DERBY WATER RESERVE
WATER SOURCE PROTECTION PLAN

Derby Town Water Supply

WATER AND RIVERS COMMISSION REPORT
WRP 46
2001
WATER RESOURCE PROTECTION SERIES

Water and Rivers
Commission

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Water and Rivers Commission
Policy and Planning Division

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Foreword

Water Source Protection Plans

Water Source Protection Plans establish the level of protection required within Water Reserves and Catchment Areas. Catchment protection of water sources is considered a fundamental part of ensuring the provision of a safe drinking water supply.

Water Source Protection Plans identify sources of contamination that should be investigated and set out programs for management of the resource. The 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 amendments of Town Planning Schemes and Development Strategies to support land uses compatible with Water Source Protection Plans.

This Water Source Protection Plan provides a basis for establishing compatible land uses within the Water Reserve at Derby 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 (PDWSAs) that include three priority classification levels.

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 conditional development is allowed.

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 are defined to protect the water source from contamination in the immediate vicinity of production wells. Wellhead protection zones are usually circular, with a radius of 500 metres in P1 areas and 300 metres in P2 and P3 areas. These zones do not extend outside Water Reserves and special conditions apply.

Contents

Summary

Derby is located in the south west of the Kimberley region. The town of Derby is entirely dependent on groundwater for its water supply.

Groundwater for Derby Town Water Supply is obtained from both confined (Lower Erskine Sandstone) and unconfined (Wallal Sandstone) aquifers. The wellfield is being progressively rationalised to only draw water from the confined aquifer. There is also a substantial abstraction from the unconfined aquifer for private water supplies.

The public water supply is obtained from a series of Water Corporation production bores on the Derby Peninsula. The bores are predominantly screened in the confined Lower Erskine Sandstone with some bores screened in the unconfined aquifer. Future wellfield extension is planned to occur to the south east with bores drilled into the confined Lower Erskine Sandstone.

The Derby Water Reserve was declared in 1979. The entire Water Reserve is currently being managed as a Priority 3 source protection area. There are a variety of urban and industrial land uses established within the Water Reserve. Land uses include industrial, residential, power station, golf course and wastewater treatment plant. A large part of the town that includes low density residential and light industrial is unsewered, and hence poses substantial water quality risk to the unconfined groundwater source.

Production bores in the shallow aquifer are vulnerable to contamination from established uses and there are plans for developing water supplies from the confined aquifer system within the townsite. Water Corporation plans to cease abstraction from all town water supply (TWS) bores in the unconfined aquifer by the end of 2001, and source the entire town water supply from the confined aquifer (Lower Erskine Sandstone), thereby making a Water Reserve unnecessary. It is proposed abolish the Water Reserve after decommissioning the shallow bores in the unconfined aquifer.

However, ongoing land use management is still required to protect the shallow aquifer used for private water supplies. As part of that duty of care, once the Water Reserve is removed the relevant health regulations and the Country Sewerage Policy will apply.

It is recommended that until the Water Reserve is abolished, the area continues to be managed as Priority 3 source protection area.

1. Introduction

Derby is located in the south west of the Kimberley region. The townsite lies in the Shire of Derby - West Kimberley and is the administrative centre for the municipal area. Derby is situated on a peninsula on the eastern side of King Sound (Figure 1).

The town of Derby is entirely dependent on groundwater for its water supply. Regional groundwater resources comprise both confined and unconfined aquifers of substantial areal extent.

Derby is supplied with groundwater from a wellfield located in the townsite that draws water from both confined and unconfined aquifers. The wellfield is being progressively rationalised to only take water from the confined aquifer.

There is also a substantial abstraction from the unconfined aquifer for private water supplies, to support horticultural land uses and hobby farming.

2. Hydrogeology

The hydrogeology of the Derby area is well documented by Laws and Smith (1988) and Laws (1989), and the Derby Groundwater Management Plan (Water Authority of Western Australia, 1992).

Derby is located in the northern part of the Canning Basin that comprises Phanerozoic sediments of approximately 8000 m thickness at the Derby Peninsula.

The stratigraphic sequence at Derby in order of increasing age is as follows:

- Quaternary sediments
- Meda Formation
- Wallal Sandstone
- Munkayarra Shale
- Erskine Sandstone
- Blina Shale
- Liveringa Group
- Noonkanbah Formation
- Poole Sandstone
- Grant Group

The principal regional aquifers with potential for potable supply are the Wallal Sandstone and the Erskine Sandstone. Groundwater also occurs at depth in the Liveringa Group, Poole Sandstone and the Grant Group. Except for the Liveringa Group in the deep Derby Town bore (600-700 m), these aquifers have only been exploited elsewhere in areas where they occur at shallow depths.

The Wallal Sandstone aquifer is unconfined and receives recharge from direct rainfall infiltration. Groundwater flow in the aquifer is westerly toward King Sound. In the Derby area, the Quaternary sediments, the Meda Formation and the Wallal Sandstone together form an unconfined aquifer with a maximum saturated thickness of 60 m.

The Erskine Sandstone is a multilayered aquifer with shale interbeds, and is generally confined from above by the Munkayarra Shale. Groundwater flow in the aquifer is generally northerly toward the May River. However, in the area near Derby, the Erskine Sandstone is in direct hydraulic connection with the Wallal Sandstone as the confining Munkayarra Shale is absent.

The Erskine Sandstone can be divided into upper and lower sections. The lower half of the formation is mainly shale with minor interbedded sandstone while the upper half is mostly sandstone with minor shale (Laws and Smith, 1988). The shale interbeds are, however, extensive, and are considered to confine the lower Erskine Sandstone from the upper part. The Erskine Sandstone is about 200 m thick in the Derby area and rests on the Blina Shale that confines the aquifer from below.

The Erskine Formation is recharged well to the south and south east of Derby (greater than 20 km) where the aquifer is unconfined.

3. Scheme description

The public water supply is obtained from a series of Water Corporation production bores on the Derby Peninsula drilled into the confined and unconfined aquifers.

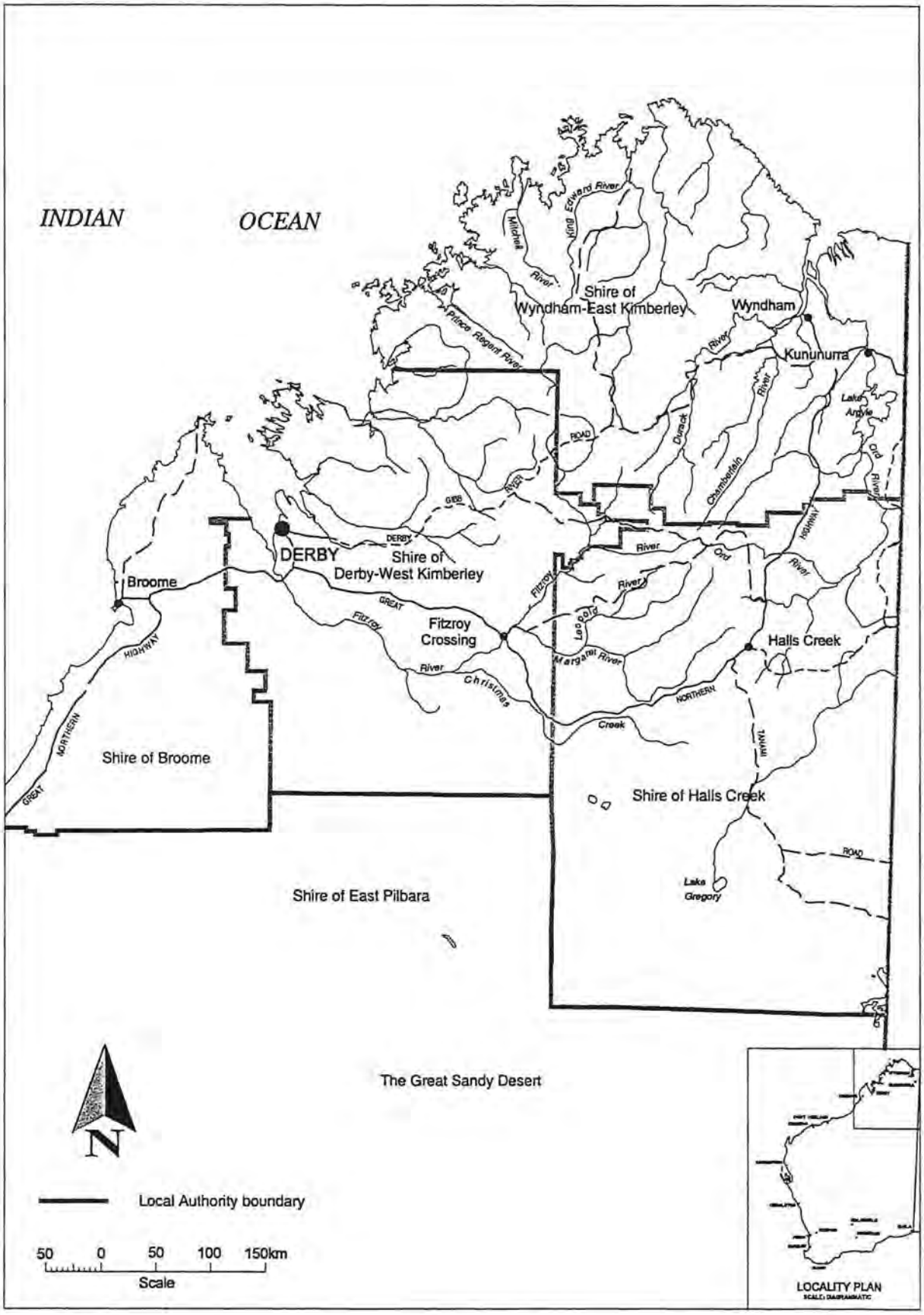


Figure 1. Derby locality map

The unconfined aquifer is mainly used for private water supplies. Public water supply bores in the unconfined aquifer are being progressively replaced with bores in the confined aquifer.

The TWS wellfield comprises seven operating production bores, of which three are drilled into the shallow unconfined aquifer to about 40 m depth, and four drilled into the confined lower Erskine Sandstone to maximum depth of 245 m. It is planned that the three operational bores in the unconfined aquifer (1/65, 3/76 and 2/78) will be progressively decommissioned by the end of 2001.

Production bores in the lower Erskine Sandstone are screened between 220 to 240 m below the natural surface. The zone of groundwater abstraction is also confined by an extensive shale layer. The recharge area for the aquifer is more than 20 km from Derby where the Erskine Formation is unconfined. It is therefore considered that the lower Erskine Sandstone is not vulnerable to contamination from activities on the Derby Peninsula.

About eighteen bores that include twelve disused production bores and three saltwater interface monitoring bores, comprise the monitoring network in Derby. Both water levels and quality are monitored at regular intervals.

Future wellfield extension is likely to occur in a south east direction with bores drilled into the confined lower Erskine Sandstone. A water supply scheme location plan is provided in Figure 2.

4. Existing Derby Water Reserve

The Derby Water Reserve was declared in 1979. The southern boundary of the Water Reserve is aligned with Conway Street and extends to the north covering the entire peninsula (Figure 3). Within the Water Reserve the by-laws of the *Country Areas Water Supply Act 1947* apply to control activities with potential to contaminate the public water supply.

5. Potential of contamination from land use

Land uses are regulated by the provisions of the Shire of Derby's Town Planning Scheme No. 5 (Draft). There are a variety of urban and industrial land uses already established within the Water Reserve. However, most land to the east of Ashley Street is low density residential that is unsewered. The land to the west of Ashley Street is mostly sewered. Current land uses in the Water Reserve include commercial, general industrial, residential, power station, golf course and wastewater treatment plant.

As described in Section 3, three operating production bores for Derby TWS draw water from the shallow unconfined aquifer, and are therefore vulnerable to contamination from these land uses.

The main threat of contamination to the unconfined aquifer is from septic systems. Septic systems are a source of harmful bacteria. These systems can also contribute significant nitrate and phosphorus that can contaminate the groundwater. Application of fertilisers at the golf course can also cause leaching of nutrients to the groundwater.

Commercial activities that can contaminate the groundwater take place throughout the Derby Peninsula. These types of activities include automotive businesses, service stations, drycleaning and paint stripping businesses. These involve storage and use of toxic substances.

Industrial developments generally pose a high risk of impact on water quality from inappropriate waste disposal or leakage and spillage of toxic and hazardous substances.

An area zoned General Industry is along the western side of Derby Highway.

Other activities that have the potential of contaminating the unconfined groundwater resource are associated with the power station, wastewater treatment plant, road maintenance facilities and the Shire of Derby-West Kimberley rubbish tip.

Figure 2. Wellfield plan

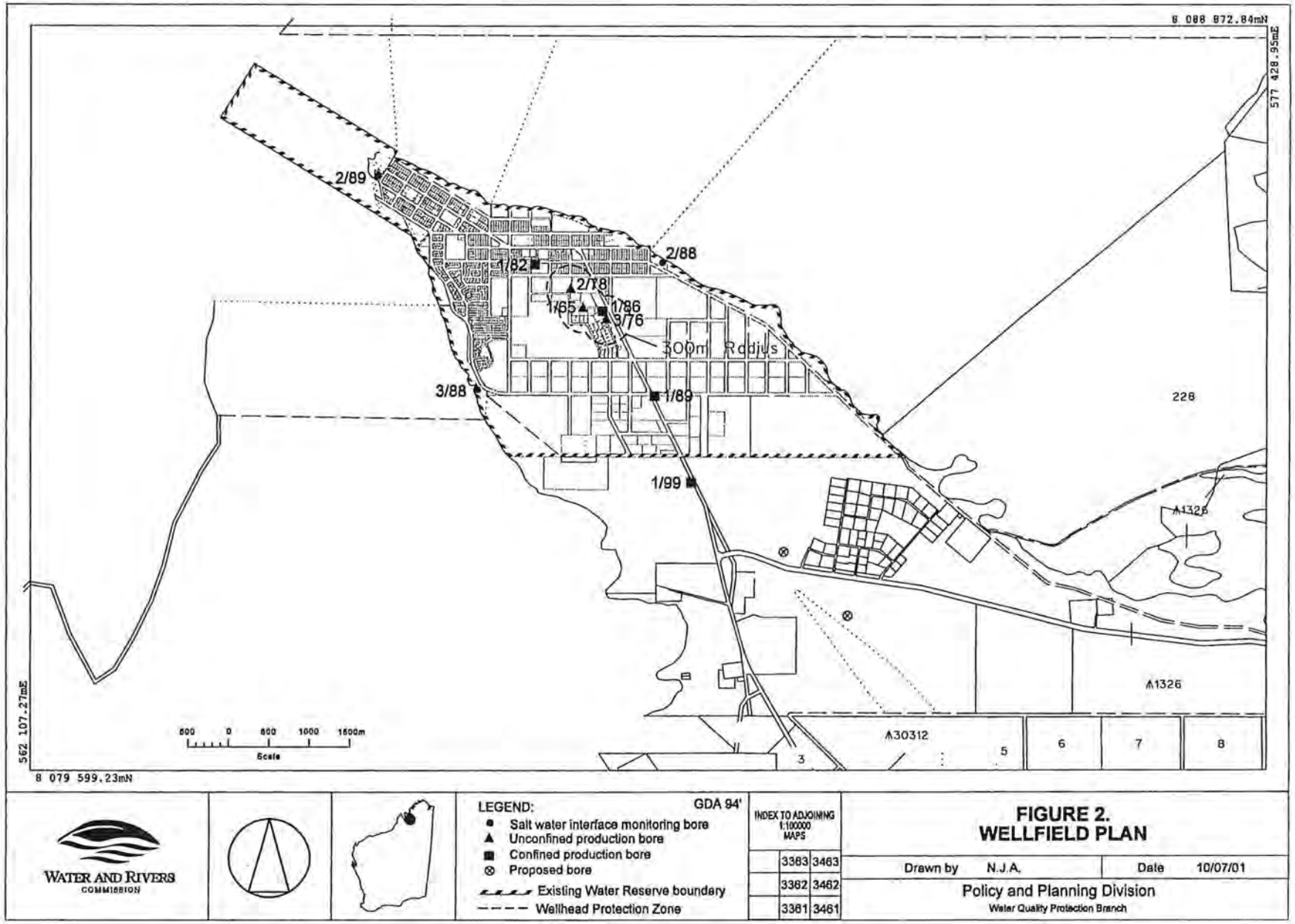
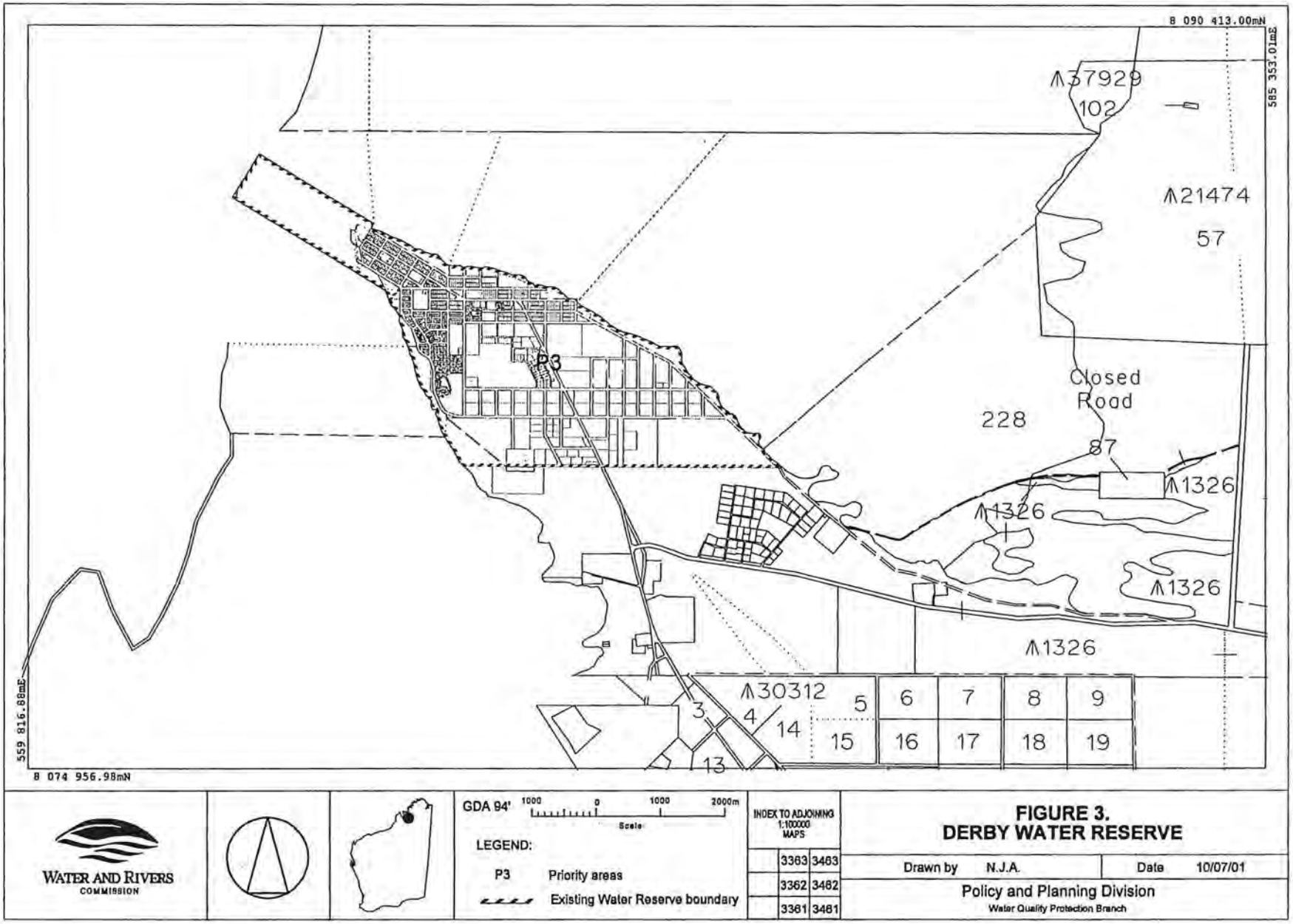


Figure 3. Derby Water Reserve



6. Strategies for water source protection

Production bores in the shallow aquifer are vulnerable to contamination from established landuses, although there are plans to replace these with bores that draw from the confined aquifer system.

Currently the Derby Water Reserve (Figure 3) is being managed as a Priority 3 source protection area. Priority 3 areas are protected by supporting best management practices rather than restricting land uses. Urban and industrial land uses are acceptable in a Priority 3 area provided they are sewered. These constraints are in place to control potential nutrient and bacteria influxes as they impact on the groundwater quality.

Water Corporation is progressively decommissioning the operational production bores (1/65, 2/78, 3/76) that draw water from the unconfined aquifer, in order to draw groundwater only from the confined aquifer in future.
To date, bore 1/65 has been decommissioned. Groundwater abstraction from the confined aquifer takes place from four production bores - 1/82, 1/86, 1/89 and 1/99. Bore 1/99 was commissioned in February 2001. Once the long term bore yield from 1/99 is confirmed, Water Corporation plans to cease abstraction from the remaining two bores in the unconfined aquifer. It is anticipated the town water supply would be sourced entirely from the confined aquifer by the end of 2001.
When the bores in the unconfined aquifer are decomissioned, the Derby Water Reserve will not be required, and will be abolished.

However, ongoing careful land use management is still required to protect the shallow unconfined aquifer for private water supplies. Relevant regulation for water quality protection will be via implementation of the Country Sewerage Policy, and relevant legislations of the Departments of Health, Environmental Protection, Minerals and Energy, and the Shire of Derby – West Kimberley.

Water quantity management will continue to be by the Water and Rivers Commission through the *Rights in Water and Irrigation Act 1914*.

It is recommended that until the shallow bores are decommissioned and the Water Reserve is abolished, the current Water Reserve continue to be managed for Priority 3 source protection. A table outlining land use compatibility in Public Drinking Water Source Areas is attached as Appendix 1.

Plate 1. There are numerous above and below ground fuel storage systems close to shallow production bores at Derby.

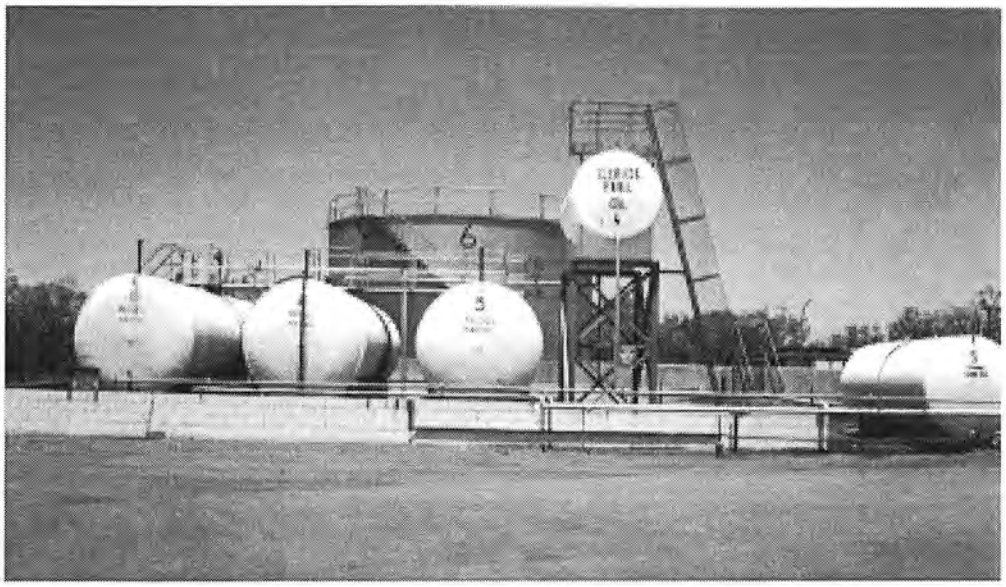


Plate 2. Western Power have installed impermeable bunds and upgraded pollution control measures at the Derby Power Station

Recommendations

1. Water Corporation should decommission all shallow TWS bores by the end of 2001.

2. The Water Reserve should remain in place and be managed as a Priority 3 source protection area, until decommissioning of all shallow TWS bores is complete. When completed, the Water Reserve should be recommended for abolition.

3. Until abolition of the Water Reserve, the Shire of Derby-West Kimberley should continue to incorporate the management principles outlined in the Water and Rivers Commission's *Land Use Compatibility in Public Drinking Water Source Areas* (see Appendix 1) and reflect the Priority 3 classification given to the Water Reserve.

4. Until abolition of the Water Reserve, the following recommendations would apply:

   I. Any land use proposals in the Water Reserve that could impact on the groundwater quality should be referred to the Water and Rivers Commission for comment.

   II. Incidents covered by WESTPLAN – HAZMAT in the Derby Water Reserve should be addressed through the following measures:

      (a) The Shire of Derby – West Kimberley Local Emergency Management Advisory Committee (through the Kimberley Emergency Management District) being familiar with the location and purpose of the Derby Water Reserve.

      (b) The locality plan for the Derby Water Reserve being provided to the Fire and Rescue Services headquarters for the HAZMAT Emergency Advisory Team.

      (c) The Water Corporation advising the HAZMAT Emergency Advisory Team during incidents in the Derby Water Reserve.

      (d) Personnel dealing with WESTPLAN - HAZMAT incidents in the area provided with ready access to a locality map of the Water Reserve and training to understand the potential impacts of spills on the groundwater resource.

5. Ongoing protection of private water supplies should continue through implementation of the Country Sewerage Policy, and via the relevant legislation of the Departments of Health, Environmental Protection, and Minerals and Energy, and the Shire of Derby – West Kimberley.

Implementation strategy

No	Description	Implemented by	Timing
1.	Decommission all operating shallow TWS bores	Water Corporation	End 2001
2.	Abolish the Derby Water Reserve following the decommissioning of all shallow TWS bores	Water and Rivers Commission	2002
3.	While the Water Reserve is in place, ensure Town Planning Scheme is compatible with water quality protection objectives for the Derby Water Reserve.	Shire of Derby – West Kimberley	Ongoing
4.	While the Water Reserve is in place, refer all rezonings, subdivisions and development proposals within the Water Reserve to the WRC.	• Shire of Derby – West Kimberley • Ministry for Planning • Other Statutory Agencies	Ongoing

5.	While the Water Reserve is in place, incidents covered by WESTPLAN – HAZMET in the Derby Water Reserve should be addressed through the following measures: • The Shire of Derby – West Kimberley Local Emergency Management Advisory Committee (through the Kimberley Emergency Management District) being familiar with the location and purpose of the Derby Water Reserve. • The locality plan for the Derby Water Reserve being provided to the Fire and Rescue Services headquarters for the HAZMAT Emergency Advisory Team. • The Water Corporation advising the HAZMAT Emergency Advisory Team during incidents in the Derby Water Reserve. • 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.	Shire of Derby – West Kimberley Local Emergency Management Advisory Committee through WRC (North West Region) WRC (North West Region) Water Corporation Shire of Derby – West Kimberley Local Emergency Management Advisory Committee	2001-02 ASAP Ongoing Ongoing
6.	Review of this plan and recommendations.	Water and Rivers Commission	Review implementation annually. Full review after 5 years

References

Laws, A. T. and Smith, R. A., 1988, Derby Regional groundwater investigation 1987, *Geological Survey of Western Australia: Hydrogeology Report No. 1988/18.*

Laws, A. T., 1989, Derby Town Water Supply – A Re-evaluation of the Erskine Sandstone Aquifer, *Geological Survey of Western Australia: Hydrogeology Report No. 1989/45.*

Water Authority of Western Australia, 1992, *Derby Groundwater Management Plan*, Water Authority of Western Australia.

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).
Alluvial	Transported by water flow processes, e.g. alluvial plain.
Alluvium	Ecologically recent sediment deposited by flowing water.
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.
Wellfield	A group of bores 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.
mAHD	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.
Recharge	Water infiltrating to replenish an aquifer.
Recharge Area (Recharge Zone)	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 upgradient 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.
Stormwater	Rainwater which has run off the ground surface, roads, roofs, 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 material. The upper surface of the groundwater within the aquifer is called the watertable.
Wastewater	Water which 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.
Water Reserve	An area defined under the Country Areas Water Supply Act in which restrictions are put on activities that may pollute the groundwater.
Watertable	The saturated level of the unconfined groundwater. Swamps or lakes in low-lying areas may be surface expressions of the watertable.

Appendix 1

Land use compatibility in Public Drinking Water Source Areas

LAND USE COMPATIBILITY IN PUBLIC DRINKING WATER SOURCE AREAS

Purpose

These notes provide the Commission's views on practices and activities related to the quality of the State's water resources. They are recommendations only, and may be varied at the discretion of the Commission.

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

Scope

These notes provide guidance on 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*.

The notes are not intended to override the statutory role and policy of other State or local government authorities. Project proponents will need to fulfil their legal responsibilities including those covering land use planning, environmental, health and building permit matters.

PDWSA 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 conditional development is allowed.

Priority 3 (P3) source protection areas are defined to **manage 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** for land use activities. 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 conditions 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 recommendations as 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). Alternatively 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.

Existing activities

The Commission recognises that many activities were established before the introduction of these tables. The Commission will negotiate with the operators of non-conforming activities to develop agreed management practices to minimise the impact on water resources. The Commission may also provide information to operators on best management practices for existing compatible and conditional activities.

Proposed activities

These tables do not replace the need for assessment of proposed activities 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.
Conditional	The land use can be compatible with the management objectives of the priority classification, with appropriate site management practices. All conditional developments / activities should be referred to the Commission for assessment on a case specific basis.
Incompatible	The land use is incompatible with the management objectives of the priority classification. Any such development proposals received may be referred for formal Environmental Impact Assessment under the Environmental Protection Act.
Extensive	Where limited additional inputs are required to support the desired land use, e.g. supplementary animal feed only during seasonal dry periods.
Intensive	Where regular additional inputs are required to support the desired land use, e.g. irrigation, fertilisers and non-forage animal feed dominates.

Tables showing landuse compatibility with PDWSA protection objectives

AGRICULTURE - ANIMALS

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

AGRICULTURE - PLANTS

Land use / practices	Priority 1	Priority 2	Priority 3
Broad land cropping i.e. non-irrigated	Incompatible	Conditional [1]	Compatible
Floriculture (extensive)	Incompatible	Conditional	Compatible
Floriculture (intensive)	Incompatible	Incompatible	Conditional
Horticulture- hydroponics	Incompatible	Conditional	Conditional
Horticulture - market gardens	Incompatible	Incompatible	Conditional
Orchards	Incompatible	Conditional	Compatible
Nurseries (potted plants)	Incompatible	Conditional	Compatible
Silviculture (tree farming)	Conditional	Conditional	Compatible
Soil amendment (clean sand, loam, clay, peat)	Incompatible	Conditional	Compatible
Soil amendment (industry byproducts & biosolids)	Incompatible	Incompatible	Conditional
Turf farms	Incompatible	Incompatible	Conditional
Viticulture (wine & table grapes)	Incompatible	Conditional	Compatible

DEVELOPMENT - COMMERCIAL

Land use	Priority 1	Priority 2	Priority 3
Aircraft servicing	Incompatible	Incompatible	Conditional [6]
Airports or landing grounds	Incompatible	Incompatible	Conditional [6]
Amusement centres	Incompatible	Incompatible	Compatible [6]
Automotive businesses	Incompatible	Incompatible	Conditional [6]
Boat servicing	Incompatible	Incompatible	Conditional [6]
Catteries	Incompatible	Compatible	Compatible
Caravan and trailer hire	Incompatible	Incompatible	Conditional [6]
Chemical manufacture / formulation	Incompatible	Incompatible	Conditional [6]
Consulting rooms	Incompatible	Incompatible [7]	Compatible [6]
Concrete batching and cement products	Incompatible	Incompatible	Conditional
Cottage Industries	Conditional	Conditional	Compatible
Dog kennels	Incompatible	Conditional	Conditional

Drive-in / take-away food shops	Incompatible	Incompatible	Compatible [6]
Drive -in theatres	Incompatible	Incompatible	Compatible [6]
Dry cleaning premises	Incompatible	Incompatible	Conditional [6]
Dye works	Incompatible	Incompatible	Conditional [6]
Farm supply centres	Incompatible	Incompatible [7]	Conditional
Fertiliser manufacture / bulk storage depots	Incompatible	Incompatible	Conditional
Fuel depots	Incompatible	Incompatible	Conditional
Garden centres	Incompatible	Incompatible	Compatible
Laboratories (analytical , photographic)	Incompatible	Incompatible	Conditional [6]
Markets	Incompatible	Incompatible	Compatible [6]
Mechanical servicing	Incompatible	Incompatible	Conditional [6]
Metal production / finishing	Incompatible	Incompatible	Incompatible
Milk transfer depots	Incompatible	Incompatible	Conditional
Pesticide operator depots	Incompatible	Incompatible	Incompatible
Restaurants and taverns	Incompatible	Incompatible	Compatible [6]
Service stations	Incompatible	Incompatible	Conditional [6]
Shops and shopping centres	Incompatible	Incompatible [7]	Compatible [6]
Transport & municipal works depots	Incompatible	Incompatible	Conditional
Vehicle parking (commercial)	Incompatible	Incompatible	Compatible
Vehicle wrecking and machinery	Incompatible	Incompatible	Conditional
Veterinary clinics / hospitals	Incompatible	Incompatible [7]	Conditional [6]
Warehouses	Incompatible	Incompatible [7]	Conditional [6]

DEVELOPMENT - INDUSTRIAL

Land use	**Priority 1**	**Priority 2**	**Priority 3**
Heavy industry	Incompatible	Incompatible	Incompatible
Light or general industry	Incompatible	Incompatible	Conditional [6]
Power stations / gasworks	Incompatible	Incompatible	Incompatible
Petroleum refineries	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	Conditional
Civic buildings	Incompatible	Conditional [7]	Compatible [6]
Clubs -sporting or recreation	Incompatible	Conditional	Compatible [6]
Community halls	Incompatible	Conditional [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	Conditional [6]
Medical, veterinary, dental centres	Incompatible	Incompatible	Compatible [6]
Toilet blocks and change rooms	Incompatible[7]	Conditional	Compatible

EDUCATION / RESEARCH

Land use	Priority 1	Priority 2	Priority 3
Community education centres	Conditional [7]	Conditional [7]	Compatible [6]
Primary / secondary schools	Incompatible	Incompatible	Compatible [6]
Scientific research	Conditional	Conditional	Compatible
Tertiary education facilities	Incompatible	Incompatible	Conditional [6]

EXPLORATION, MINING AND MINERAL PROCESSING

Land use	Priority 1	Priority 2	Priority 3
Extractive industries (sand, clay, peat and rock)	Conditional [2]	Conditional [2]	Conditional [2]
Mineral and energy source exploration	Conditional [4]	Conditional [4]	Conditional [4]
Mining	Conditional [4]	Conditional [4]	Conditional [4]
Mineral processing	Incompatible	Incompatible	Conditional [4]
Oil or gas extraction / decontamination for transport	Conditional [4]	Conditional [4]	Conditional [4]
Tailings dams	Incompatible	Incompatible	Conditional [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	Conditional [6]
Food processing	Incompatible	Incompatible	Conditional [6]
Manure stockpiling /processing facilities	Incompatible	Incompatible [7]	Conditional
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	Conditional [6]
Composting / soil blending (commercial)	Incompatible	Incompatible	Conditional
Forestry product processing- chip-mills, pulp / paper, timber preservation, wood / fibre works	Incompatible	Incompatible	Conditional
Vegetable / food processing	Incompatible	Incompatible	Conditional [6]
Wineries	Incompatible	Conditional [15, 18]	Conditional [15]

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	Conditional [8, 9]	Conditional [8]

Land use	Priority 1	Priority 2	Priority 3
Special rural subdivision to a lot size between 1 and 2 ha	Incompatible	Incompatible	Conditional [8, 9]
Special rural subdivision to a lot size less than 1 ha	Incompatible	Incompatible	Incompatible [9]
Urban subdivision	Incompatible	Incompatible	Compatible [6]
Industrial subdivision	Incompatible	Incompatible	Conditional [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	Conditional [1]
Motor sports i.e permanent racing facilities	Incompatible	Incompatible	Conditional
Public swimming pools	Incompatible	Incompatible	Conditional
Recreational parks -irrigated	Incompatible	Incompatible	Conditional [1]
Rifle ranges	Incompatible	Conditional	Compatible

STORAGE/ PROCESSING OF TOXIC AND HAZARDOUS SUBSTANCES (THS)

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

TOURISM ACCOMMODATION.

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

WASTE TREATMENT AND MANAGEMENT

Land use	Priority 1	Priority 2	Priority 3
Injection of liquid wastes into groundwater	Incompatible	Incompatible	Incompatible
Landfills -Class I, II or III	Incompatible	Incompatible	Conditional
Landfills -Class IV and V	Incompatible	Incompatible	Incompatible
Recycling depots	Incompatible	Incompatible	Conditional
Refuse transfer stations	Incompatible	Incompatible	Conditional
Sewers (gravity)	Incompatible	Incompatible	Compatible
Sewers (pressure mains)	Incompatible	Conditional	Compatible
Sewage pump stations	Incompatible	Conditional	Conditional
Used tyre storage / disposal facilities	Incompatible	Incompatible	Incompatible
Wastewater treatment plants	Incompatible	Incompatible	Conditional
Wastewater application to land	Incompatible	Incompatible [17]	Conditional

OTHER DEVELOPMENTS

Land use	Priority 1	Priority 2	Priority 3
Caretaker's housing	Incompatible [7]	Conditional	Compatible
Communications receivers / transmitters	Conditional	Conditional	Conditional
Construction projects (not shown elsewhere)	Conditional	Conditional	Conditional
Drinking water treatment plants	Conditional	Conditional	Conditional
Forestry	Conditional [1]	Compatible	Compatible
Major transport routes	Incompatible	Conditional [10]	Compatible
Construction / mining camps,	Conditional	Conditional	Conditional
Prisons	Incompatible	Incompatible	Conditional [6]
National and Regional Parks[13]	Compatible	Compatible	Compatible
Nature reserves	Compatible	Compatible	Compatible

Table reference notes:

1. Conditions may limit fertiliser and pesticide application.

2. Conditions cover the storage of fuels and chemicals, and the depth of excavation in relation to the watertable with specified guidelines for rehabilitation.

3. Conditions cover the storage and use of fuel and other chemicals.

4. Conditions placed via the Department of Minerals and Energy lease and / or Environment Minister's /Department of Environmental Protection 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. May be accepted if this facility is necessary to support acceptable land use in the area and is consistent with State and local government planning strategies.

8. Lots should only be created where land capability allows effective on-site soakage disposal of treated wastewater. Conditions apply to siting of wastewater disposal systems in areas with poor land drainage and / or a shallow depth to groundwater, and where animals are held or fertiliser is applied. Alternative wastewater treatment systems, where approved by the Health Department, may be accepted with maintenance requirements.

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 specified blocks stating that further subdivision cannot occur.

10. Conditions cover 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 stockyards used for animal husbandry.

15. Waste management practices must be compatible with source protection objectives.

16. Conditions apply on density of accommodation in Priority 2 areas.

17. May be permitted if the quantity and quality are compatible with water quality protection objectives.

18. Size of annual grape crush does not exceed 500 tonnes and grapes are sourced from operator's vineyards within the P2 area.

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