Groundwater Management Plan

for the

Katunga Water Supply Protection Area

2006

I, John Thwaites, Minister for Water, approve this management plan in accordance with section 32A(6) of the Water Act 1989.

JOHN THWAITES
Minister for Water

Date: 24.7.06

CONTENTS

Glossary

"Act" - means the *Water Act 1989*;

"annual allocation" – means the percentage of the groundwater licence entitlement that is permitted to be used under a licence for the year in which the announcement under prescription 1 is made;

"aquifer" – means a geological structure of formation permeated or capable of being permeated permanently or intermittently with water;

"Authority" - means Goulburn-Murray Rural Water Authority;

"bore construction licence" - means a licence to construct a bore issued under section 67 of the Act;

"drawdown" – means the difference between the observed water level in a bore before and after groundwater pumping occurs;

"groundwater licence entitlement" - means the total amount of groundwater authorised to be taken each year under a groundwater licence;

"groundwater licence" - means a licence to take and use groundwater issued under section 51 of the Act;

"groundwater management system" - is a data base of groundwater information managed by the Authority and the Department of Sustainability and Environment;

"groundwater use" – means the volume of groundwater extracted from a bore that has been measured by a meter or has been estimated where a meter is not fitted;

"management zone" – means an area of the Protection Area, named and approximately delineated in Schedule 1 and more accurately shown in Plan No. LEGL/06-251, which may be viewed during business hours at:

i) the central Plan Office, Land Registry, Department of Sustainability and Environment, 570 Bourke Street, Melbourne; and

ii) at the office of the Authority, 40 Casey Street, Tatura;

"ML" – means megalitre;

"off-property transfer" - means a transfer of a groundwater licence to a person to take and use groundwater from a bore on different land to which the licence was originally issued;

"permanent transfer" – means a transfer of a groundwater licence to another person on a permanent basis;

"**Protection Area**" - means the Katunga Water Supply Protection Area;

"recovery level" – means the level to which groundwater will return to after pumping has ceased;

"temporary transfer" – means a transfer of a groundwater licence to another person on a temporary basis;

"year" - means a period of 12 months beginning 1 July.

1 INTRODUCTION

The management plan has been prepared under Division 3 of Part 3 of the Act for the Katunga Water Supply Protection Area which was declared on 14 January 1999. The management plan relates to the groundwater resources of the Protection Area that are below a depth of 25 metres from the ground surface.

There is a large volume of groundwater stored in the aquifers in the Protection Area but extracting groundwater does affect groundwater levels. The Plan aims to use annual allocations to manage groundwater extractions to prevent groundwater levels from falling below what many groundwater users consider to be an acceptable level based on equity, accessibility and cost.

A monitoring and metering program provides the information necessary to manage the groundwater in the Protection Area.

Licences will be able to be transferred both permanently and temporarily to give people the flexibility to adjust their operations to changing circumstances.

An annual report will be produced and made publicly available so that the community will be aware of how the groundwater resource in the Protection Area is being managed. The report will alert groundwater users and the wider community to any emerging issues.

In developing the management plan environmental issues were considered, however no significant issues were identified.

2 PHYSICAL CHARACTERISTICS OF THE PROTECTION AREA

The Katunga Water Supply Protection Area is located to the north and west of the Great Dividing Range (see Figure 2). It incorporates parts of the flood plains of the River Murray, Broken Creek and the Goulburn River between Yarrawonga and Barmah and covers an area of approximately 2,100 km^2.

The groundwater resources of the Protection Area occur at depths greater than 25 metres below surface in the unconsolidated alluvial deposits generally referred to as the Murray Valley Deep Lead Aquifer system, although relatively high yields can also be obtained from parts of the lower Shepparton Formation aquifers.

The overlying upper Shepparton Formation aquifers (at depths less than 25 metres) also contain significant groundwater resources that are managed separately under the Shepparton Irrigation Region Groundwater Management Plan. The cross-section in Figure 1 below is representative of the aquifers in the Protection Area.

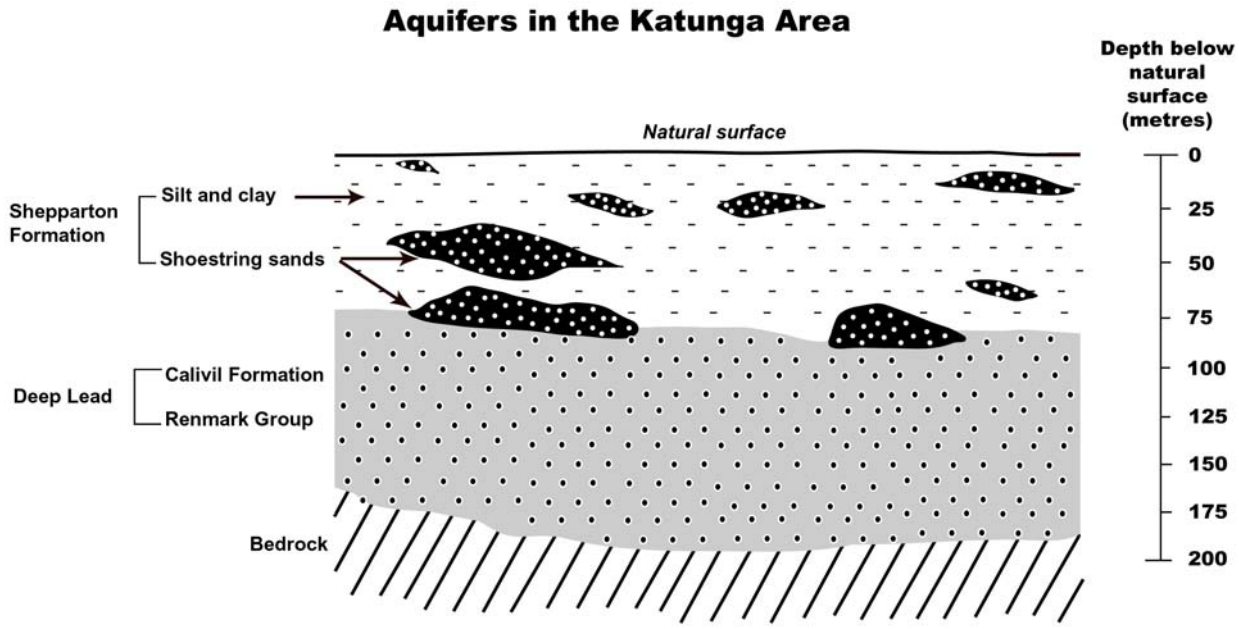

Figure 1. A cross-section of the aquifers in the Katunga Water Supply Protection Area

A large part of the Protection Area is within the Murray Valley Irrigation Area, which is supplied with surface water from the Murray River through a network of channels. Pasture production for the dairy industry is predominant in the Protection Area and is flood irrigated. A mixture of flood and pressure (drip or micro-spray) irrigation occurs in the limited horticultural areas in the north-eastern part of the Protection Area.

The Protection Area encompasses a complex hydrological system. While the aquifers are mostly recharged from rainfall and irrigation activities, the behaviour of the groundwater system is influenced by surface water features (including channels, drains and waterways), groundwater pumping and groundwater flowing to and from areas adjacent to the Protection Area. Groundwater extractions in New South Wales and the upper Shepparton Formation aquifer system also influence the system's behaviour.

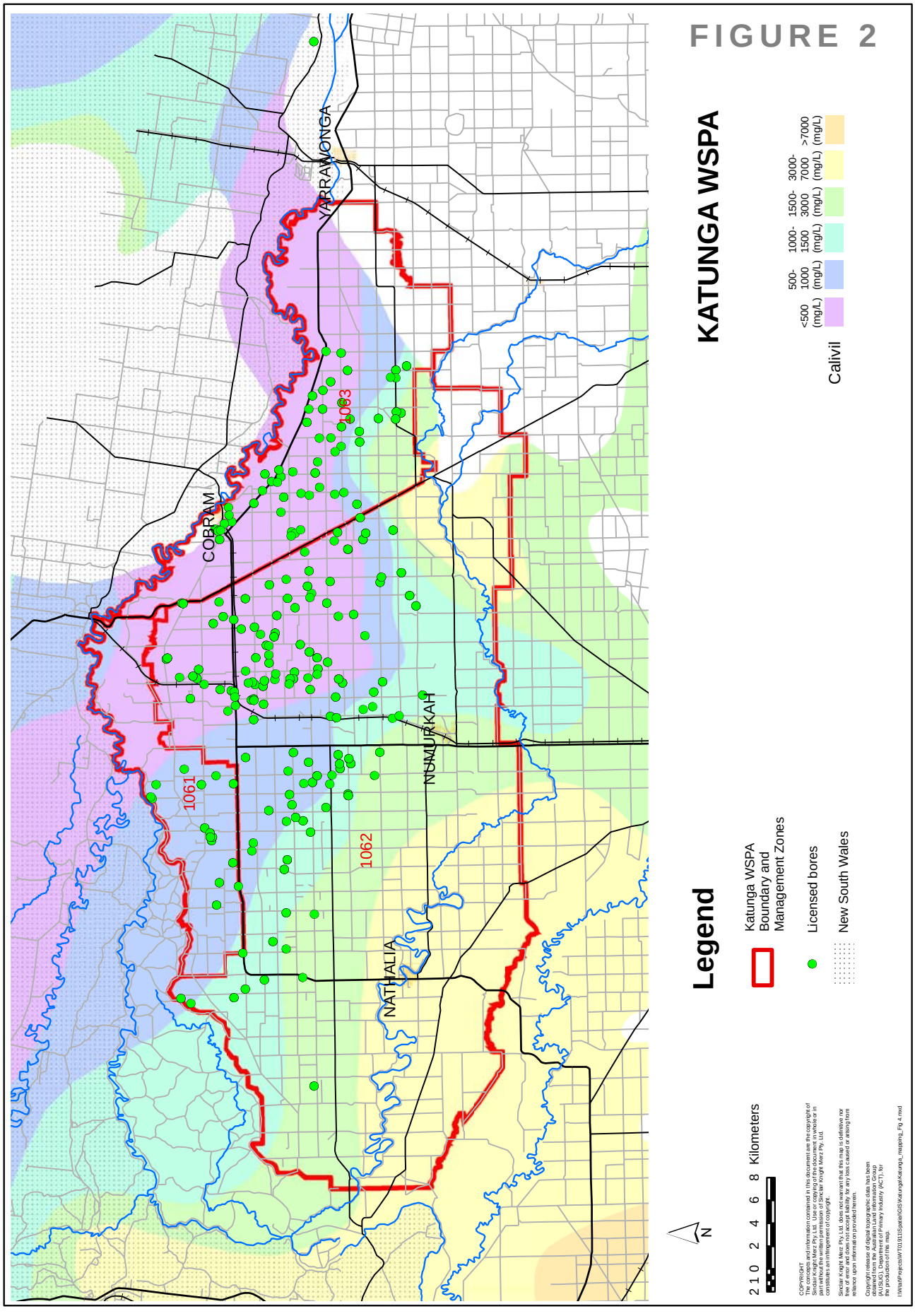
FIGURE 2
KATUNGA WSPA
Calivil
<500 (mg/L)
500-1000 (mg/L)
1000-1500 (mg/L)
1500-3000 (mg/L)
3000-7000 (mg/L)
>7000 (mg/L)
Legend
Katunga WSPA Boundary and Management Zones
Licensed bores
New South Wales
1061
1062
1063
YARRAWONGA
COBRAM
NUMURKAH
NATHALIA
N
2 1 0 2 4 6 8 Kilometers
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3 GROUNDWATER ENTITLEMENTS AND USE

The use of groundwater for other than domestic and stock use is authorised under a groundwater licence issued under the Act. There are 195 groundwater licences in the Protection Area that authorise a total of 59,780 ML/year to be taken and used each year. Figure 1 also shows the location of the bores associated with groundwater licences. People have rights to take groundwater for domestic and stock use free of charge. The management plan does not place any special requirements on the use of groundwater for domestic and stock purposes.

Approximately 90% of the groundwater used in the Protection Area is for irrigation purposes. Groundwater is also extensively used in dairies for cooling and wash-down purposes and for other commercial and industrial use, including urban water supplies.

Up until the 1972/73 drought there was very little use of groundwater for irrigation partly because the community was not generally aware of the Murray Valley Deep Lead aquifers and their potential for irrigation supply. By the late 1970's total groundwater licence entitlements in the Protection Area were about 14,000 ML/year. Demand for groundwater increased significantly in the early 1980's as a result of the 1982/83 drought. Salinity initiatives in the 1990's promoted the use of groundwater in the Protection Area and groundwater charges were waived between 1992 and 1999 as they were seen to be a disincentive to use groundwater. In 1998 a moratorium on new licences was introduced.

Over the 5 years up until 2004/2005, the average annual metered groundwater use was 28,320 ML/year. In 2002/2003 groundwater use peaked at 40,470 ML/year. Not all licence holders have used groundwater in the last 5 years. There were 44 licence holders with groundwater licence entitlements totalling 3,500 ML/year whose bores were not metered or did not extract any groundwater during this period.

Water usage between 1999/2000 and 2004/2005 measured by meters is shown in Table 1.

Table 1 - Metered groundwater use

Season	ML/year used
1999/00	28,645
2000/01	22,795
2001/02	28,873
2002/03	40,470
2003/04	24,285
2004/05	25,660

4 OBJECTIVE

The objective of the management plan as set out in the Act is to make sure that *the water resources of the area are managed in an equitable manner so as to ensure the long-term sustainability of those resources*.

Equitable means that everyone is treated fairly. When annual allocations are made under the management plan all licence holders in the Protection Area will be treated in the same manner. Individual users will be able to use water as they prefer to use it. Some may regularly use groundwater every year while others rely on it during periods of drought and so use more in some years than in others. Under the management plan there will be rules for licence transfers; they are set out further in section 7.

To ensure the long-term sustainability of the groundwater resource the management plan aims to prevent groundwater levels measured in Spring from declining below

recent recovery levels and to maintain them at levels that ensure access to groundwater without major cost impacts.

It is possible to allow groundwater levels to decline further but in doing so, costs would be incurred by some groundwater users who might need to deepen bores or lower pumps. Pumping costs would also increase.

Falling water levels in the Murray Valley Deep Lead aquifer would also mean that increased quantities of water would be drawn from overlying Shepparton Formation aquifers. This may impact in the long term on the upper Shepparton Formation aquifers which are an important supply to shallow pumpers, particularly in dry periods. It could also have water salinity impacts although short term impacts on the Deep Lead aquifer are expected to be small. Monitoring is required to assess long term changes.

5 ADMINISTRATION AND ENFORCEMENT OF THE PLAN

The Authority has the duty of administering and enforcing the management plan.

6 RESTRICTIONS ON TAKING GROUNDWATER

Groundwater licences in the Protection Area authorise a total of 59,780 ML/year of groundwater to be taken each year. Average use over the last 5 years has been approximately half of the total groundwater licence entitlement.

Groundwater levels are affected by the amount of groundwater extracted, as shown in Figure 3. There is a relationship between groundwater use and water levels as follows:

- When average use is around 10,000 ML/year or less (A-B), average recovery levels do not fall and seasonal fluctuation is slight.
- When average use is around 25,000-30,000 ML/year (B-D), seasonal fluctuations increase and average recovery levels fall to around 20 metres below ground surface.
- If average use increases above 30,000 ML/year (D-E), average recovery levels will be greater than 20 metres below ground surface and are likely to be around 23 metres if average use was 38,000 ML/year.

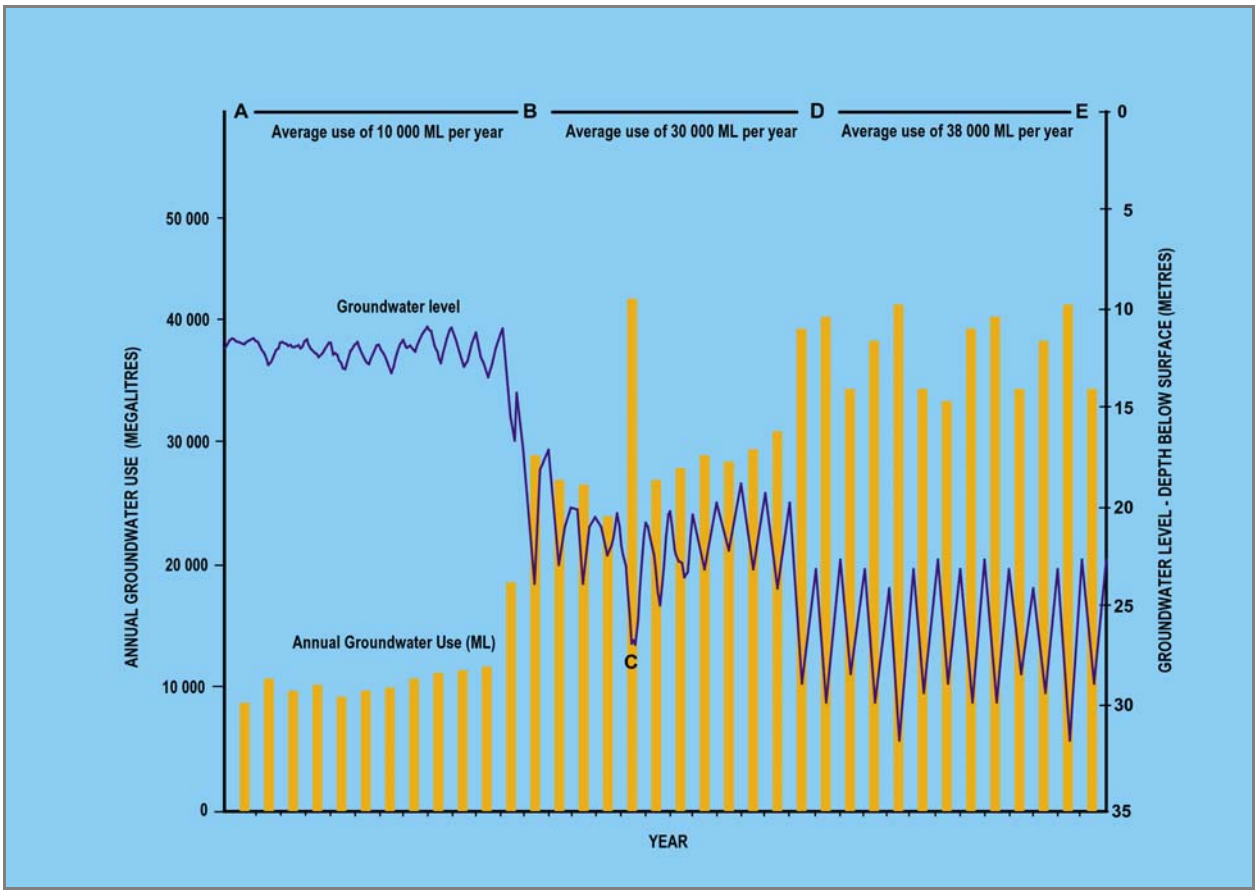

Figure 3. Typical relationship between use and groundwater levels

The management plan aims to manage groundwater extractions so that the average Spring five-year groundwater level recovers to 20 metres below ground level or higher. This is referred to as the average recovery level. Eight groundwater monitoring bores (see Schedule 2), spread over the intensively pumped area and screened in the Deep Lead, will be used to calculate the average recovery level. The actual recovery level in any year is expected to be around the B-D range in the above graph.

The 20-metre average recovery level was chosen because a lower level may affect access to water late in the irrigation season when levels fall due to pumping, particularly people who have shallower bores. It would also cause increased pumping costs to be incurred by everyone.

To ensure that groundwater levels recover as planned a system of annual allocations will be put in place and the allocation for each season will depend on the 5-year average annual groundwater use. A system of annual allocations will give certainty for the coming season and users will know the volume of groundwater that will be available prior to the season commencing. Groundwater users will then be able to plan their operations with confidence.

The annual allocation will be determined following the examination of the preceding 5-year average annual groundwater use for the Protection Area. A 5-year average is used because data has shown that the aquifer was relatively slow in recovering from the high use in 2002/03 and the extent to which levels recover in any year is affected by the date that pumping started that season. Therefore, while the management plan aims to prevent the average recovery level from falling below 20 metres, in the occasional drought year when pumping starts early because of dry spring conditions, the recovery level may not reach 20 metres in that year, but under the rules of the management plan will return to this level in subsequent years. A variation of 2

metres is considered acceptable from the average level predicted from the 5-year average pumping volume. Each year, the Authority will review the relationship between average use and average level illustrated in Figure 3 and may make recommendations on the need for review of the management plan if the actual average level is 2 metres above or below the predicted average level.

Few licence holders extract their full groundwater licence entitlement every year. Groundwater use will vary depending on climatic conditions, availability of surface water and on individual farming practices. Over the 5 years up to 2004/05, the average annual metered groundwater use was 28,320 ML/year. This average includes a peak usage of 40,470 ML/year which occurred in 2002/03.

In most years, an annual allocation of around 42,000 ML/year (a 70% annual allocation) could be made, and in an exceptionally dry year if all licence holders used their full annual allocation a groundwater level decline (seasonal drawdown) of approximately that shown in year C in the above graph could be tolerated. This is around the seasonal drawdown that occurred in 2002/03.

However, if the previous five year average use was greater than 30,000 ML/year, the five year average recovery level would be greater than 20 metres. An annual allocation of around 30,000 ML/year will then be announced (a 50% annual allocation).

While predictions that a 5-year average use of 30,000 ML/year is expected to lead to the recovery of 20 metres is based on aquifer behaviour and metered use over the last few years, in some instances bores have not been metered (particularly those used solely for dairy use). Sometimes a meter is removed for repair. In these instances an estimate of groundwater use may be made by the Authority or the bore may be metered in the future. As understanding of use from these bores improves, the average annual use of 30,000 ML/year expected to lead to a five-year average groundwater recovery level of 20 metres may need to be adjusted to take into account this previous unmetered use. The management plan allows the Authority to make these adjustments and to factor into the calculations estimates of groundwater use where no meters are installed. Such a recalculation based upon a more accurate assessment of past use, will improve the confidence of the relationship between use and level.

Individual licence holders will only be able to extract up to the volume determined by the annual allocation.

Example: if a licence holder is entitled to take 100 ML/year and an annual allocation is announced at 70%, the licence holder will be able to extract 70 ML/year for that year.

There will be the opportunity under the management plan to obtain additional water through licence transfers. Nevertheless, any licence transferred will be subject to the annual allocations.

Groundwater licences issued for urban supply will be subject to the same annual allocations as all other groundwater licence holders. Groundwater is currently used to supply Katunga Township and is a back-up supply to Strathmerton which has recently commenced being supplied by pipeline from Cobram. Under the management plan the arrangements to allow licence transfers and the ability to move extractions points will ensure a high level of reliability of access to groundwater for these towns.

PRESCRIPTION

1. By 1 August or earlier each year the Authority must determine and announce the annual allocation in accordance with Prescriptions 2 and 3 which aims to prevent the average groundwater recovery level falling below 20 metres below ground level.
2. An announcement under Prescription 1 must be made, by publishing a notice in a newspaper circulating generally in the Protection Area.
3. In any year where the 5-year average annual groundwater use is:
   a) less than 30,000 ML/year, the annual allocation must be announced at 70%; or
   b) 30,000 ML/year or greater, the annual allocation must be announced at 50%.
4. The 30,000 ML/year specified in Prescription 3(a) and (b) may be recalculated by the Authority, to account for use from bores that were operational but not metered prior to the commencement of this management plan.
5. For the purpose of Prescription 1, the average groundwater recovery level means the groundwater recovery level determined by summing the highest winter/spring water level elevation (measured as depth below ground level) available for the preceding five years for each observation bore listed in schedule 2 (or any replacement bore as provided in Prescription 28) divided by the total number of readings used in the calculation.
6. For the purpose of Prescription 3, the average annual groundwater use means the volume determined by summing the total volume of groundwater use for the Protection Area for the preceding five years and dividing this cumulative volume by five.

7 LICENCE TRANSFERS

7.1 Introduction

Allowing licences to transfer from one person or business enterprise to another can bring significant benefits to both individuals and the broader community. It allows water to move to the land and enterprises where the most value will be generated. It also allows individuals to adjust their enterprises depending on their individual circumstances and to be more flexible where water from different sources is also available. The ability to transfer groundwater licences is also essential to enable demand for any future urban groundwater use to be met.

Under the Act a licence holder may apply to transfer a licence to another person either temporarily or permanently. A licence may be transferred as a result of the transfer or conveyance of a property on which the licence is used or it may be transferred to an owner or occupier of other land (off-property transfer). To reduce the total groundwater licence entitlement in the Protection Area over time, a permanent off-property transfer of a licence will be subject to adjustment of volumes on transfer whereby the individual licence entitlement will be reduced by 20%. If for example a person transferred a licence issued for 100 ML/year the person who obtained the transferred licence would receive a licence of 80 ML/year.

The reduction will not apply to transfers resulting from the transfer or conveyance of a property. In these circumstances properties are normally sold as a going concern and any reduction in the availability of water may adversely affect the sale.

Permanent licence transfers will enable new entrants to access the groundwater resource thereby meeting the equity objectives of the management plan. Some restrictions apply to temporary licence transfers as a transitional measure. These restrictions will assist licence holders who have made significant investments in

infrastructure to establish and operate their businesses and who as a consequence of this plan, face restrictions on an annual basis.

In considering an application to transfer a licence temporarily or permanently, the Act requires the Authority to undertake a thorough assessment of the application. An application to transfer a licence is not automatically approved. In deciding whether or not to approve an application the Authority must have regard to a whole range of matters including:

- the availability of water now and in the future;
- adverse effects that an approval may have on existing users, on waterways and aquifers and on the environment; and
- the existing and projected water quality in the Protection Area.

The above matters require consideration of catchment management objectives and therefore local Land and Water Management Plan issues. They also include demonstration and commitment to best management practices for irrigation use.

Any transfer approved by the Authority must also comply with rules specified in the management plan.

When an application is made, the Authority will assess whether groundwater extractions at the new site will cause adverse and material interference to any nearby groundwater user. If interference is likely the Authority may set transfer conditions to minimise interference or it may refuse to approve the application.

Under the management plan there are no specific restrictions placed on the transfer of a groundwater licence resulting from the transfer or conveyance of land on which the groundwater is taken or used.

However, where a licence is transferred to a person who owns a different property, rules have been set in certain areas limiting transfers to guard against excessive annual groundwater level drawdown in those areas.

7.2 Management Zones

Three management zones have been established as shown on the following map to enable the rules to be set (see Figure 4).

7.2.1 Management Zone 1061 transfers

Management Zone 1061 is the north western dryland area. Water level data in this area suggests that the shallow and intermediate aquifers, which are predominantly used for domestic and stock purposes around the Barmah Forest, may be seasonally affected by deep groundwater pumping. Graziers in the area have no other source of water for domestic and stock purposes and their groundwater supply needs to be protected.

Licences will be allowed to be transferred within the zone. However, licence transfers from other management zones will not be allowed if the amount of groundwater licence entitlement in the zone reaches 6,500 ML/year. The current groundwater licence entitlement in Management Zone 1061 totals 4,621 ML/year. The limit in this zone has been set so that the volume of water allowed to be extracted under licence would equate to about 4,600 ML/year if an annual allocation of 70% was announced. This equates to the total groundwater licence entitlement in Management Zone 1061 at the time the plan was prepared.

7.2.2 Management Zone 1062 transfers

Management Zone 1062 largely covers that part of the Murray Valley Irrigation Area to the west of the Tocumwal/Katamatite road. In Management Zone 1062 a licence transfer may be approved if a licence is transferred within the zone or from any other management zone into Zone 1062.

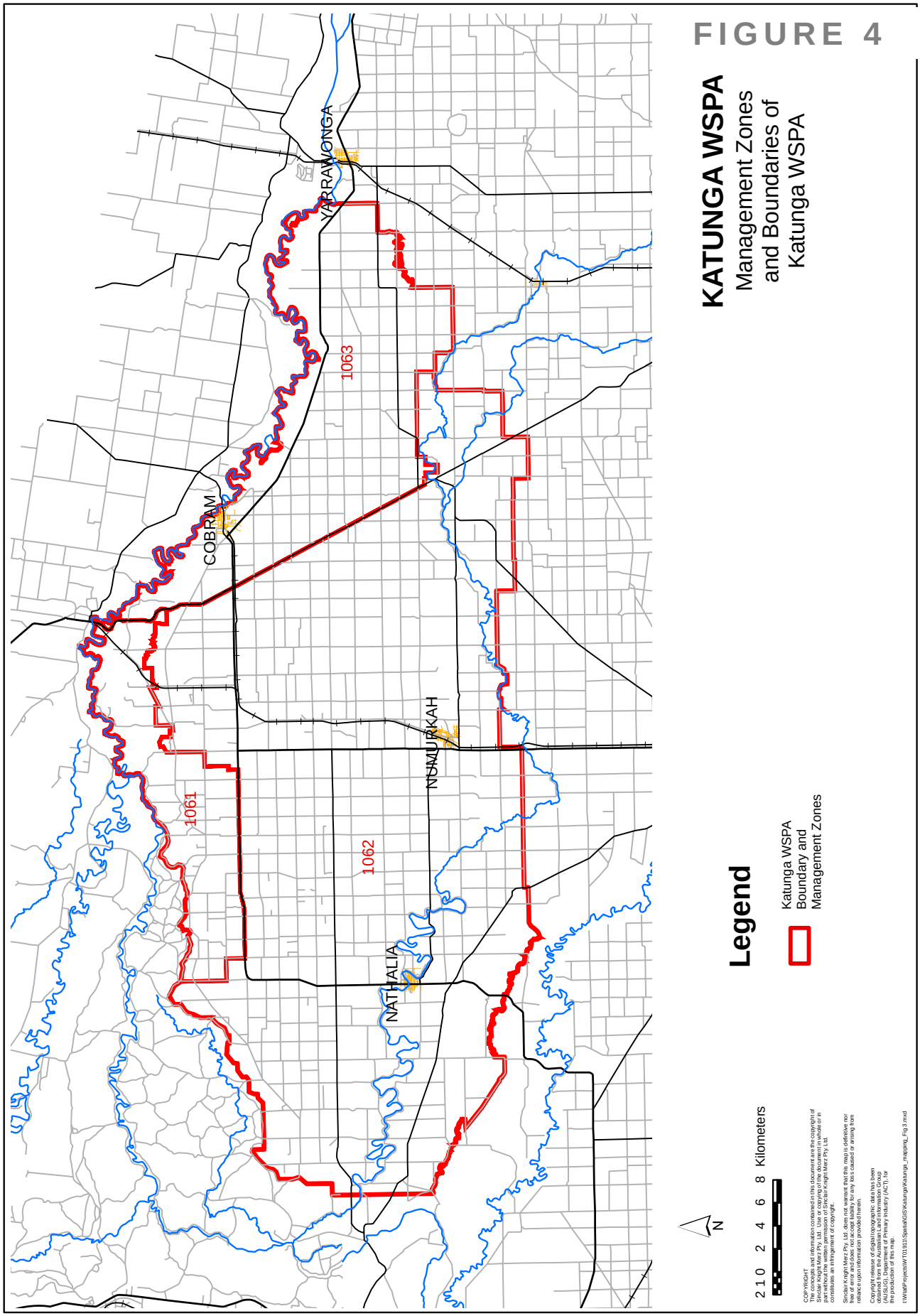
FIGURE 4
KATUNGA WSPA
Management Zones
and Boundaries of
Katunga WSPA
YARRAWONGA
COBRAM
NUMURKAH
NATHALIA
1061
1062
1063
Legend
Katunga WSPA
Boundary and
Management Zones
N
2 1 0 2 4 6 8 Kilometers
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7.2.3 Management Zone 1063 transfers

Observation bores in this zone suggest that the western part of this area is experiencing the greatest seasonal drawdown of any management zone. To avoid an excessive increase in drawdown in this area while providing some flexibility to allow users to adjust to the new management arrangements, licence transfers from other zones into Management Zone 1063 will not be approved if the total groundwater licence entitlement in the zone would exceed 25,000 ML/year. The current groundwater licence entitlement in the management zone 1063 totals 20,745 ML/year. The maximum amount (25,000 ML/year) represents about 120% of the total groundwater licence entitlement in Management Zone 1063 at the time the management plan was prepared.

Licences will be allowed to be transferred within the zone.

7.3 Transfer arrangements

Specific rules have been established in this management plan pertaining to the temporary and permanent transfer of a licence as discussed below.

7.3.1 Permanent transfer arrangements

Under the management plan, permanent off-property transfers will not be allowed if the water to be taken at the proposed new location is within 2 kilometres of the River Murray. This restriction aims to minimise the potential impacts that groundwater extractions may have on the river. However, people with existing groundwater licences within 2 kilometres of the River Murray will be able to permanently transfer a licence. The amount of water that will be able to be permanently transferred in these circumstances will be limited to 43% of their existing groundwater licence entitlement held by them at the commencement of the management plan. Consequently they will be able to offset the impact of any 70% annual allocation.

To ensure that pockets of intense use do not develop which may cause excessive local groundwater level drawdown, the management plan requires the Authority to refuse to approve permanent transfer applications in accordance with extraction intensity rules.

The extraction intensity rules require that an application for a permanent transfer must not be approved if the total of all groundwater licence entitlements within a 2-kilometre radius of the proposed bore site would exceed 3,700 ML/year.

Annual allocations made under the management plan will apply to all licences that have been permanently transferred.

7.3.2 Temporary transfer arrangements

Under the management plan, temporary transfers will be allowed so that licence holders may, on a yearly basis, gain access to additional groundwater to offset the impact of the restrictions prescribed in the management plan.

Temporary licence transfers will only be allowed to those landholders with a groundwater licence. The volume on the temporary transferred licence will be limited to an amount of water that would authorise the licensee to use the equivalent of their full entitlement if the restrictions under the plan did not apply.

Where a licence is transferred temporarily the Authority may require the bore which relates to the transferor's licence to be metered.

7.3.3 General transfer arrangements

On some occasions interference between bores occurs. Sometimes this follows the approval of the construction of a new bore or as a result of an increased rate of extraction from an existing bore. The Authority has procedures in place for setting minimum distances between bores and determining extraction rates from existing

bores. Approval of the application to transfer may be subject to technical assessments to determine an acceptable distance between bores and an appropriate extraction rate. The Authority's procedures will also be used in circumstances where a licence holder wishes to change the groundwater extraction site as mentioned in the following section.

PRESCRIPTION

7. The Authority may approve an application for the temporary transfer of a licence for the current year under section 62 of the Act only to the extent that it will permit a licence holder to take and use up to a volume of groundwater that would have been authorised if restrictions under Prescription 1 did not apply.
8. The Authority must not approve an application for the permanent transfer of a licence under section 62 of the Act if:
    a) the groundwater subject to the transfer is to be taken from a location within 2 kilometres of the River Murray; or
    b) the total groundwater licence entitlement from all licences authorised to be taken within a 2-kilometre radius of the proposed extraction site exceeds 3700 ML/year or the approval of the application would lead to this volume being exceeded;
    c) the transfer would result in:
        i) the total groundwater licence entitlement from all licences in Management Zone 1061 exceeding 6,500 ML/year; or
        ii) the total groundwater licence entitlement from all licences in Management Zone 1063 exceeding 25,000 ML/year.
9. Despite Prescription 8(a) the Authority may approve an application if:
    a) the groundwater licence to be transferred is used in conjunction with an existing groundwater licence; and
    b) the groundwater licence entitlement of the transferred licence does not exceed 43% of the groundwater licence entitlement of the existing licence.
10. If the Authority approves an application for the permanent transfer of a licence which is not associated with the transfer or conveyance of land, the groundwater licence entitlement must be reduced by 20%.

8 CHANGING THE GROUNDWATER EXTRACTION SITE

It is not uncommon for a groundwater licence holder to want to use groundwater at a different site to that which is stated on the licence. This could occur because the farmer wants to irrigate a different paddock on the farm or a different block or even a different farm in another location. Sometimes all that is needed is a new delivery line. Sometimes it requires the construction of a new bore and pumping from a new location.

Under the management plan a groundwater licence holder will be able to move the point of extraction from one location to another under the same rules that apply to licence transfers. An application for a licence will need to be made and the Authority will need to make proper assessments of the application and consider matters set out in section 40 of the Act. If a new bore is to be constructed an application for a bore construction licence will also be necessary.

The extraction intensity rules that apply to licence transfers will apply as will the restriction on additional groundwater extractions within 2 kilometres of the River Murray. The limitations that apply to licence transfers in Management Zones 1061 and 1063 will also apply.

PRESCRIPTION

11. The Authority must not approve an application for a groundwater licence under section 51 of the Act or a bore construction licence under section 67 of the Act if:
    a) the application is to enable groundwater to be taken for uses other than domestic and stock from a location within 2 kilometres of the River Murray; or
    b) the total groundwater licence entitlement from all licences authorised to be taken within a 2-kilometre radius of the proposed extraction site exceeds 3700 ML/year or the approval of the application would lead to this volume being exceeded; or
    c) the approval of the application would result in:
        i) the total groundwater licence entitlement associated with all licensed bores in Management Zone 1061 exceeding 6,500 ML/year; or
        ii) the total groundwater licence entitlement associated with all licensed bores in Management Zone 1063 exceeding 25,000 ML/year.
12. Prescription 11(a) and 11 (b) do not apply where:
    a) an application is for a bore construction licence to replace an existing bore and the new bore site is within 20 metres of the existing bore; or
    b) an application is related to an existing groundwater licence and the approval of the application would not result in an increase in the amount of groundwater authorised to be taken from that location.

9 RESTRICTIONS AND PROHIBITIONS ON THE ISSUE OF LICENCES

9.1 Introduction

For licensing administration purposes new groundwater licences sometimes need to be issued. They may need to be issued to allow for groundwater licences to be amalgamated or divided or where there is a requirement for a new bore or different property to be included on a groundwater licence. It may also be necessary to issue licences in some cases as a result of transfers.

However, no new groundwater licence will be issued if the total of all groundwater licence entitlements of 59,780 ML/year would be exceeded.

In addition where a groundwater licence is surrendered, revoked or expires without an application for re-issue or renewal, a new groundwater licence will not be able to be issued. As a result the total authorised licensed volume would reduce over time. The Authority will identify the total authorised licensed volume in its annual report on the administration and enforcement of the management plan. The total authorised licensed volume will also reduce over time as a result of the 20% adjustment to licences when permanent off-property transfers occur.

New bore construction licences may also need to be issued and the Authority will make appropriate assessments and attach relevant conditions in accordance with the provisions of the Act that includes an assessment of extraction rate, distance to existing bores and other factors.

9.2 Dairy Licences

In 2004 the Government released a White paper – Our Water Our Future which indicated that dairy use licences had in the past been issued with groundwater licence entitlements that would normally be associated with domestic and stock use. Most dairy licences in the Protection Area authorise 2 ML/year to be taken. Work by the Department of Primary Industries indicates that the average water use in a large dairy is in the vicinity of 13 ML/year.

When renewing dairy licences, the Authority will make an assessment of the amount of groundwater used in each dairy. Any adjustments to licences will only be made in accordance with any State-wide policy approved by the Minister for Water.

PRESCRIPTION

13. The Authority may issue a new groundwater licence provided that in doing so the total groundwater licence entitlement from all licences in the Protection Area does not exceed 59,780 ML/year or any volume adjusted in accordance with Prescriptions 14 to 17.
14. If a groundwater licence is surrendered, revoked or not renewed the total groundwater licence entitlement in Prescription 13 will be adjusted by the amount of the groundwater licence entitlement that applied to the groundwater licence that was surrendered, revoked or not renewed.
15. If the Authority approves an off-property transfer in accordance with Prescription 10 the total groundwater licence entitlement in Prescription 13 will be adjusted by the corresponding adjusted volume under Prescription 10.
16. If the Authority renews a groundwater licence that authorises the use of groundwater in a dairy in accordance with any State-wide policy approved by the Minister for Water, the total groundwater licence entitlement in Prescription 13 is deemed to be adjusted by any additional volume of groundwater authorised under the renewed licence.
17. The Authority may issue a licence which may lead to the total groundwater licence entitlement specified in Prescription 13 being exceeded to overcome an administrative oversight or error or other anomaly.
18. The Authority must report the details of any licence referred to in Prescriptions 14 to 17 in the annual report on the administration and enforcement of the management plan required under section 32 of the Act.

10 METERING PROGRAM

10.1 General

Metering water use enables better management of the water resource. It provides vital information on the amount of water used and the location of where it is used which aids in the sustainable management of the resource. It also ensures that the water is shared equitably and licensees stay within their annual allocation. Metering also provides benefits to the farming operation and can lead to greater water use efficiencies.

It is government policy to meter all existing irrigation and commercial use for groundwater licences that authorise the use of groundwater for 20 ML/year or more. New licences are metered irrespective of the amount of groundwater licensed to be extracted.

10.2 Installation of meters

Metering of all licensed bores while desirable is not considered essential for compliance management purposes. Most of the bores that authorise the use of less than 20 ML/year are used in the operation of dairies. The use of water in dairies is relatively constant from year to year. The Authority will establish other compliance arrangements for dairy use bore for example periodic checks on usage.

The management plan requires a meter to be installed on all operational bores that are associated with a licence that authorises 20 ML/year or more. Metering will be completed within 12 months of the approval of the management plan. If a new extraction bore is constructed a meter must be installed on the new bore prior to it being used unless it is used solely for domestic and stock purposes.

PRESCRIPTION

19. Within 12 months from the time that the management plan commences, the Authority must ensure that a meter is fitted to every operational bore listed on a groundwater licence that authorises the extraction of 20 ML/year or more.
20. The Authority must ensure that a meter is fitted to any new operational bore that is constructed in the Protection Area that is used for other than domestic and stock purposes.

10.3 Maintenance of meters

Meters need to be properly maintained to ensure accurate readings can be taken. Both the Authority and the licensee have a responsibility to ensure meters are properly maintained.

PRESCRIPTION

21. The Authority must:
    a) inspect the condition of the meter whenever it is read by the Authority;
    b) maintain the meter in good condition;
    c) recalibrate the meter at any time when the Authority has reason to believe that a reading from the meter may be inaccurate;
    d) replace any damaged meter; and
    e) keep a record of all work done under paragraphs (b), (c) and (d).
22. The licensee must:
    a) ensure reasonable care is taken of any meter fitted to the bore; and
    b) ensure the Authority is promptly advised whenever that meter appears to be defective, registering incorrectly or is damaged.

10.4 Meter Readings

Meters must be read at least once a year and the data must be maintained on a database. In some instances the Authority may request the licensee to read the meter and provide the meter reading to the Authority and the licensee must comply with the request.

PRESCRIPTION

23. The Authority must:
    a) read each meter at least once in every year;
    b) determine the volume of water extracted from each metered bore each year; and
    c) within 30 days after a meter is read, record the amount of water determined in paragraph b) in a database.
24. If for any reason the Authority is unable to determine the amount of water by means of a meter it must estimate the volume of water extracted and record the estimate in a database.
25. If the Authority requests the Licensee to read a meter and to provide the Authority with the meter reading, the Licensee must comply with the request.

11 BORE MONITORING PROGRAM

11.1 General

Monitoring of groundwater levels provides information to enable sustainable management of the resource. Observation bores will be used to:

- assess annual and long term impacts on water levels from groundwater pumping
- monitor regional and local seasonal drawdown
- examine interrelationships with the River Murray, overlying aquifers, aquifers in New South Wales and saline groundwater in the west and south west of the Protection Area.
- provide information for future resource assessments
- assess potential management issues including evaluating potential interference between bores.

11.2 Groundwater Level Monitoring

The management plan aims to effectively manage the groundwater resources of the Protection Area. Monitoring is therefore critical to understanding

(a) how the deep lead aquifer responds in the long term to the management arrangements introduced under the management plan; and

(b) the interaction of the deep lead aquifer with the broader hydrological system.

At the time the management plan was prepared there were 67 observation bores that were regularly monitored. These monitoring bores are geographically distributed over the Protection Area and surrounding areas targeted at various depths to monitor the aquifers as follows:

- 17 bores monitoring the mid-Shepparton Formation
- 15 bores monitoring the lower Shepparton Formation
- 35 bores monitoring the Calivil Formation/Renmark Group aquifer

The bores listed in Schedule 2 are the key bores which will be used to determine the average groundwater recovery level for comparison with the 20-metre level specified in Prescription 1. They will be read at least 12 times a year. If any of these bores need to be replaced this will be undertaken so that the water level readings can continue to be taken as close to the original bores site as is practical. The locations of these bores are shown in Figure 5.

Monitoring of other bores in the Protection Area and the surrounding area will be undertaken on a strategic basis taking into account pumping intensity and general coverage of the Protection Area and the surrounding area. The bores that were monitored at the time the management plan was prepared are listed in Schedules 3 and 4 and also shown in Figure 6. The Authority in conjunction with the Department of Sustainability and Environment will regularly review the monitoring program and details of the monitoring strategy will be presented in the annual report prepared by the Authority. Two new bores are needed in the east of Management Zone 1062 and one additional bore is needed in the centre of Management Zone 1063. Other bores may not be needed in some areas or monitoring frequency may be varied from time to time. Observations over the past number of years reveal that the water levels in many of bores behave in similar ways. Flexible and cost effective monitoring arrangements are needed.

It will be the responsibility of the Authority and the Department of Sustainability and Environment to ensure that an appropriate level of monitoring is carried out in the

area and that bores are properly maintained. The data from the monitoring bores will also be recorded in the groundwater management system soon after it is collected. The Department of Sustainability and Environment and the Authority will enter into an agreement on the full monitoring program including cost sharing arrangements for monitoring, maintenance and replacement of observation bores consistent with a state-wide approach. The cost sharing arrangements will be reported in the annual report.

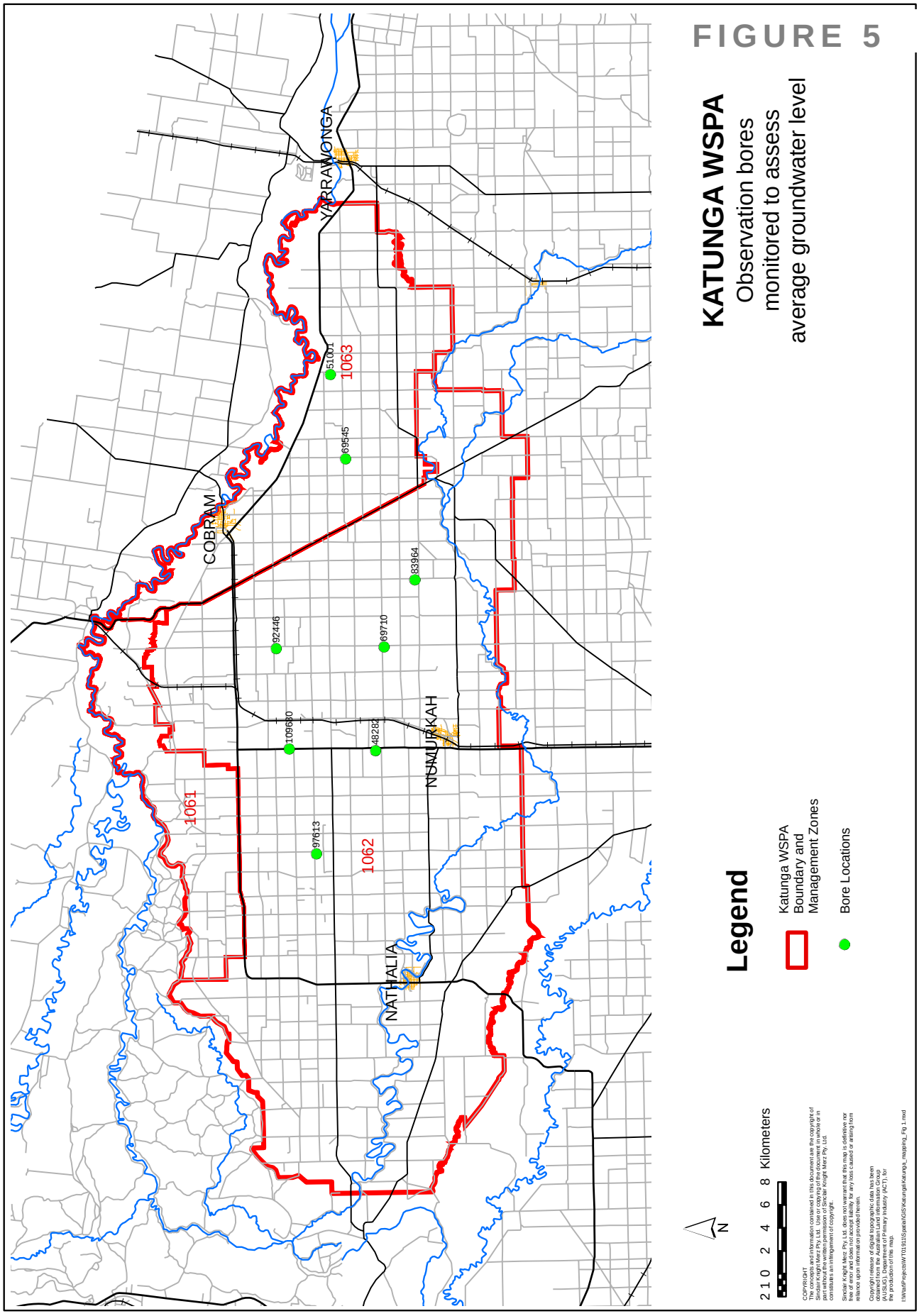
FIGURE 5
KATUNGA WSPA
Observation bores monitored to assess average groundwater level
Legend
Katunga WSPA Boundary and Management Zones
Bore Locations
1061
1062
1063
COBRAM
YARRAWONGA
NATHALIA
NUMURKAH
51001
69545
83964
92446
69710
109680
48282
97613
N
2 1 0 2 4 6 8 Kilometers

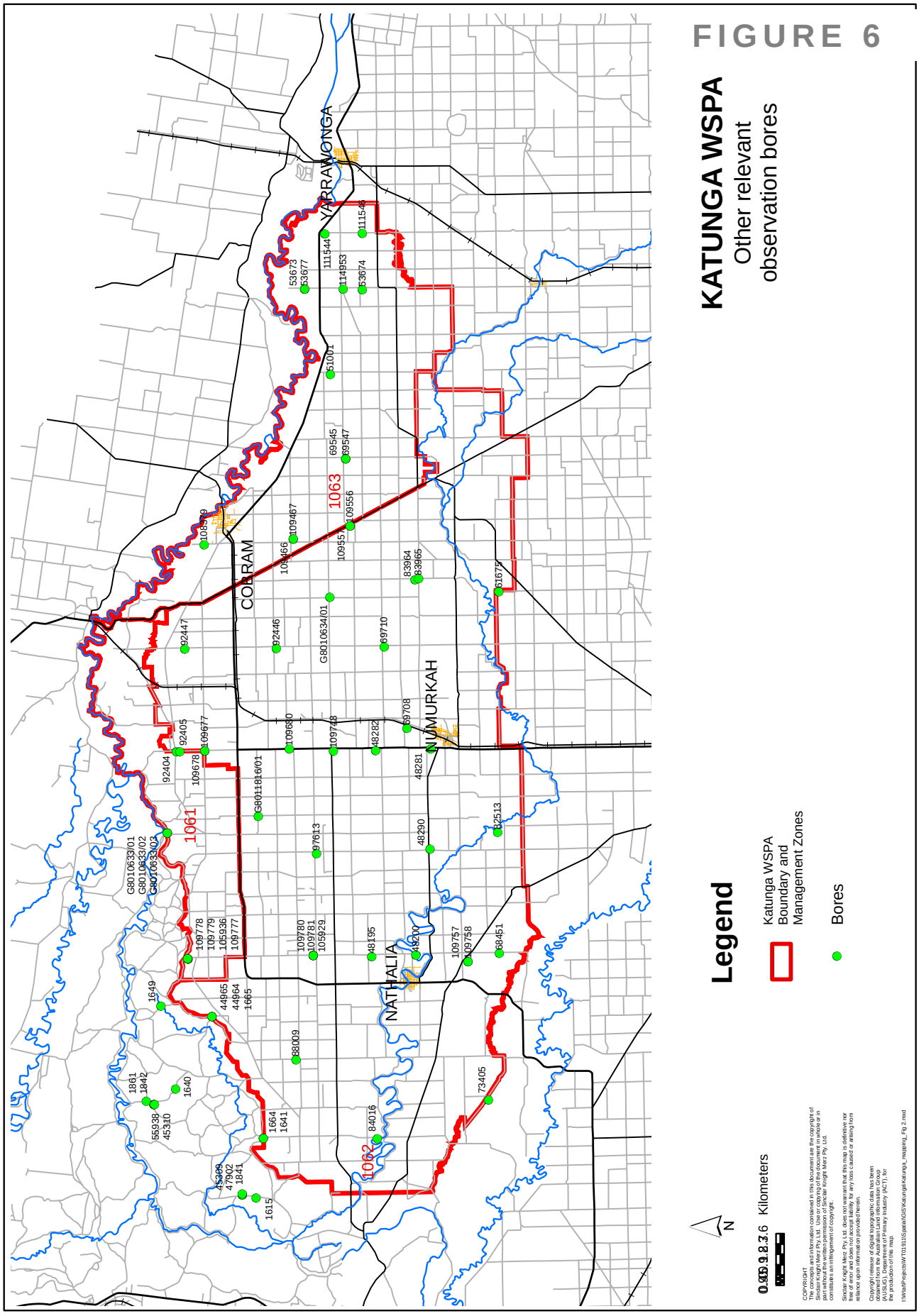
FIGURE 6
KATUNGA WSPA
Other relevant observation bores
Legend
Katunga WSPA Boundary and Management Zones
Bores
Kilometers
N
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COBRAM
YARRAWONGA
NUMURKAH
NATHALIA
1061
1062
1063

PRESCRIPTION

26. The Department of Sustainability and Environment and the Authority must ensure that the bores specified in Schedule 2 are monitored at the frequencies listed in the schedule.
27. In addition to the monitoring in Prescription 26 the Department of Sustainability and Environment and the Authority must ensure that water level monitoring is carried out at appropriate locations throughout the Protection Area to:
    a) assess annual and long term impact on water levels from groundwater pumping;
    b) monitor regional and local seasonal drawdown;
    c) examine interrelationships with the River Murray, overlying aquifers, aquifers in New South Wales and saline groundwater in the west and south west;
    d) provide information for future resource assessments; and
    e) monitor the impacts of groundwater pumping generally across the Protection Area and in areas of high intensity groundwater pumping.
28. The Department of Sustainability and Environment and the Authority must ensure that:
    a) monitoring bores are properly maintained and replaced if necessary; and
    b) data collected from the bores is entered into the groundwater management system, within 30 days after it has been collected.

11.3 Groundwater Salinity

Most of the groundwater pumped from the Murray Valley Deep Lead aquifers is sourced from the overlaying Shepparton Formation aquifer. Within the Protection Area, groundwater in the overlying formation is generally more saline than that pumped from the major aquifer. Regular analysis of water from bores is advisable so that potential future salinity issues can be better understood. Nevertheless, any salinity changes are likely to be slow and there is therefore no immediate need for action other than to develop monitoring programs that will allow long term changes to be assessed.

The Authority will collect and analysis water samples from groundwater users. Each year the Authority will ask groundwater licence holders to submit a sample of pumped groundwater from each licensed bore for salinity testing. Domestic and stock users may also have their bore water analysed if they register an interest with the Authority. The Authority will provide sample bottles.

The Authority will analyse the water, enter the results into the groundwater management system within 30 days of the analysis and will send the results of the analysis to the licence holder.

PRESCRIPTION

29. The Authority must:
    a) at least once a year provide a sample bottle to every groundwater licence holder;
    b) provide a sample bottle to any domestic and stock user who requests one;
    c) on receipt of a returned sample analyse the water within 30 days;
    d) enter the analysis results into the groundwater management system within 30 days of the analysis; and
    e) send a copy of the results of the analysis to the licence holder who supplied the water sample.

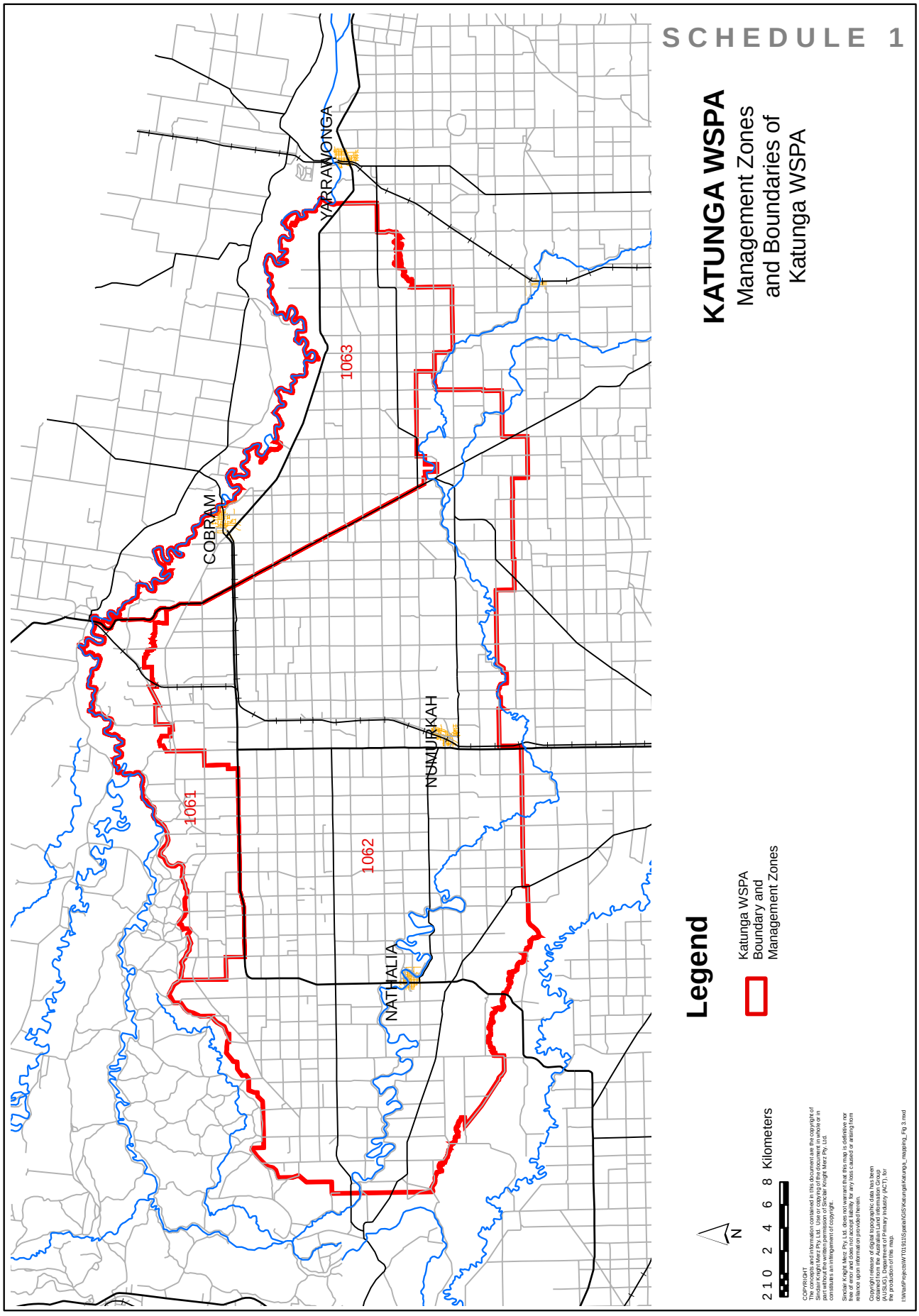
12 ANNUAL REPORT

By 30 September each year the Authority will prepare an annual report on the enforcement and administration of the plan. The report will be given to the Minister for Water and the Goulburn Broken Catchment Management Authority and will be publicly available.

If the Authority is of the opinion that the management plan is in need of review it should include recommendations to that effect in the annual report. In any event in each fifth annual report the Authority will make comment on the need to review the management plan.

If a review indicates that the management plan should be amended the Minister for Water may amend the management plan. However, the Minister must first publish notices of the amendment and consider submissions and must appoint a consultative committee to advise on the amendment.

The annual report will also contain details about the groundwater monitoring strategy to be undertaken in the following year.


SCHEDULE 1
KATUNGA WSPA
Management Zones
and Boundaries of
Katunga WSPA
YARRAWONGA
COBRAM
NUMURKAH
NATHALIA
1061
1062
1063
Legend
Katunga WSPA
Boundary and
Management Zones
N
2 1 0 2 4 6 8 Kilometers
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SCHEDULE 2

Bores to be used monitored to assess average groundwater recovery level

	Bore location coordinates GDA94 MGA Zone 55		Monitoring Frequency
Bore Number	**Eastings**	**Northings**	**Readings per year**
48282	358613	6011334	12
51001	391413	6015284	12
69545	384064	6013944	12
69710	367663	6010584	12
83964	373513	6007884	12
92446	367513	6019984	12
97613	349613	6016484	12
109680	358748	6018851	12

SCHEDULE 3

Groundwater monitoring bores within the Protection Area at the time the management plan was approved

	Bore location coordinates GDA94 MGA Zone 55		
Bore Number	**Eastings**	**Northings**	**Assumed formation**
48195	340613	6011668	lower Shepparton
48200	340766	6007809	Calivil
48281	358760	6006505	Calivil
48282	358613	6011334	Calivil
48290	350013	6006584	Calivil
51001	391413	6015284	Calivil
53673	398863	6017534	Calivil
53674	398813	6012484	Calivil
53677	398863	6017534	lower Shepparton
61675	372463	6000584	lower Shepparton
68451	340913	6000534	Calivil
69545	384064	6013944	Calivil
69547	384063	6013934	lower Shepparton
69708	360532	6008586	mid Shepparton
69710	367663	6010584	Calivil
73405	328113	6001484	lower Shepparton

82513	351463	6000684	Calivil
83964	373513	6007884	Calivil
83965	373613	6007584	Calivil
84016	324755	6011189	Calivil
88009	331613	6018284	Calivil
92404	358507	6028702	Calivil
92405	358510	6028410	Calivil
92446	367513	6019984	Calivil
92447	367463	6027984	lower Shepparton
97613	349613	6016484	Calivil
105929	340743	6016764	Calivil
105936	340413	6027684	Calivil
108379	376563	6026284	lower Shepparton
109466	377077	6018525	mid Shepparton
109467	377077	6018525	mid Shepparton
109556	378208	6013560	lower Shepparton
109557	378208	6013560	lower Shepparton
109677	358574	6026240	mid Shepparton
109678	358574	6026240	Calivil
109680	358748	6018851	Calivil
109748	358551	6015001	lower Shepparton
109757	340183	6003264	mid Shepparton
109758	340183	6003264	lower Shepparton
109777	340463	6027734	Calivil
109778	340463	6027734	mid Shepparton
109779	340463	6027734	lower Shepparton
109780	340728	6016764	lower Shepparton
109781	340728	6016764	lower Shepparton
111544	403696	6015744	Calivil
111546	403731	6012501	mid Shepparton
114953	398883	6014163	mid Shepparton
G8010633/01	351315	6029323	Calivil
G8010633/02	351313	6029323	mid Shepparton
G8010633/03	351311	6029323	mid Shepparton
G8010634/01	371875	6015125	Calivil
G8011816/01	352750	6021375	Calivil