ALLANOOKA AND DONGARA-DENISON WATER RESERVES WATER SOURCE PROTECTION PLAN

Geraldton and Dongara-Port Denison Town Water Supplies

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Water and Rivers Commission

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Foreword

Water source protection plans

Water Source Protection Plans establish the level of protection required within Water Reserves. 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, 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 Allanooka and Dongara-Denison Water Reserves 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.

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 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 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 bores. 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.

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Summary

The town water supplies for Geraldton, Dongara, Port Denison, Walkaway and Narngulu come from Water Corporation bores that are screened in the multi-layered aquifer of the Yarragadee Formation. The aquifer is recharged by direct infiltration of rainfall and by infiltration of surface water along drainage lines.

The Allanooka and Dongara-Denison Water Reserves were proclaimed under the *Country Areas Water Supply Act 1947* in 1965 and 1990, respectively, to protect the public drinking water source.

Principal land uses in the existing Water Reserves are broad hectare cropping and grazing, and crude oil extraction. The water source has the potential to be contaminated from agricultural activities and the oilfield.

The plan proposes a modification to the Water Reserves to:

- exclude land down-gradient of the existing and proposed public water supply production bores; and
- combine the existing Water Reserves to create one reserve.

The objective of water source protection in this reserve is to preserve water quality at its current high level. Generally, the reserve should be managed to ensure that there is no increased risk to water quality. Dual classification for water source protection is appropriate for the proposed Allanooka-Dongara Water Reserve. Priority 1 source protection is proposed for the Crown Reserve land and Priority 2 source protection for the freehold land.

Public water supply production bores in the Priority 1 area should have a 500 metre radius wellhead protection zone. Bores in the Priority 2 area should have a 300 metre radius wellhead protection zone.

The current agricultural and industrial land uses are compatible with the proposed level of protection. The Water and Rivers Commission encourages the adoption of best management practices to protect water quality.

As the majority of land in the reserves is freehold rural land, it is anticipated that alternative agricultural land uses will be proposed in the future. The Commission will provide recommendations into the development approval process in accordance with this plan and Water Quality Protection Notes, Guidelines and Policies.

A draft plan was released for consultation in April 2000. Submissions on the draft plan and the outcomes of discussions with key stakeholders, including landowners, the Water Corporation, Shire of Irwin, Agriculture Western Australia, Mid West Development Commission, Department of Minerals and Energy, Department of Environmental Protection and Ministry for Planning were considered during development of this plan.

1. Introduction

Geraldton is a regional city located in the Mid West Region of Western Australia some 424 kilometres north of Perth. Dongara and Port Denison are south of Geraldton (see **Figure 1**).

Geraldton's industries include rock lobster fishing, broad hectare agriculture, mining, market gardening, light industry and tourism. The major industries in Dongara and Port Denison include broad hectare agriculture, tourism, and rock lobster fishing.

1.1 Existing water supply system

The Allanooka Scheme (consisting of the Mt Hill and Allanooka wellfields) supplies water to the City of Geraldton, the towns of Dongara, Port Denison, Walkaway, Narngulu, Eradu and Mullewa. In addition, a number of services draw directly from the supply mains. These wellfields are located in the existing Allanooka Water Reserve, approximately 50 kilometres south-east of Geraldton (see **Figure 1**). The Wye Springs Wellfield supplements the town water supply for Dongara and Port Denison. This wellfield is located in the Dongara-Denison Water Reserve, 12 kilometres north-east of Dongara-Port Denison (see **Figure 1**). Both Water Reserves are located within the Shire of Irwin.

The Allanooka Scheme and Wye Springs Wellfield, both operated by the Water Corporation, source water from the Yarragadee Formation, which varies between unconfined and semi-confined systems.

1.2 Existing water source protection

The Allanooka Water Reserve was proclaimed in 1965 under the *Country Areas Water Supply Act 1947* for the purpose of protecting the public drinking water supply source (see **Figure 2**). An extension to the Allanooka Water Reserve was gazetted in 1989. The Dongara-Denison Water Reserve was proclaimed in 1990, also under the *Country Areas Water Supply Act 1947*.

1.3 Water resource allocation

Groundwater resource utilisation and conservation in Western Australia is administered by the Water and Rivers Commission in accordance with the *Rights in Water and Irrigation Act 1914*. This Act requires the compulsory licensing of all artesian wells throughout Western Australia. In addition, non-artesian wells require licensing in specific areas, proclaimed under the Act as Groundwater Areas.

1.3.1 Arrowsmith Groundwater Area

The Arrowsmith region was proclaimed as the North Coastal Groundwater Area in 1975. An amendment to the boundaries occurred in 1990, which divided the area into the Arrowsmith Groundwater Area and the Jurien Groundwater Area. The Arrowsmith Groundwater Area was divided into six sub-areas based on groundwater flow systems to better manage the quantity of groundwater resources. The Allanooka and Dongara-Denison Water Reserves are located within the Allanooka and Eneabba Plain Sub-areas.

A Groundwater Management Plan was completed for the Arrowsmith Groundwater Area in 1995 (Water Authority of Western Australia, 1995). The Commission is preparing the Jurien-Arrowsmith Groundwater Area Management Plan, which includes the Allanooka Sub-area.

1.3.2 Current allocation licence for public supply

The Water Corporation is licensed by the Commission to draw water for public water supply purposes from the Allanooka Scheme and the Wye Springs Wellfield. The Allanooka Scheme comprises 19 bores and annual abstraction varied between 8 and 10 gigalitres during the 1989-90 and 1998-99 period (see **Figure 2**). The Water Corporation is licensed to abstract up to 12 gigalitres/annum from the Allanooka Scheme. The Wye Springs Wellfield comprises 2 bores and annual abstraction is up to 0.5 gigalitres. The Water Corporation is licensed to abstract up to 0.6 gigalitres/annum from the Wye Springs Wellfield.

2. Physiography

The Allanooka Water Reserve includes an undulating area (Arrowsmith Region), an upland with a relatively flat plateau (Victoria Plateau) and dissected margin, and the Swan Coastal Plain located on the western edge (Allen, 1980; Mory, 1995). The Dongara-Denison Water Reserve is situated on the Swan Coastal Plain.

The Arrowsmith Region is a deeply dissected part of the Victoria Plateau, with hills that are commonly capped by laterite (Mory, 1995; Allen, 1980).

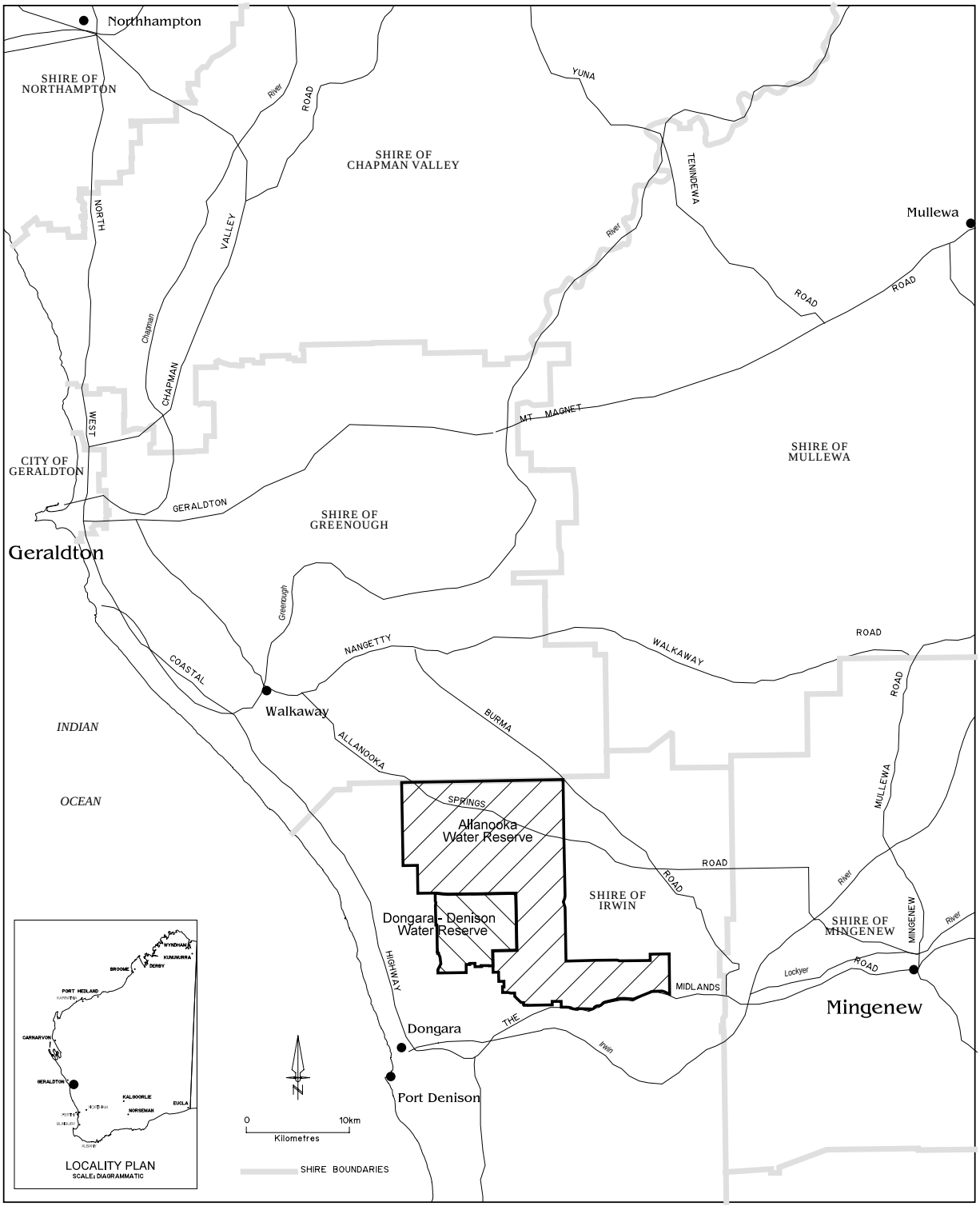

Figure 1. Existing Allanooka and Dongara-Denison Water Reserves locality map

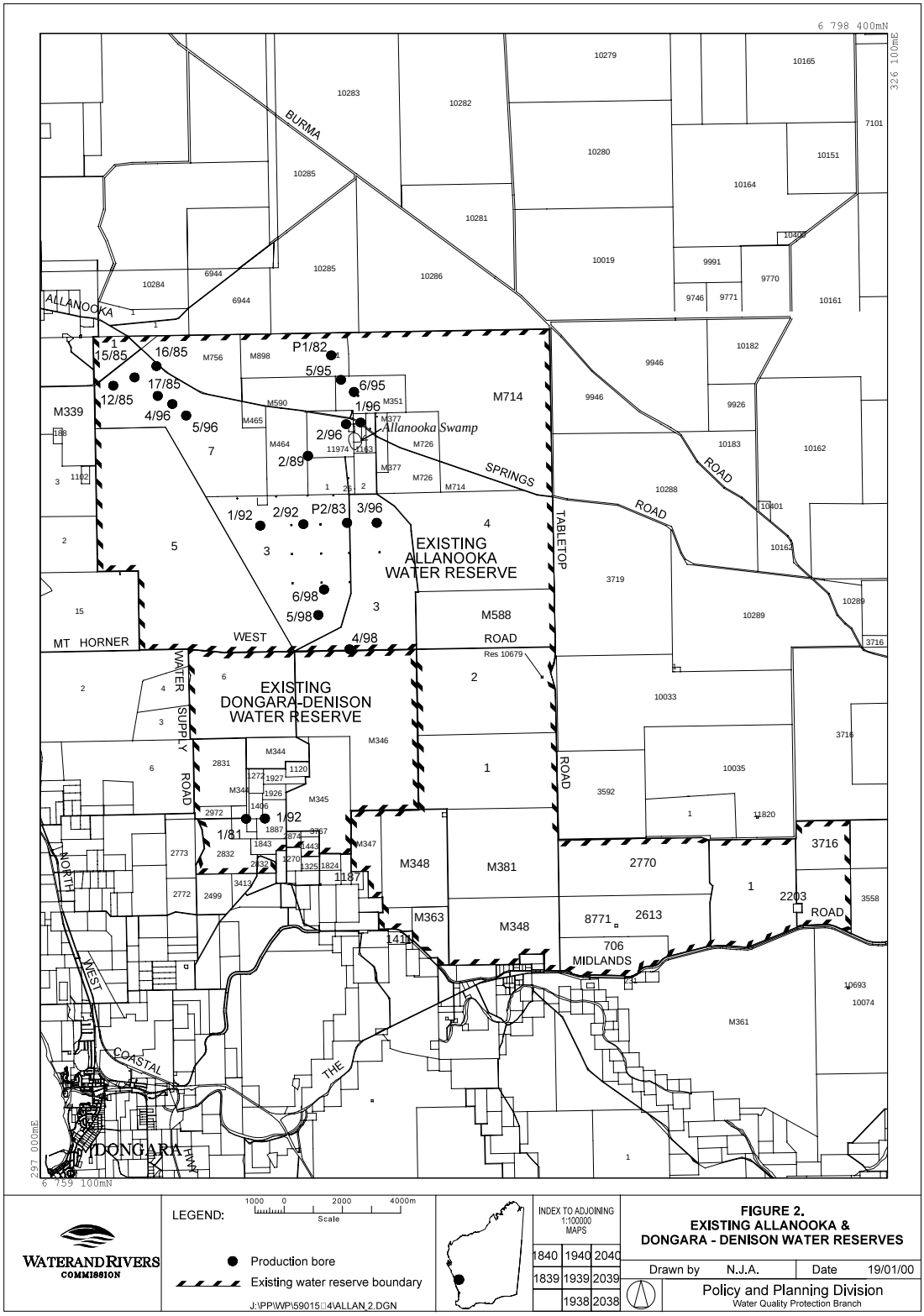

Figure 2. Existing Allanooka and Dongara-Denison Water Reserves

This map data is in Australian Geocentric Datum 1984 and is not Geocentric Datum of Australia 1994 compliant.

Victoria Plateau is a relatively flat sand and laterite capped plateau 200 to 300 metres above sea level, bordered by steep escarpments (Allen, 1980; Mory, 1995).

The boundary of the Swan Coastal Plain coincides with the relatively abrupt change that occurs at the Gingin Scarp. The plain consists of a belt of modern dunes that run parallel to the coast, with Tamala Limestone exposed at points on the crest of hills (Allen, 1980). Small alluvial plains are associated with the Irwin River.

3. Climate

The region has a Mediterranean-type climate, with hot, dry summers and cool, wet winters. Rainfall at Eradu averaged 375 millimetres in the period 1908-93. Eradu is 40 kilometres north of Allanooka and is expected to have similar rainfall. The average annual rainfall for Dongara was 465 millimetres between 1884-1992. Dongara has an average annual evaporation rate of approximately 2,400 millimetres.

4. Hydrogeology

The majority of the Allanooka Water Reserve consists of a thin mantle of surface sand and laterite overlying sediments of the Yarragadee Formation (Mory, 1995; Playford, Cockbain and Low, 1976). The Wye Springs Wellfield consists of the Tamala Limestone Formation overlying sediments of the Yarragadee Formation (WAWA, 1994).

The Yarragadee Formation consists of inter-bedded sandstone, siltstone and shale. The beds are discontinuous and range from 2 to 30 metres in thickness, with an average of about 10 metres. The formation outcrops east of the Gingin Scarp in small weathered exposures beneath laterite breakaways (Mory, 1995). The groundwater may be confined to varying degrees at depth beneath the water table because of the layered nature of the formation (Allen, 1980). The Yarragadee Formation aquifer screened in the Allanooka Scheme and Wye Springs Wellfield is a complex system that varies between being unconfined through to semi-confined.

The Yarragadee Formation aquifer extends from the Urella Fault (which is approximately 25-30 kilometres to the east of Allanooka Water Reserve) to beneath the Indian Ocean in the west; and from near the Greenough River in the north (where the base of the formation outcrops) to a groundwater divide near Hill River, 130 kilometres to the south (Rockwater, 1991; Commander, Allen and Davidson, 1990).

Groundwater flow in the vicinity of the wellfields is generally south-westerly (adapted from Allen, 1980). However, the existence of several faults throughout the Water Reserves complicates the pattern of groundwater flow.

The depth to water table in the Yarragadee aquifer system in the Allanooka Scheme ranges between approximately 12 to 85 metres below ground level and averages 50 metres below ground level. The water table is 12 metres below ground level at production bore 1/96, which is located near Allanooka Swamp. The water table at the two production bores in the Wye Springs Wellfield is approximately 20 metres below ground level.

The relatively deep water table and the varying unconfined through to semi-confined systems, results in the aquifer utilised for public drinking water supply having variable vulnerability to contamination. In general, the aquifer is considered moderately vulnerable to contamination. However, in the vicinity of Allanooka Swamp, the aquifer is considered moderately to highly vulnerable to contamination due to the relatively shallow water table and its unconfined nature.

Within the Water Reserves, recharge is by direct infiltration of rainfall and by infiltration of surface water along drainage lines (WAWA, 1987). The recharge area could extend north-east of the Water Reserves, to the Urella Fault. The full extent of the recharge area is not well defined.

4.1 Water quality

Groundwater salinity in the Yarragadee Formation is reported to increase with depth (WAWA, 1994). Allanooka and Wye Springs bores had total dissolved solids (TDS) levels that varied between 500 and 1,300 milligrams/litre (WAWA, 1994; Water Corporation, 1996). After mixing, the salinity in the supplied water is less than 1000 milligrams/litre (Water Corporation, 1996). Potable water extends to an average depth of 90 metres below the water table (Allen, 1980).

Groundwater abstracted from some Allanooka and Wye Springs bores has had elevated iron levels (WAWA, 1994; Water Corporation, 1996). Water treatment reduces the levels of iron to acceptable standards. Salinity and iron occur naturally in the abstracted groundwater.

Nitrate as nitrogen occurs in most of the production bores at concentrations less than or equal to 1 milligram/litre (Rockwater, 1991). These results are well within the national drinking water guidelines, which recommend a maximum nitrate as nitrate level of 50 milligrams/litre (i.e. 11.3 milligrams/litre nitrate as nitrogen) (NH&MRC & ARMCANZ, 1996). However, nitrate and nitrite as nitrogen concentrations in water abstracted from Wye Springs bore 1/92 have been elevated in recent years, but to less than the national drinking water guidelines. Therefore, nitrate levels in water abstracted from bore 1/92 should be closely monitored.

Generally, the groundwater quality in the wellfield areas is considered of a high standard.

4.2 Water treatment

Water abstracted from the Allanooka Scheme is chlorinated and aerated at the inlet to the unroofed "summit" reservoir. This primary treatment provides for initial disinfection, the removal of iron and some carbon dioxide, and control of algal growth in summer. The water is lime dosed at the "summit" reservoir outlet. Dosing provides a buffering effect, which increases the pH and reduces corrosion potential. The final stage before distribution is chlorination and fluoridation, which occurs at the Walkaway chemical dosing plant.

The water abstracted from the Wye Springs Wellfield is pumped to two storage tanks, where it is chlorinated, then aerated for pH and iron control and filtered to reduce iron levels.

5. Existing and proposed land use

5.1 Regional planning

The Geraldton Region Plan (Western Australian Planning Commission, 1999) identified part of the southern section of the Allanooka Water Reserve as a "Potential Intensive Agricultural Area". This section is not a confirmed area for intensive agriculture, as other issues, such as drinking water quality protection, will be considered during decision-making stages. Therefore, there is an opportunity for the Geraldton Region Plan to recognise the Water Reserve and the proposed priority classification when the Plan undergoes subsequent review.

The Geraldton Region Scheme is being scoped and the area to be covered by the Scheme has not yet been determined. Region Schemes can include protection of Water Reserves through development of Special Control Areas and associated policy.

The Allanooka and Dongara-Denison Water Reserves are zoned Rural – General Farming in the Shire of Irwin Town Planning Scheme (TPS) No. 4. The zone covers the broad hectare farming areas of the Shire.

A new TPS is currently being developed. It is likely that the Rural - General Farming zone will remain over both Water Reserves.

5.2 Crown owned or managed land

Lot 7 Allanooka Springs Road and Lot 3 Mt Horner West Road are freehold land owned by the Water and Rivers Commission. The land is leased for broad hectare sheep and cattle grazing, and wheat cropping. The lease conditions are audited every six months. Gravel has been extracted to construct roads and Water Corporation easements on the properties.

Reserve 1020 (Lot 11974 Allanooka Springs Road) is vested with the Commission. Part of the Reserve has been leased for sheep grazing for a short period each year, when rain-fed grass is available. The remainder of the Reserve contains native vegetation. Recreational hunting for kangaroos occurs in the Reserve. A former gravel pit exists at the site, which was filled by the Water Corporation with inert waste, such as concrete rubble. However, the site is also being used as an illegal domestic rubbish dump. A Water Corporation compound also exists on the Reserve, which is in the process of being decommissioned.

5.3 Broad hectare grazing and cropping

The predominant land use within the Allanooka and Dongara-Denison Water Reserves is broad hectare agriculture, mostly wheat and lupin crops, pasture and sheep and cattle grazing.

Cattle and sheep grazing in the region includes grazing on pasture, tagasaste and supplementary feeding. This grazing, including the "fattening" of lambs, as currently undertaken, is considered extensive in nature. There is no current grazing in the Water Reserves that the Commission or Agriculture Western Australia (Patterson, G. 2000, pers. comm.) would consider intensive in nature (to the best of the knowledge available about the area).

Broad hectare (i.e. extensive) grazing involves limited additional inputs of nutrients. For example, supplementary animal feed is only applied during seasonal dry periods or during "finishing off" or "fattening" of stock. Desirable stocking rates are determined by considering the impact of stock on vegetation cover and soil condition.

It is anticipated that landowners within the reserve will be interested in undertaking ongoing pasture improvement activities to increase stock carrying capacity and land productivity (e.g. using more perennial pasture species, such as tagasaste and lucerne).

Broad hectare cropping involves no irrigation and acceptable nutrient inputs from fertilisers (e.g. common nitrogen application rates are in the order of 50-80 kilograms N/hectare/annum).

A pine and tagasaste agroforestry trial operated by the Department of Conservation and Land Management exists on private land in the Allanooka Water Reserve (see **Plate 1**).

5.4 Intensive grazing

Approximately 80 hectares of lucerne and clover are irrigated with groundwater abstracted from the Yarragadee Formation (WAWA, 1995). The operation is located on Lot M363 Midlands Road, in the south-western section of the Allanooka Water Reserve. The groundwater well licence issued for this operation includes conditions that assist in reducing contamination risk.

5.5 Aquaculture

An aquaculture (marron farm) operation is located in the southern section of the Allanooka Water Reserve. The current operational management practices of this enterprise are consistent with this plan, and the groundwater well licence issued for this operation includes conditions that assist in reducing the contamination risk.

5.6 Crude oil extraction

The Water Reserves are located in an area with oil and gas reserves. Several oil and gas exploration permits and / or production licences exist within the Water Reserves.

The Mt Horner Oilfield, operated by Petro Energy and located on Tabletop Road, consists of eight production wells, which utilise beam pumps to abstract crude oil (see **Plate 2**). The Department of Environmental Protection licenses the operation under Part V of the *Environmental Protection Act 1986*. The oilfield is regulated under the *Petroleum Act 1967*, which is administered by the Department of Minerals and Energy (DME), and operates under a Petroleum Licence granted by the DME. The facility is also operated in accordance with the *Schedule of Onshore Petroleum Exploration and Production Requirements 1991*, issued by the DME. This schedule includes environmental requirements for the operation of the site.

The oil product passes via buried pipe work into two separation tanks, connected in series. The oil and associated water are separated and the crude oil is pumped into storage tanks and the formation water (i.e. wastewater) is directed to a pond. The plant produces 8000 kilolitres/annum of oil and 250 000 kilolitres/annum of wastewater. The wastewater contained in the pond is irrigated onto a number of tree plantations at a rate of about 685 kilolitres/day (see **Plate 3**).

5.7 Gravel extraction

Some gravel extraction, mostly for on-farm road construction, occurs in the area.

5.8 Private airstrip

A non-commercial airstrip is located in the Water Reserve. This is used to support broad hectare farming practices (e.g. for aerial pesticide spraying). Fuel is stored on-site on a periodic and temporary basis in 200 litre drums.

5.9 Potential future land uses

Interest has been expressed in the establishment of diversified agricultural enterprises within the Water Reserve. These land uses include activities such as intensive grazing, feedlots, orchards, viticulture and market gardens. These activities are discussed in more detail in Section 8.3.

6. Proposed proclaimed area and priority classifications

The existing and proposed Water Reserves are shown in **Figure 3**. Areas proposed for expansion of the Allanooka Water Supply Scheme in the near future are located within the existing Dongara-Denison Water Reserve. Therefore, the proposed Water Reserve combines the Allanooka and Dongara-Denison Water Reserves and includes some boundary changes. The new reserve is proposed to be named the Allanooka-Dongara Water Reserve.

The proposed Allanooka-Dongara Water Reserve excludes sections on the western edge of the existing Water Reserves. This land is down-gradient of existing and proposed public water supply production bores. The higher groundwater salinity at these locations precludes the use for public water supply. Lot M363 and part of Lot M348 Midlands Road have also been excluded from the proposed Water Reserve. This area has been removed due to the risk of groundwater contamination from nutrients and pesticides resulting from the intensive agricultural practices. This area is also down-gradient of potential locations for public water supply production bores.

The area in the southern section and to the east in the proposed Water Reserve is necessary to allow for future expansion of the public water supply wellfield.

The recharge area for the aquifer system is located within the Water Reserve and also extends up-gradient (i.e. outside) of the proposed Water Reserve. The existing hydrogeological information confirms that the proposed boundary is necessary for water source protection. In addition, activities within the Water Reserve present a greater risk to contamination of the water source than recharge areas outside of the Water Reserve, due to their proximity to the production bores.

The full extent of the recharge area is not well defined. A detailed hydrogeological investigation is required to better define the recharge processes in the north-eastern area outside of the Water Reserve. This information would aid in determining the level of risk to the water source from activities outside of the Water Reserve. The assessment may indicate that the reserve boundary requires expansion to the north-east.

The Allanooka Scheme and the Wye Springs Wellfield abstract groundwater from an unconfined to semi-confined aquifer. In general, the groundwater is considered moderately vulnerable to contamination.

Most of the Allanooka Scheme production bores are located within land owned or controlled by the Water and Rivers Commission, so land use activities close to the wellheads can be directly managed through lease conditions to minimise risks to the water source.

The source protection objective for the Water Reserve is to maintain existing water quality and minimise increased risks of contamination.

In accordance with this objective, it is recommended all freehold land located within the proposed Water Reserve be managed for Priority 2 (P2) source protection (see **Figure 3**). The decision process used to determine the appropriate level of water source protection is shown in **Appendix 2**. This classification is based on the following criteria:

- the water source is of strategic importance as it is the water source for the City of Geraldton and the towns of Dongara, Port Denison, Walkaway and Narngulu;
- the groundwater is moderately vulnerable to contamination; and
- the current private land uses are generally compatible with Priority 2 classification, and activities can be directly controlled on the Commission's freehold land.

The Water and Rivers Commission controlled land at Reserve 1020 (Lot 11974 Allanooka Springs Road) should be managed as a Priority 1 (P1) source protection area (see **Figure 3)**. This classification is based on the following criteria:

- the water source is of strategic importance for supply to the City of Geraldton and the towns of Walkaway and Narngulu;

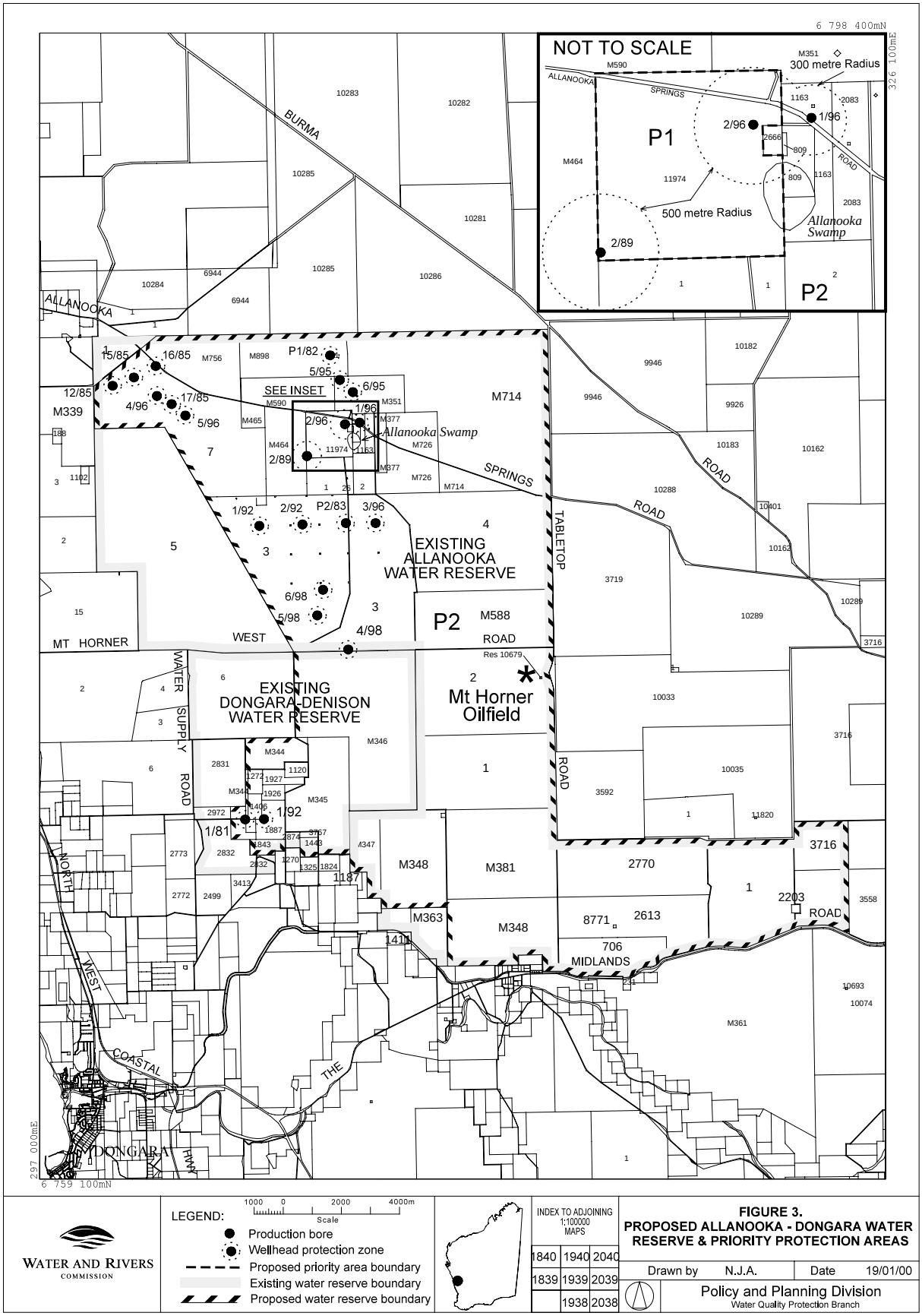

Figure 3. Proposed Allanooka-Dongara Water Reserve and priority protection areas

This map data is in Australian Geocentric Datum 1984 and is not Geocentric Datum of Australia 1994 compliant.

- the groundwater is moderately to highly vulnerable to contamination;
- the historical land use is acceptable with Priority 1 classification; and
- land is under Crown ownership, so land use and development can be controlled.

The detail of general land use compatibility under each classification is outlined in the guidance document titled *Land Use Compatibility in Public Drinking Water Source Areas* (see **Appendix 3**). This document provides general guidance on the compatibility of future land use development. It is not an exhaustive list of land uses and will be updated as clarification of uses are requested and industry standards change. The term "conditional" is used where the land use can usually be compatible with the objectives of source protection, with the adoption of appropriate site management practices. Generally, these are practical steps to protect water resources from potential contaminants and cover issues such as fuel and chemical storage, nutrient application and waste disposal. This document is also available at the Commission's website: www.wrc.wa.gov.au/protecting water/policies/water quality protection notes, where it is updated from time to time.

6.1 Wellhead protection zone

In addition to priority classifications, wellhead protection zones are defined to protect the water source from contamination in the immediate vicinity of production bores. Wellhead protection zones are defined over the immediate area around bores and special conditions may apply to limit groundwater pollution risks. For example, the Commission would have concerns with activities such as fuel and chemical storage in the wellhead protection zone. No constraints would be placed on grazing and cropping within a wellhead protection zone.

Each production bore within the P1 area should have a 500 metre radius wellhead protection zone. Each production bore within the P2 area should have a 300 metre radius wellhead protection zone. The priority classifications, as shown in Figure 3, apply in the wellhead protection zones, that is, the zone does not contain a different priority classification.

7. The impact of water source protection planning

Common areas of concern raised during consultation on the draft plan are addressed below.

7.1 New conditions on existing land uses

The Commission's water source protection planning recognises existing land use approvals and does not prohibit or constrain currently approved land use activities. The Commission will not be placing new restrictions on existing practices (e.g. fertiliser application rates). However, the adoption of best management practices is encouraged for water quality protection.

It is only when a landowner applies to the Local Government Authority to expand an existing operation or develop the land for a new land use type that the Commission will provide advice into the approval process. Advice will be based on the compatibility of the activity with the Priority classification.

7.2 Compensation for development constraints

The issue of compensation is often raised through water source protection planning. The existing water source protection legislation, the *Country Areas Water Supply Act 1947*, does not contain any provision for compensation when a protection area is proclaimed.

As shown in Appendix 2, the Commission recommends long term Crown ownership only for land classified as P1 areas. As freehold land in P1 areas generally cannot be managed to meet P1 objectives, Government purchase is appropriate. This policy position was recommended in the 1994 Select Committee Report on Metropolitan Development and Groundwater Supplies. This policy approach is also recommended in the Gnangara Land Use and Water Management Strategy (2001), the draft Greater Bunbury Region Scheme (2000) and all Water Source Protection Plans.

8. Management of potential water quality risks

8.1 Protection objectives

Priority 1 and 2 classifications proposed for this reserve have the fundamental water quality objectives

of risk avoidance and risk minimisation, respectively. The overall source protection objective for the reserve is to maintain existing water quality and minimise increased risks of contamination.

Current land uses are generally compatible with the Priority 2 classification. This plan recognises the right of existing approved land uses to continue to operate in the reserve.

8.2 Best management practices

The adoption of best management practices for land use activities is encouraged to help protect water quality.

To assist the adoption of sound environmental practices, guidelines for specific industries are being progressively developed in conjunction with other agencies (e.g. Agriculture Western Australia and the Department of Environmental Protection) and the relevant peak industry body (e.g. WA Pork Producers' Association). Examples include recently released Dairy Guidelines and Draft Viticulture and Cattle Feedlot Guidelines. These guidelines incorporate a practical, commonsense approach to environmental management issues, and are aimed at avoiding any unreasonable burden to the industry.

The Commission recommends these guidance documents to landowners and managers as best practice for water quality protection.

Education and awareness (e.g. signage and informative material) is a key mechanism for water quality protection for those who visit the reserve and for landowners in the catchment.

On freehold land, the Commission aims to inform landowners and managers on protection of public drinking water sources through environmental management guidelines and other informative material. The Commission recommends the use of best practice for water quality protection through provision of management advice in the form of environmental guidelines and water quality protection notes. **Appendix 4** provides a list of some current and in development guidelines, policies and water quality protection notes.

8.3 Land use planning

It is recognised under the State Planning Strategy (Western Australian Planning Commission, 1997) that the establishment of appropriate protection mechanisms in statutory land use planning processes is necessary to secure the long-term protection of water sources.

It is therefore appropriate that the proposed Allanooka-Dongara Water Reserve and priority classifications be recognised in the Shire of Irwin Town Planning Scheme, the Geraldton Region Plan (when it is reviewed) and the Geraldton Region Scheme (if the Scheme area includes the Water Reserve).

Priority classifications are not statutory under the *Country Areas Water Supply Act 1947*. They define the level of catchment protection that guides the Commission's response on land development proposals.

This protection plan and subsequent recognition of the reserve and priority classifications in statutory planning strategies will provide certainty for long-term management requirements for the land. These statutory planning mechanisms will determine future development within the proposed Allanooka-Dongara Water Reserve.

The Water and Rivers Commission's input into the development approval process is through providing advice on the compatibility of land uses with the priority classification. Advice is on a case-by-case basis.

Throughout the consultation process, questions were raised about the potential future development of other land use activities and if these would be acceptable in the proposed Water Reserve. Some of these activities are discussed here in more detail.

8.3.1 Intensive grazing

Intensive grazing, where regular additional inputs are required to support the land use (e.g. fertilisers and irrigated pasture or non-forage animal feed dominates) and higher (than broad hectare) stocking rates occur, is considered an incompatible activity in P2 areas. Irrigated and fertilised pastures generally present an unacceptable water quality risk due to higher chemical (e.g. fertiliser and pesticides) inputs and the increased

leaching rate of contaminants, due to irrigation increasing recharge rates. The higher amounts of non-forage animal feed associated with intensive grazing increases the potential stocking rates. The increased stocking rates present an unacceptable risk to water quality due to the level of nutrient and microbiological contamination from animal wastes.

Some levels of grazing on irrigated pastures may be acceptable in P2 areas, with best practice. Acceptability will depend on the proposed irrigation and fertilising systems and annual stocking rates. Development applications would be assessed to determine if it can be demonstrated that the development will be compatible with P2 source protection objectives.

8.3.2 Feedlots and piggeries

A more intensive approach for the meat production industry in the northern agricultural region is cattle feedlotting. A beef cattle feedlot is a confined yard area with watering and feeding facilities where cattle are hand or mechanically fed for the purpose of production. The cattle are maintained at such densities (i.e. in the order of greater than 50 head cattle/hectare, equivalent to approximately 350 DSE/hectare) that pasture foraging has a negligible role in providing sustenance.

The very high stocking rates in cattle feedlots presents an unacceptable risk to water quality from animal waste concentrations. Therefore, cattle feedlotting is considered an incompatible activity within the Water Reserve. More information on feedlotting can be found in the inter-agency *Draft Guidelines for the Environmental Management of Beef Cattle Feedlots in Western Australia* (Agriculture Western Australia et al., 2000).

Piggeries produce a very high amount of animal wastes and present an unacceptable risk to water quality. Therefore, piggeries are considered an incompatible activity in the Water Reserve. More information on piggeries can be found in the inter-agency *Environmental Guidelines for New and Existing Piggeries* (Agriculture Western Australia et al., 2000).

8.3.3 Horticulture

Some interest has been expressed in the establishment of horticulture enterprises, such as orchards and viticulture, in the Water Reserve.

Orchards (for growing fruit and nut crops, where common nitrogen application rates are in the order of 150 kilograms N/hectare/annum) are considered acceptable in P2 areas, with best practice (e.g. efficient fertiliser and irrigation systems). A best practice guidance document for this industry has not yet been produced.

Viticulture (where common nitrogen application rates are in the order of 180 kilograms N/hectare/annum) is also considered acceptable in P2 areas, with best practice. The inter-agency *Draft Environmental Management Guidelines for Vineyards* (Wine Industry Association of Western Australia et al., 2001) provides more information on acceptable viticulture practices.

The intensive fertiliser (e.g. in the order of 1200 kilograms N/hectare/annum) and chemical applications of market garden operations present an unacceptable contamination risk to the groundwater source. Therefore, market gardening is considered an incompatible activity within the Water Reserve. An inter-agency *Code of Practice for Sustainable Vegetable and Potato Production* is currently in development.

8.3.4 Silviculture

Silviculture (tree plantations) is considered acceptable in P2 areas, with best practice. An inter-agency best practice guidance document for this industry has not yet been produced. However, the Forest Products Commission and the timber plantation industry are producing a revised version of the Code of Practice for Timber Plantations in WA, to which the Water and Rivers Commission has provided input.

8.3.5 Other potential land uses

It is anticipated that other agricultural land uses will be proposed in the future within the Water Reserve.

The Commission will always give consideration to innovative land use developments that demonstrate they can be compatible with P2 source protection objectives. The Commission would provide advice

into the assessment process of the approving agency, in accordance with this plan and Water Quality Protection Notes, Guidelines and Policies.

Potential developers are encouraged to liaise with the Commission prior to submitting formal development applications so that water resource protection and availability considerations can be adequately addressed as part of assessing the viability of the proposal.

8.4 Surveillance and by-law enforcement

The quality of public drinking water sources within country areas of the State is protected within Public Drinking Water Source Areas proclaimed under the *Country Areas Water Supply Act 1947*. Declaration of these areas allows by-laws to be established to protect water quality.

The Commission considers by-law enforcement, through on-ground surveillance of land use activities in Water Reserves, as an important water quality protection mechanism. Surveillance, and subsequent contact with visitors to the reserve, is also important in raising the general level of awareness of the need to protect water quality.

Signs are erected in Water Reserves to advise of the Water Reserve location, activities that are prohibited or regulated and water quality protection measures.

8.5 Emergency response

Escape of chemicals during unforeseen incidents and use of chemicals during emergency response can cause groundwater contamination. The Shire of Irwin Local Emergency Management Advisory Committee through the Geraldton Emergency Management District should be familiar with the location and purpose of the Allanooka-Dongara Water Reserve. A locality plan should be provided to the Fire and Rescue Services headquarters for the HAZMAT Emergency Advisory Team. The Regional Manager of the Mid-West Gascoyne Region (Water and Rivers Commission) should have an advisory role to any HAZMAT incident in the Allanooka-Dongara Water Reserve.

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.

8.6 Land use, potential water quality risks and recommended strategies

Table 1 details the existing and potential land uses in the reserve and the potential water quality risks leads through a discussion to a recommended strategy to manage the risk.

The discussion and recommended strategies balance the need to protect water quality for the community in the long term with the rights of landowners to continue to utilise their land for lawful purposes.

Table 1. Land use, potential water quality risks and recommended strategies

The following table summarises the potential water quality risks associated with the land use activities in the reserve and recommends strategies for minimising the impact on the quality of water abstracted from the reserve. The responsible agencies and appropriate timeframes for implementation of the strategies recommended in this table are outlined in the Implementation Strategy section of this report.

Activity	Potential Water Quality Risks	Consideration for Management	Recommended Protection Strategies
Freehold Land			
Broad hectare cropping and grazing (which includes improved pastures, such as tagasaste, but does not include irrigated pastures)	The potential groundwater quality risks associated with these land uses include: • nutrient and microbiological contamination from fertilisers and animal waste; • chemical (e.g. pesticides such as Atrazine) contamination; and • leakage/spillage from chemicals/fuel storage and resultant contamination.	The existing land uses are considered 'low intensity' and therefore compatible with the proposed Priority 2 (P2) classification. To aid water quality protection, landowners should be encouraged to adopt best practice. The groundwater from production and selected monitoring bores is monitored for nutrients and pesticides on a scheduled basis.	*Acceptable with Best Management Practices*. • Development proposals to be referred to WRC for advice and recommendation. Proposals to be assessed to ensure that water quality objectives are met. Advice is on a case-by-case basis. • Allow scope for innovative land use developments to demonstrate they can be compatible with P2 source protection. • Inform public and landowners on protection of drinking water quality with the use of signage and informative material. For example, see Water Quality Protection Notes: *Aboveground chemical storage tanks in PDWSAs*, *Toxic and hazardous substances in PDWSAs* and *Underground chemical storage tanks in PDWSAs*. • Develop environmental guidelines for agricultural activities (e.g. broad hectare cropping and grazing) in drinking water areas with industry groups and relevant agencies. Landowners will be encouraged to adopt the guidelines as best practice.
Aquaculture	The potential risk to groundwater quality is from the disposal of wastewater from ponds containing nutrients/organic material.	Fisheries WA approval requires pond wastewater discharge into treatment ponds before discharge to ground or to surface waters. Water and Rivers Commission provides advice on best management practices. See Water Quality Protection Note: *Aquaculture projects*.	*Acceptable with Best Management Practices*. • Aquaculture proposals within the Water Reserve should continue to be referred by Fisheries WA to the Water and Rivers Commission for assessment and advice.

Table 1 contd.

Activity	Potential Water Quality Risks	Consideration for Management	Recommended Protection Strategies
Orchards and Viticulture	The potential groundwater quality risks associated with these land uses include: • nutrient contamination from fertilisers; • chemical contamination from pesticides; and • leakage/spillage from chemicals/fuel storage and resultant contamination.	Orchards and viticulture are considered as conditional activities in P2 areas and can be managed to meet water quality objectives.	*Acceptable with Best Management Practices.* • Development proposals to be referred to WRC for advice and recommendation. Proposals to be assessed to ensure that water quality protection objectives are met. Advice is on a case-by-case basis. • Allow scope for land use developments to demonstrate they can be compatible with P2 source protection objectives. • Viticulture developments should be in accordance with the *Draft Environmental Management Guidelines for Vineyards*. • Develop environmental management guidelines for orchards with industry groups and relevant agencies. Landowners will be encouraged to adopt the guidelines as best practice.
Silviculture (tree plantations)	The potential groundwater quality risks associated with these land uses include: • nutrient contamination from fertilisers; • chemical contamination from pesticides; and • leakage/spillage from chemicals/fuel storage and resultant contamination.	Silviculture is considered as a conditional activity in P2 areas and can be managed to meet water quality objectives.	*Acceptable with Best Management Practices.* • Development proposals to be referred to WRC for advice and recommendation. Proposals to be assessed to ensure that water quality protection objectives are met. Advice is on a case-by-case basis. • Allow scope for land use developments to demonstrate they can be compatible with P2 source protection objectives. • Develop environmental management guidelines for silviculture with industry groups and relevant agencies. Landowners will be encouraged to adopt the guidelines as best practice. (Note: the Forest Products Commission and the timber plantation industry are producing a revised version of the Code of Practice for Timber Plantations in WA).

Table 1 contd.

Activity	Potential Water Quality Risks	Consideration for Management	Recommended Protection Strategies
Gravel extraction	The potential risks to groundwater quality are: • hydrocarbon contamination from leaks or spillage; and • turbidity from removal of gravel at or below the water table.	An extractive industry licence is required from the Shire of Irwin when commercial quantities of product are proposed to be extracted. Environmental management conditions can be placed on these licences.	*Acceptable with Best Management Practices.* • Assessment and approval of gravel extraction should include the conditions stated in the Water Quality Protection Note: *Extractive industries within Public Drinking Water Source Areas*.
Private (non-commercial) airstrip	The potential risk to groundwater quality is from leakage/spillage from fuel storage and resultant contamination.	The airstrip is used to support broad hectare farming practices and there is occasional and minimal fuel storage. Therefore, the airstrip is compatible with the proposed Priority 2 (P2) classification.	*Acceptable activity.* • The discharge of oil or fuel onto the ground should be avoided. If an accident occurs, clean-up systems should be applied immediately.
Water and Rivers Commission freehold land: broad hectare cropping and grazing	The potential groundwater quality risks associated with these land uses include: • nutrient and microbiological contamination from fertilisers and animal waste; and • chemical (e.g. pesticides such as Atrazine) contamination.	Water and Rivers Commission lease conditions specify fertiliser and pesticide application and storage requirements and animal stocking rates. The lease is audited every six months. Herbicide use is regulated by the Commission in accordance with Health Department of Western Australia circular PSC 88.	*Acceptable with Best Management Practices.* • Assessment and approval of proposed activities and lease auditing to ensure activities are in accordance with Priority 2 objectives.
Water and Rivers Commission freehold land: fuel and chemical storage	The potential risk to groundwater quality is due to leakage/spillage from chemicals/fuel storage. There was former evidence of fuel spillage (see **Plate 4**), resulting from previous above ground fuel storage: one 27,000 litre diesel tank, two 2,000 litre unleaded petrol tanks and small quantities of oil. Chemical containers were previously stored outdoors, on bare ground.	Fuel tanks and contaminated soil have been removed. Bunded fuel/oil and chemical storage areas have been installed. Maximum fuel storage limits have been set as a lease condition, as per the Water Quality Protection Note: *Aboveground chemical storage tanks in Public Drinking Water Source Areas*.	*Acceptable with Best Management Practices.* • Ensure future fuel and chemical storage is in accordance with the Water Quality Protection Notes: *Aboveground chemical storage tanks in PDWSAs* and *Toxic and hazardous substances in PDWSAs* and check compliance through lease auditing.

Table 1 contd.

Activity	Potential Water Quality Risks	Consideration for Management	Recommended Protection Strategies
Roads			
Transport of fuel and chemicals along roads	The potential risks to groundwater quality are from a spill of a contaminating substance such as oil, diesel or chemicals.	The roads are necessary for regional transportation and property access, so the best approach would be to minimise the impact of a spill through management measures.	*Acceptable with Best Management Practices*. • Ensure emergency response process is in place and the local emergency management advisory committee is aware of the Allanooka-Dongara Water Reserve. • Place signs along Allanooka Springs Road with an emergency contact number in the event of a spill.
Mt Horner Oilfield			
Crude oil extraction	Potential risks to groundwater quality include: • hydrocarbon contamination from oil spills/leaks at production wellheads and associated pipe work; • hydrocarbon contamination from fuel/oil storage; • increased salinity due to irrigation of wastewater (order of 6,000 milligrams/litre total dissolved solids); and • oil and grease contamination from irrigated wastewater (approximately 50 milligrams/litre Total Oil and Grease).	The oilfield and wastewater irrigation area are 2 - 3 kilometres upstream of an area identified for future public water supply bores. The operation is licensed by the Department of Environmental Protection (DEP) and regulated and licensed by the Department of Minerals and Energy (DME). DEP/DME are responsible for the regulation of emergency response and ensuring appropriate decommissioning of the site. Crude oil and chemical storage is in accordance with DME dangerous goods requirements. The DME requires that an acceptable Oil Spill Contingency Plan is in place before operation of the facility. The high viscosity and wax content of the oil results in shallow penetration into the soil profile after oil spillage/leaks. An Environmental Management Plan has been assessed by DME, DEP and WRC. Oil contaminated sand is excavated and taken to DEP approved disposal facilities in Geraldton. Contaminated soil testing is undertaken in accordance with DEP requirements.	*Acceptable with Best Management Practices*. • Conduct a risk assessment for the aquifer from wastewater storage and irrigation. • Review groundwater monitoring program to assess and detect potential contamination of Yarragadee aquifer from wastewater storage and irrigation. • DME to refer the decommissioning strategy (once prepared) to the Commission for advice.

Table 1 contd.

Activity	Potential Water Quality Risks	Consideration for Management	Recommended Protection Strategies
Crown Reserved land			
Waste disposal	The potential groundwater quality risks are chemical/nutrient contamination from dumped domestic rubbish.	Illegal rubbish dumping is considered unacceptable, particularly as the water table is relatively shallow at this locality.	*Illegal rubbish dumping is not an acceptable activity.* • Restrict access into the reserve and erect signs. • Remove domestic rubbish and inert fill and rehabilitate former gravel pit. • Ensure decommissioning of Water Corporation compound is completed.
Recreational kangaroo hunting	The presence of recreational hunters in the Crown Reserve increases the potential risk of pathogen contamination from carcasses and litter.	The risk to water quality presented by uncontrolled hunting is considered unacceptable.	*Uncontrolled hunting is not an acceptable activity on the Crown Reserve.* • Close Crown Reserve 1020 to uncontrolled hunting through the CAWS Act by-laws. • Signs should be placed around the reserve indicating that uncontrolled hunting is illegal. • Undertake surveillance of the catchment and by-law enforcement.
Sheep grazing	The potential risk to groundwater quality is from small-scale nutrient and microbiological contamination from sheep wastes.	Water and Rivers Commission lease conditions control sheep stocking rates and access period.	*Acceptable with Best Management Practices*. • Desirable that there is no sheep grazing. However, if it was to continue, ensure sheep stocking rates continue to be in accordance with Priority 1 objectives.

Table 1 contd.

Activity	Potential Water Quality Risks	Consideration for Management	Recommended Protection Strategies
Production and monitoring bores			
Use and maintenance of bores	• Stock congregating around the immediate vicinity of production bores increases the potential risk from nutrient and microbiological contamination from animal waste and can cause damage to bore headworks. • Soil subsidence around monitoring bores can result in a shortened pathway for contaminants (e.g. fertilisers and pesticides) to travel to the groundwater. • Unauthorised access to unsecured bores may result in direct addition of contaminants to the groundwater.	Water and Rivers Commission and Water Corporation guidelines to be followed for bore maintenance and decommissioning.	• Install stock-proof fences around production bores to prevent stock from congregating too close to the bores. • Evaluate condition of soil surrounding monitoring bores and where necessary remediate subsidence around monitoring bores. • All abandoned production bores unsuitable for use as monitoring bores should be decommissioned. • All monitoring bores should be tested, failed bores should be considered for decommissioning or re-drilling and remaining bores should be secured (i.e. capped and locked) in accordance with standard specifications.

Recommendations

1. The existing Allanooka Water Reserve and Dongara-Denison Water Reserve should be de-proclaimed and replaced by the proposed Allanooka-Dongara Water Reserve under the *Country Areas Water Supply Act 1947*.
2. Land planning strategies, including the Geraldton Region Plan and the Shire of Irwin Town Planning Scheme, should incorporate the Allanooka-Dongara Water Reserve and management principles outlined in this plan and reflect the Priority 1 and 2 classifications given to the Water Reserve.
3. All development proposals within the Allanooka-Dongara Water Reserve that are likely to impact on water quality should be referred to the Water and Rivers Commission for advice and recommendation.
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. Incidents covered by WESTPLAN – HAZMAT in the Allanooka-Dongara Water Reserve should be addressed through the following measures:

- The Shire of Irwin Local Emergency Management Advisory Committee (through the Geraldton Emergency Management District) being familiar with the location and purpose of the Allanooka-Dongara Water Reserve.
- The locality plan for the Allanooka-Dongara Water Reserve being provided to the Fire and Rescue Services headquarters for the HAZMAT Emergency Advisory Team.
- The Water and Rivers Commission advising the HAZMAT Emergency Advisory Team during incidents in the Allanooka-Dongara 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.

6. A surveillance program should be established to identify and respond to any incompatible land uses or potential contaminant threats within the Allanooka-Dongara Water Reserve. Consideration should be given to delegation of surveillance and by-law enforcement responsibilities in the proposed Allanooka-Dongara Water Reserve to the Water Corporation.
7. Review monitoring program to ensure water quality risks identified in this plan are addressed. Routinely review water quality analysis results to detect any adverse trends or results and initiate appropriate action.
8. A detailed hydrogeological investigation should be conducted to further define the recharge processes for the water source.
9. Adopt strategies detailed in Section 8.6 Table 1 “Land use, potential water quality risks and recommended strategies”.
10. Implementation of these recommendations should be reviewed annually after this plan is endorsed. A full review of this protection plan should be undertaken after five years.

Implementation strategy

No.	Description	Implemented by	Recommended timing
1.	Gazettal of the proposed Allanooka-Dongara Water Reserve under the *Country Areas Water Supply Act 1947*.	Program Manager, Protection Planning (WRC).	2001-2002
2.	Incorporation into land planning strategies.	Shire of Irwin, Ministry for Planning and Western Australian Planning Commission.	Ongoing.
3.	Referral of development proposals (i) WRC to provide guidance on what land use activities constitute a potential water quality risk. (ii) Referral of development proposals that are likely to impact on water quality.	(i) Program Manager, Assessment and Advice (WRC). (ii) Shire of Irwin, Ministry for Planning, Department of Minerals and Energy, Department of Environmental Protection, Mid-West Development Commission and Department of Resources Development.	(i) 2001-2002 (ii) Ongoing.
4.	Erection of signs along reserve boundary and at major access points (i) Development of guidelines for signage. (ii) Determine number and location of signs required. (iii) Erect and maintain signs.	(i) Program Manager, Protection Planning (WRC). (ii) Regional Manager, Mid-West Gascoyne Region (WRC), Regional Business Manager, Mid-West Region (WC) and Shire of Irwin. (iii) Regional Manager, Mid-West Gascoyne Region (WRC) and Regional Business Manager, Mid-West Region (WC).	(i) 2001-2002 (ii) On completion of signage guidelines. (iii) On completion of signage guidelines.

No.	Description	Implemented by	Recommended timing
5.	Incidents covered by WESTPLAN – HAZMAT in the Allanooka-Dongara Water Reserve should be addressed through the following measures.		
	(i) The Shire of Irwin Local Emergency Management Advisory Committee (through the Geraldton Emergency Management District) being familiar with the location and purpose of the proposed Allanooka-Dongara Water Reserve.	(i) Shire of Irwin Local Emergency Management Advisory Committee (through WRC Mid-West Gascoyne Region).	(i) 2001-2002
	(ii) The locality plan for the Allanooka-Dongara Water Reserve being provided to the Fire and Rescue Services headquarters for the HAZMAT Emergency Advisory Team.	(ii) Program Manager, Protection Planning (WRC).	(ii) 2001-2002
	(iii) The HAZMAT Emergency Advisory Team must receive water quality protection advice during incidents in the Allanooka-Dongara Water Reserve.	(iii) Regional Manager, Mid-West Gascoyne Region (WRC).	(iii) Ongoing.
	(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.	(iv) Shire of Irwin Local Emergency Management Advisory Committee.	(iv) Ongoing.
6.	Surveillance program and by-law enforcement		
	(i) Develop guidelines for the surveillance of Water Reserves.	(i) Program Manager, Protection Planning (WRC).	(i) 2001-2002
	(ii) Consider delegation of surveillance and by-law enforcement responsibilities to the Water Corporation.	(ii) Program Manager, Protection Planning (WRC).	(ii) 2002
	(iii) Implement the surveillance and by-law enforcement program.	(iii) Regional Business Manager, Mid-West Region (WC).	(iii) On delegation.
7.	Review the water quality monitoring program and results as per the recommendations.	Water Corporation.	Ongoing.
8.	Develop environmental guidelines for broad hectare agricultural activities in drinking water areas with industry groups and relevant agencies. The use of best practice will be encouraged.	Water and Rivers Commission, Agriculture WA, peak industry groups and landowner groups.	2001-2002

No.	Description	Implemented by	Recommended timing
9.	Proposed and existing activities at the Water and Rivers Commission freehold land to be managed in accordance with Priority 2 source protection.	Section Leader, Land and Clearing Management (WRC) and Regional Manager, Mid-West Gascoyne Region (WRC).	Ongoing.
10.	Place signs along Allanooka Springs Road with an emergency contact number in the event of a spill.	Regional Manager, Mid-West Gascoyne Region (WRC) and Regional Business Manager, Mid-West Region (WC).	ASAP.
11.	Mt Horner oilfield		
	(i) Conduct a risk assessment on the impact from wastewater storage and irrigation.	(i) Petro Energy.	(i) 2001-2002
	(ii) Groundwater monitoring program to be reviewed.	(ii) Regional Manager, Mid-West Gascoyne Region (WRC) and Mid-West Branch (Department of Environmental Protection).	(ii) 2001-2002
	(iii) Department of Minerals and Energy to refer decommissioning strategy (once prepared) to Water and Rivers Commission and Department of Environmental Protection for advice and comment.	(iii) Department of Minerals and Energy, Regional Manager, Mid-West Gascoyne Region (WRC) and Mid-West Branch (Department of Environmental Protection).	(iii) On completion of the draft decommissioning strategy.
12.	Prevention of rubbish dumping at Reserve 1020		
	(i) Restrict access into the reserve and erect signs.	(i) Regional Manager, Mid-West Gascoyne Region (WRC).	(i) 2001-2002
	(ii) Initiate removal of domestic rubbish and inert fill and rehabilitation of the former gravel pit.	(ii) Regional Manager, Mid-West Gascoyne Region (WRC).	(ii) 2001-2002

No.	Description	Implemented by	Recommended timing
13.	Ensure decommissioning of Water Corporation compound is completed.	Regional Manager, Mid-West Gascoyne Region (WRC) and Property Manager, Mid-West Region (WC).	2001-2002
14.	Develop and implement regulations under the CAWS Act by-laws to prohibit uncontrolled hunting in Crown Reserve 1020.	Water and Rivers Commission and Water Corporation (under delegation).	2002-2003, ongoing.
15.	Sheep grazing at Crown Reserve 1020 to be managed in accordance with Priority 1 source protection.	Section Leader, Land and Clearing Management (WRC) and Regional Manager, Mid-West Gascoyne Region (WRC).	Ongoing.
16.	Production and monitoring bores		
	(i) Install stock-proof fences around production bores.	(i) Regional Business Manager, Mid-West Region (WC).	(i) 2001-2002
	(ii) Remediate subsidence around bores.	(ii) Regional Manager, Mid-West Gascoyne Region (WRC) and Regional Business Manager, Mid-West Region (WC).	(ii) To be determined.
	(iii) Secure site and decommission abandoned production bores unsuitable for use as monitoring bores.	(iii) Regional Business Manager, Mid-West Region (WC).	(iii) Ongoing.
	(iv) Test monitoring bores, consider decommissioning failed bores and secure remaining bores.	(iv) Regional Manager, Mid-West Gascoyne Region (WRC) and Regional Business Manager, Mid-West Region (WC).	(iv) To be determined.
17.	Investigate securing appropriate funding, and then conduct hydrogeological investigation to further define the recharge processes of the groundwater source.	Water and Rivers Commission.	Subject to available funds; within five years.
18.	Review		
	(i) Implementation strategy.	(i) Water Quality Protection Branch (WRC).	(i) Annually.
	(ii) Plan.	(ii) Water Quality Protection Branch (WRC).	(ii) After five years.

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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 non-porous (e.g. shale) 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.
Feedlot	A beef cattle feedlot is where cattle are maintained at such densities that pasture foraging has a negligible role in sustaining them and, in some cases, the cattle may be held in roofed enclosures. This definition does not include day by day feeding or penning of cattle for weaning, dipping or similar husbandry purposes or for drought or other emergency feeding, or at a slaughter place or in recognised saleyards.
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 Drinking Water Source Area	(PDWSA) An area proclaimed for the management and protection of water used for public drinking water supply.
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 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 that 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 which does not have an upper confining (non-porous) layer. The upper boundary of the groundwater within the aquifer is called the water table.
Underground Water Pollution Control Area	(UWPCA) An area defined under the Metropolitan Water Supply, Sewerage and Drainage Act for the management and protection of water used for public drinking water supplies, 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.
Water table	The upper saturated level of the unconfined groundwater.
Wellfield	A group of bores to monitor or withdraw groundwater.

Appendices

Appendix 1. Plates of land use within the Allanooka and Dongara-Denison Water Reserves

Appendix 2. Priority classification decision-making process

Appendix 3. Land use compatibility in Public Drinking Water Source Areas

Appendix 4. Guidelines, policies and water quality protection notes

Appendix 1

Plates of land use within the Allanooka and Dongara-Denison Water Reserves

Plate 1: **Agroforestry farm, Allanooka Springs Road.**

Plate 2: **Oil production well, Mt Horner oilfield.**

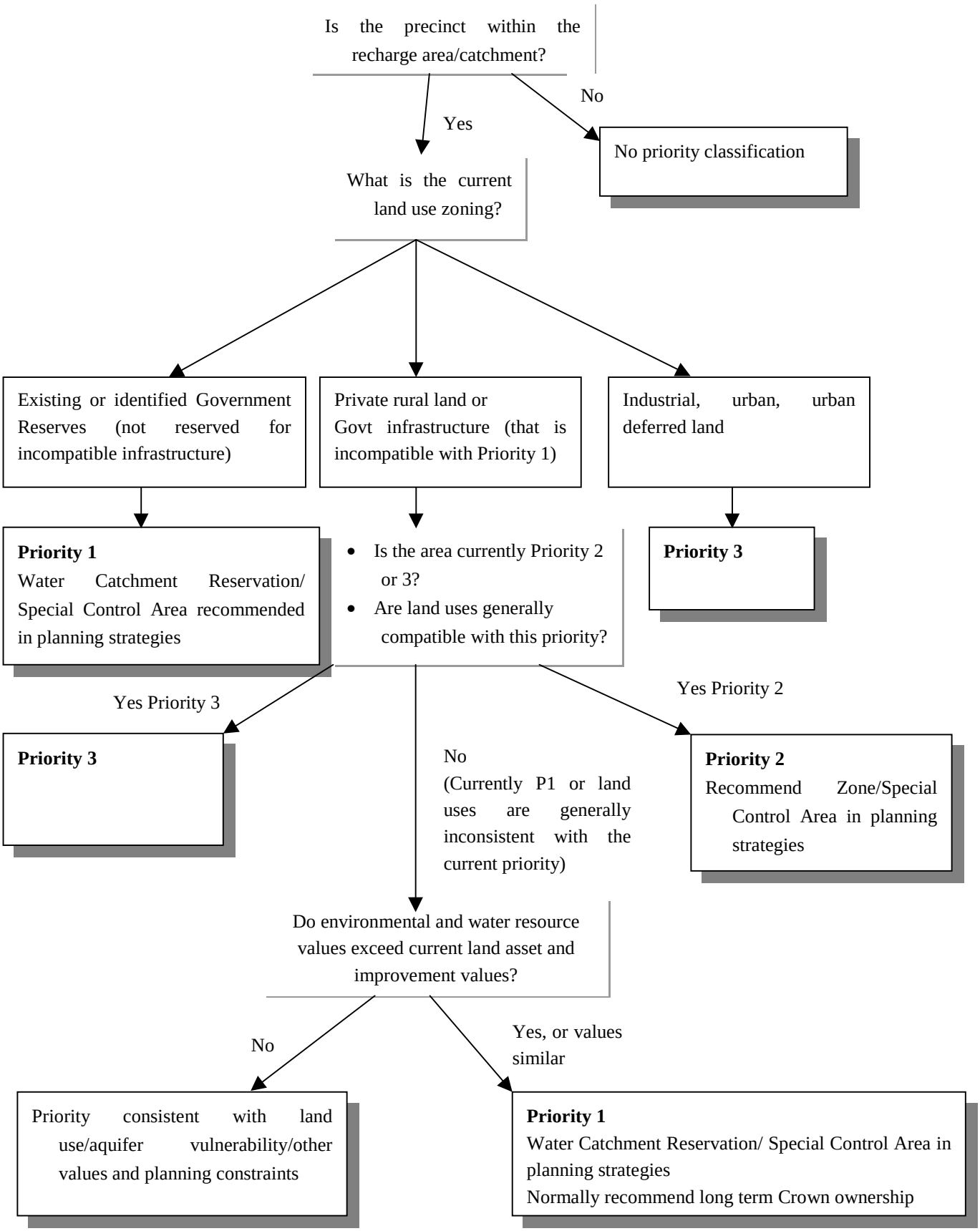
Plate 3: Tree farm irrigation channel, Mt Horner oilfield.

Plate 4: Evidence of fuel spillage (tank and contaminated soil now removed), Allanooka Farm, Mt Horner West Road.

Appendix 2

Priority classification decision-making process

Decision-making process for assignment of priority classifications and planning recommendations



Appendix 3

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.

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 following 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.
E-mail: use the {feedback} section at our Internet address (http://www.wrc.wa.gov.au) citing the topic and version.

Tables showing land use 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

Land use	Priority 1	Priority 2	Priority 3
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]
Special rural subdivision to a lot size between 1 and 2 ha	Incompatible	Incompatible	Conditional [8, 9]

Land use	Priority 1	Priority 2	Priority 3
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, the depth of excavation in relation to the water table 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, 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 sourced from operator's vineyards within the P2 area.

Appendix 4

Guidelines, policies and water quality protection notes

Examples of current Guidelines, Policies and Water Quality Protection Notes: (see www.wrc.wa.gov.au/protecting water/policies)

Draft Environmental Guidelines for Horse Activities, 2001.

Draft Environmental Management Guidelines for Vineyards, 2001.

Draft Guidelines for the Environmental Management of Beef Cattle Feedlots in Western Australia, 2000.

Environmental Guidelines for the Establishment and Maintenance of Turf and Grassed Areas, 2001.

Environmental Guidelines for New and Existing Piggeries, 2000.

Environmental Management for Animal-based Industries – Dairy Farm Effluent, 1998.

Guidelines for Direct Land Application of Biosolids and Biosolid Products, 2002.

Statewide Policy No 2: *Pesticide use in Public Drinking Water Source Areas*, 2000.

Water Quality Protection Note: *Aboveground chemical storage tanks in Public Drinking Water Source Areas*.

Water Quality Protection Note: *Aquaculture projects*.

Water Quality Protection Note: *Extractive industries within PDWSAs*.

Water Quality Protection Note: *Floriculture Activities.*

Water Quality Protection Note: *Low hazard wastewater containment with non-synthetic (clay) liners*.

Water Quality Protection Note: *Nutrient and irrigation management plans*.

Water Quality Protection Note: *Ponds for stabilising organic waste*.

Water Quality Protection Note: *Poultry farms in Public Drinking Water Source Areas.*

Water Quality Protection Note: *Stabling and agistment of horses*.

Water Quality Protection Note: *Temporary aboveground chemical storage in Public Drinking Water Source Areas*.

Water Quality Protection Note: *Underground chemical storage tanks in Public Drinking Water Source Areas*.

Examples of In Development Guidelines, Policies and Water Quality Protection Notes:

Code of Practice for Environmentally Sustainable Vegetable and Potato Production.

Environmental Guidelines for Broad Hectare Agriculture.

Environmental Guidelines for Pastoral Activities.

Water Quality Protection Note: *Hydroponic Systems in Public Drinking Water Source Areas*.

Water Quality Protection Note: *Nurseries (Potted).*

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