GOVERNMENT OF WESTERN AUSTRALIA

CALINGIRI WATER RESERVE

WATER SOURCE PROTECTION PLAN

Calingiri Town Water Supply

WATER RESOURCE PROTECTION SERIES

WATER AND RIVERS COMMISSION REPORT WRP 19

1999

WATER AND RIVERS COMMISSION

WATER AND RIVERS COMMISSION
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Cover Photograph: Shire of Victoria Plains - administrative building (Calingiri)

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Calingiri Town Water Supply

Water and Rivers Commission
Policy and Planning Division

WATER AND RIVERS COMMISSION
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REPORT NO. WRP 19
1999

Acknowledgments

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Foreword

Water Source Protection Plans

Water Source Protection Plans establish the level of protection required within Water Reserves. The plans identify sources of contamination that should be investigated and set out programs for management of the resource. Water Source Protection Plans are developed in consultation with affected landowners and industry groups and relevant government agencies.

Proclaiming Water Reserves under the *Country Areas Water Supply Act 1947* protects the quality of water sources in country Western Australia. The Act's by-laws enable the Water and Rivers Commission to control potentially polluting activities, to regulate land use, inspect premises and to take steps to prevent or clean up pollution.

The Water and Rivers Commission aims to work pro-actively with planning agencies to incorporate water protection in the land planning process. Decisions on land use zoning and subdivision applications have a significant impact on the protection of water sources. The Commission supports the amendment of Town Planning Schemes and Development Strategies that reflect land use compatible with Water Source Protection Plans.

This Water Source Protection Plan provides a basis for establishing compatible land uses within the Water Reserve at Calingiri and is a mechanism for practical implementation of the Commission's protection strategies. Local government decision-makers, State planning authorities and operational staff are encouraged to recognise this document as a basis for ensuring the long term protection of this groundwater resource for generations to come.

Water quality protection framework

The Water and Rivers Commission is responsible for managing and protecting Western Australia's water resources. The Commission has developed policies for the protection of public drinking water source areas that include three levels of priority classification of lands within PDWSAs.

Priority 1 (P1) source protection areas are defined to ensure that there is no degradation of the water source. P1 areas are declared over land where the provision of the highest quality public drinking water is the prime beneficial land use. P1 areas would typically include land under Crown ownership. P1 areas are managed in accordance with the principle of risk avoidance and so land development is generally not permitted.

Priority 2 (P2) source protection areas are defined to ensure that there is no increased risk of pollution to the water source. P2 areas are declared over land where low intensity development (such as rural) already exists. Protection of public water supply sources is a high priority in these areas. P2 areas are managed in accordance with the principle of risk minimisation and so some development is allowed under specific guidelines.

Priority 3 (P3) source protection areas are defined to minimise the risk of pollution to the water source. P3 areas are declared over land where water supply sources need to co-exist with other land uses such as residential, commercial and light industrial developments. Protection of P3 areas is achieved through management guidelines rather than restrictions on land use. If the water source does become contaminated, then water may need to be treated or an alternative water source found.

In addition to priority classifications, wellhead protection zones and reservoir protection zones are defined to protect the water source from contamination in the immediate vicinity of production wells and reservoirs. Wellhead protection zones are usually circular, with a radius of 500 metres in P1 areas and 300 metres in P2 and P3 areas. Reservoir protection zones usually consist of a 2 kilometre buffer area around the top water level of a reservoir and include the reservoir itself. These zones do not extend outside water reserves. Special restrictions apply within these zones.

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Summary

Calingiri town water supply is obtained from the Yenart wellfield located 11 km west of the townsite. The scheme draws water from a shallow, unconfined aquifer vulnerable to contamination. The Yenart wellfield is within agricultural land used for broadacre cropping and dryland grazing.

Establishment of a Water Reserve is proposed to protect the water source from contamination. The boundaries of the proposed Yenart Water Reserve follow topographic divides that form the boundaries to the local groundwater flow system. It is proposed that the water reserve be classified as a Priority 2 source protection area.

The reserve should be managed to minimise the risk of contamination to the water resource. Management strategies will include posting of signs that indicate the location of the reserve, and the assessment of development proposals that may impact on water quality.

This plan has undergone extensive consultation during the development process. Prior to the preparation of the draft plan, discussions were held with key stakeholders. The draft plan was released for comment to key stakeholders including the Water Corporation, Department of Conservation and Land Management, Shire of Victoria Plains and the Conservation Council. Comments received were considered and have been addressed in the preparation of this plan.

1. Introduction

This report provides a plan to protect the groundwater resources, used to supply the town of Calingiri, from contamination.

The rural town of Calingiri is located 115 km north-east of Perth on the Bindi Bindi-Toodyay Road (Figure 1). Calingiri is the administrative centre for the Shire of Victoria Plains and a centre for the local agricultural industry.

The Calingiri town water supply is obtained from four production wells located in the Yenart wellfield, 11 km west of the townsite. A water reserve to protect the wellfield water resource from contamination has not been proclaimed.

2. Physiography

The region is gently undulating with the Yenart wellfield near the drainage divides of the Moore River, Mortlock River and Yalgan Brook. The crests of the divides represent an old surface continuous with that of the sand plain country to the east. The sand from this high-level plain drapes down the drainage slopes and contains numerous seeps or ponds such as those at Yenart Soak. These sand deposits may, however, occupy remnant drainage channels.

Most of the area is cleared for farming; however, native vegetation has been retained along some drainages and where massive laterite or basement rock outcrop.

Calingiri experiences a Mediterranean type climate with warm to hot summers and mild, wet winters. The average annual rainfall is approximately 450 mm.

3. Hydrogeology

Crystalline rocks of the Yilgarn Craton underlie the Calingiri area. These consist of granite, gneiss, schist and quartzite that are intruded by various mafic and felsic dykes and quartz veins. The basement is overlain by a weathered profile consisting of kaolinite clay, sandy clay and sand and is covered by laterite on the hills.

There is some debate as to whether the residual sand, within the wellfield, represents a palaeochannel or a high-level sand plain deposit. At Yenart Soak it is up to 30 m thick and forms an unconfined aquifer occupying a depression within the weathered profile. Recharge to the aquifer is from rainfall infiltration.

The Yenart wellfield abstracts water from this sandy aquifer and because of its shallow depth, and absence of confining layers, it is vulnerable to contamination.

4. Scheme description

The Calingiri town water supply scheme consists of four production wells (1/72, 2/72, 1/81 and 4/81) located about 11 km west of the town.

The average annual abstraction from Yenart wellfield is approximately 54 000 kilolitres (for the 1981-1989 period).

Water salinity levels in production wells and reticulation fluctuate seasonally, varying between 200 and 850 mg/L. Chemical analysis of other water quality parameters conforms to the current Australian drinking water guidelines (NH&MRC and ARMCANZ, 1996).

Plate 1. Yenart Wellfield.

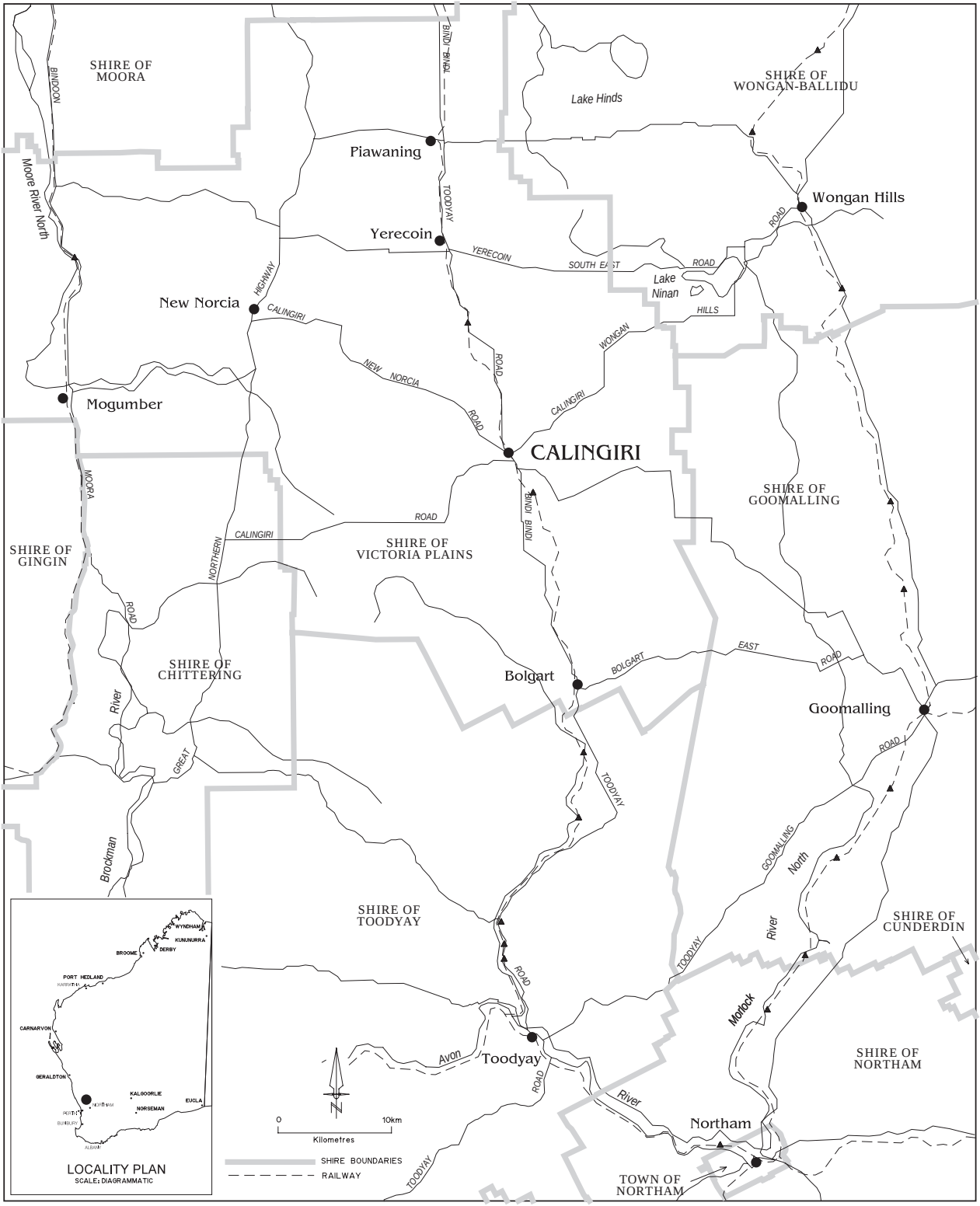


Figure 1. Calingiri locality map.

5. Existing and proposed land use

Broadacre cropping and dryland grazing occurs over a large proportion of the recharge area of the Yenart Wellfield. This landuse is likely to continue (Plate 1).

6. Potential for contamination

A Groundwater Scheme Review (Hodgkinson, 1990) indicated a trend of steadily rising nitrate concentrations in groundwater sampled from the wellfield. Fertiliser application to pasture is considered the main source of nutrient contamination to groundwater.

An increase in algal growth has occurred in a soak downgradient of the wellfield (Plate 2). This growth is most likely due mainly to the leaching of nutrients from fertilisers.

An additional contamination threat to groundwater quality is a diesel-operated pump that draws water from the drainage line that extends from a soak downgradient of the Yenart wellfield. This pump is placed on swampy ground that is sometimes inundated (Plate 3). It is, also, within the proposed wellhead protection zone where the storage of fuel is normally prohibited.

6.1 Emergencies

Escape of chemicals during unforeseen incidents and use of chemicals during emergency response can cause groundwater contamination. The Shire of Victoria Plains Local Emergency Management Advisory Committee through the Northam Group Emergency Management District should be familiar with the location and purpose of the Calingiri Water Reserve. A locality plan should be provided to the Fire and Rescue Services headquarters for the HAZMAT Emergency Advisory Team. The Regional Manager Water and Rivers Commission should have an advisory role to any HAZMAT incident in the Calingiri Water Reserve. [NB on occasions the Regional Operations Manager Water Corporation may be more suitable, depending on distances]

Personnel who deal with WESTPLAN - HAZMAT incidents within the area should be given ready access to a locality map of the Water Reserve. These personnel should receive training to ensure an understanding of the potential impacts of spills on the groundwater resource.

Plate 2. Algal growth within the Yenart soak.

7. Proposed proclaimed area

The proposed Calingiri Water Reserve is shown in Figure 2. The boundaries are based on topographic divides and are inferred to form the boundaries of the local groundwater flow system.

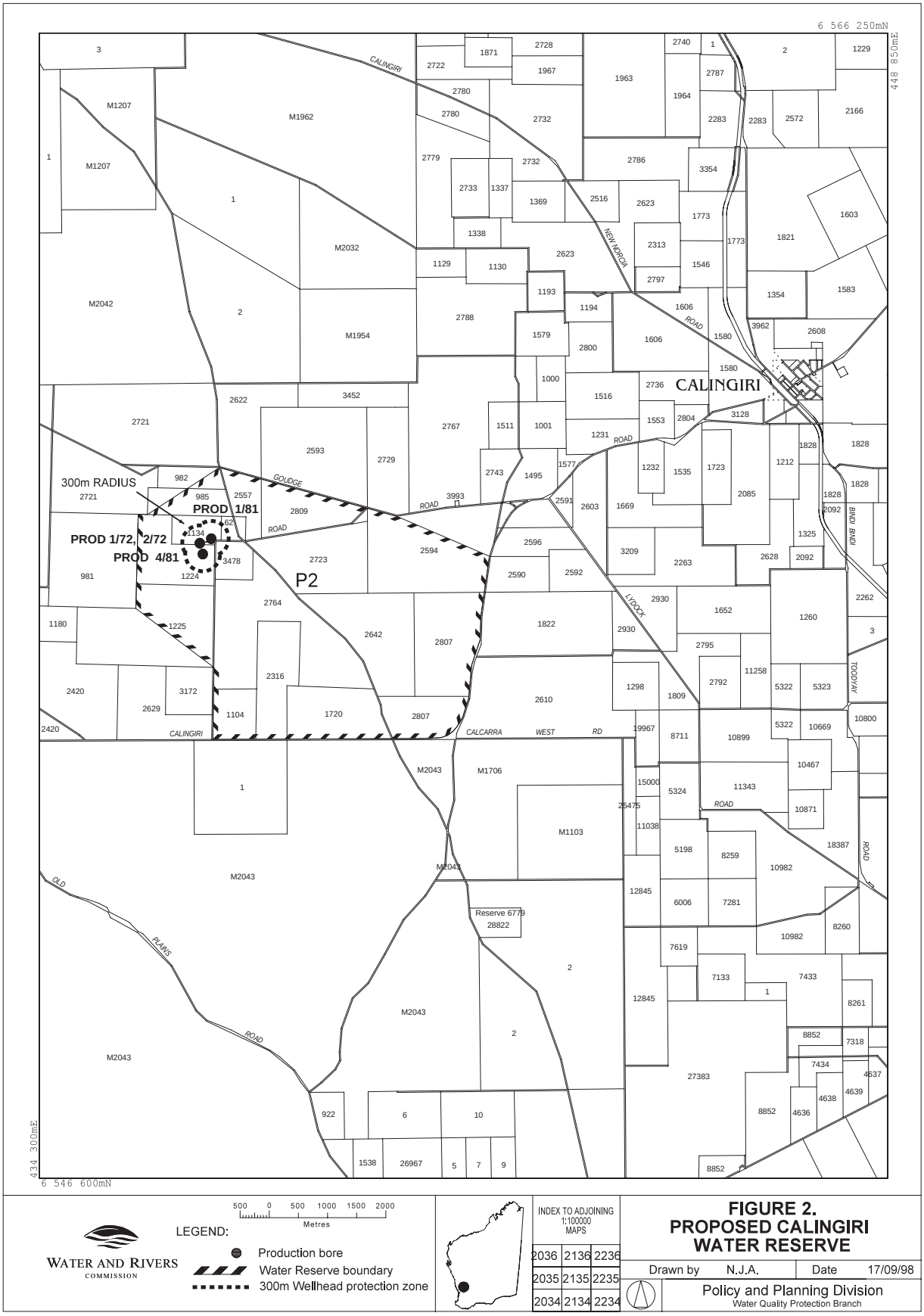
The proposed Water Reserve extends to the south and south east to ensure that the surface water catchment, contributing to wellfield recharge, is protected.

The proposed Water Reserve of the Yenart wellfield should be classified a Priority 2 source protection area according to the following criteria:

- The wellfield is of critical importance to the community of Calingiri.
- The area forms an important recharge area to the aquifer.
- The land is privately owned and zoned rural.
- The area has soil conditions and hydrogeological characteristics that could lead to degradation of the groundwater quality if more intensive agricultural development took place.

A circular protection zone of 300 m radius, centred at each well, should secure the immediate wellfield.

Plate 3. Potential contamination threats to the wellfields.


6 566 250mN
448 850mE
434 300mE
6 546 600mN
CALINGIRI
300m RADIUS
PROD 1/81
PROD 1/72, 2/72
PROD 4/81
P2
GOUDGE
ROAD
NEW MORGIA
LYDOCK
BINDI BINDI
TOODYAY
CALCARRA WEST RD
OLD PLAINS ROAD
Reserve 6779
28822
LEGEND:
Production bore
Water Reserve boundary
300m Wellhead protection zone
Metres
WATER AND RIVERS COMMISSION
INDEX TO ADJOINING 1:100000 MAPS
2036 2136 2236
2035 2135 2235
2034 2134 2234
FIGURE 2.
PROPOSED CALINGIRI
WATER RESERVE
Drawn by N.J.A.
Date 17/09/98
Policy and Planning Division
Water Quality Protection Branch

Recommendations

1. The proposed Calingiri Water Reserve should be gazetted under the *Country Areas Water Supply Act 1947*.

2. Planning strategies should incorporate the management principles outlined in the Water and Rivers Commission's *Land use compatibility in Public Drinking Water Source Areas* (Appendix 1) and reflect the Priority 2 classification given to the Water Reserve.

3. All development proposals in the Water Reserve that are likely to impact on water quality should be referred to the Water and Rivers Commission.

4. Signs should be erected along the boundaries of the Water Reserve to define the reserve and promote public awareness of the need to protect water quality.

5. A process should be put in place to address spillage of pollutants within the Water Reserve.

6. A surveillance program should be established to identify incompatible land uses or potential contaminant threats within the Water Reserve.

7. Nutrient and pesticide levels in the Water Corporation production wells should be monitored to ensure drinking water quality criteria are not compromised. Also, cooperation with local landowners should be sought to ensure fertiliser application rates are not excessive and fuel storage and management do not compromise water resources.

8. Implementation of these recommendations should be reviewed one year after this plan is endorsed. A full review of this protection plan should be undertaken approximately every five years.

Implementation strategy

No.	Description	Implemented by	Timing
1.	Gazettal of Water Reserve.	Program Manager, Protection Planning (WRC).	1999-2000
2.	Incorporation into land planning strategies.	Shire of Victoria Plains.	Ongoing
3.	Referral of development proposals: (i) WRC to provide the Shire of Victoria Plains with guidelines for referral of development proposals. (ii) referral of development proposals.	(i) Program Manager, Protection Planning (WRC) (ii) Shire of Victoria Plains, Ministry for Planning, Department of Minerals and Energy and Department of Environmental Protection.	(i) 1999-2000 (ii) Ongoing
4.	Erection of signs: (i) develop guidelines for signage. (ii) determine number and location of signs required. (iii) erect signs.	(i) Program Manager, Protection Planning (WRC). (ii) Regional Manager, Mid West Gascoyne (WRC) in consultation with WC. (iii) Regional Managers WRC & WC.	(i) 1999-2000 (ii) 2000-01 (iii) To be arranged

(continued)

5.	Incidents covered by WESTPLAN – HAZMAT in the Calingiri Water Reserve should be addressed through the following measures: (i) The Victoria Plains Local Emergency Management Advisory Committee (through the Northam Emergency Management District) being familiar with the location and purpose of the Calingiri Water Reserve. (ii) The locality plan for the Calingiri Water Reserve being provided to the Fire and Rescue Services headquarters for the HAZMAT Emergency Advisory. (iii) The Water Corporation advising the HAZMAT Emergency Advisory Team during incidents in the Calingiri Water Reserve. (iv) Personnel dealing with WESTPLAN - HAZMAT incidents in the area given ready access to a locality map of the Water Reserve and training to understand the potential impacts of spills on the groundwater resource.	(i) Victoria Plains Local Emergency Management Advisory Committee through WRC (Mid-West Gascoyne Region) (ii) WRC (Mid-West Gascoyne Region) (iii) Water Corporation (iv) Victoria Plains Local Emergency Management Advisory Committee	(i) 1999 (i) 1999 (ii) Ongoing (iii) Ongoing
6.	Surveillance program: (i) develop guidelines for the surveillance of Water Reserves. (ii) implement the surveillance program.	(i) Program Manager, Protection Planning (WRC). (ii) Regional Manager, Mid-West Gascoyne Region (WRC).	(i) 1999-2000 (ii) On completion of surveillance guidelines.
7.	Monitoring program: (i) incorporate monitoring for nutrients and pesticides into routine monitoring programs.	(i) Water Corporation.	(i) Ongoing
8.	Review of this plan and recommendations.	Water Quality Protection Branch (WRC).	(i) Initial review-2000 (ii) Full review-2000-05

References

Hodkinson, W.A. 1990, *Groundwater Scheme Review: Calingiri*, Report No. WG95, Water Resources Directorate, Water Authority of Western Australia.

Holmes, D. 1995, *Groundwater Protection Plans for the Shires of Dandaragan, Gingin, Moora and Victoria Plains - Goldfields and Agricultural Region*, Report No. WG 203, Water Authority of Western Australia, Groundwater and Environment Branch, Draft, June 1995.

Holmes, D. 1995, *Protection of Groundwater Resources Used for Drinking Water Supplies in Country Areas of Western Australia (Country Areas Groundwater Protection Policy)*, Water Authority of Western Australia, Groundwater and Environment Branch.

National Health and Medical Research Council and Agricultural and Resource Management Council of Australia and New Zealand (NH&MRC and ARMCANZ) 1996, *Australian Drinking Water Guidelines.*

Glossary

Abstraction	Pumping groundwater from an aquifer.
Allocation	The quantity of groundwater permitted to be abstracted by a well licence, usually specified in kilolitres/year (kL/a).
Alluvium (alluvial)	Detrital material which is transported by streams and rivers and deposited.
Aquifer	A geological formation or group of formations able to receive, store and transmit significant quantities of water.
Bore	A narrow, lined hole drilled to monitor or withdraw groundwater.
Catchment	The area of land which intercepts rainfall and contributes the collected water to surface water (streams, rivers, wetlands) or groundwater.
Confined Aquifer	An aquifer that is confined between shale and siltstone beds and therefore contains water under pressure.
Diffuse Source Pollution	Pollution originating from a widespread area e.g. urban stormwater runoff, agricultural runoff.
Effluent	The liquid, solid or gaseous wastes discharged by a process, treated or untreated.
Groundwater	Water which occupies the pores and crevices of rock or soil.
Hydrogeology	The study of groundwater, especially relating to the distribution of aquifers, groundwater flow and groundwater quality.
Leaching / Leachate	The process by which materials such as organic matter and mineral salts are washed out of a layer of soil or dumped material by being dissolved or suspended in percolating rainwater, the material washed out is known as leachate. Leachate can pollute groundwater and waterways.
m AHD	Australian Height Datum. Height in metres above Mean Sea Level +0.026 m at Fremantle.
Nutrient Load	The amount of nutrient reaching the waterway over a given time (usually per year) from its catchment area.
Nutrients	Minerals dissolved in water, particularly inorganic compounds of nitrogen (nitrate and ammonia) and phosphorus (phosphate) which provide nutrition (food) for plant growth. Total nutrient levels include the inorganic forms of an element plus any bound in organic molecules.
Pesticides	Collective name for a variety of insecticides, fungicides, herbicides, algicides, fumigants and rodenticides used to kill organisms.
Point Source Pollution	Specific localised source of pollution e.g. sewage or effluent discharge, industrial waste discharge.
Pollution	Water pollution occurs when waste products or other substances e.g. effluent, litter, refuse, sewage or contaminated runoff, change the physical, chemical, biological or thermal properties of the water, adversely affecting water quality, living species and beneficial uses.

Public Water Source Area	(PWSA) As for UWPCA, but allowing the taking of groundwater for public supplies.
Recharge	Water infiltrating to replenish an aquifer.
Recharge Area	An area through which water from a groundwater catchment percolates to replenish (recharge) an aquifer. An unconfined aquifer is recharged by rainfall throughout its distribution. Confined aquifers are recharged in specific areas where water leaks from overlying aquifers, or where the aquifer rises to meet the surface.
Runoff	Water that flows over the surface from a catchment area, including streams.
Saltwater Intrusion	The inland intrusion of saltwater into a layer of fresh groundwater.
Scheme Supply	Water diverted from a source (or sources) by a water authority or private company and supplied via a distribution network to customers for urban, industrial or irrigation use.
Storage Reservoir	A major reservoir of water created in a river valley by building a dam.
Stormwater	Rainwater which has run off the ground surface, roads, paved areas etc and is usually carried away by drains.
Treatment	Application of techniques such as settlement, filtration and chlorination to render water suitable for specific purposes including drinking and discharge to the environment.
Unconfined Aquifer	An aquifer containing water, the upper surface of which is lower than the top of the aquifer. The upper surface of the groundwater within the aquifer is called the watertable.
Underground Water Pollution Control Area	UWPCA) An area defined under the Metropolitan Water Supply Sewerage and Drainage Act, in which restrictions are put on activities that may pollute the groundwater.
Wastewater	Water that has been used for some purpose and would normally be treated and discarded. Wastewater usually contains significant quantities of pollutant.
Water Quality	The physical, chemical and biological measures of water.
Watertable	The upper saturated level of the unconfined groundwater.
Wellfield	A group of bores to monitor or withdraw groundwater.

Appendix 1

Land use compatibility in Public Drinking Water Source Areas

LAND USE COMPATIBILITY IN PUBLIC DRINKING WATER SOURCE AREAS

Purpose

To provide information on land use and activities that may impact on the quality of the State's water resources.

These notes provide a basis for developing formal guidelines in consultation with key stakeholders.

Scope

These notes apply to proposed and existing land use within Public Drinking Water Source Areas (PDWSAs).

PDWSAs include Underground Water Pollution Control Areas, Water Reserves and public water supply catchment areas declared under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*, and the *Country Areas Water Supply Act 1947*.

Preamble

The following notes reflect the Commission's current position. They are recommendations only, and may be varied at the discretion of the Commission.

Overview of Protection Framework

The Water and Rivers Commission is responsible for managing and protecting Western Australia's water resources. The Commission has policies for the protection of public drinking water source areas that include three levels of priority classification of lands within PDWSAs.

Priority 1 (P1) source protection areas are defined to ensure that there is **no degradation** of the water source. P1 areas are declared over land where the provision of the highest quality public drinking water is the prime beneficial land use. P1 areas would typically include land under Crown ownership. P1 areas are managed in accordance with the principle of **risk avoidance** and so land development is generally not permitted.

Priority 2 (P2) source protection areas are defined to ensure that there is **no increased risk of pollution** to the water source. P2 areas are declared over land where low intensity development (such as rural) already exists. Protection of public water supply sources is a high priority in these areas. P2 areas are managed in accordance with the principle of **risk minimisation** and so some development is allowed under specific guidelines.

Priority 3 (P3) source protection areas are defined to **minimise the risk of pollution** to the water source. P3 areas are declared over land where water supply sources need to co-exist with other land uses such as residential, commercial and light industrial developments.

Protection of P3 areas is achieved through **management guidelines** rather than restrictions on land use. If the water source does become contaminated, then water may need to be treated or an alternative water source found.

In addition to priority classifications, **well-head protection zones** and **reservoir protection zones** are defined to protect the water source from contamination in the immediate vicinity of production wells and reservoirs. Well-head protection zones are usually circular, with a radius of 500 metres in P1 areas and 300 metres in P2 and P3 areas. Reservoir protection zones usually consist of a 2 kilometre buffer area around the top water level of a reservoir and include the reservoir itself. These zones do not extend outside water reserves. Special restrictions apply within these zones.

Tables showing Land Use Compatibility with the Commission's PDWSA protection strategy

These tables should be used as a guideline only. More detailed information on the Commission's requirements in the form of activity guidelines or notes is available for some land uses. These can be found on the 'Protecting Water' web page on the Commission's internet site (www.wrc.wa.gov.au). Alternately information relating to land use and development within PDWSAs including those not listed in the tables, can be obtained from the Commission's Water Quality Protection Branch.

The Commission recognises that many activities were established before the introduction of these tables. The Commission will negotiate with the operators of such activities to develop appropriate management practices to minimise the impact on water resources.

These tables do not replace the need for assessment by the Commission. Please consult the Commission for advice on any land use proposals in Public Drinking Water Source Areas that may impact on water resources.

Definitions used in the following tables

Compatible	The land use is compatible with the management objectives of the priority classification.
Incompatible	The land use is incompatible with the management objectives of the priority classification.
Restricted	The land use may be compatible with the management objectives of the priority classification, with appropriate site management practices. All restricted developments / activities should be referred to the Commission for assessment on a case specific basis.
Extensive	Where limited additional inputs are required to the land to support the desired land use. eg supplementary animal feed only during seasonal dry periods.
Intensive	Where regular additional inputs are required to support the desired land use. eg irrigation, fertilisers and non forage animal feed dominates.

More information

We welcome your comment on these notes. They will be updated from time to time as comments are received or activity standards change. The Commission is progressively developing Water Quality Protection Notes and Guidelines covering land uses described in the attached tables. Advice on available guidance documents may be obtained by contacting the Commission.

If you wish to comment on the notes or require more information, please contact the Commission's Water Quality Protection Branch at the Hyatt Centre in East Perth.
Phone: (08) 9278 0300 (business hours) or Fax:(08) 9278 0585

Land Use Compatibility Tables

AGRICULTURE - ANIMALS

Land use	Priority 1	Priority 2	Priority 3
Animal saleyards and stockyards[14]	Incompatible	Incompatible[7]	Restricted[7]
Apiaries on Crown land	Restricted	Restricted	Restricted
Aquaculture eg. crustaceans, fish, algae farms	Incompatible	Restricted	Restricted
Dairy sheds	Incompatible	Incompatible[11,15]	Restricted[15]
Feedlots	Incompatible	Incompatible	Restricted
Livestock grazing - pastoral leases	Restricted	Compatible	Compatible
Livestock grazing - broad acre (extensive)	Incompatible	Restricted[11]	Compatible
Livestock grazing (intensive)	Incompatible	Incompatible	Restricted[11]
Piggeries	Incompatible	Incompatible	Incompatible
Poultry farming (housed)	Incompatible	Restricted	Restricted
Stables	Incompatible	Restricted	Compatible

AGRICULTURE - PLANTS

Land use	Priority 1	Priority 2	Priority 3
Broad acre cropping i.e. non-irrigated	Incompatible	Restricted[1]	Compatible
Floriculture (extensive)	Incompatible	Restricted	Compatible
Floriculture (intensive)	Incompatible	Incompatible	Restricted
Horticulture- hydroponic	Incompatible	Restricted	Restricted
Horticulture - market gardens	Incompatible	Incompatible	Restricted
Orchards	Incompatible	Restricted	Compatible
Nurseries (potted plants)	Incompatible	Restricted	Compatible
Silviculture (tree farming)	Restricted	Restricted	Compatible
Turf farms	Incompatible	Incompatible	Restricted
Viticulture (wine & table grapes)	Incompatible	Restricted	Compatible

DEVELOPMENT - COMMERCIAL

Land use	Priority 1	Priority 2	Priority 3
Aircraft servicing	Incompatible	Incompatible	Restricted[6]
Airports or landing grounds	Incompatible	Incompatible	Restricted[6]
Amusement centres	Incompatible	Incompatible	Compatible[6]
Automotive businesses	Incompatible	Incompatible	Restricted[6]
Boat servicing	Incompatible	Incompatible	Restricted[6]
Catteries	Incompatible	Compatible	Compatible
Caravan and trailer hire	Incompatible	Incompatible	Restricted[6]
Consulting rooms	Incompatible	Incompatible[7]	Compatible[6]
Concrete batching and cement products	Incompatible	Incompatible	Restricted
Cottage Industries	Restricted	Restricted	Compatible
Dog kennels	Incompatible	Restricted	Restricted
Drive in / take-away food shops	Incompatible	Incompatible	Compatible[6]
Drive -in theatres	Incompatible	Incompatible	Compatible[6]
Dry cleaning premises	Incompatible	Incompatible	Restricted[6]
Farm supply centres	Incompatible	Incompatible[7]	Restricted
Fuel depots	Incompatible	Incompatible	Restricted
Garden centres	Incompatible	Incompatible	Compatible
Laboratories (analytical , photographic)	Incompatible	Incompatible	Restricted[6]
Markets	Incompatible	Incompatible	Compatible[6]
Mechanical servicing	Incompatible	Incompatible	Restricted[6]
Metal production / finishing	Incompatible	Incompatible	Incompatible
Milk transfer depots	Incompatible	Incompatible	Restricted
Pesticide operator depots	Incompatible	Incompatible	Incompatible
Restaurants and taverns	Incompatible	Incompatible	Compatible[6]

Land use	Priority 1	Priority 2	Priority 3
Service stations	Incompatible	Incompatible	Restricted[6]
Shops and shopping centres	Incompatible	Incompatible[7]	Compatible[6]
Transport depots	Incompatible	Incompatible	Restricted
Vehicle parking (commercial)	Incompatible	Incompatible	Compatible
Vehicle wrecking and machinery	Incompatible	Incompatible	Restricted
Veterinary clinics / hospitals	Incompatible	Incompatible[7]	Restricted[6]

DEVELOPMENT - INDUSTRIAL

Land use	Priority 1	Priority 2	Priority 3
Heavy Industry	Incompatible	Incompatible	Incompatible
Light or general Industry	Incompatible	Incompatible	Restricted[6]
Power Stations	Incompatible	Incompatible	Incompatible

DEVELOPMENT - URBAN

Land use	Priority 1	Priority 2	Priority 3
Aged and dependent persons group dwellings	Incompatible	Incompatible	Compatible[6]
Cemeteries	Incompatible	Incompatible	Restricted
Civic buildings	Incompatible	Restricted[7]	Compatible[6]
Clubs -sporting or recreation	Incompatible	Restricted	Compatible[6]
Community halls	Incompatible	Restricted[7]	Compatible
Family day care centres	Incompatible	Incompatible[7]	Compatible[6]
Funeral parlours	Incompatible	Incompatible	Compatible[6]
Health centres	Incompatible	Incompatible	Compatible[6]
Hospitals	Incompatible	Incompatible	Restricted[6]
Medical centres	Incompatible	Incompatible	Compatible[6]
Toilet blocks and change rooms	Incompatible[7]	Restricted	Compatible

EDUCATION / RESEARCH

Land use	Priority 1	Priority 2	Priority 3
Community education centres	Restricted[7]	Restricted[7]	Compatible[6]
Primary / Secondary Schools	Incompatible	Incompatible	Compatible[6]
Scientific Research	Restricted	Restricted	Compatible
Tertiary Education Facilities	Incompatible	Incompatible	Restricted[6]

MINING AND MINERAL PROCESSING

Land use	Priority 1	Priority 2	Priority 3
Extractive industries (sand mining, quarries)	Restricted[2]	Restricted[2]	Restricted[2]
Mineral exploration	Restricted[4]	Restricted[4]	Restricted[4]
Mining	Restricted[4]	Restricted[4]	Restricted[4]
Mineral processing	Incompatible	Incompatible	Restricted[4]
Tailings dams	Incompatible	Incompatible	Restricted[4]

PROCESSING OF ANIMALS / ANIMAL PRODUCTS

Land use	Priority 1	Priority 2	Priority 3
Animal product rendering works	Incompatible	Incompatible	Incompatible
Abattoirs	Incompatible	Incompatible	Incompatible
Dairy product factories	Incompatible	Incompatible	Restricted[6]
Food Processing	Incompatible	Incompatible	Restricted[6]
Tanneries	Incompatible	Incompatible	Incompatible
Wool-scourers	Incompatible	Incompatible	Incompatible

PROCESSING OF PLANTS / PLANT PRODUCTS

Land use	Priority 1	Priority 2	Priority 3
Breweries	Incompatible	Incompatible	Restricted[6]
Composting / soil blending (commercial)	Incompatible	Incompatible	Restricted
Vegetable / food processing	Incompatible	Incompatible	Restricted[6]
Wineries	Incompatible	Incompatible	Restricted

SUBDIVISION

Land use	Priority 1	Priority 2	Priority 3
Rural subdivision to a minimum lot size of 4 ha	Incompatible	Compatible	Compatible
Rural subdivision to a lot size less than 4 ha	Incompatible	Incompatible	Incompatible
Special rural subdivision to a minimum lot size of 2 ha	Incompatible	Restricted[8,9]	Restricted[8]
Special rural subdivision to a lot size between 1 and 2 ha	Incompatible	Incompatible	Restricted[8,9]
Special rural subdivision to a lot size less than 1 ha	Incompatible	Incompatible	Incompatible
Urban subdivision	Incompatible	Incompatible	Compatible[6]
Industrial subdivision	Incompatible	Incompatible	Restricted[6]

Note: Subdivision of lots to any size within Priority 1 areas is incompatible

SPORT AND RECREATION

Land use	Priority 1	Priority 2	Priority 3
Equestrian centres	Incompatible	Incompatible	Compatible
Golf courses	Incompatible	Incompatible	Restricted[1]
Motor sports ie permanent racing facilities	Incompatible	Incompatible	Restricted
Public swimming pools	Incompatible	Incompatible	Restricted
Recreational parks -irrigated	Incompatible	Incompatible	Restricted[1]
Rifle ranges	Incompatible	Restricted	Compatible

STORAGE/ PROCESSING OF TOXIC AND HAZARDOUS SUBSTANCES (THS)

Land use	Priority 1	Priority 2	Priority 3
Above ground storage of THS	Restricted	Restricted	Restricted
Underground storage tanks for THS	Incompatible	Incompatible	Restricted

TOURISM ACCOMMODATION.

Land use	Priority 1	Priority 2	Priority 3
Bed and breakfast accommodation	Incompatible	Restricted[16]	Compatible
Caravan parks	Incompatible	Incompatible	Restricted[6]
Farm stay accommodation	Incompatible	Restricted[16]	Compatible
Motels, hotels, lodging houses, hostels	Incompatible	Incompatible	Compatible[6]

WASTE TREATMENT AND MANAGEMENT

Land use	Priority 1	Priority 2	Priority 3
Injection of liquid wastes into ground water	Incompatible	Incompatible	Incompatible
Landfills -Class I, II or III	Incompatible	Incompatible	Restricted
Landfills -Class IV and V	Incompatible	Incompatible	Incompatible
Recycling depots	Incompatible	Incompatible	Restricted
Refuse transfer stations	Incompatible	Incompatible	Restricted
Sewers (gravity)	Incompatible	Incompatible	Compatible
Sewers (pressure mains)	Incompatible	Restricted	Compatible
Sewage pump stations	Incompatible	Restricted	Restricted
Used tyre storage / disposal facilities	Incompatible	Incompatible	Incompatible
Wastewater treatment plants	Incompatible	Incompatible	Restricted
Water treatment plants	Restricted	Restricted	Restricted

OTHER DEVELOPMENTS

Land use	Priority 1	Priority 2	Priority 3
Caretaker's housing	Incompatible[7]	Restricted	Compatible
Communications receivers / transmitters	Restricted	Restricted	Restricted
Construction projects (not shown elsewhere)	Restricted	Restricted	Restricted
Forestry	Restricted[1]	Compatible	Compatible
Major transport routes	Incompatible	Restricted[10]	Compatible
National and Regional Parks[13]	Compatible	Compatible	Compatible
Nature reserves	Compatible	Compatible	Compatible

Table reference notes:

1. Restrictions include fertiliser and pesticide application.
2. Restrictions include the storage of fuels and chemicals, the depth of mining in relation to the water table with strict guidelines for rehabilitation.
3. Restrictions include the storage and use of fuel and other chemicals.
4. Subject to conditions placed on the mining lease and / or environmental approval.
5. Special rural development must have appropriate provisions under the Town Planning Scheme, to prevent introduction of land uses and practices that pose an unacceptable risk to water resources.
6. Must be connected to deep sewerage, except where exemptions apply under the current Government Sewerage Policy.
7. Only permitted if this use is incidental to the overall land use in the area and consistent with planning strategies.
8. Lots should only be created where land capability allows on-site soakage disposal of treated wastewater. Restrictions apply to siting of wastewater disposal systems in areas with poor land capability and / or a shallow depth to groundwater, animals are held or fertiliser is applied. Alternative wastewater treatment systems, where approved by the Health Department, may be appropriate if well maintained.
9. An average rather than minimum lot size may be acceptable if the proponent can demonstrate that the water quality objectives of the source protection area are met, and caveats are placed on titles of larger blocks stating that further subdivision cannot occur.
10. Restrictions include road design, construction and the types of goods that may be carried.
11. May be permitted if animal stocking levels (number of animals per hectare) are consistent with source protection objectives.
12. May be permitted if the type, volume and storage mechanisms for chemicals are compatible with water quality protection objectives.
13. Visitor and management infrastructure and facilities must be appropriately sited and maintained.
14. This does not include on-farm / pastoral lease stock-yards used for animal husbandry.
15. Waste management practices must be compatible with source protection objectives.
16. Restrictions apply on density of accommodation in Priority 2 areas.