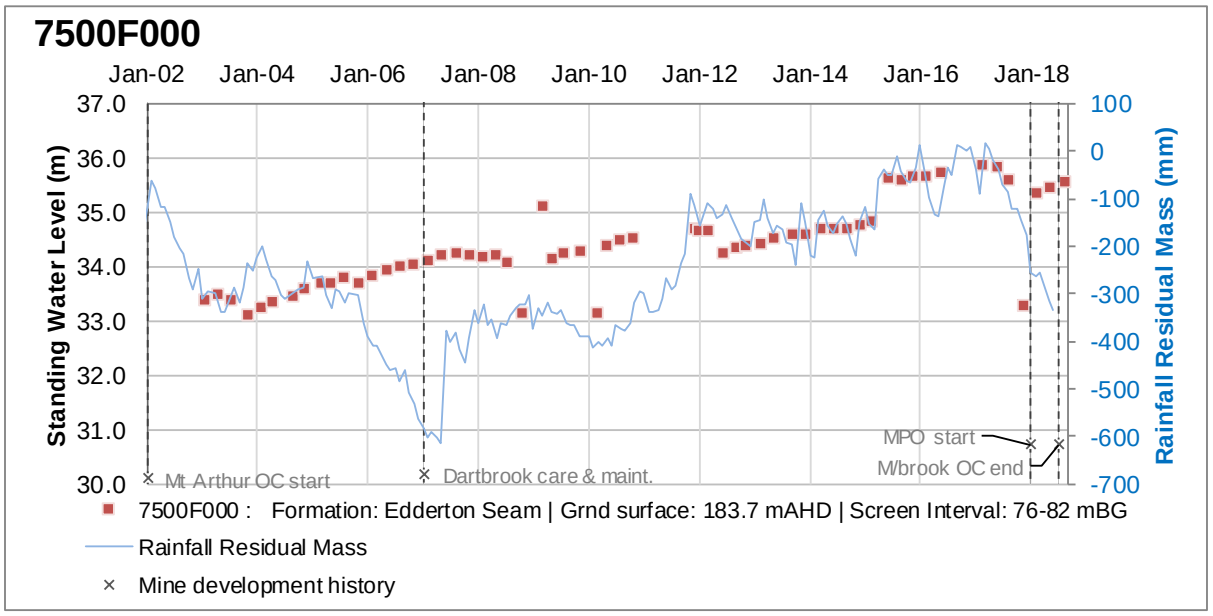

4500F000
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
Standing Water Level (m)
100
0
-100
-200
-300
-400
-500
-600
-700
Rainfall Residual Mass (mm)
MPO start
M/brook OC end
Mt Arthur OC start
Dartbrook care & maint.
4500F000 : Formation: Vaux Seam | Grnd surface: 217.2 mAHD | Screen Interval: 110-116 mBG
Rainfall Residual Mass


5000D000
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
87.0
85.0
83.0
81.0
79.0
77.0
Standing Water Level (m)
100
0
-100
-200
-300
-400
-500
-600
-700
Rainfall Residual Mass (mm)
MPO start
M/brook OC end
Mt Arthur OC start
Dartbrook care & maint.
5000D000 : Formation: Wynn & Edderton Seams | Grnd surface: 241.1 mAHD | Screen Interval: 200-206 mBG
Rainfall Residual Mass
Mine development history

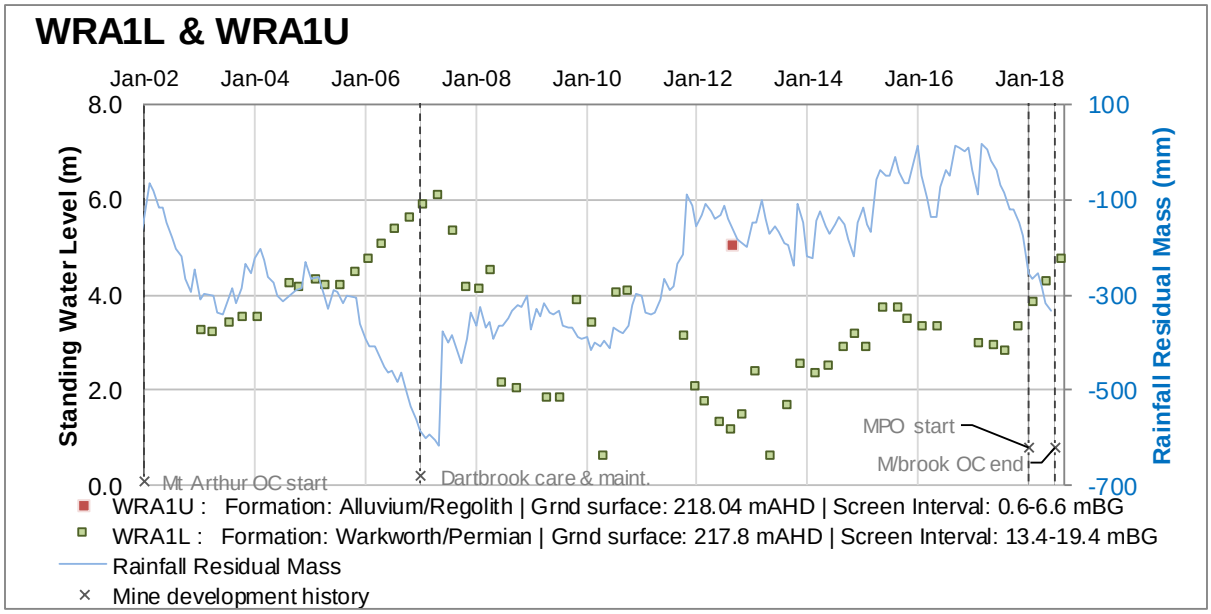

5500D000
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
66.0
65.0
64.0
63.0
62.0
61.0
60.0
Standing Water Level (m)
100
0
-100
-200
-300
-400
-500
-600
-700
Rainfall Residual Mass (mm)
MPO start
M/brook OC end
Mt Arthur OC start
Dartbrook care & maint.
5500D000 : Formation: Interburden #7 & Wynn Seam | Grnd surface: 222 mAHD | Screen Interval: 130-136 mBG
Rainfall Residual Mass

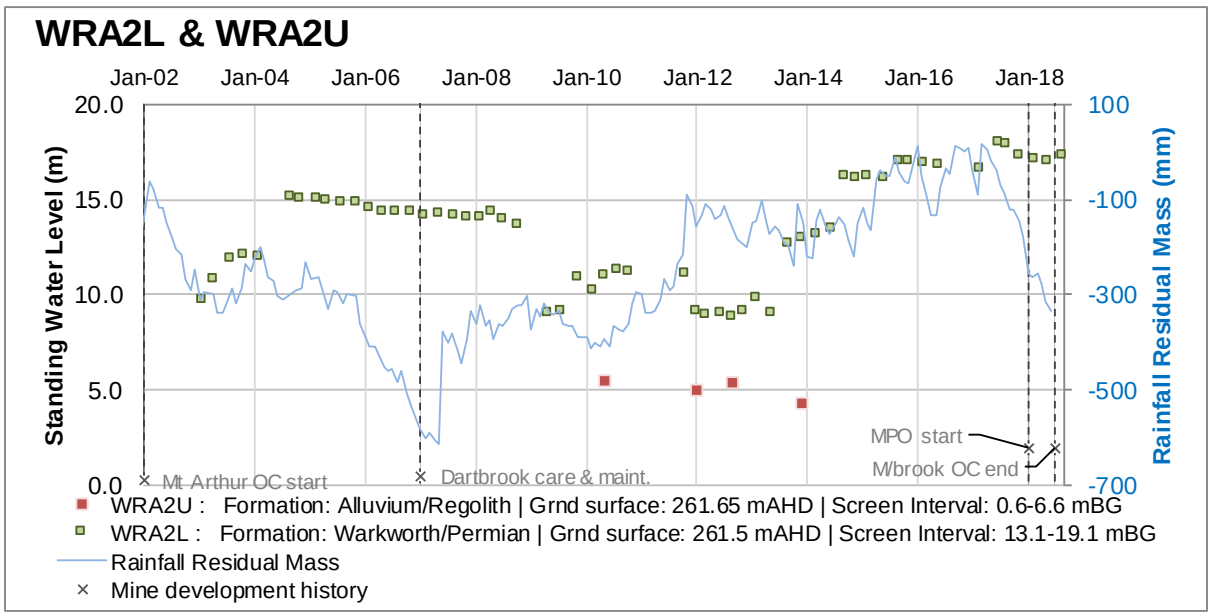

6500F500U & 6500F500M & 6500F500L
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
70.0
50.0
30.0
10.0
Standing Water Level (m)
100
0
-100
-200
-300
-400
-500
-600
-700
Rainfall Residual Mass (mm)
MPO start
M'brook OC end
Mt Arthur OC start
Dartbrook care & maint.
6500F500M : Formation: Interburden #6/Wynn Seam | Grnd surface: 189 mAHD | Screen Interval: unknown-77.3 mBG
6500F500U : Formation: Interburden #4/Broonie Seam | Grnd surface: 189 mAHD | Screen Interval: unknown-35.1 mBG
6500F500L : Formation: Maitland Group | Grnd surface: 189 mAHD | Screen Interval: unknown-115.2 mBG
Rainfall Residual Mass
Mine development history

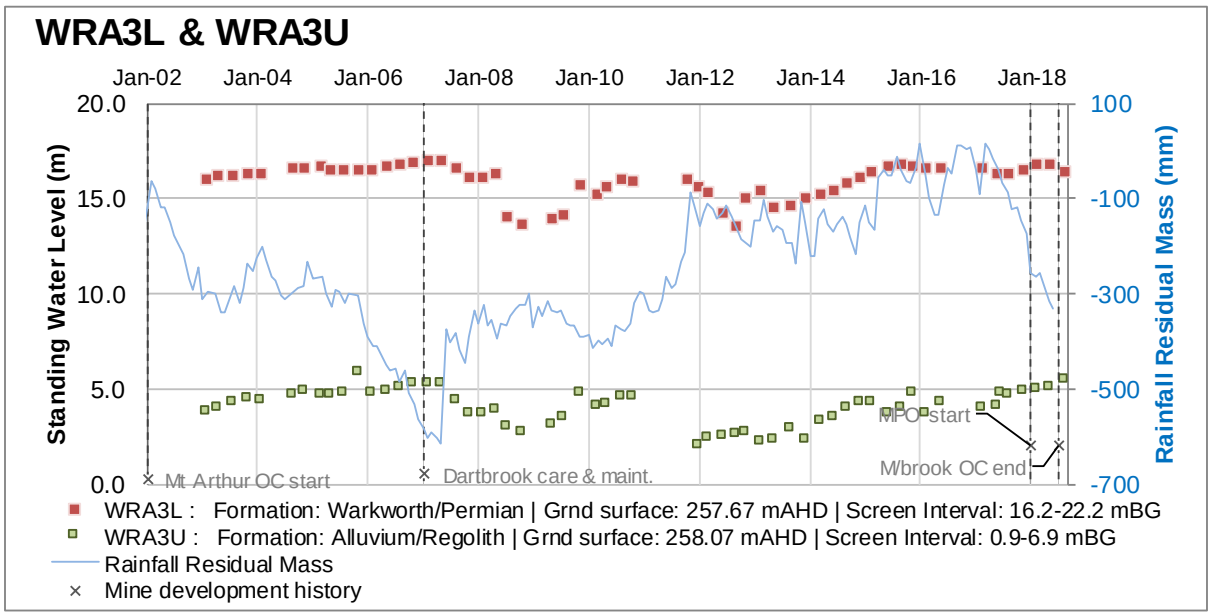

7000D000U & 7000D000L
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Standing Water Level (m)
21.0
16.0
11.0
6.0
1.0
Rainfall Residual Mass (mm)
100
-100
-300
-500
-700
MPO start
M/brook OC end
Mt Arthur OC start
Dartbrook care & maint.
7000D000U : Formation: Interburden #7/Edderton Seam | Grnd surface: 162.4 mAHD | Screen Interval: 6.8-11.8 mBG
7000D000L : Formation: Maitland Group | Grnd surface: 162.4 mAHD | Screen Interval: 93-99 mBG
Rainfall Residual Mass
Mine development history

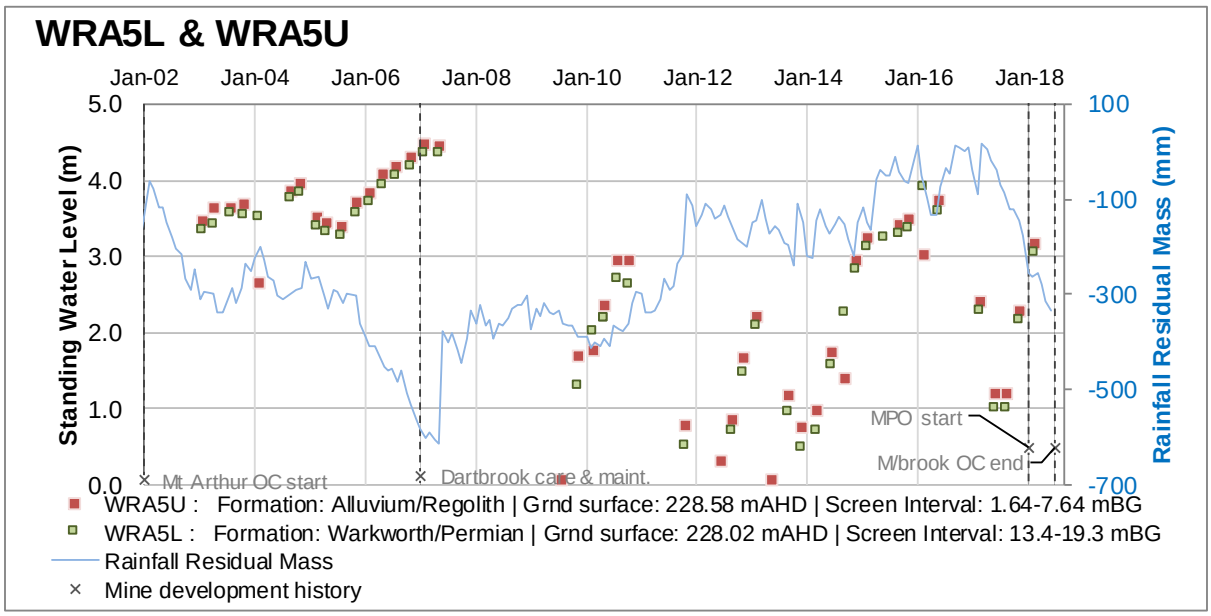

7500F000
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Standing Water Level (m)
37.0
36.0
35.0
34.0
33.0
32.0
31.0
30.0
Rainfall Residual Mass (mm)
100
0
-100
-200
-300
-400
-500
-600
-700
MPO start
M/brook OC end
Mt Arthur OC start
Dartbrook care & maint.
7500F000 : Formation: Edderton Seam | Grnd surface: 183.7 mAHD | Screen Interval: 76-82 mBG
Rainfall Residual Mass
Mine development history

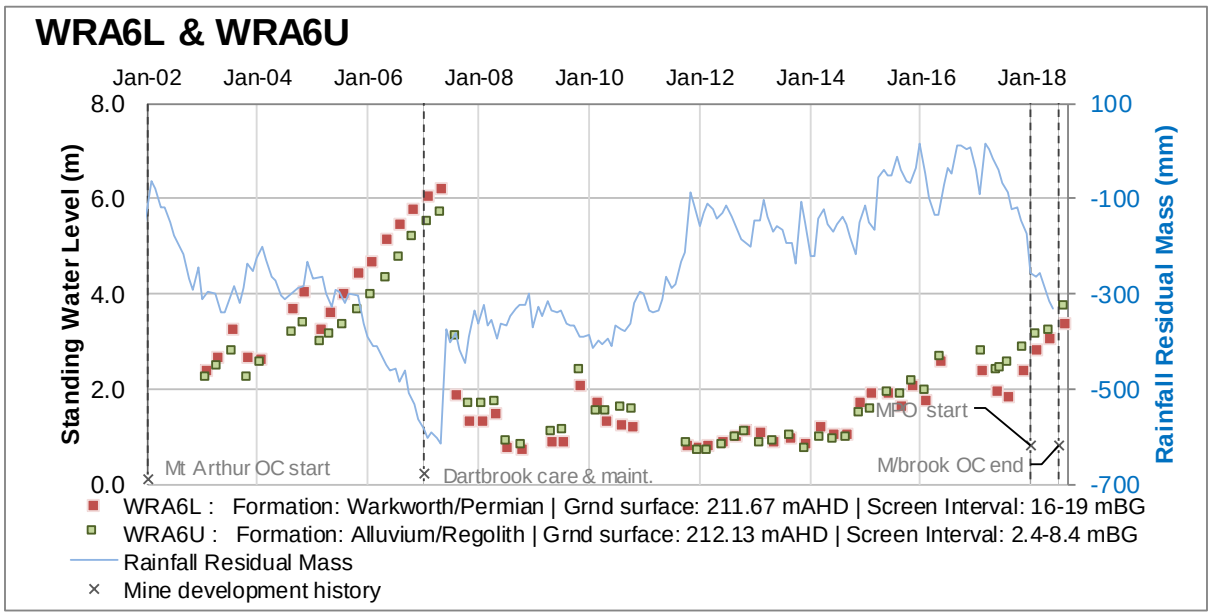
Western Bores






WRA3L & WRA3U
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
20.0
15.0
10.0
5.0
0.0
Standing Water Level (m)
100
-100
-300
-500
-700
Rainfall Residual Mass (mm)
Mt Arthur OC start
Dartbrook care & maint.
MPO start
M/brook OC end
WRA3L : Formation: Warkworth/Permian | Grnd surface: 257.67 mAHD | Screen Interval: 16.2-22.2 mBG
WRA3U : Formation: Alluvium/Regolith | Grnd surface: 258.07 mAHD | Screen Interval: 0.9-6.9 mBG
Rainfall Residual Mass
Mine development history


WRA5L & WRA5U
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
5.0
4.0
3.0
2.0
1.0
0.0
Standing Water Level (m)
100
-100
-300
-500
-700
Rainfall Residual Mass (mm)
Mt Arthur OC start
Dartbrook care & maint.
MPO start
M/brook OC end
WRA5U : Formation: Alluvium/Regolith | Grnd surface: 228.58 mAHD | Screen Interval: 1.64-7.64 mBG
WRA5L : Formation: Warkworth/Permian | Grnd surface: 228.02 mAHD | Screen Interval: 13.4-19.3 mBG
Rainfall Residual Mass
Mine development history


WRA6L & WRA6U
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
8.0
6.0
4.0
2.0
0.0
Standing Water Level (m)
100
-100
-300
-500
-700
Rainfall Residual Mass (mm)
Mt Arthur OC start
Dartbrook care & maint.
MPO start
M/brook OC end
WRA6L : Formation: Warkworth/Permian | Grnd surface: 211.67 mAHD | Screen Interval: 16-19 mBG
WRA6U : Formation: Alluvium/Regolith | Grnd surface: 212.13 mAHD | Screen Interval: 2.4-8.4 mBG
Rainfall Residual Mass
Mine development history

ATTACHMENT 3

BASELINE GROUNDWATER QUALITY DATA

Table A3-1
Baseline Groundwater Quality Data – Fractured and Porous Rock Groundwater Sources

Site	Number of Samples*	Number of Dry Samples	pH					EC (µS/cm)				
			Min	20th %ile	Median	80th %ile	Max	Min	20th %ile	Median	80th %ile	Max
Central Groundwater Site												
3500B500S	30	0	7.0	7.2	9.2	9.6	9.9	1,820	2,060	2,410	3,530	4,990
3500B500L	56	0	6.8	7.1	7.3	7.4	7.7	4,350	5,454	5,600	5,826	6,930
3500C500S	40	0	6.8	7.1	7.2	7.4	7.7	726	2,708	5,130	5,664	9,320
3500C500L	39	0	6.9	7.2	7.3	7.4	7.6	3,290	4,140	4,140	5,590	7,260
4500F000	59	0	6.3	6.5	6.7	6.9	7.2	1,300	1,616	1,830	6,904	9,550
5000D000	59	2	6.2	6.7	6.8	7.0	7.3	460	522	618	703	840
5500D000	59	2	6.0	6.4	6.6	6.9	7.1	730	900	990	1,570	3,910
6000C000S	28	0	6.3	6.4	6.9	7.1	7.2	800	930	4,555	4,984	5,090
6000C000L	60	51	6.4	7.0	7.0	7.2	7.5	3,860	5,016	5,305	5,474	6,000
6500F500U	55	22	6.6	6.8	6.9	7.0	7.0	5,150	5,366	5,570	5,778	5,880
6500F500M	48	0	6.0	6.9	7.1	7.2	7.4	1,126	1,820	1,900	2,804	3,040
6500F500L	55	22	6.1	6.5	6.8	7.0	7.3	1,170	1,290	1,360	1,526	3,410
6500F625	49	0	6.4	6.7	6.9	7.0	7.4	3,490	3,890	4,026	4,086	5,200
7000D000U	53	0	6.4	6.6	6.7	7.6	12.4	830	970	6,415	6,730	7,480
7000D000L	15	0	6.6	6.6	6.8	6.8	6.9	1,045	1,115	1,243	1,370	1,480
7500F000	59	0	6.2	6.7	7.0	7.6	8.0	955	1,416	1,650	5,918	6,390
Western Groundwater Site												
WRA1U	41	40	-	-	-	-	-	-	-	-	-	-
WRA1L	57	0	7.0	7.2	7.4	7.7	8.0	2,690	3,120	3,520	4,496	4,770
WRA2U	38	34	6.7	6.7	6.8	7.0	7.2	360	850	1,586	4,108	5,790
WRA2L	58	3	6.7	7.0	7.1	7.3	8.0	4,140	5,508	5,840	6,086	7,550
WRA3U	57	1	6.8	7.1	7.3	7.5	8.0	488	3,010	5,935	9,020	11,590
WRA3L	57	0	6.3	6.6	6.8	6.9	7.0	9,740	14,802	15,830	16,734	22,690
WRA5U	61	0	5.7	7.1	7.3	7.4	7.8	2,030	2,496	2,905	4,772	5,470
WRA5L	58	0	6.9	7.1	7.5	7.8	8.2	2,250	2,854	4,160	7,034	7,530
WRA6U	58	0	6.5	6.8	6.9	7	7.1	7,260	10,110	10,735	11,240	13,290
WRA6L	57	0	6.9	7.2	7.3	7.7	7.9	4,510	5,434	5,740	5,970	6,910

Table A3-2
Baseline Groundwater Quality Data – Alluvial Groundwater Sources

Site	Number of Samples*	Number of Dry Samples	pH					EC (µS/cm)				
			Min	20th %ile	Median	80th %ile	Max	Min	20th %ile	Median	80th %ile	Max
Eastern Groundwater Site												
MPBH1	59	0	6.4	6.8	6.9	7.1	7.8	467	500	540	590	970
MPBH2	60	0	6.3	6.8	6.9	7.1	7.6	758	822	870	930	1080
MPBH3	30	17	6.2	6.6	6.8	6.9	6.9	850	970	1005	1083	1130
MPBH3b	27	0	7.1	7.4	7.6	7.7	8.1	2650	3190	3860	4420	4740

ATTACHMENT 4

BASELINE AQUIFER TESTING DATA

Table A4-1
Groundwater Testing undertaken as part of the Mount Pleasant EIS (1997)

Bore/Piezometer	Test Undertaken	Test Interval (m)	Lithology	Transmissivity (kL/day/m)	Hydraulic Conductivity (kL/day/m^2)	Hydraulic Conductivity (m/day)
3500B500L	Slug	-	-	-	0.017	-
3500B500U	Slug	-	-	-	0.0064	-
3500C500L	Injection	-	-	0.44	0.09	-
3500C500U	Injection	-	-	0.51	0.085	-
3500E000U	Slug	-	-	-	0.022	-
3500E000M	Slug	-	-	-	0.0040	-
3500E000L	Injection	-	-	0.69	0.18	-
4500F000	Injection	-	-	0.084	0.014	-
5000A500	Injection	-	-	1.35	0.15	-
5000D000	Injection	-	-	0.077	0.013	-
5500D000	Injection	-	-	0.28	0.14	-
6000C000L	Slug	-	-	-	0.0046	-
6500F500U	Injection	-	-	0.14	0.046	-
6500F500M	Injection	-	-	0.1	0.03	-
6500F500L	Slug	-	-	-	0.042	-
7000D000L	Slug	-	-	-	0.84	-
7000D000U	Slug	-	-	-	0.05	-
7500F000	Injection	-	-	0.43	0.078	-
4250F250	Packer	150.0 – 153.0	Coal – VAU	-	-	0.1479
4750C000	Packer	70.5 – 73.5	Coal – PFD	-	-	0.1415
5750D750	Packer	91.0 – 94.0	Coal – BAY			0.1132
5750D750	Packer	106.0 – 109.0	Coal – WYN	-	-	0.1029
4250F250	Packer	191.5 – 194.5	Coal – BAY	-	-	0.0958
5750D750	Packer	133.0 – 136.0	Coal – WYN	-	-	0.0801
5750D750	Packer	141.0 – 144.0	Coal – EDD	-	-	0.063
5750D750	Packer	56.0 – 59.0	Coal – BRN	-	-	0.037
4750C000	Packer	135.0 – 138.0	Coal – BRN	-	-	0.0336
4250F250	Packer	86.0 – 89.0	Coal – PFD	-	-	0.0145
5750D750	Packer	124.0 – 127.0	Interburden	-	-	0.0064
5750D750	Packer	72.0 – 75.0	Interburden	-	-	0.0062
5750D750	Packer	83.0 – 86.0	Coal and Interburden	-	-	0.0053
4750C000	Packer	153.5 – 156.5	Interburden	-	-	0.0033
5750D750	Packer	113.0 – 116.0	Interburden	-	-	0.0032
4750C000	Packer	111.0 – 114.0	Interburden	-	-	0.003
4250F250	Packer	173.5 – 176.5	Interburden and coal	-	-	0.003
4250F250	Packer	127.0 – 130.0	Interburden	-	-	0.0026
4250F250	Packer	211.0 – 214.0	Interburden	-	-	0.0024
4750C000	Packer	164.5 – 167.5	Interburden	-	-	0.0017
4750C000	Packer	52.0 – 55.0	Interburden	-	-	0.0011
4750C000	Packer	97.5 – 100.5	Interburden	-	-	0.0011

Table A4-1 (continued)
Groundwater Testing undertaken as part of the Mount Pleasant EIS (1997)

Bore/Piezometer	Test Undertaken	Test Interval (m)	Lithology	Transmissivity (kL/day/m)	Hydraulic Conductivity (kL/day/m^2)	Hydraulic Conductivity (m/day)
4750C000	Packer	77.0 – 80.0	Interburden	-	-	0.0008
5750D750	Packer	87.0 – 90.0	Interburden	-	-	<0.0001

Notes: kL/day/m = kilolitre per day per metre, kL/day/m^2 = kilolitre per day per square metre.
Source: ERM Mitchell McCotter (1997).

Table A4-2
Groundwater Testing undertaken on Coal Seams at the Mt Arthur Coal Mine

ss	Test Method	Seam	Depth (m)	Transmissivity (m^2/day)	Hydraulic Conductivity (m/day)
WT1	Packer	Vaux	25 – 35	1	0.12
		Bayswater	50 – 60	1	0.11
		Wynn	65 – 75	0.1	0.04
		Clanricard	85 – 95	0.01	0.01
		Bengalla	98 – 108	0.05	0.02
		Edinglassie	130 – 140	0.5	0.05
		U. Ramrod Creek	156 – 166	0.6	0.12
		L. Ramrod Creek	168 – 178	0.3	0.15
		Interburden	Various	<0.01	<0.01
T13 (BH403)	Packer	Piercefield	-	-	0.69
		Vaux	-	-	0.52
		Bayswater	-	-	0.35
		Wynn	-	-	0.35
		Clanricard	-	-	0.26
		Bengalla	-	-	0.15
		Edinglassie	-	-	0.16
		Ramrod Creek	-	-	0.06
T16 (BH401)	Packer	Piercefield	-	-	0.6
		Vaux	-	-	0.52
		Bayswater	-	-	0.26
		Wynn	-	-	0.17
		Clanricard	-	-	0.35
		Bengalla	-	-	0.60
		Edinglassie	-	-	0.26
		Ramrod Creek	-	-	0.1
		Interburden	-	-	5.2 x 10^{-3} to 8.6 x 10^{-5}

Source: AGC (1979) and LM&P (1982).

ATTACHMENT 5

SUMMARY OF BORE CENSUS RESULTS

Bore ID (ME No.)	PS WGS84)	Northing	Year Drilled (Census Letter)	Property	Bore ID (property & Bore No.) - Field Sheet	GW No.	Survey Sheet	Use (Y/N)	Observed Purpose	Equipment Type	Casing ID & Type
4500F000	296128	6433360	1994 & 2003	MACH	THORNDALE 1	V078628 (1994) & GW080733 (2003	20161214P1	Y	Monitoring	Piezometer (PVC)	50mm (NB)
5000D000	296664	6431370	2003	MACH	BOXFIELD	N/A	20161214P3	Y	Monitoring	Piezometer (PVC)	40mm (NB)
5500D000	297166	6431378	2003	5500D000	MACH	GW078629	20170314P4	Y	Monitoring	Steel Casing	160mm
6000F625	297642	6433994	2003	6000F625 (1)	MACH	GW080732	20170314P3	N	Monitoring	PVC Casing	PVC 96mm
6500F500	298120	6433898	2003	6500F500	GLENMORE / 6500 F500	GW080729 / 080730 / 080731	20161213P4 & 20170314P3	Y	Monitoring	Piezo (L M U nested)	40mm PVC
7000D000	298661	6431400	2003	MACH	COUNTRY VIEW	NA	20161214P3	Y	Monitoring	Piezometer (PVC)	1x40mm (D) 1x50mm (S)
7500F000	299088	6433428	2003	MACH	GLENMORE No1	GW078630 / GW080728	20161214P1	Y	Monitoring	Piezometer (PVC)	50mm (NB)
ADNUM1	300521	6429434	N/A	KAYUGA RD 51	ADNUM1	GW040531	20170316P1	Y	Domestic	Equipped	Concrete Cylinder
ASHFIELD1	289344	6428899	<50-60 YRS	ASHFIELD (JLON)	WYBONG RD 1510	GW047863	20170316P7	Y	Stock & Domestic	Concrete Cylinder	Concrete Cylinder Well [1120mm] – Pump Equipped
BARRY1	299564	6430431	N/A	BARRY	PRIVATE BARRY 1	N/A	20170315P2	Y	Stock & Domestic	Concrete Cylinder	Concrete cylinder (1200mm ID)
BE1	293476	6429036	2011	MACH	McLEAN	GW201518 & GW201519	20161215P1	Y	Monitoring	50mm PVC	50mm (PVC)
BELGRAVE	295085	6434438	N/A	LONERGAN	LONERGAN 6 (FAR WEST)	N/A	20161215P3	Y	Stock	Timber Frame	Timber Frame Well
CAS1	296503	6434654	1964	CASEY GM	CAS1	GW078985	20170313P2	N	N/A	N/A	Steel Casing 155mm
CAS2	295914	6435419	<1950s	CASEY GM	CAS2	GW078986	20170313P1	N	Monitoring - Not Equipped	Steel Casing	Steel Casing 155mm
CAS3	295821	6435484	1957	CASEY GM	CAS3	GW078987	20170313P1	N	Windmill	Steel Casing	Windmill / Steel Casing 130mm
CAS4	294928	6435957	N/A	CASEY GM	CAS4	GW078988	20170313P2	N	Monitoring	N/A	Steel Casing 155mm
COWTIME1	300330	6429753	N/A	KAYUGA RD 72	COWTIME1	N/A	20170316P1	Y	Stock	Equipped (Housing)	Steel Casing (6 inch)
GRAY1	299882	6430334	N/A	KAYUGA RD 161	GRAY1	N/A	20170316P3	Y	Domestic	Steel Casing	Steel Casing (6 inch)
GRAY2	299856	6430316	N/A	KAYUGA RD 161	GRAY2	N/A	20170316P3	Y	Stock & Domestic	Steel Casing	Steel Casing (6 inch)
GW015881	299428	6428129	1957	MACH	OVERDEEN 2	GW015881	20161214P4	N	Backfilled/Collapsed	Timber? Not located	N/A
GW028510	298649	6429099	1965	MACH	WYBONG (1)	GW028510	20161215P5	N	Monitoring, Stock & Irrigation	Concrete Cylinder	1219mm
GW037774	298661	6429086	1974	MACH	WYBONG (2)	GW037774	20161215P5	N	Monitoring, Stock & Irrigation	Concrete Cylinder	1219mm
GW038412	291568	6437714	<1950s	TONY LONERGAN	NWEST (892 DORSET RD)	GW038412	20170315P1	Y	Stock & Domestic	Pump Equipped	Timber Frame (Square 1180mm)
GW038752	294050	6436664	N/A	MACH	NW Properties (Woodburn2)	GW038752	20161212P1	N	N/A	N/A	N/A
GW042701	298568	6428634	1976 (GW Record)	MACH	SCRIVENS (1)	GW047277	20161215P4	Y	Monitoring & Stock	Concrete Cylinder	900mm
GW053007	298718	6428859	1965	MACH	SCRIVENS (2)	GW053007	20161215P4	Y	Monitoring & Stock	Concrete Cylinder	1200mm
HAYES1	299582	6430624	1930s	HAYES1	HAYES1	GW053534	20170314P1	Y	Irrigation (Lucerne) Stock & Domest	8 FT Concrete	Concrete Well (~8 ft)
HAYES2	299681	6430616	1950s-60s	HAYES2	HAYES2	N/A	20170314P2	Y	Stock & Domestic (Taps)	Concrete Cylinder	Concrete Cylinder (1200mm)
JLON.1	292407	6434333	1 Feb 1971#	JOHN LONERGAN	MARYLANDS1_GW33725	GW033725	20170315P1	Y	Stock (NB: Mill not bringing water to	Windmill / Tanks	Steel Casing [152mm OD]#
JLON.2	292320	6434393	1 Sep 1965*	JOHN LONERGAN	MARYLANDS2_GW23652	GW023652	20170315P1	N	N/A	Steel Casing	Steel Casing [127mm OD]*
JLON1	298194	6434785	1 Feb 1979# (Converted to Bore)	LONERGAN	LONERGAN 5 (MARYLANDS WESTERN PADDOCK)	GW078926 & GW049015	20161215P3	Y	Monitoring & Stock (NB: Well was D	Concrete Cylinder + Bore	Concrete Cylinder Well [1200mm] with internal Bore [Steel Casing 162 mm]#
JLON2	300044	6434608	~1965-80s	LONERGAN	LONERGAN 1 (WEST OF HOUSE)	GW053282	20161215P2	N	Never Used	Steel Casing (hole)	Steel Casing 200mm
JLON3	299887	6434455	<1961	LONERGAN	LONERGAN 2 (FRONT OF HOUSE)	N/A	20161215P2	Y	Domestic	Concrete Cylinder. Well (pump equiped)	Concrete Cylinder Well [1200mm] – Pump Equipped
JLON4	299404	6434623	1932 (GW Record)	LONERGAN	LONERGAN 3 (PADDOCK)	GW037479	20161215P2	Y	Stock	Concrete Cylinder	Concrete Cylinder Well [1200mm]
JLON5	299629	6434796	1 August 1954^	LONERGAN	LONERGAN 4 (MARYLANDS BACK PADDOCK)	rrigation) and GW026137 (test bore	20161215P3	N	Irrigation (not in use)	Concrete Cylinder	Concrete Cylinder [1000mm]
KELMAN1	300925	6429305	N/A	KAYUGA RD 20	KELMAN1	GW037964	20170316P1	Y	Domestic	Equipped	Concrete Cylinder (1,828mm) *
MATHER1	299814	6430440	> 40 years old	MATHER	KAYUGA RD 175	N/A	20170316P2	Y	Domestic	Concrete Cylinder	Concrete Cylinder (750mm)
ME1 [1 Collins Ln]	299805	6430470	1970	MACH	COLLINS LANE	GW032709	20161213P2	Y	Domestic	GW Records	152mm
ME10 [Road Reserve Collins Ln]	299484	6430555	N/A	OVERGRONN SHED	MACH	N/A	20170315P3	N	N/A	N/A	N/A
ME11 [Road Reserve Collins Ln]	299495	6430656	N/A	DAMAGED	SHED	N/A	20170315P3	N	N/A	N/A	N/A
ME12 [57 Kayuga Rd]	300474	6429471	N/A	MACH	KAYUGA RD 57	GW034015	20161212P2	Y	Stock & Domestic	Surface Pump	TIMBER
ME13 [135 Kayuga Rd]	299959	6430143	N/A	KAYUGA RD 135	MACH	N/A	20170314P2	Y	Equipped	Concrete Cylinder	1200mm
ME14 [137 Kayuga Rd]	299946	6430151	N/A	KAYUGA RD 137	MACH	N/A	20170314P2	Y	Equipped	Steel Casing	5 Inch (Casing)
ME15 [141 Kayuga Rd]	299952	6430191	N/A	KAYUGA RD 141	KAYUGA RD 141	N/A	20170313P4	Y	Front Garden	Equiped (Tap)	6 Inch
ME16 [153 Kayuga Rd]	299875	6430285	N/A	KAYUGA RD 153	MACH	N/A	20170316P6	Y	Domestic	Equipped Concrete Cylinder	1000mm
ME17 [163-165 Kayuga Rd]	299874	6430370	N/A	MACH	KAYUGA RD 163-165	GW037832	20170316P3	Y	Domestic	Concrete Cylinder	4 FT
ME18 [167 Kayuga Rd]	299827	6430402	N/A	KAYUGA RD 167	KAYUGA RD 167	N/A	20170316P4	Y	Domestic	Concrete Cylinder	1200mm
ME19 [353 Wybong Rd]	299996	6429261	N/A	WYBONG RD 353	MACH	N/A	20170315P4	Y	Domestic	Equipped	5 Inch (Steel)
ME2 [1 Collins Ln]	299811	6430465	N/A	COLLINS LANE 1	T. POWELL	N/A	20170313P2	N	N/A	Equipment / Not Used	6 Inch / 5 Inch
ME20 [357 Wybong Rd]	299956	6429231	N/A	WYBONG 357	MACH	N/A	20170316P4	Y	Domestic	PVC Casing Equipped	6 Inch
ME21 [359 Wybong Rd]	299960	6429225	N/A	WYBONG 359	MACH	N/A	20170316P4	N	N/A	Steel Casing	6 Inch
ME22 [361 Wybong Rd]	299946	6429214	1953 (GW Record)	MACH	WYBONG RD 361	GW078902	20170316P5	Y	Domestic	Steel Casing	N/A
ME23 [Bimbadeen]	299456	6430443	N/A	MACH	BIMBADEEN	GW048754	20161213P2	Y	Equiped	Concrete Cylinder	1067mm (OD)
ME24 [Broomfield]	292374	6433010	N/A	MACH	BROOMFIELD (1)	N/A	20161215P4	N	N/A	Concrete Cylinder	1200mm
ME25 [Country View]	298695	6431537	N/A	MACH	COUNTRY VIEW 2	N/A	20161214P3	N	Stock	Timber	1200mm
ME26 [Glenmore]	298441	6434044	1985	MACH	GLENMORE	GW061302	20161213P3	N	N/A	Welded Steel	165mm (OD)
ME27 [Glenmore 'C']	299563	6434555	1984	MACH	GLENMORE 'C'	GW058686	20161213P3	Y	Stock	Concrete Cylinder	1219mm (1350 OD)
ME28 [Jandell]	300056	6428793	1983	MACH	JANDELL	GW060024	20161214P4	Y	Stock & Irrigation	Concrete Cylinder	1600mm
ME29 [Jandell]	299621	6428790	N/A	MACH	(NEAR 6006E)	N/A	20170317P2	Y	Stock	Equipped - Pump	Steel Casing (6Inch)
ME3 [3 Collins Ln]	299803	6430447	N/A	COLLINS LANE 3	COLLINS LANE 3	N/A	20170313P3	N	Not Used	Equiped / Pump	1000mm
ME30 [Karrabah]	299843	6434195	1981	MACH	KARRABAH	GW053783	20161213P3	Y	Irrigation (Lapsed)	Concrete Cylinder	1219mm
ME31 [Kropp]	292302	6436824	21/04/1994	MACH	NW Properties (KROPP)	N/A	20161212P1	Y	Stock	Solar Submersible	Concrete Cylinder [1m]
ME32 [Melody Farm]	297625	6434009	N/A	6500F625 (2)	MACH	N/A	20170314P4	N	Monitoring	Steel surface Casing (W PVC)	60mm (PVC)
ME33 [Overdeen]	299100	6427748	1946	MACH	OVERDEEN 1	GW015696	20161214P4	Y	Irrigation	Concrete Cylinder	1829mm (OD)
ME34 [Rosebrook 1]	299259	6429884	N/A	MACH	ROSEBROOK 1	GW034303	20161213P1	Y	Stock	Concrete Cylinder	1219mm
ME35 [Rosebrook 2]	300330	6429634	N/A	MACH	ROSEBROOK 2	GW034302	20161213P1	N	Collapsed	N/A	N/A
ME36 [Rosehill]	299550	6430090	1971 (GW Record)	MACH	ROSEHILL	GW033610	20161213P1	Y	Surface Pump	Concrete Cylinder	1800mm
ME37 [Roselyn 1]	299495	6428767	1962	MACH	ROSELYN 1	GW020305	20161215P1	Y	Stock & Irrigation	Concrete Cylinder	1219mm (OD)
ME38 [Roselyn 2]	299457	6429125	1964	MACH	ROSELYN 2	GW022223	20161215P1	Y	Stock & Domestic	Open Hole / Steel Casing	150mm (Steel)
ME39 [Scrivens]	298768	6428561	1976 (GW Record)	MACH	SCRIVENS (3)	GW071295	20161215P5	N	Stock	Concrete Cylinder	1219mm
ME4 [4 Collins Ln]	299769	6430448	N/A	COLLINS LANE 4	COLLINS LANE 4	N/A	20170313P3	Y	Domestic	Equiped / Pump	6 Inch
ME40 [Thorndale 1]	296326	6433371	2002 (GW Record)	MACH	THORNDALE 2	GW080205	20161214P1	N	Stock	Well	(1200mm) Timber
ME41 [Thorndale 2]	295772	6433898	N/A	MACH	THORNDALE	GW080206	20161214P2	N	Collapsed	Windmill / Timber Frame	N/A
ME42 [Thorndale South]	295117	6432422	2002 (GW Record)	MACH	THORNDALE SOUTH	GW080203	20161214P2	N	Collapsed	Windmill / Timber Frame	1200mm
ME43 [Warrawee]	296672	6434348	1999 (GW Record)	MACH	WARRAWEE	GW080134	20161214P2	N	Collapsed	Windmill / Timber Frame	N/A
ME5 [5 Collins Ln]	299756	6430451	N/A	COLLINS LANE 5	COLLINS LANE 5	N/A	20170313P3	Y	Domestic	Equiped / Pump	1000mm (Well)
ME6 [9 Collins Ln]	299734	6430455	N/A	COLLINS LANE 9	COLLINS LANE 9	N/A	20170313P4	N	Vacant	Equiped (Hose)	1000mm (Well)
ME7 [17 Collins Ln]	299680	6430461	N/A	COLLINS LANE 17	MACH	N/A	20170316P6	Y	Pump Raised	Concrete Cylinder	1200mm
ME8 [33 Collins Ln]	299474	6430442	N/A	COLLINS LANE 33	COLLINS LANE 33	N/A	20170315P3	Y	Domestic	Concrete Cylinder	1219mm
ME9 [Lot 3 Collins Ln]	299600	6430535	N/A	COLLINS LANE LOT 3	LOT 3	N/A	20170315P2	Y	Domestic	Steel Casing	6 Inch
MITCHELL1	299860	6430413	N/A	MITCHELL	KAYUGA RD 173	N/A	20170316P2	Y	Domestic	Steel Casing	Steel Casing (6 inch)
MOORE1	299668	6430812	1 January 1958#	KAYUGA RD 211 (MOORE)	MOORE 1	GW045435	20170314P1	Y	Domestic (Front Yard)	Concrete Cylinder	Concrete Cylinder
MOORE1S	291441	6429318	N/A	GILGAI	MOORE (S1)	N/A	20170317P1	Y	Stock (Grazing)	Spring	Spring (Pond immediately up-catchment of Moore2S)
MOORE2	299720	6430762	27 Feb 2003*	KAYUGA RD 207 (MOORE)	MOORE 2 [PREVIOUS MP-BH3]	GW080726	20170314P1	N	Previously Monitoring	PVC In Steel Mount	PVC [100mm] in Steel Monument
MOORE2S	291427	6429323	N/A	GILGAI	MOORE (S2)	N/A	20170317P1	Y	Stock (Grazing)	Spring	Spring (Pond immediately down-catchment of Moore 1S)
MOORE3S	290851	6429236	N/A	GILGAI	MOORE (S3)	N/A	20170317P1	Y	Stock (Grazing)	Spring	Spring (Pond further down-catchment of Moore 1S & Moore 2S)
MOORE4	290139	6430000	< 60 Years (1800 GW Record)	GILGAI	JB MOORE	GW019979	20170317P2	Y	Stock	Equipped - Pump	Timber Frame Well (1200mm)
MP-BH1	301149	6432563	2003	YORE / DAPKOS	MP-BH1	GW080727	20170314P3	Y	Monitoring	Steel Casing	Steel casing with PVC (4 inch) in monument
MP-BH2	299407	6428712	N/A	MP - BH2	MACH	N/A	20170313P4	Y	N/A	None	6 Inch
MP-BH3	299481	6431354	N/A	MACH	MPBH3 (BORE2)	N/A	20161213P2	Y	Monitoring	Concrete Cylinder	1200mm
PARKINSON1	288944	6427796	N/A	WYBONG RD (LEFT)	PARKINSON1	N/A	20170316P6	Y	Stock	Windmill	Well (1m diameter)
PITMAN1	300806	6429378	30 Apr 1991*	KAYUGA RD 36	PITMAN1	GW200004	20170316P7	Y	Domestic	Steel Casing	Steel Casing 190mm OD* (~7 inch)
RDH76	296343	6435365	1982	CASEY GM	RDH76	GW078941	20170313P1	N	Monitoring^	PVC Casing	PVC Casing 130mm
SIMPSON1	299906	6429198	> 50 years (Hand Dug)	WYBONG RD 365	SIMPSON1	N/A	20170316P5	Y	Stock & Domestic	Concrete Cylinder	Concrete Cylinder (900mm)
SORMAZ1	300010	6429263	1992 (GW Record)	WYBONG RD 351	SORMAZ1	GW078261 (Cancelled)	20170316P7	N	Would require reconditioning to use	Steel Casing	Steel Casing (6 inch)
TLON1	294061	6436687	7/10/1999 (Form A)	MACH	NW Properties (Woodburn1)	GW078952	20161212P1	Y	Monitoring	Windmill	100mm (ID) (5 inches)
WALTON1	290331	6428144	N/A	WYBONG RD 1431	WALTON1	N/A	20170316P5	Y	Stock	Steel Casing	Steel Casing (6 inch)
WICKS1	300534	6429472	N/A	KAYUGA RD 53	WICKS1	N/A	20170316P2	Y	Domestic	Concrete Cylinder	Concrete Cylinder (900mm)

Bore ID (ME No.)	PS WGS84)	Northing	Year Drilled (Census Letter)	Property	Bore ID (property & Bore No.) - Field Sheet	Casing Stick Up (SU)	Depth To Water (mbtoc)	Bore Depth (mbtoc)	SWL (mbgl)	SWL (mbgl)	EC (µs/Cm)	pH	Sample Source
4500F000	296128	6433360	1994 & 2003	MACH	THORNDALE 1	1.0	19.88	-	18.88	18.88	7,300	6.62	BAILER
5000D000	296664	6431370	2003	MACH	BOXFIELD	1.0	82.45	-	81.45	81.45	-	-	-
5500D000	297166	6431378	2003	5500D000	MACH	1.0	64.7	121.7	63.7	63.7	-	-	(DNF)
6000F625	297642	6433994	2003	6000F625 (1)	MACH	0.0	16.73	34.5	16.73	16.73	3,620	6.66	BAILER
6500F500	298120	6433898	2003	6500F500	GLENMORE / 6500 F500	1.0	measured from top of steel U[32.8]M[54.53]L[52.9]	114.60(L) / 76.70(M) / 35.40(U)	U[31.8] M[53.53] L[51.9]	U[31.8] M[53.53] L[51.9]	-	-	-
7000D000	298661	6431400	2003	MACH	COUNTRY VIEW	1.0	[50]=6.0[40]=18.93	-	[50]=5.0 [40]=17.93	[50]=5.0 [40]=17.93	4,650 [50mm]	6.57 [50mm]	BAILER
7500F000	299088	6433428	2003	MACH	GLENMORE No1	1.0	36.07	not measured 168-170 Check GW?	35.07	35.07	6,170	7.67	BAILER
ADNUM1	300521	6429434	N/A	KAYUGA RD 51	ADNUM1	0.9	11.52	13	10.62	10.62	918	6.66	TAP
ASHFIELD1	289344	6428899	<50-60 YRS	ASHFIELD (JLON)	WYBONG RD 1510	0.15	3.1	5.75	2.95	2.95	5,320	7.10	BAILER
BARRY1	299564	6430431	N/A	BARRY	PRIVATE BARRY 1	0.7	12.36	13.56	11.66	11.66	842	6.01	BAILER
BE1	293476	6429036	2011	MACH	McLEAN	-	-	-	-	-	-	-	-
BELGRAVE	295085	6434438	N/A	LONERGAN	LONERGAN 6 (FAR WEST)	0.2	7.25	23.85 (75ft)	7.05	7.05	6,820	7.42	BAILER
CAS1	296503	6434654	1964	CASEY GM	CAS1	0.3	11.65	28.23	11.35	11.35	8040	7.74	BAILER
CAS2	295914	6435419	<1950s	CASEY GM	CAS2	0.55	40.01	65	39.46	39.46	10,010	6.79	BAILER
CAS3	295821	6435484	1957	CASEY GM	CAS3	0.2	Dry	76.7	Dry	Dry	Dry	Dry	-
CAS4	294928	6435957	N/A	CASEY GM	CAS4	0.45	27.96	34.8	27.51	27.51	8170	6.78	BAILER
COWTIME1	300330	6429753	N/A	KAYUGA RD 72	COWTIME1	1.2	-	-	-	-	890	6.89	TAP
GRAY1	299882	6430334	N/A	KAYUGA RD 161	GRAY1	-	-	-	-	-	712	6.49	TAP
GRAY2	299856	6430316	N/A	KAYUGA RD 161	GRAY2	-	-	-	-	-	693	6.49	TAP
GW015881	299428	6428129	1957	MACH	OVERDEEN 2	-	-	-	-	-	-	-	-
GW028510	298649	6429099	1965	MACH	WYBONG (1)	1.25	12.16	14.69	10.91	10.91	1,880	6.74	BAILER
GW037774	298661	6429086	1974	MACH	WYBONG (2)	1.5	12.05	15.25	10.55	10.55	870	6.90	BAILER
GW038412	291568	6437714	<1950s	TONY LONERGAN	NWEST (892 DORSET RD)	0.5	5	7.7	4.5	4.5	1,103	6.44	TAP
GW038752	294050	6436664	N/A	MACH	NW Properties (Woodburn2)	-	-	-	-	-	-	-	-
GW042701	298568	6428634	1976 (GW Record)	MACH	SCRIVENS (1)	1.5	11.99	13.7	10.49	10.49	941	6.76	BAILER
GW053007	298718	6428859	1965	MACH	SCRIVENS (2)	0.15	11.1	12.65	10.95	10.95	881	6.67	BAILER
HAYES1	299582	6430624	1930s	HAYES1	HAYES1	0.0	11.9	15.2	11.9	11.9	-	-	-
HAYES2	299681	6430616	1950s-60s	HAYES2	HAYES2	1.2	12.7	15.5	11.5	11.5	680	6.60	TAP
JLON.1	292407	6434333	1 Feb 1971#	JOHN LONERGAN	MARYLANDS1_GW33725	0.5	-	57.9	-	-	-	-	TANK
JLON.2	292320	6434393	1 Sep 1965*	JOHN LONERGAN	MARYLANDS2_GW23652	0.5	31.04	37.4	30.54	30.54	6,650	6.13	BAILER
JLON1	298194	6434785	1 Feb 1979# (Converted to Bore)	LONERGAN	LONERGAN 5 (MARYLANDS WESTERN PADDOCK)	1.0	Dry	6 (Well) 51.8 (Bore from GW Record)	Dry	Dry	-	-	-
JLON2	300044	6434608	~1965-80s	LONERGAN	LONERGAN 1 (WEST OF HOUSE)	0.4	14.39	82	13.99	13.99	650	7.33	BAILER
JLON3	299887	6434455	<1961	LONERGAN	LONERGAN 2 (FRONT OF HOUSE)	0.2	10.4	12.83	10.2	10.2	1,730	6.99	TAP
JLON4	299404	6434623	1932 (GW Record)	LONERGAN	LONERGAN 3 (PADDOCK)	1.8	11.35	12.5	9.55	9.55	1,980	6.99	BAILER
JLON5	299629	6434796	1 August 1954^	LONERGAN	LONERGAN 4 (MARYLANDS BACK PADDOCK)	0.0	10.2	11.7	10.2	10.2	800	6.60	BAILER
KELMAN1	300925	6429305	N/A	KAYUGA RD 20	KELMAN1	0.0	-	12.4	-	-	652	6.60	TAP
MATHER1	299814	6430440	> 40 years old	MATHER	KAYUGA RD 175	0.95	11.46	13.08	10.51	10.51	742	6.44	TAP
ME1 [1 Collins Ln]	299805	6430470	1970	MACH	COLLINS LANE	-	-	12	-	-	-	-	-
ME10 [Road Reserve Collins Ln]	299484	6430555	N/A	OVERGRONN SHED	MACH	-	-	-	-	-	-	-	-
ME11 [Road Reserve Collins Ln]	299495	6430656	N/A	DAMAGED	SHED	-	-	-	-	-	-	-	-
ME12 [57 Kayuga Rd]	300474	6429471	N/A	MACH	KAYUGA RD 57	0.35	11.17	14.0 (from GW Record)	10.82	10.82	1176	6.98	BAILER
ME13 [135 Kayuga Rd]	299959	6430143	N/A	KAYUGA RD 135	MACH	1.0	12.45	14.1	11.45	11.45	945	6.50	TAP
ME14 [137 Kayuga Rd]	299946	6430151	N/A	KAYUGA RD 137	MACH	-	-	-	-	-	470	6.80	TAP
ME15 [141 Kayuga Rd]	299952	6430191	N/A	KAYUGA RD 141	KAYUGA RD 141	N/A	-	-	-	-	1,000	6.65	TAP
ME16 [153 Kayuga Rd]	299875	6430285	N/A	KAYUGA RD 153	MACH	1.0	12.12	13.42	11.12	11.12	930	6.60	TAP
ME17 [163-165 Kayuga Rd]	299874	6430370	N/A	MACH	KAYUGA RD 163-165	0.3	12.6	14.85	12.3	12.3	656	6.59	TAP
ME18 [167 Kayuga Rd]	299827	6430402	N/A	KAYUGA RD 167	KAYUGA RD 167	0.6	11.5	13.45	10.9	10.9	752	6.46	TAP
ME19 [353 Wybong Rd]	299996	6429261	N/A	WYBONG RD 353	MACH	-	-	-	-	-	1003	6.51	TAP
ME2 [1 Collins Ln]	299811	6430465	N/A	COLLINS LANE 1	T. POWELL	N/A / 0	N/A / 10.80	N/A / 11.24	10.8	10.8	N/A / 905	N/A / 6.68	N/A / BAILER
ME20 [357 Wybong Rd]	299956	6429231	N/A	WYBONG 357	MACH	-	-	-	-	-	1,027	6.78	TAP
ME21 [359 Wybong Rd]	299960	6429225	N/A	WYBONG 359	MACH	-	-	-	-	-	N/A	N/A	-
ME22 [361 Wybong Rd]	299946	6429214	1953 (GW Record)	MACH	WYBONG RD 361	-	(Equipped)	12.12m based on GW Record (Equipped)	-	-	1,025	6.72	TAP
ME23 [Bimbadeen]	299456	6430443	N/A	MACH	BIMBADEEN	0.0	11.87	14.57	11.87	11.87	1,863	6.88	BAILER
ME24 [Broomfield]	292374	6433010	N/A	MACH	BROOMFIELD (1)	0.45	3.15	4.65	2.7	2.7	4,500	8.10	BAILER
ME25 [Country View]	298695	6431537	N/A	MACH	COUNTRY VIEW 2	0.0	4.16	-	4.16	4.16	6,770	7.14	BAILER
ME26 [Glenmore]	298441	6434044	1985	MACH	GLENMORE	0.3	50.05	38.15	49.75	49.75	3,010	7.37	BAILER
ME27 [Glenmore 'C']	299563	6434555	1984	MACH	GLENMORE 'C'	0.8	10.12	11.33	9.32	9.32	1,060	6.83	BAILER
ME28 [Jandell]	300056	6428793	1983	MACH	JANDELL	1.1	11.58	11.67	10.48	10.48	-	-	DRY (MOISTURE)
ME29 [Jandell]	299621	6428790	N/A	MACH	(NEAR 6006E)	-	-	-	-	-	-	-	-
ME3 [3 Collins Ln]	299803	6430447	N/A	COLLINS LANE 3	COLLINS LANE 3	0.5	11.8	12.1	11.3	11.3	840	6.63	BAILER
ME30 [Karrabah]	299843	6434195	1981	MACH	KARRABAH	0.5	9.96	12.95	9.46	9.46	1,050	7.02	BAILER
ME31 [Kropp]	292302	6436824	21/04/1994	MACH	NW Properties (KROPP)	-	-	-	-	-	3,600	7.73	TAP
ME32 [Melody Farm]	297625	6434009	N/A	6500F625 (2)	MACH	0.4	11.98	40.46	11.58	11.58	890	6.70	BAILER
ME33 [Overdeen]	299100	6427748	1946	MACH	OVERDEEN 1	0.0	11.03	14.04	11.03	11.03	1,350	6.84	BAILER
ME34 [Rosebrook 1]	299259	6429884	N/A	MACH	ROSEBROOK 1	0.3	12.13	14.1	11.83	11.83	1016	6.88	BAILER
ME35 [Rosebrook 2]	300330	6429634	N/A	MACH	ROSEBROOK 2	-	-	12.0 (from GW Record)	-	-	-	-	-
ME36 [Rosehill]	299550	6430090	1971 (GW Record)	MACH	ROSEHILL	0.1	12.13	14.25	12.03	12.03	720	6.93	BAILER
ME37 [Roselyn 1]	299495	6428767	1962	MACH	ROSELYN 1	-	-	13.4 (GW Record)	-	-	-	-	-
ME38 [Roselyn 2]	299457	6429125	1964	MACH	ROSELYN 2	0.5	11.78	11.88	11.28	11.28	-	-	-
ME39 [Scrivens]	298768	6428561	1976 (GW Record)	MACH	SCRIVENS (3)	1.0	12.35	14.6	11.35	11.35	1,100	6.84	BAILER
ME4 [4 Collins Ln]	299769	6430448	N/A	COLLINS LANE 4	COLLINS LANE 4	N/A	N/A	-	-	-	725	7.18	BAILER
ME40 [Thorndale 1]	296326	6433371	2002 (GW Record)	MACH	THORNDALE 2	0.0	4.5	8.5	4.5	4.5	7,900	7.03	BAILER
ME41 [Thorndale 2]	295772	6433898	N/A	MACH	THORNDALE	-	-	-	-	-	-	-	-
ME42 [Thorndale South]	295117	6432422	2002 (GW Record)	MACH	THORNDALE SOUTH	0.0	5.95	19.25	5.95	5.95	3,150	7.90	BAILER
ME43 [Warrawee]	296672	6434348	1999 (GW Record)	MACH	WARRAWEE	-	-	-	-	-	-	-	-
ME5 [5 Collins Ln]	299756	6430451	N/A	COLLINS LANE 5	COLLINS LANE 5	0.6	12.37	12.85	11.77	11.77	745	6.80	BAILER
ME6 [9 Collins Ln]	299734	6430455	N/A	COLLINS LANE 9	COLLINS LANE 9	1.1	12.7	13.6	11.6	11.6	796	6.82	BAILER
ME7 [17 Collins Ln]	299680	6430461	N/A	COLLINS LANE 17	MACH	0.76	12.31	12.9	11.55	11.55	912	6.65	BAILER
ME8 [33 Collins Ln]	299474	6430442	N/A	COLLINS LANE 33	COLLINS LANE 33	0.3	12.45	14.9	12.15	12.15	1,315	6.54	BAILER
ME9 [Lot 3 Collins Ln]	299600	6430535	N/A	COLLINS LANE LOT 3	LOT 3	-	-	-	-	-	830	6.25	TAP
MITCHELL1	299860	6430413	N/A	MITCHELL	KAYUGA RD 173	0.5	-	-	-	-	664	6.64	TAP @ HOUSE
MOORE1	299668	6430812	1 January 1958#	KAYUGA RD 211 (MOORE)	MOORE 1	0.75	12.55	52-56FT (13)	11.8	11.8	740	6.60	BAILER
MOORE1S	291441	6429318	N/A	GILGAI	MOORE (S1)	-	AT SURFACE	-	0	0	12,000	8.68	GRAB SAMPLE
MOORE2	299720	6430762	27 Feb 2003*	KAYUGA RD 207 (MOORE)	MOORE 2 [PREVIOUS MP-BH3]	0.47	N/A (blocked)	-	-	-	-	-	-
MOORE2S	291427	6429323	N/A	GILGAI	MOORE (S2)	-	AT SURFACE	-	0	0	8,200	8.28	GRAB SAMPLE
MOORE3S	290851	6429236	N/A	GILGAI	MOORE (S3)	-	AT SURFACE	-	0	0	7,900	8.80	GRAB SAMPLE
MOORE4	290139	6430000	< 60 Years (1800 GW Record)	GILGAI	JB MOORE	0.25	3.1	4.5	2.85	2.85	3,670	7.40	BAILER
MP-BH1	301149	6432563	2003	YORE / DAPKOS	MP-BH1	0.35	9.99	18	9.64	9.64	510	6.60	BAILER
MP-BH2	299407	6428712	N/A	MP - BH2	MACH	0.45	12.46	17.4	12.01	12.01	856	6.56	BAILER
MP-BH3	299481	6431354	N/A	MACH	MPBH3 (BORE2)	0.3	12.22	14	11.92	11.92	2,005	7.38	BAILER
PARKINSON1	288944	6427796	N/A	WYBONG RD (LEFT)	PARKINSON1	0.7	3.75	4.7	3.05	3.05	5,160	7.35	BAILER
PITMAN1	300806	6429378	30 Apr 1991*	KAYUGA RD 36	PITMAN1	1.5	-	-	-	-	715	6.83	TAP
RDH76	296343	6435365	1982	CASEY GM	RDH76	0.0	17.36	49.4	17.36	17.36	4800	6.84	BAILER
SIMPSON1	299906	6429198	> 50 years (Hand Dug)	WYBONG RD 365	SIMPSON1	0.0	10.9	11.6	10.9	10.9	990	7.40	TAP
SORMAZ1	300010	6429263	1992 (GW Record)	WYBONG RD 351	SORMAZ1	0.6	11.55	11.61	10.95	10.95	-	-	-
TLON1	294061	6436687	7/10/1999 (Form A)	MACH	NW Properties (Woodburn1)	0.2	11.43	-	11.23	11.23	-	-	-
WALTON1	290331	6428144	N/A	WYBONG RD 1431	WALTON1	0.3	NA (Equipped)	90m Deep / 87m to Pump (From Owner)	-	-	8,290	7.10	TAP
WICKS1	300534	6429472	N/A	KAYUGA RD 53	WICKS1	0.9	11.8	12.5	10.9	10.9	1,340	6.80	BAILER

Bore ID (ME No.)	PS WGS84)	Northing	Year Drilled (Census Letter)	Property	Bore ID (property & Bore No.) - Field Sheet	Allocation (ML/Yr)	Pump Regime (Rate/Frequency)	Storage (Dam/Tank/Troughs/Vol)	Log (Y/N)	Water Sample (Y/N)	Photo (Y/N)	Date Inspected
4500F000	296128	6433360	1994 & 2003	MACH	THORNDALE 1	-	-	-	N	Y	Y	14/12/2016
5000D000	296664	6431370	2003	MACH	BOXFIELD	-	-	-	N	N	Y	14/12/2016
5500D000	297166	6431378	2003	5500D000	MACH	-	-	-	N	N	Y	14/03/2017
6000F625	297642	6433994	2003	6000F625 (1)	MACH	-	-	-	N	Y	Y	14/03/2017
6500F500	298120	6433898	2003	6500F500	GLENMORE / 6500 F500	-	-	-	N	N	Y	13/12/2016 & 14/03/2017
7000D000	298661	6431400	2003	MACH	COUNTRY VIEW	-	-	-	N	Y	Y	14/12/2016
7500F000	299088	6433428	2003	MACH	GLENMORE No1	-	-	-	N	Y	Y	14/12/2016
ADNUM1	300521	6429434	N/A	KAYUGA RD 51	ADNUM1	-	AS REQUIRED	-	N	Y	Y	16/03/2017
ASHFIELD1	289344	6428899	<50-60 YRS	ASHFIELD (JLON)	WYBONG RD 1510	-	-	Tank	N	Y	Y	16/03/2017
BARRY1	299564	6430431	N/A	BARRY	PRIVATE BARRY 1	-	-	-	N	Y	Y	15/03/2017
BE1	293476	6429036	2011	MACH	McLEAN	-	-	-	N	N (refer to BENGALLA records)	Y	15/12/2016
BELGRAVE	295085	6434438	N/A	LONERGAN	LONERGAN 6 (FAR WEST)	-	-	-	N	Y	Y	15/12/2016
CAS1	296503	6434654	1964	CASEY GM	CAS1	-	-	-	N	Y	Y	13/03/2017
CAS2	295914	6435419	<1950s	CASEY GM	CAS2	-	-	-	N	Y	Y	13/03/2017
CAS3	295821	6435484	1957	CASEY GM	CAS3	-	-	-	N	N	Y	13/03/2017
CAS4	294928	6435957	N/A	CASEY GM	CAS4	-	-	-	N	Y	Y	13/03/2017
COWTIME1	300330	6429753	N/A	KAYUGA RD 72	COWTIME1	-	AS REQUIRED	-	N	Y	Y	16/03/2017
GRAY1	299882	6430334	N/A	KAYUGA RD 161	GRAY1	-	-	-	N	Y	Y	16/03/2017
GRAY2	299856	6430316	N/A	KAYUGA RD 161	GRAY2	-	-	-	N	Y	Y	16/03/2017
GW015881	299428	6428129	1957	MACH	OVERDEEN 2	-	-	-	N	N	N	14/12/2016
GW028510	298649	6429099	1965	MACH	WYBONG (1)	-	-	-	N	Y	Y	15/12/2016
GW037774	298661	6429086	1974	MACH	WYBONG (2)	-	-	-	N	Y	Y	15/12/2016
GW038412	291568	6437714	<1950s	TONY LONERGAN	NWEST (892 DORSET RD)	-	AS REQUIRED	-	N	Y	Y	15/03/2017
GW038752	294050	6436664	N/A	MACH	NW Properties (Woodburn2)	-	-	-	N	N	Y	12/12/2016
GW042701	298568	6428634	1976 (GW Record)	MACH	SCRIVENS (1)	-	-	-	N	Y	Y	15/12/2016
GW053007	298718	6428859	1965	MACH	SCRIVENS (2)	-	-	-	N	Y	Y	15/12/2016
HAYES1	299582	6430624	1930s	HAYES1	HAYES1	22 units	EVERYDAY/SUMMER	-	N	N	Y	14/03/2017
HAYES2	299681	6430616	1950s-60s	HAYES2	HAYES2	-	-	-	N	Y	Y	14/03/2017
JLON.1	292407	6434333	1 Feb 1971#	JOHN LONERGAN	MARYLANDS1_GW33725	-	Windmill	YES	N	N	Y	15/03/2017
JLON.2	292320	6434393	1 Sep 1965*	JOHN LONERGAN	MARYLANDS2_GW23652	-	-	-	N	Y	Y	15/03/2017
JLON1	298194	6434785	1 Feb 1979# (Converted to Bore)	LONERGAN	LONERGAN 5 (MARYLANDS WESTERN PADDOCK)	-	-	-	N	N	Y	15/12/2016
JLON2	300044	6434608	~1965-80s	LONERGAN	LONERGAN 1 (WEST OF HOUSE)	-	-	-	N	Y	Y	15/12/2016
JLON3	299887	6434455	<1961	LONERGAN	LONERGAN 2 (FRONT OF HOUSE)	-	PUMPING (TIMED)	-	N	Y	Y	15/12/2016
JLON4	299404	6434623	1932 (GW Record)	LONERGAN	LONERGAN 3 (PADDOCK)	-	-	-	N	Y	Y	15/12/2016
JLON5	299629	6434796	1 August 1954^	LONERGAN	LONERGAN 4 (MARYLANDS BACK PADDOCK)	-	-	-	N	Y	Y	15/12/2016
KELMAN1	300925	6429305	N/A	KAYUGA RD 20	KELMAN1	-	AS REQUIRED	-	N	Y	Y	16/03/2017
MATHER1	299814	6430440	> 40 years old	MATHER	KAYUGA RD 175	-	AS REQUIRED	-	N	Y	Y	16/03/2017
ME1 [1 Collins Ln]	299805	6430470	1970	MACH	COLLINS LANE	-	-	-	N	N	Y	13/12/2016
ME10 [Road Reserve Collins Ln]	299484	6430555	N/A	OVERGRONN SHED	MACH	-	-	-	N	N	Y	15/03/2017
ME11 [Road Reserve Collins Ln]	299495	6430656	N/A	DAMAGED	SHED	-	-	-	N	N	Y	15/03/2017
ME12 [57 Kayuga Rd]	300474	6429471	N/A	MACH	KAYUGA RD 57	-	-	TAP	N	Y	Y	12/12/2016
ME13 [135 Kayuga Rd]	299959	6430143	N/A	KAYUGA RD 135	MACH	-	-	-	N	Y	Y	14/03/2017
ME14 [137 Kayuga Rd]	299946	6430151	N/A	KAYUGA RD 137	MACH	-	-	-	N	Y	Y	14/03/2017
ME15 [141 Kayuga Rd]	299952	6430191	N/A	KAYUGA RD 141	KAYUGA RD 141	-	-	-	N	Y	Y	13/03/2017
ME16 [153 Kayuga Rd]	299875	6430285	N/A	KAYUGA RD 153	MACH	-	AS REQUIRED	-	N	Y	Y	16/03/2017
ME17 [163-165 Kayuga Rd]	299874	6430370	N/A	MACH	KAYUGA RD 163-165	60 Units in Hunter Regulat	-	-	N	Y	Y	16/03/2017
ME18 [167 Kayuga Rd]	299827	6430402	N/A	KAYUGA RD 167	KAYUGA RD 167	-	AS REQUIRED	-	N	Y	Y	16/03/2017
ME19 [353 Wybong Rd]	299996	6429261	N/A	WYBONG RD 353	MACH	-	-	-	N	Y	Y	15/03/2017
ME2 [1 Collins Ln]	299811	6430465	N/A	COLLINS LANE 1	T. POWELL	-	-	-	N	N / Y	Y (x2)	13/03/2017
ME20 [357 Wybong Rd]	299956	6429231	N/A	WYBONG 357	MACH	-	AS REQUIRED	-	N	Y	Y	16/03/2017
ME21 [359 Wybong Rd]	299960	6429225	N/A	WYBONG 359	MACH	-	-	-	N	N	Y	16/03/2017
ME22 [361 Wybong Rd]	299946	6429214	1953 (GW Record)	MACH	WYBONG RD 361	-	-	-	N	Y	Y	16/03/2017
ME23 [Bimbadeen]	299456	6430443	N/A	MACH	BIMBADEEN	-	-	-	N	Y	Y	13/12/2016
ME24 [Broomfield]	292374	6433010	N/A	MACH	BROOMFIELD (1)	-	-	-	N	Y	Y	15/12/2016
ME25 [Country View]	298695	6431537	N/A	MACH	COUNTRY VIEW 2	-	-	-	N	Y	Y	14/12/2016
ME26 [Glenmore]	298441	6434044	1985	MACH	GLENMORE	-	-	-	N	Y	Y	13/12/2016
ME27 [Glenmore 'C']	299563	6434555	1984	MACH	GLENMORE 'C'	-	-	TANK (Concrete)	N	Y	Y	13/12/2016
ME28 [Jandell]	300056	6428793	1983	MACH	JANDELL	-	-	-	N	N	Y	14/12/2016
ME29 [Jandell]	299621	6428790	N/A	MACH	(NEAR 6006E)	-	-	-	N	N	Y	17/03/2017
ME3 [3 Collins Ln]	299803	6430447	N/A	COLLINS LANE 3	COLLINS LANE 3	-	-	-	N	Y	Y	13/03/2017
ME30 [Karrabah]	299843	6434195	1981	MACH	KARRABAH	-	-	-	N	Y	Y	13/12/2016
ME31 [Kropp]	292302	6436824	21/04/1994	MACH	NW Properties (KROPP)	-	-	-	N	Y	Y	12/12/2016
ME32 [Melody Farm]	297625	6434009	N/A	6500F625 (2)	MACH	-	-	-	N	Y	Y	14/03/2017
ME33 [Overdeen]	299100	6427748	1946	MACH	OVERDEEN 1	-	-	-	Y	Y	Y	14/12/2016
ME34 [Rosebrook 1]	299259	6429884	N/A	MACH	ROSEBROOK 1	-	On demand	TANK	N	Y	Y	13/12/2016
ME35 [Rosebrook 2]	300330	6429634	N/A	MACH	ROSEBROOK 2	-	-	-	N	N	Y	13/12/2016
ME36 [Rosehill]	299550	6430090	1971 (GW Record)	MACH	ROSEHILL	-	Timer	TROUGHS	N	Y	Y	13/12/2016
ME37 [Roselyn 1]	299495	6428767	1962	MACH	ROSELYN 1	-	-	-	N	N	Y	15/12/2016
ME38 [Roselyn 2]	299457	6429125	1964	MACH	ROSELYN 2	-	-	Plastic Tank	N	N	Y	15/12/2016
ME39 [Scrivens]	298768	6428561	1976 (GW Record)	MACH	SCRIVENS (3)	-	-	-	N	Y	Y	15/12/2016
ME4 [4 Collins Ln]	299769	6430448	N/A	COLLINS LANE 4	COLLINS LANE 4	-	AS REQUIRED	-	N	Y - At House	Y	13/03/2017
ME40 [Thorndale 1]	296326	6433371	2002 (GW Record)	MACH	THORNDALE 2	-	-	-	N	Y	Y	14/12/2016
ME41 [Thorndale 2]	295772	6433898	N/A	MACH	THORNDALE	-	-	-	N	N	Y	14/12/2016
ME42 [Thorndale South]	295117	6432422	2002 (GW Record)	MACH	THORNDALE SOUTH	-	-	-	N	Y	Y	14/12/2016
ME43 [Warrawee]	296672	6434348	1999 (GW Record)	MACH	WARRAWEE	-	-	-	N	N	Y	14/12/2016
ME5 [5 Collins Ln]	299756	6430451	N/A	COLLINS LANE 5	COLLINS LANE 5	-	AS REQUIRED	-	N	Y	Y	13/03/2017
ME6 [9 Collins Ln]	299734	6430455	N/A	COLLINS LANE 9	COLLINS LANE 9	-	-	-	N	Y	Y	13/03/2017
ME7 [17 Collins Ln]	299680	6430461	N/A	COLLINS LANE 17	MACH	-	-	-	N	Y	Y	16/03/2017
ME8 [33 Collins Ln]	299474	6430442	N/A	COLLINS LANE 33	COLLINS LANE 33	-	-	-	N	Y	Y	15/03/2017
ME9 [Lot 3 Collins Ln]	299600	6430535	N/A	COLLINS LANE LOT 3	LOT 3	-	-	-	N	Y	Y	15/03/2017
MITCHELL1	299860	6430413	N/A	MITCHELL	KAYUGA RD 173	-	AS REQUIRED	-	N	Y	Y	16/03/2017
MOORE1	299668	6430812	1 January 1958#	KAYUGA RD 211 (MOORE)	MOORE 1	-	-	-	N	Y	Y	14/03/2017
MOORE1S	291441	6429318	N/A	GILGAI	MOORE (S1)	-	-	-	Y	Y	Y	17/03/2017
MOORE2	299720	6430762	27 Feb 2003*	KAYUGA RD 207 (MOORE)	MOORE 2 [PREVIOUS MP-BH3]	-	-	-	N	N	Y	14/03/2017
MOORE2S	291427	6429323	N/A	GILGAI	MOORE (S2)	-	-	-	Y	Y	Y	17/03/2017
MOORE3S	290851	6429236	N/A	GILGAI	MOORE (S3)	-	-	-	Y	Y	Y	17/03/2017
MOORE4	290139	6430000	< 60 Years (1800 GW Record)	GILGAI	JB MOORE	-	-	-	N	Y	Y	17/03/2017
MP-BH1	301149	6432563	2003	YORE / DAPKOS	MP-BH1	-	-	-	N	Y	Y	14/03/2017
MP-BH2	299407	6428712	N/A	MP - BH2	MACH	-	-	-	N	Y	Y	13/03/2017
MP-BH3	299481	6431354	N/A	MACH	MPBH3 (BORE2)	-	-	TROUGHS	N	Y	Y	13/12/2016
PARKINSON1	288944	6427796	N/A	WYBONG RD (LEFT)	PARKINSON1	-	-	-	N	Y	Y	16/03/2017
PITMAN1	300806	6429378	30 Apr 1991*	KAYUGA RD 36	PITMAN1	-	-	-	N	Y	Y	16/03/2017
RDH76	296343	6435365	1982	CASEY GM	RDH76	-	-	-	N	Y	Y	13/03/2017
SIMPSON1	299906	6429198	> 50 years (Hand Dug)	WYBONG RD 365	SIMPSON1	-	-	-	N	Y	Y	16/03/2017
SORMAZ1	300010	6429263	1992 (GW Record)	WYBONG RD 351	SORMAZ1	-	-	-	N	N	Y	16/03/2017
TLON1	294061	6436687	7/10/1999 (Form A)	MACH	NW Properties (Woodburn1)	-	-	-	N	N	Y	12/12/2016
WALTON1	290331	6428144	N/A	WYBONG RD 1431	WALTON1	-	-	-	N	Y	Y	16/03/2017
WICKS1	300534	6429472	N/A	KAYUGA RD 53	WICKS1	-	-	-	N	Y	Y	16/03/2017

Bore ID (ME No.)	PS WGS84)	Northing	Year Drilled (Census Letter)	Property	Bore ID (property & Bore No.) - Field Sheet	Comments
4500F000	296128	6433360	1994 & 2003	MACH	THORNDALE 1	4500F000
5000D000	296664	6431370	2003	MACH	BOXFIELD	5000D000
5500D000	297166	6431378	2003	5500D000	MACH	MONITORING BORE 5500D000 (2003). [UNABLE TO LOCATE 500E000]
6000F625	297642	6433994	2003	6000F625 (1)	MACH	6500F625 "MELODY FARM". ABOVE DAM. STAR PICKET
6500F500	298120	6433898	2003	6500F500	GLENMORE / 6500 F500	UPPER=32.8MID=54.53LOWER=52.9TRIPLE NESTED PIEZOMETERS
7000D000	298661	6431400	2003	MACH	COUNTRY VIEW	TOP OF STEEL7000D0002X PIEZOS. DEEP(40MM) SHALLOW (50MM)BESIDE DAM. PVC DISCONNECTED IN THE MONUMENT [CABLE TIES]
7500F000	299088	6433428	2003	MACH	GLENMORE No1	7500 F000NB: LOCATION ALIGNED WITH GW078629 + GW078630
ADNUM1	300521	6429434	N/A	KAYUGA RD 51	ADNUM1	SERVICES BTH. HOUSES ON ADNVM (4-51)
ASHFIELD1	289344	6428899	<50-60 YRS	ASHFIELD (JLON)	WYBONG RD 1510	SANDY CREEK WINDMILL. LOCATION ALIGNS WITH GW047863 HOWEVER DEPTH & YR CORRESPONDS WITH GW014135
BARRY1	299564	6430431	N/A	BARRY	PRIVATE BARRY 1	BACK OF PROPERTY.
BE1	293476	6429036	2011	MACH	McLEAN	VWP (WITH LOGGER) + OPEN HOLE. BE1
BELGRAVE	295085	6434438	N/A	LONERGAN	LONERGAN 6 (FAR WEST)	75FT DEPTH. "BELGRAVE". ANGLO AMERICAN. MONITORING SITE
CAS1	296503	6434654	1964	CASEY GM	CAS1	CAS1. OFF DIRECT RD (CRN OF PROPERTY)
CAS2	295914	6435419	<1950s	CASEY GM	CAS2	ADJACENT TO DWELLING [S-E] DARTBROOK MONITORING SITE DATA
CAS3	295821	6435484	1957	CASEY GM	CAS3	WINDMILL - WEST OF DWELLING [IN 1975 USED @ 2 GALLONS/MIN]
CAS4	294928	6435957	N/A	CASEY GM	CAS4	DARTBROOK MONITORING SITE [CAS4]
COWTIME1	300330	6429753	N/A	KAYUGA RD 72	COWTIME1	GREEN HOUSING AT BACK OF HOUSE. OPERATING AT TIME - FOR CATTLE TROUGH
GRAY1	299882	6430334	N/A	KAYUGA RD 161	GRAY1	FRONT OF HOUSE. EQUIPPED. GREEN SHADE CLOTH.
GRAY2	299856	6430316	N/A	KAYUGA RD 161	GRAY2	FEEDS HORSE TROUGH. NEW SLAB LAID
GW015881	299428	6428129	1957	MACH	OVERDEEN 2	BACKFILLED NOT LOCATED
GW028510	298649	6429099	1965	MACH	WYBONG (1)	(BENGALLA). 28510. NEAREST HOUSE TO WEST.
GW037774	298661	6429086	1974	MACH	WYBONG (2)	(BENGALLA). 37774. MIDDLE OF PADDOCK
GW038412	291568	6437714	<1950s	TONY LONERGAN	NWEST (892 DORSET RD)	ANGLOAMERICAN GW038412. SOLAR PANELS. OLD WINDMILL
GW038752	294050	6436664	N/A	MACH	NW Properties (Woodburn2)	NO CASING VISIBLE
GW042701	298568	6428634	1976 (GW Record)	MACH	SCRIVENS (1)	42701 (BENGALLA). MONITOR.
GW053007	298718	6428859	1965	MACH	SCRIVENS (2)	53007 (BENGALLA). MONITOR.
HAYES1	299582	6430624	1930s	HAYES1	HAYES1	9 HORSE POWER METER (WEIDEMAN'S DIARY). FIRBRE GLASS MESH. GW RECORD ASSIGNED BASED ON PROXIMITY
HAYES2	299681	6430616	1950s-60s	HAYES2	HAYES2	FRONT YARD (TAPS)
JLON.1	292407	6434333	1 Feb 1971#	JOHN LONERGAN	MARYLANDS1_GW33725	EQUIPPED & OPERATING (NO MEASUREMENTS OBTAINED). OLD WINDMILL
JLON.2	292320	6434393	1 Sep 1965*	JOHN LONERGAN	MARYLANDS2_GW23652	JLON.2
JLON1	298194	6434785	1 Feb 1979# (Converted to Bore)	LONERGAN	LONERGAN 5 (MARYLANDS WESTERN PADDOCK)	WINDMILL. ANGLO AMERICAN. JLON1. BORE+WELL. DARTBROOK MONITORING SITE
JLON2	300044	6434608	~1965-80s	LONERGAN	LONERGAN 1 (WEST OF HOUSE)	NORTH EAST OF HOUSE. GW ASSIGNED BASED ON SIMILAR DEPTH. DEEPENED 1981
JLON3	299887	6434455	<1961	LONERGAN	LONERGAN 2 (FRONT OF HOUSE)	FRONT OF HOUSE
JLON4	299404	6434623	1932 (GW Record)	LONERGAN	LONERGAN 3 (PADDOCK)	PADDOCK. CONCRETE CYLINDERS REPLACED TIMBER CIRCA 1976
JLON5	299629	6434796	1 August 1954^	LONERGAN	LONERGAN 4 (MARYLANDS BACK PADDOCK)	NO LONGER USED
KELMAN1	300925	6429305	N/A	KAYUGA RD 20	KELMAN1	GREEN SHED AT RD FRONT NEAR WORKSHOP. METAL GRILL IN WELL (PREVENTED ACCESS FOR DIPPING)
MATHER1	299814	6430440	> 40 years old	MATHER	KAYUGA RD 175	BACK OF HOUSE. PUMP AT 1955 FLOOD LEVEL (1.6MAGL)
ME1 [1 Collins Ln]	299805	6430470	1970	MACH	COLLINS LANE	CORNER HOUSE. COLLINS LANE
ME10 [Road Reserve Collins Ln]	299484	6430555	N/A	OVERGRONN SHED	MACH	SHED - OVERGROWN OVER BACK OF LOT 3.
ME11 [Road Reserve Collins Ln]	299495	6430656	N/A	DAMAGED	SHED	SHED COLLAPSED. FLOOD PROTECTION.
ME12 [57 Kayuga Rd]	300474	6429471	N/A	MACH	KAYUGA RD 57	TENANTED
ME13 [135 Kayuga Rd]	299959	6430143	N/A	KAYUGA RD 135	MACH	FRONT OF HOUSE (NE). TAP SAMPLE
ME14 [137 Kayuga Rd]	299946	6430151	N/A	KAYUGA RD 137	MACH	FRONT OF HOUSE. TAP SAMPLE. RAINWATER TANK (INFLUENCE)
ME15 [141 Kayuga Rd]	299952	6430191	N/A	KAYUGA RD 141	KAYUGA RD 141	-
ME16 [153 Kayuga Rd]	299875	6430285	N/A	KAYUGA RD 153	MACH	BACK OF HOUSE. DOGS LOCKED UP.
ME17 [163-165 Kayuga Rd]	299874	6430370	N/A	MACH	KAYUGA RD 163-165	SERVICES BOTH 163-165 DWELLINGS. GW RECORD ASSIGNED BASED ON LOCATION AND CONSTRUCTION
ME18 [167 Kayuga Rd]	299827	6430402	N/A	KAYUGA RD 167	KAYUGA RD 167	BACK OF HOUSE .
ME19 [353 Wybong Rd]	299996	6429261	N/A	WYBONG RD 353	MACH	-
ME2 [1 Collins Ln]	299811	6430465	N/A	COLLINS LANE 1	T. POWELL	GW LEVEL (UNABLE TO USE) *ALSO INSPECTED ROUND 1 DEC2016. TWO BORES LOCATED 10M APART
ME20 [357 Wybong Rd]	299956	6429231	N/A	WYBONG 357	MACH	BACK OF SHED.
ME21 [359 Wybong Rd]	299960	6429225	N/A	WYBONG 359	MACH	NOT USED. OVERGROWN.
ME22 [361 Wybong Rd]	299946	6429214	1953 (GW Record)	MACH	WYBONG RD 361	BACK OF HOUSE. COVERED BLACK SEMI-CIRCLE. GW RECORD ASSIGNED BASED ON LOCATION.
ME23 [Bimbadeen]	299456	6430443	N/A	MACH	BIMBADEEN	BIMBADEEN. CASED HOLE ADJACENT
ME24 [Broomfield]	292374	6433010	N/A	MACH	BROOMFIELD (1)	WINDMILL. CREEK NEAR CONFLUENCE
ME25 [Country View]	298695	6431537	N/A	MACH	COUNTRY VIEW 2	DISUSED WINDMILL AT BASE OF DAM
ME26 [Glenmore]	298441	6434044	1985	MACH	GLENMORE	WINDMILL DISMANTLED. DOWNSLOPE OF DAM
ME27 [Glenmore 'C']	299563	6434555	1984	MACH	GLENMORE 'C'	WINDMILL
ME28 [Jandell]	300056	6428793	1983	MACH	JANDELL	GW060025 WAS BACKFILLED NEARBY
ME29 [Jandell]	299621	6428790	N/A	MACH	(NEAR 6006E)	BACK OF YARDS (JANDELL). [6006E NO BORES. HORNE NO BORES]
ME3 [3 Collins Ln]	299803	6430447	N/A	COLLINS LANE 3	COLLINS LANE 3	-
ME30 [Karrabah]	299843	6434195	1981	MACH	KARRABAH	IRRIGATION INFRASTRUCTURE
ME31 [Kropp]	292302	6436824	21/04/1994	MACH	NW Properties (KROPP)	KUMINANDI 21/4/19994R. KROPP
ME32 [Melody Farm]	297625	6434009	N/A	6500F625 (2)	MACH	"MELODY FARM" BESIDE 6500F625 (1). (BUCKET ON TOP).
ME33 [Overdeen]	299100	6427748	1946	MACH	OVERDEEN 1	IRRIGATION. PUMPING AT TIME OF MEASUREMENT
ME34 [Rosebrook 1]	299259	6429884	N/A	MACH	ROSEBROOK 1	HORSES.BORE PUMPING WHEN MEASURED.MAIN SUPPLY SOURCE
ME35 [Rosebrook 2]	300330	6429634	N/A	MACH	ROSEBROOK 2	FRONT PADDOCK. COLLAPSED
ME36 [Rosehill]	299550	6430090	1971 (GW Record)	MACH	ROSEHILL	BACK OF HOUSE AT SHED
ME37 [Roselyn 1]	299495	6428767	1962	MACH	ROSELYN 1	ROSEBROOK CREEK CHANNEL. PADLOCKED
ME38 [Roselyn 2]	299457	6429125	1964	MACH	ROSELYN 2	BACK OF HOUSE. INSUFFICIENT WATER TO SAMPLE.
ME39 [Scrivens]	298768	6428561	1976 (GW Record)	MACH	SCRIVENS (3)	OVERGROWN. CORNER NEAR ROSEBROOK CREEK. GW RECORD ASSIGNED BASED ON PROXIMITY & SIMILAR DEPTH
ME4 [4 Collins Ln]	299769	6430448	N/A	COLLINS LANE 4	COLLINS LANE 4	-
ME40 [Thorndale 1]	296326	6433371	2002 (GW Record)	MACH	THORNDALE 2	WINDMILL TIMBER FRAME
ME41 [Thorndale 2]	295772	6433898	N/A	MACH	THORNDALE	FENCED OFF AREA. TREE GROWING IN WELL. NO MEASUREMENT
ME42 [Thorndale South]	295117	6432422	2002 (GW Record)	MACH	THORNDALE SOUTH	COLLAPSED. ONE SAMPLE MEASURED. WINDMILL DERELICT
ME43 [Warrawee]	296672	6434348	1999 (GW Record)	MACH	WARRAWEE	COLLAPSED. NO MEASUREMENT. WINDMILL DERELICT
ME5 [5 Collins Ln]	299756	6430451	N/A	COLLINS LANE 5	COLLINS LANE 5	-
ME6 [9 Collins Ln]	299734	6430455	N/A	COLLINS LANE 9	COLLINS LANE 9	VACANT MACH PROPERTY
ME7 [17 Collins Ln]	299680	6430461	N/A	COLLINS LANE 17	MACH	NOT USED AT MOMENT. PUMP TOO HIGH.
ME8 [33 Collins Ln]	299474	6430442	N/A	COLLINS LANE 33	COLLINS LANE 33	-
ME9 [Lot 3 Collins Ln]	299600	6430535	N/A	COLLINS LANE LOT 3	LOT 3	EQUIPPED. DOMESTIC
MITCHELL1	299860	6430413	N/A	MITCHELL	KAYUGA RD 173	MATHER ACCESS (KEY). MITCHELL VACANT
MOORE1	299668	6430812	1 January 1958#	KAYUGA RD 211 (MOORE)	MOORE 1	FRONT OF HOUSE. GW RECORD ASSIGNED BASED ON PROXIMITY AND SIMILAR DEPTH.
MOORE1S	291441	6429318	N/A	GILGAI	MOORE (S1)	TWO SPRINGS ADJACENT. UPSTREAM POND
MOORE2	299720	6430762	27 Feb 2003*	KAYUGA RD 207 (MOORE)	MOORE 2 [PREVIOUS MP-BH3]	OLD C&A (SITE) BLOCKED LIKELY WITH TREE ROOTS
MOORE2S	291427	6429323	N/A	GILGAI	MOORE (S2)	DOWNSTREAM POND
MOORE3S	290851	6429236	N/A	GILGAI	MOORE (S3)	TWO DAMS / PONDS
MOORE4	290139	6430000	< 60 Years (1800 GW Record)	GILGAI	JB MOORE	WELL WITH OLD/DERELICT WINDMILL. CORRUGATED IRON OVER COVER. GW RECORD ASSINGED BASED ON PROXIMITY AND SIMILAR CONSTRUCTION
MP-BH1	301149	6432563	2003	YORE / DAPKOS	MP-BH1	MP-BH1 (NEAR POWER BOX TOP OF BANK). KEITH YORE/DAPKOS. SPOKE TO PROPERTY MANAGER
MP-BH2	299407	6428712	N/A	MP - BH2	MACH	MACH
MP-BH3	299481	6431354	N/A	MACH	MPBH3 (BORE2)	ENV. MONITORING SITE. MPBH3.
PARKINSON1	288944	6427796	N/A	WYBONG RD (LEFT)	PARKINSON1	BEHIND PROPERTY. ELECTRIC FENCE. WINDMILL.
PITMAN1	300806	6429378	30 Apr 1991*	KAYUGA RD 36	PITMAN1	HOUSING ABOVE FLOOD LEVEL. IN CORNER OF PROPERTY.
RDH76	296343	6435365	1982	CASEY GM	RDH76	DARTBROOK MONITORING SITE [RDH76] - PHOTO TAKEN OF NEARBY VENTURI HOLE AS WELL
SIMPSON1	299906	6429198	> 50 years (Hand Dug)	WYBONG RD 365	SIMPSON1	BACK OF HOUSE. HAND DUG
SORMAZ1	300010	6429263	1992 (GW Record)	WYBONG RD 351	SORMAZ1	BACK OF PROPERTY. SHED. LAID CONCRETE UP NEXT DOOR. GW RECORD ASSINGED BASED ON LOCATION.
TLON1	294061	6436687	7/10/1999 (Form A)	MACH	NW Properties (Woodburn1)	TLON1. CHECK FOR DARTBROOK /ANGLO AMERICAN RECORDS
WALTON1	290331	6428144	N/A	WYBONG RD 1431	WALTON1	BACK OF SHED - FRONT PROPERTY. STAR PICKETS. SALTY/CORROSION. GW080272 LOCATED 300M WEST UPHILL
WICKS1	300534	6429472	N/A	KAYUGA RD 53	WICKS1	WELL IN THE HOUSE. 53 KAYUGA