WIM Resource Pty Ltd

Avonbank HMS Project

Desktop Hydrogeological Assessment

August 2018

Table of contents

Table index

Figure index

Appendices

1. Introduction

WIM Resources Pty Ltd (WIM) plan to develop the Avonbank heavy mineral sands(HMS) mine, around 15 kms north-east of Horsham. The mine footprint is approximately 2,500 Hectares and the expected mine life is 30 years

GHD Pty Ltd (GHD) was engaged by WIM Resources (WIM) to undertake a desktop hydrogeological review to characterise the groundwater resources in the direct vicinity of their proposed mineral sands mining area, and propose a baseline groundwater monitoring bore network.

Therefore this report provides:

- Description of regional hydrogeological setting
- Characterisation of aquifers, groundwater quality and levels of existing use based on available published information
- The level of saturation of the deposit based on the regional groundwater level information
- A proposed groundwater monitoring bore network to provide site-specific baseline information (ie groundwater depth, quality and hydraulic conductivity).

2. Scope of Works

The scope of works for this project are detailed in the GHD Proposal dated 16 February 2018 and is summarised below:

- Task 1: Desktop Review: Compilation of Data
- Task 2: Monitoring Bore Network Design
- Task 3: Reporting

3. Project Background

3.1 Overview

WIM plan to develop the Avonbank HMS mine, around 15 kms north-east of Horsham.

WIM plan to develop the Avonbank HMS mine, around 15 kms north-east of Horsham. The proposed years 1-30 mine footprint area is approximately 2,500 hectares, and the mine life will be in the order of 30 years. Process water for the mine (in the order of 4-6 GL/year) is planned to be sourced from Grampians Wimmera Mallee Water (GWM Water) via a nearby pipe offtake.

The mineral deposit is within the Loxton-Parilla Sands (LPS) geological unit, which was deposited in a low energy wave base depositional environment. The HMS deposit is typically between 15m and 30m below ground level and is partially below the groundwater table in the LPS

WIM plan to use conventional dry mining techniques for the deposit, where topsoil, subsoil and overburden will be removed by scrapers and stockpiled separately. The HMS will then be mined and slurred and conventional wet separation techniques will be used to separate out the heavy minerals. The remaining sands and fines tailings will be returned to the base of the mine pit. All efforts will be made to maximise the recovery of the process water, though the process system and drainage systems in the mine pit.

Where the HMS is mined below the groundwater level, in-pit sump pumping is proposed to manage groundwater inflow. This is based on the expected low hydraulic conductivity of the ore body and the short term nature of each mining cell.

Part of the rationale for this preliminary assessment is to assess the areas where the HMS is likely to be below the water table, and also establish an observation bore network to better understand the groundwater levels and quality across the site, which will provide further input to the water management plan for the proposed mine.

3.2 Study Area

The Retention Licence 2014 (**Project Area**), deposit extent and proposed years 1-30 mine footprint is shown in Figure 1**.**

The project area is traversed by the Wimmera Highway and the regional railway line, in addition to a number of minor roads. There is an existing rail running through the centre of the project and an existing intermodal terminal within the project area.

The main drainage features include Yarriambiack Creek which is approximately 3 kms to the east, Two Mile Creek to the south and the Wimmera River approximately 3 to 5 kms to the south.

Figure 1 also shows the location of 6 temporary geotechnical bores that have also been used for preliminary groundwater monitoring.

3.3 Climate

Climate statistics from BOM Station 079028 Longerenong are shown in Table 1. Long term average annual rainfall in the vicinity of the mine is approximately 416 mm, with the wettest month on average being June with 44 mm.

Table 1 Climate Statistics

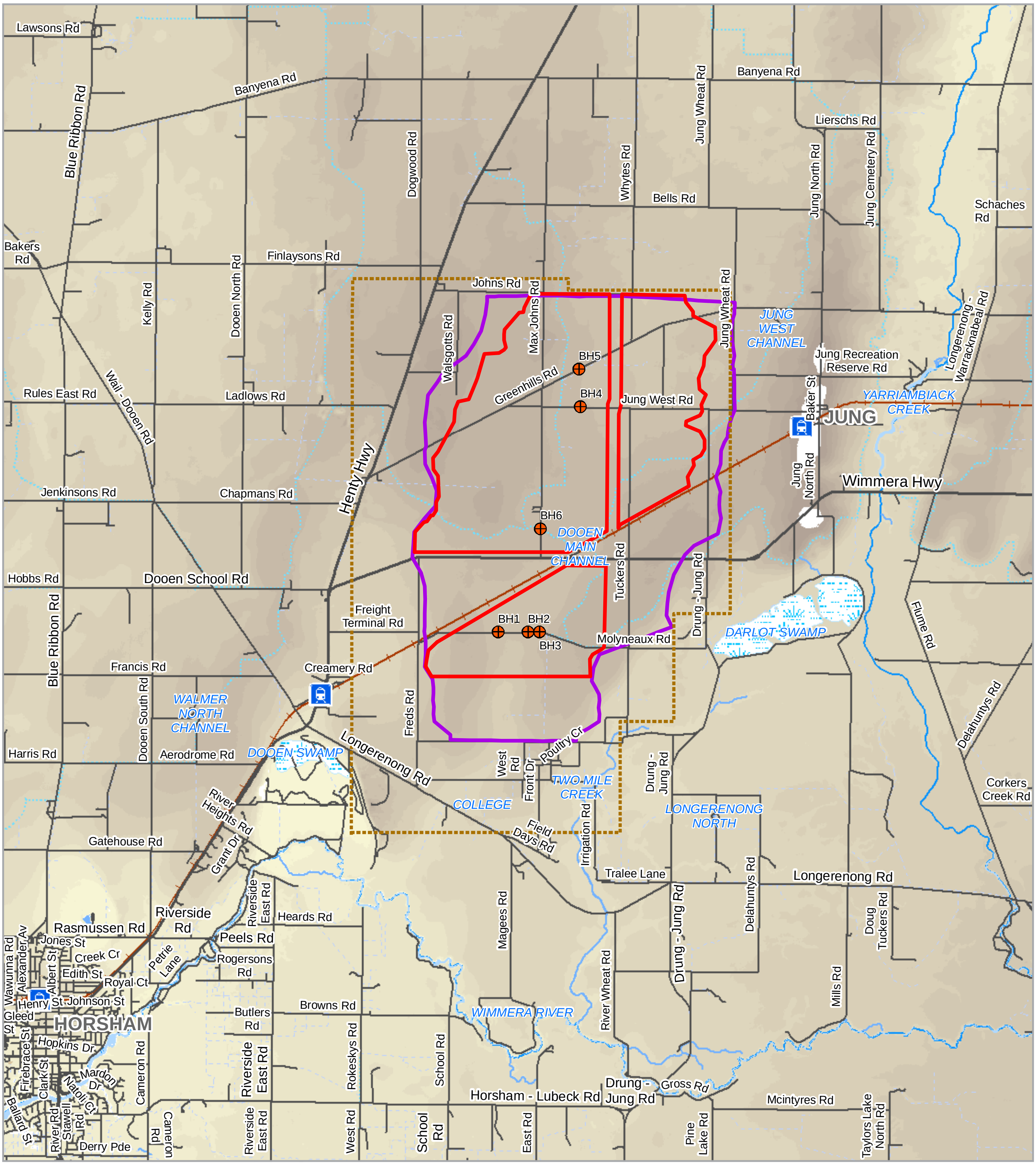
Month	Mean daily evaporation (mm) (1965 to 2001)	Mean monthly rainfall (mm) (1860 to 2018)	Mean maximum temperature (ºC) (1891 to 2018)	Mean minimum temperature (ºC) (1891 to 2018)
January	8.4	24.9	30	13
February	7.9	23.1	30	13.2
March	5.7	22.6	26.3	10.9
April	3.5	29.1	21.6	8.1
May	1.9	42.7	17.1	5.9
June	1.2	44	13.8	4.1
July	1.3	43	13.2	3.4
August	1.8	43.4	14.8	4
September	2.8	40.8	17.3	5.1
October	4.2	41.2	20.9	6.6
November	5.9	30.6	24.7	9
December	7.6	27.8	27.8	11.2
Annual	4.4	415.7	21.5	7.9

3.4 Data Sources

This desktop assessment has relied on a number of key data sources including:

- Project information provided by WIM
- Publically accessible geological and hydrogeological information and data, including that contained in:
  - Department of Environment, Land, Water and Planning (DELWP) Groundwater Management System (WMIS) database
  - DELWP groundwater resource reports
  - Published geological and hydrogeological map sheets

These data sources have been referenced, where relevant, throughout this report. A complete list of references is provided in Section 9 of this report.



Legend

WIM existing bores	Highway	Watercourse	River	**Ground Elevation**
Project area	Arterial	Lake	Stream	**AHD (m)**
Preliminary mine footprint	Collector	Swamp	Channel	
Ore body extent	Proposed		Drain/Channel/Ot...	
	Tracks		Railway	

AHD (m)	AHD (m)
126 - 126	135 - 136
127 - 128	137 - 138
129 - 130	139 - 140
131 - 132	141 - 142
133 - 134	143 - 144
	145 - 146
	147 - 148
	149 - 150

Paper Size ISO A4

0 0.75 1.5 2.25 3

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

WIM Resource Pty Ltd
Avonbank HMS Project

Hydrogeological Assessment
Site Location

Project No. 31-36025
Revision No. 0.0
Date 30/08/2018

Figure 1

G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 30 Aug 2018 - 12:35

Data source: DELWP, VicMap, 2017; WIM, 2018 Created by: bsmyth

4. Geology and Hydrogeology

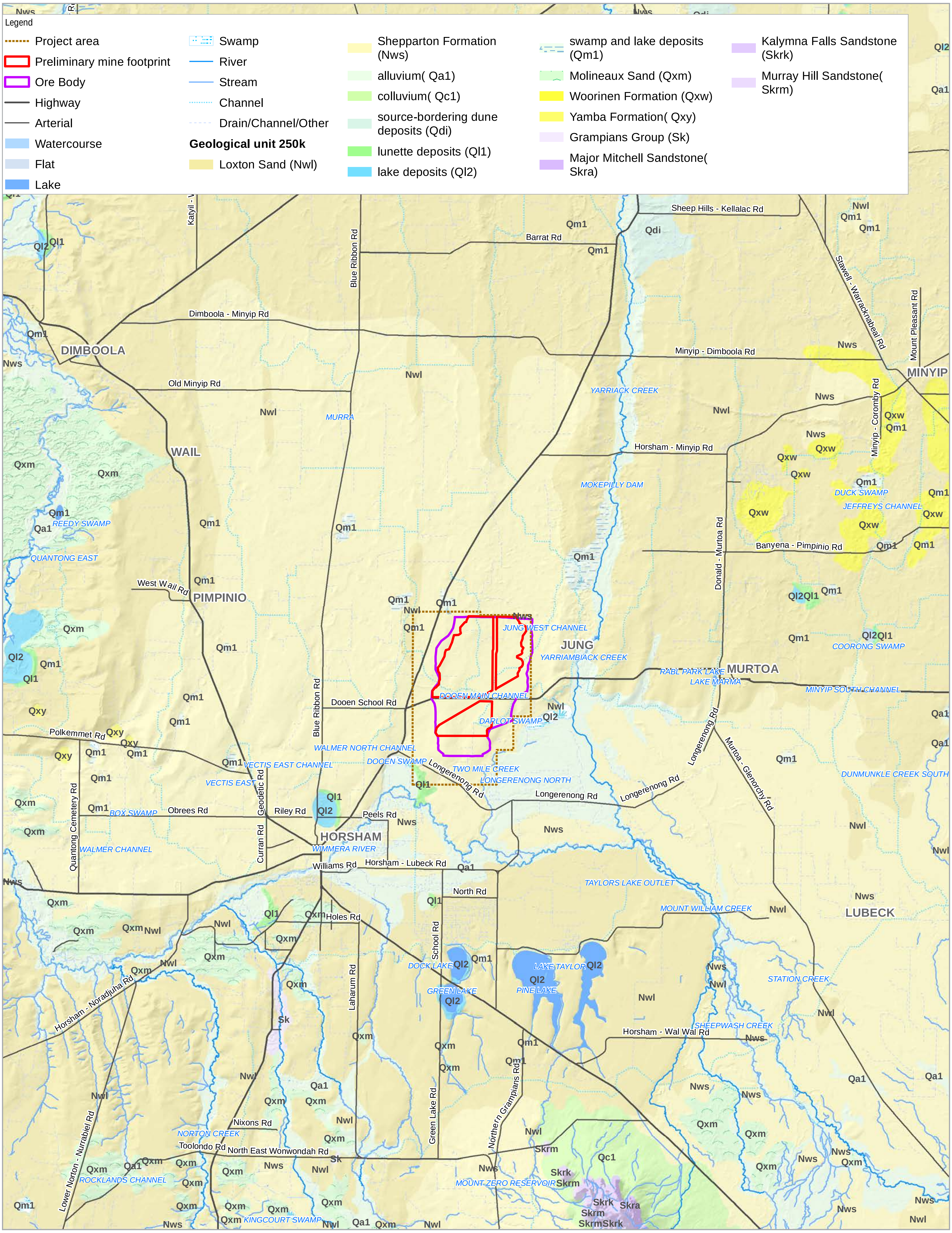
4.1 Geology

The Avonbank project area is located on the southern edge of the Murray Basin, a structurally controlled depression, which has been filled with Tertiary aged marine and non-marine sediments and which are overlain in many locations by Quaternary aged aeloian, fluvial and lacustrine sediments.

The surface geological information has predominately been sourced from the 1:250,000 Horsham Geological Mapsheet (GSV, 1974). The surface geology of the study area is shown in Figure 2. A summary of the main geological units, from youngest to oldest, is shown in Table 3.

Table 2 Local Geological Unit

Period	Geological Unit	Description	Location	Notes
Quaternary	Alluvial and Colluvial Deposits	Undifferentiated deposits consisting of silty clays, sands and gravels	Outcropping along drainage lines (ie Yarriambiack Creek, Two Mile Creek and Wimmera River)	Expected to generally be <10 m thick
Quaternary/ Upper Tertiary	Shepparton Formation (Qs)	Unconsolidated fluvial and lacustrine sediments consisting of sands, gravels and clays	Main surface outcrop formation in the MLA	Generally < 10 m thick across the MLA
Upper Tertiary	Parilla Sands (or Loxton – Parilla Sands)	Sands, sandstones and silt. Shallow marine deposit.	Regionally extensive unit.	Generally in the order of 20-30m across the MLA. HMS occurs in this unit
Tertiary	Geera Clay	Clay, dark grey-black rare silt, sometime glauconitic.	Regionally extensive unit, however thins towards the south west, where it is interpreted to be absent.	Variable thickness, expected to be around 10-35m thick. Thicker towards the north-west beneath the site.
Tertiary	Renmark Group	Sands, gravels, clays	Regionally extensive but absent in local areas to the north-east of the site.	Variable thickness, expect to be in the order of 10-40m beneath the site, generally thicker towards the west.
Silurian	Grampians Group-Undifferentiated (basement)(Sk)	Sandstones/siltstones/minor mudstones	Basement rock	Basement is expected at a depth of around 110-120m



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Kilometers

Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 54

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GHD

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Project No. 31-36025
Revision No. 0
Date 28/08/2018

Geology Map

FIGURE 2

G:\31\36025\GIS\Maps\Working\31_36025_03_Geology_A3P_Rev0.mxd
Print date: 28 Aug 2018 - 09:37

Data source: WIM Resources, Ore body, mine footprint and project area, 2018; DELWP, VicMap, 2018; . Created by: bsmyth

4.2 Hydrogeology

Based on the regional geology, the principal aquifers and aquitards in the vicinity of the mine lease area (MLA) are listed below (from surface down):

- **Parilla Sands Aquifer (PSA)**

The Parilla Sands Aquifer system forms the water table aquifer system in the MLA. Based on the Horsham Hydrogeological Mapsheet (AGSO, 1992) the regional groundwater contours (refer Figure 3) show the groundwater elevation from approximately 110m to 120m AHD. The groundwater flow is generally in a north-west direction.

The depth to groundwater is shown in Figure 4. This shows the groundwater depth is around 20m at the southern end of the deposit, and increases to around 25 depth to the north. This is generally consistent with groundwater level information from the 6 temporary bores installed by WIM, which recorded groundwater depths from 16.6m (southern end) to 27m (northern end) (refer Figure 1). The saturated thickness of the aquifer system is expected to be approximately 4m to 8m through the MLA.

Figure 5 indicates the groundwater salinity in the PSA is in the order of 3,000 to 7,000 mg/L Total Dissolved Solids (TDS) at the northern end of the deposits and 7,000 to 14,000 mg/L at the southern end. The initial results from the 6 temporary bores installed by WIM was slightly different to the regional interpretation, with the majority of bores recording salinity between approximately 9,000 and 11,000 mg/L TDS, the exception being bore BH2, in the south which recorded approximately 5,000 mg/L TDS.

The individual bore yields are expected to be less than 0.5 L/sec based on the hydrogeological map, as the PSA are clayey/silty in this region and have relatively low permeability in comparison to other areas further west of the Wimmera River.

Aquifer parameters for the Pliocene Sands Aquifer near the deposit could not be sourced, however further south around the Pine-Taylor Lakes areas the hydraulic conductivity of the PSA is approximately 1-2 m/day (AGSO, 1992).

Recharge to the PSA aquifer system is minimal, if any, as reflected by the high groundwater salinity. Low rainfall and high evaporation rates, result in minimal recharge to the system, with diffuse recharge probably occurring during wet years, and localised recharge occurring in areas where the PSA has relatively high permeability.

To the south, around the Wimmera River, the overlying Shepparton Formation becomes saturated and forms the water table aquifer.

- **Geera Clay Aquitard:**

The Geera Clay forms an aquitard that separates (to a degree) the overlying PSA from the underlying Renmark group Aquifer system. As noted, the Geera Clay thickness is expected to vary between 10m and 35m thick at the site.

- **Renmark Group Aquifer (RGA)**

This aquifer system is present at a depth of around 70-80m at the site. As noted, it is of variable thickness, but is likely to be in the order of 10-40m thick at the site. The aquifer is thicker towards the north-west and may be absent to the east of the site.

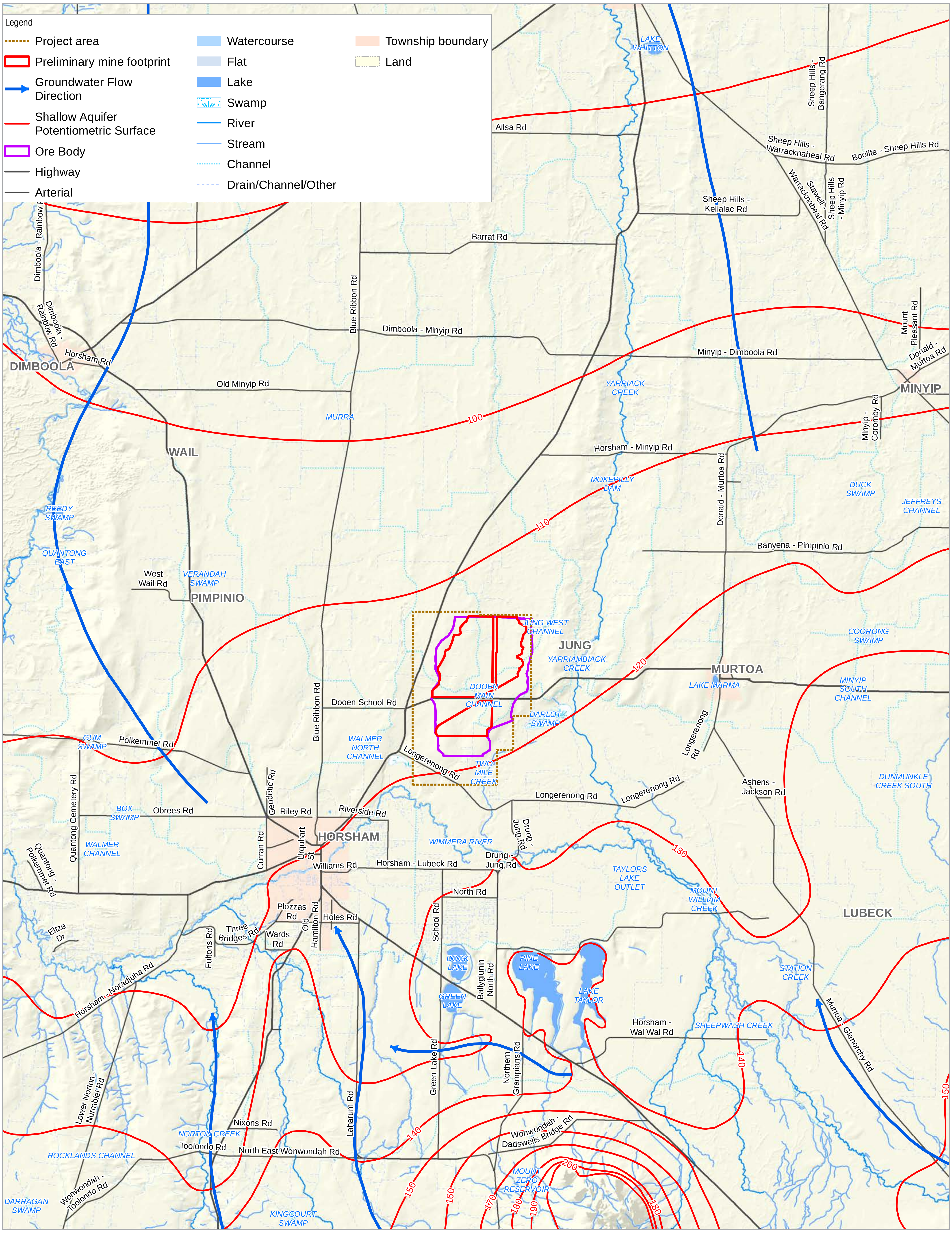
The aquifer system is confined, with groundwater flow towards the north-west (refer Figure 6). The potentiometric surface is approximately 110m AHD at the site. Based on the regional groundwater levels there is a downward hydraulic gradient from the PSA to the RGA at the site. The depth to groundwater in the RGA is expected to be around 30m the site.

Figure 7 indicates the groundwater salinity in the RGA is in the order of 7,000 to 14,000 mg/L TDS at the northern end of the deposits and 3,000 to 7,000 mg/L at the southern end. The aquifer yield is expected to be greater in the southern end, between 0.5 – 5 L/sec, while to the north yields are expected to be <0.5 L/sec. Yields and quality in the RGA generally improve to the north- west where the aquifer system is deeper and thicker.

Aquifer parameters for the RGA aquifer at the site is not known, however further south around the Pine-Taylor Lakes areas the hydraulic conductivity of the RGA is approximately 1.5-1.8 m/day and storativity between 5 $x10^{-4}$ and 5 $x10^{-3}$ (AGSO, 1992).

Recharge to the RGA aquifer system in this area is expected to occur largely from the south where the unit is present on the flanks of the outcropping Grampians Sandstone, which forms The Grampians. The RGA although present at depth is expected to receive recharge from the overlying permeable colluvium on the flanks of the Grampian ranges which are recharged by direct rainfall and runoff from the Grampian ranges in this relatively high rainfall region. This is reflected by the groundwater flow direction and in some areas close to the Grampians the groundwater quality in the RGA is less than 1,500 mg/L TDS. The Mt Zero borefield, which is used for urban supply for Horsham, is screened within the RGA on the flanks of Mt Zero and operated by GWMWater.

Some diffuse recharge to the RGA will also occur via the downward vertical movement from the PSA to the RGA.



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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

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GHD

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Water Table Aquifer Potentiometric Surface and Flow Direction

Project No.	31-36025
Revision No.	0
Date	28/08/2018

FIGURE 3

G:\31\36025\GIS\Maps\Working\31_36025_06_WaterTableSurfaceAndFlow_A3P_Rev0.mxd
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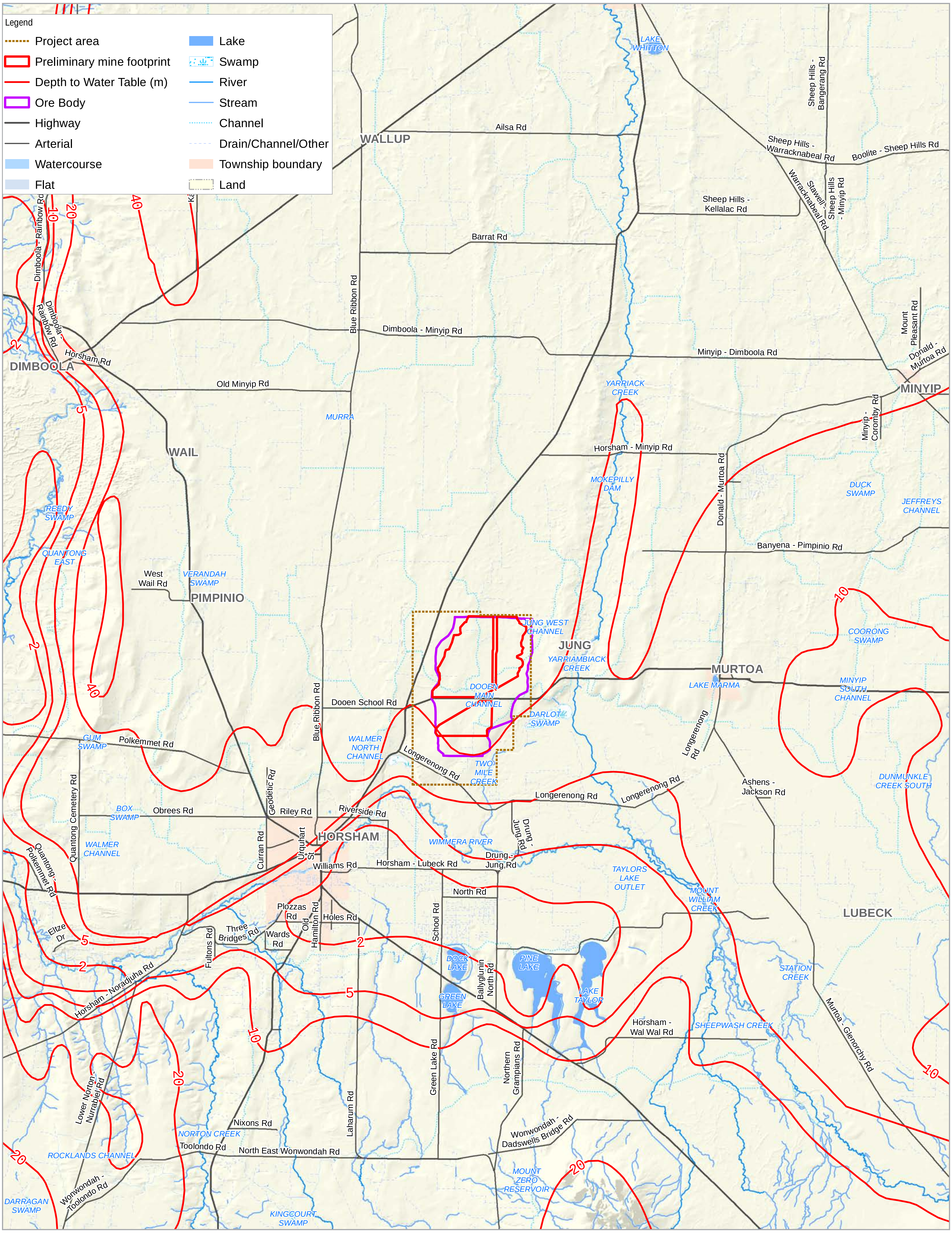
Data source: MDBC, Hydrogeology of the Murray Basin (Basin in a Box), 2000; WIM Resources, Ore body, mine footprint, project area, 2018; DELWP, VicMap, 2018; . Created by: bsmyth



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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

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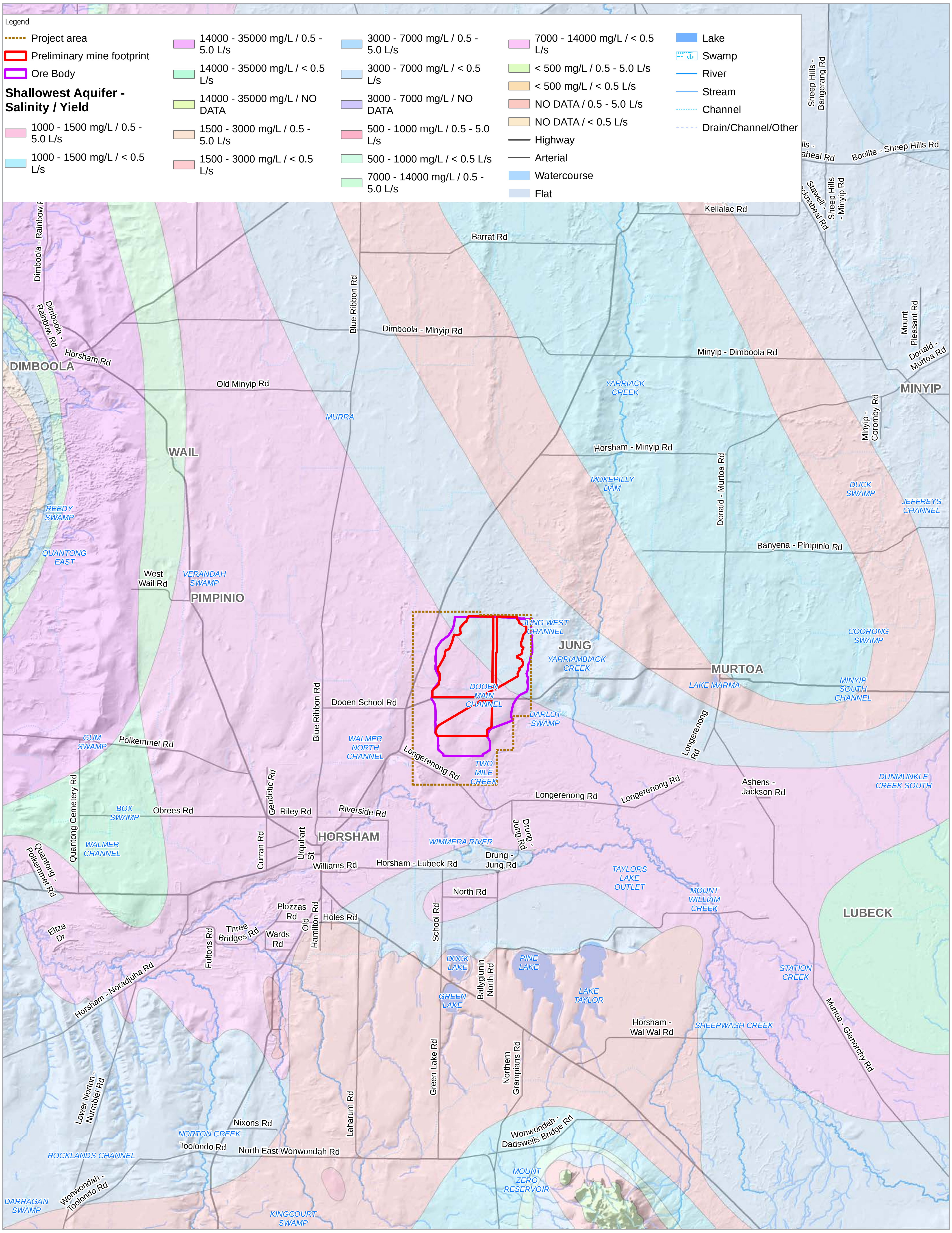
WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Depth to Water
Basin in a Box

Project No.	31-36025
Revision No.	0
Date	28/08/2018

FIGURE 4



Paper Size ISO A3

0 1.5 3 4.5 6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

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GHD

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Water Table Aquifer Yield and Salinity

Project No. 31-36025
Revision No. 0
Date 28/08/2018

FIGURE 5

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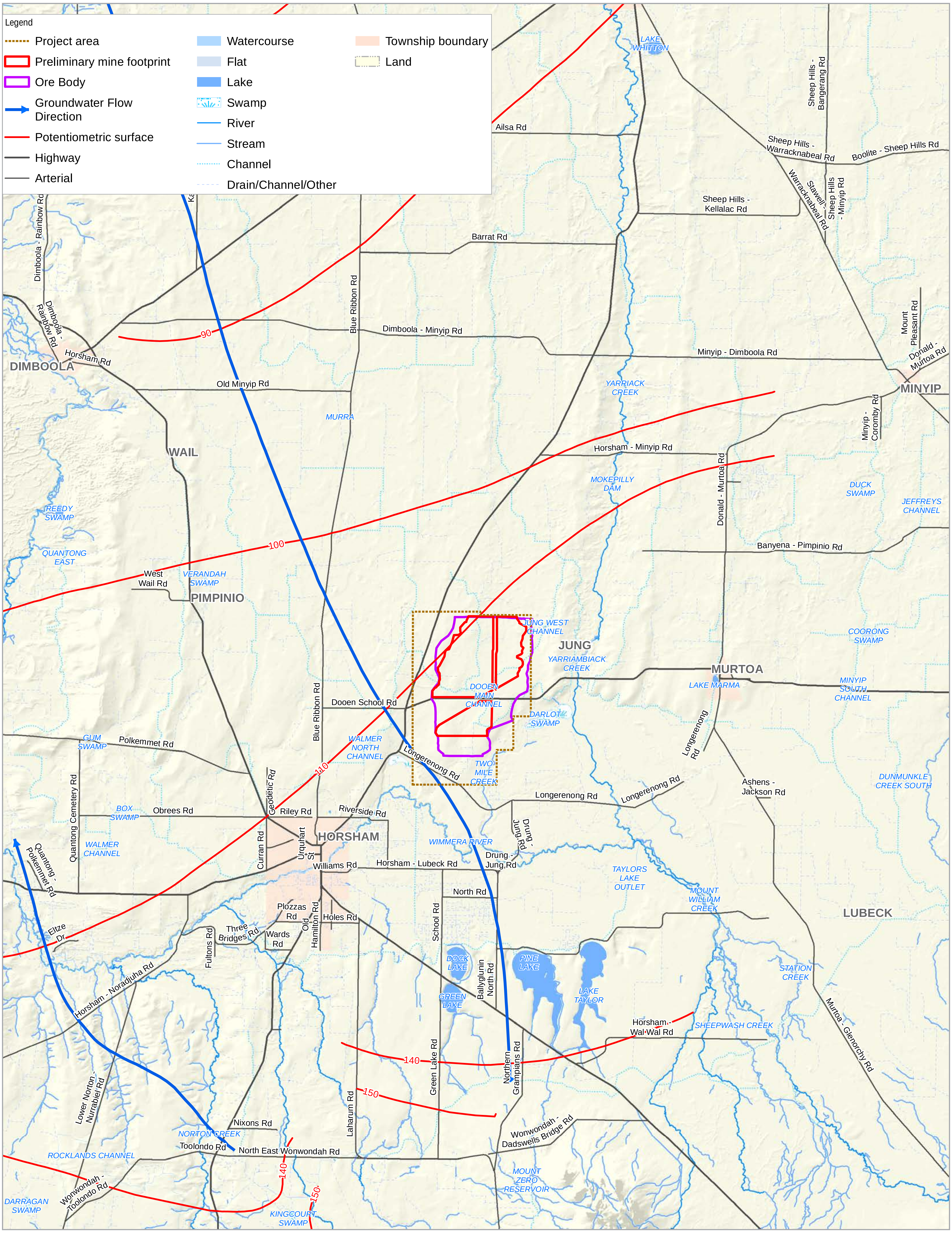
Data source: MDBC, Hydrogeology of the Murray Basin (Basin in a Box), 2000; WIM Resources, Ore body, mine footprint, project area, 2018; DELWP, VicMap, 2018; . Created by: bsmyth



Paper Size ISO A3

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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

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GHD

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Lower Renmark Group Aquifer Potentiometric Surface and Flow Direction

Project No. 31-36025
Revision No. 0
Date 28/08/2018

FIGURE 6

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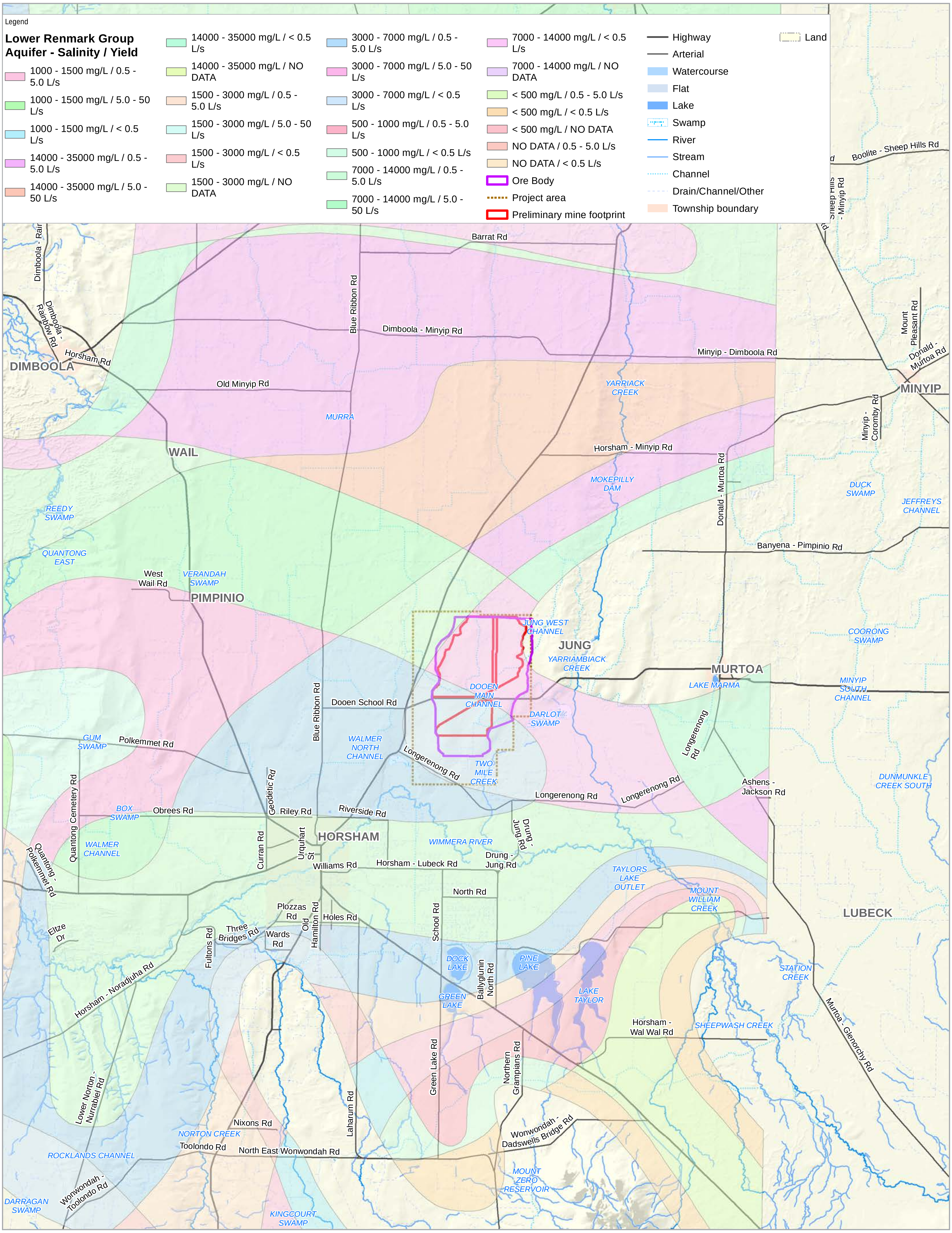

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Project No. 31-36025
Revision No. 0
Date 28/08/2018

Lower Renmark Group Aquifer
Salinity and Yield

FIGURE 7

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Data source: MDBC, Hydrogeology of the Murray Basin (Basin in a Box), 2000; WIM Resources, Ore body, mine footprint, project area, 2018; DELWP, VicMap, 2018; . Created by: bsmyth

4.3 Groundwater Dependent Ecosystems (GDEs)

Discharge from some aquifer systems can provide baseflow to surface water features such as lakes, swamps and rivers (i.e. in the Wimmera River) and support GDE's such as terrestrial flora and fauna (for example riverside vegetation and platypus populations), and aquatic ecosystems (for example, macro-invertebrates).

Potential GDE's in the region have been mapped by the Bureau of Meteorology (BoM) and are shown in Figure 8 and summarised in Table 3 and Table 4.

The closest surface water features which may have a level of groundwater dependence include:

- Darlot Swamp: This is a shallow freshwater marsh, expected to be a losing surface water feature (ie. surface water recharges the aquifer system), and thus has a low potential to be an aquatic groundwater dependent ecosystem.
- Two Mile Creek: Also has a low potential to be a groundwater dependent ecosystem, due to the deep groundwater level in this area. Directly south of the MLA is an area where groundwater is considered by BOM as likely to support Terrestrial GDEs (in the area of the Longerenong College), however groundwater depths are expected to be relatively deep in the order of 10-15 m in this area.
- Dooen Swamp: This is a deep freshwater marsh, which again has a low potential to be an aquatic GDE, however there is a high potential that terrestrial GDEs are dependent on groundwater directly around the swamp. This is expected to be due to the surface water feature being a losing feature and leakage from the swamp supporting vegetation along the edges of the swamp.
- Yarriambiack Creek. This surface water feature is expected to be a losing system, recharging the local aquifer system to a degree when there is surface water flow. This is based on the groundwater depth is expected to be around 10-20m at the creek in the stretch east of the site. Seepage from the river has a high potential to support terrestrial GDEs in the immediate vicinity of the river channel.
- Wimmera River. The Wimmera River to the south of the site is likely to be a losing feature when flowing, however when the river is low it may be a gaining surface water feature in some stretches. Smart, 2009 observed that downstream of Horsham, the river has been observed to be gaining, with saline groundwater seeping into the river. Some bores installed adjacent the Wimmera River and Mt William Creek which showed that the surface water features were losing in these specific locations (on the Horsham- Lubeck Rd).

It is noted that there are numerous small (unnamed) areas which are identified as potential terrestrial GDEs (refer Figure 8). All of these are not listed in below.

Table 3 Potential Aquatic GDEs

Feature Name	Ecosystem Type [1]	Supplied ecosystem type[1]	Aquatic GDE Potential[1]	Approximate distance form Mine Footprint Boundary (kms)	Comment
Darlot Swamp	Wetland	Palustrine: Unknown	Low potential GDE - from regional studies	2	Ephemeral wetland, expected to be a losing surface water feature.
Wimmera River	River	Watercourse	High potential GDE - from national assessment	3.6	When the river level is low it is expected to be a gaining surface water feature
Yarriambiack Creek	River	Watercourse	Low potential GDE - from national assessment	2.5	Ephemeral creek, expected to be a losing surface water feature when flowing. Groundwater depth around 10-20m
Dooen Swamp	Wetland	Palustrine: Temporary freshwater swamps	Low potential GDE - from regional studies	2.4	Ephemeral wetland, expected to be a losing surface water feature
Unnamed (on two mile creek line)	Wetland	Palustrine: Unknown	Low potential GDE - from regional studies	1.2	Ephemeral creek, expected to be a losing surface water feature when flowing.
Unnamed (on two mile creek line)	Wetland	Palustrine: Unknown	Low potential GDE - from regional studies	1.8	Ephemeral creek, expected to be a losing surface water feature when flowing.

Notes

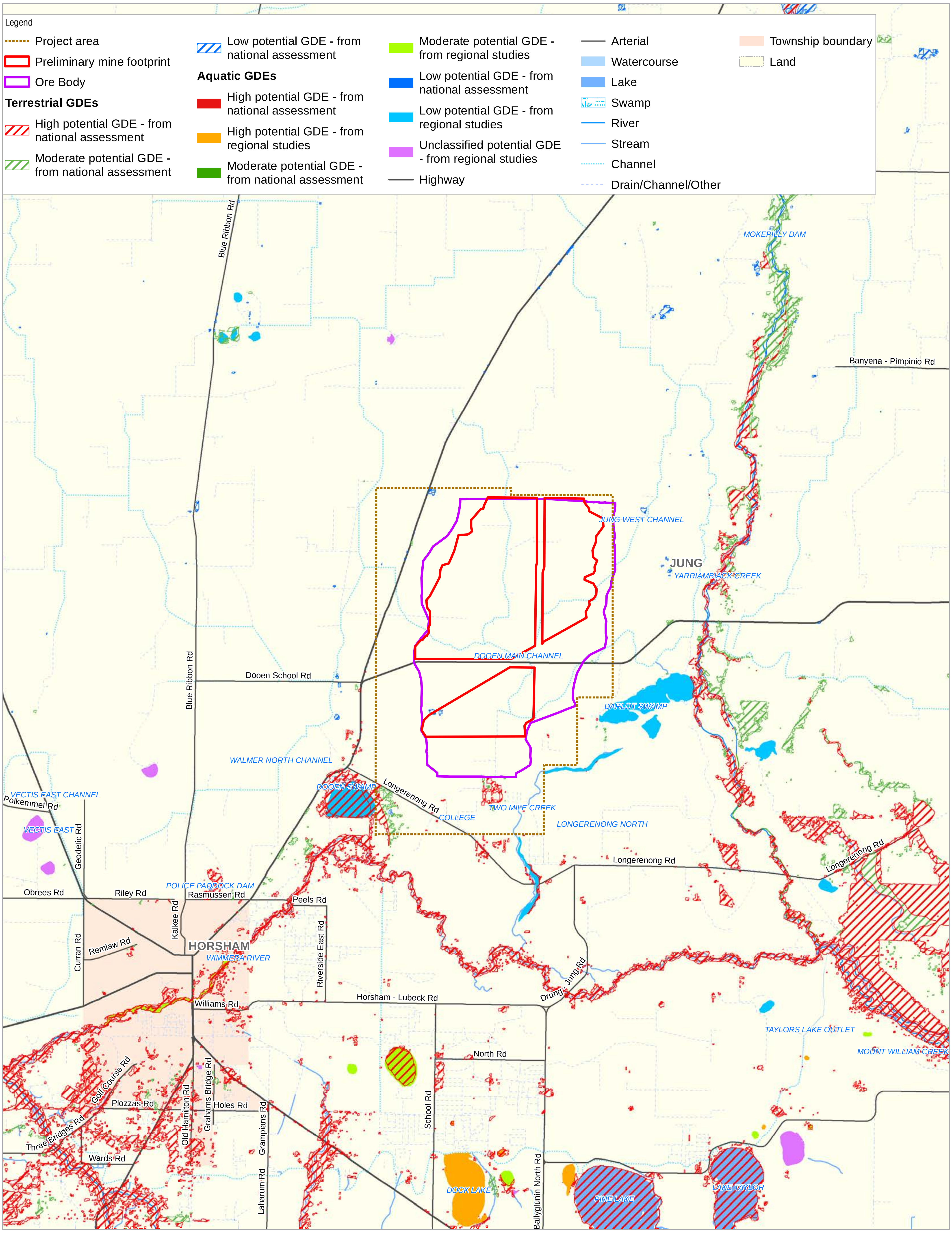
(1) Information from the BOM GDE atlas

Table 4 Potential Terrestrial GDEs

Feature Name	Ecosystem Type [1]	Supplied ecosystem type[1]	Terrestrial GDE Potential [1]	Distance from Mine Footprint Boundary (kms)	Comment
Darlot Swamp	Vegetation	-	Not classified	2	Vegetation unlikely to be groundwater dependent. It is noted however there are two small patches of vegetation to the west which have high to moderate GDE potential (refer Figure 8)
Wimmera River	Vegetation	Riverine Chenopod Woodland	High potential GDE - from national assessment	3.6	Certain vegetation, in the vicinity of the river has high potential to be supported by groundwater.
	Vegetation	Floodplain Riparian Woodland	High potential GDE - from national assessment		
Yarriambiack Creek	Vegetation	Lignum Swampy Woodland	High potential GDE - from national assessment	2.5	Seepage from the river, when flowing, has high potential to support certain vegetation around the creek banks
	Vegetation	Riverine Chenopod Woodland	Moderate potential GDE - from national assessment		
	Vegetation	Riparian Woodland	Moderate potential GDE - from national assessment		
	Vegetation	Riparian Woodland	Moderate potential GDE - from national assessment		
	Vegetation	Riparian Woodland	High potential GDE - from national assessment		

Feature Name	Ecosystem Type (1)	Supplied ecosystem type(1)	Terrestrial GDE Potential (1)	Distance from Mine Footprint Boundary (kms)	Comment
Dooen Swamp	Vegetation	Sand Ridge Woodland	Moderate potential GDE - from national assessment	2.4	Ephemeral wetland- some vegetation types likely to be supported by groundwater,
	Vegetation	Sand Ridge Woodland	High potential GDE - from national assessment		
	Vegetation	Riverine Chenopod Woodland	High potential GDE - from national assessment		
	Vegetation	Red Gum Swamp	High potential GDE - from national assessment		
	Vegetation	Plains Woodland	High potential GDE - from national assessment		
	Vegetation	Plains Woodland	Moderate potential GDE - from national assessment		
Area on southern mine boundary	Vegetation	Plains Woodland	Moderate potential GDE - from national assessment	0	Relatively shallow groundwater in this area has potential to support some vegetation types
	Vegetation	Plains Woodland	High potential GDE - from national assessment		
Area inside Mine boundary	Vegetation	Plains Savannah	Low potential GDE - from national assessment	Inside	Vegetation unlikely to be dependent on groundwater. May be a remnant vegetation patch.
Unnamed (on two mile creek line)	Vegetation	Riverine Chenopod Woodland	High potential GDE - from national assessment	1.8	Relatively shallow groundwater in this area has potential to support some vegetation types

Notes: (1) Information from the BOM GDE atlas



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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Groundwater Dependent Ecosystem (GDE) Map

Project No. 31-36025
Revision No. 0
Date 28/08/2018

FIGURE 8A

G:\31\36025\GIS\Maps\Working\31_36025_01_GDEmap_A3P_Rev0.mxd
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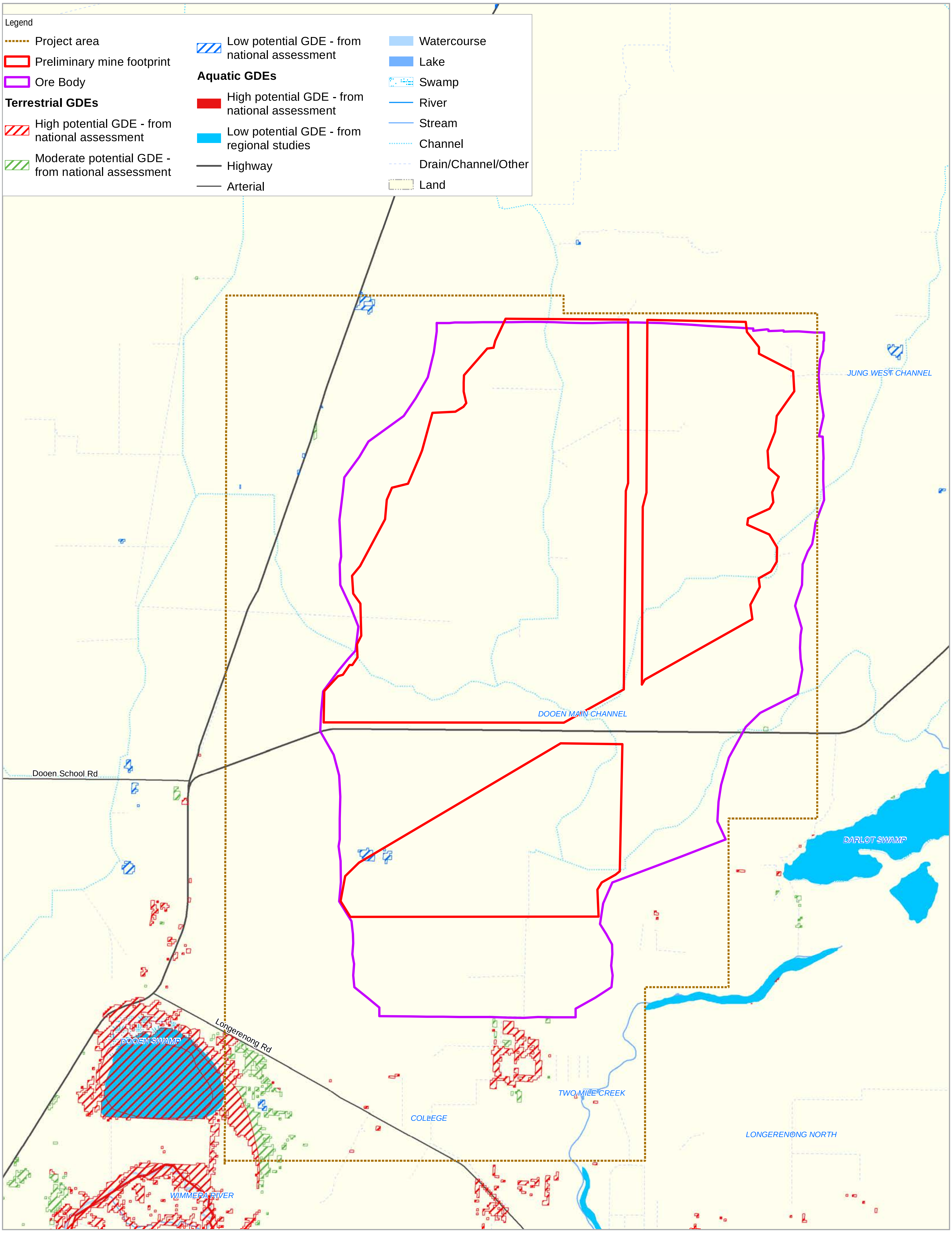
Data source: BOM, GDE data, 2018; WIM Resources, Ore Body, mine footprint, project area, 2018; DELWP, VicMap, 2018; . Created by: bsmyth



Paper Size ISO A3

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Kilometers

Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 54

N

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Groundwater Dependent Ecosystem (GDE) Map

Project No. 31-36025
Revision No. 0
Date 28/08/2018

FIGURE 8B

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Print date: 28 Aug 2018 - 09:22

Data source:BOM, GDE data, 2018; WIM Resources, Ore Body, mine footprint, project area, 2018; DELWP, VicMap, 2018; . Created by: bsmyth

4.4 Existing Groundwater Bores

In order to identify existing groundwater bores in the area a 50 km x 50 km square block surrounding the MLA was searched using the WIMS database. Bores identified, including bore use, are shown in Figure 9.

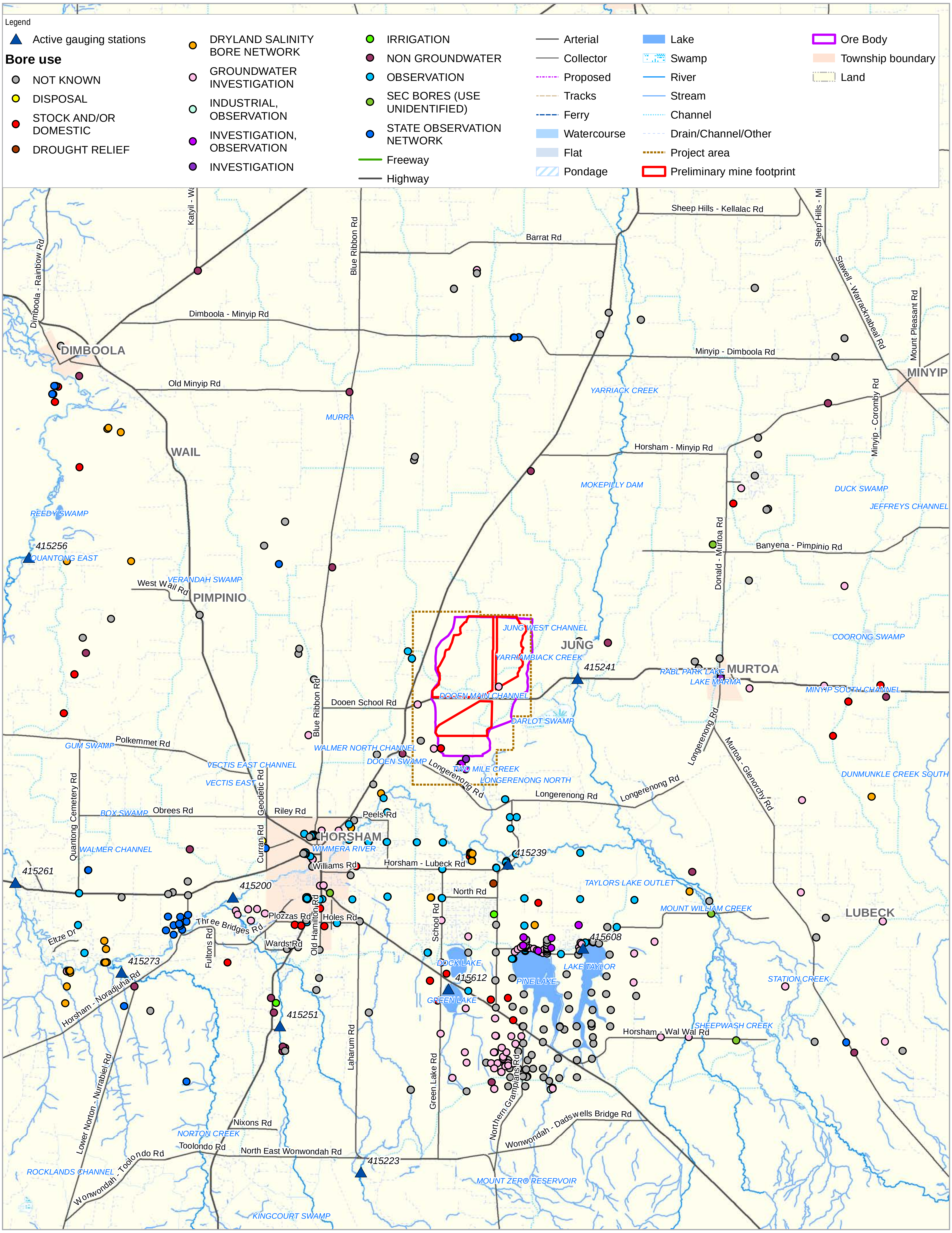
State observation bores, and the aquifer screened, in the area are shown Figure 10. This indicates that there are three nested bore locations (PSA and RGA or QA and RGA) around the MLA, however these sites are located at greater than 5 kms from the site.

Within 5 kilometres of the MLA, there are 42 bores as shown in Figure 11. Bore construction details from these bores and other available information is included in Appendix A. It is noted that:

- 3 of the bores are listed as not being used.
- 9 of the bores have been decommissioned (in 2013).
- The WIM bores (BH1-BH6) are not registered in the WIMS database.
- The 3 Australian Zircon bores (INV) are not registered in the WIMS database.
- There are only two stock and domestic bores, bore 68431 is within the deposit extent and 117043 is around 3 kilometres to the south (near the Wimmera River).

Figure 12 shows the aquifer screened by the monitoring bores within 5 kilometres of the site (ignoring the decommissioned bores). Where no screened aquifer data was available, GHD assigned a monitored aquifer system based on the Victorian Aquifer Framework layers and the screen interval or depth. Figure 12 shows the following:

- There are two bore 68433 and 68432 which could be possibly added to WIM's monitoring program. They were drilled in 1989, however the current status of these bores on the ground is not known.
- There are a number of shallow observation bores to the south of the MLA, in the area of the Longerenong College. If access to one or more of these bores could be arranged then this would provide a PSA monitoring location on the southern boundary of the MLA and near a potential GDE.



Paper Size ISO A3

0 1.5 3 4.5 6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

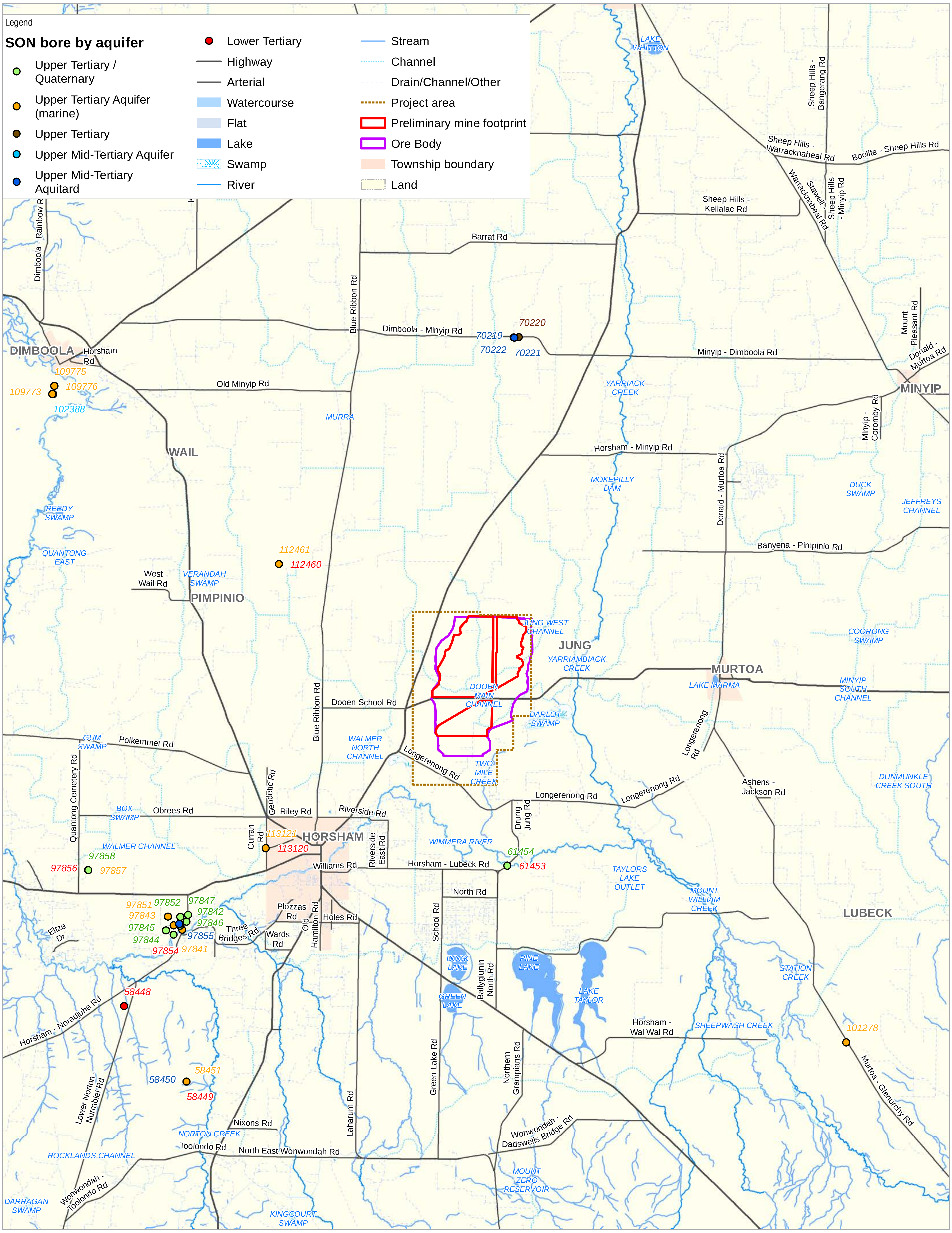
Project No. 31-36025
Revision No. 0
Date 28/08/2018

Regional Bore Location
and Surface Water Gauges Map

FIGURE 9

G:\31\36025\GIS\Maps\Working\31_36025_02_RegionalBores_A3P_Rev0.mxd
Print date: 28 Aug 2018 - 09:38

Data source: DELWP, WMIS bore locations, 2018; WIM Resources, Mine footprint, ore body, project area, 2018; DELWP, VicMap, 2018; . Created by: bsmyth



Paper Size ISO A3

0 1.5 3 4.5 6

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

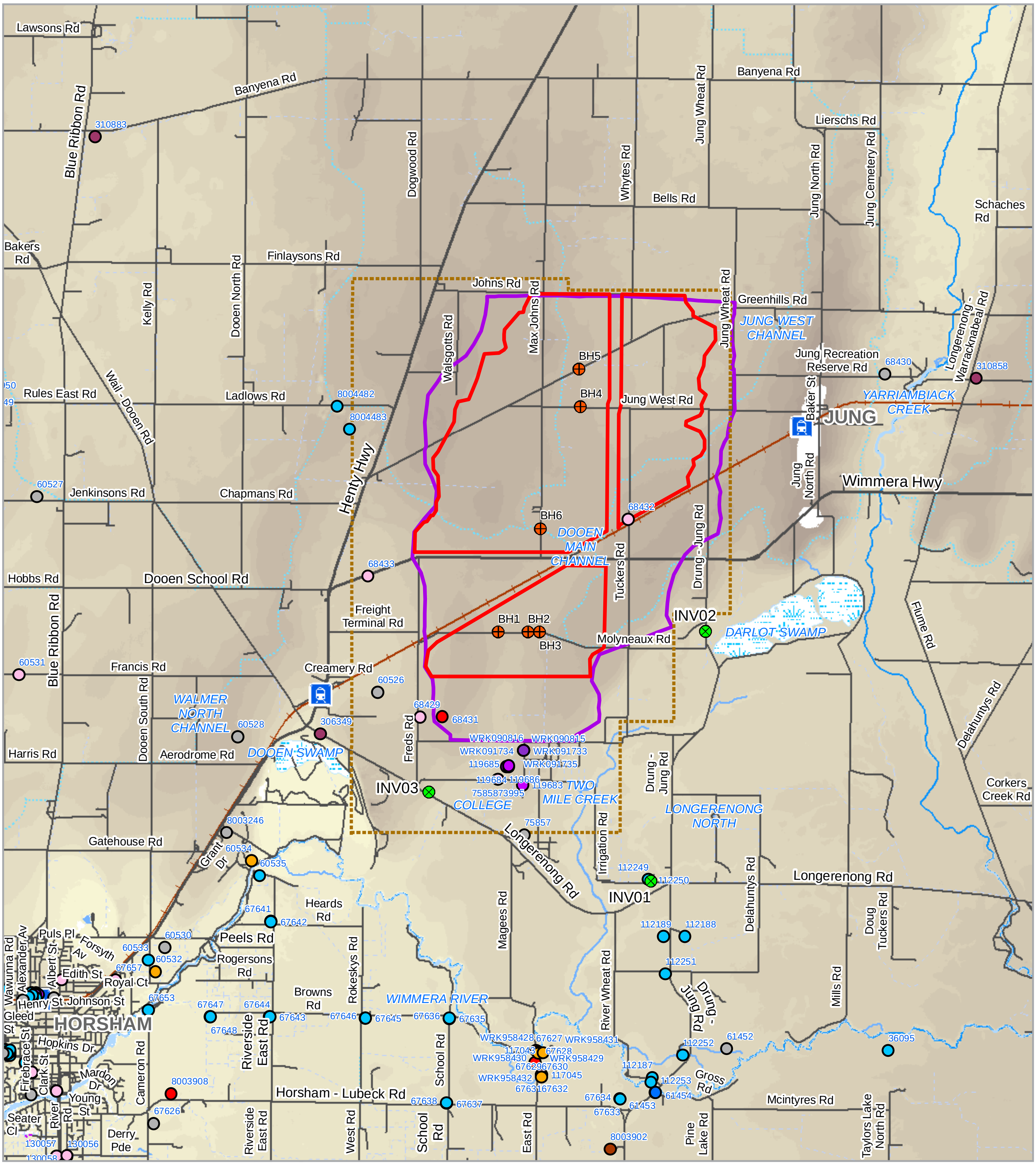
SON Bore Location Map

Project No. 31-36025
Revision No. 0
Date 28/08/2018

FIGURE 10

G:\31\36025\GIS\Maps\Working\31_36025_11_SOBNBores_A3P_Rev0.mxd
Print date: 28 Aug 2018 - 09:45

Data source: DELWP, WMIS bore locations, 2018; WIM Resources, Mine footprint, project area, ore body, 2018; DELWP, VicMap, 2018; . Created by: bsmyth



Legend

WIM existing bores	Bore use	INVESTIGATION, OBSERVATION	Highway	Watercourse	River	Ground Elevation AHD (m)
Investigation Bores	NOT KNOWN	INVESTIGATION	Arterial	Lake	Stream	126 - 126
Project area	STOCK AND/OR DOMESTIC	NON GROUNDWATER	Collector	Swamp	Channel	127 - 128
Preliminary mine footprint	DROUGHT RELIEF	OBSERVATION	Proposed		Drain/Channel/Ot...	129 - 130
Ore body extent	DRYLAND SALINITY BORE NETWORK	STATE OBSERVATION NETWORK	Tracks		Railway	131 - 132
	GROUNDWATER INVESTIGATION					133 - 134

135 - 136	143 - 144
137 - 138	145 - 146
139 - 140	147 - 148
141 - 142	149 - 150

Paper Size ISO A4

0 0.75 1.5 2.25 3

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

WIM Resource Pty Ltd
Avonbank HMS Project

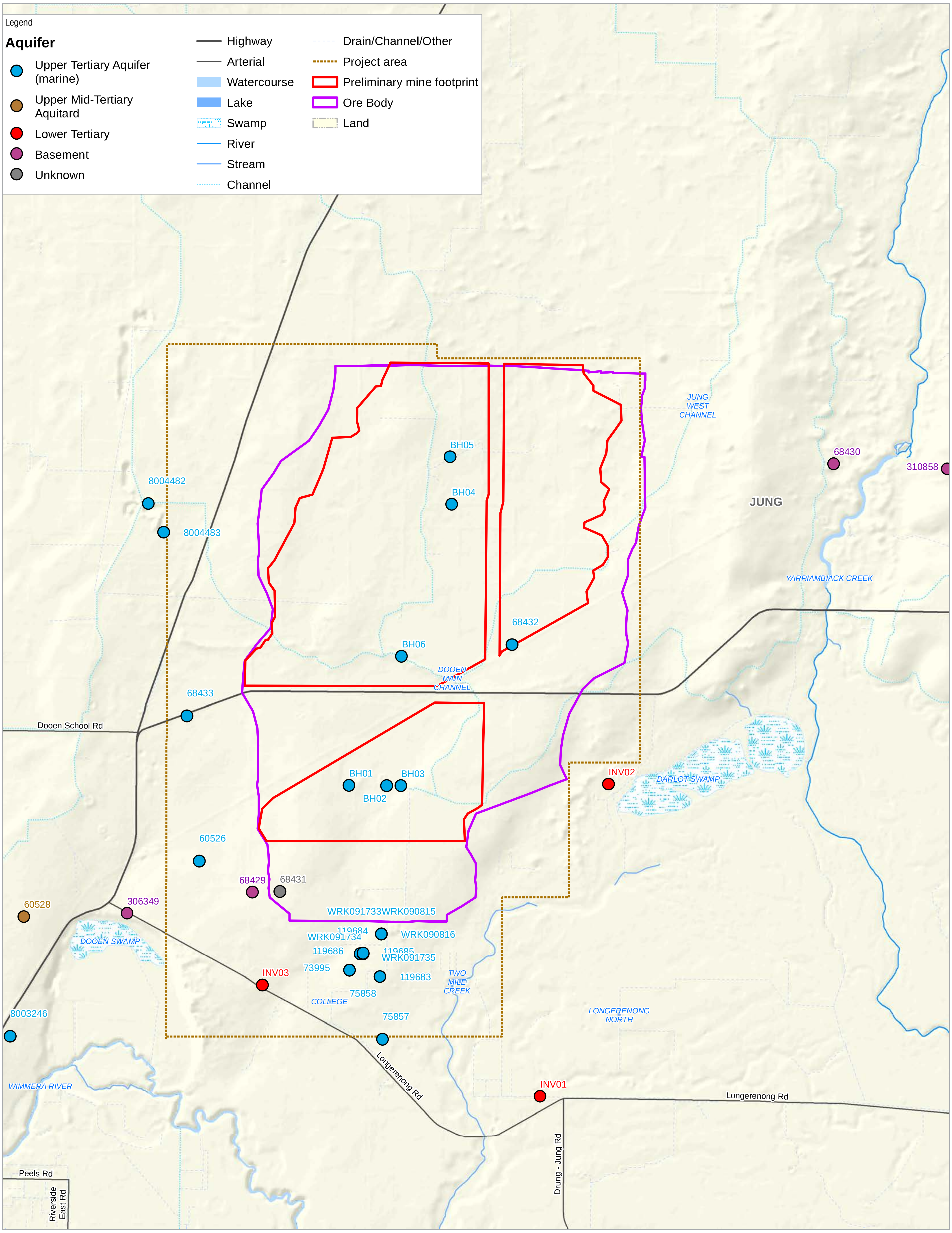
Hydrogeological Assessment
Bore Location Map

Project No. 31-36025
Revision No. 0.0
Date 30/08/2018

Figure 11

G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 30 Aug 2018 - 12:35

Data source: DELWP, VicMap, 2017; WIM, 2018 Created by: bsmyth



Paper Size ISO A3

0 0.35 0.7 1.05 1.4

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

WIM Resources
Avonbank HMS Project
Hydrogeological Assessment

Local Bores and Aquifer Map

Project No. 31-36025
Revision No. 0
Date 30/08/2018

FIGURE 12

G:\31\36025\GIS\Maps\Working\31_36025_12_NeighbouringBoresAndAquifer_A3P_Rev0.mxd
Print date: 30 Aug 2018 - 12:27

Data source: DELWP, WMIS bore locations, 2018; WIM Resources, Mine plan, ore body, bore locations, 2018; DELWP, VicMap, 2018; . Created by: bsmyth

5. Deposit Depth and Depth below Groundwater

5.1 Deposit Depth

GHD has presented the deposit depth and the expected level of saturation (ie. depth below the regional water table) as part of this review.

Figure 13 shows the deposit thickness across the MLA on a regional dataset contour basis. The deposit is hosted within the Loxton Parilla Sands (LPS) and the deposit thickness is variable in some areas, with the majority of the deposit being greater than 5m in thickness in the preliminary mine footprint, with the thickest areas, generally in the centre and to the south, being up to 18m in thickness. WIM has completed detailed resource definition drilling over the deposit, and the areas where the deposit is generally quite consistent with respect to its thickness (i.e. 10-15m thick) will be the target areas for mining.

Figure 14 shows the depth to the top of the deposit, and Figure 15 show the depth to the base of the deposit. These figures show the deposit is generally shallower in the southern half, with the top of the deposit being 10-20m below ground level, while in the northern half the top of the deposit gets slightly deeper being more commonly around 20-25m, while on the north-west side the it reaches 25-30m depth.

The base of the deposit has a similar trend, generally being slightly shallower in the southern half at approximately 20-30m depth, while in the norther half and particularly to the north-west the base of the ore is generally around 25-35 m depth below ground surface.

The depth to the top of the Geera Clay has been presented in Figure 16. The Geera Clay is below the deposit and is generally at a depth of 20- 30m deep at the southern end of mine area to 30-40m at the northern end of the mine area. This based on the WIM's extensive resource drilling, detailed geological logging and interpretation of the intersection of the Geera Clay.

5.2 Deposit Depth below Groundwater

The groundwater level (mAHD) in the PSA across the MLA based on the regional information is shown in Figure 17. Depth to groundwater across the MLA is shown in Figure 18.

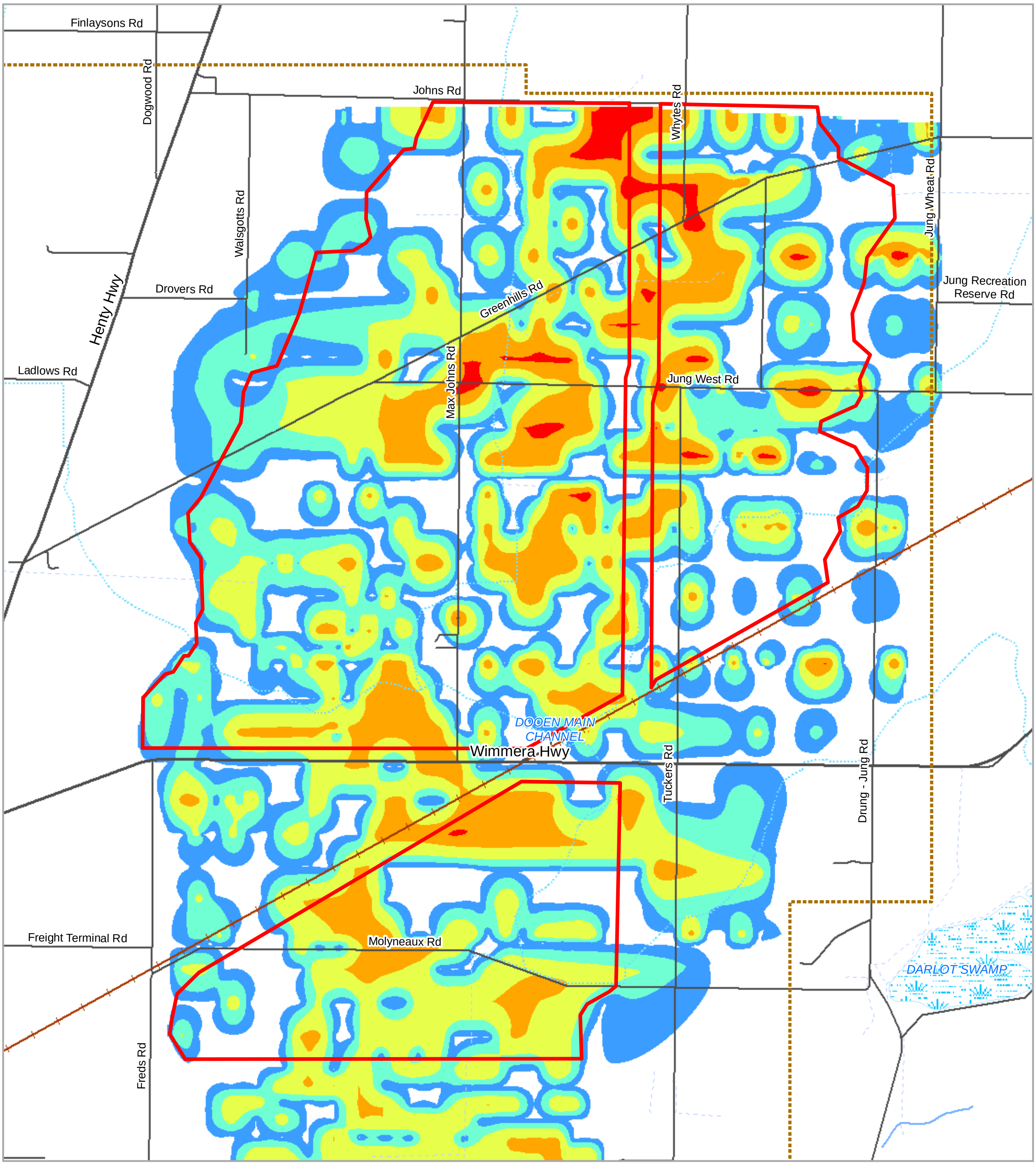
The saturated thickness of the deposit is shown in Figure 19, based on the regional groundwater level information. This figure shows that in general the deposit is partially saturated, generally <4m below the water table in the south and generally <6m below the water table in the north.

On the northern end of the mine area there is a zone where the ore is 6-8m below the water table. Assuming the aquifer parameters are similar across the whole deposit, the northern area is likely to be where the maximum groundwater inflow to the mine pit will occur, and therefore where the maximum dewatering rates will be required (ie. sump pumping). In some areas the base of the deposit is above the regional water table.

A cross section and long section through the deposit is shown in Figure 20. This shows the variability in the deposit thickness and depth, as well as the level of saturation. It shows that in general the lower 25%-30% of the deposit is likely to be saturated.

It is noted that GHD originally completed this assessment of deposit saturation with the groundwater level surface provided by WIM, which was based on saturation levels noted in the exploratory bores.

However, GHD subsequently decided to use the regional groundwater levels as it appeared that the groundwater / moisture level in the core holes was possibly impacted by the drilling method (ie. air pressure may hold the groundwater level back, or low permeability material may take a long time to reach stabilised groundwater levels).



Legend

Project area	Highway	Lake	Stream	**Orebody Thickness (m)**	2 - 5
Preliminary mine footprint	Collector	Swamp	Channel	0 - 0.3	5 - 10
			Drain/Channel/Ot...	0.3 - 2	10 - 15
			Railway		15 - 18

Paper Size ISO A4

0 0.3 0.6 0.9 1.2 Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

WIM Resource Pty Ltd
Avonbank HMS Project

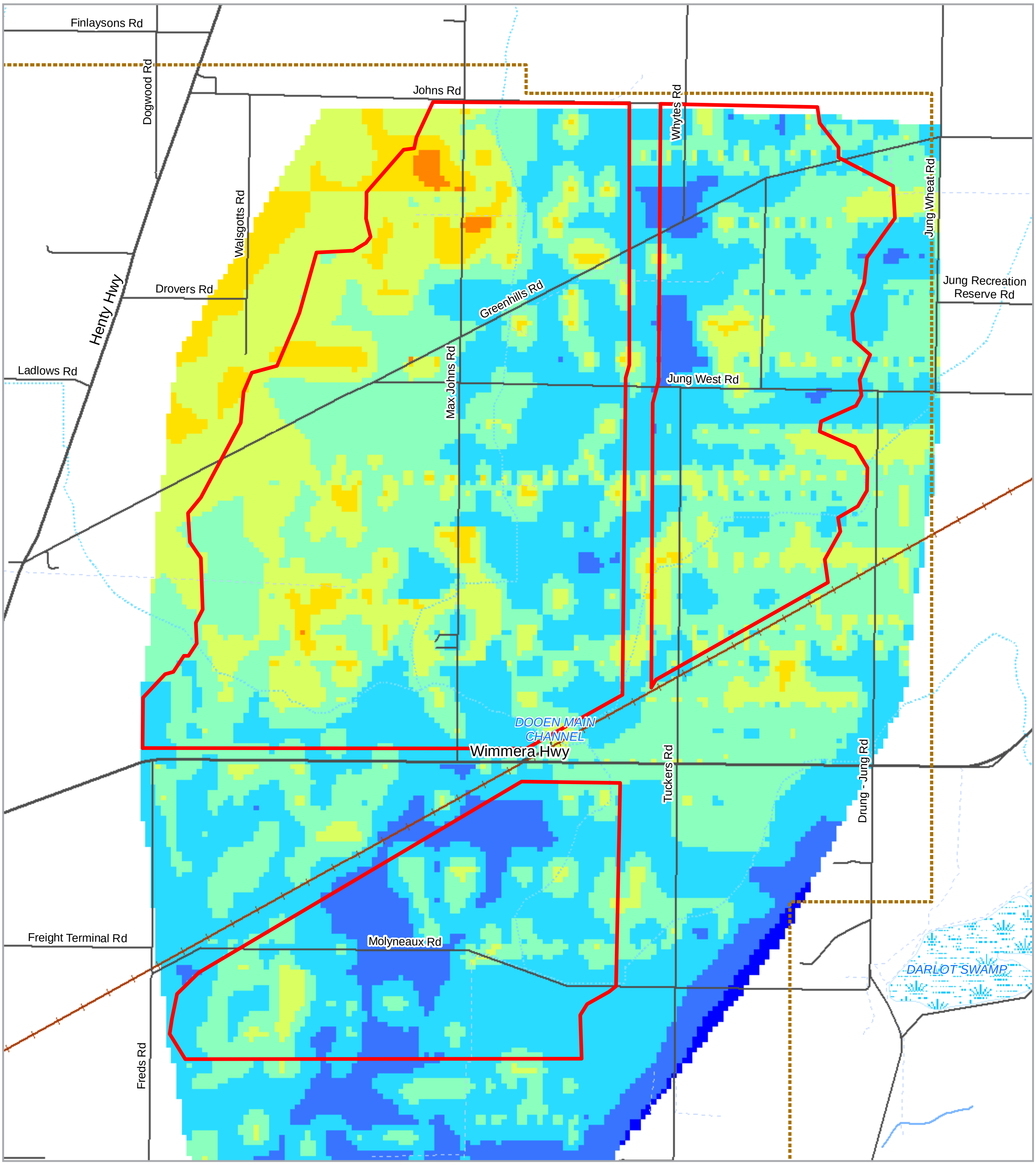
Hydrogeological Assessment
Orebody thickness

Project No. 31-36025
Revision No. 0.0
Date 28/08/2018

Figure 13

G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 28 Aug 2018 - 09:50

Data source: DELWP, VicMap, 2017; WIM, 2018 Created by: bsmyth



Legend

- Project area
- Preliminary mine footprint
- Highway
- Collector
- Lake
- Swamp
- Stream
- Channel
- Drain/Channel/Ot...
- Railway

Depth to Top of Orebody

from ground surface (m)

- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40

Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

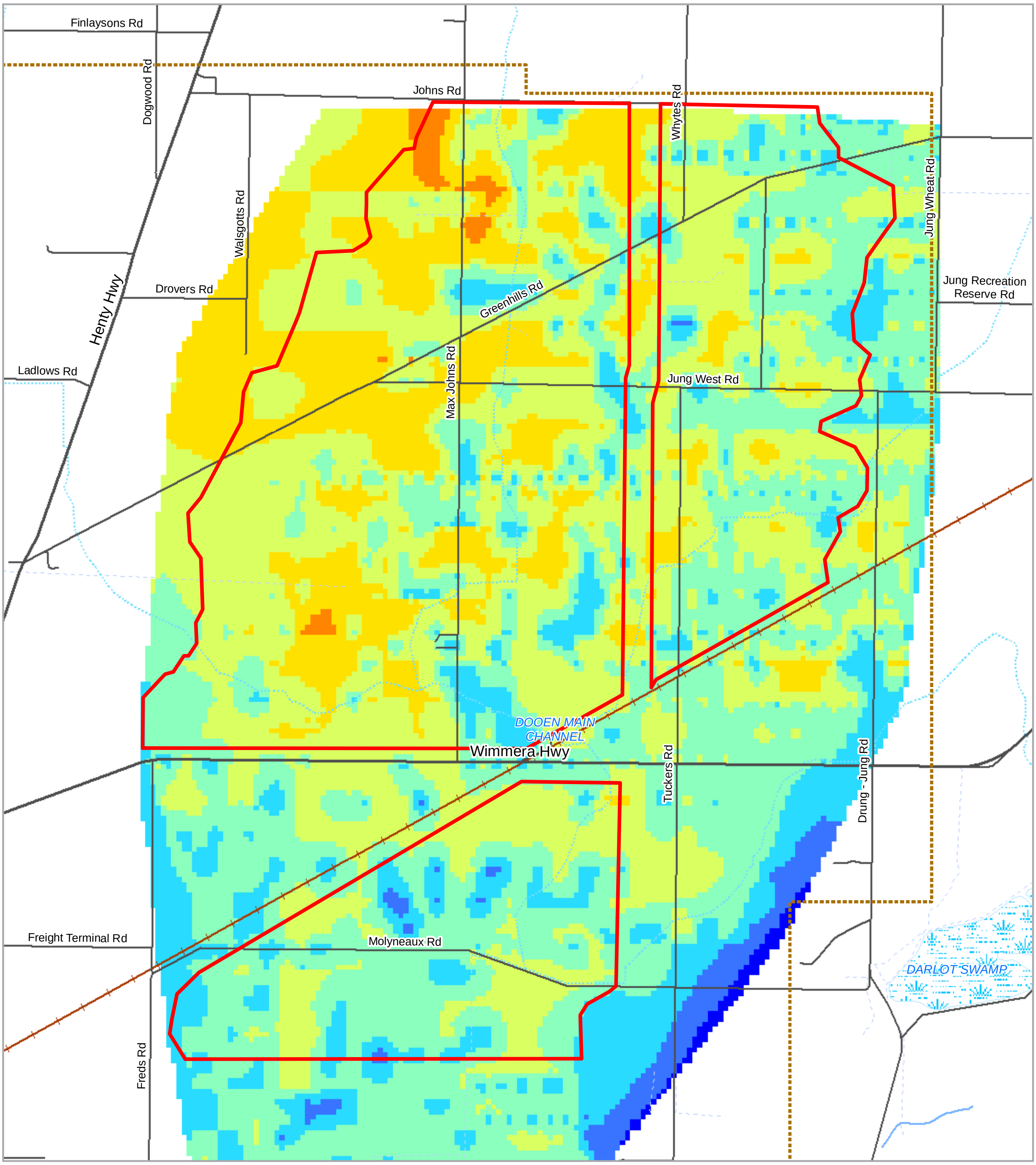
GHD

WIM Resource Pty Ltd
Avonbank HMS Project

Hydrogeological Assessment
Depth to Top of Orebody

Project No. 31-36025
Revision No. 0.0
Date 28/08/2018

Figure 14



Legend

- Project area
- Preliminary mine footprint
- Highway
- Collector
- Lake
- Swamp
- Stream
- Channel
- Drain/Channel/Ot...
- Railway

Depth to Base of Orebody from ground surface (m)

- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35
- 35 - 40

Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

WIM Resource Pty Ltd
Avonbank HMS Project

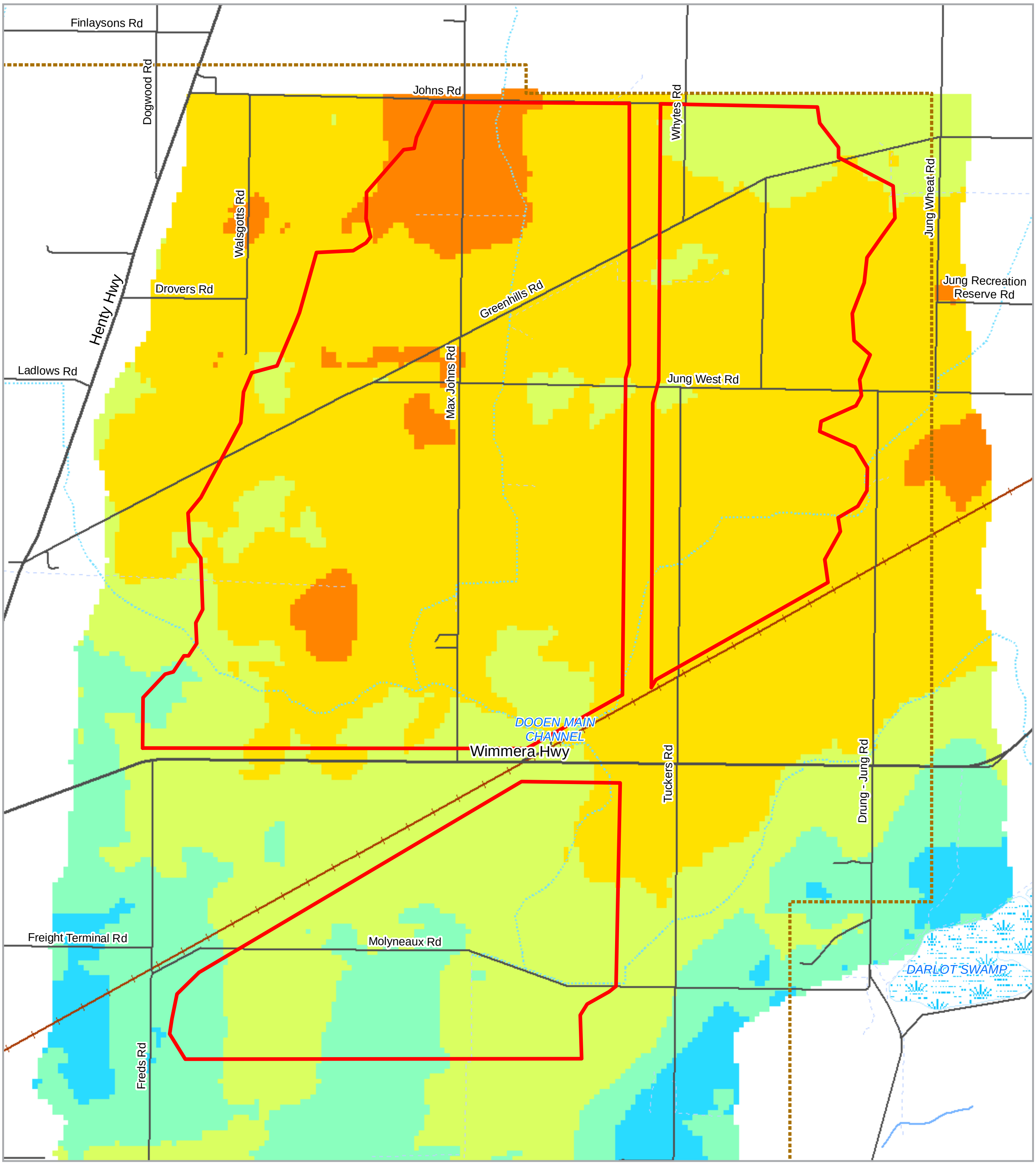
Hydrogeological Assessment
Depth to Base of Orebody

Project No. 31-36025
Revision No. 0.0
Date 28/08/2018

Figure 15

G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 28 Aug 2018 - 09:50

Data source: DELWP, VicMap, 2017; WIM, 2018 Created by: bsmyth



Legend

Project area	Highway	Lake	Stream	**Depth to Top of Geera Clay from ground surface (m)**	15 - 20	20 - 25	25 - 30
Preliminary mine footprint	Collector	Swamp	Channel			30 - 35	35 - 40
			Drain/Channel/Ot...				
			Railway				

Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

WIM Resource Pty Ltd
Avonbank HMS Project

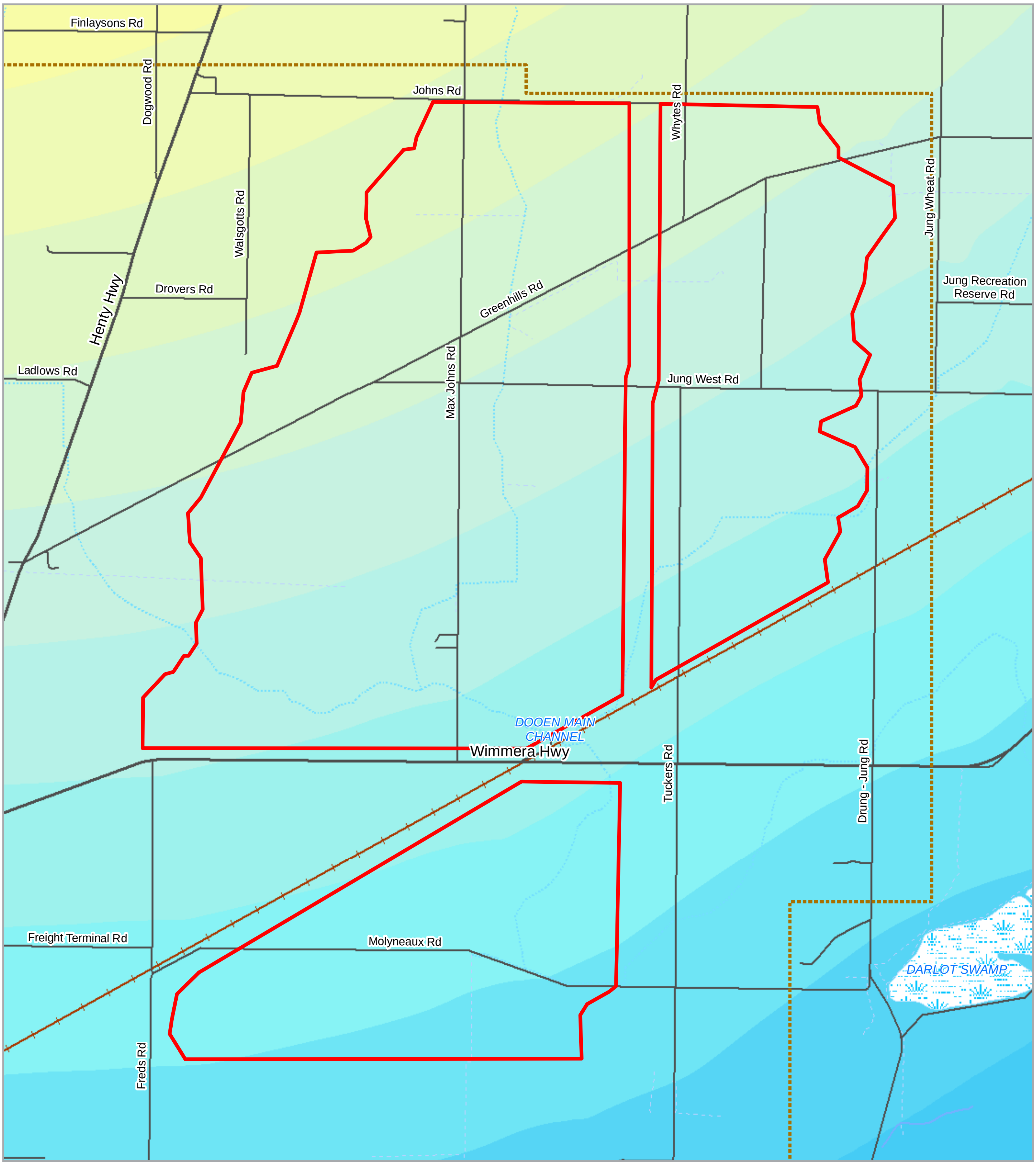
Hydrogeological Assessment
Depth to Top of Geera Clay

Project No. 31-36025
Revision No. 0.0
Date 28/08/2018

Figure 16

G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 28 Aug 2018 - 09:50

Data source: DELWP, VicMap, 2017; WIM, 2018 Created by: bsmyth



Legend

- Project area
- Preliminary mine footprint
- Highway
- Collector
- Lake
- Swamp

Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

WIM Resource Pty Ltd
Avonbank HMS Project

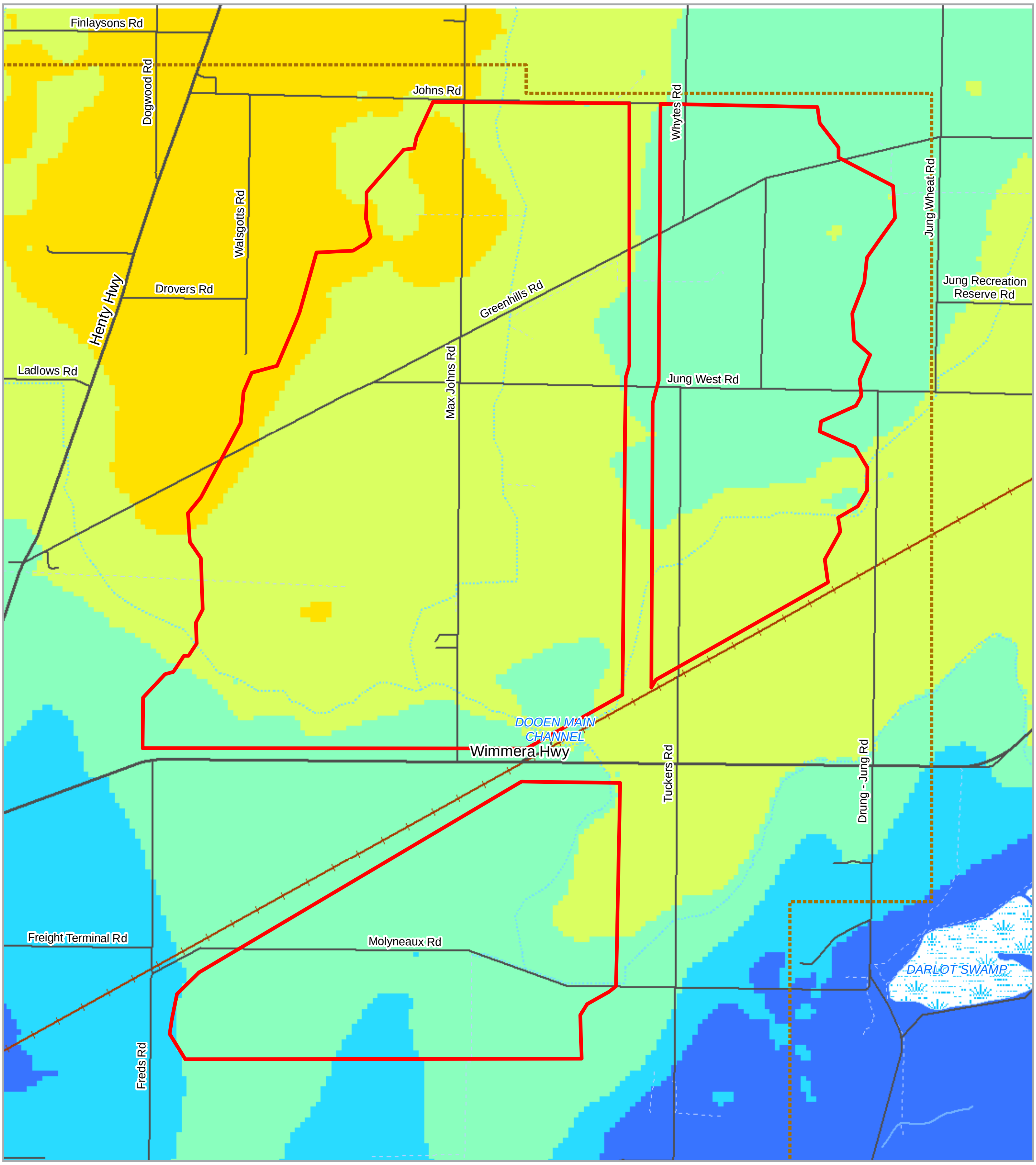
Hydrogeological Assessment
Groundwater level

Project No. 31-36025
Revision No. 0.0
Date 28/08/2018

Figure 17

G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 28 Aug 2018 - 09:50

Data source: DELWP, VicMap, 2017; WIM, 2018 Created by: bsmyth



Legend

- Project area
- Preliminary mine footprint
- Highway
- Collector
- Lake
- Swamp
- Stream
- Channel
- Drain/Channel/Ot...
- Railway

Depth to Groundwater from ground surface (m)

- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 30
- 30 - 35

Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

GHD

WIM Resource Pty Ltd
Avonbank HMS Project

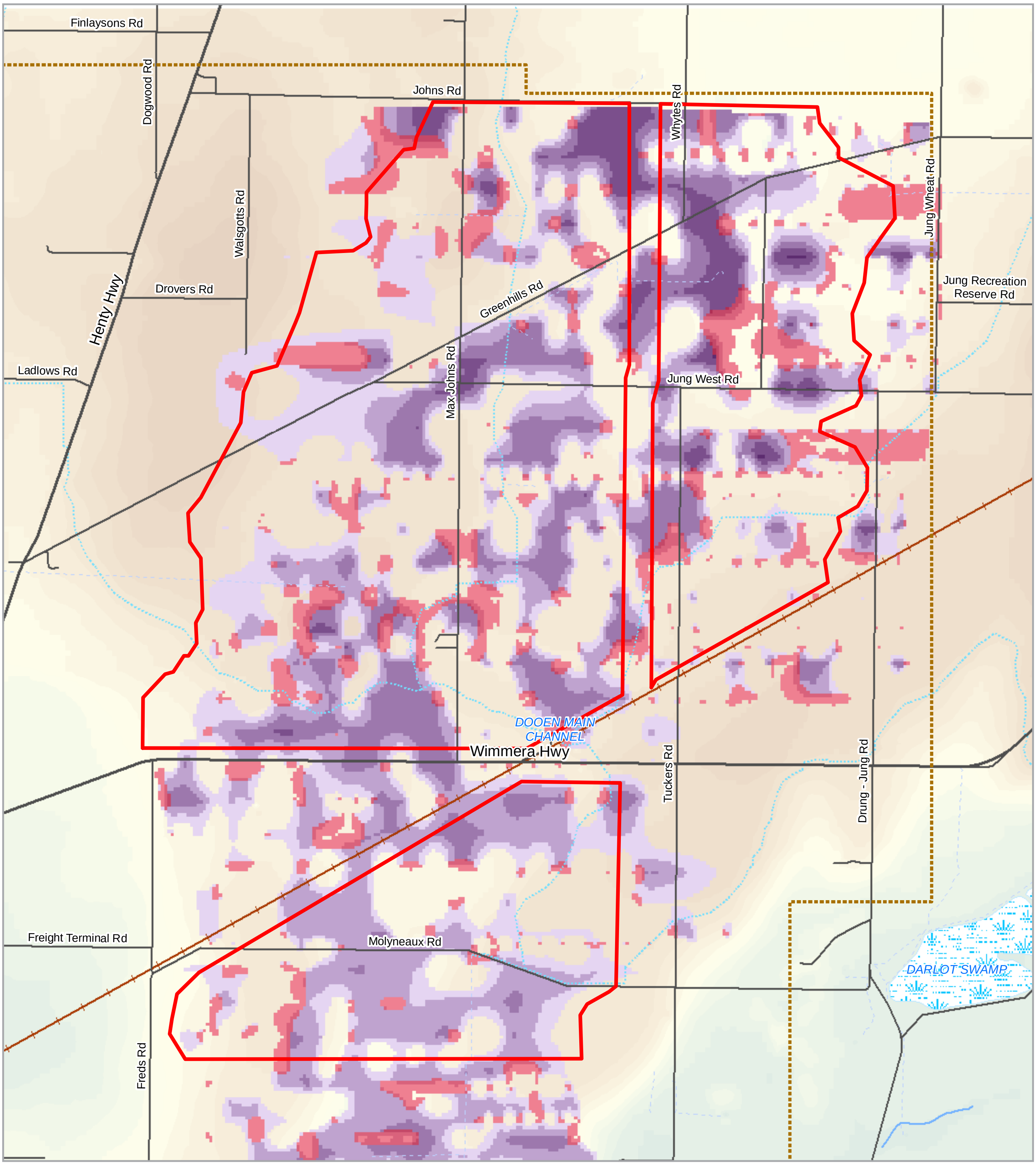
Hydrogeological Assessment
Depth to Groundwater

Project No. 31-36025
Revision No. 0.0
Date 28/08/2018

Figure 18

G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 28 Aug 2018 - 09:50

Data source: DELWP, VicMap, 2017; WIM, 2018 Created by: bsmyth



Legend

- Project area
- Preliminary mine footprint
- Highway
- Collector
- Lake
- Swamp
- Stream
- Channel
- Drain/Channel/Ot...
- Railway

Groundwater level above top of the orebody

- 0.05 - 8.6 m

Orebody in Groundwater

depth of ore in groundwater (m)

- < 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10

Paper Size ISO A4

0 0.3 0.6 0.9 1.2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

WIM Resource Pty Ltd
Avonbank HMS Project

Hydrogeological Assessment
Orebody Thickness below Groundwater

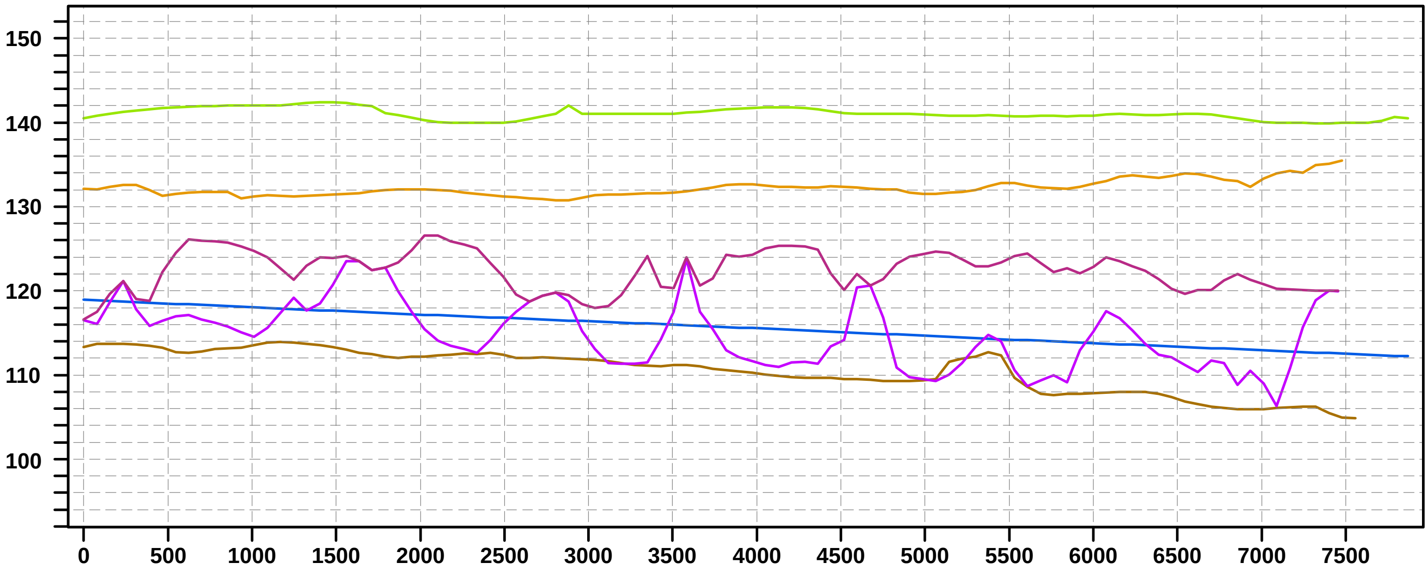
Project No. 31-36025
Revision No. 0.0
Date 28/08/2018

Figure 19

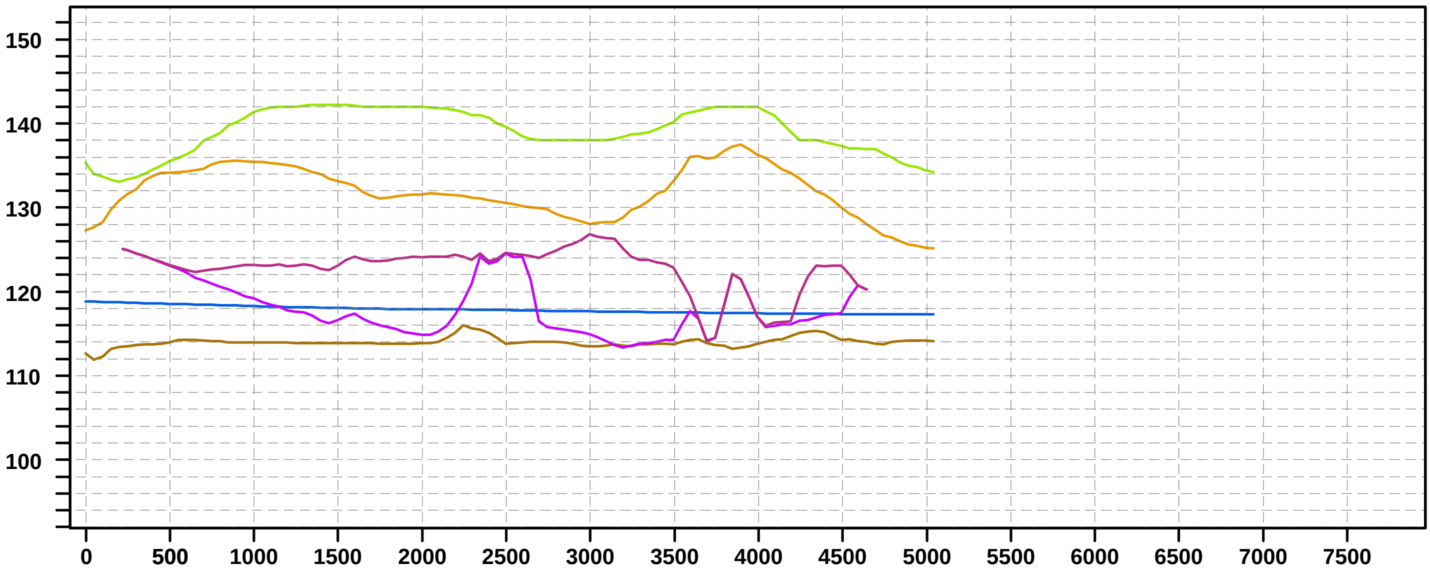
G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 28 Aug 2018 - 09:50

Data source: DELWP, VicMap, 2017; WIM, 2018 Created by: bsmyth

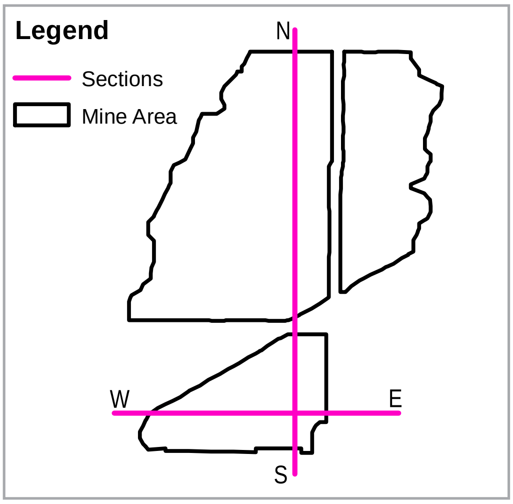
Section S - N



Section W - E



Scale: vertical exageration x50



Legend

Geological Profile

- Ground Surface
- Lower Parilla Sands
- Top of Ore Body
- Base of Ore Body
- Geera Clay
- Ground Water Level

Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Lambert Conformal Conic
Horizontal Datum: GDA 1994
Grid: GDA 1994 VICGRID94

N

WIM Resources Pty Ltd
Avonbank HMS Project

Hydrogeological Assessment
Cross-Sections:
Orebody below Groundwater level

Project No. 31-36025
Revision No. 0.1
Date 06/03/2018

Figure 20

H:\Data\3136025\Maps\Working\3136025_Sections.mxd
Print date: 14 Mar 2018 - 14:20

Data source: WIM Res. 2018. Created by: tworth

6. Proposed Monitoring Bore Network

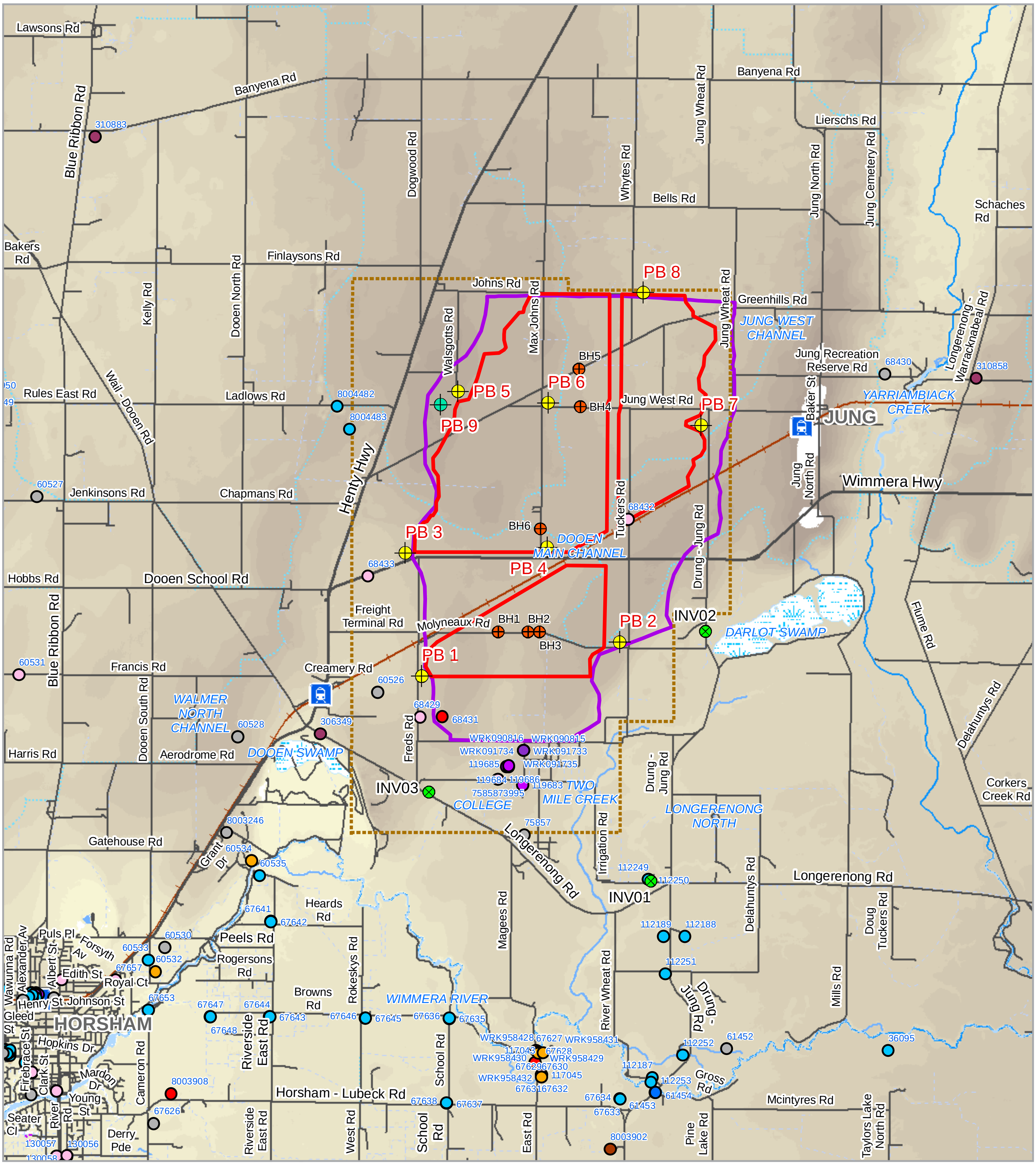
Based on the hydrogeological review GHD has proposed a baseline groundwater monitoring network around the mine area. The monitoring bore locations are shown in Figure 21 and summarised in Table 5.

It is noted that the final bore locations can be adjusted based on access conditions and a site inspection. The bores can be completed in either road reserves or private land in the MLA. This choice will be dependent on WIM's relationship with land owners, however written permission to drill on the land (albeit council or private) will be required prior to submission of the Bore Construction Licences (BCLs) to GWMWater.

Table 5 Proposed Monitoring Bores

Bore ID	Aquifer	Approx. bore depth (m)	Screen From (mBGL)	Screen To (mBGL)	Location Description	Justification /Notes
PB1	PSA	25	22	25	South-west	Network spatial coverage
PB2	PSA	25	22	25	South-east	Spatial coverage and towards Darlot swamp
PB3	PSA	30	27	30	Centre-west	Spatial coverage.
PB4	PSA	30	27	30	Central	Spatial Coverage
PB5	PSA	35	31	34	North-west	Spatial coverage and nested with proposed RGA bore
PB6	PSA	35	31	34	Central- north	Spatial coverage- thicker ore zone
PB7	PSA	35	31	34	North-east	Spatial coverage
PB8	PSA	35	31	34	North	Spatial coverage – area of deeper ore
PB9	RGA	110	101	107	South-west	In area where RGA may be thicker and in combination with INV bores will provide coverage across the MLA of the RGA.

Notes: PB = Proposed Bore



Legend

Proposed monitoring bore locations

- Parilla Sand
- Renmark Group
- WIM existing bores
- Investigation Bores

- Project area
- Preliminary mine footprint
- Ore body extent

Bore use

- NOT KNOWN
- DISPOSAL
- STOCK AND/OR DOMESTIC
- DROUGHT RELIEF
- DRYLAND SALINITY BORE NETWORK
- GROUNDWATER INVESTIGATION
- INDUSTRIAL, OBSERVATION
- INVESTIGATION, OBSERVATION
- INVESTIGATION
- IRRIGATION
- NON GROUNDWATER
- OBSERVATION
- SEC BORES (USE UNIDENTIFIED)
- STATE OBSERVATION NETWORK

Paper Size ISO A4

0 0.75 1.5 2.25 3

Kilometers

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

GHD

WIM Resource Pty Ltd
Avonbank HMS Project

Hydrogeological Assessment
Proposed Monitoring Bore Location

Project No. 31-36025
Revision No. 0
Date 27/08/2018

Figure 21

G:\31\36025\GIS\Maps\Working\3136025_KBM.mxd
Print date: 27 Aug 2018 - 14:10

Data source: DELWP, VicMap, 2017; WIM, 2020 Created by: bsmyth

7. Potential Groundwater Impacts

Potential groundwater impacts associated with the mineral sand mining are summarised in Table 6.

It is noted that the risk associated with these identified potential groundwater impacts will be dependent on a number of key factors including:

- The ore processing technique and slimes placement process, including the final moisture content of the slimes and timing to reach this point.
- The salinity and quality of the surface water used for the ore processing, and the recovery of the process water before it is replaced in the pits.
- Any additives used within the ore processing, or bi-products, which will be replaced to the pit.

As input to the environmental effects assessment, an understanding of these operational factors will be needed so the risk of potential impacts can be assessed. To address these impacts a numerical groundwater model will be required to help estimate:

1) The dewatering rate that will be required for each mine pit, and the drawdown cone that will develop around the mine.
2) The level of mounding associated with the replacement of slimes into the mine pits.

Other potential impacts make be identified by the project reference group, as the planning stages progress.

Table 6 Summary of Potential Groundwater Impacts

Action	Hydrologic Response	Impact to Assess	Note
Dewatering (sump pumping)	Groundwater drawdown	Impact on neighbouring groundwater users	Poor quality water, limited users
		Impact on baseflow to or leakage from a local surface water features	Potential to risk on Wimmera River, Darlot Swamp, etc depending on extent of drawdown cone and ground water-surface water interaction
		Impact to Aquatic GDEs	As noted above, if baseflow or leakage from a surface water feature is impacted then there is the potential to impact aquatic GDEs. The potential GDEs are noted in Table 3. The Wimmera River is identified as a high potential Aquatic GDE, other surface water features are low potential aquatic GDE's: The main potential to impact aquatic GDEs is likely to be the Wimmera River around 3.6 kms away, dependent on the extent of the drawdown cone and the level of ground water-surface water interaction.
		Impact to Terrestrial GDEs	As noted in Section 4.3 (). There are numerous moderate to high potential terrestrial GDEs in the region around the mine area. The potential to impact on these areas will be dependent on the extent and magnitude of the drawdown cone, in conjunction with the vegetation type and tolerance for potential changes in groundwater levels.
		Subsidence	Low risk expected: minor drawdowns limited infrastructure
		Disposal of groundwater	Expected to supplement the ore processing water- no separate disposal requirement.
		Activation of Potential Acid sulfate Soil	Further review required
Disposal of Tailings into the pit: Additional seepage into the aquifer system	Groundwater Mounding	Potential to bring saline groundwater close to the ground surface	Unlikely as ore is >10m depth and tailings are expected to be returned below this depth (ie mounding will not be above the top of the tailings layer). Depends on process water quality.
		Impact on neighbouring users	Dependent on recovery of process water and how excess water will dissipate.

Action	Hydrologic Response	Impact to Assess	Note
		Impact on baseflow to local surface water features	As above.
		Impact to Aquatic GDEs	As above, depending on the level and extent of predicted mounding.
		Impact to Terrestrial GDEs	As above, depending on the level and extent of predicted mounding.
	Change in groundwater quality	Impact on native groundwater quality and beneficial use segment	This will be dependent on the salinity of the process water and any additives used (flocculants) or bi-products. The process water is likely to be fresher than the groundwater. Consideration of beneficial use, extractors (ie Mt Zero borefield), aquatic and terrestrial GDEs etc. Consideration of Radionuclides concentration changes
		Geochemical reactions and potential clogging of the aquifer	

Action	Hydrologic Response	Impact to Assess	Note
Disposal of Tailings into the pit: Changes in aquifer permeability	Impact on regional flow direction and Groundwater level variations	Impact on neighbouring users	Limited users. Dependent on the permeability of the tailing when returned to the pit.
		Impact on baseflow to local surface water features	As above
		Impact to Aquatic GDEs	As above, depending on the level and extent of predicted groundwater level variations
		Impact to Terrestrial GDEs	As above, depending on the level and extent of predicted groundwater level variations.
		Impact on depth to groundwater	Potential to cause soil salinisation,
Disposal of tailings to the pit: Perched water table.	Development of a perched water table or saturated saline tailing near surface	Soil salinisation if saline tailings are replaced within 3m of the ground surface And perched water table	Unlikely to be a high risk as ore is >10m depth and tailings are expected to be returned below this depth (ie mounding will not be above the top of the tailings layer). The region has low groundwater recharge rates. The risk will also depends on process water quality.
Construction: Hydrocarbon/chemical spills	Impact on groundwater quality	Impact on native groundwater quality and beneficial use	Unlikely, but environmental management plans will need to be in places

8. Conclusions

The objective of this desktop hydrogeological review wasto characterise the groundwater resources in the direct vicinity of their proposed mineral sands mining area, and to propose a baseline groundwater monitoring bore network. Based on the work completed the following conclusions have been made:

- The ore deposit is within the Parilla Sands Aquifer system. This aquifer system is unconfined, with groundwater depth around 20m at the southern end of the deposit, which increases to around 25 depth to the north (AGSO, 1994). The groundwater flow is generally in a north-westerly direction. The saturated thickness of the aquifer system is expected to be approximately 4 to 8 m through the proposed mine area. Bore yields from this aquifer are expected to be less the 0.5 L/sec, reflecting the relatively fine and clayey nature of the PSA in this area.
- The groundwater salinity in the PSA is in the order of 3,000 to 7,000 mg/L Total Dissolved Solids (TDS) at the northern end of the deposits and 7,000 to 14,000 mg/L at the southern end, based on regional data (AGSO, 1992). The initial results from the 6 temporary bores installed by WIM was slightly different to the regional interpretation, with the majority of bores recording salinity between approximately 9,000 and 11,000 mg/L TDS, the exception being bore BH2, in the south which recorded approximately 5,000 mg/L TDS.
- The deposit thickness is highly variable, with the majority of the deposit being greater than 5m thick where mining is proposed, with the thickest areas, generally in the centre and to the south, being up to 18m. The depth to the top of the deposit generally varies between 10m and 30m, with the deposit generally being deeper to the north.
- The deposit is partially saturated, generally <4m below the water table in the south and generally <6m below the water table in the north. On the northern end of the mine area there is a zone where the ore is 6-8m below the water table. Assuming the aquifer parameters are similar across the whole deposit, this northern area is likely to be where the maximum groundwater inflow to the mine pit will occur, and therefore where the maximum dewatering rates will be needed (ie. sump pumping). In some areas the base of the deposit is above the regional water table.

9. References

AGSO, 1992,” Murray basin Hydrogeological Map Series: Horsham Mapsheet”.

Department of Environment, Land, Water and Planning (DELWP) Groundwater Management System (WMIS) database.

Smart, 2009 “Groundwater Investigations WIM150-April 2009” for Australian Zircon N.L.

10. Limitations

This report: has been prepared by GHD for WIM Resource Pty Ltd and *may only be used and relied on by WIM Resource Pty Ltd for the purpose agreed between GHD and the WIM Resource Pty Ltd as set out in Section 2 of this report.*

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

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

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

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

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

Appendices

Appendix A – Bore details

Bore_ID	Drilled date	Total depth	Status	Date decomr	Screen from	Screen to	Screen lithology	Condition	Water level (Depth to water (m))	TDS (mg/L)	EC (uS/cm)	Aquifer
112188	3/11/1991	21.50	Decommissioned	9/11/2013	2.10	3.40	NOT KNOWN		4.26	N	N	Quaternary Aquifer
112189	3/11/1991	28.00	Decommissioned	9/11/2013	2.00	4.00	NOT KNOWN		6.41	N	N	Quaternary Aquifer
112249	6/12/1991	26.50	Decommissioned	9/11/2013	2.00	4.00	CLAY		4.47	N	N	Quaternary Aquifer
112250	8/12/1991	26.50	Decommissioned	9/11/2013	16.00	18.00	SAND		6.29	N	N	Upper Tertiary Aquifer (marine)
112251	3/11/1991	28.00	Decommissioned	9/11/2013	16.00	18.00	NOT KNOWN		6.44	N	N	Upper Tertiary Aquifer (marine)
119683	8/12/1993	17.50	Used		14.50	16.50	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
119684	9/12/1993	6.70	Not Used		0.00	0.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
119685	10/12/1993	6.70	Not Used		0.00	0.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
119686	14/12/1993	17.50	Used		14.50	16.50	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
306349	7/10/1981	141.00	Used		0.00	0.00	NOT KNOWN		N	N	N	Basement
310858	8/10/1981	140.00	Used		0.00	0.00	NOT KNOWN		N	N	N	Basement
60526	7/07/1958	0.00	Used		0.00	0.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
60528	31/12/1960	68.58	Used		30.48	68.58	GRAVEL		N	4103	7118	Upper Mid-Tertiary Aquitard
60534	1/01/1988	28.00	Decommissioned	9/11/2013	0.00	0.00	NOT KNOWN	BORE DESTROYED - recorded 14/08/2008	4.42	8223	15000	Upper Tertiary Aquifer (marine)
60535	21/10/1990	28.00	Decommissioned	9/11/2013	20.00	22.00	NOT KNOWN		19.84	10220.6	17000	Upper Tertiary Aquifer (marine)
67641	1/01/1988	25.00	Decommissioned	10/11/2013	0.00	0.00	NOT KNOWN		7.81	9514.2	16000	Upper Tertiary Aquifer (marine)
67642	1/01/1988	8.90	Decommissioned	10/11/2013	0.00	0.00	NOT KNOWN	BORE DRY - recorded 14/08/2008	7.49	9146.5	16000	Upper Tertiary Aquifer (marine)
68429	31/12/1959	131.06	Used		0.00	0.00	NOT KNOWN		N	N	N	Basement
68430	10/05/1968	106.68	Used		0.00	0.00	NOT KNOWN		N	2680	4600	Basement
68431	31/12/1959	0.00	Used		0.00	0.00	NOT KNOWN		N	3960	N	Unknown
68432	2/12/1989	32.00	Used		23.80	24.80	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
68433	2/12/1989	20.00	Used		16.00	18.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
73995	17/08/1989	22.00	Used		16.00	20.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
75857	8/03/1974	32.01	Used		21.95	24.39	GRAVEL		N	N	N	Upper Tertiary Aquifer (marine)
75858	17/08/1989	22.00	Used		16.00	20.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
8003246		29.30	Not Used		0.00	0.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
8004482	21/01/2012	34.00	Used		0.00	0.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
8004483	22/01/2012	31.00	Used		0.00	0.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
WRK090815	28/01/2016	16.00	Used		10.00	16.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
WRK090816	28/01/2016	16.00	Used		10.00	16.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
WRK091733	28/01/2016	16.00	Used		10.00	16.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
WRK091734	28/01/2016	16.00	Used		10.00	16.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
WRK091735	28/01/2016	16.00	Used		10.00	16.00	NOT KNOWN		N	N	N	Upper Tertiary Aquifer (marine)
INV01	8/01/2014	84.00000000000	Used		33.00000000000	57.00000000000	SAND		5.5	5800	N	Lower Tertiary Aquifer
INV02	12/01/2014	116.50000000000	Used		50.00000000000	60.00000000000	SAND SILT AND GRAVEL		5.5	10000	N	Lower Tertiary Aquifer
INV03	24/01/2014	128.00000000000	Used		67.00000000000	73.00000000000	SILT SAND AND SHELLS		16.5	Unknown	N	Lower Tertiary Aquifer
BH1	NA	27.70000000000	Used		Unknown	Unknown	Unknown		17.45	N	15580	Unknown
BH2	28/04/2016	27.00000000000	Used		19.00000000000	25.00000000000	Unknown		16.16666667	N	8450	Unknown
BH3	28/04/2016	28.00000000000	Used		19.00000000000	25.00000000000	Unknown		16.85833333	N	16400	Unknown
BH4	NA	34.40000000000	Used		24.40000000000	32.40000000000	Unknown		25.55666667	N	18490	Unknown
BH5	NA	35.00000000000	Used		Unknown	Unknown	Unknown		26.42333333	N	18440	Unknown
BH6	NA	34.00000000000	Used		24.00000000000	32.00000000000	Unknown		23.40833333	N	18020	Unknown

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