Middle Helena Catchment Area
Land Use and Water Management Strategy

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Summary

Surface water from the Middle Helena catchment area and overflows or releases from Mundaring Weir are collected in the Helena Pumpback Dam. The dam, situated 11.8 kilometres downstream from Mundaring Weir, is a source of water for Lake CY O'Connor via a pumpback pipeline. The Helena Pumpback Dam can contribute 25-40 per cent to Lake CY O'Connor's inflow, with the remaining inflow from the local catchment and Integrated Water Supply System transfers. Lake CY O'Connor is the sole water source for the Goldfields and Agricultural Water Supply Scheme and also supplies part of the Integrated Water Supply System.

In addition to the importance of the Middle Helena catchment area as a source of water for drinking, domestic, industrial and agricultural uses, the Helena River has important ecological values and provides habitat for numerous plant and animal species.

The Western Australian Parliamentary Select Committee's report Metropolitan Development and Groundwater Supplies (1994) considered the relationship between land use and the protection of drinking water resources. The select committee recommended the preparation of land use and water management strategies for the Jandakot and Gnangara Mounds. The Jandakot Land Use and Water Management Strategy was completed in 1995 and the Gnangara Land Use and Water Management Strategy in 2001. The Western Australian Legislative Council's standing committee on Ecologically Sustainable Development in Relation to the Quality of Perth Water Supply (2000) and the Western Australian Planning Commission's (WAPC) Public Drinking Water Source Policy (2003) endorsed the approach adopted in these strategies and found that, as a priority, water should be protected through good land use planning.

The strategic importance of the Helena Pumpback Dam, the ongoing commitment by State Government to protect clean drinking water supply and the Swan River System, and a strong community desire to maintain the environmental values of the catchment, prompted the preparation of a similar land use and water management strategy for the Middle Helena catchment area.

The principal objectives of the strategy focus on improving water quality management, while also broadly benefiting the management of natural resources. The strategy supports, and is supported by, other natural resource management strategies, plans and projects. For example, Perth Region NRM's Swan Region Strategy, the Eastern Hills Catchment Management Project, the Swan Mundaring Community Catchment Project and management plans for national and regional parks prepared by the Department of Environment and Conservation. These processes address broader natural resource management issues and also result in improved water quality management.

The strategy, prepared by the Department of Planning, on behalf of the WAPC, includes a proposed priority source protection area map (figure 13) that recommends the classification of all land in the Middle Helena catchment area into three risk management based priority zones. Priority 1 source protection areas are defined to ensure that there is no degradation of the water source. Priority 2 areas are defined to ensure that there is no increased risk of pollution to the water source, while priority 3 areas are defined to manage the risk of pollution to the water source. The proposed priority source protection area map is generally aligned with the Metropolitan Region Scheme (MRS) and local planning scheme reservations and zonings. The priority classifications provide the basis for future land use decisions.

The strategy also proposes MRS and local planning scheme land use categories. It is proposed that the MRS be amended to overlay a water catchments reservation on areas designated as priority 1 (all government owned land with the exception of one property). The preclusion of development or expansion of high risk land uses in these areas is recommended.

It is proposed that areas designated as priority 2 and currently zoned rural be re-zoned for rural water protection. Existing land uses would be able to continue, while local government and/or the WAPC would consider risks to water quality and a range of other issues as specified in the

strategy when making a determination about new land uses or the expansion of existing land uses. No change to the MRS is recommended for priority 3 areas, but additional factors to be taken into consideration in determining new land use applications, are specified in the strategy.

To give effect to the water catchments reservation and the rural water protection zone in the Shire of Mundaring's and Shire of Kalamunda's local planning schemes, it is proposed that the Middle Helena catchment area (including priority 3 areas) be shown as a special control area in the two local government schemes. This special control area would set out guidelines on the considerations to be taken into account when considering development in the area, and would also identify any specialist agencies to be consulted prior to determining applications in the special control area.

To protect the Helena Pumpback Dam from immediate risks to water quality, including human contact, the strategy proposes that the area in the immediate vicinity of the reservoir be managed as a reservoir protection zone. The proposed reservoir protection zone includes the reservoir and all publicly owned land bounded by the Bibbulmun Track and the bridle trail in the south and the two kilometre boundary in all other areas. Use of the Bibbulmun Track, bridle trail, Schipp Road Walk and Rocky Pool Walk would continue. Unauthorised public access to the reservoir, the track that runs parallel to the reservoir and the walking trail close to the reservoir (Helena Pipehead Walk Trail), would be prohibited following gazettal of the reservoir protection zone.

Activities that are prohibited in reservoir protection zones are defined in the Policy and Guidelines for Recreation Within Public Drinking Water Source Areas on Crown Land (Water and Rivers Commission, 2003). Prohibited activities include camping, driving vehicles off road, fishing, bushwalking and swimming.

The strategy also describes a revised catchment boundary to more closely reflect the true physical catchment and recommends that the new boundary be gazetted as the Middle Helena catchment area.

Following release of this strategy, the process to amend the proposed MRS will be initiated. This will also include consultation with affected landowners and the public.

The proposed MRS amendments, subsequent establishment of special control areas in the local planning schemes, implementation of other natural resource management plans and strategies, gazettal of a new catchment boundary, and establishment of a reservoir protection zone for the Helena Pumpback Dam should achieve the long-term protection of an important public drinking water source and other environmental values of the Middle Helena catchment area.

1.0 Introduction

1.1 Background to the strategy

Western Australia is a dry state and relies heavily on a good quality water supply to maintain our livelihood, lifestyle and environment. The protection of our public drinking water supplies from contamination is of paramount importance.

Western Australia has some 208 significant rivers that extend over 25 000 kilometres. The Helena River, a tributary of the Swan River, has its headwaters in the Shire of York and flows into the Swan River at South Guildford. Surface water collected from the Helena River provides water to the Goldfields and agricultural areas and the Perth Metropolitan Water Supply Scheme.

Lake CY O'Connor (formerly known as the Helena River Reservoir), formed by the construction of Mundaring Weir in 1902 and located in the upper catchment of the Helena River, is the sole source of drinking water for the Goldfields and Agricultural Water Supply Scheme. This scheme serves the Goldfields towns and many areas of the eastern Wheatbelt.

A number of suburbs in the hills (such as Mundaring, Glen Forrest, Mahogany Creek, Hovea, Stoneville and Sawyers Valley) are also supplied with water from the scheme.

The Helena Pumpback Dam is located in the middle catchment of the Helena River, downstream from Mundaring Weir and is a source of water for Lake CY O'Connor via a pumpback pipeline. The Helena Pumpback Dam can contribute 25-40 per cent to Lake CY O'Connor's inflow, with the remaining inflow from the local catchment and Integrated Water Supply System transfers.

In addition to the importance of the Helena River as a source of water for drinking, domestic, industrial and agricultural uses, the river has important ecological values and provides habitat for numerous plant and animal species. Water quality is an important factor for the maintenance of these species and their habitats in the Helena River and in its receiving waterbody, the Swan River.

The ongoing demand for protecting clean drinking water for the Goldfields and agricultural areas, the desire by community groups to protect the environmental values of the catchment, and the commitment of State Government and the wider community to protect and maintain the environmental values of the Swan River have prompted the preparation of a Middle Helena catchment area land use and water management strategy.

1.2 Strategy aims and objectives

The overall aim of the strategy is to provide a framework for sustainable and integrated land use and water management for the Middle Helena catchment area (the catchment for the Helena Pumpback Dam) by way of integrating the land use planning process, public drinking water source protection and catchment management.

The principal objectives are to:

- ensure that the long-term quality of public drinking water sources is not compromised;
- reduce potential nutrient, contaminant and sediment export into the Swan River;
- provide a planning framework for land use decision-making for landowners and local and State Government that promotes water resources, and particularly public drinking water source protection;
- promote integrated catchment management as an approach to facilitating the coordinated management of land and water resources in the catchment; and
- improve coordination of administrative arrangements and information access between different government agencies and community groups to improve land use planning decision-making processes.

The strategies proposed for meeting these objectives focus on improving water quality management while also benefiting the management of natural resources more broadly. Strategies outlined in this document support other natural resource management strategies, plans and projects. For example, Perth Region NRM's Swan Region Strategy, the Eastern Hills Catchment Management Project and the Swan Mundaring Community Catchment Project. These processes address broader natural resource management issues and also result in improved water quality management.

This document is limited to the preparation of a land use and water management strategy for the Middle Helena catchment area. Following the preparation of the strategy for this catchment area, a subsequent study will focus on the preparation of a land use and water management strategy for the Lower Helena catchment area and the integration of the two strategies into an overall strategic management approach for both areas.

A water source protection plan was released in 2007 for the upper catchment of the Helena River, that is, the Mundaring Weir catchment area. This plan is another mechanism used by the Department of Water to protect public drinking water sources from potential contamination.

1.3 Study area

The study area encompasses the Middle Helena catchment area only (figure 1 and figure 2). The catchment is located about 25 kilometres east of the centre of Perth.

The Middle Helena catchment area is the catchment area for the Helena River and the Helena Pumpback Dam. It extends from the Mundaring Weir (Mundaring) to the Pumpback Dam (situated in bushland between Darlington and Piesse Brook). The catchment includes all or part of suburbs in the shires of Kalamunda and Mundaring, including Bickley, Hacketts Gully, Piesse Brook, Paulls Valley, Mundaring, Glen Forrest, Kalamunda, Walliston, Carmel and Pickering Brook.

The Middle Helena catchment area was gazetted as the Lower Helena Pipehead Dam catchment area in 1972 under the *Country Areas Water Supply Act 1947* and is proposed to be gazetted under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*

rather than the *Country Areas Water Supply Act 1947*. The gazettal of a catchment area enables the Department of Water to control potentially polluting activities, regulate land use, inspect premises and take steps to prevent or clean up pollution in the area.

The gazetted boundary of the Middle Helena catchment area does not accurately reflect the physical (hydrological) catchment of the Helena Pumpback Dam. A revised boundary has been delineated as part of this strategy (figure 1 and section 6.2). All references to the Middle Helena catchment area in this strategy refer to the revised boundary and land in it, unless otherwise stated.

1.4 Preparation of the strategy

The Middle Helena Catchment Area Land Use and Water Management Strategy has been prepared by the Department of Planning, in conjunction with key stakeholders under the direction of a steering committee and project reference group. It is the culmination of several years of work with agencies and the community to resolve issues which were highlighted as part of the formal advertising of the draft strategy in 2003.

The steering group was responsible for providing overall direction to the project, resolving technical and project issues and agreeing to and endorsing the content of the report.

This group comprised senior representatives of the departments of Planning, Water and Environment and Conservation, as well as the shires of Mundaring and Kalamunda.

The project reference group was a forum for key stakeholder input. Its role was to:

- facilitate the collaborative and integrated planning efforts for the project;
- identify and assess issues and associated management strategies;
- facilitate communication with, and input , their representative stakeholder groups;
- consider documentation;
- provide comment and advice to the steering group; and
- provide direction to working groups.

The project reference group included representatives of the affected shires, the Helena River Catchment Group, local orcharding and vigneron industries, recreational groups, residents and ratepayers associations, environmental groups, land development interests and a number of key agencies. Informal working groups were established from time to time to consider specific issues and to formulate positions to be considered by the project reference group and the steering group. More detailed information on the committee structures and consultation process is outlined in the Middle Helena Catchment Area Land Use and Water Management Strategy for Public Comment (2003).

The methodology for preparation of the Middle Helena Catchment Area Land Use and Water Management Strategy is outlined briefly in section 6.

Picture: Helena Pumpback Dam








2.0 Natural resources

2.1 Geology and landform

The Darling Plateau, commonly called the Darling Range, rises to the east above the Swan Coastal Plain. At the interface between the Darling Plateau and the Swan Coastal Plain lies the Darling Scarp.

Most of the Darling Plateau overlies ancient granites of the Yilgarn Block. The undulating lateritic uplands of the Darling Plateau surface are dissected by the major valley systems of Piesse Gully and the Helena Valley. The uplands and the river valleys are the main geomorphic features of the Middle Helena catchment area. An aerial three dimensional view of the catchment is illustrated in figure 2.

There are several distinct landform units in these main geomorphic units. Each landform unit has particular soil and vegetation characteristics, and each unit is capable of supporting certain types of land uses without causing further degradation. The landform units are illustrated in figure 3.

2.1.1 The Darling Plateau

The Darling Plateau has an average elevation of 300 metres above sea level. Extensive surface erosion of the Darling Plateau has resulted in steep sided valleys with bare granite faces and rounded hilltops. Exposed rocks are mostly granites, gneisses and migmatites with some intrusive dolerite dykes. The bedrock tends to be blanketed by a layer of laterite (a hard duricrust or 'cap rock') and associated gravel.

The Darling Plateau consists of three landform units: the Dwellingup landform unit (ridges and upland areas in the lateritic plateau); the Yarragil landform unit (valleys in the lateritic plateau); and the Munbup landform unit (ridges and uplands overlaying the granite bedrock areas).

The Dwellingup and Yarragil landform units are predominant in the Middle Helena catchment area. The soils in the Yarragil landform unit are generally considered to be very suitable for horticultural use and are also suitable for rural/residential use. The soils of the Dwellingup landform unit are generally considered unsuitable for horticultural pursuits because of the infertile nature of the soil. The Dwellingup landform unit may support limited rural/residential uses, with careful management.

2.1.2 River valleys

A number of major valley and river systems dissect the Darling Plateau and scarp and drain westward onto the Swan Coastal Plain. These major valleys in the Middle Helena catchment area can be grouped into the Helena landform unit (major V-shaped river valleys with steep slopes) and the Murray landform unit (tributary valleys to the Helena landform unit).

The Helena landform unit is predominant in the Helena Valley (through which the main Helena River waterway flows) and in Piesse Gully. The Murray landform unit is evident in the lower reaches of Piesse Gully (near Carmel), Hackett Gully and the sub-catchments of Bourkes Gully and Hardey Road.

According to the Darling Range Rural Land Capability Study (1990), the Murray landform unit is generally considered to have a fair capability for rural/residential development and a mixed capability for perennial horticulture.

2.2 Vegetation

Each landform unit described in section 2.1 has a particular vegetation type associated with it. Slope, aspect, rainfall, temperature and the impact of people also play an important role in determining vegetation distribution.

Vegetation complexes of the Middle Helena catchment area are illustrated in figure 4 and briefly described in table 1.

Table 1: Vegetation complexes of the Middle Helena catchment area

Vegetation Complex	Location	Characteristics
Dwellingup	Lateritic uplands, deeper soils Medium to high rainfall	Open jarrah-marri (Eucalyptus marginata – E. calophylla) and some wandoo (E, wandoo) where rainfall is lower.
Cooke	Lateritic uplands. Expression variable according to the variations in depth to basement rock.	Open jarrah-marri (E. marginata – E. calophylla) forest in deeper soils to heath and herbland. On exposed granite, growths of lichens and mosses.
Yarragil (both minimum and maximum development swamps)	Minor valleys Medium to high rainfall	Open jarrah-marri (E. marginata – E. calophylla) forest on upper slopes. Mixtures of yarn (E. patens) and bullich (E. megacarpa) in low lying areas. Bullich requires high rainfall above 1100 mm and is therefore restricted to the upper gullies. Some wandoo (E. wandoo) woodland in drier areas.
Pindalup	Minor valleys Low to medium rainfall	Open jarrah-marri (E. marginata – E. calophylla) forest on slopes moving into a woodland mixture of wandoo) on the slopes with some yarn (E. patens) in the lower gullies.
Helena	Major valleys, both slopes and valley floors Medium rainfall	Highly variable along the deeply dissected narrow valleys of the Helena Valley according to varying depth of soil. It is primarily open wandoo (E. wandoo) woodland on valley slopes and floors.
Murray and Bindoon	Major valleys, both slopes and valley floor Medium to high rainfall and low to medium rainfall	Dominated by open jarrah-marri (E. marginata – E. calophylla) forest in moderately incised valleys. Intrusions of yarn (E. patens) on slopes. Replacement by a flooded gum-swamp paperbark (E. rudis – Melaleuca rhaphiophylla) woodland along the tributaries.

Source: Heddle et al., 1980; King and Wells, 1990 in Itzstein-Davey, 1998.

In the river valleys of the upland plateau surface, the land has mostly been cleared for horticultural and other agricultural purposes. Limited remnant vegetation remains, particularly in areas of private ownership. Clearing has caused the invasion of weeds, mainly along the banks of the Helena River.

There are a number of known populations of declared rare and priority listed flora in the Middle Helena catchment area. The four declared rare flora and 11 priority listed flora are mainly found in areas of state forest, national park, vacant crown land or land reserved for parks and recreation. The known declared rare flora are Acacia anomala (grass wattle); Acacia aphylla (leafless rock wattle); Anthocercis gracilis (slender tailflower); and Darwinia apiculate (scarp Darwinia).

Fungal diseases pose a threat to native vegetation in parts of the study area. Dieback (Phytophthora cinnamomi) is the most widespread and detrimental. Phytophthora cinnamomi is a soil borne pathogen that kills a wide range of plant species in the catchment area by attacking their root systems. Phytophthora cinnamomi is primarily spread with the movement of soil.

2.3 Fauna

The fauna in the Middle Helena catchment area is generally confined to the remaining areas of relatively undisturbed habitat, such as the state forests, national parks, remnant bushland and areas reserved for parks and recreation.

Very little is known of the aquatic invertebrates in the study area. There are a number of native freshwater species of fish in the Middle Helena catchment area, such as the western minnow, freshwater cobbler, nightfish, western pygmy perch and the hardyhead.

Many of the species of native birds in the Middle Helena catchment area are specialised insect, seed or nectar feeders and, as such are dependent on the presence of specific vegetation types. There are a number of declared threatened fauna which have been found in the Middle Helena catchment including the endangered Carnaby's black cockatoo *(Calyptorhynchus latirostris)* and Baudin's cockatoo *(Calyptorhynchus baudinii)*, as well as a number of vulnerable species and priority fauna species.

Mammals that may historically have been present in the Middle Helena catchment area include ringtail possum, bat, echidna, antechinus, honey possum, grey kangaroo, pygmy possum, quoll, chuditch, quokka, numbat, dalgyte, bodie, woylie, tammar wallaby, brush tail wallaby, brown bandicoot and western native cat. A number of these species are now locally extinct, such as the ringtail possum, numbat, dalgyte, bodie, woylie, and tammar wallaby.

2.4 Climate

The region has a Mediterranean type climate, with warm dry summers and mild wet winters. The hottest months are January and February and the coldest months are July and August.

Rainfall generally occurs from May through to October. The average annual rainfall is 1000 mm/year near the Helena Pumpback Dam, and increases southwards to 1200 mm/year near the headwaters of Piesse Brook.

3.0 Water resources

3.1 The Middle Helena catchment area

The Middle Helena catchment area, including its sub-catchments, has an area of about 113 square kilometres. It extends from Mundaring Weir in the east to the Helena Pumpback Dam in the west and from Glen Forrest in the north to Pickering Brook in the south.

The Helena River is a tributary of the Swan River and joins the Swan in South Guildford. The Helena River contributes less than 1 per cent to the long-term average flow of the Swan River due to water extraction upstream. The construction of Mundaring Weir on the Helena River in 1902, as well as the construction of private dams, has significantly altered water flows in the main waterway. During summer, the river channel in the Middle Helena catchment area is reduced to a series of intermittent pools and exposed dry riverbed. During most winters, the river experiences significant flushing flows that are important for fish breeding, fish migration, suppressing weed invasion and scouring out sediment from riffles and pools.

The Middle Helena catchment is divided into eight sub-catchments (figure 5), the largest of these being the Piesse Gully sub-catchment. The long-term average flow from Piesse Gully, (including Hackett Gully) is estimated at 8 300 megalitres/year or 61 per cent of the long-term average flow of the Helena River downstream of Mundaring Weir (13 500 megalitres/year measured at the Helena Pumpback Dam). The other sub-catchments are South Ledge (13.1 per cent of the long-term average flow), Bourkes Gully (8.9 per cent), Paulls Valley (7.8 per cent), Rifle Range (6.0 per cent), Bending Gully (4.8 per cent), Nelson Road (4.7 per cent) and Hardey Road (4.5 per cent) (Muirden, 2002).

3.2 Water quantity management

3.2.1 Environmental water provisions

The Department of Water has administrative responsibility in the sharing of water resources between the often competing environmental, social and economic needs of the environment and the community. To fulfil this responsibility, the department estimates the total flow in a river, determines how much is needed for the environment, and then shares the remainder among public, agricultural and industrial uses.

Water resource allocation plans, prepared by the Department of Water, seek to meet all legitimate water needs. The plans may cover a river basin or all or part of a river catchment and may be subject to public and Environmental Protection Authority review. There is a statewide program for the preparation of water allocation plans.

To ensure that provision is made for the environment in water allocation decision-making and the preparation of allocation plans, ecological water requirements and environmental water provisions are determined. Ecological water requirements are the water regimes needed to sustain key ecological values of water dependent ecosystems at a low level of risk. Environmental water provisions are the water regimes that will be maintained and may involve some compromise between ecological, social and economic goals.

As part of a statewide program, environmental water provisions will be determined for the Helena River downstream from Mundaring Weir and for the Helena Pumpback Dam. Local community groups, including catchment groups, a range of State and local agencies and other key stakeholders would be involved in the development of desired future states and overall objectives for the modified river system, in the terms of environmental water provisions.

Further information can be accessed in the Department of Water's Policy No. 5 Environmental Water Provisions Policy for Western Australia (2000).

3.2.2 Water licensing

The law relating to the rights to surface water is contained in the *Rights in Water and Irrigation Act 1914* that is administered by the Department of Water. Under provisions of the act, river systems may be proclaimed to allow management controls for protection of the environment and riparian users. The act defines riparian rights for those landholders where there is a waterway flowing through their property, or the property abuts the waterway and there is no publicly reserved land between the waterway and the private property. This gives the landholder the right to take water from the waterway for specific non-commercial uses.

The taking of water in excess of riparian rights, or for commercial use, may require a licence issued under section 5C of the *Rights in Water and Irrigation Act 1914*. Licensing may be required in areas where there is an increasing demand by landholders to take water from the waterway. Licensing control is one method used to manage this demand. In addition, under section 11 of the act, a permit must be issued by the Department of Water prior to any interference or obstruction with beds and banks of a waterway in a proclaimed area.

Part of the Middle Helena catchment area is located in an area proclaimed under the *Rights in Water and Irrigation Act 1914* as the Swan River and tributaries surface water catchment area. The geographical boundary of this proclaimed area covers all land in the Shire of Mundaring, and a section of the Shire of Kalamunda, that is, a band approximately one kilometre wide, south of the Helena River from the Helena Pumpback Dam to Mundaring Weir (figure 5).

3.3 Water impoundments

The Helena Pumpback Dam is the only significant impoundment on the Helena River between Mundaring Weir and the confluence with the Swan River. The dam, constructed in 1971, is 11.8 kilometres downstream from Mundaring Weir.

Run-off to the Helena Pumpback Dam comes from the Middle Helena catchment area and overflow or release from Mundaring Weir. The Water Corporation is licensed by the Department of Water to take up to 14 gigalitres (14 000 megalitres) per annum from the Helena Pumpback Dam.

Water from the dam can be transferred, traditionally during winter via a pumpback pipeline to Lake CY O'Connor and, from there it can be pumped to the Goldfields and agricultural areas. Lake CY O'Connor is the sole water source for the Goldfields and Agricultural Water Supply Scheme, and also supplies part of the Integrated Water Supply System.

The Helena Pumpback Dam has a volume of 130 megalitres and on short-term average could supply about 9000 megalitres, or 25 per cent of inflow, to Lake CY O'Connor every year. On long-term average, the contribution could be as much as 45 per cent of Lake CY O'Connor's inflow.

The Water Corporation's long-term plans indicate that Lake CY O'Connor and the Helena Pumpback Dam will continue to be of primary importance to the Goldfields and Agricultural Water Supply Scheme and an integral part of the Integrated Water Supply System.

The catchment area for the Pumpback Dam was gazetted under the *Country Areas Water Supply Act 1947* in 1972 as the Lower Helena Pipehead Dam catchment area. The area is proposed to be re-gazetted under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*, including revision to the catchment boundary to accurately reflect the true physical (hydrological) catchment. This process will be initiated as part of this strategy (section 6.2).

There are numerous small dams on private land holdings in the Middle Helena catchment area. These dams are generally used for stock watering and irrigation. Development approval is needed to construct a new dam since the

definition of development under the *Planning and Development Act 2005* includes the carrying out on the land of any excavation or other works. The Mundaring town planning scheme includes a provision that no dam will be constructed (or the flow of water artificially retarded) without the approval of the Department of Water and Council.

3.4 Water quality management

The National Water Quality Management Strategy (1994) was developed by the Commonwealth Government with the main objective being to provide for the 'sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development'. The Australian Drinking Water Guidelines (2004) support this strategy. These guidelines were developed by the National Health and Medical Research Council in collaboration with the Natural Resource Management Ministerial Council. These guidelines incorporate the Framework for the Management of Drinking Water Quality (1999), and provide the Australian community and the water supply industry with guidance on what constitutes good quality drinking water.

In Western Australia, the principles and objectives of the National Water Quality Management Strategy are incorporated into the Western Australian State Water Quality Management Strategy (2001). The Western Australian strategy similarly seeks to balance social and economic factors and the protection of the natural environment.

The Australian Drinking Water Guidelines recommend a 'catchment to consumer' approach to providing a safe drinking water supply. Applying protection at the source, rather than relying solely on downstream controls such as water treatment, is recognised worldwide. For catchments that maintain a high degree of remnant vegetation cover and where there is limited human activity, the risk of contamination of public drinking water sources is generally low. As human activity in catchments intensifies, contamination risks increase. Although many contaminants can be removed through water treatment processes, effective removal of all contaminants may not be technically or economically feasible. Water treatment costs are reflected in the costs of water supply to consumers.

The strength of the catchment to consumer protection system approach is that failure of one part may be compensated for by the effective operation of the remaining elements that may include:

- active catchment management and source water protection;
- detention in protected reservoirs or water storage facilities;
- protection of reservoirs or water storage facilities;
- coagulation, sedimentation and filtration;
- disinfection and maintaining an adequate disinfection residual; and
- protection and maintenance of the water distribution system.

Catchment management and water source protection is considered the most effective aspect as water treatment does not necessarily remove all hazards to public health. The Western Australian Legislative Council's standing committee on Ecologically Sustainable Development in Relation to the Quality of Perth's Water Supply found that, as a first priority, water should be protected through good land use planning. The committee supported the adoption of catchment protection as the major mechanism for preventing contamination of water supplies.

The standing committee also endorsed the differential approach or 'priority classification' system used by the Department of Water for the sustainable protection of public drinking water source areas. The priority classification approach developed by the Water Authority of Western Australia, and subsequently supported by the Select Committee on Metropolitan Development and Groundwater Supplies (1994) determines the degree of protection

offered to, or level of activity allowed in, different parts of the catchment. The aims and management objectives for priority 1, priority 2 and priority 3 source protection areas are provided in section 5.2.

The catchment to consumer approach outlined in the Australian Drinking Water Guidelines further states that unless water storages are protected from public access, there is an increased risk of the supply becoming contaminated. Faecal material from human and animal waste may be washed into the water storage and passed quickly into the distribution system, by passing or short circuiting the normal protective detention time of the storage. Therefore, reservoir protection zones are defined to protect reservoirs from immediate risks to water quality.

The reservoir protection zone is generally defined as an area upstream and in two kilometres of the top water level of a surface water reservoir. It includes the reservoir itself and encompasses all land contiguous with the reservoir that is in the reservoir's identified catchment area. For the majority of circumstances, the reservoir protection zone contains mostly Crown land, but it may contain private land in certain circumstances. As a policy, the extent of the reservoir protection zone for primary storages is set at two kilometres. For secondary storages/ pumpbacks, it can be determined at a lesser distance. The extent of the reservoir protection zone can be agreed during the preparation of a land use and water management strategy or a water source protection plan.

Activities that are prohibited in reservoir protection zones are defined in the Policy and Guidelines for Recreation in Public Drinking Water Source Areas on Areas on Crown Land (2003). Prohibited activities include camping, driving vehicles off road, fishing, bushwalking and swimming.

In Western Australia, the Department of Health currently requires the Water Corporation to comply with the Australian Drinking Water Guidelines. The guidelines must be met for potable water pumped from Lake CY O'Connor to the Goldfields and other areas.

The applicable water quality guideline for aquatic ecosystems, primary industries (ie irrigation, livestock drinking water, aquaculture) and recreational water quality is that of the Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand. Its title is: National Water Quality Management Strategy: Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).

The Swan Canning Cleanup Program was launched in 1994 to limit the frequency and extent of algal blooms and prevent toxic blooms by reducing nutrient levels in the Swan and Canning rivers. In 1998, the State Government gazetted the Environmental Protection (Swan and Canning Rivers) Policy, which aims to restore, enhance, preserve and protect the environmental quality, ecological processes and ecological integrity of the two rivers.

The Swan Canning Water Quality Improvement Plan (draft for public comment) was released by the Swan River Trust in 2009. It provides a coordinated commitment to reducing nutrient levels in the Swan Canning catchment. It used predictive catchment modelling underpinned by sound science to forecast the potential impacts of climate and land use change scenarios. The water quality improvement plan prioritises and identifies the most effective management actions to address nutrient sources and improve water quality in the medium term.

The Swan Canning Water Quality Improvement Plan water quality targets for the Helena River are 0.1 milligrams/litre for total phosphorus and 1.0 milligrams/litre for total nitrogen. Although the results of the modelling suggest that the phosphorous target is currently being met, a 38 per cent reduction in nitrogen, or 2.2 tonnes per year, is required to achieve the nitrogen target.

Strategies adopted to reduce the risks to drinking water quality will also support the protection of aquatic ecosystems, improve the water quality for other water uses (such as irrigation water) and benefit environmental management. For example, fencing and revegetating waterways will reduce sediment transport while also providing habitat for native flora and fauna.

3.5 Water quality in the Middle Helena catchment area

With the exception of ongoing analysis of water quality by the Water Corporation at the Helena Pumpback Dam, water quality monitoring in the sub-catchments of the Middle Helena catchment area is based on winter streamflow, so is irregular.

Raw water quality in the Helena Pumpback Dam is considered the most marginal of the jarrah forested catchments in the hills. It is only through blending and storage of the water in Lake CY O'Connor and subsequent treatment that an acceptable water quality can be achieved and the Australian Drinking Water Guidelines are met. Water quality data for the Helena Pumpback Dam and its tributaries is provided below.

The relatively high turbidity and coliform counts are thought to reflect existing land uses in parts of the catchment. Soil erosion, as a result of clearing, grazing of animals and inappropriate drainage systems, particularly for roads in the area, are factors influencing these levels.

3.5.1 Water sampling

Water from the Helena Pumpback Dam is not supplied directly to users. Water from the dam (sourced from the Middle Helena catchment area) is pumped to Lake CY O'Connor. The water is mixed with water from the Mundaring Weir catchment area and potable water from the Integrated Water Supply System in the lake and gains the benefit of natural microbiological improvement through storage. The water is treated prior to supply to users.

The Water Corporation has monitored the raw (source) water quality from the Helena Pumpback Dam and inflow points into the dam in accordance with the Australian Drinking Water Guidelines and interpretations agreed to with the Department of Health. The raw water is regularly monitored for:

- health related characteristics
- microbiological contaminants
- health related chemicals
- aesthetic related characteristics (non-health related)

Additional information about these characteristics and their effect on drinking water quality is provided in section 5.1.

The water quality data provided refers to raw water in the Helena Pumpback Dam and not to chloraminated water supplied to users. The quality of the water supplied to users by the Water Corporation from Lake CY O'Connor cannot be inferred from this data. It should be noted that until November 2007, the water in the Helena Pumpback Dam could be a mixture of Middle Helena catchment raw water and potable water from the integrated system. The data provided for Helena Pumpback Dam Raw Water is from December 2007 to December 2009 to eliminate the influence of the potable water.

In the absence of specific guidelines for raw water quality, the results have been compared with Australian Drinking Water Guidelines values set for drinking water, which defines the quality requirements at the customer's tap. Results that exceed the guidelines have been highlighted to give an indication of potential raw water quality issues associated with this source.

A - Microbiological contaminants

(i) Helena Pumpback Dam raw water

Microbiological water quality testing of raw water samples was conducted during December 2007-December 2009 on at least a quarterly basis, via a dip sample taken from a boat at a location on Helena Pumpback Dam. Due to safety reasons, no sampling occurs when the dam is overflowing.

Positive E. coli counts were recorded in 100 per cent of samples and indicate a high and consistent degree of faecal contamination. The E. coli counts in the Helena Pumpback Dam are generally higher (and a higher percentage of samples are positive) than microbiological sampling results in other hills drinking water catchment areas.

(ii) Middle Helena catchment

Microbiological water quality testing of catchment water samples from a sample point upstream of the Helena Pumpback Dam on Piesse Gully (a major inflow into the pumpback dam) was conducted between July 2002-December 2009 on a 1-2 monthly basis, but only during streamflow (normally June-November).

Positive E. coli counts were recorded in 100 per cent of samples and indicate a high and consistent degree of faecal contamination. This is also evident in the E. coli counts for Helena Pumpback Dam during streamflow events.

B - Health related chemicals

(i) Helena Pumpback Dam raw water

Water is sampled for pesticides, hydrocarbons, metals and nutrients. The values are taken from raw water monitoring from a dip sample taken from a boat at a location on Helena Pumpback Dam for the period September 2000-December 2009. It should be noted that until November 2007, the water in the Helena Pumpback Dam could be a mixture of Middle Helena catchment raw water and potable water from the integrated supply system.

Water quality analyses for the Helena Pumpback Dam detected the presence of dieldrin once, in September 2000. Barium and boron were detected at less than 10 per cent Australian Drinking Water Guidelines health guideline value via a one-off metals sample in July 2002. No hydrocarbons were detected in a sample taken in July 2002. The following table summarises the results of nutrient testing.

Parameter	Units	Health Guideline Value Drinking Water	Raw Water Helena Pumpback Dam
ammonia (as N)	mg/L	0.41	<0.005-0.34
filterable reactive phosphorus	mg/L	not set	<0.002-0.12
nitrate (as N)	mg/L	11.3 (infant) 22.6 (adult)	<0.002-1.1
nitrite (as N)	mg/L	0.91	<0.002-0.047
total kjeldahl nitrogen	mg/L	not set	0.12-0.68
total phosphorus	mg/L	not set	<0.002-0.029

(ii) Middle Helena catchment

Water sampled upstream of the Helena Pumpback Dam on Piesse Gully between July 2002 and November 2009 detected hydrocarbons C15-28 in a sample in October 2008. Chlorpyrifos was the only pesticide detected, once in August 2009, together with zinc at less than 10 per cent of Australian Drinking Water Guidelines aesthetic guideline value. The following table summarises the results of nutrient testing.

Parameter	Units	Health Guideline Value Drinking Water	Piesse Gully
ammonia (as N)	mg/L	0.41	<0.005-0.12
filterable reactive phosphorus	mg/L	not set	<0.002-0.012
nitrate (as N)	mg/L	11.3 (infant) 22.6 (adult)	0.013-2
nitrite (as N)	mg/L	0.91	<0.002-0.009
total kjeldahl nitrogen	mg/L	not set	0.033-0.48
total phosphorus	mg/L	not set	<0.002-0.09

C- Aesthetic data summary

(i) Helena Pumpback Dam raw water

Aesthetic water quality testing of raw water samples was conducted during December 2000-December 2009 from a dip sample taken from a boat at a location on Helena Pumpback Dam. The analyses are summarised in the following table. The water quality parameters that have on occasion exceeded the Australian Drinking Water Guidelines aesthetic guideline values for supplied drinking water are shaded. Raw water from Helena Pumpback Dam is not required to meet these guidelines. The guidelines apply to water supplied from Lake CY O'Connor.

Parameter	Units	Health Guideline Value Drinking Water	Raw Water Helena Pumpback Dam
pH	-	6.5-8.5	6.87-8.45
turbidity	NTU	5	0.3-19
colour	TCU	15	<1-24
conductivity	mS/m	not set	28-88
total dissolved solids	mg/L	500	164-569
iron (unfiltered)	mg/L	0.3	<0.003-2.2
manganese (unfiltered)	mg/L	0.1	<0.002-0.25
aluminium (unfiltered)	mg/L	0.1	<0.008-0.5
sodium	mg/L	180	46-93
hardness (as $CaCO_3$)	mg/L	200	45-95
chloride	mg/L	250	81-150
sulphate	mg/L	250	15-27

(ii) Middle Helena catchment

The following results are from a sample point upstream of the Helena Pumpback Dam on Piesse Gully, which is a major inflow into the pumpback dam. The values are for sampling from July 2002-October 2009. The water quality parameters that have, on occasion, exceeded the Australian Drinking Water Guidelines aesthetic guideline values for supplied drinking water are shaded. Raw water from tributaries of the Middle Helena catchment area is not required to meet these guidelines. The guidelines apply to water supplied from Lake CY O'Connor.

Parameter	Units	Health Guideline Value Drinking Water	Piesse Gully
pH	-	6.5-8.5	6.94-7.67
turbidity	NTU	5	0.8-24
colour	TCU	15	3-42
conductivity	mS/m	not set	35-62
total dissolved solids	mg/L	500	255-270
iron (unfiltered)	mg/L	0.3	0.09-0.5
manganese (unfiltered)	mg/L	0.1	<0.002-0.1

Parameter	Units	Health Guideline Value Drinking Water	Piesse Gully
aluminium (unfiltered)	mg/L	0.1	<0.008-0.5
sodium	mg/L	180	63-67
hardness (as CaCO3)	mg/L	200	55-60
chloride	mg/L	250	105-115
sulphate	mg/L	250	28-29

Turbidity is of great importance to the microbiological safety of drinking water. It can protect pathogenic microorganisms from the effects of disinfection, promote bacterial growth and exert a significant disinfectant demand, so turbidity levels of less than 1 NTU are desirable for effective disinfection. Adequate disinfection may be achieved at higher turbidity levels (particularly up to the guideline level of 5 NTU), but the efficiency of disinfection decreases with increasing turbidity. High turbidity levels occasionally recorded at the Helena Pumpback Dam would be of concern for the microbiological quality of the water if no treatment, other than chloramination, is provided.

4.0 Land resources

4.1 Land tenure

Land tenure in the Middle Helena catchment area is mixed and state forest is the dominant form.

The Middle Helena catchment area covers a total of about 11 260 hectares, 35 per cent of which is state forest managed by the Department of Environment and Conservation. An additional 32 per cent is other Crown land and 1 per cent is State Government land. Private persons and commercial organisations own about 27 per cent of the total area. Land tenure in the Middle Helena catchment area is illustrated in figure 6 and listed in table 2.

Land tenure varies throughout the sub-catchments of the Middle Helena catchment area. Data collected in 2003 showed that the highest percentage of state forest tenure is found in the South Ledge (77 per cent) and Rifle Range (75 per cent) sub-catchments, with the lowest percentage in the Hardey Road sub-catchment (less than 1 per cent). The sub-catchments with the greatest private person and commercial organisation ownership are the Hardey Road (40 per cent), Piesse Gully (37 per cent), Bourkes Gully (26 per cent) and Nelson Road (24 per cent) sub-catchments.

The Combined Metropolitan Native Title claim incorporates the whole of the Middle Helena catchment area. The claim was submitted to the National Native Title Tribunal for registration in 1999 and passed the Commonwealth Government's registration test. Planning and development activities in areas of importance to Nyungar people will need to be comply with the provisions of the *Aboriginal Heritage Act 1972*.

Land tenure	Hectares	% of total
Crown land		
• state forest	3 971	35
• crown reserves	3 573	32
• roads	412	4
• unallocated crown land	111	1
State Government owned	166	1
Local government	8	<1
Privately owned		
• private person	2 679	24
• commercial organisation	303	3
Other	9	<1
Total	**11 260**	**100**

Table 2: Land tenure in the Middle Helena catchment area

4.1.1 National parks

There are established and proposed national and regional parks in the boundaries of the Middle Helena catchment area (figure 7). These include Beelu, Kalamunda and Korung national parks.

Beelu (formerly Mundaring) National Park is an area of state forest and parks and recreation reserve situated to the west of Mundaring Weir Road in the shires of Mundaring and Kalamunda. It is approximately 3000 hectares and includes the popular recreation sites of Fred Jacoby Park, South Ledge, North Ledge, Farrell Grove, The Dell, Gungin Gully, Pimelea Mycumbene and Grevillea Mycumbene.

Kalamunda National Park is a 375 hectare national park notable for its diversity of native plants. Piesse Brook runs through the park and the rising slopes of its valley are covered with open woodlands of jarrah, marri, wandoo and butter gum. There are several walk trails through the park, including the first stage of the Bibbulmun Track.

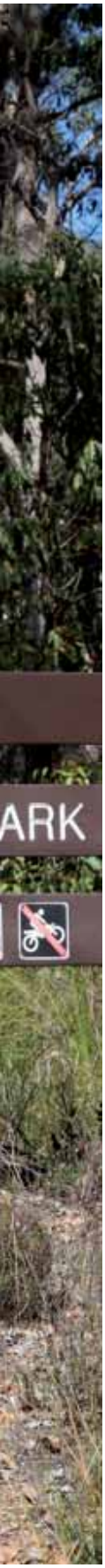
Korung National Park is a 6000 hectare national park, including areas of state forest surrounding the horticultural areas in the Piesse Gully sub-catchment. The proposed national park is located around the townsites of Karragullen and Pickering Brook. It was formerly unofficially known as Pickering Brook National Park, and is popular for bushwalking. The Munda Biddi Bike Trail and the Kattamorda Heritage Trail run through parts of this park.

4.2 Land use

The MRS (which extends over the entire Middle Helena catchment area), Kalamunda local planning scheme and Mundaring local planning scheme broadly control land use in the catchment.

To better understand the potential risks to water quality from current land uses and associated land use practices and activities, a land use survey was completed for the Middle Helena catchment area in 2003. The outcome of the survey is illustrated in figure 8.

The land use survey information revealed that almost 79 per cent (or 8880 hectares) of the Middle Helena catchment area is native vegetation (figure 9). The reservation of a large percentage of the total catchment for parks and recreation and state forest in the MRS supports the maintenance of native vegetation over much of the area.



Clearing has occurred for the establishment of paddocks or fields (7.3 per cent), horticulture enterprises (5.9 per cent) and houses with gardens (3.4 per cent). Land has also been cleared for public open space, golf courses and roads. Stock grazing includes horses, sheep, cattle and a limited number of deer.

The MRS and town planning scheme zonings and reservation are illustrated in figures 10 and 11. Land uses in the Middle Helena catchment area are illustrated in figure 8 and are summarised in table 3.

Table 3: Land use in the Middle Helena catchment area

Land use	Hectares *	% of total
Native vegetation (public and private)	8 880	78.9
Paddock/field	825	7.3
Horticulture (orchards and vineyards)	662	5.9
House and garden	388	3.4
Cleared public land	104	0.9
Roads (primary, secondary, tertiary) and open air parking	78	0.7
Golf courses	75	0.7
Dams (water storage areas)	34	0.3
Sheds (packing and other)	29	0.3
Parkland (cleared)	28	0.2
Other sporting facilities	21	0.2
Schools and training centres	16	0.1
Other (40 land uses)	120	1.1
Total	**11 260**	**100**

* Note: This information is based on the land use survey completed in 2003.

Land uses differ between the sub-catchments. In 2003, the sub-catchments that maintained the highest percentage of native vegetation were the Rifle Range (93.9 per cent), South Ledge (93.5 per cent), Nelson Road (90.2 per cent) and Paulls Valley (90.3 per cent) sub-catchments. The Piesse Gully and Hardey Road sub-catchments have been cleared to the greatest extent. About a quarter (25 per cent) of the Piesse Gully sub-catchment has been cleared for paddocks, orchards and vines, and houses with gardens. Similarly, about 26 per cent of the Hardey Road sub-catchment has been cleared for paddocks and houses with gardens.

No major changes in land use in the Middle Helena catchment area are anticipated. Nonetheless, some important land use trends are noted below.

4.2.1 Urban growth

Land adjoining the settlements of Bickley and Carmel in the Shire of Kalamunda has been identified for rezoning to special rural (Draft District Planning Scheme No. 3) to allow for some growth in rural lifestyle blocks and an intensification of use. Major expansion or intensification of the portions of the townsites of Mundaring and Kalamunda and other established urban settlements in the catchment area are not anticipated by the shires of Mundaring and Kalamunda.

The Mundaring and Kalamunda town centres are sewered. Other residential areas in both shires are not sewered and are unlikely to be sewered in the future because of limitations such as the steep and rocky nature of the terrain, distance from main sewers, density of settlement and associated costs.

4.2.2 Horticulture

The returns from some orchards in the Middle Helena catchment area have been disappointing in recent years and the area under orchard trees has declined (Australian Bureau of Statistics, 2001). Growth in viticulture in the Middle Helena catchment area is projected. There is also a trend towards vertical integration with the establishment of boutique wineries, cellar door sales, wine tasting, cafes, tea rooms, restaurants and cottage art and craft centres.

The horticultural areas of the Piesse Gully sub-catchment in the Hills Orchard area have been identified as an agricultural priority management area. This means that land use planning and subdivision of land in the area will be guided by State Planning Policy 2.5: Agricultural and Rural Land Use Planning and Development Control Policy 3.4 Subdivision of Rural Land. These policies, although currently under review by the Department of Planning, seek to protect agricultural land resources by discouraging land uses unrelated to agriculture from locating on agricultural land, limiting the ad hoc fragmentation of rural land, and minimising the potential for land use conflict.

4.2.3 Industrial development

No further industrial development in the Middle Helena catchment area is anticipated.

4.2.4 Roads and powerlines

No new major roads or powerlines are currently planned for the study area.

4.2.5 Forestry

No further native forest harvesting will occur in areas in the Middle Helena catchment area that are designated for a change of purpose to national park. Harvesting in existing areas of national park or regional park will also not occur. Harvesting may occur in other areas of state forest in the catchment. There is an expectation that demand for recreational experiences in state forests, national parks and other native vegetation areas will increase. Additional recreational activity is expected in the catchment and will have a potential impact on water quality and other environmental values. This is discussed in more detail in section 4.2.6.

4.2.6 Recreation in bushland areas

The Helena River Valley and lower Piesse Gully (in the Kalamunda Regional Park) are scenic, steep sided valleys with a species rich flora, granite outcrops and fast flowing waterways. The river valleys, surrounding state forest and parks and recreation areas are close to the growing Perth metropolitan area and provide opportunities for a range of recreational experiences.

Significant recreational pressures occur at, and immediately below, Mundaring Weir at South Ledge (and to a lesser extent North Ledge), at the main southern entrances to Kalamunda Regional Park and at Rocky Pool; and in state forest areas in the vicinity of Pickering Brook.

Significant recreational pressures occur:

- at, and immediately below, Mundaring Weir at South Ledge (and to a lesser extent North Ledge);
- at the main southern entrances to Kalamunda Regional Park
- at Rocky Pool; and
- in state forest areas in the vicinity of Pickering Brook.

The main recreation activities currently taking place in bush reserves in the Middle Helena catchment area are:

- Bush walking on formal trails and informal tracks. Formal trails include the Bibbulmun Track (includes over night campsites), Helena Pipehead Walk Trail,

Rocky Pool Walk, Schipp Road Walk and several other walk trails that are managed by the Department of Environment and Conservation.

- Dog exercising takes place throughout the catchment on formal and informal tracks.
- Orienteering.
- Horse riding (Lower Helena Bridle trail and informal trails), camel and llama rides.
- Four wheel driving - there is an established four wheel drive trail in the state forest west of Mundaring Weir (Bourkes Gully sub-catchment). In general, this activity occurs in state forests and other bush reserves throughout the catchment, particularly on powerline access tracks and firebreaks.
- Trail bike riding, particularly in state forests.
- Swimming in the Helena Pumpback Dam and other dams. Swimming in the reservoir and in streams located on Crown land is not supported based on existing legislation and policy.
- Marroning in the Helena Pumpback Dam and waterways.
- Mountain bike riding. The recently established Munda Biddi Mountain Bike Trail passes through the Middle Helena catchment area.
- Target shooting - there is a rifle range in state forest in the Pickering Brook area.

Mundaring Weir is a well known and popular tourist and recreation area. The creation of a more formal recreation/tourist precinct below Mundaring Weir is currently occurring as part of the Golden Pipeline Project. This project is an initiative of the National Trust of Australia (Western Australia), the Water Corporation and 11 local government authorities. It encompasses the conservation and interpretation of the Goldfields and Agricultural Water Supply Scheme designed by CY O'Connor, and specifically the No. 1 Pump Station in the Mundaring Weir precinct. The boundaries of the Mundaring Weir precinct correspond with the Mundaring Weir Road, between Allen Road and South Ledge Road. This extends east to include the Hills Forest Discovery Centre and west to include South Ledge and North Ledge.

Common issues faced in the management of bushland include illegal firewood collection, rubbish dumping (vehicles, tyres, household and agricultural waste), arson and the dumping of unwanted pets. It is recognised that these issues are not restricted to public drinking water source areas, as they are common to the majority of bushland areas. It should be noted that although these issues pose a risk to water quality, this level of risk is generally lower than from other land uses. Land use risks to water quality are discussed in more detail in section 5.1.

Many of the bush reserves in which the recreational and other activities occur have been incorporated into national or regional parks (section 4.1). Management plans for these parks, plus the application of the Conservation and Land Management Regulations 2002, will promote the effective management of recreational activities in these areas. Furthermore, in July 2010, the standing committee on public administration plans to report its findings on recreation access to public drinking water source areas. Those findings will help guide planning, environment/conservation and drinking water source protection in the Middle Helena catchment.

As recreation management issues will be addressed by the Department of Environment and Conservation during the preparation of management plans for the various regional and national parks, this strategy does not specifically address these issues. The preparation of a specific recreation concept plan for the proposed Helena Valley National Park is a recommendation of this strategy.

The Middle Helena catchment area is facing competing pressures from urban development, agricultural diversification and an increasing demand for recreation opportunities close to Perth. Careful planning and management are needed to encourage land use and development that protects water quality and maintains its suitability as a public drinking water source.








5.0 Land use and drinking water quality protection

5.1 Land use risks to water quality

Different land uses and activities pose varying levels of risk to water quality. The level of risk associated with a particular land use or activity depends on the intensity of that use (for example, the quantity of nutrients applied, irrigation rates, stocking rates, and management of sewage), the management practices applied, and the characteristics of the land on which the use occurs (such as soil type, slope and proximity to waterways).

Potential risks related to some current and proposed land uses in the Middle Helena catchment area are briefly provided in Table 4.

Table 4: Land use risks

Land use	Potential water quality risks from:
Orchards	Nutrients from fertilisers; chemicals from pesticides and fuel; sediments from water run-off, and erosion if there is inadequate vegetation cover.
Vineyards	Nutrients from fertilisers; chemicals from pesticides and fuel; sediments from water run-off, and erosion if there is inadequate vegetation cover.
Wineries	Nutrients, organic matter and chemical cleaner residues from effluent and solids disposal; hydrocarbons from visitor car park run-off.
Grazing of animals	Nutrients, pathogens and sediment from animal manure, compaction and run-off erosion; chemicals from pesticides and fuel. Risk is increased by stock access to waterways and the loss of the riparian zone.
Floriculture	Nutrients from fertilisers; chemicals from pesticides and fuel; sediments from water run-off if there is inadequate vegetation cover.
Poultry/egg production	Nutrients and pathogens from manure; chemicals from pesticides and cleaner residues.
Recreation in bush reserves/waterways	Four-wheel drive vehicles and trail bikes, eg hydrocarbon contamination from accidents or spills and from crossing/entering waterways; sediments from erosion of unsealed roads and tracks and disturbance of waterway banks and beds; spread of weeds and dieback. Swimming, marroning, camping, picnicking, walking, animal exercising, eg pathogens and nutrients from direct human/animal contact with water, human/animal ablutions (urine and faeces), marron baits and rubbish disposal; sediments from disturbance of waterway banks and beds.
Unsewered rural lifestyle blocks	Nutrients and pathogens from wastewater disposal systems and animal manures; nutrients from fertilisers; chemicals from pesticides, vehicle storage and maintenance.
Unsewered urban areas	Nutrients and pathogens from wastewater disposal systems; nutrients from fertilisers; chemicals from pesticides and chemical use; sediment and hydrocarbons from stormwater disposal.
Sewered urban areas	Nutrients from fertilisers; chemicals from pesticides and chemical use; sediment and hydrocarbons from stormwater disposal.
Golf courses and sports fields (irrigated)	Nutrients from fertilisers; chemicals from pesticides.
Roads	Hydrocarbons and sediment from stormwater; chemicals from spills.

Land use	Potential water quality risks from:
Power transmission lines, telephone lines and pipelines	Sediment from recreational use and maintenance of access roads.
Restaurants/tea rooms	Nutrients and pathogens from wastewater disposal; sediment and hydrocarbons from car park run-off.
Hotels/hostels	Nutrients and pathogens from wastewater disposal; sediment and hydrocarbons from car park run-off.
Plantations	Sediments from roads and water run-off, particularly if vegetation buffers are inadequate; nutrients from fertilisers; chemicals from pesticides.
Quarry	Sediments; hydrocarbons from storage and spillage of fuel.
Light industry	Hydrocarbons, chemicals (such as solvents and paints) and sediment from depots, auto-mechanics and machining industries.
Dam construction	Sediments from exposure of soils; impacts on flows.

From table 4, the key risks to water quality are from:

- nutrients and pathogens from wastewater disposal systems and/or animal manure;
- nutrients from fertilisers;
- chemicals from pesticides, fuel and chemical use; and
- sediment, erosion and hydrocarbons from stormwater run-off and disposal.

These risks can be separated into microbiological contaminants (generally pathogens), health-related chemicals such as pesticides and nutrients; and aesthetic characteristics. These are explained in more detail in section 5.1.1.

5.1.1 Microbiological contaminants

Pathogens are types of microorganisms that are capable of causing diseases. These include bacteria, protozoa and viruses. In water supplies, pathogens that can cause illness are mostly found in the faeces of humans and domestic animals.

There are a number of pathogens that are commonly known to contaminate water supplies worldwide. These include bacteria (for example, Salmonella, *Escherichia coli* and Cholera), protozoa (for example, Cryptosporidium, Giardia) and viruses. *Escherichia coli* counts are a way of measuring these pathogens and are an indicator of faecal contamination.

Pathogen contamination of a drinking water source is influenced by the existence of pathogen carriers (that is, humans and domestic animals such as dogs or cattle in the catchment), the pathogen's transfer to, and movement in, the water source and its ability of the pathogen to survive in the water. The percentage of humans in the world that carry various pathogens varies. It is estimated that between 0.6 to 4.3 per cent of people are infected with Cryptosporidium worldwide, and 7.4 per cent with Giardia (Geldreich 1996).

Pathogens may enter a water source through activities involving direct contact of people and domestic animals with the main water body or its tributaries (such as fishing, marroning and swimming). This primarily occurs through the direct transfer of faecal material to the water where even a very small amount can cause contamination. It can also occur indirectly through run-off, moving faecal material into the water.

The ability of pathogens to survive in surface water differs between species. For example, Salmonella may be viable for two to three months, Giardia may still infect after one month in the natural environment and Cryptosporidium oocysts (cells containing reproductive spores) may survive weeks to months in freshwater.

The effect on people consuming drinking water that is contaminated with pathogens varies considerably, ranging from mild illness (such as stomach upset or diarrhoea) to hospitalisation and sometimes death. In 2000, in Walkerton, Canada, seven people died due to contamination by a pathogenic strain of *Escherichia coli* and Campylobacter in the town water source and supply. Preventing the introduction of pathogens into the water source is the most effective barrier in avoiding this public health risk.

As highlighted in section 3.4, consistent counts of *E. coli* have been regularly recorded in the Helena Pumpback Dam raw water. The *E. coli* counts for the Middle Helena catchment sample points indicate a high and consistent degree of faecal contamination. This is also evident in the *E. coli* counts for Helena Pumpback Dam during streamflow events. The *E. coli* counts in the Helena Pumpback Dam are generally higher (and a higher percentage of samples are positive) than microbiological sampling results in other hills drinking water catchment areas.

The Helena Pumpback Dam is considered to be at a high risk of microbiological contamination because of activities in the catchment. Management strategies are in place to reduce the contamination risk.

5.1.2 Health related chemicals

A health related guideline value is the concentration or measure of a water quality characteristic that, based on present knowledge, does not result in any significant risk to the health of the consumer over a lifetime of consumption.

Land use activities in the catchment can directly influence the effectiveness of water treatment. For example, off-road driving and driving on unauthorised tracks contributes to erosion and the uprooting of vegetation. Erosion results in the mobilisation of soil particles which are then released into the air and tributaries, increasing the turbidity of the main water body. Pathogens can absorb onto these soil particles and may be shielded from the effects of disinfection. Increased turbidity also impacts upon other environmental constituents, that is, smothering riparian vegetation and reducing light transfer in the water column, which affects plant growth.

A number of chemicals, both organic and inorganic, are of concern in drinking water from a health perspective because they are potentially toxic to humans. Chemicals usually occur in drinking water sources attached to suspended material such as soil particles, and may result from natural leaching of mineral deposits or from different land uses.

Pesticides include agricultural chemicals such as insecticides, herbicides, nematicides (used to control nematodes), rodenticides and miticides (used to control mites). Contamination of a drinking water source by pesticides may occur as a result of accidental spills, incorrect or over use, and leakage from storage areas. In such cases, prompt action is required to notify relevant authorities to clean up the spill.

Nutrients (such as nitrogen) can enter drinking water supplies from leaching of fertiliser, septic tanks and from faeces of domestic animals (cattle grazing on the land). Nitrate and nitrite (ions of nitrogen) can be toxic to humans at high levels, with infants less than three months old being most susceptible.

Hydrocarbons (fuels, oils, solvents) are potentially toxic to humans, and harmful by-products may be formed when they are

combined with chlorine in water treatment processes. Hydrocarbons can occur in water supplies from pollution events such as vehicle accidents, refuelling and leakage from storage areas.

Although limited sampling has occurred, none of the health related water quality parameters measured in the Helena Pumpback Dam exceeded health guideline values. These parameters will continue to be routinely monitored.

5.1.3 Aesthetic characteristics

Impurities in drinking water can affect the aesthetic qualities of water such as appearance, taste, smell and feel. Such impurities are not necessarily hazardous to human health; for example, water that is cloudy and has a distinctive colour may not be harmful.

Iron and dissolved organic matter can affect the colour and appearance of water and salinity can affect the taste. The Australian Drinking Water Guidelines set limits on water quality characteristics to meet the aesthetic requirements of consumers.

Some properties such as pH (a measure of acidity and alkalinity) can contribute to the corrosion and encrustation of pipes. The guidelines also set out aesthetic guidelines for these types of water quality characteristics.

Raw water quality measured in the Middle Helena catchment slightly exceeded Australian Drinking Water Guidelines for aesthetic indicators in pH, turbidity, colour, and unfiltered iron, manganese and aluminium.

5.2 Water quality objectives

The Department of Water has developed a differential approach towards the sustainable protection of public drinking water source areas. The Middle Helena catchment area was gazetted in 1972 (as the Lower Helena Pipehead Dam catchment area) under the *Country Areas Water Supply Act 1947,* and serves to protect the quality of drinking water sourced from the catchment. The three levels of priority classification that apply to the catchment as well as water quality objectives for each priority classification are provided below.

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

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

Priority 3 source protection areas are defined to manage the risk of pollution to the water source. Priority 3 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 priority 3 areas is achieved through management guidelines rather than restrictions on land use.

5.3 Land use compatibility

The Department of Water has investigated the level of risk to public drinking water sources associated with each of the existing and a number of other land uses. The water quality protection note 25 Land Use Compatibility in Public Drinking Water Source Areas and other water quality protection notes, policies and guidelines provide information on the level of risk to water quality from specific land uses. The level of risk then determines if the land use is incompatible, compatible with conditions and acceptable in priority 1, priority 2 or priority

3 areas. For example, the Policy and Guidelines for Recreation in Public Drinking Water Source Areas on Crown Land provides a guide to the compatibility of specific recreational activities in Crown lands that are priority 1 source protection areas.

The Land Use Compatibility in Public Drinking Water Source Areas water quality protection note is not an exhaustive list of land uses and will be updated as clarification of uses are requested and industry standards change. The term 'compatible with conditions' 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.

The adoption of best management practices for land use activities is encouraged to help protect water quality. To assist adoption of best management practices, water quality protection notes, environmental management guidelines and policies for specific land uses are being progressively developed by the Department of Water in conjunction with other agencies (eg Department of Agriculture and Food and the Department of Environment and Conservation) and the relevant peak industry body. For example, the Wine Industry Association and the Grape Growers' Association together with a number of agencies developed the Environmental Management Guidelines for Vineyards (2002). These guidelines incorporate a practical, commonsense approach to environmental management issues, and are aimed at avoiding any unreasonable burden to the industry.








6.0 Land Use and Water Management Strategy: Middle Helena Catchment Area

The Middle Helena Catchment Area Land Use and Water Management Strategy is proposed to be delivered through:

- the allocation of priority areas and water quality objectives;
- realignment of the gazetted catchment boundary;
- definition of a reservoir protection zone; and
- use of planning controls to guide planning decision-making in accordance with water quality objectives.

6.1 Allocation of priority areas

The land use and water management strategy recommends the priority classification of land in the physical boundary of the Middle Helena catchment area as priority 1, priority 2 and priority 3 source protection areas (section 5.2). The priority classifications have been allocated on the basis of zoning, land use and ownership, as outlined in section 6.1.1.

6.1.1 Planning precinct definition

In order to allocate priority areas and assign water quality objectives, the Middle Helena catchment area was separated into planning precincts on the basis of various attributes associated with each lot in the catchment. Lots with similar attributes were combined form a precinct, as indicated in table 5.

Table 5: Precinct attributes

Attribute	Component
Metropolitan region scheme reservation or zoning	State forest, parks and recreation, public purpose, roads, rural, urban, urban deferred and industrial.
Town planning scheme (reservation and) zoning	The zone of the precinct as reflected in the Kalamunda or Mundaring town planning schemes.
Town planning scheme identified for subdivision	Lots where subdivision can occur as identified in appendix 1 of the Kalamunda Town planning scheme (Hills Orchard area – areas with subdivision potential in the gazetted water catchment) and the Shire of Mundaring's town planning scheme.
Land use	Current land use based on information collated during a windscreen survey and from aerial photographs.
Land tenure	Ownerships of each lot, ie private person or company (commercial), local government, State Government, Commonwealth, Crown or vacant Crown land.

6.1.2 Priority classification of land

Priority classifications for precincts in the Middle Helena catchment area are determined by assessing the attributes of each area, and assigning a priority classification level on the basis of a decision tree (figure 12).

Precincts reserved as state forest or parks and recreation in the MRS and in public ownership are generally classified as priority 1. Areas zoned rural in the MRS that are in public ownership (such as Crown reserves, vacant Crown land), and where the predominant land use is bush,

are also generally classified as priority 1. For areas zoned rural in the MRS that are in private ownership, reference is made to the Land Use Compatibility in Public Drinking Water Source Areas water quality protection note, as varied specifically for the Middle Helena catchment area (section 6.4.2). Where the established land use is acceptable with a priority 2 classification, the priority 2 classification is adopted. Where the established land use is compatible with conditions or incompatible, a priority classification is assigned that is consistent with the precinct's local planning scheme zoning, the water quality risks associated with the existing land use, and other land use constraints.

All areas zoned urban, urban deferred and industrial in the MRS are classified as priority 3.

The priority classification for road reserves is determined by the classification assigned to adjoining areas (table 6).

Table 6: Road reserve priority classification

Priority classification of adjacent land	Road reserve priority classification
All adjacent land is classified priority 1	priority 1
All adjacent land is classified priority 2	priority 2
All adjacent land is classified priority 3	priority 3
Adjacent land is of mixed classification, eg: - priority 1/priority 2 - priority 2/priority 3 - priority 1/priority 3	Adopt the lower classification priority 2 priority 3 priority 3

It is noted that in the Middle Helena catchment area, a number of anomalies exist where the proposed priority classification of a precinct is not in strict accordance with the decision tree (figure 12). These anomalies, or exceptions, were outlined in detail in the draft Middle Helena Catchment Area Land Use and Water Management Strategy.

Further detailed information regarding individual precincts and land parcels is contained in the draft Middle Helena Catchment Area Land Use and Water Management Strategy.

6.1.3 Priority source protection area map

On the basis of the methodology, in section 6.1.2 a priority source protection area map (figure 13) is proposed. The map recommends the classification of all land in the boundaries of the Middle Helena catchment area as priority 1, priority 2 or priority 3 source protection areas.

The proposed priority source protection area map is generally aligned with MRS and local planning scheme reservations and zonings. No alterations or adjustments to existing local planning scheme zonings are envisaged as an outcome of the strategy but special control areas overlying the local planning scheme zones and reserves are proposed (section 6.4.4).

6.2 Realignment of the gazetted catchment boundary

The Middle Helena catchment area was gazetted in 1972 under the *Country Areas Water Supply Act 1947* as the Lower Helena Pipehead Dam catchment area. Gazettal of the catchment area and the act's by-laws enables the Department of Water to control potentially polluting activities, regulate land use, inspect premises and take steps to prevent or clean up pollution in the gazetted boundary.

Due to the location of the Middle Helena catchment area being in the Perth metropolitan area, there is a need to re-gazette the catchment under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*. The development of the land use and water management strategy for the Middle Helena catchment area has provided an opportunity to review the catchment boundary, to ensure the water source is protected. The current gazetted catchment area boundary and the proposed modified boundary are shown in figure 1. The proposed boundary represents the physical (hydrological) catchment of the Helena Pumpback Dam.

Implementation of the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* by-laws will complement planning controls of the water catchments reservation (priority 1), rural water protection zone (priority 2) and priority 3 areas in the gazetted catchment area boundary.

6.3 Definition of a reservoir protection zone

To protect the Helena Pumpback Dam from immediate risks to water quality, including human contact, it is proposed that the area in the immediate vicinity of the reservoir be managed as a reservoir protection zone.

Consistent with the 'catchment to consumer' approach, and in an effort to protect reservoirs from immediate risks to drinking water quality (section 5.1), reservoir protection zones are defined in Western Australia. The current by-laws of the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* provide for the designation of two kilometre reservoir protection zones (these are termed prohibited zones in the current by-laws). The Department of Water is currently developing new by-laws that will apply to public drinking water source areas proclaimed under both the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* and the *Country Areas Water Supply Act 1947*. The new by-laws will allow for the provision of reservoir protection zones.

The reservoir protection zone is generally defined as an area upstream and within two kilometres of the top water level of a reservoir. It includes the reservoir itself and encompasses all land contiguous with the reservoir that is in the reservoir's identified catchment area. For the majority of circumstances, the reservoir protection zone contains mostly crown land, but it may contain private land in certain circumstances. As a policy, the extent of the reservoir protection zone is set at two kilometres for primary storage reservoirs. For secondary storages/pumpback reservoirs, it can be determined at a smaller distance during the preparation of a land use and water management strategy or a water source protection plan.

The proposed reservoir protection zone for the Helena Pumpback Dam includes the reservoir and all publicly owned land bounded by the Bibbulmun Track and the bridle trail in the south and the two kilometre boundary in all other areas (figure 14). The boundary of the reservoir protection zone would be on the edge of the Bibbulmun Track and bridle trail closest to the reservoir which would allow for the continued use of the track and trail, as well as the Schipp Road Walk and Rocky Pool Walk. The exact distance between the reservoir protection zone boundary and the Bibbulmun Track and bridle trail would be determined through consultation with the Department of Environment and Conservation. Unauthorised public access to the reservoir, the track that runs parallel to the reservoir and the walking trail close to the reservoir (Helena Pipehead Walk Trail), would be prohibited following gazettal of the reservoir protection zone. Access to the reservoir protection zone and the use of tracks for fire fighting, conservation activities, Aboriginal heritage access requirements and the maintenance of infrastructure would continue to be allowed. The proposed reservoir protection zone was considered the preferred option following consultation on four alternatives with the Helena strategy project reference group , although the Shire of Kalamunda remains opposed to the closure of the Helena Pipehead Walk Trail.

A two kilometre reservoir protection zone is not imperative for the Helena Pumpback Dam because the proposed zone is around a secondary storage dam, so pathogen die off and sediment settling would be increased with the extra residence time in Lake CY O'Connor.

The process for closure and rehabilitation of the section of the Helena Pipehead Walk Trail that is located in the proposed reservoir protection zone will be agreed to between key agencies including the departments of Environment and Conservation, Water, and Sport and Recreation.

Further information about the activities that are prohibited in reservoir protection zones can be found in the Policy and Guidelines for Recreation in Public Drinking Water Source Areas on Crown Land. Prohibited activities

include camping, driving vehicles off gazetted roads, fishing and swimming.

It is noted that the standing committee on public administration is undertaking a review of recreation in public drinking water source areas. This committee is expected to finalise its report by 1 July 2010, for consideration by the Western Australian Government.

6.4 Land use controls

Land use controls are proposed to be imposed consistent with the priority classifications. Land in priority 1 areas is proposed to be reserved for water catchments in the MRS, whereas land in priority 2 areas will be zoned for rural water protection. These areas, together with the priority 3 areas, are proposed to be incorporated into the Shire of Kalamunda and Shire of Mundaring local planning schemes via a special control area. Planning decision-making in the Middle Helena catchment area is to be guided by the objectives and controls applicable to the water catchments reservation (priority 1), rural water protection zones (priority 2) and priority 3 areas.

The inclusion of land in the proposed priority 1 and priority 2 areas in a water catchments reservation and the rural water protection zone in the MRS, will ensure that the protection of public drinking water sources is recognised at the regional planning level and that local government schemes give effect to the regional planning strategies.

6.4.1 Water catchments reservation

A water catchments reservation is proposed for land located in areas classified as priority 1 source protection areas. The water catchments reservation will be an overlay on the underlying reserve and indicates provisions for the protection of water sources that are additional to the existing reservation or zoning provisions.

Land included in the proposed water catchments reservation in the MRS is currently reserved as state forest or parks and recreation. In addition, some land zoned rural in the MRS, which is in public ownership and is not developed, has been classified as priority 1, and is proposed for inclusion in the water catchments reservation.

The objective of the water catchments reservation is to recognise the priority 1 source protection objective, that is, to ensure that there is no degradation of the water resource and to manage these areas in accordance with the principle of risk avoidance.

Land use controls in the proposed water catchments reservation would be imposed through the MRS and local planning schemes and be guided by this strategy, as well as State Planning Policy 2.7 Public Drinking Water Source Policy and the priority 1 land uses reflected in the latest version of the Department of Water's Land Use Compatibility in Public Drinking Water Source Areas water quality protection note.

Local planning schemes, amendments, subdivision and development approvals in the water catchments reservation (and a similarly designated area in the special control area in the local town planning scheme) should:

- permit only land uses that conform with the objective for priority 1 source protection areas and are in accordance with the latest version of the Land Use Compatibility in Public Drinking Water Source Areas water quality protection note;
- preclude urban development, industrial development, rural development or further subdivision;
- work towards risk reduction of existing land uses that are considered incompatible in priority 1 source protection areas;
- incorporate best management practice into the planning, design and construction of roads, pipelines, transmission lines and other linear infrastructure that may traverse the water catchments reservation;
- incorporate drainage mechanisms that are in accordance with best management practices;
- protect threatened ecological communities, flora and fauna and

the integrity of regionally and locally important bushland vegetation;

- protect and restore waterways through negotiation with State and local government authorities;
- accommodate low impact cultural, recreational and tourism facilities that are acceptable in priority 1 source protection areas; and
- provide for the preparation of landscape and recreation site management plans that locate and manage uses to protect water quality.

A significant portion of the area identified as a water catchments reservation is proposed for incorporation into a regional or national park. Regional planning for these areas, including agreement on objectives for and the management of conservation and recreation uses, will be undertaken during the preparation of appropriate management plans. At a more local level, the preparation of a recreation concept plan for the proposed Helena Valley National Park may be needed to effectively manage recreation activities in the objectives for the priority 1 source protection area and the water catchments reservation.

Management of recreation activities in the water catchment reservation should also comply with the Department of Water's Statewide Policy No 13: Policy and Guidelines for Recreation in Public Drinking Water Source Areas on Crown Land. The policy takes a number of issues into account when determining a management approach, such as approved recreation activities, social and economic factors and environmental impacts.

6.4.2 Rural water protection zone

A rural water protection zone is proposed for land located in areas classified as priority 2 source protection areas. Land in the proposed rural water protection zone is currently zoned rural under the MRS. The proposed water catchments reservation and rural water protection zone are illustrated in figure 13.

The objective of the rural water protection zone is to recognise the priority 2 source protection objective, that is, to ensure that there is no increased risk of pollution to the water source and to manage these areas in accordance with the principle of risk minimisation.

Land use controls in the proposed rural water protection zone should be imposed through the MRS and local planning schemes, guided by this strategy and State Planning Policy 2.7 Public Drinking Water Source Policy.

Land use controls should also be guided by priority 2 uses reflected in the latest version of the Land Use Compatibility in Public Drinking Water Source Areas water quality protection note together with the agreed variations in table 7.

Table 7: Variations to the land use compatibility table for the Middle Helena catchment

Land use	Priority 2
Restaurants (including cafes and tea rooms)	Compatible with conditions^
Exhibition centre	Compatible with conditions^
Irrigated golf courses or recreational parks	Incompatible #
Public swimming pools/ aquatic centres	Incompatible #

^ Proposals for onsite wastewater disposal should be consistent with the Government Sewerage Policy: Perth Metropolitan Region and will be assessed on an individual basis to consider site characteristics and management practices proposed.

Compatible with conditions on Mundaring Recreational Oval and Golf Course (Reserve 7045), Mundaring Weir Road, Mundaring.

These variations are limited in their application to the Middle Helena catchment area. The variations recognise the desire of the community, supported by the Kalamunda and Mundaring shire councils, to promote the continued establishment of low key

tourist facilities and recreational uses in the catchment. A number of wineries are already established in the catchment and there is a desire for these establishments to provide food in addition to wine tastings. Other facilities that may be considered include cafés, tea rooms, restaurants, art galleries and museums. Such uses are currently deemed incompatible in priority 2 areas in the current Land Use Compatibility in Public Water Source Areas water quality protection note. The Department of Water has agreed to allow these uses in priority 2 areas in the Middle Helena catchment area, subject to limitations on the scale of the proposed developments and the adoption of best management practices (such as the use of grease traps and appropriate stormwater management).

Local planning schemes, amendments, subdivision and new land use development approvals in the rural water protection zone (and a similarly designated area in the special control area in the local planning scheme) should:

- permit only land uses that conform with the objective for priority 2 source protection areas and are in accordance with the latest version of the Land Use Compatibility in Public Drinking Water Source Areas water quality protection note and variations provided in this strategy;
- preclude urban and industrial development;
- incorporate lot sizes to suit local conditions that are based on land capability and suitability assessment that do not result in the creation of lots less than two hectares in areas zoned for rural living or equivalent zones, or four hectares in areas zoned rural. Alternatively, adopt the minimum lot size specified for the zone in the respective town planning scheme, if the minimum lot size is greater than two hectares in areas zoned for rural living or four hectares in areas zoned rural;
- work toward risk reduction of existing land uses that are considered incompatible in priority 2 source protection areas;
- incorporate land use and development control provisions that control clearing, except where considered central to the proposed land use or development or in a defined building envelope. Promote revegetation, particularly along waterways;
- incorporate best management practice into the planning, design and construction of roads, pipelines, transmission lines and other linear infrastructure that may traverse the rural water protection zone;
- protect landscape features, significant wetlands, regionally and locally significant remnant vegetation and other environmental values;
- incorporate best environmental management practices, (including waste management practices) compatible with the water source protection objective for proposed wineries, restaurants, tea rooms and other ancillary uses;
- protect and restore waterways through negotiation with developers and landowners about the establishment of suitable setbacks from waterways, limiting clearing, promoting revegetation to create waterway buffers or foreshore areas, and habitat and/or flow enhancement. Foreshore protection and waterway restoration advice can be obtained from the Department of Water;
- incorporate the creation of foreshore reserves and the preparation of management plans for key streamlines in subdivision proposals, where appropriate;
- require waterways and existing bushland to be described and illustrated on all proposals;
- encourage proponents to subscribe to best management practices and applicable industry guidelines and standards, such as the Environmental Management Guidelines for Vineyards (2002);
- ensure drainage mechanisms are in accordance with best management practice to reduce the outflow of sediments and nutrients from the property; and

- encourage proponents, where appropriate, to comply with local government guidelines for ancillary uses such as the Shire of Kalamunda's Interim Guidelines for Ancillary Uses in the Hills Orchard Area (1999).

6.4.3 Other areas in the Middle Helena catchment area (priority 3)

Areas in the Middle Helena catchment area that are not in the rural water protection zone or the water catchments reservation are classified as priority 3. These source protection areas are generally over land where residential, commercial and light industrial land uses occur.

The objective of these areas is to recognise the priority 3 source protection objective, that is, to manage the risk of pollution to the water source and to manage these areas through the adoption of best management practices.

These areas are not required to be subject to specific provisions in the MRS, but are proposed to be identified by a special control area in the respective town planning schemes.

Land use controls and decisions in the priority 3 area should have regard to the recommendations of this strategy and the latest version of the Land Use Compatibility in Public Drinking Water Source Areas water quality protection note. Proposals for land use change and development are unlikely to be supported where the change is to a more polluting land use (ie changing from a use which is acceptable to one that is only compatible with conditions).

Town planning schemes, amendments, subdivision and development approvals in priority 3 source protection areas (as designated in a special control area in the local planning scheme) should:

- permit only land uses that conform with the objective for priority 3 source protection areas;
- work towards risk reduction of existing land uses that are considered incompatible in priority 3 source protection areas;
- incorporate best practice water-sensitive urban design in all new development and redevelopment proposals;
- incorporate urban water management plans for new developments and redevelopment proposals where applicable;
- incorporate connection to deep sewerage, except where exemptions apply under the current government sewerage policy;
- protect landscape features, significant wetlands and regionally and locally significant vegetation and incorporate into open public space where possible;
- protect and restore waterways through negotiation with developers and landowners about the establishment of suitable setbacks from waterways, limiting clearing, promoting revegetation to create waterway buffers or foreshore areas, and habitat and/or flow enhancement. Foreshore protection and waterway restoration advice can be obtained from the Department of Water;
- incorporate the creation of foreshore reserves and the preparation of management plans for key streamlines in subdivision proposals, where appropriate;
- incorporate best practice into the planning, design and construction of roads, pipelines transmission lines and other linear infrastructure that may traverse the priority 3 area;
- incorporate specific exclusion, siting and risk prevention factors for commercial and industrial activities; and
- incorporate best management practices compatible with water source protection objectives for all industrial and commercial proposals.

6.4.4 Special control areas

Under the *Metropolitan Region Town Planning Scheme Act 1959,* town planning schemes must give effect to the provisions of the MRS. To give effect to the proposed water catchments

reservation and the rural water protection zone in the Shire of Mundaring and Shire of Kalamunda local planning schemes, it is proposed that the Middle Helena catchment area be shown as special control areas in these two local government schemes.

Special control areas deal with issues that overlap zone and reserve boundaries, where the requirements of the special control areas apply in addition to the requirements of the zone or reserve. Special control areas set out guidelines on the special considerations to be followed in considering development in the area and identify relevant specialist agencies to be consulted prior to determining applications in the special control area.

The purpose of the special control area would be to give effect to the MRS amendment(s), to identify the Middle Helena catchment area boundary (section 6.2), and to guide future land use or development that may affect the quality of public drinking water sourced from priority 1, priority 2 and priority 3 areas.

The special control area would be shown on separate scheme maps or as overlays on the Shire of Mundaring and Shire of Kalamunda zoning maps.

The proposed special control area provisions are contained in appendix 2 and are depicted in figure 15.

6.4.5 Incompatible land uses

The rights of existing approved land uses to continue are recognised. On a limited number of lots, where existing approved land uses may be incompatible with the proposed priority classification and the Department of Water's water quality protection note Land Use Compatibility in Public Drinking Water Source Areas, the land use would be able to continue as a non-conforming use under the respective local planning scheme. The Department of Water and other agencies would work with the land owners/managers to encourage the adoption of best practices to reduce the risk to water quality from incompatible land uses.

Although not recommended, landowners may seek approval to change from an existing incompatible land use to another incompatible land use, if the proposed land use presented a reduced risk to water quality. The Department of Water may also consider proposals for expansion of existing incompatible land uses if management practices were employed that reduced risks to water quality.








7.0 Implementation

Implementation of the land use and water management strategy would be through the MRS, local town planning schemes, conservation and management plans, recreation concept plans and other relevant plans and guidelines prepared by State and local government agencies. For the strategy to be implemented, amendments to the MRS and local planning schemes will require initiation.

The day to day decision-making process for subdivision and development applications, and the actions taken by State agencies and local governments in carrying out their responsibilities, will also be central to implementation of the strategy. Ongoing actions by State and local government, community groups and industry in the Middle Helena catchment area should focus on applying the recommendations of the strategy and achieving its objectives.

This strategy provides guidance for planning decision-making with regards to the protection of water quality for public drinking water supply in the Middle Helena catchment area. It does not remove the need for planning decision-making to give full consideration to other planning matters, such as heritage issues, rural land use or other social and economic considerations,

Initial and day to day decision-making processes necessary to implement the strategy are outlined in section 7.

7.1 Water catchments reservation (priority 1)

7.1.1 Metropolitan Region Scheme and local planning scheme amendments

The *Metropolitan Region Town Planning Scheme Act 1959* and the MRS provide a regional land use planning framework that, together with the *Planning and Development Act 2005,* provide the basis for land use planning controls in the Perth metropolitan region.

The process to be adopted for reserving areas classified as priority 1 for water catchments in the metropolitan region is by amendment to the MRS. The process for amendments to the MRS is provided for in the *Planning and Development Act 2005*.

The Shire of Kalamunda and Shire of Mundaring would subsequently amend their town planning schemes to achieve consistency with, and give effect to, the MRS. Consistency would be achieved by the identification of the water catchments reservation and priority 1 area in a special control area in the local government's local planning scheme (figure 13). The boundary of the special control area is proposed to be the boundary of the Middle Helena catchment area.

7.1.2 Day-to-day implementation

Development control in the water catchments reservation resides with the WAPC and, as such, local government must refer all planning applications to the commission for determination.

In determining proposals, the WAPC shall have regard to the WAPC policies and factors listed.

- State Planning Policy 2.7 Public Drinking Water Source Policy;
- the extent to which the proposal is consistent with the latest version of the Department of Water's water quality protection note Land Use Compatibility in Public Drinking Water Source Areas;
- land use objectives and controls for the water catchments reservation (section 6.4.1);
- the extent to which the proposal achieves and adheres to best environmental management practices, particularly for the storage and use of substances that could contaminate water sources;
- the extent to which the proposal adopts water-sensitive design principles and appropriate stormwater management measures;
- the extent to which the proposal may result in a loss of native vegetation that will be detrimental to maintaining water quality and ecosystem processes; and

- other relevant planning and environmental policies and factors.

The WAPC would seek advice from the Department of Water and other government agencies where land use or development has the potential to impact on water quality or is inconsistent with this strategy.

Existing land uses that are incompatible in priority 1 source protection areas would generally not be permitted to expand. These land uses would be allowed to continue at existing approved levels under non-conforming rights, as specified in local planning schemes. The Department of Water may consider proposals for expansion of existing incompatible land uses if best management practices are employed that reduce risks to water quality.

7.2 Rural water protection zone (priority 2)

7.2.1 Metropolitan Region Scheme and local planning scheme amendments

Similar to the process described above, the proposed amendment to the MRS to rezone those areas of the current rural zone designated as priority 2 areas with a rural water protection zone (figure 13), is provided for under the *Planning and Development Act 2005*.

The Shire of Kalamunda and Shire of Mundaring would subsequently amend their planning schemes to achieve consistency with, and give effect to, the changes in the MRS. Consistency would be achieved by the identification of the rural water protection zone or priority 2 area in a special control area (figure 15). The boundaries of the special control area would be the boundary of the Middle Helena catchment area.

7.2.2. Day-to-day implementation

Day to day decision-making for land use and development in priority 2 areas and rural water protection zones is generally the responsibility of the local government. All subdivision applications must be referred to the WAPC for determination. When a proponent seeks planning approval for land included in the rural water protection zone the local government and/or WAPC would have regard to the WAPC policies and factors listed.

- State Planning Policy 2.7 Public Drinking Water Source Policy;
- the extent to which the proposal is consistent with the Department of Water's water quality protection note Land Use Compatibility in Public Drinking Water Source Areas, including the variations contained in this strategy (table 7);
- the land use objectives and controls for the rural water protection zone (section 6.4.2);
- the extent to which the proposal achieves and adheres to best environmental management practices, particularly for the storage and use of substances that could contaminate water sources;
- the extent to which the proposal adopts water-sensitive design principles and appropriate stormwater management measures;
- the extent to which the proposal may result in a loss of native vegetation (in particular, riparian) that will be detrimental to maintaining water quality and ecosystem processes; and
- other relevant planning and environmental policies and factors.

The local government and WAPC should also seek advice from the Department of Water and other government agencies where the planning application has the potential to impact on water quality or other environmental values, or is inconsistent with this strategy.

Where the proposed land use or activity is identified as compatible with conditions in a priority 2 area in the latest version of Land Use Compatibility in Public Drinking Water Source Areas water quality protection note, local government should refer the application to the Department of Water, unless other referral arrangements have been agreed to between the

two parties. Any assessment of conditional uses by the Department of Water will consider the effect of best practice management and proven improvements in technology to better address potential water quality impacts. Proposals for on-site wastewater disposal should be consistent with the Government Sewerage Policy: Perth Metropolitan Region and will be assessed on an individual basis to consider site characteristics and management practices proposed.

Existing land uses that are incompatible in priority 2 source protection areas would generally not be permitted to expand. These land uses would be allowed to continue at existing approved levels under non-conforming use rights, as specified in local planning schemes. The Department of Water may consider proposals for expansion of existing incompatible land uses if best management practices were employed that reduced risks to water quality.

7.3 Other areas in the Middle Helena catchment area (priority 3)

7.3.1 Local planning scheme amendments

To assist agencies and the community in management of the Middle Helena catchment area, it is proposed that the Shire of Kalamunda and Shire of Mundaring identify those areas classified as priority 3 in a special control area in the local planning scheme (figure 15). The boundaries of the special control area would be the boundary of the Middle Helena catchment area.

7.3.2 Day-to-day implementation

Responsibilities for day-to-day decision-making for land use and development in priority 3 areas is the same as for priority 2 areas. When a proponent seeks planning approval for land use and development in a priority 3 area, the local government and/or WAPC would have regard to the WAPC policies and factors listed.

- State Planning Policy 2.7 Public Drinking Water Source Policy;
- the extent to which the proposal is consistent with the latest version of the Department of Water's water quality protection note Land Use Compatibility in Public Drinking Water Source Areas, including the variations contained in this strategy (table 7);
- the land use objectives and controls other areas in the Middle Helena catchment area priority 3 (section 6.4.3);
- the extent to which the proposal achieves and adheres to best environmental management practices, particularly for the storage and use of substances that could contaminate water sources;
- the extent to which the proposal adopts water-sensitive design principles and appropriate stormwater management measures;
- the extent to which the proposal may result in a loss of native vegetation (particularly riparian) that will be detrimental to maintaining water quality and ecosystem processes; and
- other relevant planning and environmental policies and factors.

Local government and the WAPC should seek advice from the Department of Water and other government agencies where the application has the potential to impact on water quality or is inconsistent with this strategy. Where the proposed land use or activity is identified as compatible with conditions in a priority 3 area in the latest version of Land Use Compatibility in Public Drinking Water Source Areas water quality protection note, local government should refer the application to the Department of Water, unless other referral arrangements have been agreed to between the two parties. Any assessment of conditional uses by the Department of Water will consider the effect of best practice management and proven improvements in technology to better address potential water quality impacts. Proposals for on-site wastewater disposal should be

consistent with the Government Sewerage Policy: Perth Metropolitan Region and will be assessed on an individual basis to consider site characteristics and management practices proposed.

Existing land uses that are incompatible in priority 3 source protection areas would generally not be permitted to expand. These land uses would be allowed to continue at existing approved levels under non-conforming rights, as specified in local town planning schemes. The Department of Water may consider proposals for expansion of existing incompatible land uses if best management practices were employed that reduced risks to water quality.

7.4 Other implementation avenues

Implementation of the Middle Helena land use and water management strategy is primarily through the planning system and water quality protection mechanisms. The protection of broader ecological and environmental values of importance in the catchment also requires actions outside the planning system. Important linkages with other agencies, community groups and industry groups that are active in the catchment should be supported for the effective implementation of this strategy and other catchment management efforts. Such initiatives include the implementation of the Swan Mundaring community catchment project Integrated Catchment Management Plan, the Swan Region: A Natural Resource Management Strategy and the Eastern Hills Catchment Management Project.

Activities that would support the implementation of this strategy and broader catchment management objectives are briefly listed in table 8. The table recognises existing activities and suggests a number of initiatives that would assist in improving water quality protection. The agencies, community groups or industry groups that could assist with undertaking these activities are noted.

Table 8: Additional activities to aid implementation of the Middle Helena Land Use and Water Management Strategy

Activity	Implementation agents
Rationalise paths, tracks and firebreaks through bush reserves and encourage low impact multiple use.	Department of Environment and Conservation, local government, Water Corporation in consultation with the Helena River Catchment Group, Fire and Emergency Services, Volunteer Fire Services, user groups.
Identify and manage regionally and locally significant remnant vegetarian, including riparian.	Department of Environment and Conservation, Local Government Association's Perth Biodiversity Project, Helena River Catchment Group, Perth Region NRM, Eastern Hills Catchment Management Project, local catchment and friends groups.
Protect and manage remnant vegetation in road reserves.	Main Roads Western Australia, local government.
Utilities with linear infrastructure to adhere to best management practices for the planning, design and ongoing maintenance of facilities in the catchment.	Western Power, Water Corporation, Alinta Gas, Telstra, Main Roads Western Australia, local government, Department of Water.
Develop best practice environmental guidelines/ code of practice for fruit and nut growers.	Western Australia Fruit Growers Association, Department of Agriculture and Food, Department of Water, Department of Environment and Conservation.
Encourage adoption of the environmental management guidelines for grape growers.	Perth Hills Vignerons Association, Department of Agriculture and Food, Department of Water, Department of Environment and Conservation, local government, Eastern Hills Catchment Management Project.
Develop and adopt environmental management guidelines for poultry farms.	Poultry industry representatives, Department of Agriculture and Food, Department of Water, Department of Environmental Protection, local government, Eastern Hills Catchment Management Project.
Encourage adoption of the environmental guidelines for horse activities.	Local pony clubs and stables, Department of Agriculture, Department of Water, local government, Eastern Hills Catchment Management Project.
Encourage adoption of the code of practice for environmentally sustainable vegetable and potato production in Western Australia.	Western Australian Vegetable and Potato Growers Associations, Department of Agriculture and Food, Department of Water, Department of Environmental and Conservation, local government, Eastern Hills Catchment Management Project.
Encourage adoption of the environmental management best practice guidelines for the nursery industry and the nurseries and garden centres water quality protection note.	Nursery and Garden Industry of Western Australia, Department of Agriculture and Food, Department of Water, local government, Eastern Hills Catchment Management Project.

Activity	Implementation agents
Develop and implement best practice management plans for irrigated golf courses and recreation parks in accordance with environmental guidelines for turf and grassed areas.	Local government and/or facility managers.
Prepare the Darling Range Regional Park management plan.	Department of Environment and Conservation in consultation with the community and relevant government agencies.
Prepare a recreation concept plan for the proposed Helena Valley National Park that includes detailed consideration of activities that pose a risk to water quality, such as trail biking, four-wheel driving, swimming, marroning, mountain biking, horse-riding and hiking.	Department of Environment and Conservation in consultation with the Department of Water, local government, Water Corporation, and representatives of four-wheel drive, trail bike, pony and other recreational clubs.
Preclude horse riding and motorised recreation (four-wheel drive vehicles and trail bikes) except on designated trails, in designated areas or on gazetted roads.	Department of Environment and Conservation, Water Corporation, local government, Department of Water, Recreation clubs.
Develop a code of conduct for trail bike riders on designated trails and in designated areas.	Trail bike clubs, Department of Environment and Conservation, Department of Sport and Recreation.
Prepare river action plans and/or sub-catchment management plans consistent with the objectives of the strategy, the Integrated Catchment Management Plan and the Helena River catchment Group's vision and objectives for second and third order waterways.	Local catchment and friends groups, assisted by the Department of Water, Eastern Metropolitan Regional Council, Perth Region NRM.
Gradually re-establish riparian corridors/ greenways along waterways by establishing adequate waterway buffer widths, protecting existing vegetation (eg through fencing to manage stock access) and, where appropriate, restoring waterways through revegetation and managing weeds.	Department of Environment and Conservation, local catchment and friends groups, local government, landowners, Eastern Metropolitan Regional Council. Funding and/or technical assistance available from Natural Heritage Trust, Swan Catchment Centre, Perth Region NRM and Department of Water.
Encourage the replacement of wastewater treatment systems not meeting Department of Health guidelines and those in 100 metres of waterways.	Local government, Department of Health, landowners.
Maintain (and replace where necessary) existing stormwater drainage to best practice standards. All new stormwater drains to follow best practice water-sensitive urban design guidelines.	Main Roads Western Australia, local government, Department of Water.
Determine environmental water provisions for the Helena River below the Mundaring Weir and the pumpback dam as a priority.	Department of Water, Water Corporation.

Activity	Implementation agents
Ensure that emergency response management strategies for the Middle Helena catchment area are adequate to deal with potential accidents that could detrimentally affect surface water sources.	Fire and Emergency Services, Local Government, Main Roads Western Australia, Volunteer Fire Serves, Department of Water, Water Corporation, Department of Environment and Conservation.
Erect signage and implement an education program to ensure visitors are aware of their water quality protection responsibilities while in the Middle Helena catchment area.	Department of Water, Water Corporation, Department of Education
Monitor and police recreational activities in the designated reservoir protection zone for the Helena Pumpback dam.	Water Corporation, Department of Water.
Vest a consolidated parcel of land that encompasses the Helena Pumpback Dam and related infrastructure with the Water Corporation, in accordance with the *Land Administration Act 1997*.	Department of Land Information, Water Corporation.
Close road reserves in the designated reservoir protection zone in accordance with the *Land Administration Act 1997*.	Department of Land Information, WAPC.
Monitor/police illegal activities in the Middle Helena catchment area, such as rubbish dumping, vandalism, wildflower picking, arson, exercising animals except in designated areas, unauthorised vehicle access.	Water Corporation, Department of Environment and Conservation, Department of Water, local government
Encourage landowners with existing dams on watercourses to bypass summer flows to sustain ecological and social values.	Landowners, Department of Water.

A recommendation of this strategy (section 8) is for the Department of Planning and Department of Water to liaise with agencies and community groups to pursue the implementation of activities outlined in table 8.








8.0 Recommendations

The recommendations arising from the Middle Helena land use and water management strategy, and the agencies responsible for their implementation are:

- Amend the MRS to place a water catchments reservation over areas designated as priority 1 in the gazetted boundary of the Middle Helena catchment area (Department of Planning, WAPC).
- Amend the MRS to place a rural water protection zone over areas in the gazetted boundary of the Middle Helena catchment area that are designated as priority 2 areas (Department of Planning, WAPC).
- Establish special control areas in the Kalamunda local planning scheme and Mundaring local planning scheme which would illustrate the Middle Helena catchment area boundary, give effect to the MRS amendments as well as identify areas designated as priority 3 (Shire of Kalamunda, Shire of Mundaring, WAPC).
- Refer all planning applications in the water catchments reservation (priority 1) to the WAPC for determination (Shire of Kalamunda, Shire of Mundaring, or proponent).
- Refer all planning applications that are listed as compatible with conditions in priority 2 and priority 3 areas in the Department of Water's water quality protection note Land Use Compatibility in Public Drinking Water Source Areas, including the variations contained in this strategy (table 7), to the Department of Water for advice and recommendations prior to determination, unless other referral arrangements have been agreed with the Department of Water (Shire of Kalamunda, Shire of Mundaring).
- Refer all planning applications that are not consistent with this strategy, or with State Planning Policy 2.7 Public Drinking Water Source Policy, to the WAPC for advice and recommendation prior to determination (Shire of Kalamunda, Shire of Mundaring).
- De proclaim the Lower Helena Pipehead Dam catchment area and gazette the Middle Helena catchment area under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* (Department of Water).
- Delineate a reservoir protection zone for the Helena Pumpback Dam and proclaim the zone following amendment of the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* by-laws (Department of Water).
- Ensure that the objectives and recommendations of the Department of Environment and Conservation's management planning program for national and regional parks considers the protection of public drinking water sources and is consistent with the objectives of this strategy, particularly when developing plans for access, recreation and other activities and land uses in park boundaries (Department of Environment and Conservation).
- Liaise with agencies and community groups to pursue the implementation of activities outlined in section 7.4 (Department of Planning, and Department of Water).
- Review the land use and water management strategy five years after the release of the final strategy (Department of Planning).

9.0 References and acronyms

9.1 References

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9.2 Acronyms and abbreviations

MRS	Metropolitan Region Scheme
mg/L	milligrams per litre
mS/m	micro Siemens per metre
NTU	nephelometric turbidity unit
NRM	Natural Resource Management
TCU	true colour unit
WAPC	Western Australian Planning Commission








10.0 Appendices

Appendix 1: Principal land use and water management agencies

In Western Australia, land use and water quality is managed by a number of agencies working in partnership with the community and industry. The three levels of government (Commonwealth, State and local government) have different roles as specified in legislation, policies and controls. Industry and the community, especially landowners, recognise the value of maintaining these resources and are in the forefront of land use and water quality management.

Effective land use and water quality management requires the efficient coordination of the shared government, community and industry responsibilities. A number of the processes are complementary and an important function of this strategy will be to highlight these areas and to recommend possible solutions for any potential areas of conflict.

The roles of agencies with primary responsibility for land use management and the protection of public drinking water sources in the Middle Helena catchment area are outlined, as are the roles and functions of key community and industry groups.

Key planning policies and controls are provided by the following agencies. Information and copies of the relevant documents are available on the various agency websites.

Western Australian Planning Commission and Department of Planning

Western Australia's land use planning system is managed by the Minister for Planning, the WAPC, and local government. The WAPC is responsible for undertaking the amendment to and management of the Perth MRS and assesses all subdivision and some development applications. The Department of Planning, on behalf of the WAPC, is responsible for preparing the land use and water management strategy for the Middle Helena catchment area.

Key references and resources of the Department of Planning include the Perth Region Scheme, state planning policies, development control policies, strategic plans and structure plans. These are located on the Department of Planning website (www.planning.wa.gov.au) under publications.

Department of Water

The Department of Water administers a number of acts to ensure that the State's water resources are managed to support sustainable development and conservation of the environment for the long-term benefit of the community. The three broad areas of service delivered by the Department of Water are:

- water information investigating the location, quality and quantity of water resources to provide the information and understanding needed for management;
- water allocation ensuring water is allocated fairly and used efficiently to maintain environmental values and support sustainable development;
- water protection and enhancement protecting wetlands, waterways and water supplies and restoring degraded environments through land use planning and management.

The Department of Water employs a number of mechanisms to ensure public drinking water sources are protected from potential contamination. These include developing water source protection plans, incorporating water source protection into land use planning, developing policy and land use guideline documents, and using legislation and by-laws to prevent pollution.

Key references and resources of the Department of Water include policies, guidelines, water quality protection notes, water notes, the River Restoration Manual, the Stormwater Management Manual for Western Australia, and water law reform brochures. These are located on the Department of Water website (www.water.wa.gov.au) under Waterways health: Drinking water and Waterways health: Water quality.

Environmental Protection Authority

The Environmental Protection Authority is an independent statutory authority and is the Government's primary environmental advisor. The authority's objectives are to protect the environment and to prevent, control and abate pollution. This is achieved mainly through the development of policies and assessment of proposals that may have a significant impact on the environment.

The Office of the Environmental Protection Authority supports the Environmental Protection Authority in carrying out its responsibilities in regard to environmental impact assessments (under part IV of the act) and the formulation of environmental protection policies (under part III of the act).

Key references and resources of the Environmental Protection Authority include the *Environmental Protection Act 1986*, environmental planning policies, and waste management policies and guidelines. These references are located on the Environmental Protection Authority website (www.epa.wa.gov.au).

Swan River Trust

The Swan River Trust, under the *Swan River Trust Act 1988*, protects and manages the Swan River Trust Management Area. The management area extends up the Helena River to the Helena Pumpback Dam. The Swan River Trust therefore has an interest in land use activities in the Middle Helena catchment area as they impact on the quality and quantity of water in the Helena River.

Key references and resources of the Swan River Trust include the *Swan and Canning Rivers Management Act 2006*, the Swan Canning Water Quality Improvement Plan and the Healthy Rivers Action Plan. These references are located on the Swan River Trust website (www.swanrivertrust.wa.gov.au).

Perth Region NRM

Perth Region NRM, formerly the Swan Catchment Council, coordinates integrated catchment management activities in the Swan Region. It is a community chaired and led committee with management responsibility for implementing the Swan Avon Integrated Catchment Management Program in the Swan Region. The Swan Region incorporates all the Eastern Hills catchments, including the Middle Helena catchment area. Perth Region NRM has prepared a Natural Resource Management Strategy (Swan Catchment Council, 2002) for the area that aims to conserve natural diversity, ensure acceptable water quantity and quality, improve land condition, improve management processes and achieve cultural change.

Key Perth Region NRM documents are located on their website: www.perthregionnrm.com.

Department of Environment and Conservation

The Department of Environment and Conservation has the lead responsibility under the *Conservation and Land Management Act 1984* for conserving the State's native plants, animals and natural ecosystems, and many of its unique landscapes. The department manages national parks, conservation parks, regional parks, State forests and timber reserves, and nature reserves.

The department provides a wide range of services, including:

- conservation of ecosystems and species;
- management of native plants and animals;
- production and implementation of management plans;

- protection of wildlife by preventing illegal taking of native plants and animals;
- protection of native plants and animals from disease, feral predators and pests;
- management of national parks for conservation and recreation;
- management of nature reserves for conservation; and
- management of State forests for tourism, recreation, water catchment protection, timber production and conservation of biodiversity values.

The parks and reserves managed by the Department of Environment and Conservation are sometimes located in public drinking water source areas. Where this occurs, the department is required to liaise with the Department of Water and the Minister for Water when preparing management plans for these parks and reserves. The Department of Environment and Conservation does not have a statutory responsibility for water quality management.

The Department of Environmental and Conservation is responsible for administering the *Environmental Protection Act 1986*. In particular, part V of the act in order to prevent pollution, includes the registration, works approval and licensing of prescribed premises that discharge waste to the environment.

The Department of Environment and Conservation gives effect to water quality management through its pollution control provisions and investigation processes.

Key documents and policies of the Department of Environment and Conservation are located on their website: www.dec.wa.gov.au.

Department of Health

The Department of Health by means of the *Health Act 1911*, is responsible for promoting public health, healthy surroundings and healthy lifestyles and providing health services. In particular, the department is responsible for administering statutory processes to protect and maintain safe drinking water.

Key documents and policies of the Department of Health are located on their website: www.health.wa.gov.au.

Department of Agriculture and Food

The Department of Agriculture and Food assists the State's agricultural, food and fibre industries to be sustainable and profitable. One of its key objectives is the sustainable management of natural resources affected by agriculture. In fulfilling this role, the department advises farmers and landholders on farm management and sustainability issues. The department is committed to establishing environmental management systems or best management practices for producing agricultural products under environmentally sustainable conditions for broadacre and intensive industry.

Key documents and policies of the Department of Agriculture and Food, including legislation, guidelines and codes of practice are located on their website: www.agric.wa.gov.au.

Water Corporation

The Water Corporation is the major water service provider in Western Australia and is responsible for the sustainable management of drinking water and wastewater services (domestic and industrial) in Western Australia. The corporation strives to provide a reliable and safe drinking water supply that is of a consistent aesthetic appearance. While the management of drinking water source catchments

is the legislative responsibility of the Department of Water, the day-to-day management of the metropolitan and some country catchments is delegated to the Water Corporation.

The corporation believes that the most important barrier to contamination of public water supplies is the protection of catchments for both surface and underground sources. It invests in catchment protection, monitors water quality, identifies and assesses potential risks to water quality, patrols for unauthorised activities, manages land use activities and enforces by-laws.

Key documents and guidelines of the Water Corporation are located on their website: www.watercorporation.com.au.

Local government

Local government's responsibilities are defined under the *Local Government Act 1995* and the *Town Planning and Development Act 1928*. It is the responsibility of local governments to ensure appropriate land use, development and planning controls are administered through planning approvals in relation to their town planning schemes. In addition to statutory controls, local governments use a range of policies, strategies, guidelines and codes of practice to encourage sustainable land uses that explicitly and implicitly protect water quality.

Key policies and guidelines, including local planning schemes and local planning policies can be found on the websites of the shires of Kalamunda and Mundaring: www.kalamunda.wa.gov.au and www.mundaring.wa.gov.au.

Eastern Metropolitan Regional Council

The Eastern Metropolitan Regional Council provides a formal structure to facilitate the development and implementation of regional strategies and the provision of services and facilities for the benefit of the cities of Belmont, Bayswater and Swan, the Town of Bassendean and the shires of Mundaring and Kalamunda. A specific purpose of the council is to provide regional environmental services. The council is involved in a range of natural resource management projects, including the Eastern Hills Catchment Management Project. The project is seen as a vehicle for integrated catchment management in the Helena River catchment and the other catchments it serves. The Eastern Hills Catchment Management Project currently provides support to the Helena River Catchment Group for catchment management activities, strategic planning, on ground actions and education and training.

Appendix 2: Proposed scheme provisions for special control area

The following provisions are recommended to be included in the local planning schemes of the shires of Kalamunda and Mundaring for the special control area over the Middle Helena catchment area.

#.# Middle Helena catchment area

#.#.1 The Middle Helena catchment area is the catchment for that section of the Helena River from the Mundaring Weir downstream to the Helena Pumpback Dam (also known as the Lower Helena Diversion Dam). The portion of the Middle Helena catchment area that falls in the Shire of XXX is shown on the scheme map. The area is subject to the Middle Helena Catchment Area Land Use and Water Management Strategy, which identifies three priority classification areas (priority 1, priority 2 and priority 3). These priority classifications are also shown on the scheme map.

#.#.2 The purpose of this special control area is to implement the Middle Helena Catchment Area Land Use and Water Management Strategy. The objectives of this special control area are to:

(a) ensure that the long-term quality of the Middle Helena catchment as a public drinking water source is not compromised;

(b) reduce potential nutrient, contaminant and sediment export into the Helena River; and

(c) provide a planning framework for land use decision-making for landowners and local and state government.

#.#.3 All development in the special control area requiring planning approval shall be subject to the shire's discretion, notwithstanding that the use may be designated a 'permitted' use under the scheme.

#.#.4 The shire may refer all applications for planning approval to the Department of Water for comment where that application is for a use which is identified as 'compatible with conditions' or 'incompatible' in the relevant priority classification on the Department of Water's land use compatibility table in the water quality protection note Land Use Compatibility in Public Drinking Water Source Areas, incorporating the following variations to that table, which are specific to the Middle Helena catchment area:

(a) in the priority 2 area, the land use 'restaurants (including cafes and tea rooms)' shall be compatible with conditions;

(b) in the priority 2 area, the land use 'exhibition centre' shall be compatible with conditions; and

(c) in the land containing the Mundaring recreation oval and golf course (Reserve 7045), Mundaring Weir Road, Mundaring, the land uses 'irrigated golf courses or recreational parks' and 'public swimming pools/aquatic centres' shall be compatible with conditions.

#.#.5 Except where a proposed use is for extension or replacement of a non-conforming use, which is non-conforming due to this clause, a use which is identified as incompatible in the relevant priority classification on the Department of Water's land use compatibility table in the water quality protection note Land Use Compatibility in Public Drinking Water Source Areas and incorporating the variations to that table specific to the Middle Helena catchment area, shall not be approved.

#.#.6 In determining or making recommendation on an application for planning approval in the special control area, or making recommendation on an application for subdivision in the special control area, the shire shall have particular regard to:

(a) any advice received from the Department of Water;

(b) the Department of Water's land use compatibility table in the water quality protection note Land Use Compatibility in Public Drinking Water Source Areas, incorporating the variations to that table specific to the Middle Helena catchment area (clause #.#.4);

(c) the recommendations of the Middle Helena Catchment Area Land Use and Water Management Strategy, particularly those specific to the relevant priority classification area;

(d) the requirements of State Planning Policy 2.7 Public Drinking Water Source Policy;

(e) the potential impact of the proposal on the quality of the water resource; and

(f) the drainage characteristics of the land, including surface and groundwater flow, and the adequacy of proposed measures to meet water quality targets and manage run-off and drainage.

#.#.7 The shire may refuse any application for planning approval or may impose appropriate conditions on any planning approval so as to protect the water resource.

Figures

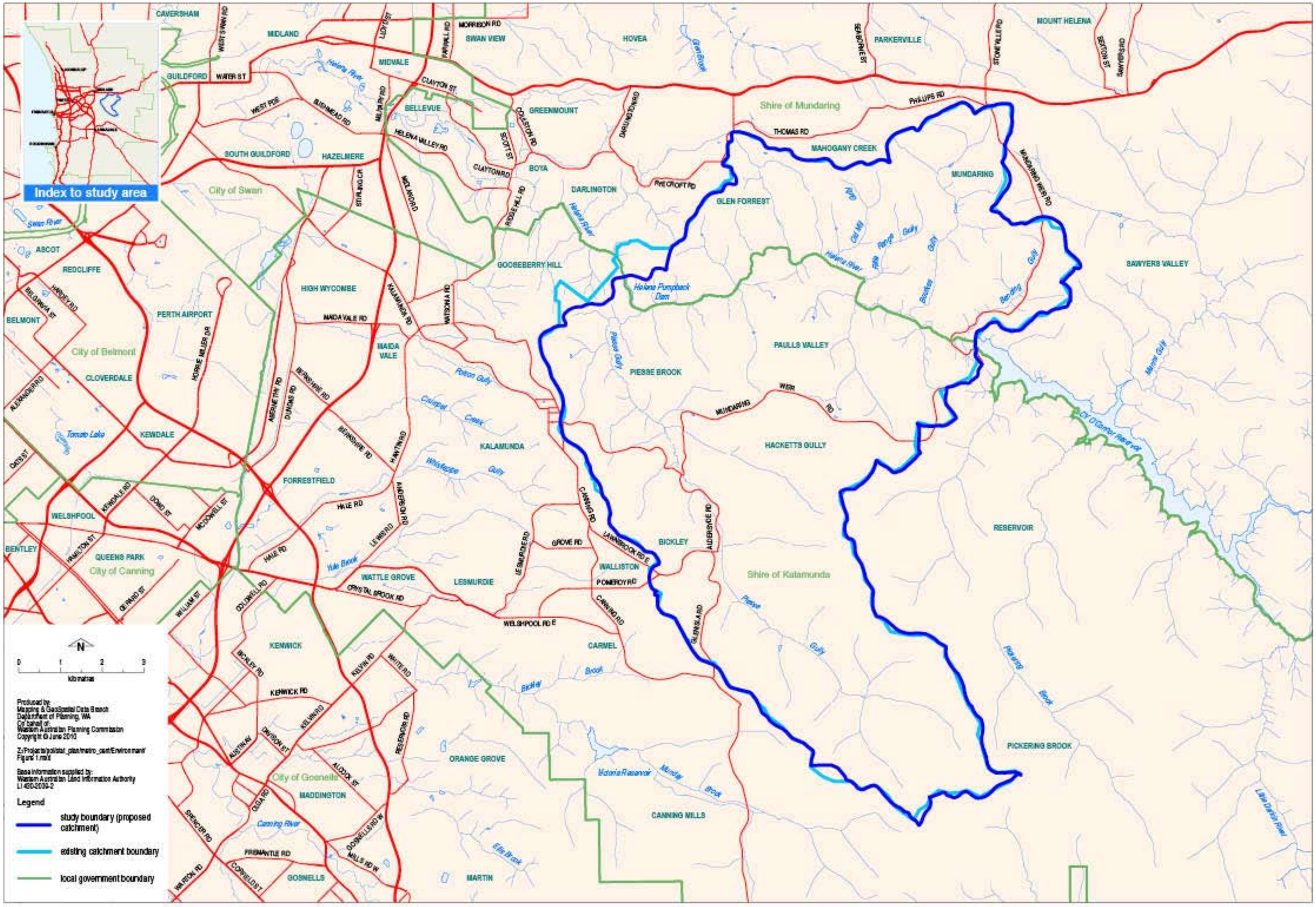
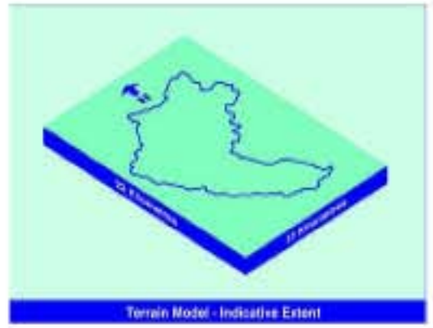
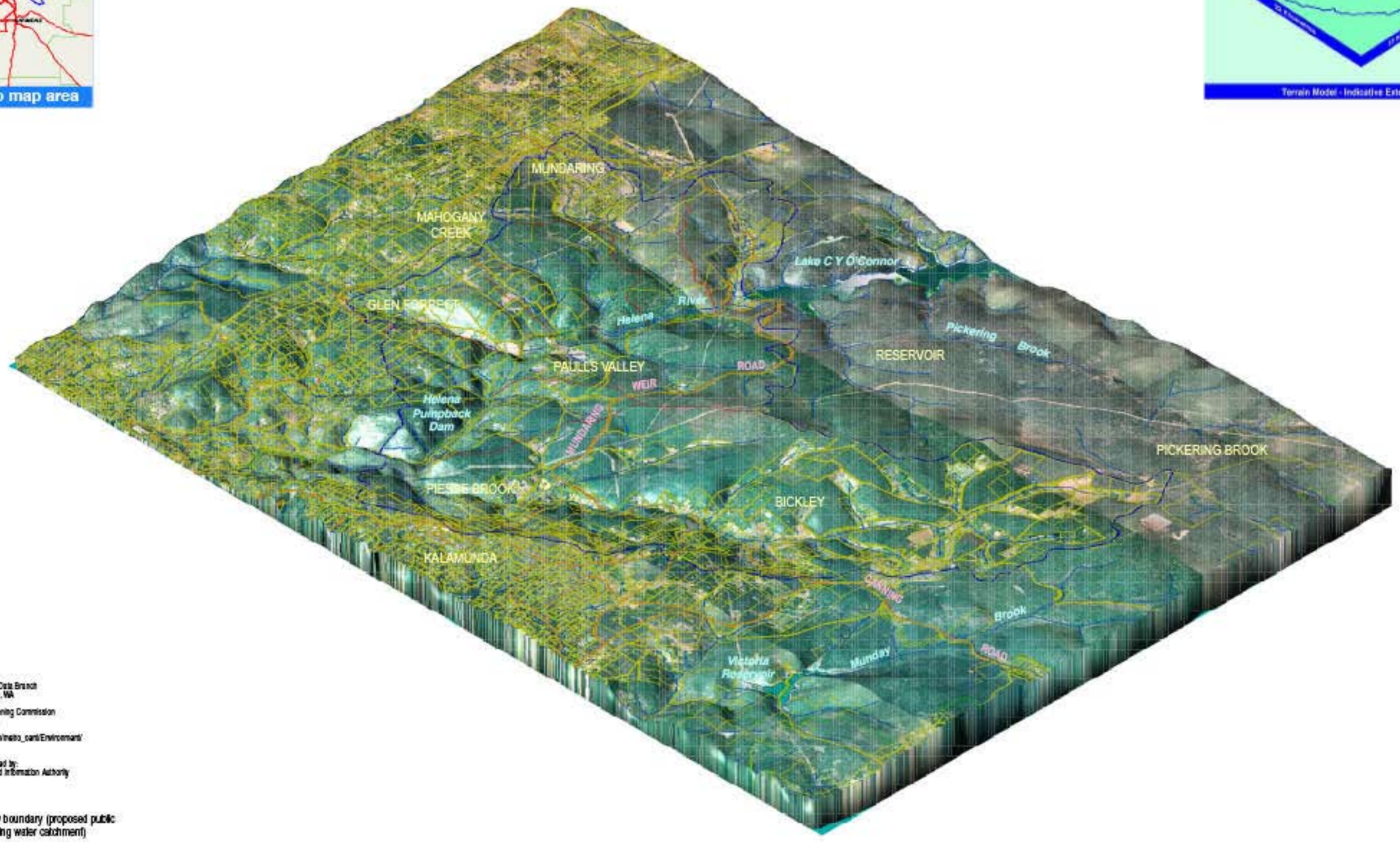


Figure 1: Location of study area





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Mapping & GeoSpatial Data Branch
Department of Planning, WA
On behalf of:
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Base information supplied by:
Western Australian Land Information Authority
LI 433-2009-2

Legend

- study boundary (proposed public drinking water catchment)
- cadastral boundary
- road
- river/creek

Figure 2: Middle Helena catchment area: terrain model

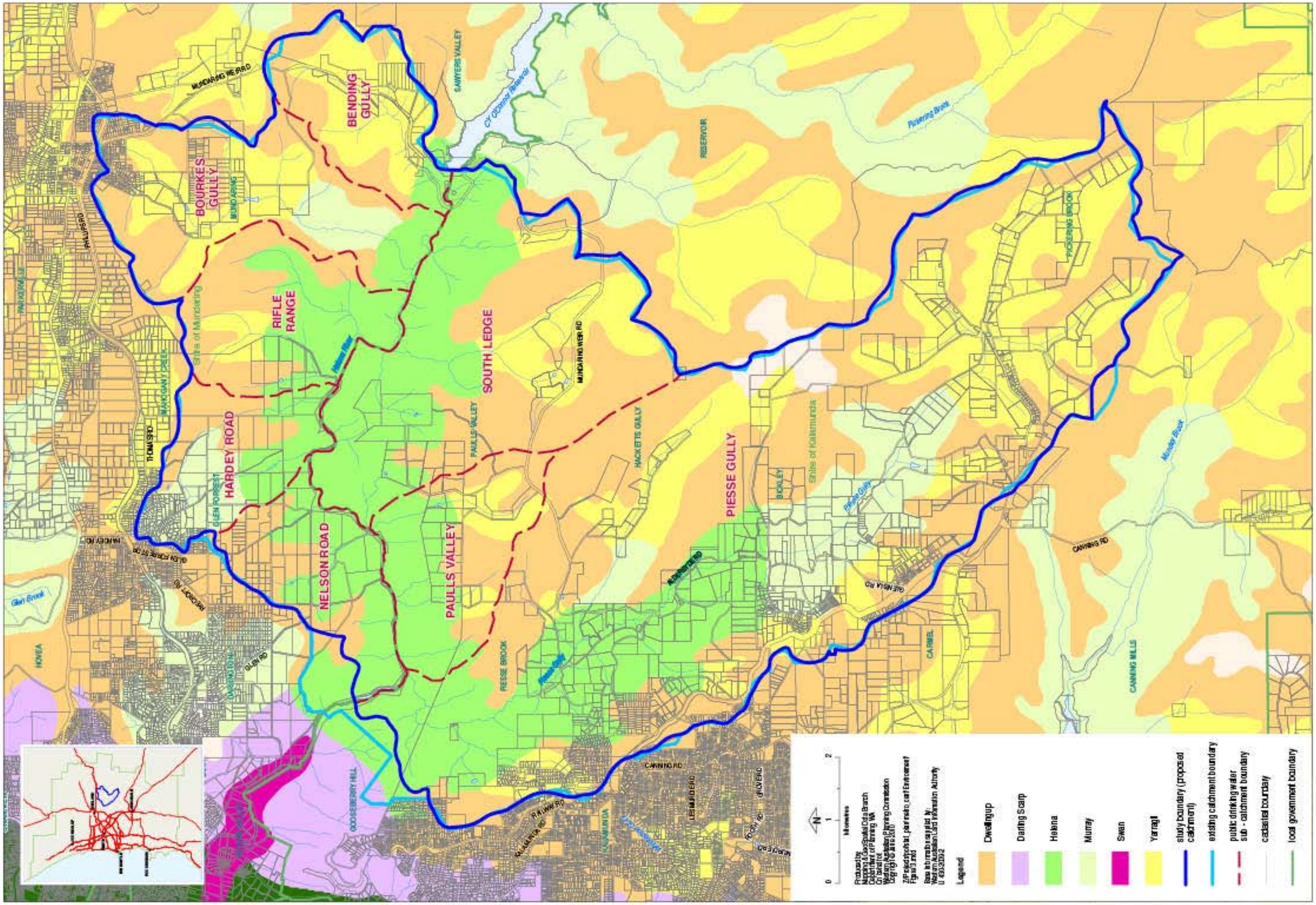


Figure 3: Landform units

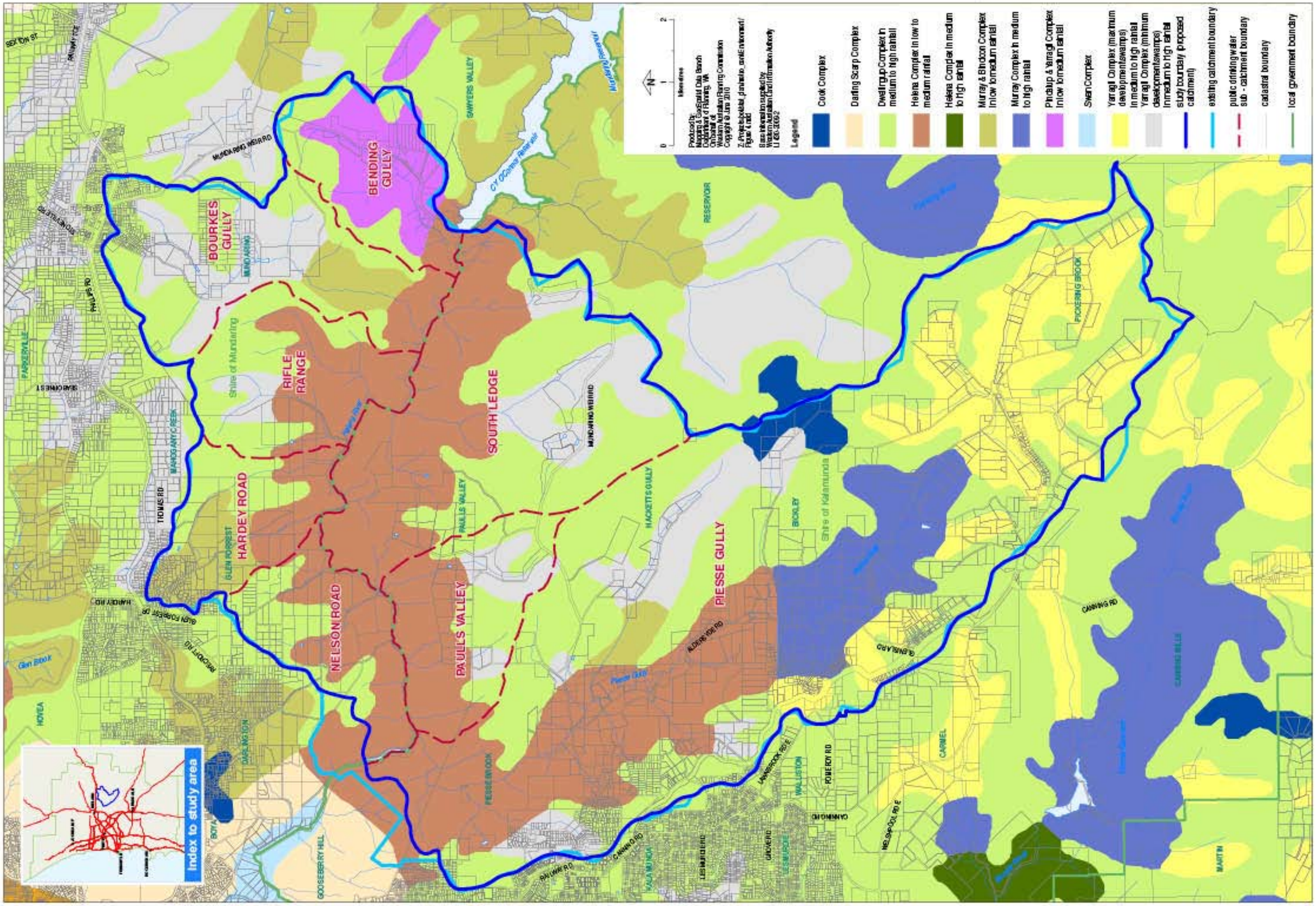
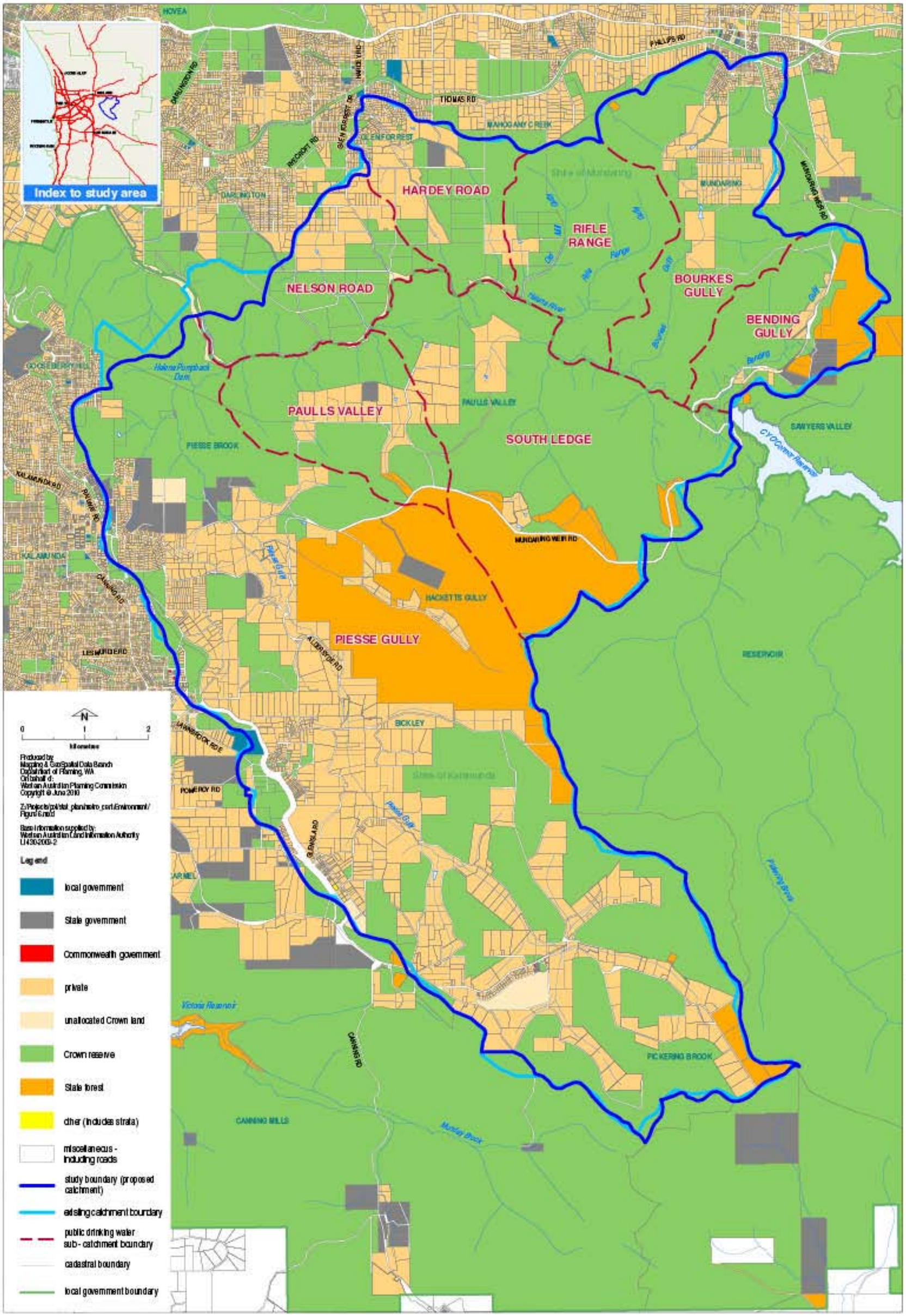


Figure 4: Vegetation complexes

Figure 5: Middle Helena catchment area and sub-catchments, as proclaimed under the *Rights in Water and Irrigation Act 1914*

Figure 6: Land tenure



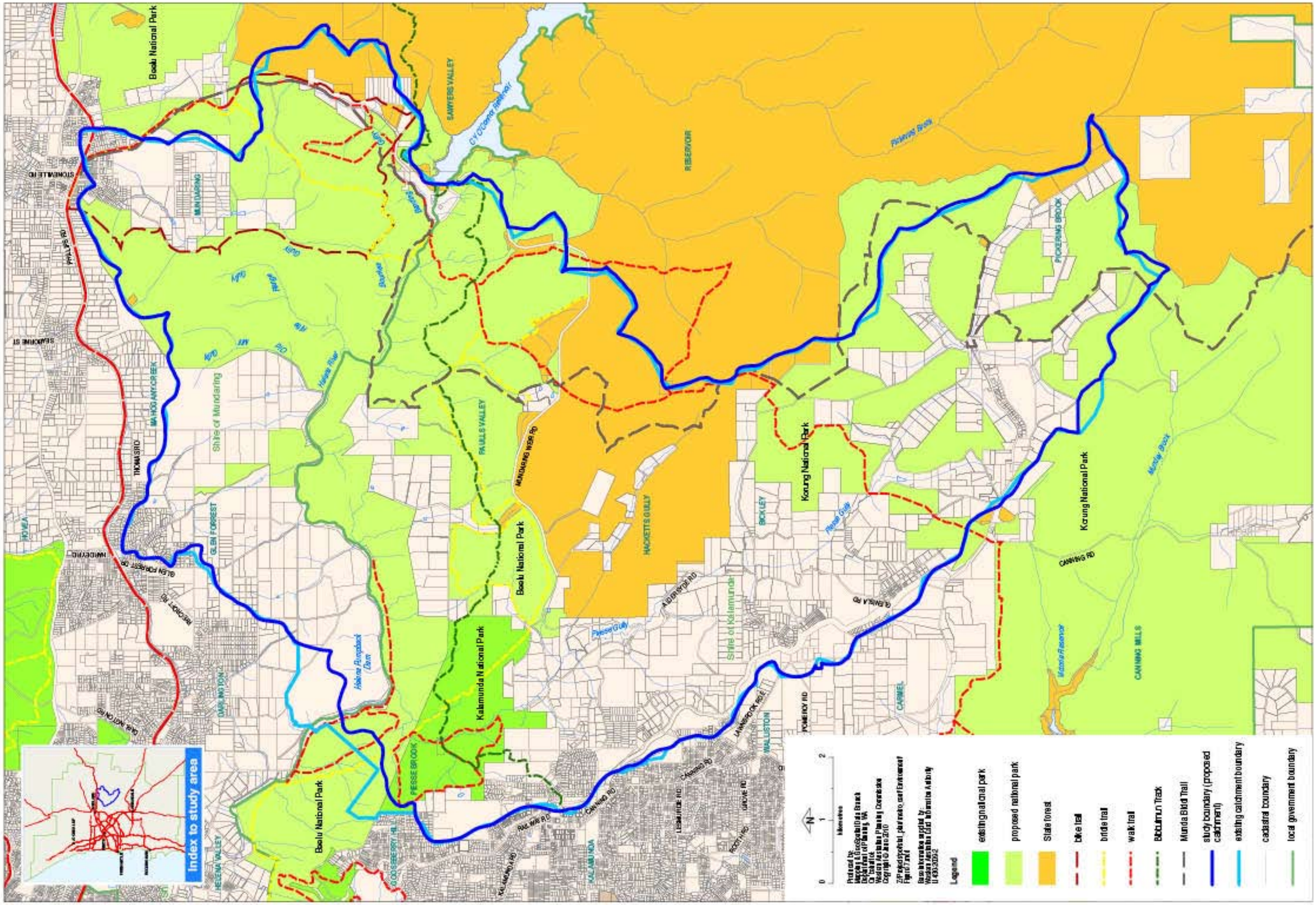
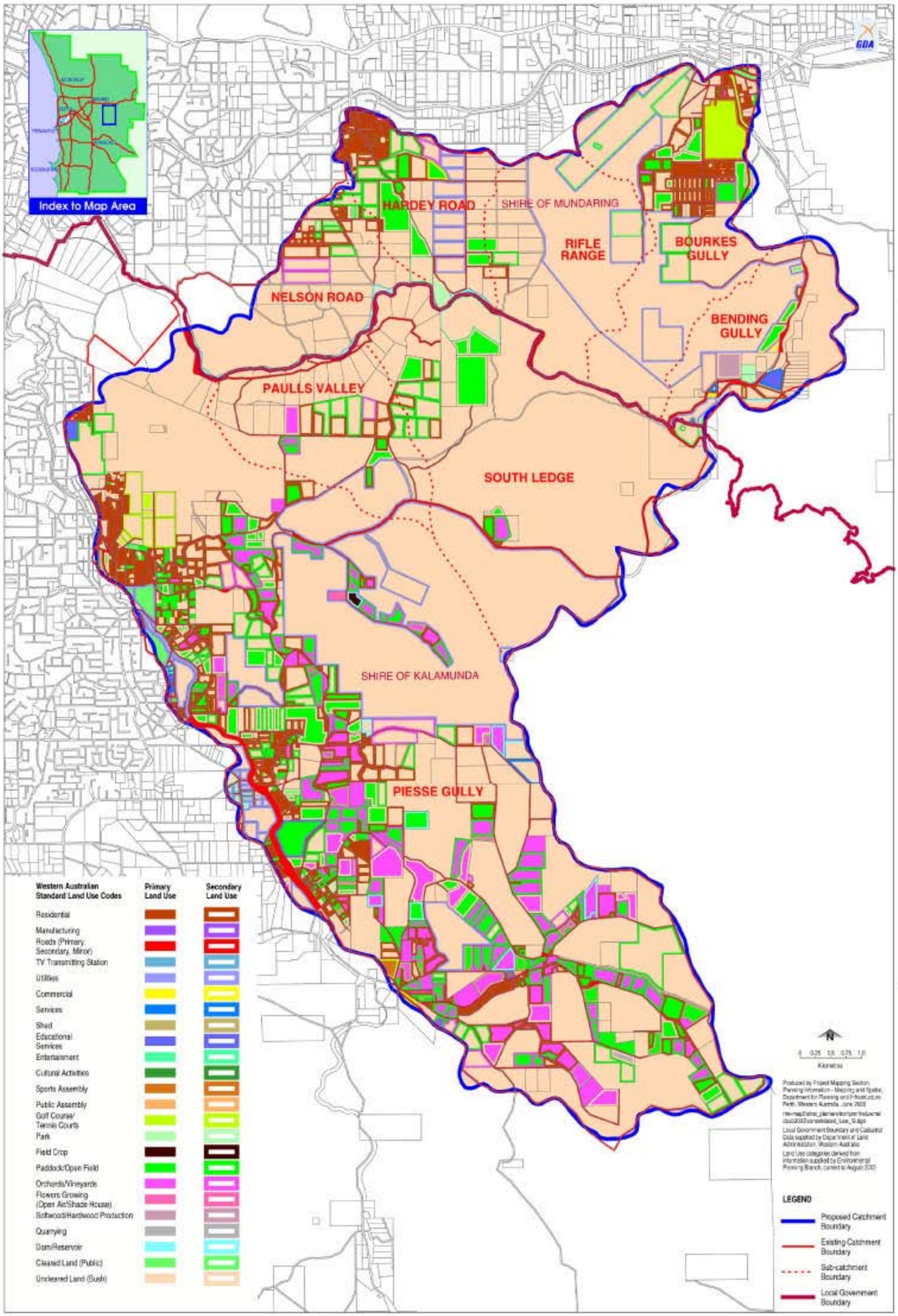


Figure 7: Proposed and existing national and regional parks

Figure 8: Land use



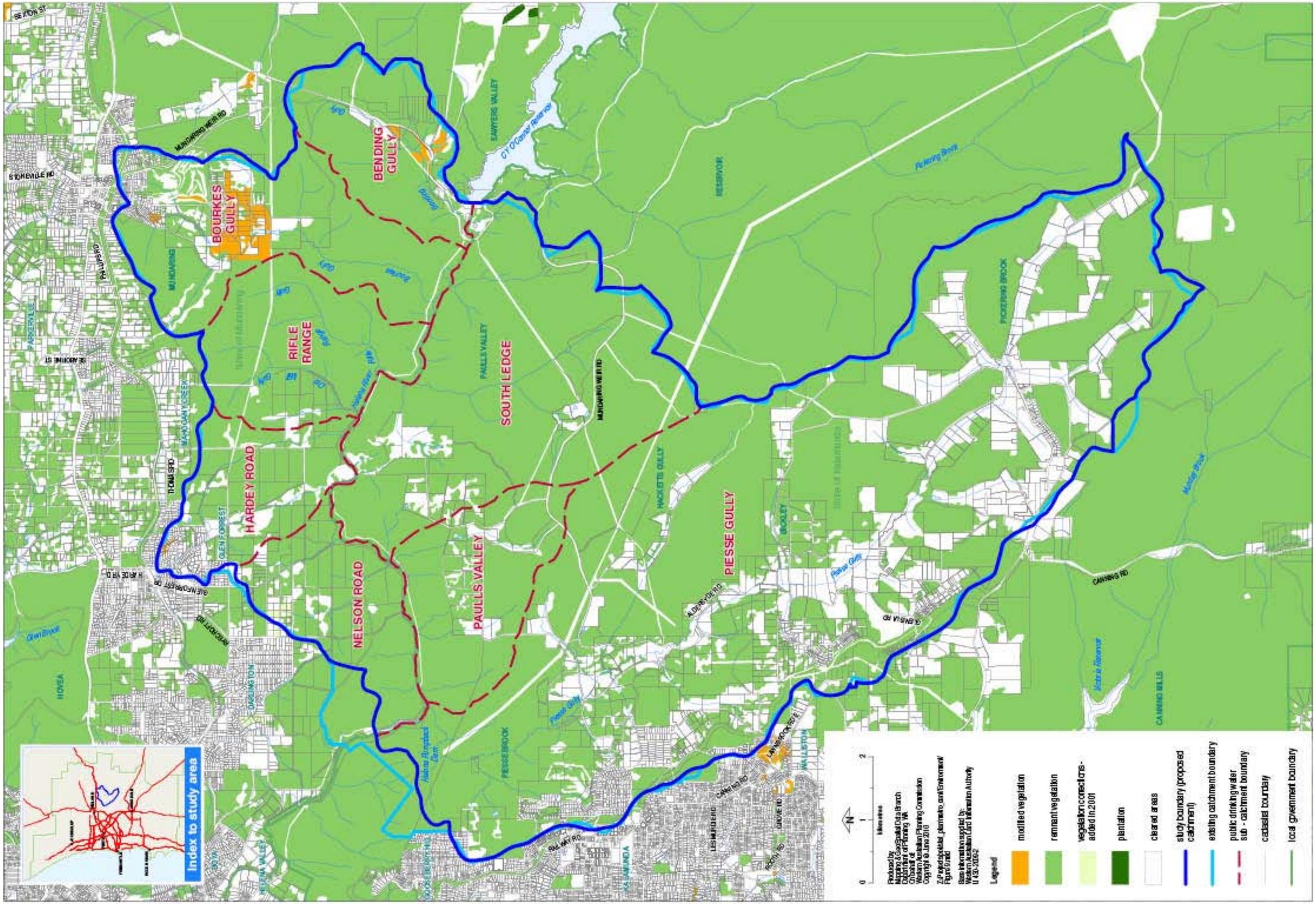


Figure 9: Vegetation

Figure 10: Metropolitan Region Scheme

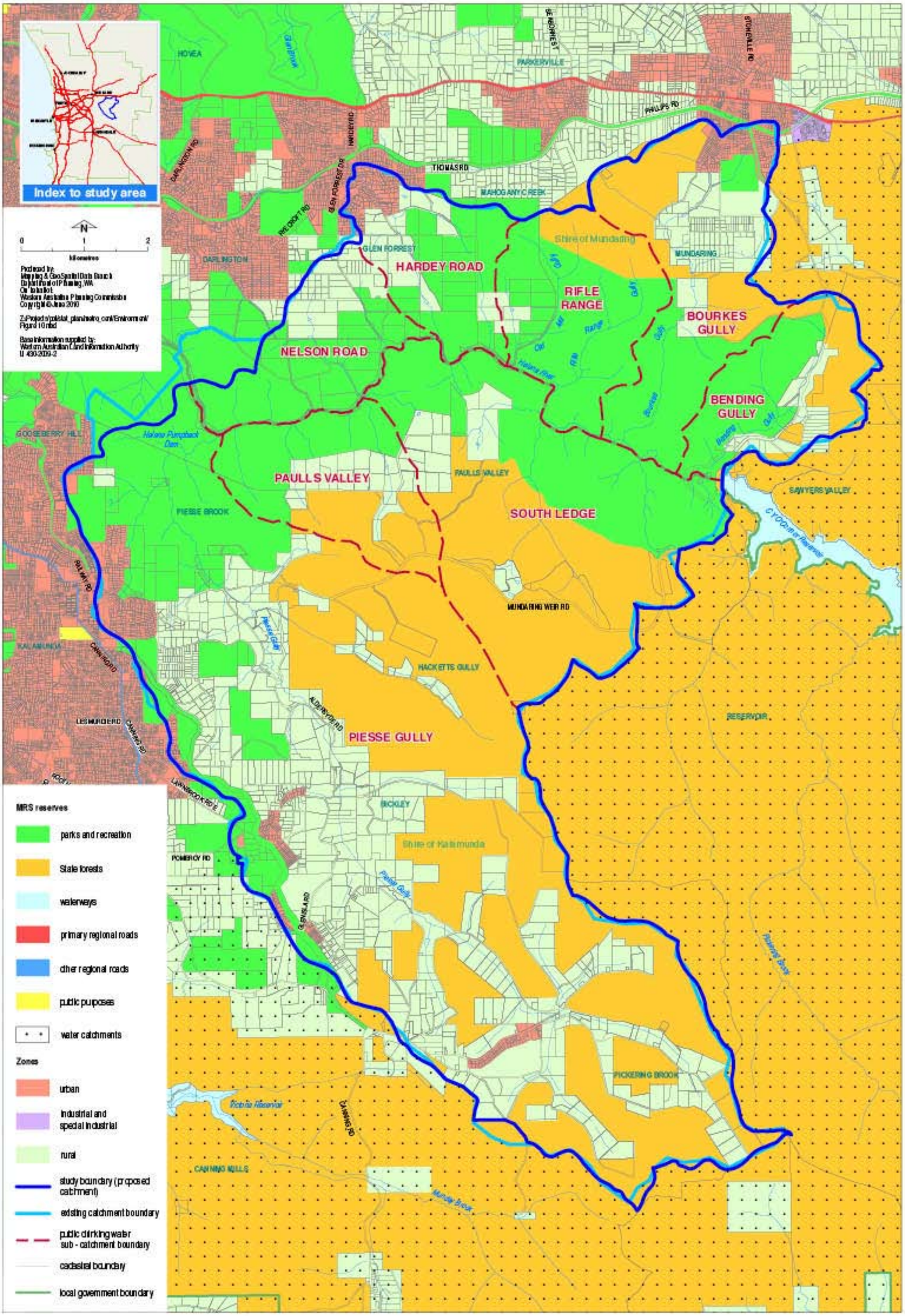
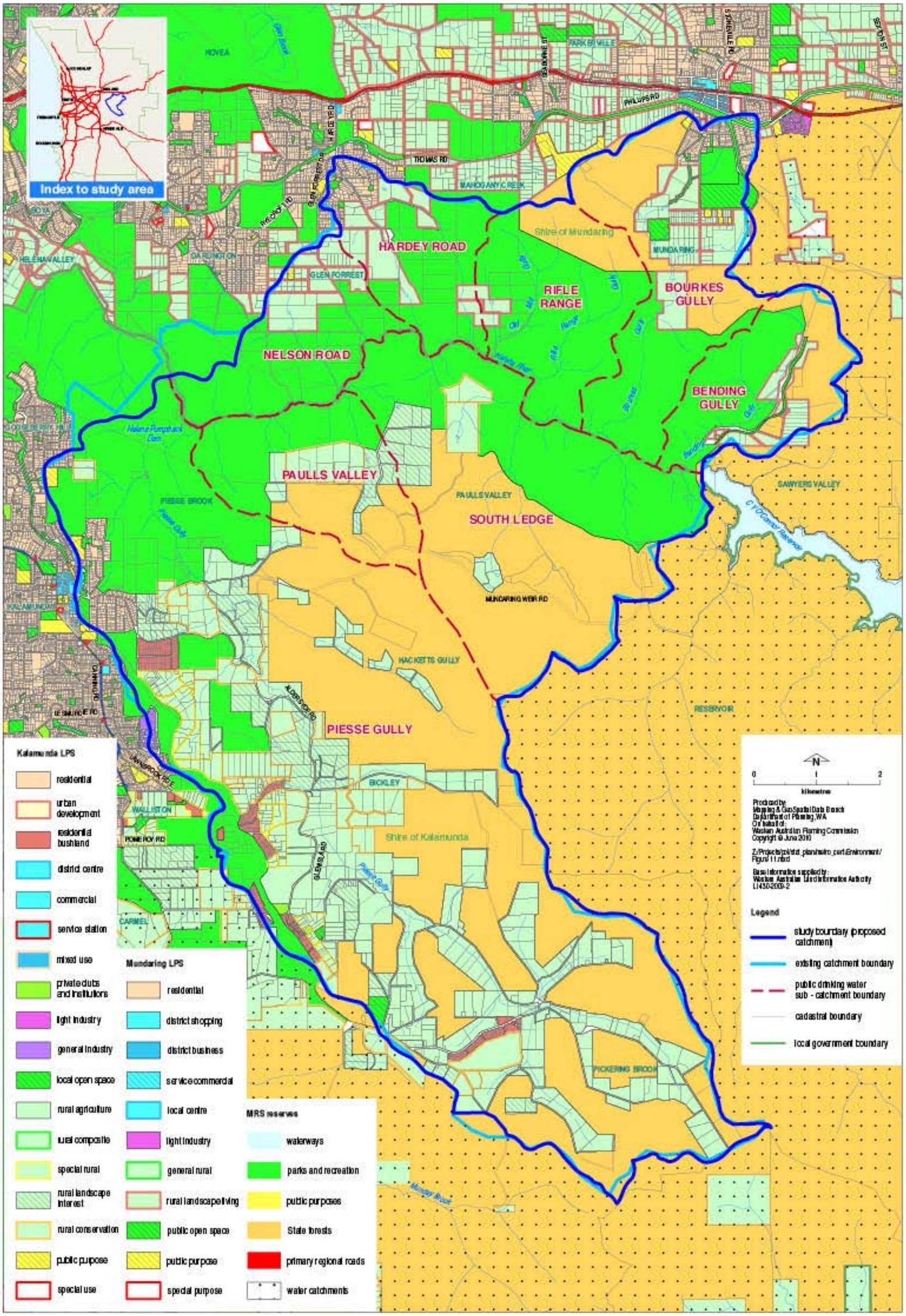
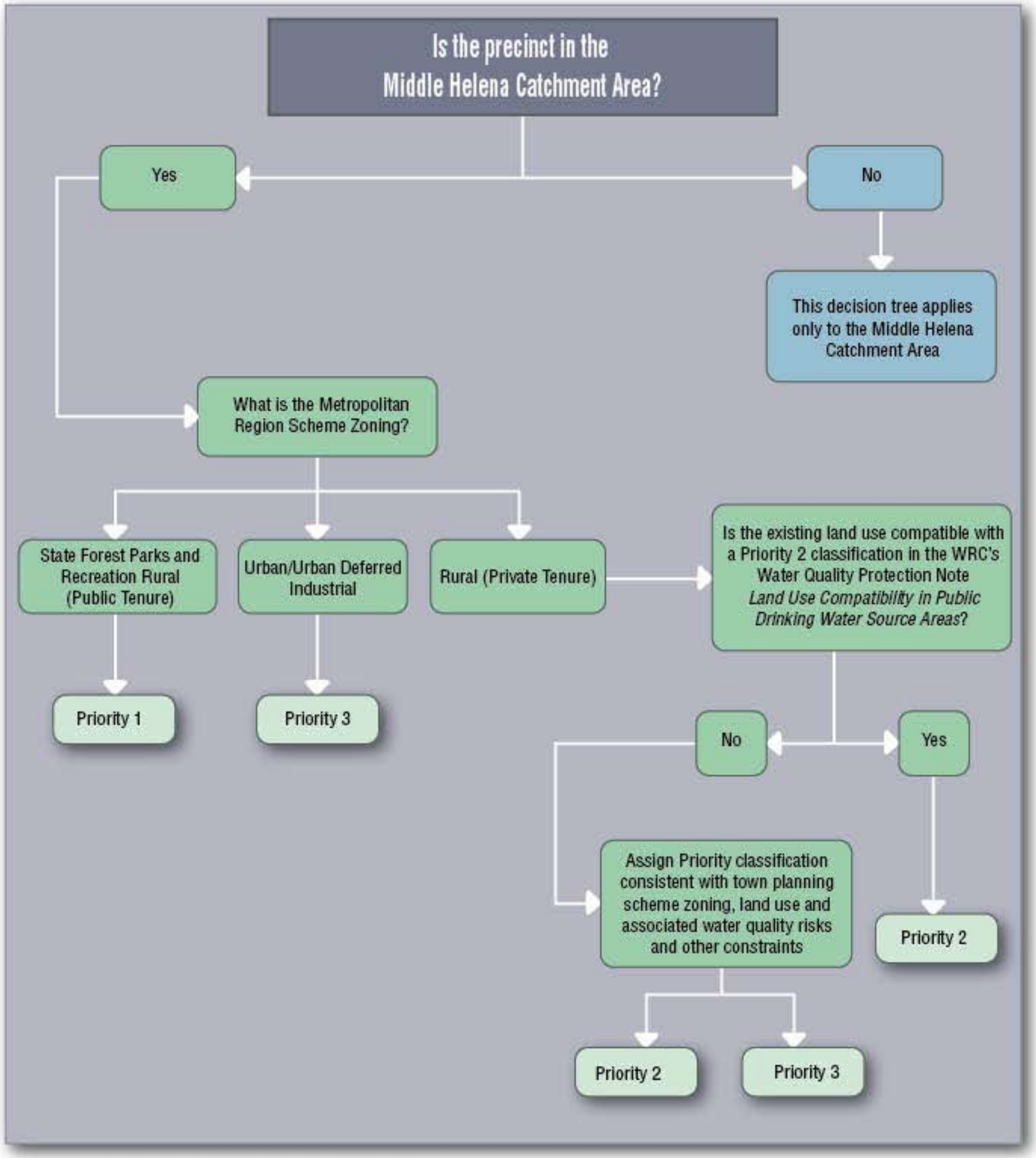


Figure 11: Local planning schemes Kalamunda/Mundaring





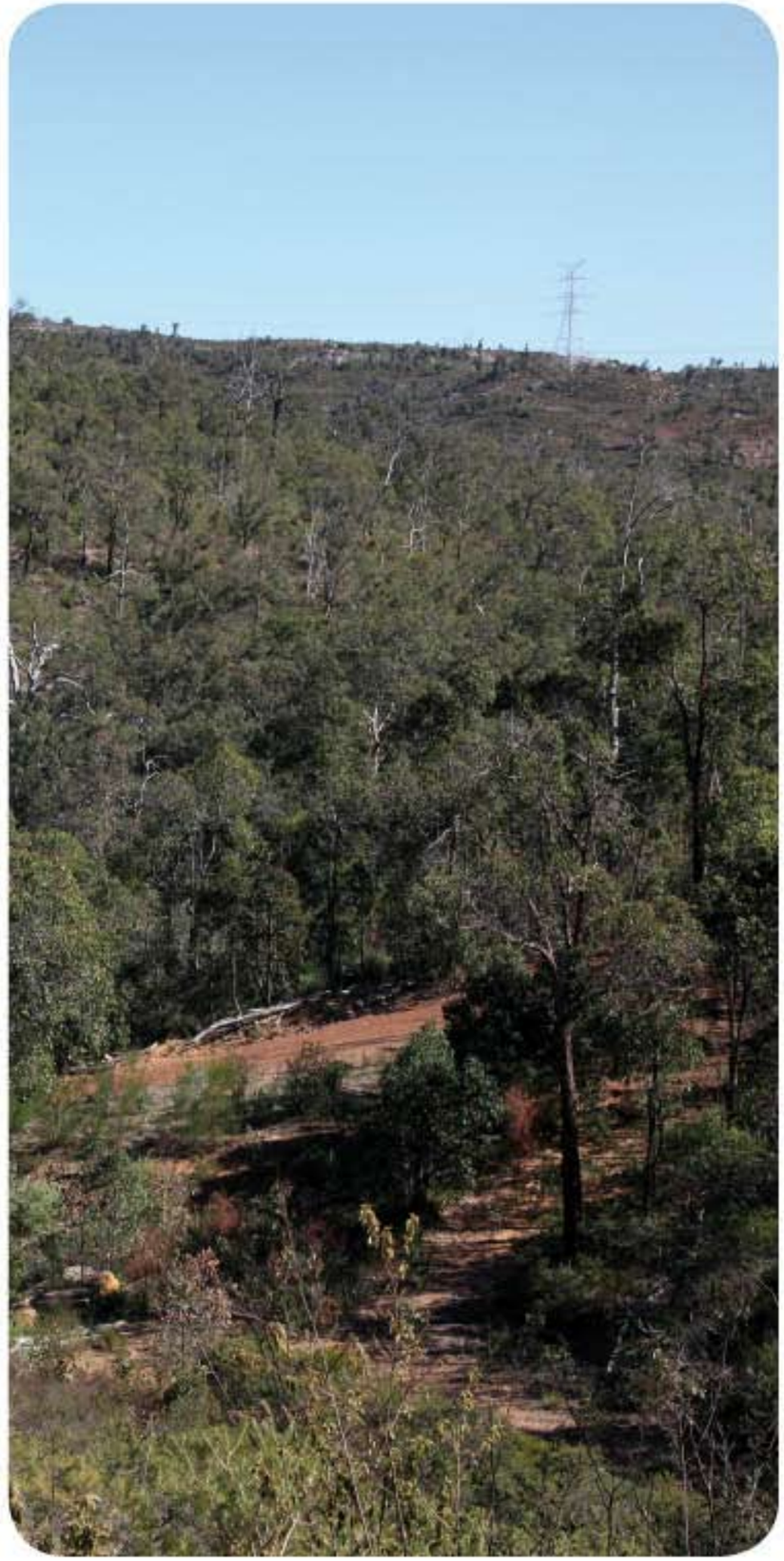
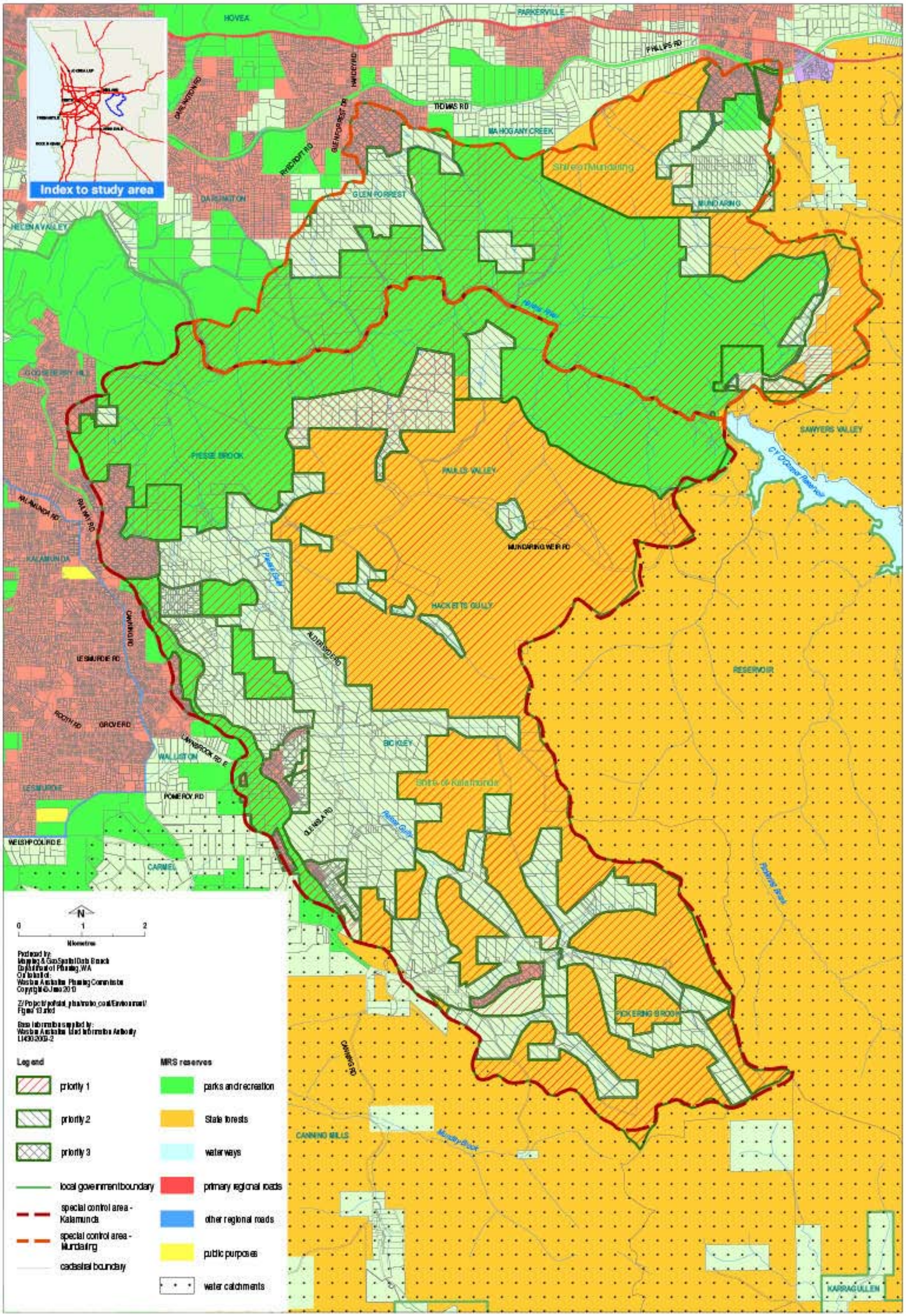


Figure 12: Priority classification decision tree

Figure 13: Priority source protection area map



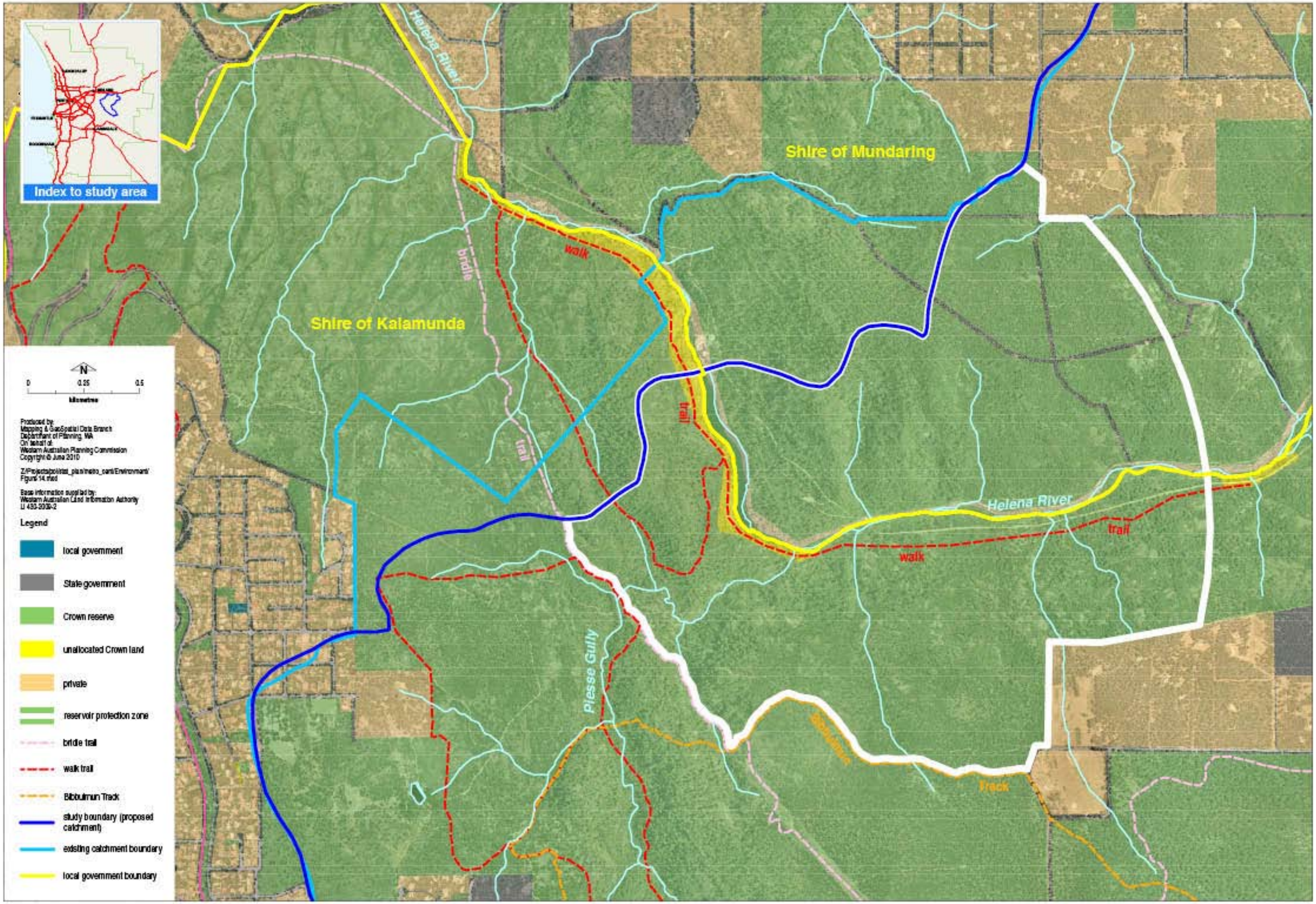


Figure 14: Proposed reservoir protection zone and land tenure

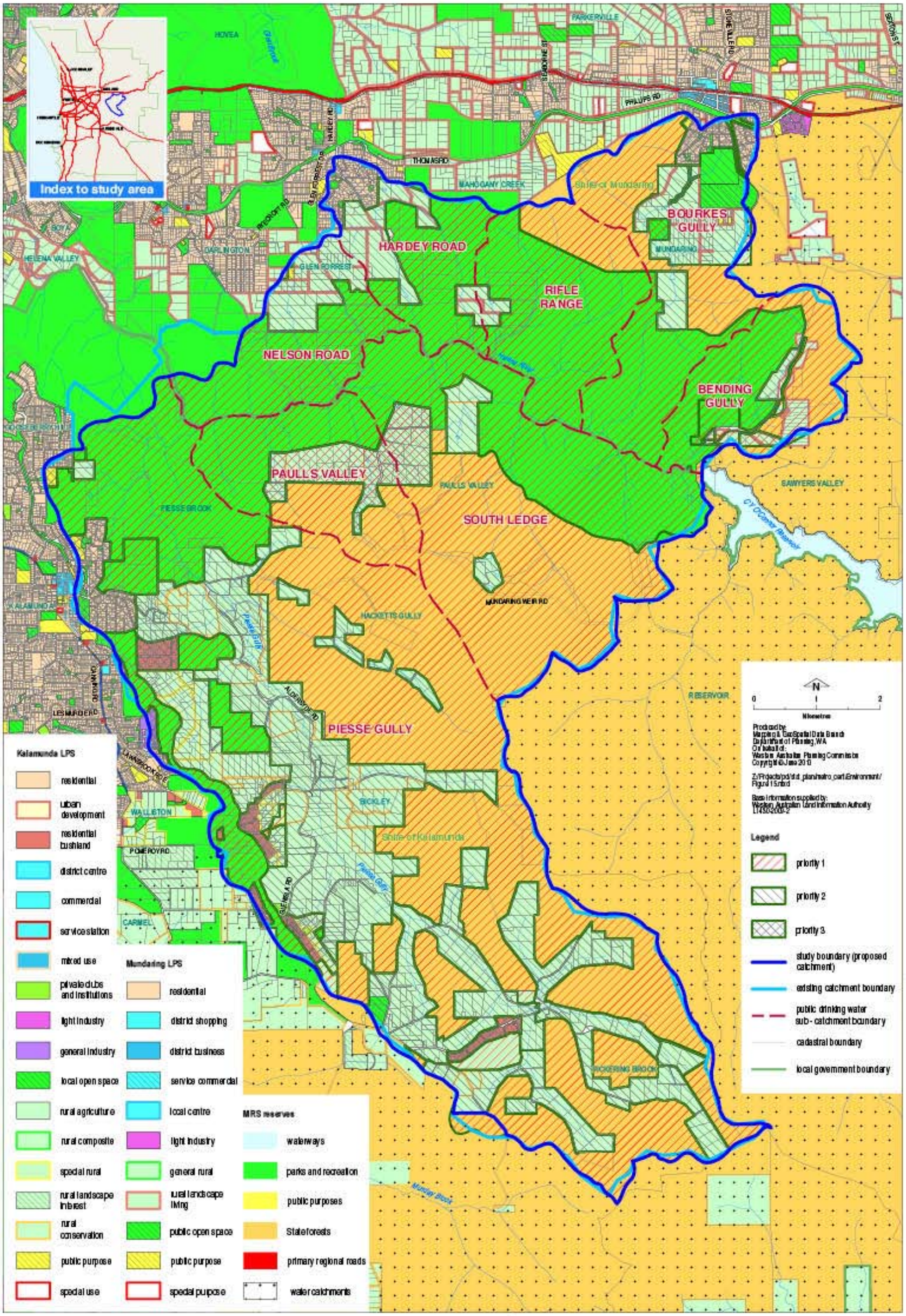


Figure 15: Proposed special control areas Kalamunda/Mundaring