Shire of Mundaring

ROADSIDE CONSERVATION STRATEGY

Approved by Council – 9 August 2016

Acknowledgments

The compilation of this Roadside Conservation Strategy would not have been possible without contribution from the following organisations, volunteers, committee members and Shire of Mundaring staff. We would like to formally recognise and thank the following groups:

- Roadside Conservation Committee and community volunteers for undertaking the roadside surveys in the Shire of Mundaring and for compiling the *Roadside Vegetation and Conservation Values in the Shire of Mundaring* report in October 2008.
- The Environmental Advisory Committee (EAC) members.
- The EAC Roadside Conservation Sub-Committee members for their invested interest in the development of the RCS.
- Shire of Mundaring staff who have been involved in developing and implementing the RCS.

Target audience

The Roadside Conservation Strategy has been written for, but is not limited to, contractors, internal staff at Shire of Mundaring, councillors, utilities workers, stakeholders and community members. This strategy deals with road reserves that are managed by the Shire of Mundaring and does not include road reserves managed by Main Roads or other local government authorities.

Executive Summary

Roadsides play a very important role in preserving Western Australia's unique flora and fauna. The protection and conservation of roadside vegetation is also of great importance to the local community in the Shire of Mundaring

Much of the Shire's roadsides contain environmental features and vegetation that are worthy of protection due to the rich biodiversity and ecological corridor they provide for many local fauna species.

According to the Shire of Mundaring's Geographical Information System (GIS) there is approximately 2,074 hectares of road reserve in the strategy study area, of which 1,837 hectares is vested in the Shire. In terms of the amount of actual land that requires management, there is approximately 1,636km vested in the Shire of Mundaring.

The aims of the RCS are:

- Land owners are informed of their responsibilities and limitations regarding the road verge;
- Consistency and standards are provided to stakeholders involved in roadside works;
- Increased education and training is provided to those that undertake works or burning on road verges in order to minimise environmental impacts;
- Increase the ability of road verges to act as wildlife corridors through increased connectivity between high conservation value areas;
- Protection and maintenance of 'at risk' high-medium conservation value road verge;
- Renewal of medium or low conservation road verge where it has potential value in aesthetics, tourism or as a wildlife corridor

The Shire of Mundaring isn't able to actively manage roadsides for environmental enhancement due to resource constraints. Instead, the Shire focuses on maintaining safety issues such as clearing sightlines, removing fallen trees, reducing fuel loads, clearing vegetation along footpaths, weed spray along kerb lines and hardstand areas, isolated removal of noxious weeds and maintaining drainage infrastructure by removing weeds or upgrading drains.

The information contained in this Strategy can be used by the Shire and stakeholder groups to:

- plan roadwork (capital and maintenance) operations to minimise their impact on native plants and animals
- strategically prioritise and plan weed control
- identify possible Flora Roads which may be used to promote the shire to tourists
- apply for grants to fund strategic weed management, revegetation etc.
- consider landscape-scale planning (e.g. help identify areas which could be rehabilitated to form a wildlife corridor between large areas of bush, helping animals to move between them)

This Roadside Conservation Strategy seeks to have a proactive and integrated approach to roadside conservation, while also providing for the appropriate management of the various uses of the road reserve, and capitalise on the potential environmental, social and economic benefits associated with roadside conservation in the Shire of Mundaring

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1 Introduction

1.1 Context

Roadsides play a very important role in preserving Western Australia's unique flora and fauna. In some areas, roadside vegetation is the only lasting example of remnant vegetation in the landscape. As well as the conservation value of the vegetation itself, roadsides also provide habitat and connectivity to other tracts of remnant bushland for native fauna. The protection of roadside vegetation is of particular importance in the south-west of Western Australia due to the natural richness in endemic flora and fauna and the bioregion being recognised as an international biodiversity hotspot. Additionally, roadside vegetation contributes to the character and sense of place within a locality. It can provide opportunities for economic development, through tourism, while also contributing to the aesthetics of a locality.

To recognise the value of roadside conservation and in response to community interest, a Road Verge Conservation Committee was formed in Western Australia in 1968 and operated until 1983. In 1985, the Committee reformed as the current Roadside Conservation Committee (RCC). The Committee members are appointed by the Minister for Environment, and the Committee reports to the Minister. Currently, funding for a full-time executive officer is provided by the Department of Parks and Wildlife (DPaW) and Main Roads Western Australia. The RCC executive is hosted by DPaW. The purpose of this committee is "*to coordinate and promote the conservation and effective management of rail and roadside vegetation for the benefit of the environment and the people of Western Australia*".

The protection and conservation of roadside vegetation is also of great importance to the local community in the Shire of Mundaring. Many residents chose to live in this locality due to the bushland and rural setting, rich biodiversity and presence of wildlife, while still being close to Perth's Central Business District (CBD). There is approximately 818km of road reserve vested to the Shire of Mundaring. The Shire is located approximately 35 kilometres east of Perth's CBD in Western Australia (Figure 1).

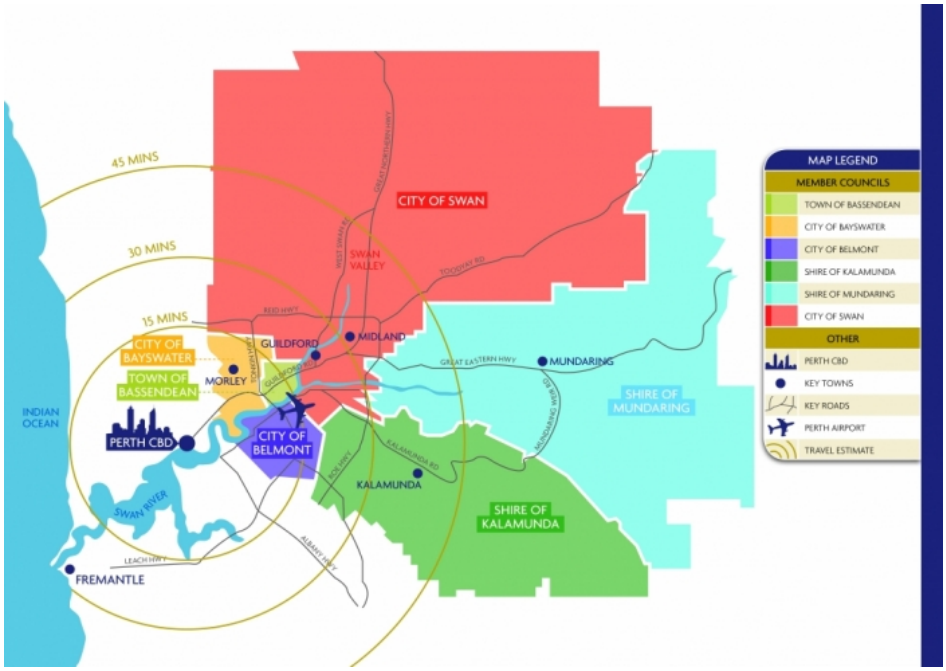


Figure 1 – Shire of Mundaring Map

Road reserves in the Shire of Mundaring, while providing biodiversity, are also subject to diversified use through infrastructure maintenance, providing mobility for residents, development and subdivision, utilities and fire management. This Roadside Conservation Strategy seeks to have a proactive and integrated approach to roadside conservation, while also providing for the appropriate management of the various uses of the road reserve, and capitalise on the potential environmental, social and economic benefits associated with roadside conservation in the Shire of Mundaring.

There are many challenges associated with the protection, conservation and enhancement of roadside vegetation. This strategy provides management solutions to address these potential impacts, while giving proactive objectives and action plans to ensure the implantation of the strategy and best practice outcomes for roadside conservation.

1.2 Vision

The vision for the Roadside Conservation Strategy is:

> ***To protect and enhance the environmental values of the Shire of Mundaring's roadside vegetation.***

1.2.1 Objective

The overarching objective for the Roadside Conservation Strategy is:

To identify roads in need of protection and value to provide incentive to protect other roads in the shire through:

- Conducting an ongoing assessment of roadside conservation in the Shire of Mundaring
- Protecting, maintaining and enhancing local roadside vegetation within the Shire of Mundaring as a conservation asset for future generations
- Identifying roads in need of protection and to provide incentive to better protect other roads in the Shire
- Ensuring environmental values and attributes within roadsides are protected
- Identifying, protecting and enhancing roadside vegetation for the long term.

1.2.2 Aims:

- Land owners are informed of their responsibilities and limitations regarding the road verge;
- Consistency and standards are provided to stakeholders involved in roadside works;
- Increased education and training is provided to those that undertake works or burning on road verges in order to minimise environmental impacts;
- Increase the ability of road verges to act as wildlife corridors through increased connectivity between high conservation value areas;
- Protection and maintenance of 'at risk' high-medium conservation value road verge;
- Renewal of medium or low conservation road verge where it has potential value in aesthetics, tourism or as a wildlife corridor.

1.2.3 Assumptions

- That Shire staff will utilise the strategy when working in road verges.

- Mapping and GIS of the conservation status of roadsides is kept updated to a workable standard.
- That Infrastructure, Operations and Environmental staff will assist with the process and provide input to the RCS.
- That Utility companies and contractors are receptive of the strategy and its information.

1.3 Responsibility

All road reserves are Crown land owned by the state. The land within a road reserve is vested in a managing authority, which is either Main Roads Western Australia or local government; depending on whether the road is a primary distributor or local road. The management of vegetation within that road reserve is the responsibility of that managing authority (ie local roads are managed by the relevant local government body and primary distributor roads are managed by Main Roads Western Australia). Although it is to the discretion of the managing authority as to how they manage the road reserve, they would still need to comply with the relevant legislation. This strategy deals with road reserves that are managed by the Shire of Mundaring and does not include road reserves managed by Main Roads or other local government authorities.

According to the Shire of Mundaring's Geographical Information System (GIS) there is approximately 2,074 hectares of road reserve in the study area, of which 237 hectares is vested in Main Roads and 1,837 hectares is vested in the Shire of Mundaring. In terms of the amount of actual land that requires management, there is approximately 104km of road verge vested in Main Roads and 1,636km vested in the Shire of Mundaring.

Main Roads have a responsibility to ensure that their works complies with environmental provisions set out in their clearing permit, or environmental impact assessment. This includes the protection of declared rare flora, threatened or endangered fauna or offset plantings.

The Shire of Mundaring isn't able to actively manage roadsides for environmental enhancement due to resource constraints. Instead, the Shire focuses on maintaining safety issues such as clearing sightlines, removing fallen trees, reducing fuel loads, clearing vegetation along footpaths, weed spray along kerb lines and hardstand areas, isolated removal of noxious weeds and maintaining drainage infrastructure by removing weeds or upgrading drains.

Service authorities have powers under their respect Acts to undertake works in the road reserve and only need to notify the LG. When notification is received, the Shire will negotiate with the service authority to establish alignments that minimise vegetation impact whilst meeting the obligations of the service authority.

2 Threats

Roadside verges are a valuable natural resource, despite this they are:

- At risk from land owners and their activities adjacent to or on the verge;
- At risk from bushfire prevention strategies;
- At risk from public works undertaken on the verge;
- Not utilised or appreciated as wildlife corridors;
- Unaddressed by any targeted conservation strategies, policies or guidelines.

2.1 Vegetation loss

Road reserves serve a number of different functions, which can lead to circumstances where clearing of vegetation is required to facilitate additional functions of the road reserve. The cumulative impact of clearing of native vegetation can place significant pressure on roadside conservation values. This may include clearing to facilitate new roads, upgrade existing roads, providing drainage infrastructure, utility services and bushfire management. Clearing to facilitate such functions is often governed by requirements with varying levels of flexibility. Where safety is the main consideration, often the maximum vegetation clearance is enforced.

2.2 Introduced species

Any disturbance to roadside vegetation has the potential to introduce species such as weeds and pathogens. Disturbed roadsides can quickly become colonised by weeds which may out compete native plants. This colonisation can result in a decline of species diversity as introduced species can form a monoculture. Watsonia is a prime example of this as it is able to establish rapidly and overwhelm native shrubs and grasses. Where invasive weeds have colonised drains or watercourses, its seeds are able to be transported downstream spreading the infestation further. A change in composition of species from native plants to invasive weeds also impacts on local fauna that rely on native bushland for food and habitat.

In addition to the above, poor road management practices can result in the introduction or spread of Phytophthora dieback. The plant pathogen *Phytophthora cinnamomi* has had a devastating impact on vegetation in the South-west of WA and continues to threaten over 2000 different plant species. Road construction, earthmoving and dirty vehicles all contribute to the risk of introducing and spreading Phytophthora dieback.

2.3 Fire

Fire, both prescribed and naturally occurring, impacts roadside vegetation. Although Western Australia's flora and fauna have evolved with a tolerance to fire, with some species needing exposure, fire regimes employed today are significantly different to those occurring prior European settlement.

The intensity, frequency and seasonality of fire can influence vegetation composition and density. Frequent hazard reduction burns alter diversity of species in favour of those with fire tolerance, to the detriment of non-fire tolerant species. The timing of a burn is also an important consideration. Burning vegetation before it has flowered removes a generation of seeds from the seed bank which reduces the bushland's ability to recover from fire. Fire Management Plans provide a strategic process for controlled burns along roadsides. Controlled burns should be limited to one side of the road at a time to allow for habitat retention for fauna.

2.4 Awareness

Stakeholder communication

The Shire encourages residents to maintain and/or improve their verge area outside their property. However, clear guidance is required to ensure perceived improvements are not detrimental to roadside vegetation. For example, many species considered invasive weeds have been planted on road verges to provide screening, such as eastern states wattles, Victorian tea tree and tagasaste. These species have rapidly colonised large stretches of road verge to the detriment of the endemic species of the locality.

A general lack of awareness of roadside conservation values and function is common for both the general community and roadside workers; as a result the integrity of the verge value may be compromised.

Through the 1990's and in 2001 a lot of roadside conservation measures were focused upon within the Shire organisation and within practical parameters became the way Operations Services have conducted their works

3 Priorities

The Key Focus Areas (KFAs) for the RCS are:

1. Native Vegetation Management
2. Fire Management
3. Habitat and Wildlife Corridors
4. Community Education and Awareness
5. Road construction, maintenance and drainage
6. Installation and Maintenance of Utilities and Services
7. Statutory and Strategic Planning
8. Cultural and Heritage Assets
9. Visual Amenity and Landscape Values

3.1 Native Vegetation Management

Key objective: To protect and enhance existing values of native roadside vegetation.

Recognition of the value of native roadside vegetation will assist in ensuring its long-term survival. Features that require protection and enhancement include areas that have declared rare flora or fauna and riparian vegetation. Some roadside vegetation may have value for its ability to create linkages between vegetation complexes or because it is relatively free of weed infestation.

The Local Biodiversity Strategy has identified areas for protection through assignment of Local Natural Area mapping, roadside vegetation can serve as a valuable linkage between these areas.

3.2 Fire Management

Key objective: The management of fire and control burning to ensure preservation of environmental assets.

Fire and fuel load accumulation is a natural part of the Jarrah Forest ecosystem. Many local native species rely on fire for their persistence, however poorly managed fire regime can quickly turn a pristine roadside into a weed infested and degraded area.

Fire should be managed in such a way as to preserve environmental assets; this requires close co-ordination between DPaW and Shire of Mundaring Fire hazard Inspection Officers and Environmental Services. Co-ordination would focus on ensuring control burns take place at times appropriate for preservation of flora and fauna assemblages, as well as identification of those areas that require active management.

3.3 Habitat and Wildlife Corridors

Key objective: Identification of roadsides that offer value as a habitat and/or wildlife corridor and measures being taken to ensure their protection and enhancement.

Measures are to be developed that enable identification of roadsides that offer value as a habitat and/or wildlife corridor. These areas can then be targeted for priority protection through the

development of a register identifying significant/habitat trees, and Green Spot Program initiatives. In addition, revegetation with locally native plants and provision of habitat (e.g. firewood/habitat logs) can be initiated to further enhance existing values.

3.4 Community Education and Awareness

Key objective: To continue to provide advice, support and initiatives to encourage community involvement in the recognition and management of roadside biodiversity.

The Shire of Mundaring currently communicates with the community through provision of information (e.g. brochures, media releases, new resident packs, Shire webpage updates) and resources (e.g. road signage and Tree Canopy and Understorey Program).

The Shire also co-ordinates work by Friends Groups who operate within road reserves and other areas. A key part of work within roadsides is not only ensuring they understand the values of the area, but that they are operating in a safe manner with the necessary equipment and support.

The RCS will further enhance the knowledge of community groups in conservation and enhancement of roadsides.

3.5 Road construction, maintenance and drainage

Key objective: To ensure that construction, maintenance and drainage works taking place within roadsides are done so with due consideration of existing environmental values to ensure protection of environmental assets.

Works that are carried out on roadsides need to be cognisant of existing environmental values, which can be achieved through adequate awareness and education of the various crews involved in the works. Triggers can be developed to allow appropriate communication between interested groups (e.g. Environmental Services and Infrastructure Services); this might be through checklists or availability of mapping data which highlights areas that may require additional safeguards (e.g. erosion control) or assessment.

Areas identified as having potential dieback (*Phytophthora cinnamomi*) should be flagged to ensure the appropriate hygiene is observed (e.g. clean, dieback free materials and machinery hygiene).

3.6 Installation and Maintenance of Utilities and Services

Key objective: Provision of communication between Council and utility companies to ensure works carried out within or close to roadsides are done so with due consideration of existing environmental values to ensure protection of environmental assets.

Similar to Section 3.5 communication between stakeholders is critical for ensuring that existing environmental values are recognised and preserved. Should works be carried out within roadsides, strategies for reinstatement of vegetation post works should be undertaken in a way which is appropriate to that roadside in co-ordination with Council through the identification of service provider works on verges permits through Infrastructure Services.

3.7 Statutory and Strategic Planning

Key objective: Statutory and strategic planning is carried out in consultation with Environmental Services and other stakeholders to ensure the protection and enhancement of roadsides.

Conditions can be placed on Development Applications and Subdivisions to create improved roadside status and outcomes.

Subdivisions should be completed with appropriate permits (e.g. Works on Verge Permit), measures to ensure vegetation reinstatement is carried out (e.g. bonds covering future works), and crossovers are placed in such a ways as to protect environmental assets.

3.8 Cultural and Heritage Assets

Key objective: Cultural and Heritage assets within roadsides to be identified and protected.

A Cultural and Heritage asset includes Aboriginal and European heritage, recognised and registered assets as well as historic sites that may be identified by the local community.

Provision of signage at these locations will assist in their recognition and protection.

3.9 Visual Amenity and Landscape Values

Key objective: Recognition of visual amenity and landscape values provided by roadsides.

Within the Shire of Mundaring there are recognised flora roads and tourist routes that can be further enhanced and protected, as well as areas that may have the potential for enhancement due to their location (e.g. close to visitors centre or high use parks).

4 Actions

Roadside Conservation Strategy actions are aimed at protecting existing roadside environmental assets, maintaining roadside environmental assets, minimise disturbance or loss to roadside environmental assets and enhancing roadside environmental values.

The information contained in this Strategy can be used by the Shire and stakeholder groups to:

- plan roadwork (capital and maintenance) operations to minimise their impact on native plants and animals
- strategically prioritise and plan weed control
- identify possible Flora Roads which may be used to promote the shire to tourists
- apply for grants to fund strategic weed management, revegetation etc.
- consider landscape-scale planning (e.g. help identify areas which could be rehabilitated to form a wildlife corridor between large areas of bush, helping animals to move between them)

This will improve roadside conservation in the Shire of Mundaring through raising awareness of roadside environmental values and encouraging groups to take an active role in the protection and enhancement of roadside flora and fauna.

To achieve this it is envisaged that a Policy will be developed under the RCS which assists in the on-ground identification of the status and values associated with roadside vegetation within the Shire. The Policy will ensure that everything is captured, rather than as a tool to simply identify high value or 'iconic' roadsides. It will identify what is at risk, what uses exist, and what can be done to protect and/or enhance roadside vegetation.

The Policy will become a useful tool for all levels of land management e.g. Government, council, property owners, planners, etc.

4.1 Strategies for protection and enhancement of roadside environmental values

Protection and enhancement of roadside environmental values can be achieved by:

- retaining remnant vegetation
- minimising disturbance to existing roadside vegetation
- minimising disturbance to soil
- preventing the introduction, or controlling weeds.

Promote and raise awareness of the conservation value associated with roadside vegetation by:

- establishing a register of all Shire roads, highlighting those that are important for conservation
- declaring suitable roadsides as Flora Roads
- incorporating them into tourist, wildflower and/or scenic drives.

Improve roadside sections of medium to low conservation value by:

- minimising disturbance caused by machinery, adjoining land practices and incidences of fire
- carrying out a targeted weed control program
- retaining remnant trees and shrubs

- allowing natural regeneration
- actively rehabilitating the roadside
- encouraging revegetation projects on adjacent land.

4.2 Actions for protection and enhancement of roadside vegetation

4.2.1 Objective: Minimise the loss of native vegetation

Actions

	Action	Indicator	Time frame	Service Level / Resources	Internal Service partnership
1.1	Preparation of an Internal Procedure by Environmental Services in consultation with Infrastructure and Community Safety and Emergency Management. Preparation and content of the internal procedure is to provide for the following: • Set practices of referral and consultation between the Shires Environmental Service, Infrastructure Service and Community Safety Services • Review future roadside hazard reduction burn program to ensure hazard reduction targets and roadside conservation values are being met. This should contain assessment of future hazard reduction programs against medium to high	Endorsement of Internal Procedure	Short – Medium 1-5 years	Existing in-house	Environment, Infrastructure, Community Safety and Emergency Management.

	conservation value roadsides, and investigating where possible alternatives to burning can be used to reduce fuel loads • Review Infrastructure future works program in relation to the roadside conservation priority mapping				
1.2	Ongoing implementation of Internal Procedure	Effective and functional internal referral process produced.	Ongoing	Existing In-house	All Services
1.3	Develop fire management plans for hazard reduction burns on high conservation road reserves	Plans developed and implemented in consultation with Environmental Officer	Ongoing	Existing in-house	Emergency Management
1.5	Educate residents about alternative hazard reduction methods when proposing a hazard reduction burn on their verge.	Annual fire break notice and associated materials revised to include alternative methods	Short 1-5 years	Existing In-House $3,000	Community Safety and Emergency Management
1.6	Publish brochure detailing the importance of roadside vegetation and how to manage it. It will also outline the rules in regard to clearing on a road verge	Brochure published	Short 1-5 years	Existing in-house $2,000	Environment and Communications Team
1.7	Process satellite images to calculate area of vegetation on road verges. Use this as base information to develop change mapping over number of years.	Initial base layer of roadside vegetation mapped – revised every 3 years	Medium/ongoing 5-8 years	Existing additional capacity $600	IT, Environmental Services
1.8	Infrastructure Services to forward Future Works Program to environmental staff to assess against roadside conservation priority mapping.	Future works program forwarded to environmental services	Short 1-5 years	Existing in-house	Infrastructure and Environment

1.9	Staff to be made aware of Roadside Conservation Committee's Handbook of Environmental Practice for Road Construction and Maintenance Works.	RCC information incorporated into construction planning and processes	Medium 5-8 years	Existing Services	Infrastructure and Environment
1.10	Major road works conducted in medium to high conservation areas are to have an environmental management plan developed following RCC handbook.	Plans developed and implemented	Ongoing	Existing in-house	Infrastructure and Environment
1.11	Prior to commencement of site works, native seeds are to be collected and stored as DEC's Verge Notes - Guidelines for managing the harvesting of native flowers, seed and timber from roadsides	Seeds collected and used in revegetation projects	Ongoing	External and in- house additional capacity $200	Environment and Infrastructure

Weeds

The Shire currently has in place a Weed Control Strategy that prioritises weeds and recommends different control methods. The document does include a general action plan for some reserves within the Shire; however, there is no specific mention of roadside weeds. Before developing a detailed action plan for the management of roadside weeds, it is important to first identify where the weeds are occurring and which weed species are present. This will enable officers to prioritise areas for management.

To manage these weeds the Shire should consider allocating additional resources to enable a focused and sustained effort on weed removal program from road reserves, which may involve the development of a roadside conservation team or use of contractors.

When hiring contractors, it is also important to ensure that the person undertaking the works is suitable. This guarantees that the works will be to a high standard while being cost effective, as that person knows how to eradicate a certain weed efficiently. To do this, the Shire should develop a list of preferred contractors based on different circumstances, e.g. Watsonia control verses woody weed removal.

4.2.2 Objective: Reduce the occurrence and spread of weeds with in road reserves

Actions

	Action	Indicator	Time Frame	Service Level / Resources	Internal Service partnership
2.1	Review Shire's Weed	Weed Control	Short	External	Community

	Control Strategy to include reference to the management of weeds with in road verges.	Strategy reviewed and modified	1-5 years Listed year 2 on CBP	$15,000	Safety, infrastructure Environment, Emergency Management
2.2	Map locations of weeds on road verges within the Shire by visual observations and mobile mapping devices.	Weed locations mapped and Shire GIS updated	Short 1-5 years	Existing $2,000 – in-house additional capacity	Infrastructure, IT and environment
2.3	Prioritise key weed management locations based on type of weed, prevalence and impact on surrounding bushland.	Database of weed locations and priority created	Medium 5-8 years	In-house additional capacity	Infrastructure, environment and IT
2.4	Develop and implement weed management plans for highest priority road reserves	Weed Management plans created and implemented	Medium 5-8 years	Existing in-house	Environment
2.5	Create list of preferred contractors to undertake weed management based on unique skills	Contractor list created	Short 1-5 years	Existing in-house	Infrastructure and environment
2.6	Present business case for additional resources to undertake weed management activities on roadsides	Business case formulated and submitted during budget process	Medium 5-8 years	In-house additional capacity $150,000	Infrastructure and Environment
2.7	Encourage residents to better manage and enhance their verges by eradicating weeds.	Noted reduction in roadside weeds	Ongoing	Existing	Environment
2.8	Develop weeds brochure to help residents identify common weeds and provide management solutions.	Brochure created and distributed	Short	External $1800	Environment
2.9	Continue to seek grants for the management of weeds in road reserves	Grant applications prepared and submitted	ongoing	Existing in-house	Environment

Dieback

Phytophthora dieback infestations can have a devastating impact on vegetation. Roadside vegetation is particularly susceptible as a road verge is long and narrow resulting in a large surface area that dieback can be introduced to. Furthermore, there is the risk that imported soils used for road or utility works could be infested with *P.cinnamomi*, introducing it to the neighbouring bushland.

Incorporating best management practices into project planning and adequate awareness and training can lower the chance of dieback being inadvertently introduced into bushland. This includes the local council, developers, contractors, residents and community groups.

The following should be considered when working within a road reserve:

- Where practicable, works should be scheduled for the dry summer months
- Determine presence of dieback and areas of medium to high risk. These should be clearly demarcated onsite
- Minimise soil disturbance
- Imported gravel or soil should be free of dieback
- Avoid stockpiling soil in vegetated areas
- Vehicles and workers should stay within the construction area and avoid vegetated areas
- Vehicles should be free of mud and soil before entering or exiting the site. A vehicle wash down area should be used where necessary
- Machinery and materials should be stored on a hard surface that does not drain towards vegetation

Major disturbances such as construction works is not the only way dieback is spread. It can also spread naturally through the soil and by root-to-root contact. It is therefore important to protect the existing vegetation through the application of phosphite. Due to the amount of vegetation present on roadsides within the Shire, it is important to target certain areas and vegetation types to gain the most benefit. Large Jarrah habitat trees would, for instance, be considered a high priority for phosphite treatment.

A very high proportion of roadside vegetation abuts private property. The Shire should continue to encourage residents to borrow DIY dieback injection kits to manage dieback on their road verges. Furthermore, the Shire should consider the purchase of a phosphite spray trailer to enable larger scale dieback treatments.

4.2.3 Objective: Reduce the introduction and spread of dieback in road reserves

Actions

	Actions	Indicators	Time Frame	Service Level / Resources	Internal Service partnership
3.1	Planning developments that include works to the road reserve are to follow dieback hygiene best management framework	Dieback conditions applied where appropriate	Ongoing	Existing	Planning and Environment
3.2	Engage the Dieback Working Group to conduct dieback awareness training for works supervisors and crews	Completion of dieback awareness training	Medium 5-8 years	External $220pp	Environment and infrastructure

3.3	Incorporate Dieback Best Management Practices into tender documents for construction works	Templates for tender documents revised to include Best Dieback Management Practices	Ongoing	Existing	infrastructure
3.4	Contractors to be given information about dieback best management practices	Guidelines provided prior to commencement of works	Ongoing	Existing $2 each copy	Infrastructure
3.5	Overlay roadside vegetation mapping over dieback mapping to find high conservation roadsides under threat from dieback	Roadside vegetation mapping cross checked	Short 1-5 years	In-house existing	Environment and IT
3.6	Prepare and implement dieback management plans for high conservation road reserves	Reduction in spread of dieback through implementation of plans	Medium 5-8 years	In-house Additional capacity	Environment
3.7	Protect large Jarrah habitat trees through the application of phosphite	Jarrah trees injected annually	Ongoing	External $5,000	Environment
3.8	Continue to promote the Shire's DIY dieback injection kits for residents and encourage their use in road verges	Enquiries about injection kits received	Ongoing	Existing	Environment
3.9	Purchase phosphate trailer to enable community groups and residents to undertake wide scale dieback treatments of roadside vegetation.	Trailer purchased and in use	Short 1-5 years	In-house additional capacity $5,000	Environment

Stakeholder Communication

Identifying and engaging with relevant stakeholders will enable a consistent approach to roadside conservation. Stakeholders may include:

- Local residents
- Road managers such as MainRoads
- Utility service providers
- Community groups
- Government agencies
- Local fire brigades

There are also internal stakeholders within the Shire that have a vesting interest in roadsides, such as:

- Environmental staff
- Engineering design team
- Parks supervisors
- Works crews
- Community Safety Rangers
- Fire Hazard Inspection Officers and Fire Protection Officers
- FESA officers

Clearly identifying all stakeholders who have an interest in roadside vegetation should be the first priority when planning a project. Doing this early in the process will enable all points of view to be expressed, reducing the likelihood of any conflicts arising during the project.

The first step would be to clearly outline the Shire's position on roadside conservation. This will demonstrate to the community that the Shire values roadside vegetation and will strive to maintain it. This can be achieved by providing information to the public, such as website materials, brochures, fact sheets and guidelines.

Communication is a two-way process, so it is equally important that external parties inform the Shire about impending works. This gives the Shire the opportunity to work with the particular group to ensure best management practices are employed.

4.2.4 Objective: Increase communication between stakeholders

Actions

	Action	Indicator	Time Frame	Service Level / Resources	Internal Service partnership
4.1	Identify all stakeholders who have an interest in managing and working within road reserves	Stakeholder list created and kept up-to-date	Short/ongoing 1-5 years	Existing	Environment
4.2	Post an article in the Shire's Focus Page and EHCMP's Greenpage outlining the importance of roadside conservation	Articles posted	Medium	Existing	Environment and Communications Team
4.3	Update Shire website to include section on roadside vegetation conservation	Website updated	Medium	Existing	Environment and Communications Team
4.4	Encourage external stakeholders to advise the Shire on upcoming works to enable the	Notification of works received, site visits undertaken and	Ongoing	Existing	Infrastructure and Environment

	Shire to comment on proposed works and better plan roadside revegetation projects	comments provided where necessary			
4.5	Establish memorandum of understanding between the Shire and utility companies agreeing to the importance of roadside vegetation, and an undertaking to follow best management practices where projects come into conflict with roadside vegetation	MoU established and adhered to	Medium 5-8 years	Existing in-house	Infrastructure
4.6	Develop environmental checklist for road managers	Checklist used and environmental officer consulted with	Short 1-5 years	Existing	Environment

Policy and Guidelines

The Shire of Mundaring is currently lacking a clear policy on the protection of roadside vegetation. A Roadside Conservation Policy would be broken down into the following sections:

- Policy provisions for the protection of roadside vegetation
    - Roadsides that have been assigned a conservation value would have specific requirements for the retention of vegetation
    - These would also be used in the assessment of planning applications, such as minor developments, subdivisions and structure plans
- The requirements for verge reinstatement and revegetation
    - Outline when revegetation of a road verge would be required
- Standards for street trees and verge treatments
    - Design standards for residential and commercial developments in terms of landscaping
- Criteria for the nomination and management of Flora Roads
- Significant tree register
    - A database of significant trees based on their habitat value, importance to the landscape or historical importance

A policy will give better direction to officers when assessing planning applications, giving advice to external customers and investigating non-compliance.

One important part of this policy would be to expand the Shire's Flora Roads. The Roadside Conservation Committee defines flora roads as "those roads which have conservation value owing to

the vegetation growing within the reserve". The aim of these roads is to encourage road managers to protect and conserve roadside vegetation of high conservation value. Flora Roads also highlight high conservation roadside vegetation to the community and increases tourism in the area.

The following should be taken into consideration when nominating a flora road:

- Vegetation within the roadside must predominately be native
- The vegetation should be in close a natural state as possible. This means a good representation of understorey, middle story and canopy species
- The vegetation may be the only remnant vegetation remaining in the landscape

Once a Flora Road is established, the RCC will provide two tourists signs to indicate where the road starts and finishes. Maps and brochures can also be given to the Mundaring Tourist Centre to promote the flora roads of the Shire.

4.2.5 Objective: Incorporate roadside conservation into the planning framework

Actions

	Actions	Indicators	Time Frame	Service Level / Resources	Internal Service partnership
5.1	Draft a Roadside Conservation Policy	draft competed	Medium 5-8 years	Existing in-house	Environment and Planning
5.2	Roadside Conservation Policy to go before Environmental Advisory Committee and Council forum for comment	Comments received and any necessary changes to policy made	Medium 5-8 years	Existing	Environment
5.3	Council to adopt Roadside Conservation Policy	Policy adopted by Council	Medium 5-8 years	Existing	Environment and Planning
5.4	Develop a clear compliance process for the investigation of illegal vegetation removal on road verges.	Process developed and compliance issues investigated.	Medium 5-8 years	Existing	Planning
5.5	Create significant tree register to protect significant trees based on habitat value, importance to the landscape or cultural value	Significant tree register created and maintained	Short 1-5 years	Existing Additional capacity	Planning, IT, Environment
5.6	Undertake roadside survey to determine suitable Flora Roads based on high species and structural diversity	List of possible Flora Roads created	Medium 5-8 years	Existing	Environment

5.7	Submit nominated Flora Roads to Roadside Conservation Committee for their consideration	Advice received from Roadside Conservation Committee	Medium 5-8 years	Existing	Environment and Planning
5.8	Raise community awareness about Shire flora roads through the use of signage and tourist brochures	Signs provided by RCC erected. Brochures produced and distributed through Mundaring Tourist Centre	Long	External $1400	Environment
5.9	Nominated Flora Roads receive priority management to maintain their high ecological and tourist value	Vegetation quality maintained, minimal weed intrusion	Ongoing	In-house Additional capacity	Infrastructure and Environment
5.10	Review current set of guidelines relating to landscaping and identify gaps relating to verge areas	Review completed and gaps	Short 1-5 years	In-house existing	Infrastructure and Environment
5.11	Continue to meet requirements of EP Act (Clearing Regulations)	Clearing permits obtained where necessary	Ongoing	In-house Existing	Infrastructure Environment and Planning

4.3 Budget

Implementing Roadside Conservation Strategy actions requires resources and the following actions will need to be listed for future consideration in the Shire's long term financial plan and annual budgeting process:

Action	Approx. Cost	Description
1.5	$3000	Reprint of colour booklets
1.6	$2000	Design and printing
1.7	$600	Ikonos satellite images
1.11	$200	Seed collecting by volunteers, cost of food, drinks and equipment
2.1	$2700	EMRC Officer time
2.2	$2140	$640 officer time + $1500 mobile mapping device
2.6	$150 000	2FTE @ $52 000 + equipment
2.8	$1800	Design and printing

2.9	+$15 000	Grant allocations
3.2	$220 pp	Basic dieback training
3.4	$2ea	10 page @ 20c a page
3.7	$5000	Dieback consultant time @ approx $100-120/hr
3.9	$5000	Trailer, 100L tank
5.8	$1400	Design and printing

The initial cost of implementing this plan is approximately $174 060. There will be a running cost of approximately $105 000 each year, which is required to employ a full time roadside conservation team. Shire staff will carry out the majority of the plan with the assistance of external contactors and consultants.

4.4 Implementation

Environmental Services will co-ordinate the implementation of this strategy and it will be reviewed and actions revised where necessary.

The Shire of Mundaring's Corporate Business Plan (CBP) 2015/16 – 2018/19 has listed $15,000 in 2017/2018 to assist in resources to implement this strategy. The above highlighted items in the table can be prioritised to be completed during that time. This will be written into the internal Project Plan process to assist with timely implementation involving all services required to assist.

5 Link to Strategic Documents

5.1 Link to Corporate Business Plan

Mundaring 2026 – a sense of space a sense of place is the Shire's Strategic Community Plan (SCP).

Community engagement for the Strategic Community Plan 2016- 2026 conducted in October 2015 to February 2016 identified the 'natural environment' as one of four equal key priority areas, along with governance, community and built environment.

The Shire of Mundaring's Corporate Business Plan (CBP) 2015/16 – 2018/19 is a pivotal document that describes how the Shire will give effect to the Strategic Community Plan (SCP) over the next four years. The SCP reflects the community's aspirations for the next ten years, while the CBP shows how the Shire of Mundaring will apply its resources and skills over the next four years towards the SCP implementation.

The CBP lists strategy and planning priorities within each of the services areas including projects to be implemented over the next four years. The Roadside Conservation Strategy (RCS) is listed under the Environmental Service plan and Natural Environment theme.

<table>
<tr><th>Theme</th><th>Year 1 (16/17)</th><th>Year 2 (17/18)</th><th>Year 3 (18/19)</th><th>Year 4 (19/20)</th></tr>
<tr><td rowspan="3">Natural Environment</td><td colspan="2">Reserves Assessment Strategy</td><td></td><td>Wildlife Corridor Strategy review</td></tr>
<tr><td></td><td>Roadside Conservation Strategy</td><td></td><td></td></tr>
<tr><td></td><td colspan="2">Weed Strategy review</td><td></td></tr>
</table>

5.2 Link to Environmental Management Plan

The Environmental Management Plan (EMP) 2012 – 2022 aims to guide the Shire's environmental management activities over ten years in order to protect and enhance the local environment. The Vision for the EMP is to establish a sustainable Shire that demonstrates our corporate and community commitment to the environment and reflects our responsibility to its natural assets for future generations. The EMP identifies six Key Focus Areas (KFAs) based on the themes identified in the 2008 State of Environment Report. The six KFAs are:

- Atmosphere and Climate Change
- Biodiversity
- Heritage
- Human Impact
- Land
- Water.

Each of the KFA includes a background summary, impacts, legislative context, policy linkage, objectives and actions required. Table 3 in the EMP outlines the relationship between the Biodiversity KFA and the requirement for a Roadside Conservation Strategy. The objectives of the Biodiversity KFAs are:

i) to protect, enhance and conserve bushland areas managed by the Shire; and

ii) to work with state government agencies and private land holders to protect, enhance and conserve non-Shire managed bushland areas.

The first objective, listed above, include the protection, enhancement and conservation of bushland verges or roadsides; which is land vested to the Shire of Mundaring. One of the actions to be completed relating to Biodiversity (table 16, point 2.23) is to develop and implement a Roadside Conservation Strategy. This action has a medium timeframe and priority, responsibility is Environment and Engineering, partnership with EAC and the key performance indicator as the strategy completed.

Table 16: Summary of actions to be completed relating to Biodiversity.

	Action	Time-frame	Priority	Responsibility	Partnerships	Key Performance Indicator
2.23	Develop and implement a Roadside Conservation Strategy.	Medium	Medium	Environment/ Engineering	EAC	Strategy completed

5.3 Link to the Environmental Advisory Committee (EAC)

The Shire's Environmental Advisory Committee (EAC) consists of up to fifteen members from the community, local Friends Groups and elected Council members. The committee meets once a month to discuss matters of an environmental nature that affect the Shire and the community.

The EAC's Terms of Reference are:

- To advise Council on community opinion and attitude on environmental issues within the Shire of Mundaring
- To work within the community to encourage an environmental ethic
- To consider and provide recommendations to Council on any matter referred to it by Council
- To, subject to Council direction, conduct functions and activities involving the community to create environmental awareness, canvass issues and/or gain community opinion it deems necessary.

The EAC members have a direct interest in the development and implementation of a Roadside Conservation Strategy.

5.4 Legislation

Road management in Western Australia is governed by the following relevant legislation:

- The Commissioner of Main Roads has responsibility for roads in Western Australia as set out in the Main Roads Act 1930 and the Road Traffic Act 1974 (including the Road Traffic Code 2000).
- Local governments have responsibility for roads as defined in the Local Government Act 1995.

Below is a list of legislation and planning frameworks relevant to this Roadside Conservation Strategy.

Federal Level

i) Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the Act as matters of national environmental significance. The Act is administered by the Federal Department of the Environment (formerly Department of Sustainability, Environment, Water, Population and Communities).

Any proposal that could have a significant impact on the environment (i.e. those matters listed under the EPBC Act) is required to be referred to the Minister for the Environment. Within the Shire of Mundaring there are 29 Threatened Species, six Migratory Species, two Threatened Ecological Communities and one National Heritage Place listed as Matters of National Environmental Significance. Of these 29 Threatened Species, five are bird species, six are mammal species, and 18 are plant species. Of the six Migratory Species, one is a marine bird, two are terrestrial species, and three are wetland species. Many of these listed species rely on specific habitat requirements and have the potential to occur within roadsides.

State Level

i) Wildlife Conservation Act 1950

The Wildlife Conservation Act 1950 provides for the listing of threatened native plants and threatened native animals that need to be specially protected because they are under identifiable threat of extinction, are rare, or otherwise in need of special protection. The Act is administered by the Western Australian Department of Parks and Wildlife (DPaW) (formerly Department of Environment and Conservation). Under the Act there are 46 taxa having a priority conservation status and 21 specially protected (threatened) fauna in the Shire of Mundaring. Many of these listed species rely on specific habitat requirements and have the potential to occur within roadsides.

ii) Environmental Protection Act 1986

The Environmental Protection Act 1986 (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. It provides for an Environmental Protection Authority (EPA), for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the above. Under this act, all clearing of native vegetation requires a permit unless it is for an exempt purpose. The requirements for a permit are outlined in Schedule 2 of the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. The Act is administered by the Department of Environment Regulation (DER) (formerly Department of Environment and Conservation).

iii) Conservation and Land Management Act 1984

The Conservation and Land Management Act 1984 provides for the better protection and management of certain public lands and waters, and the flora and fauna thereof. The Act is administered by the Department of Parks and Wildlife (DPaW) (formerly Department of Environment and Conservation).

iv) Land Administration Act 1997

The Land Administration Act 1997 provides the legislative framework which is used in the dedication and management of roads. Within the Shire of Mundaring, road reservations are commonly created through subdivision of freehold land, whereby the land is vested to the Local Government for management.

v) Directions 2031 and Beyond & Outer Metropolitan Perth and Peel Sub-regional Strategy

These two documents set out broad planning strategies for the long-term development of the Perth Metropolitan area. These documents include an urban expansion program, which seeks to ensure urban growth occurs at the right time and in the right locations.

With the exception of what has already been zoned urban and urban deferred under the Metropolitan Regional Scheme, there is minimal land being investigated for future urban use. The two main urban developments that will greatly impact on the natural environment are the North Parkerville and North Stoneville Townsites. These documents discuss the future expansion of major transport routes which has relevance to roadside conservation in the study area. These include the Perth-Adelaide Highway and the Hills Spine Route.

vi) Metropolitan Regional Scheme

The Metropolitan Region Scheme is the overarching planning document that guides development and zoning of land in the Perth Metropolitan Area. It divides the metropolitan area into broad zones and reserves and guides what is set out in local planning schemes.

The Shire of Mundaring is located over the rural urban interface, which is roughly delineated by the Darling Scarp. Lack of reticulated sewer, transport corridors and difficult terrain, limits urban zoning to the Swan Coastal Plain and around town centres.

Local Level

i) Local Planning Strategy and Local Planning Scheme No.4

The Shire of Mundaring's Local Planning Strategy (LPS) and Local Planning Scheme No.4 (LPS4) were gazetted in February 2014. These two documents increase the level of environmental protection of local natural areas through more stringent clearing provisions and development setbacks. LPS4 also sets out detailed zones and reserves across the Shire of Mundaring, and scheme provisions regulate the subdivision of land and developments. Prior to LPS4, Town Planning Scheme No.3 (TPS3) was the current local planning document that guided development in the Shire of Mundaring. TPS3 was in operation from 1994 to early 2014. In 1999, the Shire of Mundaring commenced a review of TPS3 which bought into existence the new Local Planning Strategy (LPS) and Local Planning Scheme No.4 (LPS4).

ii) Local Biodiversity Strategy

In early 2010, Shire of Mundaring Council resolved to adopt a Local Biodiversity Strategy (LBS). The purpose of the LBS is to protect, manage and/or retain local natural areas that are not included in conservation estates. Although this strategy is not a statutory document, it has been integrated into the Local Planning Strategy and Local Planning Scheme No. 4.

iii) Thoroughfares Local Law – (Activities on Thoroughfares and Trading in Thoroughfares and Public Places Local Law)

This law sets out the permissible uses of a verge area, including the removal of vegetation.

iv) Rate Payers Use of Natural Bush Reserves Policy

Like the Thoroughfares Local Law, this policy details some of the permissible uses of a verge area, including burning off and parking.

6 Importance of roadside vegetation

The RCS highlights the importance of roadside vegetation and outlines key issues that threaten the persistence of valuable roadside vegetation both now and into the future. The RCS seeks to identify roads, vested to the Shire of Mundaring, which exhibit environmental values that are in need of protection, enhancement and maintenance. Much of the Shire's roadsides contain environmental features and vegetation that are worthy of protection due to the rich biodiversity and ecological corridor they provide for many local fauna species.

Last representation of vegetation

Approximately 8000 species of native flora are thought to occur within the south-west of WA, of which approximately 70% are locally endemic. Extensive clearing over the last two hundred years has had an irreversible impact to native vegetation within this region. Of the 25,091,622ha of original bushland across WA's agricultural zone, only 30% remains. This large-scale clearing has resulted in fragmented native vegetation communities, which in some cases has left mosaics of man-made biological islands. In some areas, remnant vegetation within the road reserve is the only remaining vegetation left in the landscape, which has provided a refuge for threatened and endangered plant species that may not be found anywhere else. Fifty-three percent of Declared Rare Flora (DRF) has at least one population on a roadside and three species are known only to exist in roadside populations. Within the Shire of Mundaring, there are four known locations of DRF occurring in road reservations.

Connecting Bushland Remnants

Extensive clearing across the south-west has resulted in a highly fragmented landscape, with only small pockets of remnant vegetation remaining. Vegetation corridors contained within road reserves serve to connect these remnant pockets, allowing the movement of fauna and biological material (plant seeds, pollen etc.) between larger areas of native bush. Some pockets of remnant bush are too small to support a population of fauna; however an area can support a native fauna population when linked via roadside vegetation corridors.

Habitat for Native Fauna

Roadside vegetation provides habitat to native fauna, particularly in areas where vegetation is scarce. The Shire of Mundaring contains approximately 207 species of native fauna, seventeen of which are listed as threatened or priority fauna under the Wildlife Conservation Act 1950, and sixteen listed as threatened under the *Environmental Protection and Biodiversity Conservation Act 1999*.

Three of these threatened species are *Calyptorhynchus banksia naso* (Forest Red-tailed Black Cockatoo), *Calyptorhynchus baudinii* (Baudin's Black Cockatoo) and *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo). These birds rely on large hollows in trees for habitat, including those found in road reserves.

Aesthetics and Human Health

Part of the attraction to the Mundaring Shire is the "hills lifestyle" and connection to nature. Vegetated roadsides provide screening to development and reinforce the natural/rural aesthetic of the hills. Research has also shown that vegetated road reserves reduce stress when driving. Roadsides containing a high level of flowering shrubs can also be utilised in an economic capacity, in attracting tourists to the region. Roadside vegetation also provides windbreaks and stock shelter for adjoining landowners, as a well as providing shade for to reducing the urban heat island effect.

6.1 History

6.1.1 Roadside Conservation Survey and Report

Background of survey

In September 2007, the Shire of Mundaring, with assistance from the Roadside Conservation Committee (RCC), undertook a roadside survey and mapping program to determine the conservation status of roadsides within the Shire. The survey was conducted between September and November 2007 and recorded information about and mapped high, medium and low quality native vegetation areas and weeds on the roadside. The study area only included non-urban roads. See Appendix 1 for maps of the survey area and the roadside conservation values.

Survey Methodology

Roadside surveys were undertaken in a vehicle, where the passenger recorded roadside attributes using a held-held personal computer. The survey information was then returned to the Roadside Conservation Committee where it was analysed and mapped.

The methods for assessing conservation values were based on the document *Assessing Roadsides: A Guide for Rating Conservation Value*. The process involved scoring against pre-defined attributes, which combined, formed the overall conservation status.

The following six attributes were used to measure conservation value:

- Structure of native vegetation on roadside;
- Extent of native vegetation along roadside;
- Number of native species;
- Level of weed infestation;
- Value as a biological corridor; and
- Predominant adjoining land use.

Each of those 6 attributes was given a score between 0 to 2 points. Their combined score then provided a conservation value score ranging between 0 – 12. The conservation value corresponded to a category which represented the roadside's overall conservation status, as summarised below:

Conservation Value	Conservation Status	Colour Code
9 – 12	High	Dark Green
7 – 8	Medium High	Light Green
5 – 6	Medium Low	Dark Yellow
0 – 4	Low	Light Yellow

To increase the usability of the data, the following attributes were also assessed during the survey. *Note: these did not contribute to the conservation value score.*

- Width of road reserve
- Presence of utilities/disturbances
- General comments
- Presence of 6 nominated weeds (African Lovegrass (*Eragrostis curvula*); Bridal Creeper (*Asparagus asparagoides*); Flinders Range Wattle (*Acacia iteaphylla*); Tagasaste

(*Chamaecytisus palmensis*); Watsonia (*Watsonia sp.*); and Flaxleaf Broom (*Genista linifolia*))

- Presence of Jarrah habitat trees.

A total of approximately 234.7km of roads were surveyed and assessed of the potential 1636km of roadside vested to the Shire of Mundaring. The area surveyed represents the majority of non-urban roads. The full results of this survey are contained in Appendix 2.

6.2 Summary of Roadside Conservation Survey Results

Below is a summary of the results from the Roadside Conservation Survey.

Roadside Conservation Status

The roadside conservation values and the overall conservation status of the surveyed roadsides in Shire of Mundaring were based on six attributes, these being: structure of native vegetation on roadside, extent of native vegetation along roadside, number of native species, level of weed infestation, value as a biological corridor, and predominant adjoining land use.

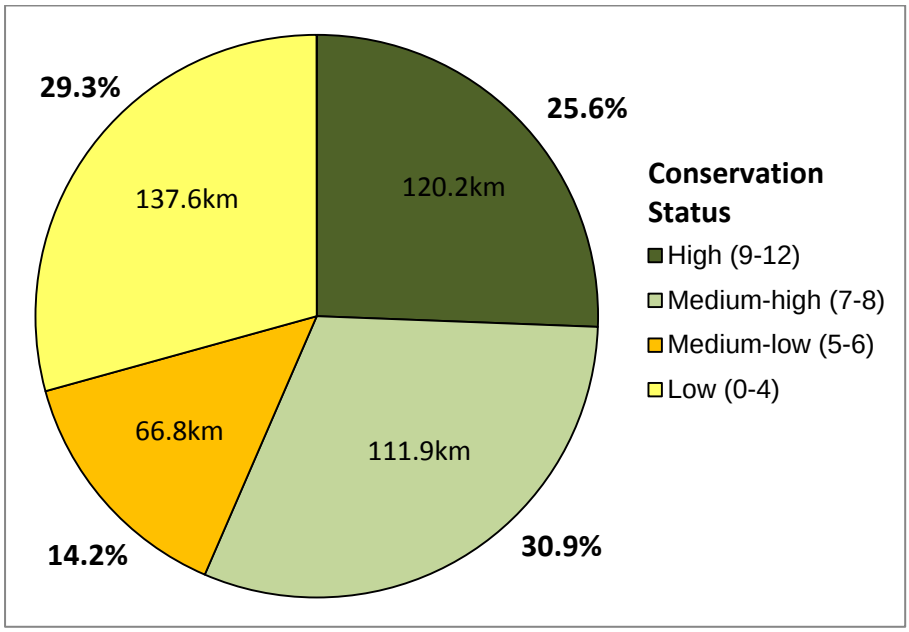


Figure 1. Sum total of roadside conservation values and the overall conservation status in Shire of Mundaring study area.

Extent of Native Vegetation Cover

The extent of native vegetation refers to the density of the roadside vegetation and takes into account the presence of disturbances such as weeds. The percentage cover excludes weed presence in the percentage cover estimate.

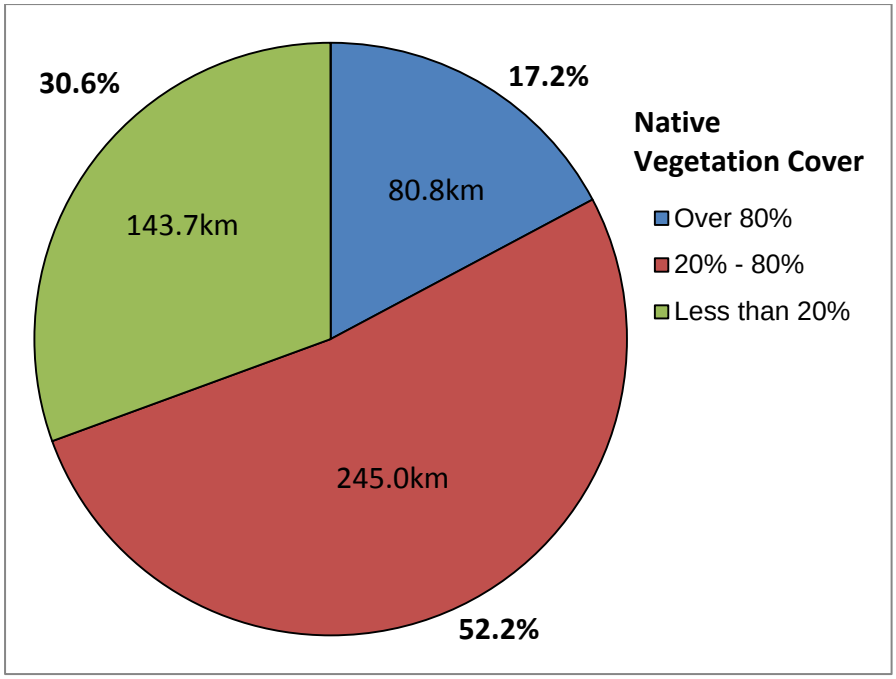


Figure 2. Extent of native vegetation in roadsides in the Shire of Mundaring study area.

Weed Infestation

The level of weed infestation along the surveyed roadsides varied from light (less than 20% cover) to heavy (greater than 80% cover).

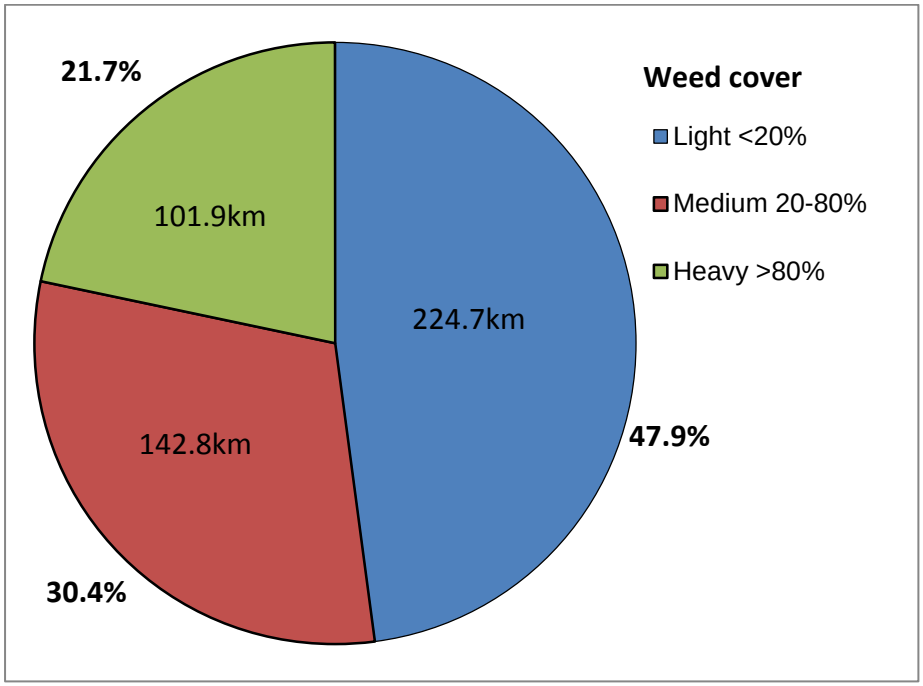


Figure 3. Weed infestation along roadsides in the Shire of Mundaring study area.

Value as Biological Corridor

This characteristic considered the presence of four attributes: connection of uncleared areas; presence of flowing shrubs; presence of large trees with hollows, and presence of hollow logs.

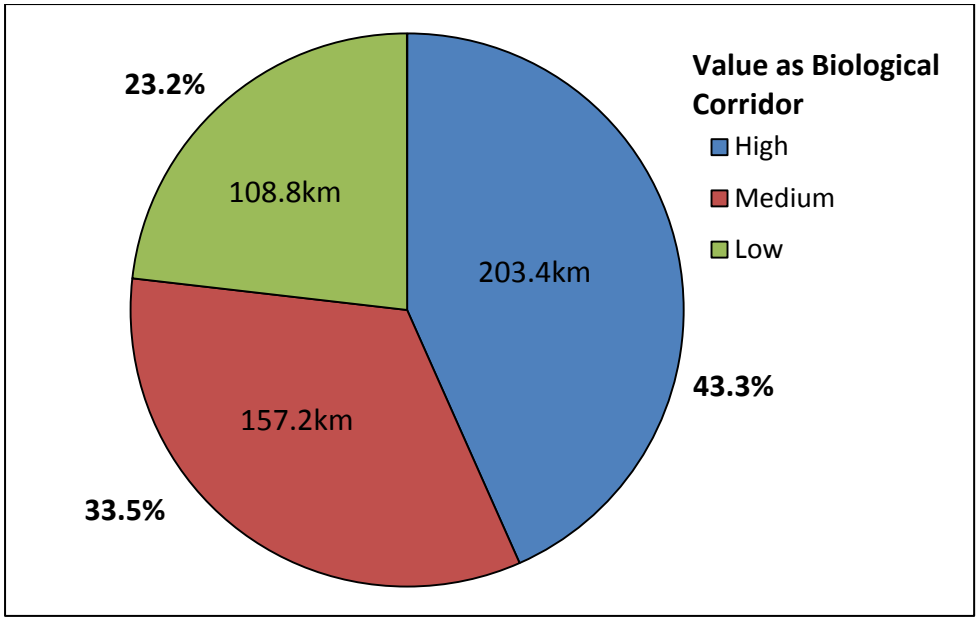


Figure 4. Roadside vegetation value as a biological corridor in the Shire of Mundaring study area.

Predominant Adjoining Land Use

The predominant land use adjoining the surveyed roadsides varied greatly. The adjoining land use can impact significantly on the status of the roadside due to the edging effect and associated works of that land use.

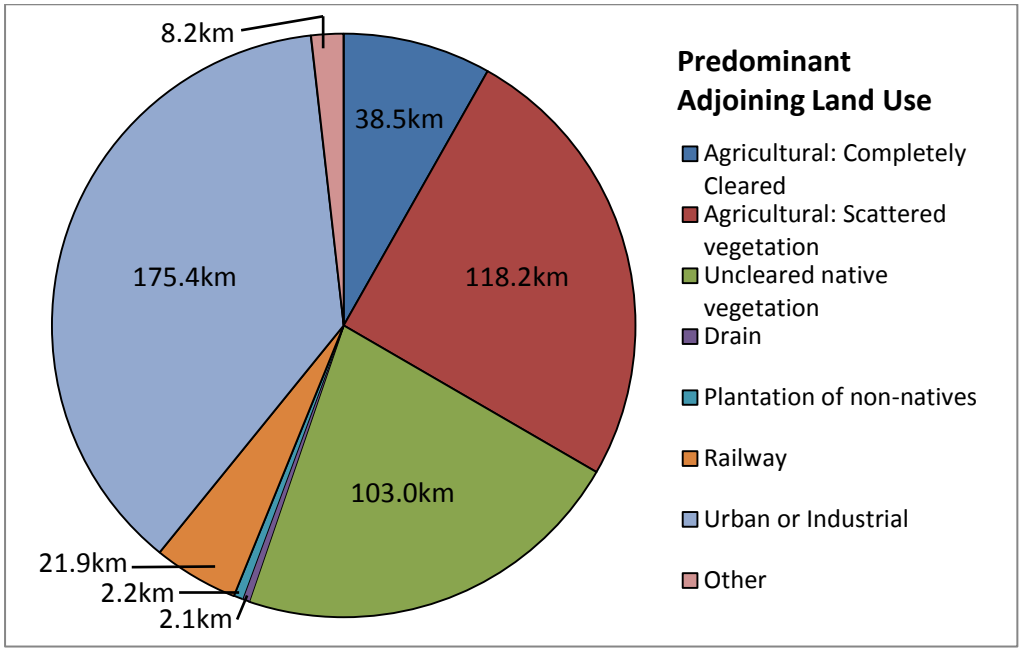


Figure 5. Predominant adjoining land use in the Shire of Mundaring study area.

Width of Vegetated Road Reserve

The width of vegetated roadside was recorded by selecting one of four categories: 1-5 metres, 5-20 metres, over 20 metres in width or unknown. The left and right hand sides were recorded independently, and then combined to establish the total figures.

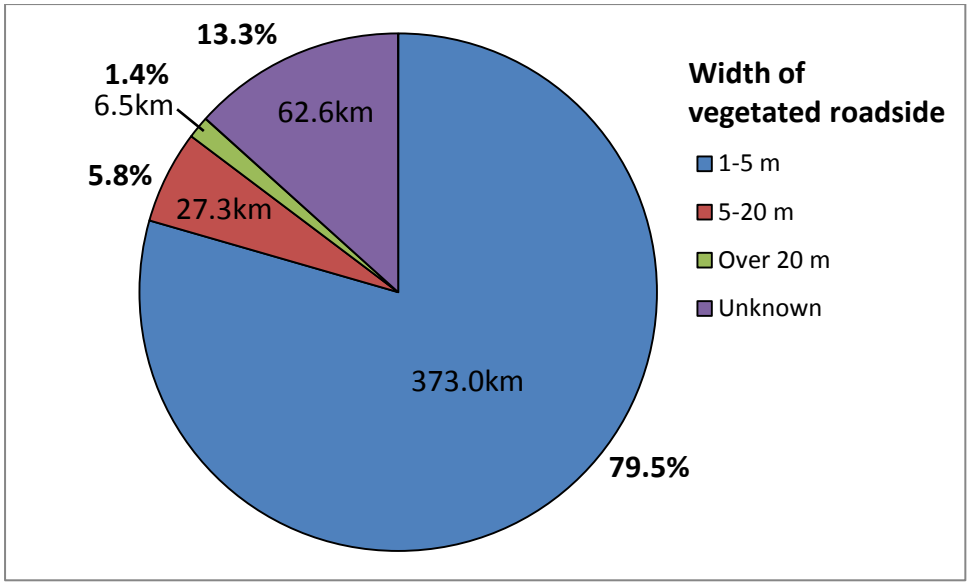


Figure 6. Width of vegetation on roadsides in the Shire of Mundaring study area.

Roadside Conservation Value Categories

High conservation value roadsides are those with a score between 9 and 12, and generally display the following characteristics:

- intact natural structure consisting of a number of layers, i.e. ground, shrub, tree layers;
- extent of native vegetation greater than 80%, i.e. little or no disturbance;
- high diversity of native flora, i.e. greater than 20 different species;
- few weeds, i.e. less than 20% of the total plants; and
- high value as a biological corridor, i.e. may connect uncleared areas, contain flowering shrubs, tree hollows and/or hollow logs for habitat.

Medium-high conservation value roadsides are those with a score between 7 and 8, and generally have the following characteristics:

- generally intact natural structure, with one layer disturbed or absent;
- extent of native vegetation between 20 and 80%;
- medium to high diversity of native flora, i.e. between 6 and 19 species;
- few to half weeds, i.e. between 20 and 80% of the total plants; and
- medium to high value as a biological corridor.

Medium-low conservation value roadsides are those with a score between 5 and 6, and generally have the following characteristics:

- natural structure disturbed, i.e. one or more vegetation layers absent;
- extent of native vegetation between 20 and 80%;
- medium to low diversity of native flora, i.e. between 0 and 5 species;
- half to mostly weeds, i.e. between 20-80% of total plants; and
- medium to low value as a biological corridor.

Low conservation value roadsides are those with a score between 0 and 4, and generally have the following characteristics:

- no natural structure i.e. two or more vegetation layers absent;
- low extent of native vegetation, i.e. less than 20%;
- low diversity of native flora, i.e. between 0 and 5 different species;
- mostly weeds, i.e. more than 80% of total plants, or ground layer totally weeds; and
- low value as a biological corridor.

Conservation Status

The conservation status category indicates the combined conservation value of roadsides surveyed in the Shire of Mundaring. Roadside sections of high conservation value covered 25.6% (120.1km) of the roadsides surveyed. Medium-high conservation value roadsides accounted for 30.9% (144.9km) of the total surveyed, medium-low conservation roadside covered 14.2% (66.8km) of the total roadsides surveyed. Roadsides of low conservation value occupied 29.3% (137.6km) of the roadsides surveyed.

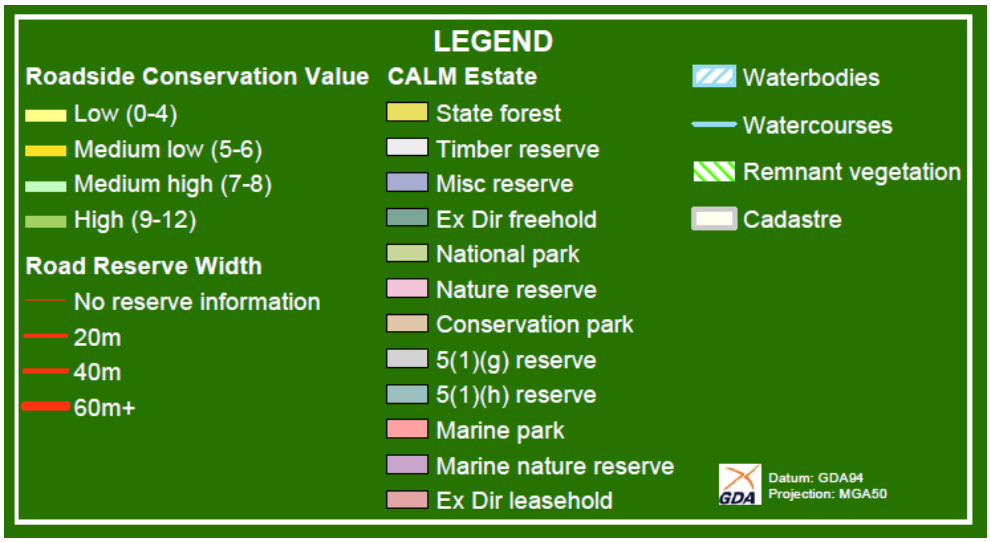
7 Appendices

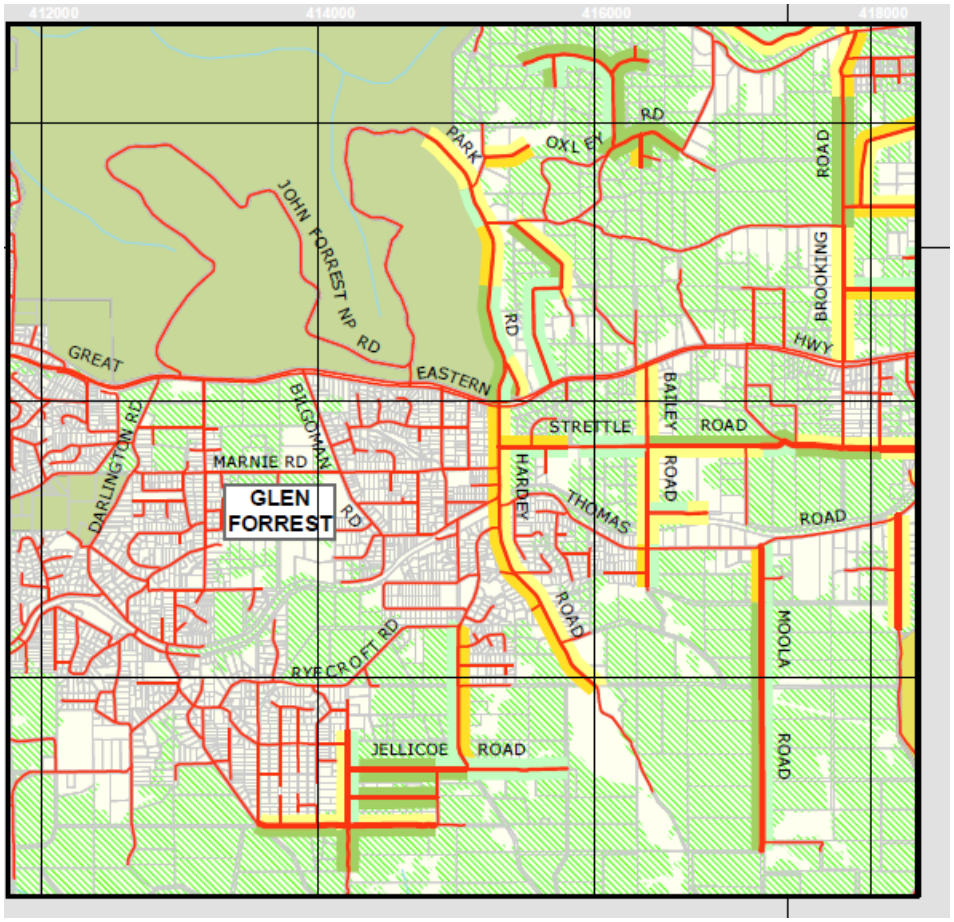
Appendix 1 - Maps of Roadside Conservation Survey Area

Appendix 2 – Roadside Vegetation and Conservation Values in the Shire of Mundaring.

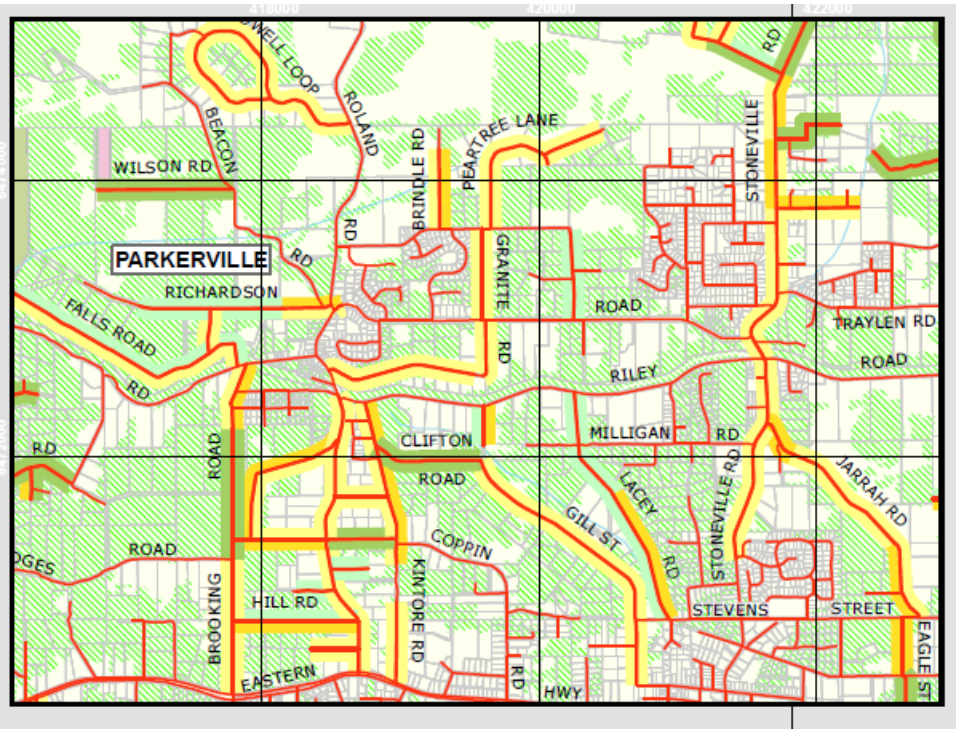
7.1 Appendix 1: Maps of Roadside Conservation Survey Area

These maps show the Roadside Conservation Value assigned to each road surveyed in the Shire of Mundaring.

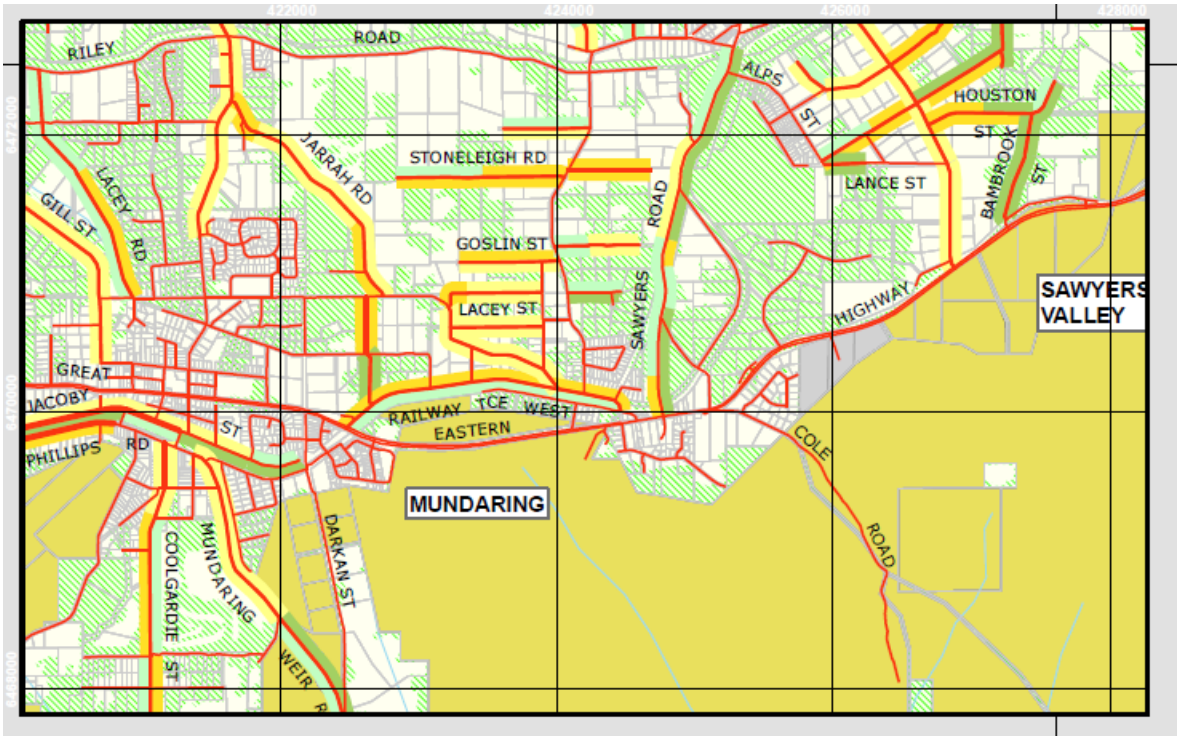




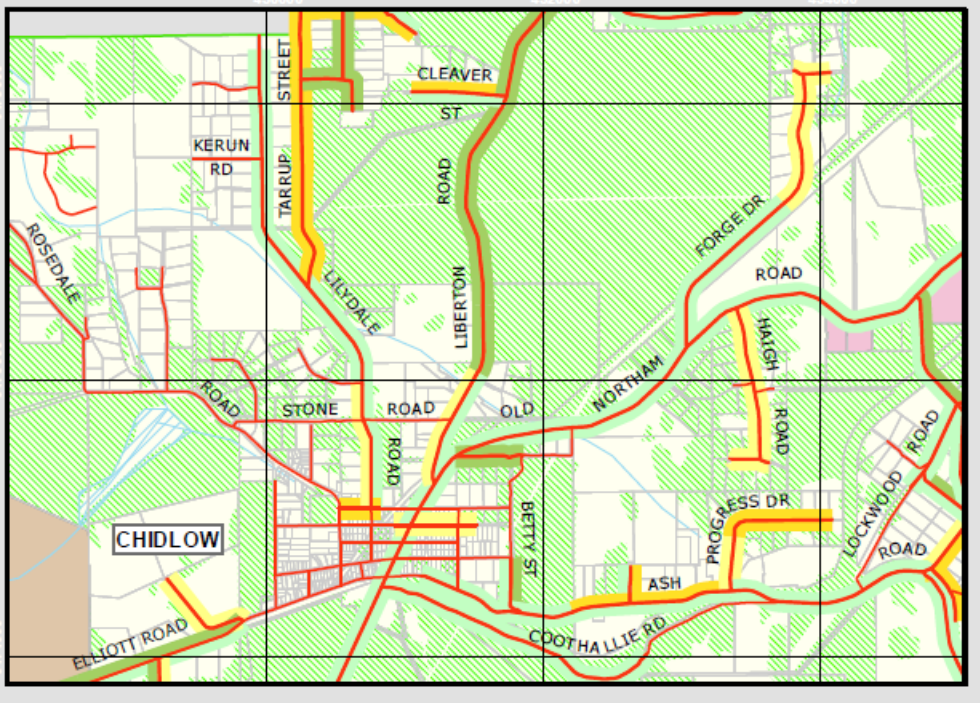
Glen Forrest



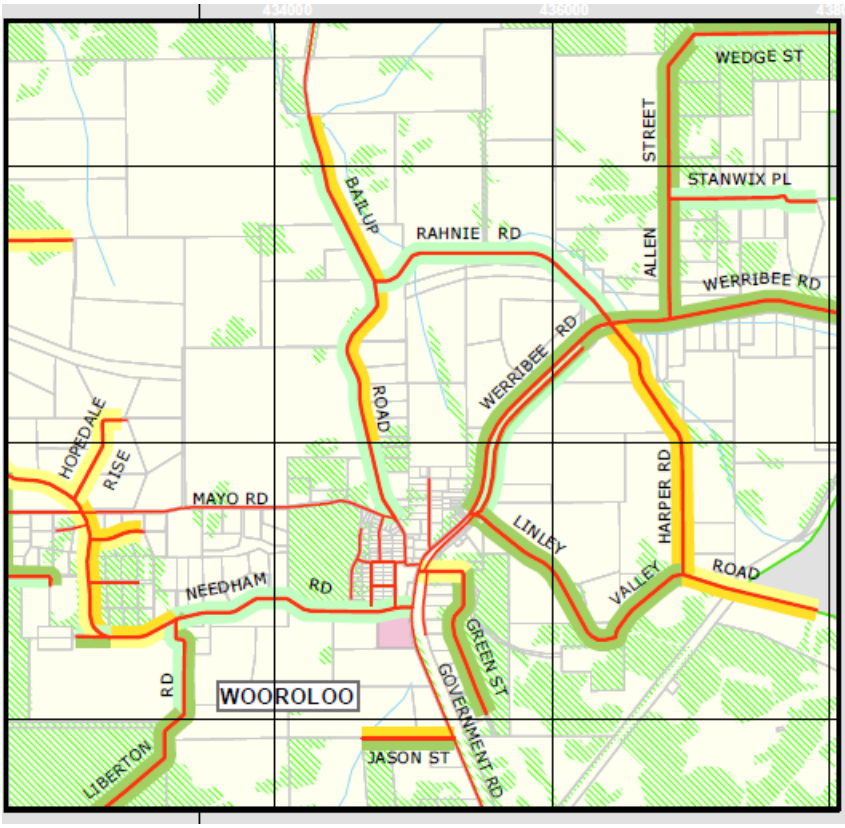
Parkerville



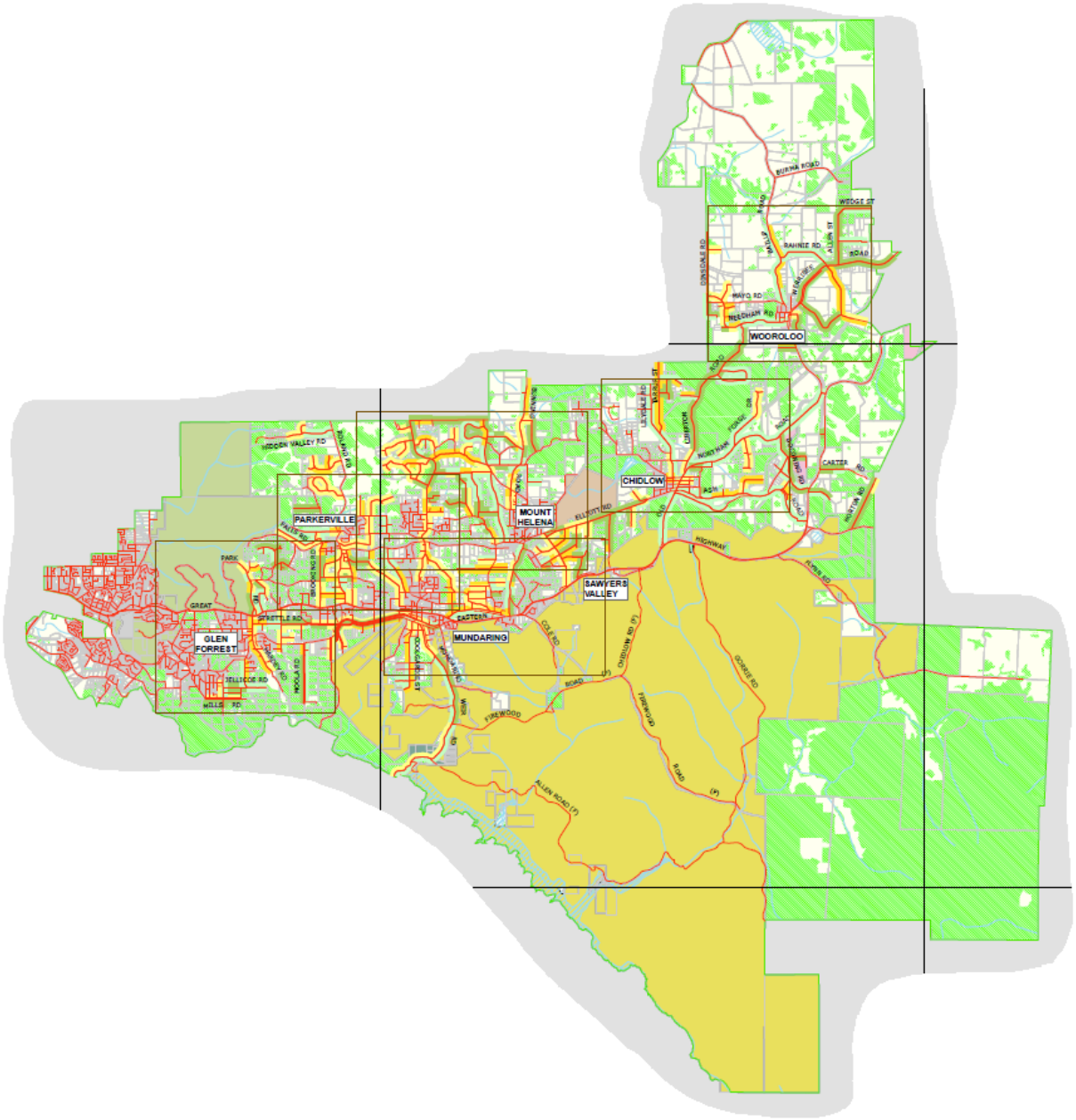
Mundaring



Chidlow



Wooroloo



Overall Shire of Mundaring map.