

Summary of findings

Groundwater resources in the Gunbower area

Hydrogeological assessment by GHD – July 2020

Background

Goulburn-Murray Water (GMW) engaged GHD Pty Ltd (GHD) to undertake a desktop hydrogeological assessment for an area between Torrumbarry and Kerang, in Northern Victoria ('Gunbower Area' hereafter). This was to determine the groundwater resource availability for the deep lead aquifers in the area and the risks associated with potential use.

Groundwater resources in the study area are in an 'unincorporated area'. This means they are not covered by a groundwater management unit or plan. At this time there is no specific resource management arrangements in place to manage extraction and environmental or sustainability consequences.

The assessment determined a number of risks and areas for consideration, including:

- the use of high salinity water for irrigation on agricultural production and the environment;
- the potential irreversible salinisation of the deep lead aquifer; and
- potential impacts to groundwater levels that are used to determine annual allocations for existing groundwater licence holders within the adjacent Lower Campaspe Valley Water Supply Protection Area and Mid-Loddon Groundwater Management Area

Purpose of study

The purpose of this assessment was to inform the development of a sustainable yield for the deep lead aquifers in the Gunbower Area and provide information to inform a precautionary allocation of additional groundwater entitlements. The assessment also identified key information gaps and a targeted approach for improving information needed for GMW to decide on the potential for additional allocations in the area.

Study findings

The report has determined that currently 5,600 ML/yr can be made available for licensing at a low level of risk to the aquifer system and surrounding systems.

There is currently 1,945 ML/yr already licensed in the area, meaning an additional 3,655 ML/yr can be allocated at a low level of risk based on current knowledge of the system. The report also outlines recommendations for technical investigations to better understand the resource availability and potential risks, and whether additional entitlements can be allocated.

Study area

Figure 1 details the region of the hydrogeological assessment (the central and lower sections of the Loddon and Campaspe groundwater catchments). The focus area of study – delineated by a black and white line in Figure 1 – extends along the River Murray from Torrumbarry to Kerang.

Environmental features exist in the area and have a high potential to be groundwater dependent ecosystems along creeks within the focus area, including Mount Hope Creek, Pyramid Creek and Gunbower Creek; and moderate potential along the River Murray. Kow Swamp is not classified as a groundwater dependent ecosystems as its main recharge source is from the GMW regulated channel system.

Hydrogeology

Within the focus area groundwater is contained within multiple geological units, or aquifers, at different depths. This includes shallow, deep lead and bedrock aquifers. The formation of these aquifers is varied: clays, silts and sands dominate the shallow (watertable) aquifer; sands and gravels dominate the deep lead aquifer; and the bedrock aquifer is made up of fractured sedimentary basement rocks.

Based on the available data, the salinity of groundwater in the deep lead – the target aquifer for development within this area – ranges between 5,500 and 20,000 $\mu\text{S}/\text{cm}$ (EC) (Figure 19). To put this into perspective, sea water is approximately 50,000 EC, on average. GMW will work with Agriculture Victoria to better understand the impacts to the environment and agricultural productivity of the use of saline groundwater for irrigation to inform licensing

August 2020; ID#A3803953

decisions.

Groundwater resources

Groundwater level monitoring data indicates that the deep lead aquifer system is stable under average climate conditions; however, under dry conditions, when there is greater groundwater extraction across the region and potentially less recharge, groundwater is being removed from storage and the aquifer is under more stress.

Within the focus area, deep lead groundwater levels have generally declined by around 6m since 1995 (pre-Millennium drought). The declining trend during this dry period indicates that the aquifer recharge/discharge processes are not in balance and groundwater is being taken from storage. These declining levels indicate connection to heavily utilised adjacent aquifer systems.

Within the focus area there are currently three bores licensed for irrigation. They all access groundwater within the deep lead aquifer system (100-135 m below the surface) and have a combined licence volume (entitlement) of 1,945 ML/yr. The bores are high yielding (14-15 ML/day) and the water quality is largely unsuitable for irrigation without mixing with other water or salt removal.

Data gaps and limitations

In the aquifer through-flow (flow of water through an aquifer) estimations, the following data gaps were identified:

Aquifer parameters (e.g. hydraulic conductivity) – these were estimated due to the lack of existing data in the area.

Groundwater level monitoring data in New South Wales – poor information available for bores north of the River Murray.

Additional technical work may reveal that the aquifer through-flow is higher than the estimations in the hydrogeological assessment and whether this may mean that a larger volume of extraction could be sustainable.

Recommendations

Recommendations made by GHD included:

Limit initial licence entitlements to 5,600 ML/year within the focus area.

Undertake further technical investigations to assess the potential impacts of additional extraction in the area and to provide a more technically rigorous sustainable yield estimate; e.g. multiple pumping

tests, numerical groundwater modelling, groundwater quality monitoring.

Complete further work in regards to determining available groundwater entitlements in consideration of requirements of the Murray Darling Basin Plan and implications for Sustainable Diversion Limits under the Plan and the management of the groundwater resource in NSW.

Next steps

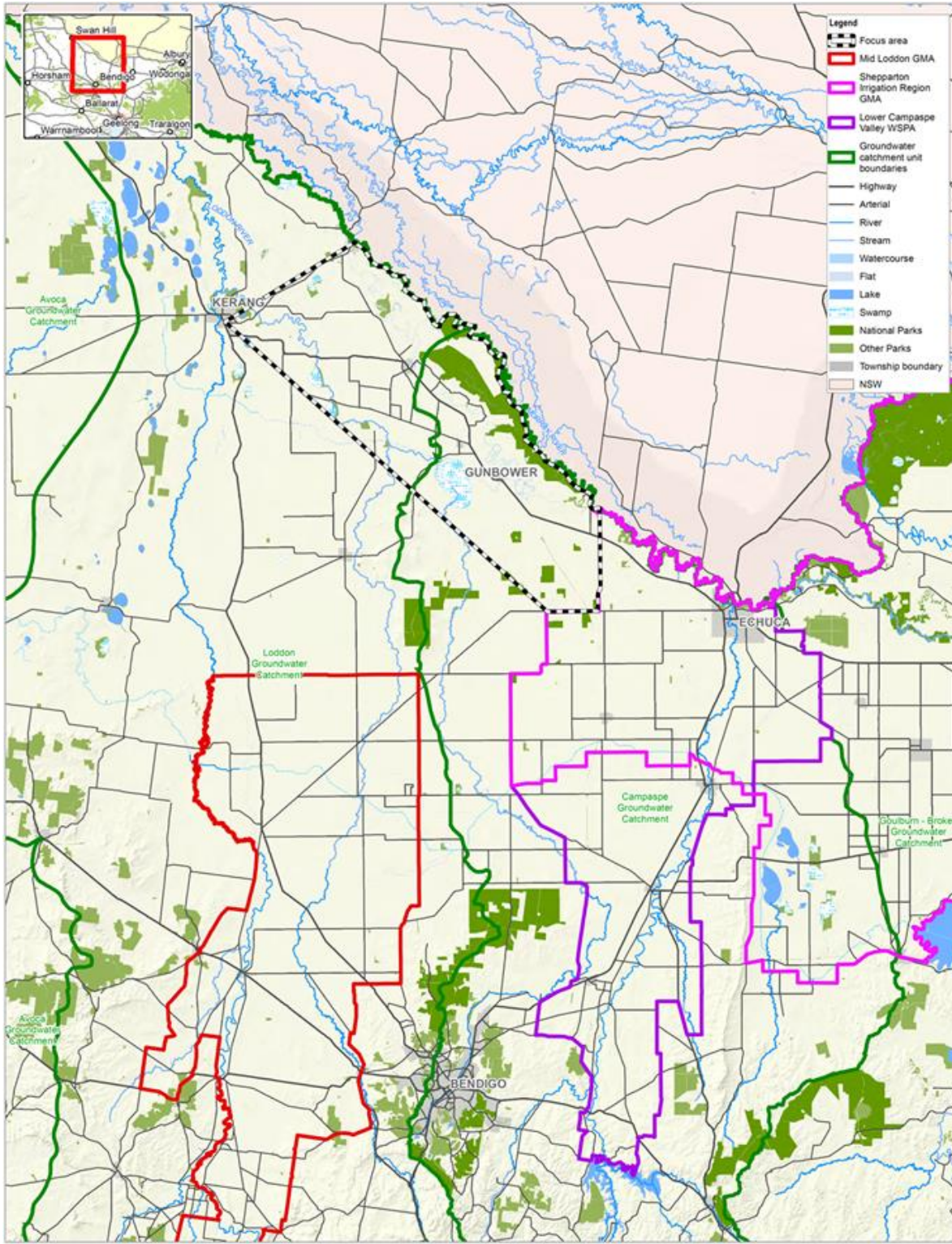
GMW will facilitate a webinar on Thursday 20 August 2020, at 12pm to discuss the report and process to consider licence applications including the distribution of the available 3,655 ML/yr. GMW, GHD and Agriculture Victoria staff will be presenting and available to answer questions you have on the day.

Please RSVP (including any questions you have) for the webinar no later than Tuesday 18 August 2020 to communications@gmwater.com.au or call Stephen Lamb on (03) 5826 3731.

The report itself is very detailed, therefore if you have any questions ahead of the webinar please contact Mr Scott Ridges on (03) 5826 3485.

References

EC (Electrical Conductivity) is a unit of measure of water salinity, expressed in microsiemens per centimetre ($\mu\text{S}/\text{cm}$). Not to be confused with Total Dissolved Solids (TDS), expressed in milligrams per litre (mg/L). Conversion: 1,000 $\mu\text{S}/\text{cm}$ EC equates to approx. 640 mg/L TDS.



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 Kilometres
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 Horizontal Datum: GDA 1984
 Grid: GDA 1984 VICGRID54

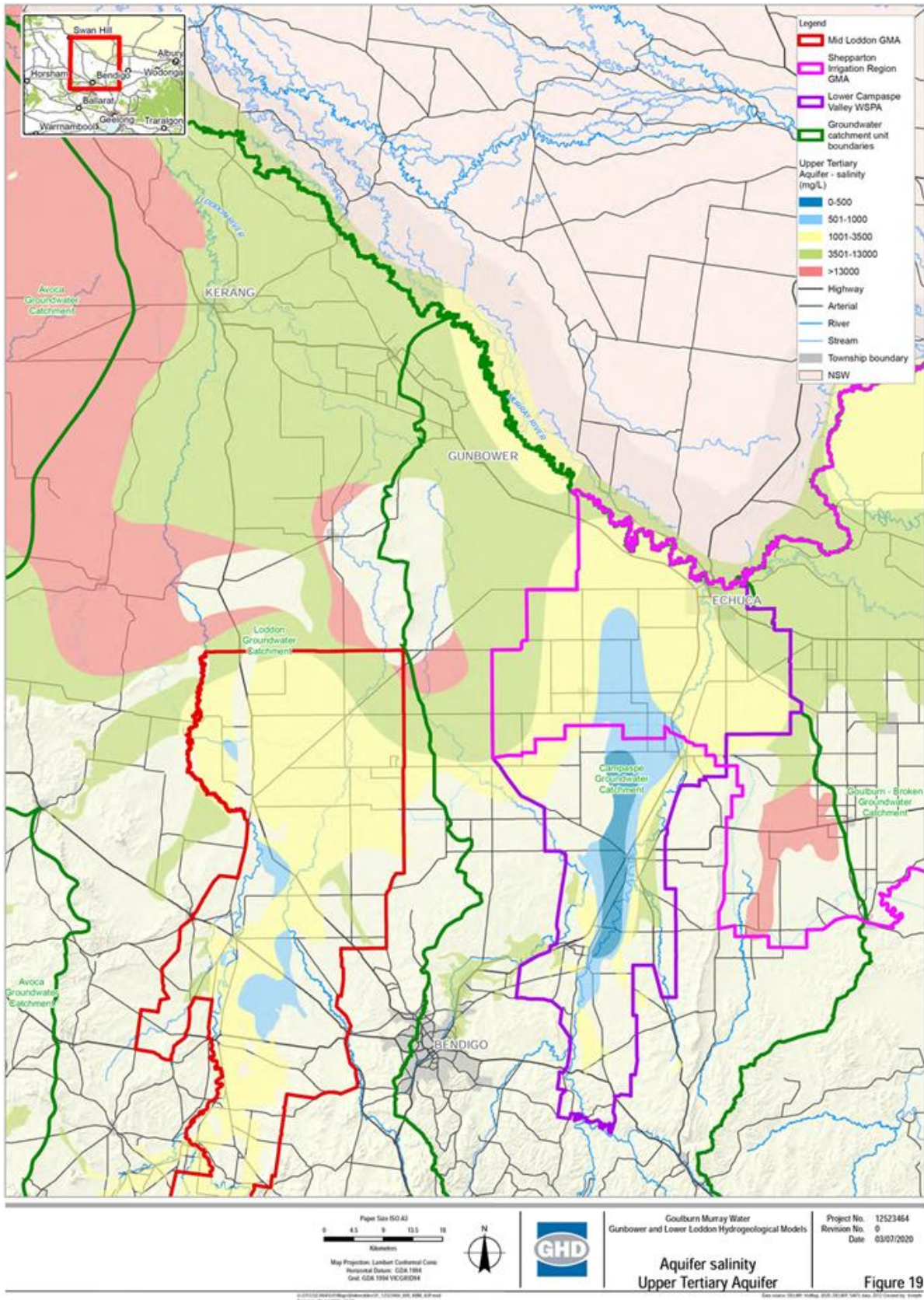


Goulburn Murray Water
 Gunbower and Lower Loddon Hydrogeological Models

Project No. 12523464
 Revision No. 6
 Date 03/07/2020

**Study area
 overview plan**

Figure 1



Date & version no; DM #