Management Plan for the Ruabon – Tutunup Rail Reserve

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Prepared for the Ruabon Tutunup Rail Reserve Preservation Group



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Limitations Statement

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Summary

The Ruabon – Tutunup Rail Reserve is located on the Swan Coastal Plain, approximately 13 km east of Busselton, 250kms south of Perth, Western Australia. The railway line was the first rail network in the South West and was used for timber transport from 1871 to 1986. It is just under 80 ha in area and runs for 16 kms.

The Ruabon Tutunup Rail Reserve Preservation Group (R-TRRPG) is a sub-committee of the Vasse-Wonnerup Land Conservation District Committee (LCDC), represented by local landowners, the Shire of Busselton, DEC, Vasse Wonnerup LCDC, Iluka, Cable Sands and GeoCatch. This group is the current management body for the reserve.

The Reserve is of state, regional and local biodiversity conservation significance as it contains remnant populations of flora communities that have been heavily cleared throughout the south-west of Western Australia. This includes the Southern Ironstone Threatened Ecological Community (TEC), several species of threatened flora and habitat for a number of threatened fauna.

The objective for the management of the Ruabon – Tutunup Rail Reserve is to protect and enhance the conservation values of the Reserve while ensuring the safety of the adjoining landowners and users of the road.

The physical environment of the reserve is described (including its geomorphology, soils, fire and linkages) as is its biological environment (vegetation, flora and fauna). The following table summarises the conservation values of the reserve.

Level	Description
Species	• 8 threatened and 13 priority flora species • 5 threatened and one priority vertebrate fauna species • 389 local native flora species • 63 identified native vertebrate fauna species
Communities	• 2 Threatened Ecological Communities • Supports vegetation complexes with little remaining extent • Conserves vegetation complexes under represented within the reserve system of Western Australia.
Landscape	• Provides a vital vegetation corridor for species to disperse in a largely cleared landscape. • Is one of only two vegetation links remaining from the scarp to the coast (and is in much better 'condition')

The reserve also has significant Aboriginal and European heritage issues, and although these aspects are included within this plan, it is recommended that further information on both these values are obtained and incorporated into future plans.

Threatening processes to the conservation values of the reserve include:

- introduced plants and animals;
- incompatible land management and use;
- inappropriate fire regimes and management; and
- *Phytophthora* dieback disease

For management, the reserve is divided into 18 zones. These zones are based on their vegetation and the ability to manage impact of fire on the reserve.

Management actions within this plan are classed as general recommendations, which refer to the overall management of the reserve, and specific zone recommendations, where the actions relate only to their individual zone.

Eighty two recommendations are made; 16 General and 66 Zone specific. Each recommendation is prioritised as High, Medium or Low, based on the conservation values they are intended to address. These actions are further prioritised into broad work priorities, with implementation schedules suggested of less than 2 years, 2-5 years and 5-10 years. It is noted that these priorities and schedules are only suggestions and specific management actions are not solely dictated by conservation priority, but by factors such as availability of people, materials and funding, societal values of landowners along the reserve, opportunistic availability of specialised funding (e.g. heritage funding) as well as the impact and severity of specific threatening process at any one site along the reserve.

The Plan highlights as set of procedures for a list of activities that may or potential occur within the reserve to ensure that on-ground actions are conducted consistently and legally. This will also ensure that the management body is a fundamental link for any actions that impact the reserve.

It is recommended that the management plan should be reviewed in 2011 (five years) with new information incorporated and redundant or outdated information archived.

Figures and appendices are attached as separate documents and a digital copy of this report has been prepared and provided to the R-T RRPG. This digital version includes the hyperlinks to the appendices, figures and additional photographs.

1) INTRODUCTION

a) Overview

The Ruabon – Tutunup Rail Reserve (hereafter called the Reserve) is located on the Swan Coastal Plain, approximately 13 km east of Busselton, 250kms south of Perth, Western Australia (Figure 1). The rail reserve and its adjoining road and drainage reserves have regional historical significance. The railway line was the first rail network in the South West and was used for timber transport from 1871 to 1986.

The Reserve is of state, regional and local biodiversity conservation significance as it contains remnant populations of flora communities that have been heavily cleared throughout the south-west of Western Australia. This includes the Southern Ironstone Threatened Ecological Community (TEC), several species of threatened flora and habitat for a number of threatened fauna.

The Ruabon – Tutunup Rail Reserve Preservation Group (R-TRRPG) is a local volunteer group that has played a key role in the past and current management of the Reserve. This group consists of local landholders, the Department of Environment and Conservation (DEC), mining companies (Iluka & Cable Sands), the Busselton Shire Council and the Geographe Catchment Council. The group is a sub-committee of the Vasse-Wonnerup Land Conservation District Committee (LCDC).

b) Objective

The objective for the management of the Ruabon – Tutunup Rail Reserve is to protect and enhance the conservation values of the Reserve while ensuring the safety of the adjoining landowners and users of the road. Management strategies within this plan are based on the principle that the safety concerns of landowners and users are considered without negatively impacting on the high conservation values of the Reserve. The management plan is intended to be reviewed every five years.

c) Purpose of the Plan

This plan outlines the values within the Reserve and the threats to those values. The physical environment and the process that shape it are described. Management zones are defined and values and threats are defined to highlight priority areas. Strategies are outlined to protect those values and mitigate potential threats. Actions are determined and works plan is proposed for both short term (1-3 years) and long term (3-10 years).

d) The Planning Process and Community Involvement

The Ruabon Tutunup Rail Reserve Preservation Group (R-TRRPG) is a sub-committee of the Vasse-Wonnerup Land Conservation District Committee (LCDC), represented by local landowners, the Shire of Busselton, DEC, Vasse Wonnerup LCDC, Iluka, Cable Sands and GeoCatch. This group is the current management body for the reserve.

Although the group has a suitable mix of local knowledge and technical expertise on issues that face the reserve, it currently does not have any official standing. This group should be formally constituted and its role, scope and responsibilities acknowledged through a Memorandum of Understanding (MOU) and an appropriate terms of reference with the Shire of Busselton. It is through this group that the plan should be implemented. A minimum of two meetings per year should be conducted and procedures developed to ensure that the results from those meetings, particularly those related to on- ground activates, are used to inform the local community.

e) The Vision for the Reserve

Previous community workshops have highlighted the values within the reserve. These are listed below (not in any specific order).

- The rare flora and threatened ecological community;
- A sealed road providing access;
- Historical values associated with the railway line and the rail sidings;
- Habitat values for many native animals;
- As a vegetated link providing access and usage for native wildlife;
- Provides an identity for the local area;
- Wildflowers can provide tourism values; and
- The Ruabon Nature Reserve.

2) THE RESERVE

a) Overview

The reserve is located on the Swan Coastal Plain, approximately 13 km east of Busselton, 250kms south of Perth, Western Australia. The reserve itself is actually a number of reserves consisting primarily of:

- Reserve 13136 – a C-class reserve vested with the Western Australian Government Railways Commission;
- Reserve 12969 – a C-class reserve vested with the Western Australian Government Railways Commission;
- The adjoining road reserve which is vested with the Shire of Busselton; and
- Numerous drainage lines that are vested with the Water Corporation.

Reserve 13136 covers an area of 25.53 ha and runs for 4.744 kms from Bussell Highway, parallel to Ruabon Road. The portion of Reserve 12969 that is part of this plan, runs for 11.36 kms from the end of Reserve 13136 to Cartis siding, and covers an area of 52.95 ha (Figure 2). Reserve 12969 continues for a further 2.7 kms and covers an additional 15.5 ha of the rail line towards Jarrahwood, however this area is not part of this management plan.

The reserve also adjoins the Ruabon Nature Reserve, which consists mainly of Reserve No: 33269, which is a C-class nature reserve vested with the Conservation Commission. It also includes the old Ruabon rubbish tip (Reserve 32205) and a drainage reserve vested with the Water Corporation. This 37ha reserve is managed by the DEC. Its management is not considered as part of this plan, however any conservation actions within the reserve and the Nature Reserve should be considered together, especially in those areas where the two areas adjoin.

There have been approaches to the Western Australian Government Railways Commission (WAGRC) for the vesting of Reserves 13136 and 12969 to be transferred to the Conservation Commission of Western Australia, due its high conservation values. This has not occurred, however to enable the Ruabon – Tutunup Rail Reserve Preservation Group to undertake management actions within the rail reserve, a 10 year licence to occupy agreement has been signed between WAGRC and the Shire of Busselton. This became effective as of the 1st of November 1998 and refers to all of Reserve 13136 and Reserve 12969 to Cartis Siding. Note that this licence expires on the 31st October 2008.

b) Status of the Plan

Once the draft plan has undergone a formal 28 day public comment period, it will be recommended to council for adoption as a formal plan of management by the Shire of Busselton.

3) PHYSICAL ENVIRONMENT

a) Geomorphology and soils

Geologically, the reserve is located on the Bunbury Trough unit of the southern Perth Basin, a graben (a depressed block of land bordered by parallel faults) lying between the Yilgarn Craton to the east and the Leeuwin Complex to the west. The Bunbury Trough is a deep graben bounded by the Darling fault and the Busselton Fault and contains up to 8,000 metres of sediments (Playford, Cockbain *et al.*, 1976).

The state has been divided into a number of areas, defined by their landscape character type. The reserve is situated in the landscape character type referred to as the Swan Coastal Plain (Department of Conservation and Land Management, 1994). The Swan Coastal Plain is a narrow strip of land that abuts the western edge of the Darling Plateau and slopes westward towards the Indian Ocean. There are three distinct landforms on the Swan Coastal Plain; foothills, alluvial plains and successive coastal dunes systems (Department of Conservation and Land Management, 1994; Weaving, 1998). The Reserve is situated on the alluvial plain and Bassendean Dune system. The alluvial plain is made up of riverine materials with pale soils and to the west of this is the Bassendean Dune system, which is an accumulation of beach sands along an ancient shoreline. These dunes are formed into low areas of pale grey quartz sands, interspersed with sand flats and seasonal swamps (Weaving, 1998). The area of the Reserve also has significant areas of ironstone, which form hard crusts on the soil surface.

A hierarchy of soil-landscape mapping has been adopted by the Department of Agriculture to maintain a consistent approach to land resource assessment and survey. The hierarchy begins classifying areas into provinces, then zones and then systems. Zones are areas defined by geomorphological criteria and are mapped at a scale of 1: 1,000,000. The reserve is within two of these zones; Swan Coastal Plain Zone and the Donnybrook Sunkland Zone. The Donnybrook Sunkland Zone consists of a landscape that is level to undulating, formed on Cretaceous and Jurassic Perth Basin sedimentary rocks. This ends at the Whicher Scarp, a low (60-120m) scarp which separates the Blackwood Plateau and the Swan Coastal Plain. The Swan Coastal Plain Zone is a flat to gently undulating plain, approximately 15 kms wide and extending eastward from Dunsborough. It is formed on Quaternary marine, alluvial (riverine) and aeolian (wind) sediments (Tille and Lantzke, 1990).

Soil-Landscape Systems are the next level down the hierarchy and are areas with recurring patterns of landforms, soils and vegetation and have been mapped at a scale of 1:250,000 (Tille and Lantzke, 1990; Weaving, 1998). Five Soil-Landscape systems are located within the reserve:

- Abba System – poorly drained flats on the southern swan coastal Plain. Main soils are grey, deep sandy duplex and wet soils. The typical vegetation type is jarrah-marri-paperbark woodlands.
- Bassendean System – Dunes flats and swampy depressions on the Swan Coastal Plain with pale deep sand. Main vegetation types are Banksia woodlands and heath on dunes and paperbarks on flats.
- Cartis System – Gentle footslopes at the base of the Whicher Scarp. Principal soils are pale deep sand and yellow deep sand. Vegetation is mainly jarrah-marri-banksia.
- Goodwood Valley System – Valleys of the Donnybrook Sunkland with sandy gravel, loamy gravel and deep sands. The principal vegetation is jarrah-marri forest and woodland.
- Whicher Scarp System – low scarp and raised platform and the northern edge of the Donnybrook Sunkland. Main soils include sandy gravel, pale deep sands, loamy gravel and non-saline wet soils. The vegetation is mainly jarrah-marri forest (Tille and Lantzke, 1990; Weaving, 1998).

Spatial analysis of the reserve boundaries shows the break up of soil-landscapes as follows:

- 75% (59.18 ha) of the Abba system
- 12% (9.8 ha) of the Goodwood Valley System
- 10% (7.5 ha) of the Bassendean System
- 2% (1.2 ha) of the Cartis System; and
- 1% (0.8 ha) of the Whicher Scarp System.

This has consequences for the value of the vegetation of the reserve. This is discussed in detail in Section 4a).

b) Fire

Fire influences the majority of Australian terrestrial ecosystems and many endemic Australian species are threatened by inappropriate fire regimes (State of the Environment Report, 2001). Fire is a natural environmental factor which can decrease, maintain or enhance the native vegetation, depending on the nature of the fire regime and the ecosystem properties. Fires burn differently in different vegetation types, even when they have the same fuel load and are adjacent to one another; similar fires can have very different effects (Whelan, 1995).

A fire regime is the sequence of fires typical of a given area (Lindenmayer and Burgman, 2005) and has four key components (Gill, 1975):

1) fire intensity;
2) fire type (e.g. crown or ground fire);
3) between fire interval (or frequency); and
4) season.

Each one of these components has an impact on the vegetation. The ideal would be to replicate the fire regime that existed in the past. However, with the changing land uses and fragmentation of bushland area, natural fire regimes have significantly changed in most areas. With fragmentation come increased disturbance from surrounding areas and increased weed invasion. The invasion of small bush areas by weeds, especially herbs and grasses, has led to dramatic changes in the types of fuels available for fires. Grasses that dry off in summer provide a greater quantity of fine fuels which will easily carry a fire. After burning, these grasses return in greater abundance, thus making the fire problem worse. It is usually difficult to determine what the original fire regime might have been for a particular vegetation type and although much of Australia's vegetation is adapted to cope with fire, it has not necessarily evolved with the current fire regimes.

There are two ways in which plants respond to fire:

- The whole plant is killed and a new generation grows from the seeds (these are called Reseeders);
- Only parts of the plant are killed and new growth arises from stems or rootstocks under the ground (called Resprouters) (Hussey and Baxter, 2006).

The biology of the plants is only one aspect, fire effects are also dependant upon the:

- Fire frequency;
- Fire intensity;
- The time of year.

Fire Frequency

For Reseeders to persist after a fire, they must have been able to reach maturity and set seed before they are burnt again. Since plants vary in the length of time they take to achieve this, the frequency of fires will have a distinct effect on the composition of the plant communities. To preserve the conservation values of the reserve, it is important that fires do not occur more

frequently than the time needed for all the plants to reach maturity and set seed. As a general rule of thumb, the interval between fires should be at least twice as long as it takes the slowest maturing plant to flower and produce seed and before the older plants are no longer able to reproduce.

Fire Intensity

The intensity at which a fire burns depends upon many factors including, the time of year, air temperature and humidity, the amount and moisture of the fuel and the soil and wind strength (Hussey and Wallace, 1993). Note that a dense layer of grasses greatly increases the fire intensity at ground level, regardless of the season. Fires of different intensity favour the regeneration of different plants, and low intensity fires tend to be patchy, leaving areas of vegetation unburnt.

Fire Season

There are three possible fire seasons, each having considerable differences in their impact (Hussey and Wallace, 1993).

- Midsummer/autumn
    - Fire is usually hot and intense, the fire front is tall and fast-moving;
    - It consumes most above ground material;
    - It is very likely to burn down mature trees;
    - It is likely to cause high mortality to native fauna;
    - Will break the dormancy of some buried seeds, e.g. Wattles.
- Winter
    - It has a low intensity, the fire front is low and slow moving, may go out at night;
    - Is patchy, with areas left unburnt;
    - It disrupts flowering and seed set for some plants;
    - In does not crack dormancy of buried seeds;
    - It encourages growth of grass weeds;
    - It disrupts the breeding cycle of some fauna;
    - Is survived by most adult fauna.
- Spring/Early Summer
    - Is of low/moderate intensity, some, but not all, tree crowns will be scorched;
    - It does not consume all ground organic material, some patches will be left unburnt;
    - It will destroy that year's seed crop for many plants;
    - In stimulates surface seed germination;
    - It does not crack dormancy of buried seed;
    - It may kill many young animal, though adults may escape and there will be colonisation of burnt areas from unburnt areas;
    - It will encourage the growth of already established perennial grass weeds;
    - It helps resprouting plants grow well over summer and out competes seeders;
    - It may weaken seedlings so they do not survive the autumn break of the season.

Disturbance is a key factor in opening up the bush to change, and fire is a major disturbance. Small and isolated remnants, such as the reserve, are subject to more disturbing factors placing them under greater stress making them less resilient to changes.

One of the major threats that occur after fire is weed invasion. Having opened up the bushland by removing canopy and/or shrubs, it is very easy for weed invasion to occur from the edges. With an area like the reserve, being long and narrow, it would not take long for weeds from the edge to invade the whole width of the vegetation. This would lead to a change in the community structure, which will provide different resources for fauna. Most weeds will also change the fire's characteristics including its readiness to burn, how easily it will spread and the temperature at ground level. The reserve has significant outbreaks of African Love Grass (*Eragrostis curvula*), which has evolved in southern Africa under a regime of annual burning (Hussey and Baxter, 2006). This species has major impacts on the fire response in bushland areas and also its capacity to spread with burning. This needs careful management to ensure that any fire events do not promote the spread of this weed.

c) Linkages

For individual plants and animals to survive in an area, they require places were they can live, obtain their nutrients (food) and breed. Communities of species also need these basic requirements, however they (or their seeds or pollen) also need to be able to migrate through the landscape to find new areas to find mates, breed and establish new communities. This also allows the flow of genes to keep the genetic diversity of that species healthy. With the clearing of native vegetation for a variety of purposes, the dispersal of plants and animals is severely limited as their habitat generally becomes fragmented from larger areas and increasingly isolated as clearing continued.

Although clearing of native vegetation, within the south west, has decreased significantly in recent time, the high level of clearing has meant that most of the remnants of native vegetation are isolated. This means that species, generally, cannot move though the landscape as easily or readily become prey for predators as they move though paddocks and uncleared areas. Generally if landscapes are more connected, it implies that more species will persist, recolonise empty habitat patches, and exchange individuals and genes amongst the population (Lindenmayer and Burgman, 2005).

The reserve is one of only two linkages of native vegetation remaining within the Swan Coastal Plain (Gibson, Keighery *et al.*, 1994). Its value as a corridor for potential dispersal by species is extremely high as it is situated within a predominately cleared landscape. This linkage maintains the major aspects of connectivity within the Ruabon – Tutunup landscape and in some way would decrease the effect of habitat fragmentation by:

- facilitating the movement of animals through the landscape including through areas where the habitat is not ideal for a particular species;
- providing habitat for resident species and populations;
- providing access for species to unexploited habitat areas;
- enhancing dispersal success by reducing the chances of death during dispersal;
- preventing and reversing local extinctions by allowing empty patches to be recolonised; and
- promoting the exchange of genes between populations, thus increasing the effective population size and reducing the risk of inbreeding (State of the Environment Report, 2001; Lindenmayer and Burgman, 2005).

In addition to the specific flora and fauna values of the reserve, the reserve itself provides a useful reference for the original vegetation types that would have existed prior to European settlement. While individual bush remnants can provide some information, the reserve shows the catena of vegetation types and the way they would have interacted.

d) Alterations to the natural environment

The reserve has been relatively undisturbed and contains remnant populations of flora communities that have been heavily cleared throughout the south west of WA. Table 1 shows the remaining area and percentage of the original native vegetation within the soil landscape units within the south west.

Table 1: Remaining Native Vegetation by Soil Landscape Unit

Landscape unit	Original Extent (ha)	Current Extent (ha)	Percentage remaining	Area in reserves* (ha)	Percentage in reserves
Abba	47,968	2,608	5.6%	121	4.5%
Bassendean	377,580	205,252	54.4%	1,403	<1%
Cartis	28,504	4,662	16%	51	1%
Goodwood Valley	54,770	44,072	80.5%	0	0
Whicher scarp	20,368	9,396	46.1%	16	<1%

Data source: (Tille and Lantzke, 1990)

* The definition of reserves in this table refers to those reserves with the primary purpose of Conservation (i.e. it does not include the rail reserve as conservation is not its purpose).

Vegetation mapping has also been undertaken for the reserve (Heddle, Loneragan *et al.*, 1980; Mattiske and Havell, 1998). These also show a similar high levels of clearing and low levels of areas in reserves (Table 2).

Table 2: Vegetation Complexes within the Reserve

Vegetation complex	Percentage uncleared	Percentage in reserves
Abba Ad[1]: Woodland of Corymbia calophylla-Agonis flexuosa-Allocasuarina fraseriana-Nuytsia floribunda on mild slopes in the humid zone.	29	0
Abba Aw[1]: Woodland of Corymbia calophylla-Agonis flexuosa on lower slopes and low woodland of Melaleuca spp. In depressions in the humid zone.	4.8	0
Abba AB[1]: Woodland and open forest of Corymbia calophylla on flats and low rises in the humid zone.	7.1	0
Abba[2]	6[3]	0.1[3]
Cartis[2]	71[3]	55.7[3]
Preston[1]	58.4[1]	21.4[1]

Source: 1- (Mattiske and Havell, 1998); 2- (Heddle, Loneragan et al., 1980); 3- (Environmental Protection Authority, 2006)

Tables 1 and 2 reinforce the vegetation value of the Reserve for conservation, especially for the Abba vegetation types. Overall, less than 10% of this vegetation type remains and less than 1% of it is in secure reserves. It is important to maintain the reserve and protect the current good areas of vegetation and, if possible, restore some of the values of the disturbed areas. Section 4 outlines more details on the specific vegetation and fauna values of the reserve.

4) BIOLOGICAL ENVIRONMENT

a) Vegetation

Native vegetation underpins the biodiversity systems that sustain agricultural and other activities. It forms the basis for healthy, functioning ecosystems and their services such as nutrient storage and cycling, soil formation, pollution breakdown and plant pollination. Vegetation also provides habitats for plants, birds and other animals and helps control salinity and erosion. Native vegetation plays an associated role in land management issues including water quality, healthy waterways and the control of greenhouse gases.

The native vegetation of the reserve is a primary reason for its unique conservation values. The reserve's vegetation is largely undisturbed and contains remnant populations of the flora

communities that have been heavily cleared throughout the south west of WA. The majority of the vegetation is intact, however weeds, disease, feral animals and other threatening processes are impacting on the remaining vegetation (see Section 6). Because of their high conservation values, the threatened flora and communities are addressed separately

i) Native vegetation

Flora surveys have been conducted over the length of the reserve by DEC, Westralian Sands Ltd and Hart Simpson and Associates. These data were incorporated into the Fire Management Plan. The Hart Simpson and Associates survey was conducted in September 1997. It identified a total of 169 plant species, of which 12 were weeds and 157 local native species. Surveys undertaken by the Department of Conservation and Land Management (now the Department of Environment and Conservation - DEC), between July and October 2005, identified a total of 473 flora species of which 389 local native and 84 introduced weed species (Webb and Grant, 2005). This survey was not intended to be a definitive species list for the reserve, but a working list to which new species can be added to over time. The survey also grouped the species into vegetation communities[1]. This was done by surveying each of the communities and recording each species encountered. It is mentioned in the report that most of the *Verticordia* spp were not flowering and that additional summer surveys are required to identify these species. The full species list is included in Appendix A and the species by vegetation communities and a representative photograph of each community are included in the digital copy of this plan.

The survey split the reserve into two using Ludlow- Hithergreen Road to intersect the reserve and delineating the Ruabon area to the west of the road and the Tutunup area to the east. 20 vegetation communities were identified in the Tutunup section and 12 were identified in the Ruabon area.

Nine vegetation communities were identified as being comparable; these groupings of communities, having similar elements, can be referred to as vegetation associations. These are listed in Table 2 and displayed in Figure 3.

Table 3: Vegetation Associations within the Ruabon - Tutunup Rail Reserve

Association	Communities	Association	Communities
Ironstone heath	Tutunup 4 Tutunup 6 Tutunup 10 Tutunup 12 Tutunup 15 Tutunup 16c	Jarrah/Marri forests over low heath	Tutunup 1a Tutunup 3 Tutunup 5 Tutunup 11 Tutunup 6a
Regelia ciliata/*Grevillea diversifolia* heaths	Tutunup 1 Tutunup 8 Tutunup 13 Tutunup 16a	Jarrah/Marri forests over heath	Tutunup 9 Tutunup 14
Regelia ciliata/*Pericalymma elliptica heaths*	Ruabon 4 Ruabon 7 Ruabon 9 Ruabon 10 Ruabon 11	Peppermint woodland	Ruabon 5 Ruabon 12 (east extent) Tutunup 7
Mixed Melaleuca woodlands	Ruabon 1 Tutunup 2	Whicher scarp *Eucalyptus haemotoxyn* Cartis units	Tutunup 17
Jarrah/Marri forests over woodland with dense sedge layer	Ruabon 2 Ruabon 3 Ruabon 6 Ruabon 8 Ruabon 12		

[1] A community is defined as all living things in a particular area. In an ecological sense it is an assemblage of interdependent populations of different species (plants and animals) interacting with one another, and living in a particular area (Lindenmayer and Burgman, 2005). In vegetation management it is often a useful practice to identify communities based on the type of vegetation and species found within it.

The condition of the reserve's vegetation was assessed as part of this management plan. This was surveyed using a combination of factors such as weeds, structure, the amount of disturbance and a generalised health rating of the native vegetation present. The criteria are outlined in Table 3. These are standard and commonly used scales within the south-west. Although these are mainly subjective criteria, they are explicit enough to enable someone with basic vegetation skill to feasibly repeat these measures in future years. The results are shown in Figure 4. In summary, the reserve consists of vegetation in good or better condition. Although this is rare for vegetation within the coastal plain landscape, the presence of good quality vegetation would also explain the presence of other high conservation values within the reserve. The maintenance and potential enhancement of the condition of the vegetation of the reserve would indicate success of future management actions and should be an explicit goal in the management of the reserve.

Table 4: Vegetation Condition Criteria.

RATING	Disturbance	Weeds	structure	"health"
Excellent (E)	none	no	intact	Recruitment evident,
Very Good (VG)	<10%	Edges only, minor spp	Slightly altered	Few young plants
Good (G)	<30	<10% some aggressive	Obviously altered	Loss of groundcovers
Poor (P)	30-50	< 30% + aggressive	significantly altered	Shrubs groundcovers absent
Very Poor (VP)	50	30-50% + aggressive	severely impacted	Abundant dead branches
Completely Degraded (D)	100%	50-100	Cleared or parkland	Mostly dead vegetation

These criteria are an amalgamation of two other condition ranking scales; (Keighery, 1994; Kaesehagen, 1995) and attempts to place some quantitative element to each of the criterion.

ii) Threatened flora and ecological communities

Under the Wildlife Conservation Act (1950), DEC is responsible for conserving and protecting wildlife (biological diversity). This is interpreted as attempting to ensure that no species or ecological communities are lost from the State as a result of human actions or inaction. One way of doing this is to maintain lists of, and knowledge about, the most threatened species and communities so that remedial actions can be taken. DEC uses internationally accepted criteria as an independent guide, and applies Western Australian knowledge, to list and rank the status of plants and animals in Western Australia. These criteria and categories are established and maintained by the International Union for the Conservation of Nature and Natural Resources (I.U.C.N), now called the World Conservation Union. This is a world-wide body, founded in 1948, that aims to influence, encourage and assist to conserve the integrity and diversity of nature and ensure the use of natural resources is equitable and ecologically sustainable. It has over 980 member agencies across 140 countries.

For threatened ecological communities, an adaptation of the IUCN categories and criteria is used.

The listing of a species or ecological community in a higher risk category implies that there is a higher expectation of extinction, and over the timelines specified, more plants or animals listed in a higher category are expected to become extinct than those in a lower one (if no effective action for their conservation takes place).

In determining the status of species suspected of being threatened the IUCN recognises seven, fairly self explanatory, categories (which are listed in decreasing levels of risk):

- Extinct (EX)
- Extinct in the wild (EW)
- Critically Endangered (CR)
- Endangered (EN)
- Vulnerable (VU)
- Near Threatened (NT) and
- Least Concern

Threatened is an umbrella term to include Critically Endangered, Endangered and Vulnerable species or ecological communities.

There is a set of five quantitative criteria that forms the heart of the system. These criteria are based on biological factors related to extinction risk and include: rate of decline, population size, area of geographic distribution, and degree of fragmentation. The criteria address specific question regarding these, and determines the associated risk of extinction, hence the status, of the species being assessed.

In Western Australia many species that are of conservation concern but are not classified as threatened are placed on informal priority lists maintained by the DEC. These lists include species that cannot be adequately assessed against the IUCN criteria because of insufficient data, those not threatened but dependent on continuing conservation actions, those recently removed from the threatened list and those that meet the IUCN criteria for Near Threatened. Some inadequately known priority species that are suspected of being threatened have high priority for further survey and research.

The reserve contains 8 threatened and 13 priority species of flora and two currently known threatened ecological communities within its boundaries (Table 4).

Table 5: Currently known Threatened flora and ecological communities within the reserve.

Species	
Conservation Status	**Name**
Critically Endangered	*Petrophile latericola* *Brachyscias verecundus*
Endangered	*Dryandra nivea* spp. *ulinginos*a *Vericordia densiflora* var. *pendunculata* *Vericordia plumosa* var. *vassensis*
Vulnerable	*Grevillea elongate* *Dryandra squarrosa* spp. *argillacea* *Chamelaucium roycei*
Priority 1	*Schoenus pennisetis* *Andersonia ferricola*
Priority 2	*Synaphea petiolaris* ssp. *simples*
Priority 3	*Verticordia attenuata* *Hakea oldfieldii* *Haloragis tenuifolia* *Isopogon formosus* ssp. *dasylepis* *Myriophyllum echinatum* *Boronia anceps* *Blennospora doliiformis* *Loxocarya magna* *Brevillea brachystylis* ssp. *brachystylis*
Priority 4	*Acacia flagelliformis*
Communities	
Critically Endangered	"Shrublands on southern ironstones (Busselton area)" (reserve contains 1/3 of all mapped occurrences of this community)
Vulnerable	"Southern *Eucalyptus calophylla* woodlands on heavy soils"

	(Reserve contains 1 of the 11 known occurrences)

Source: Department of Environment and Conservation.

Almost the entire reserve is within the Abba vegetation complex of which only 6% of the pre-European extent remains. Any vegetation complex cleared to below 10% of its original extent is regionally significant as defined by the EPA within Guidance Statement 10. One of the criteria in the determination of Critically Endangered Threatened Ecological Communities (TECs) is that the vegetation complex is cleared below 10% of its original extent. It is highly likely that all the vegetation communities along the reserve are TECs. It is important to note that, with the exception of the Busselton Ironstone community, the extent of the currently known Swan Coastal Plain TECs within the reserve area is poorly defined, and many of the known TECs are still limited to the quadrat locations of their original definition as defined by the 1994 Floristic Survey of the Southern Swan Coastal Plain.

b) Fauna

i) Native fauna

Animals play important roles in helping ecosystems to function, including maintaining soil fertility and structure, pollinating plants, dispersing seeds and recycling nutrients.

For animals to survive in an environment four elements need to be considered.

- Resources: including food, water, space and shelter;
- Mates: while individual animals can survive in isolation, animal populations must reproduce to persist. This means that they need to be able to move around to new areas and find suitable mates and their offspring need to be able to move once they are mature;
- Predators and diseases: the daily life of most animals includes a constant threat of being eaten. Diseases are a constant and major threat for most animal species. Suitable food and shelter are fundamental for protection from both predators and disease.
- Changes in the physical environment and natural disasters: these are usually related to events such as floods, fire, drought, temperature extremes or other climate related changes as well as physical changes like salinisation of surface soils and water and removal of vegetation. Again, the fundamental resources of food, space and shelter generally decide how animals survive natural disasters and physical changes to their environment.

Therefore the challenges for managing and maintaining animal populations within a specific area are to:

- Ensure there are sufficient resources to allow the populations to persist and move through the area; and
- Minimise the effects of changes to the physical environment, for example introduced weeds, or intensive fire regimes (Hussey and Wallace, 1993).

The reserve provides important refugia for fauna in the landscape as its vegetation provides suitable habitat and the continuity of the vegetation provides a vital linkage to allow animal population migration and dispersal. This is particularly important considering the extensive land clearing that has occurred within the landscape. This highlights the reserve's high conservation value for fauna.

Independent fauna surveys were conducted in August and November in 1997. The broad results are shown in Table 5 and the complete species lists are attached as Appendix B.

Table 6: Results of Fauna Surveys in Ruabon-Tutunup Rail Reserve

Taxa	August 1997	November 1997
Frogs	7	4

Lizards and skinks	11	15
Snakes	4	3
Birds	39 (including 1 non-native)	31 (including 1 non-native)
Mammals*	6 (including 3 non-natives)	6 (including 3 non-natives)

Source: Hart, Simpson & Associates, 1997.

*NOTE: DEC has identified an additional 8 native mammal species in the reserve, meaning that 11 species have been known to use the reserve.

ii) Threatened fauna

Fauna threatened with extinction are categorised the same as flora. Of the fauna identified in the surveys and by DEC field staff, the following are classified as rare or is likely to become extinct.

- Chuditch (*Dasyurus geoffroii*);
- Western Ring-tailed Possum (*Pseudocheirus occidentalis*);
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*);
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*);and
- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*). (WA Government, 2005; Department of Environment and Heritage, 2006)

The following is listed as Priority Fauna.

- Southern Brown Bandicoot (*Isoodon obesulus fusciventer*) (Priority 5)

It is important to note that there have been no formal surveys or inventories conducted on other fauna groups, for example insects, spiders, crustaceans and other invertebrates. Many of these groups, on investigation, are found to be potentially threatened with extinction.

c) Summary of conservation values

The overall conservation values of the reserve are summarised in Table 6.

Table 7: Summary of Conservation Values of Ruabon-Tutunup Rail Reserve

Level	Description
Species	• 8 threatened and 13 priority flora species • 5 threatened and 1 priority vertebrate fauna species • 389 local native flora species • 63 identified native vertebrate fauna species
Communities	• 2 Threatened Ecological Communities • Supports vegetation complexes with little remaining extent • Conserves vegetation complexes under-represented within the reserve system of Western Australia.
Landscape	• Provides a vital vegetation corridor for species to disperse in a largely cleared landscape. • Is one of only two vegetation links remaining from the scarp to the coast (and are in much better 'condition')

Overall it can be seen that the Reserve is important area for the conservation of biodiversity within a predominantly cleared agricultural landscape. Its importance is high at a local, regional, State and National level. The reserve is also centrally located within one of the identified Global Mega-Diverse Biodiversity Hotspots (Myers, Mittermeier *et al.*, 2000), hence it can be argued that the reserve also has international significance for its biodiversity values. It is vital that these values are maintained and enhanced for future generations.

5) SOCIAL VALUES

a) Aboriginal heritage

Evidence suggests that the south west was occupied by indigenous peoples approximately 40,000 years ago (Southwest Aboriginal Land and Sea Council, undated). Noongar (or Nyungar) is the generic term used today to describe the aboriginal peoples that originally occupied the whole of the south west. There was an estimated 13 regional language groups within the coastal area between Geraldton and Esperance, the area of the reserve belonged to the Wardandi group (Collard, 1994). Within Nyungar family groups, land was distributed to the sons of the local families. Nyungar families were dependant on the county's natural resources for survival and each family had control over particular areas of land. This land system was based upon clear rules of responsibility, access, use and rights of privilege such as carrying the fire stick for burning in the summertimes (*Birok* season)(Collard, 1994).

Although the specific values of the rail reserve is unknown, it is known that Wonnerup and the Tuart forest was an area of importance and access to many groups for social and economic activities and festivities (Collard, 1994). The Department of Indigenous Affairs, Heritage Inquiry System highlights the Abba River, the northern section of the Ludlow Hithergreen Road, the areas around the Capel River and the Wonnerup Inlet and estuary as places of Aboriginal significance. A specific investigation into the aboriginal heritage values of the reserve should be undertaken as this information can only add to the significance of the reserve to the region and the State.

b) European heritage

The rail reserve has regional and State historical significance as the rail line was the first rail network in the South West and the first private rail line in the State. A timber company, Western Australia Timber Co was started in 1870 from a syndication of Victorian investors, promoted by George Simpson of Lockeville (Wonnerup). The company was granted a timber concession of 181,500 acres and they established a mill and jetty at Lockeville. They also established a 3'6" gauge railway line running from Lockeville to Yokanup (Yoganup) approximately 18kms inland. This line was completed in June 1871 and designed for locomotive power. The locomotive ordered by the company became the first steam locomotive to operate in Western Australia. It was built in Ballarat, Victoria and named after the town. It entered service at Lockeville in August 1871 and was restored in the early 1990s and is still displayed in Railway Park in Busselton.

The railway line was gradually extended and by 1886 was 30kms long. WA Timber Co went into liquidation in June 1888 and an Adelaide syndicate took over their timber concession. The Western Australian Government Railway, which had opened their line to Busselton in June 1894, built their private railway from Wonnerup siding, and followed the route of the old WA Timber Co line. By June 1899, the line was completed joining Jarrahwood to Wonnerup and running for 37kms. The line was used to transport timber until 1969, but ceased to be used by trains in the 1980s.

There is an extensive history of the rail line and the trains associated with the reserve and it intrinsically linked to the European history and development of the Busselton and associated areas. The rail line was listed on the Shire of Busselton's Municipal Heritage Inventory as Place 118 in 1996. Although no specific vegetation is noted as having heritage value, areas where there were sidings and/or dwellings have non-native vegetation that were planted (specifically an area of palms and other introduced trees in Management Zone 13) that may have heritage significance. Before any removal of these plants or vegetation were to occur, the Shire of Busselton's Heritage Coordinator should be consulted[2]

The area also has significance as locations of the Groups Settlement Scheme which was inaugurated in WA in 1921. The object of the Scheme was to develop the south-western portion

[2] As at July 2006, this person is Aaron Bell: Ph: 9781 0444)

of the State by establishing dairy farms in that area. On 2 February 1923, by virtue of an agreement between the British, the Commonwealth and the WA Governments, the State undertook to settle in the South-West division about 75,000 migrants (men, women and children) from the United Kingdom over 3 years and to establish about 6000 selected men from among these migrants on about 600 farms in the division.

The Scheme provided that these selected migrants were to be placed in groups of 20 or more under supervision. Each group was to clear or partially clear 25 acres on each farm. The group was also to erect the house and necessary outbuildings on each farm, put up fencing and arrange for a satisfactory water supply. Advances for sustenance at a rate not exceeding 10/- per day were to be made to settlers whilst engaged in clearing and the State was to provide the material for all buildings, fencing, etc. besides providing reasonable equipment and stock. The farms, when cleared to the extent of 25 acres, were to be allotted to members of the group by ballot. Of the first 16 groups organised, 9 were in the Busselton district, giving impetus primarily to the dairy industry. There are two sites within the reserve that are noted by plaques (Busselton Shire Municipal Heritage Inventory).

c) Recreation

There is limited information on the recreational use of the reserve. It does have potential to be used as a walk trail in some sections, but this would need to be appropriately planned and managed to ensure that access does not degrade the conservation values of the reserve.

d) Commercial use

The reserve currently has no direct commercial use, however the road is extensively used for mineral transport. The vegetation of the reserve will have benefits to adjoining farmland as it will provide shade along fence lines and offer wind and weather shelter benefits to stock.
Landowners have commented that they have used the reserve to assist with the movement of stock between pastures. More specific information on this is required and a detailed plan of stock routes developed to ensure that the conservation values of the reserve are maintained.

e) Research and scientific study

The high conservation values of the reserve provide an excellent resource for research and scientific studies. The catena of vegetation it contains represents the best example of continuous pre-European vegetation complexes along the Swan Coastal Plain. This provides an invaluable resource for research and study. This opportunity is highlighted by the persistence of many species and communities that no longer exist elsewhere. The fact that these species and communities exist alongside productive farming enterprises, highlights the opportunities for other fields of study such as sustainable agriculture and landscape ecology.

6) THREATS

a) Introduced plants and weeds

Western Australia has about 10,000 scientifically described and named plants, with a few thousand waiting to be named (DEC, 2006). Of these, approximately 10% have been introduced from outside the state (Hussey and Wallace, 1993). The term “introduced plants” refers to a plant that has been introduced to an area and “weed” is usually defined as plants growing where they are not wanted (Hussey and Wallace, 1993; Scheltema and Harris, 1995) Environmental weeds are plants that establish themselves in natural ecosystems and proceed to modify natural processes, usually adversely, resulting in the decline of the communities they invade. There is debate on the specific definition of these terms, however throughout this report they are referred to as weeds.

Weeds have a major effect on natural vegetation communities. They:

- Compete directly with established native vegetation, inhibiting growth and displacing species;
- Replace diverse native plant communities with more uniform weed communities (i.e. they change the species composition of an area;
- Inhibit native plant regeneration though competition (for light, water, nutrients, pollinators etc.);
- Alter the nutrient cycling of natural communities
- Potentially increase the fire hazard (especially grass weeds);
- May change the soil acidity;
- Alter the resources available for native fauna by;
    - Changing the habitat (e.g. shrubs to grass);
    - Changing the food available (Hussey and Wallace, 1993; Department of Conservation and Land Management, 1999)

A number of generalisations are useful in determining where weeds are likely to occur.

- Invasion of weeds is most likely after disturbance;
- The greater the degree of disturbance, the greater the degree of invasion; and
- The greater the diversity of the natural community, the less likely weeds are to invade (Buchanan, 1989).

Management of environmental weeds is required to ensure the long term survival of natural ecosystems. Management solutions are complex and require technical commitment, research, long-term monitoring programmes and training in ecosystem restoration. The management and control of environmental weeds should be seen in the context of the restoration of the environments they invade. It is usually pointless to undertake weed control by itself as removing the weeds and disturbing the site usually results in reinfestation of the same or other weed species. Revegetating and restoring weedy areas with naturally occurring species is a critical component of the weed removal process.

To prevent weeds from establishing requires that disturbance of the bush areas are kept to an absolute minimum (Hussey and Wallace, 1993) Once weed become established, there are several methods of control which can be broadly classified under the following:

- Physical methods – pulling, mowing, slashing, scalping;
- Natural suppression – encourage native plant growth and discourage weed growth;
- Biological control methods – the introduction of a natural predator or disease which will target the weed and do not impact on the native species; and
- Chemical control methods – the prudent use of herbicides to selectively target the weed species.

Regardless of which method is used, there is a general principle of controlling weeds in the least affected areas fires, working outwards towards the more degraded section. This allows the native plants still present to regenerate and grow in the pages that are left by the weeds.

b) Feral and pest animals

Non native animals such as rabbits, foxes and feral cats, become pests in bushland areas and have a detrimental effect on the local fauna and flora. They prey on native animals, compete for food and shelter and cause damage to native plants by grazing, trampling and digging. Control methods for feral animals include shooting, poisoning and exclusion fencing. There are numerous regulations covering the use of firearms and the use of poisons is controlled under the Health Act

and the Agriculture and Related Resources Protection Act. The main feral and pest animals within the reserve are rabbits, foxes and feral cats. There has also been anecdotal information from landowners of some feral pigs being seen in the eastern sections of the reserve.

c) Incompatible management and use

The reserve is situated within a landscape that has many uses. These uses need different management approaches in order for them to achieve their own particular goals. The management of the reserve is focused on achieving the objective to:

"*protect and enhance the conservation values of the Reserve*".

Management aims to achieve this goal while ensuring the safety of the adjoining landowners and users of the road. In order to achieve this, actions and management need to, firstly, be compatible with the protection of the values of the reserve and secondly, not place undue risk on the landowners and road users. When management and uses that are not compatible with these aims of this management plan are identified, they need to be reviewed and a risk analysis undertaken on the impact on the values of the reserve. Ideally, incompatible uses would be halted, changed or alternatives found to ensure that the conservation values of the reserve are maintained for future generations. However, legislative, political and/or social pressures may prevent this from occurring. If this were to occur, consultation and negotiation should endeavour to reach the best available compromise to ensure the conservation of the biological values of the reserve.

The Ruabon-Tutunup Rail Preservation Committee should be the forum that provides advice and guidance on issues where specific actions or management are considered incompatible with the objectives of this plan. Uses that would be considered incompatible with this plan would include the movement of stock through the reserve, trail bike riding, horse riding and the removal of rail stock and sleepers.

Any incompatible uses that might impact on declared rare flora, threatened fauna, or threatened ecological communities, must be referred to DEC to ensure statutory requirements are met.

d) Inappropriate fire regimes and management

As outlined in 3b above, fire is an important component of ecosystems in south-western Australia. Uncontrolled fire can endanger human life, destroy flora and fauna and their habitat and do a great deal of damage to property and remnant vegetation. On the other hand, the correct use of fire can stimulate regeneration and regrowth of native bushland areas (Hussey and Wallace, 1993). Fire is a powerful management tool whose impact is especially significant for small of isolated plant/vegetation communities, such as those in the reserve.

Managing fire is not solely about the maintenance of biodiversity. The protection of human life and property is also a major consideration within fire planning and management. Approaches need to balance and manage the risk to property and people and the protection of biodiversity values.

The reserve has significant national, state and local conservation values and well as close proximity to houses, shed and farming properties, therefore the use of fire must be carefully planned and managed to meet both objectives.

A fire management plan was prepared in 1998 that attempted to balance these two concerns. The management objectives outlined in this plan are:

- To protect the lives of people, buildings and neighbouring properties form severe damage by uncontrolled fire;
- To protect vulnerable species and ecosystems;
- To encourage and maintain diversity, natural abundance and composition of vegetation associations and wildlife habitats;

- To ensure the survival of populations of rare and restricted flora and fauna species by the maintenance and protection of their particular ecological niche;
- To minimise the introduction or further spread of dieback disease and weeds from fire management operations; and
- To provide the opportunity to obtain information about the natural processes through the use and non-use of fire.

The fire management plan breaks the reserve into 14 management sections, and describes a fire programme for each section. Although this plan is not intended to replace the fire management plan, the objectives and principles outlined in it are considered within this document. It is important to understand that wildfire can damage and destroy both conservation and human values, consequently a risk management approach is needed, i.e. what is the risk to the biodiversity values AND the human values in any planned fire or decision not to burn. This management plan follows a risk management approach based on systematic and structured assessment on the values and threats for a specific management zone.

The protection of life and property is the highest priority in the event on a wildfire though the suppression actions undertaken need to consider the impact on the conservation values within the reserve. Protection of these values can still be achieved while conserving and enhancing the conservation values of the reserve. The two following paragraphs contain specific recommendations relevant to firebreaks and fire suppression in the reserve.

i) Firebreaks

- Firebreaks in areas of high value will be allowed to regeneration either through natural methods or rehabilitation programs
- Firebreaks in other areas will be assessed as to whether they are maintained or allowed to regenerate naturally
- Landowners whose fences are adjacent to high values areas will be approached to consider bringing their fences within their property to ensure protection during wildfires. The RTRRPG will investigate opportunities to contribute to fencing costs if this occurs.

ii) Fire suppression

- During a wildfire event, suppression activities should consider the value of the reserve.
- Where possible no new firebreaks should be constructed.
- Alternatives breaks can be utilised through water and foam, retardant, aerial and ground attack.
- Where areas area disturbed during a fire event, these will be rehabilitated at the first opportunity. RTRRPG will lead the rehabilitation of these areas with other stakeholders.

e) Phytophthora dieback disease

Dieback is a plant disease caused by an introduced, soil borne water mould of the genus, *Phytophthora*. There are a number of different species present in the south west, however the most common and destructive is *Phytophthora cinnamomi* (Department of Conservation and Land Management, 2004). This organism lives in soil and plant roots and is spread by water or the movement of infected soil and roots. This commonly occurs by human activities such as road making, extracting soil or gravel, vehicles or boots carrying infected soil or planting infected seedlings. It can also be transmitted by direct water flow and by animals moving infected soil or roots (Bailey, 1995; Smith, 2003; Department of Conservation and Land Management, 2004). The pathogen may spread slowly (about 1-2 m/year) by moving within and between plant roots, more rapidly by dispersal of its spores through sub-surface or over surface water flow or most quickly of all though the agency of animals or humans (Hill, Tippett *et al.*, 1994). Spore production reaches a maximum in spring in moist soils and if these soils are transported on feet, vehicles of

machinery conditions favour the development of new centres of infection (Shearer and Tippett, 1989).

Not all plant species are affected by the mould, some are only slightly set back, where as other are quickly killed. It kills plants by rotting their roots so they cannot take up water and nutrients, often giving the appearance of the plant dying of drought. As many as 2000 of the estimated 9000 native plant species in the south west of Western Australia are susceptible to *P. cinnamomi* root rot disease. In field studies of south western plant communities the families with the highest proportion of susceptible species were Proteaceae (92%), Epacridaceae (80%), Papilionaceae (57%) and Myrtaceae (16%) (Smith, 2003). This includes many of the rare species found in the reserve, for example the *Dryandra*, *Verticordia*, *Petrophile*, *Andersonia* and *Hakea* species (Environment Australia, 2001). The mould can also impact upon some orchard crops, such as avocados, horticultural crops, such as proteas, and even agricultural crops such as lupins (Hussey and Wallace, 1993).

There have been several unsuccessful attempts at eradicating the pathogen in the wild in Australia (Hill, Tippett *et al.*, 1995). Currently, the complete removal of *P. cinnamomi*, even from a local area, is beyond the capacity of available techniques and resources (Environment Australia, 2001). A review of current methods of managing the problems caused by *P. cinnamomi*, concluded that eradication of the pathogen was not feasible at either local or regional scale (Podger, 1999). Therefore, management is the only viable strategy.

Two key management strategies are presently recommended; constraining the spread of the pathogen; and reducing its impact were it is present (Environment Australia, 2001).

To constrain the spread, it is first vital to know the areas of infection and the areas clear of infection. Secondly, strategies are needed to keep the pathogen from the uninfected areas. These can include quarantine (this is not likely to be effective or acceptable for the reserve) and hygiene (including clean down areas, signage, track and firebreak programmes and fire response strategies (access, water sources, etc.). This will have considerable difficulties considering the open access of the reserve for activities such as walking etc.

One effective treatment has been found for controlling the pathogen in infected areas which involves the use of the chemical, phosphite. The chemical has been shown to be effective in inducing resistance when sprayed or injected at low dosages, appears to have a low toxicity for mammals, breaks down rapidly in soil and can be applied as a low-volume aerosol by hand or low flying aircraft (Environment Australia, 2001). It is however, expensive, labour intensive, requires skilled operators and can produce toxic effects if used at levels above the tolerances of plant species (Environment Australia, 2001).

f) Climate Change

Changes to Australia's climate are already occurring over and above the natural variability and these changes are expected to have an impact on biological diversity. The third assessment report of the intergovernmental panel on climate change (IPCC (Intergovernmental Panel on Climate Change), 2001) concluded that Australia will be fun report to the changes in temperature and rainfall that are projected to occur in the next hundred years. The southwest of WA has shown a declining rainfall since 1900 (Pittock, 2003; NRMMC (Natural Resource Management Ministerial Council), 2004). CSIRO checks the temperature in the southwest will increase and annual rainfall is anticipated to decrease (CSIRO., 2001) .

Many of the plants and animals in the southwest of WA have quite limited ranges of average climate and their survival could be threatened. The southwest has been specified as a region of vulnerability the biodiversity loss (IPCC (Intergovernmental Panel on Climate Change), 2001). The level of change and the actual responses of the biota are unknown. While the overall solutions to this threat are best dealt with at larger spatial scales than that of the reserve, it is important that monitoring strategies are alerted to the potential threat of climate change on the biological diversity of the reserve. This includes making sure that the impacts of climate change

are included in any risk assessment process of the reserve, especially where declines in the extent and health of the animals and vegetation of the reserve are observed in the future.

g) Ground Water Extraction

The Water Corporation in WA was investigating an application to extract 45 gigalitres of water annually from the southwest Yarragadee aquifer in the southwest of the State. This water was intended to supplement the Perth metropolitan area supply. The project was “shelved” by the Western Australian Government in May 2007.

There is much debate on the proposed impacts of drawdown in Yarragadee groundwater, especially any impacts to biological diversity. Previous drawdown of groundwater has occurred near the reserve and an observed decline in the health of the vegetation occurred, especially in the threatened Southern Ironstone's threatened ecological community. This confirms that some of the vegetation within the reserve is vulnerable to changes in groundwater.

While the proposal is not intended to go ahead, it is important to monitor for any future “invigoration” of such a project.

7) PLAN FOR MANAGEMENT

a) Resolving incompatible uses

The main objective of this plan is to “protect and enhance the conservation values of the Reserve”. Consequently all actions and/or uses undertaken in the reserve need to ensure that it does not degrade those values. Most actions or uses can be accommodated in some ways, however some may need to be conducted in a different manner. For example, the movement of stock through the Reserve is not normally considered consistent with protecting the conservation values of an area such as the reserve, however after discussion with those landowners that need to move stock identification of the routes they normally take can be made. From this historical data, a risk assessment can be undertaken of that action and the resulting impact on the conservation values determined. It may be that the stock are moved though a degraded track area or a right of access arranged through a neighbours properties, hence the impact and risk to the conservation values are negligible, or it may highlight that the normal route is through a TEC, but an alternative access way, bypassing the TEC, is also usable.

It is beyond the scope of this management plant to undertake these risk assessments, however the areas of high conservation values are outlined and spatially represented. The RTRPG operates as a sub committee of the Vasse-Wonnerup LCDC and is the recognised management body of the reserve. Any issues, such as incompatible use, need to be resolved through this body. A process, outlining how the body will operate with regards to incompatible and inappropriate use should to be developed and documented by this group.

b) Management zones

Given the length and size of the Reserve, it would be difficult to develop detailed conservation management actions that are applicable for the whole of the reserve. Some general actions that apply over the whole reserve, in particular those related to Dieback, are outlined below. However it is sensible to break the reserve down into discrete management zones and describes the values of each zone and the threats that impact upon it. From this, specific management actions can be prescribed to maintain and restore those conservation values.

Management zones can be based upon grouping areas together that have similar physical characteristics, such as vegetation type, soil type, species present and/or location in the landscape. With this approach it is assumed that those elements that are physically similar will have similar management needs. Other approaches partition areas which reflect the variations

caused by human land-use patterns (Lambeck, 1999). This approach places the priority on the feasibility of undertaking the management actions for conservation, within the land uses of the landscape.

This plan uses a combination of both, firstly by breaking the reserve into management zones around the ability to manage one of the major threats to the conservation status of the reserve: fire. Management zones initially are based upon those outlined in the 1999 Fire Management Plan. These have then been assessed and further broken down into discrete units, with the boundaries based upon a combination of breaks in the vegetation caused by access ways, tracks, firebreaks, service access etc, and areas between two different vegetation types. A total of 19 management zones are defined. The values (conservation and human) of each zone are summarised and recommendations for action are outlined. This approach enables specific management actions for each zone to be determined. Those zones with similar biodiversity values and threats are then grouped together and the resulting zones are prioritised within the overall context of the management of the reserve. The result is a broad plan of activities for the next 5-10 years, which are based on maintaining and protecting the highest conservation values first and then moving sequentially down in priority. This approach enables management actions to be prioritised from the context of the reserve as a whole, while at the same time enabling those groups that want to focus their attention on only one specific area, to determine the most effective actions to conserve the values, within that specific area only. Figure 5 shows the generalised zones for the reserve as a whole, refer to Section 8 for zone specific figures. Note that the management zone only refers to the area within the rail reserve, the boundaries shown in Figure 5 and in the specific zone figures extend beyond this only for clarity within the figure.

c) Bushland restoration and revegetation

The approach to prioritising where actions should occur within the reserve are based upon ecological concepts, including island biogeography (MacArthur and Wilson, 1967), patch, corridor and matrix (Foreman, 1995) and meta-populations (Hanski and Simberloff, 1997). The process is based on the goals of conservation biology and ecosystem management, which are:

1. maintain viable populations of all native species where they are;
2. represent, within protected areas, all native ecosystem types across their natural range of variation;
3. maintain evolutionary and ecological processes (i.e. disturbance regimes, hydrological process, nutrient cycles, etc);
4. manage, over periods of time long enough, to maintain the evolutionary potential of species and ecosystems; and
5. accommodate human use and occupancy within these constraints (Grumbine, 1994).

Within the reserve, the action prioritise can be summarised (in decreasing priority) as:

1. **Maintain** the existing condition of habitats[3] by removing and controlling threatening processes – it is generally much easier to avoid the effects of degradation than it is to reverse them;
2. **Improve** the condition of habitats by reducing or removing threatening processes (note that more active management may be needed to initiate a reversal of condition, for example the removal of an exotic species, re-introduction of native species; and

[3] The term “habitat” is used to refer to the areas where a species lives (plant and animal). Other than those areas where specific fauna habitats are identified, the approach in this plan is to focus on the vegetation elements of the reserve using the assumption that most of the fauna habitats are dependant upon the health of the native vegetation present in an area, that is having healthy vegetation/bushland will result in suitable habitat for the fauna.

3. **Reconstruct** habitats, where their total extent has been reduced below a size that will maintain species, using replanting and re-introduction technique. This is the most difficult and expensive action and should be undertaken only when no other alternative is available (McIntire and Hobbs, 1999).

It is not just the management actions that need to be prioritised, the specific conservation value or "asset" needs to be ranked in importance. The approach taken for this plan is to prioritise those "assets" that are most threatened with extinction as having higher value. The conservation priorities are (in decreasing priority).

1. Threatened and Priority species/communities.
2. Vegetation associations with less than 30% remaining;
    - Abba
    - Cartis.
3. Vegetation associations in good condition.
4. Vegetation associations with manageable threats.
5. Other vegetation associations (best quality first).

Therefore the prioritisation of actions within this plan are based on a combination of the values assigned to conservation asset, its condition, the threat/s upon it and the feasibility of protecting or restoring it.

d) Revegetation

Many of the recommended actions to manage the reserve focus on maintaining and improving the condition of the habitats within the reserve. These are considered the higher priorities given the general overall good quality and "health" of the vegetation in the reserve. However, opportunities exist and will arise where the priority would be to revegetate/restorate an area. This could either be as a consequence of weed removal, fire, or physical disturbances. The management responses to vegetation restoration objectives can range from encouraging natural regeneration through weed control to selective revegetation. Natural regeneration refers to managing the vegetation to allow the native species present to re-establish in other areas, by either seeding or resprouting. This is often the best way to rehabilitate degraded areas as it maintains the same genetic material, minimises costs as there are no plants or seeds to purchase and allows areas to grow through various stages or successions of different plant and animal species. The problem with this approach is that it takes time to occur, therefore usually some form of revegetation will occur, where seedlings or seed are used. The reason for undertaking planting within the reserve would include increasing the connectivity of vegetation, providing specific habitat needs for a suite of species, extending the size of patches of vegetation within the reserve and buffering core conservation areas. Broader landscape benefits can include helping address land degradation problems, providing windbreaks and shade and increasing the aesthetics of the landscape.

It is important that species are carefully selected for any revegetation actions within the reserve. The aim should be to restore the natural structure, composition, density and function of the native vegetation that had occurred at the site. All of these elements vary according to which vegetation community they are. Appendix C lists the species that can be used within each vegetation community. These species can all be propagated by cuttings, seed or tube seedlings. Consideration is also needed on the preparation of any site for revegetation, including weed control (pre and post planting), grazing control, and ripping and/or mounding, and monitoring of the success of revegetation. If major revegetation activities are planned within the reserve, it is recommended that a revegetation guide be prepared, outlining recommended species, planting densities, best site preparation and weed control for each vegetation community and soil type within the reserve. This will ensure that the best practices available are consistently used in.

e) Weed control

As mentioned above, weeds or introduced plants can have a significant impact on the conservation values of the reserve. There are generally limited resources for environmental weed control activities, these include people, skill, time, chemicals and funds. It is therefore important that any resources available are applied in the most effective way to achieve the best results. This involves taking a strategic approach to weed management, which allows any decisions made on weed control to be transparent and aim to maximise the conservation outcomes while minimising any adverse environmental impacts. There are many approaches to environmental weed management including:

1. Weed-led control;
2. Site-led control;
3. threatened species and communities led control;
4. human resources led control; and
5. cause-led control (Department of Conservation and Land Management, 1999).

Weed led control is a proactive strategy to prevent introduction, establishment, survival, reproduction and dispersal of an emerging environmental weed, before it becomes a major problem. The main actions involved are the prevention of new weed introduction, early detection and early eradication.

Site-led control focuses on identifying areas that require weed control to maintain their ecological values and sites which are currently in good condition and can maintain or improve that condition with planned effort.

Threatened species and communities led control places the protection of the threatened species or community as the highest priority for weed control. This is really a sub-set of the site led control, where the site is identified by the presence of a threatened species or community. It is important to remember that this approach only looks a specific points in the landscape (i.e. the site of the species or community) and consideration is also needed on the broader environment which may be critical to the conditions that maintain the weeds at that site (e.g. a continuing source of weeds).

Human led control identifies those weeds and circumstance where volunteer contribution to weed control is possible. This approach clarifies which areas or weeds are best suited to volunteer or community control and which areas or species are better managed by professionally trained staff (e.g. DEC, Shire or certified contractors).

Cause led control focuses on controlling, reducing or eliminating disturbance factors that increase ecosystem vulnerability and allow weeds to take advantage. This approach is seen a preventative in that it aims to ensure that vegetation in good condition is protected from disturbances through planning controls and management strategies.

The challenge for weed management it to look at weed control from a number of angles to fully consider the range of possible approached and then to decide the combination of approaches that will maximise the nature conservations outcomes.

The Environmental Weed Strategy for Western Australia (Department of Conservation and Land Management, 1999) suggests the following priorities for action.

1. Recognise weed potential: Early detection and eradication of new weeds is a major priority, depending on the how seriously that weed species may affect the conservation values.
2. Maintain significant areas of all ecosystems that have vegetation in good conditions (i.e. those areas where the vegetation is largely free of weeds should be the next priority).

3. Control weeds impacting on threatened species and communities: The survival of these significant species/communities is an important priority.

The approach taken for the Reserve involves an integrated approach and for each management zone the weed risk is identified and actions are suggested, depending upon the conservation values at threat and the impact the weed may have. Suggested control methods are also stated.

Weeds have impacts on biodiversity and their impacts vary between weed species. A ranking system was designed for use in the Environmental Weed Strategy for Western Australian (Department of Conservation and Land Management, 1999) which ranked the biological significance of a weed species based on its invasiveness (ability to invade bushland in good to excellent condition), its distribution (wide current or potential distribution) and it ability to change the structure, composition and function of an ecosystem, in particular the ability to form a monoculture (single species) in a vegetation community. This results in each weed species being ranked as High, Moderate, Mild or Low[4]. This system of ranking and prioritising is used in this report.

Weeds are present throughout the reserve and a preliminary weed survey was conducted for the management plan. A Global Positioning System (GPS) was used to spatially locate large populations of noticeable weed species throughout the reserve. These coordinates were transferred to a Geographic Information System (GIS) to allow them to be spatially represented. This data is shown in Figure 6.

The major weeds identified and mapped, and their prioritised ranking from the Environmental Weed Strategy for WA are listed below in Table 7. It is important to note that not all weeds would have been identified and all their location would not have been noted. Only those weed populations that were or likely to have a significant impact on the reserve's conservation values and were obvious during the survey were included, therefore not all weed species that are within the reserve are included. This is intended to be the starting information from which future surveys can be added to.

Table 8: Major weeds and their significance ranking

Common Name	Species name	Ranking
African Love Grass	*Eragrostis curvula*	High
Bridal Creeper	*Asparagus asparagoides*	High
Dock	*Rumex spp.*	High
Arum Lilly	*Zantedeschia aethiopica*	High
Watsonia	*Watsonia* spp.	High (*W. bulbillifera*)
Gladiolus	*Gladiolus* spp.	Moderate
Kikuyu	*Pennisetum pedicillatum*	Moderate

Source: (Department of Conservation and Land Management, 1999).

To understand how to control these weeds it is best to understand some of the life history and ecology of the species. Table 8 outlines the life histories and Table 9 provides suggested control methods for these major weed species.

Before using chemicals, people involved in weed control will need to familiarise themelves with the contents of the relevant "material safety data sheet", poisons information and poisons emergency contact number.

Table 9: Life History of Major Weed Species

Common name	Species	Life form	Growth form	Flowering	Reproductive unit	Dispersal agent	Seedback persistence (if known)	Fire response
African	*Eragrostis*	p	Tussock	Opportunistic	Seeds	Water,	/	resprouts

[4] Note that a ranking of High means the species has a high priority for control due to its impacts on the conservation values. Moderate indicates that control should be directed to it should funds be available, if not it their populations should be monitored.

Love Grass	*curvula*					wind, slashing, animals		
Bridal Creeper	*Asparagus asparagoides*	p	Rhizome tuber	Aus – Sept	Seed, rhizome, tuber	Bird, soil, water	2-3 years	
Dock	*Rumex* spp.	p		Jul-Dec	Seeds and fragments	Animals soil, machinery	5+ years	
Arum Lilly	*Zantedeschia aethiopica*	p	Tuber rhizome	June- Nov	Seed and offsets	Water soil, birds	<1yr	
Watsonia	*Watsonia* spp.	a	Corm	Sep – Dec	Offsets, cormels, seed	Water soil, wind	1-5 yr	Some dormancy after fire
Gladiolus	*Gladiolus* spp.	a	Corm	Oct – Dec	Offsets, cormels, seed	Soil water	1-5 yr	
Kikuyu	*Pennisetum pedicillatum*	p	Stolons & rhizome	Summer	Rhizomes stolons	Water wind	Seed rare	resprouts

Lifeform – a= annual, p = perennial; Source (Brown and Brooks, 2002)

Table 10: Suggested Control Methods

Common name	Species	Suggested Control
African Love Grass	*Eragrostis curvula*	Cut out small plants; spray with 1% glyphosate; utilise unplanned fires and spray re-growth at 5-10cm. Always requires follow-up treatment.
Bridal Creeper	*Asparagus asparagoides*	Spray glyphosate 1% + Pulse® or metsulfuron methyl 0.04 g/ 10L + Pulse®. Best results occur after flowering just as new leaves emerge.
Dock	*Rumex* spp.	Spot spray with 1% glyphosate in early bud stage, cultivation of older plants will spread root fragments.
Arum Lilly	*Zantedeschia aethiopica*	Spot spray metsulfuron methyl or cholosulfuron 0.4g /15L of water + Pulse®. Higher concentration in one litre handheld sprayer, applying a single squirt to leaves avoids off target damage. Apply any time between June and September. Early spraying prevents flowering and seed set but may miss later sprouting tubers.
Watsonia	*Watsonia* spp.	Wipe individual leaves with glyphosate 10% or spray dense infestations 2,2 DPA 10g/L + wetting agent or in degraded areas 1% glyphosate. Apply just as flower spikes emerge at corm exhaustion.
Gladiolus	*Gladiolus* spp.	Spot spray metsulfuron methyl 0.2g/15L + glyphosate 1% in degraded sites. Physical removal can result in spread of cormels.
Kikuyu	*Pennisetum pedicillatum*	Solarisation over warmer months (use of plastic to heat populations); spray with 1% glyphosate or Fusilade ® 1`0mL/L + wetting agent, 2-3 sprays over single growing season often required.

Source: (Brown and Brooks, 2002).

It is important to note that where glyphosate is suggested in these control methods, the form without surfactant is recommended. Chemical with these additives, while effective in helping plants absorb the toxin, cause lethal damage to the mucous membranes of many animal that need to keep their skin moist, such as frogs. The abundance of these animals though the reserve is high, consequently care is needed to ensure that their populations are protected during any weed control process. Glyphosate without surfactants are widely available and do not cost any more in most cases. Many are marketed as “Frog Friendly” or use the term biological friendly. An example is Roundup Biactive®.

It is also important to note that species such as Watsonia provide shelter for species such as Southern Brown Bandicoots and any method of control needs to be conducted in such a way as to minimise any harm to fauna species. For example, should an infestation of Watsonias be targeted for control using fire and post-emergent herbicide, a staged approach should be conducted, with gaps or areas left untreated (initially) to enable any fauna to escape and those gap areas not controlled until revegetation of the treated areas is sufficient to support or provide shelter.

Any spraying near DRF should be done under a permit to take rare flora in case of accidental impact on DRF.

f) Fire management

The 1998 Fire Management Plan outlines a number of strategies that aims to achieve the objective of protecting life, property and environmental values. A number of these are relevant for this management plan.

- Fire Breaks – use existing fire breaks and tracks that cross the reserve so that no other areas of the reserve are disturbed in implementing fire management.
- Fuel Reduction Burning - the use of fuel reduction burning is to reduce the intensity of a wildfire in the reserve, should one occur. There is also a need to ensure that there are adequate areas of similar bush habitat unburnt for native fauna to move.
- Threatened Plant Communities – the ironstone community has a very low rate of biomass production however the community is dominated by Myrtaceous shrub species, which have a highly combustible aerated fuel component. . Considering the biodiversity values of these areas and the impact that fire is likely to have on their long term survival, it is suggested that most of these areas are excluded from fire.

In section 3.2.3 of the Fire Management Plan, it is suggested that may of the fuel loads are above DEC recommended levels. These fuel loads have been evaluated against fire behaviour tables for forested areas (Sneeuwjagt and Peet, 1998). It is inappropriate for the majority of the vegetation within the reserve as most cannot be compared with Jarrah or Karri forest components. Although it is likely that some areas of the reserve do have high fuel loads, it is recommended that the fuel loads of the reserve be re-evaluated using ages since it was last burnt. It is also recommended that a fire history map be produced of the reserve, showing spatial area and the time since the last fire. This will enable a fire ecology approach to the biota of the reserve to be developed.

Basic fire history has been recorded by a number of adjoining landowners (Figures 7 & 8). It is recommended that this data be used as the basis from which future fire management or wildfire events are recorded to enable a fire history for the reserve to be maintained.

Within each zone work plan outlined below, the biodiversity values are rated and the risk to human and property from fire are assessed, with a broad generalisation of the fire management requirements highlighted. The rationale for these generalisations is outlined in a basic decision tree (Figure 9). This attempts to direct managers and highlight areas that need to be considered for the future fire management of the reserve while attempting to balance the safety of landowners and their property and the conservation values of the reserve.

It is also recommended that a more detailed review of the fire ecology of the vegetation in the reserve, including the rare and threatened flora and communities, be conducted in approximately five years (~2010). This will enable a review of the areas where fire exclusion is recommended, and should be based on the potential need to use fire to regenerate some areas within the reserve.

Where fire is planned to occur, consideration of the impact of weeds on the regeneration of the natural vegetation needs to be considered. This is particularly relevant to areas where threatened species are present and it may be a requirement to undertake weed control a number of years prior to the burn occurring. This will enhance the regeneration of the threatened species by removing the competition of the weeds. A plan of weed control needs to be included in any burn proposal where threatened species are present.

Adjoining landowners need to be proactive regarding fire management on their properties. Fire risks on their properties can be reduced by maintaining hazard separation and building protection zones, as recommended by FESA. Guidelines for these management strategies are outlined in the document Planning for Bushfire Protection (FESA (Fire & Emergency Service Authority of WA), 2001)

In some areas of the reserve areas of native vegetation has grown though fences. There is a concern about maintaining fire breaks along these fences to the shire requirements of 3m. One

option would be to place the firebreak on the inside of the fence line. This would negate the impact of having to remove declared rare (threatened) flora species. If this option is not taken, an application is required to enable the land manager to clear any plant material that may be declared rare (threatened). Any such action would require the input from the DEC and an application for approval to take declared rare flora in management operations is required. A copy of this form is attached in Appendix G. This process is also needed for fire operations which occur in areas where rare flora are present. Consequently any fire operations need to be planned and conducted with the cooperation of DEC. A procedure for this is included in Section 8d of this plan.

g) Disease management

The reserve was surveyed for the presence of *Phytophthora cinnamomi* in the late 1990s by trained interpreters from the Department of Conservation and Land Management. Its presence is determined by using indicator plant species (i.e. those species that are susceptible to the disease) and testing soil and plant samples. The reserve was determined to be mostly infested with a few areas of uninfested pockets. Once the organism is introduced to an area it is near impossible to eradicate. Therefore the management of the disease must aim to prevent further spread and reduce its impact.

Phosphite (phosphonate) is a biodegradable fungicide that protects plants against *Phytophthora* dieback. Phosphite works by boosting the plant's own natural defences and thereby allowing susceptible plants to survive within *Phytophthora* dieback infested bushland. It is important to note that there is no chemical that will eradicate *Phytophthora* dieback, including phosphite. However, an integrated approach can successfully control the spread and impact of the disease. An integrated approach may combine strategic phosphite treatment, controlling access, correcting drainage problems and implementing excellent hygiene protocols. Phosphite controls many species of *Phytophthora*, including *P. cinnamomi*. Phosphite is not toxic to people or animals (Shearer, Wills *et al.*, 1991) and its toxicity has been compared to table salt. There is a very low pollution risk associated with phosphite. When phosphite is sprayed on to the foliage of plants, it is applied at a very low rate, so any phosphite that reaches the soil is bound to the soil and does not reach the water table.

As the reserve is categorised as mostly infested with a few uninfested areas, the highest priority is to ensure that the pathogen is not spread throughout the reserve and that any susceptible vegetation is protected and that the pathogen is not spread. The following recommendations are aimed at this goal. They are taken from a guide written by the Dieback Working Group which is accessible on line at www.dwg.org.au (refer to Appendix H for contact information) (Dieback Working Group, 2005).

Planning

- Schedule activities that involve soil disturbance for low rainfall months (November to March) when the soil is dry.
- Minimise the number of tracks though the bushland and ensure that all tracks are well drained.
- Minimise soil disturbance during fire break maintenance. Mow, slash or herbicide use is recommended over grading or ploughing.
- Ensure that water does not drain into the Reserve from other areas, for example roads. Disease impact is greatest in wet sites.

For all activities;

- Vehicle access should be minimised. If a vehicle must enter the Reserve, they should remain on hard, well-drained tracks and avoid puddles.
- Vehicles, tools, equipment and machinery should be free of mud and all soil when entering the Reserve.
- Footwear should be free of mud and soil when entering the Reserve.

Earthworks

- It is very important that any earthworks undertaken are done in dry months.
- Any soil or gravel that is introduced into the Reserve (for example, parking areas or access ways) is obtained from sources certified free of the pathogen.
- Development areas are remote from the high conservation values that are at risk from *Phytophthora*.
- Sites of any new development activities need to be specifically assessed for dieback risk and procedures adopted to ensure that the disease is not spread.

Restoration Activities

- If revegetation is required, plant material should be purchased from nurseries with Nursery Industry accreditation to prevent other diseases being introduced.
- Select plants that are native to the reserve that are resistant to Phytophthora
- Complete planting when the soil is moist, but not wet.

Access

- Minimise walking in the reserve when the soil is wet and muddy.
- Stay on tracks.
- Potentially consider up-grading any tracks to a hard well drained surface that does not allow for the easy movement of soil out of the reserve.

Communication

- Place signs at key areas in the reserve highlighting the disease status and recommending avoiding access when the soil is wet.
- Place signs next to dead plants that have been killed by *Phytophthora* and explaining the impact the disease is having and how visitors can prevent further spread.

Protecting Vegetation

- Do not remove plants from the reserve
- Treat susceptible vegetation with phosphite. Susceptible trees should be injected and all other vegetation sprayed.

NOTE: High conservation values such as susceptible threatened flora and ecological communities have been sprayed and will continue to be treated by phosphite by the Department of Environment and Conservation.

Livestock and Horses

- Keep stock and horses out of the reserve.

Fire

- Mow, slash or use herbicide on fire breaks rather than plough or grade.
- Have contactors clean equipment before leaving the Reserve or moving to other parts of the reserve.

h) Feral and pest animal management

Foxes and rabbits are best controlled by the use of Sodium fluroacetate commonly referred to as 1080 (Department of Conservation and Land Management, Department of Agriculture *et al.*, 2002). 1080 occurs naturally in toxic plants found in Australia, South Africa and South America. Many native animals in WA have evolved with 1080-bearing plants and as such are often quite tolerant to 1080, meaning they can generally eat some plant or animals that contain 1080 with

little risk of being poisoned. However introduced animals such as foxes, rabbits, cats, pigs and dogs have higher sensitivity to 1080 than adapted native species. This makes it useful in targeting some of these pest animals. However the use of it is controlled under the Poisons Act 1976, which means that authorisation is required to use 1080 and only registered contractors can use the chemical. Authorisation is required from the Department of Agriculture for the approved use by these approved contractors. Other requirements include warning neighbours and there are restrictions on how close to dwellings the baits can be laid (e.g. not within 20 m of a road and 100m of a dwelling- D. Hill, Dept of Ag & Food, *pers comm*.).

Ideally oat baits should be used to control rabbits and these should be laid around March or April before the rains initiate new growth in crops. This will increase the likelihood of the baits being taken. Baiting at this time is also likely to impact on foxes, as secondary toxicity should occur as foxes eat the poisoned rabbits.
If no rabbit baiting occurs, then it is preferable to bait for foxes around August[5] (D. Hill, Dept of Ag & Food, *pers comm*.).

The presence of pigs at the eastern edge of the reserve is a concern and vigilance is needed to locate any feral pig populations that may exist. Should pigs use the reserve as a corridor to move though the landscape, they are likely to cause major physical damage to the flora and fauna of the reserve and are likely vectors for the spread of disease and dieback though the reserve. Should any pigs be noticed, the Department of Agriculture and Food should be notified and control methods implemented.

There is not much data on the presence and/or impact of feral cats within the reserve. More data are needed and should be compiled and if it is determined by the Management Committee that a major problem exist, then control methods needs to be evaluated and undertaken. It is important to note that the Shire of Busselton has a cat management strategy in place and is likely to be an important partner in any cat management process.

i) Traffic management

The road that adjoins the reserve is a Shire managed road, however there is a heavy haulage permit negotiated between the Shire of Busselton, Main Roads and the mining companies to allow for special usage along the Tutunup Road section of the roadway. This enables the mining companies to transport their materials at a higher frequency than normal shire policy and also the companies have upgraded the road to cater for the increased loads carried.

Road maintenance and pruning of overhanging and intruding vegetation along Tutunup Road is the responsibility of the mining companies. Any pruning is conducted under the supervision of the DEC to ensure that the conservation values of the reserve are maintained. Roadside pruning of vegetation along Ruabon Road is conducted by the Shire of Busselton. Should the rare flora be required to be removed or pruned, a permit to take rare flora is needed (Section 8 c outlines the procedures for any activities that involve the removal or damage of any aspects of rare plants).

Pruning of driveways to allow an unimpeded sightline to the Ruabon and Tutunup Roads needs to occur on a regular basis. Where there are threatened species, DEC will liaise with the property owner to ensure that the pruning that occurs meets the safety requirements without negatively impacting upon the threatened species.

The adjoining roadway that runs along the reserve, allows the carting of many materials, including heavy fuels and other hazardous material. Both Iluka Resources and Cable Sands have emergency response protocols should any hazardous material spill into the reserve. These are outlined in Appendix D and E, however the main responsibility for coordination of any clean up

[5] Note that an application for fox baiting has been submitted to the Department of Agriculture and Food for approval to enable baiting to occur in spring 2006.

lies with the Fire and Emergency Service Authority of WA (FESA). Should a major spillage occur, FESA recommends the following procedure:

If hazardous materials are spilt on the road:

- Ring 000
- Ask for Fire Services and advise (where possible and without endangering yourself):
  - location of spillage
  - name of vehicle/s
  - name of chemical and UN number
  - form of chemical (solid, liquid, gas)
  - any people trapped in vehicles
  - number of people affected or injured
- Evacuate the area and move at least 100 metres upwind
- Warn approaching traffic

It is essential you do not:

- Ignore the incident
- Touch or breathe in the chemical

Vehicles must be licensed to carry bulk dangerous goods and the drivers of those vehicles must also have special licences. Vehicles carrying packaged dangerous goods do not require special licences but do need to adhere to requirements.

j) Utility access

There are a number of drains that intersect the reserve, mainly around the area of the Ruabon Nature Reserve. These drains play an important function in moving water from the adjacent paddocks, enabling farming activities to occur and preventing flooding. These drains are under the management control of the Water Corporation. In order for these drains to function properly they need to be maintained and there is a standard requirement of 6 metres from the edge of a drain to enable maintenance access (one side only). There are also considerations regarding access and clearing of vegetation within these areas as they contain threatened species of plants. The maintenance of drains within the reserve, fall under the direction of the Busselton Office of the Water Corporation. When maintenance of areas that contain rare flora is required, the Water Corporation contacts the DEC who arrange for officers to come and mark the rare populations with tags. The Busselton Drainage Maintenance Database is flagged with the comments that no maintenance must occur in areas of the reserve without the presence of representatives of DEC (John Moon, Water Corporation, *pers com*).

Any problems or issues related to drainage and drain maintenance should be referred to the Busselton Team Leader – John Moon Ph: 97521308, 0417 928 714.

Access is also required for telecommunication and power services. These need to be accommodated within the overall management of the reserve. Most of these services are underground and should not impact on the conservation objectives of the plan, except if maintenance is required. There are a number of distribution power lines running to minesites, houses and sheds that pass through the reserve. Most of these have minimal maintenance requirements except pole management and maintaining vegetation from the line zone. There should not be any new utilities placed within the road reserve due to its biodiversity value.

The presence of plastic pillars for Telstra and power throughout the Reserve will require special considerations. Telstra will provide protection for their pillars during any such fire event.

k) Recreational access

The reserve has many values that interest a wide range of people. However, access through the reserve is limited as the rail line itself is overgrown in many places as are the old access tracks along side the rail line. Given the long and narrow nature of the reserve, its high conservation values and the presence of many threatening processes that would be increased should any formal access way be developed (for example, weed invasion and dieback spread) it is not recommended that access for recreational purposed be increased. Specific areas should be highlighted for recreational purposes, for example some of the European historically areas (sidings, group settlement areas). Many of these areas have been significantly impacted and could, with careful planning, be focal points for recreational access along the reserve. Other values, such as flora and fauna, can still be observed with the current status of access, however refer to section k) for information regarding signage.

There have been a number of requests to undertake horse endurance rides along the road reserve. These have been opposed due to the high impact on the natural values of the reserve.

l) Signage

As mentioned above, the reserve possesses many values to a wide range of people. Although access though the reserve is limited in some areas, the use of signage in specific areas of the reserve would be beneficial in educating the broader community on those values and also some of the specific threatening process that are present within the reserve. The design and location of any signage need to carefully consider the values within the reserve and ensure they do not place further pressure on those values by increasing threats. Some themes that would suit signs would include:

- Flora values;
- Fauna values;
- Connectivity values;
- Landscape values;
- Aboriginal Heritage values;
- Group settlement history;
- Railway history;
- Weed threat;
- Dieback threat.

The management committee would need to consider the issue of signage in context of their overall management of the reserve and the availability of any funding and the priority of this educational aspect of management over other actions for management.

m)Interpretation and education

Signage is one aspect of interpretation, as discussed in k) above. There are many educational benefits that can be gained from the reserve, ranging in scope from primary school to PhD level post graduate education. The breadth and depth of the educational values that can gain from the reserve would warrant (subject to funding availability) a more specific interpretation and education guide for the reserve. At a broader management level this would include a strategy for signage.

n) Monitoring and evaluation

Monitoring is the repeated measurement of something or a range of things, over time. Evaluation is the review of the information gathered by monitoring to determine whether things have change

and to analyse the information and drawing conclusion. They need to be conducted together. Monitoring provided the raw data and evaluation is where the learning occurs, questions are answered, recommendations made and improvements suggested.

A monitoring and evaluation program is important for a number of reasons:

1. it is an opportunity to build the skills and understanding of people involved in a project;
2. it allows project managers to judge the success of a project and whether or not changes are needed;
3. it provides information for the planning of new projects;
4. it is a means of justifying and promoting a project to the wider community;
5. it provides documented accountability to funding bodies;

Without monitoring and evaluation, it is impossible to know if a project was worthwhile or is achieving what is intended. It is also a vital tool to learn how to improve management techniques, especially when other scientific data is not available (Coote, Moller *et al.*, 2001).

While there are a number of approaches to monitoring and evaluation there are a number of similarities and these are all related to the specific projects being undertaken and the resources available (e.g. people, skills, time, funding). They all revolve around the following points:

1. clearly define what is you want to achieve;
2. specify how you will know you have achieved this (making sure that that the goal can be measured);
3. select the activities that will enable you to monitor the progress towards the goal. Need to consider;
    a. information needs to match the goal;
    b. the capacity of the group to monitor the activities;
    c. needs of stakeholders (funding bodies, landowners etc.)
4. decide how often to monitor and when information will be evaluated;
5. prepare a monitoring and evaluation schedule.

Specific actions, when undertaken, need to ensure that that they follow the above 5 guidelines and clearly define their goal and monitoring technique/s and timelines prior to implementation. There will be specific monitoring and evaluation requirements for threatened plants, animals and communities as part of their recovery process. These are planned and implemented by the Department of Environment and Conservation will be updated dependent upon the biota's status and the resources within the department. This species/communities monitoring is not included in this plan. These, however, could be compiled as a subset of a monitoring and evaluation process for the reserve, should resources for this become available. At a basic level, however, the persistence of threatened flora and communities and the maintenance or improvement of their "condition" should be seen as an important preliminary indicator of the success of the management of the conservation values of the reserve.

An excellent resource is the Monitoring and Evaluating Biodiversity Conservation Projects guide (Coote, Moller *et al.*, 2001). It outlines the processes as well as a suite of specific tools to monitor particular elements of biodiversity at a project based level, including a range of worksheets which can be used or modified. A digital copy of these worksheets has been provided with this plan for future use and a copy of the guide is held in the GeoCatch office in Busselton.

o) Management Actions

Management actions for this plan are classed as general recommendations or zone specific recommendations. The general management actions relate to the overall management of the reserve, while the zone actions relate to their individual zone. Management recommendations for both are prioritised as being High, Medium or Low. These relate to the value of the element of the reserve being managed, for example the degree of rarity or the severity of the threat, and the urgency required for the action to occur, for example generally high priority actions should be undertaken before medium or low priority actions[6]. The priority of each action is highlighted in Table 10 in Section 8 c on Work Plan Priorities.

Within each management zone section, a visual summary of the significant elements within each zone is displayed. This is to enable a quick snapshot of the major elements and threats within each zone and will allow the relative priority of each zone to be consistently compared with another. The specific criteria are:

Conservation Priority

Conservation Priority 1 (C1):	Presence Threatened or Priority plants and animals or Threatened Ecological Community
Conservation Priority 2 (C2):	Vegetation Associations with less than 30% remaining
Conservation Priority 3 (C3):	Other vegetation types and associations.

Fire risk to people or property

- <50m; 50-100m; >100m .

Weed Cover

- <1%; 1-5%; 6-25%; 26-50%; 51-75%; 76-100%.

Majority Vegetation Condition

- Excellent; Very Good; Good; Poor; Very Poor; Degraded.

i) General Recommendations

There are a number of recommendations that should apply to the whole of the reserve.

[6] This may not always be the case, for example funding may be gained for a medium priority action. The classification of priority is subjective and to be used a guide for implementation.

High Priorities
1. The reserve's vesting should be changed to acknowledge its high conservation values. Ideally, the reserve should be vested with the Conservation Commission and managed by DEC with the R-TRRPG, however if this cannot be achieved, vesting as a conservation reserve with the Shire of Busselton would be a better result than its current vesting with the WAGRC.
2. A new licence to occupy is required to be in place by 1 November 2008 (this is assuming that there is no change in the vesting as recommended in 1).
3. The Ruabon – Tutunup Rail Preservation Group (R-T RRPG) should be acknowledged as the recognised management body for the reserve, through a MOU with the Shire of Busselton and a specific Terms of Reference.
4. Upon acknowledgement as the management body the R-TRRPG should establish and document appropriate roles, responsibilities, accountabilities and meeting protocols.
5. Formalise procedures for interagency communications and integration of activities within the reserve. Although these are currently done, there is no formal process or documentation to support these current practices.
6. Maintain records of management works undertaken in the reserve, including any rehabilitation works (including time of any plantings, species and sources of plant material, number of each planted), maintenance works (i.e. road pruning, drain maintenance, road works, track maintenance etc).
7. Fire records of any planned burns or wildfires should be maintained including the spatial extent, date and severity of the fires.
8. Subject to additional funding, the DEC should look at establishing "health" transects though the most valuable areas of the reserve (i.e. those areas with threatened species and communities), based on the Bennet Health Scale process or similar metric to determine broader condition rating of these high conservation assets.
9. Further information on the Aboriginal and European heritage of the reserve should be assembled and incorporated into future management plans.
10. Dwellings and other infrastructure on private land should be set back from the reserve a certain distance such that the fire requirements do not impact on management of the reserve
11. All of the vegetation communities along the reserve need to be assessed for TEC status.
Medium Priorities
12. Updated fire fuel loadings and a fire history map should be prepared for the whole of the reserve, using more appropriate fuel loading calculations.
13. Develop dieback and disease management protocols for the reserve.
14. Develop a signage and interpretation strategy for the reserve.
15. Develop an access plan for the reserve, limiting access to sensitive conservation areas.
16. The management body (Ruabon Tutunup Rail Reserve Preservation Group) should meet at least annually to review management priorities (January is recommended), to determine a suitable allocation of shire budget and identify options for gaining external grant based funding.
Low Priorities
17. Liaise with school groups, colleges and universities to maximise opportunities for education and participation in management.

ii) Management Zone 1

Refer to Figure 10.

Conservation Value	C1	C2	C3

Fire Risk to People/property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length – 1,460m

Start - Bussell Highway and Ruabon Road.

Finish – 1,460m along Ruabon Road (at access way between Locations 2269 and 1430).

The vegetation begins at Bussell Highway with a Jarrah Marri community which develops into the vegetation association identified as Jarrah Marri forest over woodland with dense sedge layer (Ruabon 12) and Peppermint woodland (Ruabon 12 east). The condition varies between Very Good and Poor, however most of it is classed as Good.

Conservation Values

The vegetation is in the Bassendean landscape unit, which while under-reserved, still has more than 50% of its extent remaining. There is no threatened flora within this zone. Black Cockatoos frequently roost and feed on the Marris in this area.

Human Values

There is a house/shed on Lot 3 on Diagram 3342, which is approximately 120m south of the reserve. This is close to un-vegetated areas of the reserve and would not be considered to be at risk.

Issues

The area has extensive populations of weeds, in particular grasses. The Fire Plan assessed a moderate fuel load for this zone. These grasses would resprout with fire, further increasing any fire risk. Should any fire occur in this area, weed control on regrowth areas should be undertaken.

Zone Specific Recommendations

High Priorities
Medium Priorities
18. Control weeds in the higher quality vegetation areas.
Low Priorities
19. Rehabilitate bare areas with locally native species.

iii) Management Zone 2

Refer to Figure 11.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length – 1,640m

Start ~ 1,460 from Bussell Highway, along Ruabon Rd

Finish ~ 3,100m from Bussell Highway, along Ruabon Rd (at access track to Location 3712).

The vegetation is assessed as *Regelia ciliata* / *Pericalymma elliptica* heaths (Ruabon 11, Ruabon 10, and Ruabon 9) with areas of Jarrah/Marri forest over woodland (Ruabon 8). The vegetation is primarily ranked as Good with some Poor areas within it. The vegetation in Ruabon 10 is classed as Very Good.

Conservation Values

The vegetation within this zone is classed as Abba landscape type vegetation. Only just over 5% of this type of vegetation remains. Hence this vegetation type has high conservation values.

Human Values

There are many houses/shed adjoining or within 150m of the reserve, within this zone.

Issues

The fuel load in this zone was assessed as being high in the Fire Plan. The proximity of houses and sheds add further risk to human values. The vegetation has high conservation values and is in good condition. There are significant populations of grass weeds within the zone, which would resprout after fire and increase the fire risk. Care is also needed to ensure that grass weed populations do not increase in abundance or distribution as a consequence of any fire.

Zone Specific Recommendations

High Priorities
20. A fire prescription to reduce the fuel loading in the reserve, but maintain the integrity and composition of the vegetation is required.
Medium Priorities
21. Target weeds in the higher quality vegetation areas.
Low Priorities

iv) Management Zone 3

Refer to Figure 12.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length - 720m

Start ~ 3,100m from Bussell Highway, along Ruabon Rd

Finish ~ 3,820m from Bussell Highway, along Ruabon Rd

The vegetation is classified as *Regelia ciliata* / *Pericalymma elliptica* heaths (Ruabon 7) and finishes at the eastern boundary of this vegetation type. The vegetation is in Good or Very Good condition. However the road verge has significant grass weed populations.

Conservation Values

The vegetation within this zone is classed as Abba landscape type vegetation which has high conservation values.

Human Values

There are no houses or shed close to the reserve

Issues

There are only minimal weed populations within the bushland areas (i.e. excluding the road reserve). The fuel loading has been classified as high, however the human risk is minimal.

Zone Specific Recommendations

High Priorities
Medium Priorities
22. Control the grass weeds within the main reserve area, starting in the V Good quality areas.
Low Priorities
23. Control the grass weeds along the road reserve.

v) Management Zone 4

Refer to Figure 13.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length - 1,110m

Start ~ 3,820m from Bussell Highway, along Ruabon Rd

Finish ~ 4,930 m from Bussell Highway, along Ruabon Rd

The eastern boundary of this zone is the drain that intersects the reserve approximately 350 m from Ludlow-Hithergreen Road. There are three vegetation associations present in the zone: Jarrah/Marri forest over woodland with dense sedge layer (Ruabon 6, 3 & 2), Peppermint Woodland (Ruabon 5) and *Regelia ciliata /Pericalymma elliptica* heaths (Ruabon 4). The vegetation is in Very Good to Excellent condition and is very dense. Reserve 13136 finishes within this zone and Reserve 12969 begins.

Conservation Values

The vegetation within this zone is classed as Abba landscape type vegetation which has high conservation values. The vegetation is in excellent quality, very dense and has good signs of natural recruitment (i.e. new plants are growing). There is very little weed growth within the reserve, although the road reserve has many grass weeds. This type of vegetation and its quality would provide good habitat requirements for many native fauna.

Human Values

There are houses and shed within 150m to the south of the reserve in Location 835.

Issues

The Fire Plan assessed the area within this zone as having low ground fuel, however the western section of this zone was burnt in May 2002. The quality of this vegetation is very high and management should attempt to maintain this quality and integrity from any degrading processes.

Zone Specific Recommendations

High Priorities
24. Disturbance in this zone should be minimised. Drain management activities should not impact on the quality of the vegetation and other activities should ensure that dieback is not spread though this area.
Medium Priorities
25. Control weeds in reserve.
Low Priorities
26. Control weeds on road reserve.

vi) Management Zone 5

Refer to Figure 14.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length - 400 m

Start ~ 400 m to the west of Ludlow Hithergreen Rd.

Finish - at Ludlow Hithergreen Rd.

A Water Corporation drain runs along the northern section of the reserve separating it from the Ruabon Nature Reserve to the north. The vegetation is mixed Melaleuca woodland (Ruabon 1). There are extensive weeds along the drain line, the road verge and the area in which the Group Settlement Plaque is situated. The main areas of native vegetation are classed in Very Good and Excellent condition.

Conservation Values

The vegetation is Abba complex and is very thick and dense in the main areas, however the area where the group settlement plaque is located has little native vegetation and has major weed infestations.

Human Values

There are sheds and a house in Lot 2 of Diagram 59767, within 100m to the south of the reserve.

Issues

The vegetation is in good condition and the fuel load was assessed as moderate. Care is needed to ensure the bulk of the vegetation remains in good condition. The area that contains the Group Settlement Plaque would be a good place for some information signage or other interpretation and educational material. However any development works would need to occur in the dryer months and ensure that any material brought to the site is certified clear of *Phytophthora*.

Zone Specific Recommendations

High Priorities
Medium Priorities
27. Weed control is needed on the drainage area to the north of the reserve to ensure that weeds do not spread into the reserve or the adjoining nature reserve.
Low Priorities
28. Investigate the viability of developing interpretation boards or signage in the group settlement area – as long as there is safe parking. 29. Weed control is needed on the road reserve and the cleared area around the group settlement information.

vii) Management Zone 6

Refer to Figure 15.

Conservation Value	C1	C2	C3

Fire Risk to People/property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length – 1,510 m

Start - At Ludlow Hithergreen Rd.

Finish ~ 1,510 m along Tutunup Road from Ludlow Hithergreen Rd.

The vegetation is a mixture of Mixed Melaleuca Woodlands (Tutunup 2), Jarrah/Marri forests over low heath (Tutunup 1a) and *Regelia ciliata/Grevillea diversifolia* heaths (Tutunup 1). The vegetation condition is classified as Very Good to Excellent.

Conservation Values

There are four major pockets of Declared Rare Flora within this zone. There are some grass weed populations along the fence line to the south of the reserve, however the high vegetation condition is due to the density of the plants and the amount of regrowth observed. This vegetation is classed as Abba soil vegetation. Given the rare flora, the vegetation type and condition, this zone has very high conservation values.

Human Values

There is a house on Loc 1996 that is approximately 250m north of the reserve.

Issues

The area was burnt in 1998 and May 2000, therefore the fuel levels should not be as high as indicated in the Fire Plan.

Zone Specific Recommendations

High Priorities
30. Review fuel loads within this zone. 31. Ensure populations of declared rare flora and communities are protected and where possible, enhanced.
Medium Priorities
32. Control the grass weeds along the fence line to the south of the reserve. 33. Careful control of the weeds that exist in the rare flora populations is needed.
Low Priorities

viii) Management Zone 7

Refer to Figure 16.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length - 490 m

Start ~ 1,510 m along Tutunup Road from Ludlow Hithergreen Rd.

Finish ~ 2 kms along Tutunup Road from Ludlow Hithergreen Rd.

The vegetation is Jarrah/Marri forest over low heath (Tutunup 3) and it is in Very Good to Excellent condition. There are only small areas of grass weeds.

Conservation Values

The eastern area of this zone has populations of declared rare flora. This vegetation is classed as Abba soil vegetation. This zone has very high conservation values.

Human Values

There are no houses or sheds near the reserve.

Issues

The area was burnt in 1998 and May 2000

Zone Specific Recommendations

High Priorities
34. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 35. Minimise disturbance within the zone.
Medium Priorities
36. Review fuel loads within this zone.
Low Priorities

ix) Management Zone 8

Refer to Figure 17.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length – 1,150 m

Start ~ 2,000 m from Ludlow Hithergreen Rd

Finish ~ 3,150 m from Ludlow Hithergreen Rd

The vegetation is classed as Ironstone heath (Tutunup 4) and is in Excellent condition.

Conservation Values

The majority of this zone has rare flora present and contains areas of the threatened Ironstone Heath. It is also Abba soil vegetation system. This zone has very high conservation values.

Human Values

There are houses and sheds close the reserve in the eastern area of this zone.

Issues

The eastern are of this zone had a fire in May 2005. Watsonia is present throughout the zone, and is within areas with rare flora. This area was classified as a No Burn Area in the fire plan as the fuel loads from the Ironstone communities were low and the risk of fire impacting on the vegetation was considered too high.

Zone Specific Recommendations

High Priorities
37. Maintain the no burn policy of this zone. 38. Careful control of the weeds that exist in the rare flora and TEC is needed. 39. Minimise disturbance within the zone. 40. Ensure populations of declared rare flora and communities are protected and where possible, enhanced.
Medium Priorities
Low Priorities

x) Management Zone 9

Refer to Figure 18.

Conservation Value	C1	C2	C3

Fire Risk to People/property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -420 m

Start ~ 3,150 m from Ludlow Hithergreen Rd

Finish ~ 3,570m from Ludlow Hithergreen Rd

The vegetation consists of Jarrah/Marri forests over low heath (Tutunup 5) in Good condition.

Conservation Values

Populations of rare flora exist in the western section of this zone. The condition is assessed as good, although the area containing the rare flora is in Excellent condition. It is also Abba soil vegetation.

Human Values

There is a house/shed complex at the beginning of the zone.

Issues

The western section of this zone was burnt in May 2005. Watsonia is present along the road verge and within areas containing rare flora.

Zone Specific Recommendations

High Priorities
41. Ensure populations of declared rare flora and communities are protected and where possible, enhanced.
Medium Priorities
42. Careful control of the Watsonia along the road reserve is needed.
Low Priorities

xi) Management Zone 10

Refer to Figure 19.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -1,035 m

Start ~ 3,570 m from Ludlow Hithergreen Rd

Finish ~ 4,605m from Ludlow Hithergreen Rd

The vegetation is part of the threatened Ironstone heath community (Tutunup 6), which is in Excellent condition.

Conservation Values

The vegetation is Abba soil community. Most of the zone consists of rare or threatened flora populations. This zone has very high conservation values.

Human Values

There are sheds, adjacent to the reserve, in the eastern section of this zone.

Issues

There are extensive populations of Watsonia and grass weeds along the road reserve as well as patches of grass weeds in particular in the south east of the reserve. This area was assessed as a No Burn Area in the Fire Plan.

Zone Specific Recommendations

High Priorities
43. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 44. Careful control of the weeds that exist in the rare flora and TEC is needed. 45. Maintain the no burn policy of this zone.
Medium Priorities
46. Watsonia and grasses need to be controlled along the road reserve.
Low Priorities

xii) Management Zone 11

Refer to Figure 20.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -630 m

Start ~ 4,605m from Ludlow Hithergreen Rd

Finish ~ 5,235m from Ludlow Hithergreen Rd

The vegetation is *Regelia ciliata/Grevillea diversifolia* heaths (Tutunup 8) and Peppermint woodland (Tutunup 7), which varies in condition from Excellent to Very Poor.

Conservation Values

The vegetation is Abba soil community. There are significant populations of rare species throughout the zone.

Human Values

There are no houses or shed in the vicinity of the reserve.

Issues

The vegetation in the western section of the zone is in poor condition, mainly due to the weed burden (primarily grasses, however watsonias is also present along the road reserve). However there are rare floras present. Careful management is needed in these areas.

Zone Specific Recommendations

High Priorities
47. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 48. Careful control of the weeds that exist in the rare flora and TEC is needed.
Medium Priorities
49. Weed control and revegetation with local native species should occur in the grass infested areas, starting with those areas in the better condition.
Low Priorities
50. Control Watsonia and grasses along road verge.

xiii) Management Zone 12

Refer to Figure 21.

Conservation Value	C1	C2	C3

Fire Risk to People/property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -650 m

Start ~ 5,235m from Ludlow Hithergreen Rd

Finish ~ 5,900m from Ludlow Hithergreen Rd

The vegetation is a mixture of *Regelia ciliata/Grevillea diversifolia* heaths (Tutunup 9), Jarrah/Marri forests over heath (Tutunup 11) and threatened Ironstone heath communities (Tutunup 10). The condition varies considerably from poor to excellent. This is due to extensive weediness in particular areas.

Conservation Values

The vegetation is Abba soil vegetation. The presence of extensive areas of threatened flora and the threatened Ironstone communities makes the conservation value of this zone as very high.

Human Values

There is a house adjacent to the reserve in Location 2003.

Issues

There are a number of weed patches throughout the bushland and significant Watsonia stands along the road verge. Bandicoots have been seen in this section during the condition survey and it is highly probable that they are established within the dense areas of Watsonia. Care is needed to ensure that any weed control does not displace any native fauna.

Zone Specific Recommendations

High Priorities
51. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 52. Burning should be excluded from the Ironstone communities.
Medium Priorities
53. Careful control of the weeds that exist in the rare flora and TEC is needed. 54. Monitor the distribution and abundance of weeds within the DRF areas and their impact on the "health" of the DRF present.
Low Priorities
55. Control Watsonia and grasses along road verge.

xiv) Management Zone 13

Refer to Figure 22.

Conservation Value	C1	C2	C3

Fire Risk to People/property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -470 m

Start ~ 5,900m from Ludlow Hithergreen Rd

Finish ~ 6,370 m from Ludlow Hithergreen Rd

This area is all Ironstone Heath (Tutunup 12) in Good to Very Good condition.

Conservation Values

The area has very high conservation values based on the presence of the threatened Ironstone heath vegetation association and Abba Soil type vegetation. The entire area also contains declared rare or threatened flora.

Human Values

There are houses and shed within 100 of the reserve to the east of this zone.

Issues

There is a pocket of garden plants on the eastern area of the reserve (e.g. palms and exotic trees). These may have heritage significance. A fire occurred within this section (the eastern area) in February 2006.

Zone Specific Recommendations

High Priorities
56. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 57. Burning should be excluded from the Ironstone communities.
Medium Priorities
58. Careful control of the weeds that exist in the rare flora and TEC is needed. 59. Monitor the distribution and abundance of weeds within the DRF areas and their impact on the "health" of the DRF present.
Low Priorities
60. Investigate whether the exotic plants have heritage significance, if not, determine whether they should be eradicated.

xv) Management Zone 14

Refer to Figure 23.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -920 m

Start ~ 6,370 m from Ludlow Hithergreen Rd

Finish ~ 7,320 m from Ludlow Hithergreen Rd

The vegetation is a mixture of *Regelia ciliata/Grevillea diversifolia* heaths (Tutunup 13) and Jarrah/Marri forests over heath (Tutunup 14). The condition is mainly Very Good, however there are pockets of Very Poor condition where weed incursion has occurred.

Conservation Values

There is a major pocket of rare or threatened flora present within the zone and the vegetation is within the Abba soil complexes, hence the zone has high conservation values.

Human Values

There are sheds within 100m of the reserve

Issues

Parts of this zone were burnt in a fire in January 2005. The fire plan outlined moderately low fuel loads. There are grass weed infestations within the DRF area and along the road reserve.

Zone Specific Recommendations

High Priorities
61. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 62. Careful control of the weeds that exist in the rare flora is needed.
Medium Priorities
Low Priorities
63. Control Grasses along road verge.

xvi) Management Zone 15

Refer to Figure 24.

Conservation Value	C1	C2	C3

Fire Risk to People/property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -680 m

Start ~ 7,320 m from Ludlow Hithergreen Rd

Finish ~ 8,000 m from Ludlow Hithergreen Rd

The vegetation is classified as Ironstone Heath (Tutunup 15) and is mostly in Very Good condition, apart from the eastern areas which have significant grass weed invasion, which results in the condition being Poor and Very Poor

Conservation Values

The whole zone is threatened Ironstone, contains DRF and is mostly in very good condition. The vegetation is also with the Abba soil vegetation. This zone has very high conservation values.

Human Values

There are no houses or sheds close to the reserve.

Issues

There are extensive grass weed populations in the eastern area of the zone, with an area that appears to have been cleared of vegetation in the past. This area may be a good site to attempt restoration of the ironstone community, if sufficient resources are available for revegetation and on-going weed control.

Zone Specific Recommendations

High Priorities
64. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 65. Careful control of the weeds that exist in the rare flora and TEC is needed. 66. Maintain the no burn policy of this zone. 67. Minimise disturbance within the zone.
Medium Priorities
68. Control Grasses along road verge. 69. Investigate the possibility of restoration of the eastern, open area to Ironstone vegetation. 70. Establish monitoring of grass weed extent to ensure that it does not increase.
Low Priorities

xvii) Management Zone 16

Refer to Figure 24.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -910 m

Start ~ 8,000 m from Ludlow Hithergreen Rd

Finish ~ 8,910 m from Ludlow Hithergreen Rd

The vegetation is a mixture of Ironstone Heath (Tutunup 16c) and *Regelia ciliata/Grevillea diversifolia* heaths (Tutunup 16a). The condition is mostly Very Good apart from the western area of the zone, which contain extensive grass weed and Watsonia infestations.

Conservation Values

The whole zone contains declared rare flora, and parts of it contain threatened Ironstone communities. The vegetation is Abba soil landscape systems. The zone contains very high conservation values.

Human Values

There are no houses or sheds close to the reserve.

Issues

The comments from Zone 15 overlap on the western area of this zone.

Zone Specific Recommendations

High Priorities
71. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 72. Careful control of the weeds that exist in the rare flora and TEC is needed. 73. Minimise disturbance within the zone. 74. Burning should be excluded from the Ironstone communities.
Medium Priorities
75. Control Grasses along road verge. 76. Establish monitoring of grass weeds and Watsonia to ensure they do not increase.
Low Priorities

xviii) Management Zone 17

Refer to Figure 26.

Conservation Value	C1	C2	C3

Fire Risk to People / property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -475 m

Start ~ 8,910 m from Ludlow Hithergreen Rd

Finish ~ 9,385 m from Ludlow Hithergreen Rd

The vegetation within this zone is Whicher Scarp *Eucalyptus haematoxylon* Cartis units (Tutunup 17). The condition varies between Good to Excellent.

Conservation Values

The western are of this zone contains rare or threatened flora. The area that contains rare flora is also within the Abba Soil Landscape system, the remaining is within the Cartis system. The high condition of the zone also increases its conservation values.

Human Values

There are no houses or sheds close to the reserve.

Issues

Minimal weeds or other disturbance factors were noticed within this zone. The fuel loadings were assessed as moderately low in the fire plan.

Zone Specific Recommendations

High Priorities
77. Ensure populations of declared rare flora and communities are protected and where possible, enhanced. 78. Minimise disturbance within the zone.
Medium Priorities
Low Priorities

xix) Management Zone 18

Refer to Figure 27.

Conservation Value	C1	C2	C3

Fire Risk to People/property	<50m	50-100m	>100m

Weed Cover	<1%	1-5%	6-25%	26-50%	51-75%	76-100%

Vegetation Condition	Excellent	Very Good	Good	Poor	Very Poor	Degraded

Description

Length -1,390 m

Start ~ 9,385 m from Ludlow Hithergreen Rd (Armstrong Rd)

Finish ~ 10,775m from Ludlow Hithergreen Rd (Cartis Siding)

This area was not surveyed as part of the vegetation survey conducted by DEC in 2005 (Webb and Grant, 2005), however at a basic level it would appear to be similar in composition and structure to the Whicher Scarp *Eucalyptus haematoxylon* Cartis units (Tutunup 17). The condition was classified as Very Good with some area of Good, where minimal recruitment was observed.

Conservation Values

The vegetation is situated within the Cartis, Goodwood Valley and Whicher Scarp Soil Landscape units (Tille and Lantzke, 1990). The reserve sits within a large area of remnant vegetation (Crown Reserve 18047 and State Forest Blocks 33 & 28) and needs to be considered as an integral part of this landscape, rather than an isolated reserve.

Human Values

There are no houses or sheds close to the reserve.

Issues

In this zone, the reserve needs to be considered as a component of the larger vegetation units within the State forest areas. This means that the high conservation status of the reserve needs to be considered when management planning is undertaken in adjoining state forests areas, for example fox baiting, access planning and fire planning.

Interpretation areas could be considered at the junction of Johnson Road and possibly at Cartis Siding (which still has signage present).

There is a small population of Watsonia that should be controlled before it spreads.

Zone Specific Recommendations

High Priorities
79. Minimise disturbance within the zone. 80. Vegetation survey, consistent with the 2005 CALM survey, needs to be undertaken for this section.
Medium Priorities
81. The small pocket of Watsonia should be controlled before it expands.
Low Priorities
82. Liaison with DEC is needed to ensure complimentary management actions are undertaken for any activities in the State Forest blocks. 83. Investigate the potential for interpretive signage at Cartis siding or Johnson Road junction.

8) IMPLEMENTATION

a) Management authority

As outlined in 2a) above, the Reserve is vested in the Western Australian Government Railways Commission (WAGRC) and a 10 year licence to occupy is valid until 2008. Given the local, regional, state and national conservation values with the reserve, it is recommended that continued approaches be made to the WAGRC seeking a change of vesting to the Conservation Commission of WA. In the interim, the reserve should be continued to be managed by the Ruabon – Tutunup Rail Reserve Preservation Group (R-TRRPG). The R-TRRPG is a local volunteer group consisting of local land owners, the Shire of Busselton, DEC, Vasse Wonnerup LCDC, Iluka, Cable Sands and GeoCatch. This group is formally a sub-committee of the Vasse Wonnerup LCDC and is able to seek funds for the reserve under the auspices of the LCDC. Those involved with this group are considered an appropriate representative mix of stakeholders and should be formally recognised as the main management authority for the reserve. It is recommended that a set of procedures be formalised, including membership, meeting structure, level of authorities and clarification of roles and responsibilities. This could take the form of a Memorandum of Understanding with the Shire of Busselton and formal recognition from the LCDC. Should vesting eventually transfer to the Conservation Commission, the management authority and structure may need to change.

b) Permits and Approvals

Any activity that may impact on declared rare flora (in either a negative or positive manner) must be undertaken under a Permit to Take Rare Flora (*Wildlife Conservation Act 1950*, Section 23F). Permits will be required to cover management actions such as pruning rare flora along fencelines, maintaining firebreaks through rare flora populations, weed control in the immediate vicinity of rare flora, and recovery actions such as collection of seed.

Translocation of rare flora must be undertaken under a Translocation Proposal approved by the DEC Director of Nature Conservation.

The clearing of native vegetation must be undertaken under an Environmental Protection Act Clearing Permit, unless for an exempt purpose. Various statutory exemptions apply under the Act (including if a permit to take rare flora has been issued), while a number of 'standard' land management activities are exempt under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, unless they are to be undertaken with defined Environmentally Sensitive Areas (ESA's). These exemptions include roadside maintenance, fenceline clearing and firebreak clearing. ESA's include within 50m of declared rare flora and within Threatened Ecological Communities.

Thus, no clearing of native vegetation may be undertaken for any 'routine activity' within 50m of rare flora or within a Threatened Ecological Community without a Clearing Permit and/or Permit to Take rare flora.

Threatened flora, fauna or ecological communities may also be listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Activities that will cause a significant impact on any listed species should be referred to the Commonwealth Department of Environment and Heritage for assessment and possible permit issue under the Act.

Any on-ground actions that involve the use of 1080 poison needs permits issued from the Department of Agriculture and Food. Further information can be obtained from the Department's office at the Vasse Research Station - Ph: 9753 0333 or the Bunbury Regional Office - Ph: 9780 6100.

c) Communication

Once the management body of the reserve has been formalised and a Memorandum of Understanding or other mechanism is in place between the R-TRRPG and the Shire of Busselton, a communication process needs to be developed. This needs to facilitate a means for community views and aspirations to be delivered to the R-TRRPG and also clarify a process by which proposed actions, events, results etc, can be easily communicated to the community and other stakeholders within the reserve. This could be as simple as placing an anticipated works plan of actions on a notice board outside the Ruabon Hall, quarterly or biannually.

d) Work priorities

Table 10 outlines the recommended actions outlined in n) above for the reserve as a whole and prioritised their implementation. These suggestions are based on the conservation criteria outlined in Section 7c. Those areas with threatened or priority plants or animals are ranked as having the highest priority, then those areas with vegetation associations of less than 30% remaining (note that most of the Abba vegetation have less than 6%). Those zones where the vegetation is in a higher standard of "health" are rated as the next highest and finally those other areas. It is important to note that these priorities are only suggestions and that specific management actions are not solely dictated by conservation priority, but by factors such as availability of people, materials and funding, societal values of landowners along the reserve, opportunistic availability of specialised funding (e.g. heritage funding) as well as the impact and severity of specific threatening process at any one site along the reserve. Note that this last point is very variable with a dynamic landscape such as the Reserve, consequently some of the actual areas for action may change frequently, hence the need to monitor and review management actions and the conservation elements of the reserve.

Table 11: Reserve Priorities by Actions

Priority	General	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8	Zone 9	Zone 10	Zone 11	Zone 12	Zone 13	Zone 14	Zone 15	Zone 16	Zone 17	Zone 18
High	1,2, 3,4, 5,6, 7,8.		17		21		27, 28	31, 32	34, 35, 36, 37	38	40, 41, 42	44, 45	48, 49	53, 54	58, 59	61, 62, 63, 64	68, 69, 70, 71	74, 75	76, 77
Med	9, 10, 11, 12, 13.	15	18	19	22	24	29, 30	33		39	43	46	50, 51	55, 56		65, 66, 67	72, 73		78
Low	14	16		20	23	25, 26						47	52	57	60				79, 80

Colour	Ranking	Anticipated Timeframe
	Highest Priority Actions	Less than 2 years
	Moderate Priority Actions	2-5 years
	Lowest Priority Actions	5-10 years

b) Procedures to undertake on-ground works

Given the high conservation values and significance of the reserve any on-ground actions, which occur within the reserve, need to ensure that these values are not decreased or destroyed.

As outlined in b) above, any actions that impacts on rare flora (including pruning, fence maintenance, fire etc) need a permit under the *Wildlife Conservation Act* 1950. It is recommended that prior to any actions occurring in those zones where rare flora and communities have been recorded, that discussions are held with the local office of the Department of Environment and Conservation. Ultimately, should actions still be required where rare flora is to be affected, the appropriate form is attached as Appendix G (DEC will still need to provide assistance with its completion). The DEC recommends that an application to take needs to be submitted at least 4 weeks prior to any action to enable a permit to be issued. Further information can be obtained from the Busselton DEC office: Ph: 9752-5555.

An Actions Template and Checklist has been prepared to ensure all conservation aspects are considered for any management activity within the reserve. This is attached as Appendix I.

The following checklist is designed to clarify the procedures that are needed for any activity that may, potentially, disturb the reserve.

If you want to:

i) Burn an area within the reserve

- Is the area within Zones 1 – 5 or Zone 18?
    - Burning in these areas is unlikely to impact on rare plants or animals, but may have potential impacts on the vegetation health and weed infestations of high value Abba vegetation communities. Burning in these areas is under the responsibility of the Shire of Busselton.
- Is the area within Zones 6 – 17?
    - A fire in these zones is likely to impact on rare plants and animals. A permit is required under Section 23 F of the *Wildlife Conservation Act* 1950 WA. An application to "take[7]" rare flora is required. The appropriate form is attached as Appendix G. Contact the Busselton office of the Department of Environment and Conservation for assistance (Ph: 9752 5555).
    - If it can be ascertained that threatened flora/communities are not impacted, a fire may still have impact upon the Abba vegetation communities. Such issues should be discussed with the R-TRRPG prior to any action.

ii) Clear vegetation from a drain or alongside a drain

- Any issue related to drainage and drain maintenance should be referred to the Busselton Team Leader of the Water Corporation – John Moon Ph: 97521308, 0417 928 714. If any remedial action required, the Water Corporation and the DEC will provide assistance, if it is required.

iii) Clear vegetation around fences

- Does the fence adjoin Zones 1 – 5 or Zone 18?
    - Vegetation clearing is controlled under the Environmental Protection Act 1986. However there is an exemption for clearing vegetation to allow the construction and maintenance of boundary fences, provided that no more than 1.5 m of vegetation is cleared from the fenceline (Regulation 5, Item 11: Environmental Protection (Clearing of Native

[7] Note that the term "to take" is a legal definition under Section 6 of the *Wildlife Conservation Act 1950, WA*. It means any of the following actions: "*gather, pluck, cut, pull up, destroy, dig up, remove, or injure the flora or to cause or permit* any of these things to be done" (Italics are direct quotes from the Act).

Vegetation) Regulations, 2004). Clearing to maintain fencelines in these zones is unlikely to impact on any significant plants or vegetation.

- Does the fence adjoin Zones 6 – 17?
    - The same exemption (mentioned above) does not apply in these zones, as clearing is likely to impact on rare plants. The exemption does apply, however, if a permit to take rare flora is granted under Section 23 F of the Wildlife Conservation Act (1950) WA. An application to "take" rare flora is required. The appropriate form is attached as Appendix G. Contact the Busselton office of the Department of Environment and Conservation for assistance (Ph: 9752 5555).

iv) Clear vegetation for cross overs

- Is the cross over in Zones 1 – 5 or Zone 18?
    - Vegetation clearing is controlled under the Environmental Protection Act 1986. Management of the vegetation within the rail reserve is conferred to the Shire of Busselton under the lease between WAGRC and the Shire and the Shire has control over the positioning of cross overs onto Shire roads. Therefore anyone requiring a cross over must apply to the Shire. Since 7 January 2006, the Shire has to apply for a permit to clear the vegetation from the Department of Environment (Regulation 5, Item 23: Environmental Protection (Clearing of Native Vegetation) Regulations, 2004). Clearing vegetation in these zones is unlikely to impact on any significant plants or vegetation.

- Is the cross over in Zones 6 – 17?
    - Because clearing is likely to impact on rare plants the same exemption (mentioned above) only applies in these zones under Section 23 F of the Wildlife Conservation Act (1950) WA. An application to "take" rare flora is required. The appropriate form is attached as Appendix G. Contact the Busselton office of the Department of Environment and Conservation for assistance (Ph: 9752 5555). As for Zones 1-5 and 18 anyone requiring a cross over onto a Shire road must also apply to the Shire.

v) Move Stock

- Will stock be moved within Zones 1 – 5 or Zone 18?
    - Movement of stock can disturb native plants and animals, spread dieback and encourage weed growth. While stock movement is not an activity that is compatible with the objectives of the management plan, it is recognised that it has historically been conducted and is a practice that may have to continue, under certain circumstance, for current landowners. Stock in these zones is unlikely to impact on significant plants or vegetation, but is likely to degrade the integrity and quality of native vegetation. The plan recommends that alternative arrangements or mechanisms be sought or should this not be possible that any new landowners of properties adjoining the reserve are made aware the need to seek alternative methods of moving stock.
- Will stock be moved within Zones 6 – 17?

- The same actions as mention above apply within these zones, however there is a significant possibility that stock movement will impact on rare or threatened plants or plant communities. Any activities that could potentially destroy or injure native flora will require a permit to "take". Contact the Busselton DEC office to discuss alternatives or assist with the application form.

vii)Control Weeds

- Is the area within Zones 1 – 5 or Zone 18?
  - Weed control within these areas are unlikely to impact on significant plants or vegetation. Weed control should be coordinated thought the management body (R-TRRPG) to ensure best practices are followed and monitoring points and protocols are established.
- Is the area within Zones 6 – 17?
  - Weed control in these areas are likely to have major impacts on rare and/or threatened plants or ecological communities. This will possibly require a permit to take. Contact the Busselton office of the Department of Environment and Conservation for assistance (Ph: 9752 5555).

vi) Conduct Events

- The Shire of Busselton has control over coordinated events that occur on lands for which the shire has responsibility. All events have to comply with the Shire's Events policy and an application to council made. The event information application form and requirements are available from the Shire of Busselton Office (Ph:9781 0444) or on-line at: www.busselton.wa.gov.au

c) Funding

There is no formal allocation of funding for the reserve. Management actions that are required under legislative requirements are conducted by those agencies responsible.

To undertake many of the management actions outlined in this plan, some certainty of funding is required. Should a budget for works not be available, there are a number of external funding sources that are available for conservation works. These include:

- South West Catchment Council: this is the regional Natural Resource Management (NRM) organisation for the south west. They receive funding from the State and Commonwealth governments as part of the Federal Government Natural Heritage Trust (NHT) and National Action Plan for Salinity and Water Quality (NAP). These funds are directed to regional organisations based upon priorities determined by their regional strategies and regular Investment plans. Given the high conservation values of the reserve, it should be considered a regional priority for investment in future year. It is recommended that applications be directed to SWCC when calls for funding is made (there is currently no timelines available for this). Website : www.swcatchmentscouncil.com
- Federal Government Envirofunds: This is a direct grants process that is part of the NHT process. Community groups can apply for grants of up to $50,000 to carry out on-ground actions to target local problems. There are usually one or two calls for funding annually. Website: www.nht.gov.au/envirofund
- Threatened Species Network grants: These are administered by the WWF-Australia and aims to support community groups to undertake on-ground work that targets nationally threatened species and ecological communities. This is an annual process and includes activities such as

habitat restoration, weeding and feral animal control, fire management and monitoring activities. Website: www.wwf.org.au/species/tsngrants

Other potential external funding sources are listed in Appendix F.

d) Community involvement

Community involvement in management of the reserve according to the adopted plan is welcomed by the Shire of Busselton. As suggested earlier the preferred way to formalise community involvement in the reserve is to develop an MOU between the management group and the Shire. Under the MOU the Ruabon Tutunup Rail Preservation Group is recognised as the management group, lines of communication and volunteer insurance arrangements are established. Membership of this group may change, however any actions of the groups must be in accordance with the Management Plan. Any priorities or actions decided as a result of a management meeting must be recorded in meeting minutes and given to the Shire Environment Officer for addition to the Shire records (insurance purposes).

e) Management plan review

The complete plan should be reviewed in 2011. Additional data obtained from activities should be included and the management actions reviewed and amended to reflect best practices at the time.

A register of management actions needs to be maintained by the R-TRRPG to enable a thorough review of activities to undertaken, at least annually. This register should be linked to any monitoring and evaluation plan and clearly itemise activities, goals, how they are to be monitored, results of monitoring and what those results mean. An example is shown below as Table 11.

Table 12: Example of an Actions Register

Action	Goal	Monitoring Activity	Schedule	Responsible group /person	Results	Analysis

Additionally, any future trends or observations and relevant comments should also be recorded to ensure that pertinent issues are discussed or included in future Management Plan reviews.

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Management Plan for the Ruabon – Tutunup Rail Reserve: FIGURES

Draft for comment

July 2006

Prepared for the Ruabon Tutunup Rail Reserve Preservation Group

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Figure 1: The South West Showing the Reserve

Reserve_12969

Reserve_13136

0.0 0.6 1.2 1.8 2.4 3.0 km

N

Figure 2.

Ruabon Tutunup Rail Reserve

The Rail Reserve.

E_haemotoxyn
Woodlands

Ironstone
Heaths

Jarrah_Marri
Low Heaths

Jarrah_Marri
Woodlands

Jarrah_Marri
Heaths

Mixed_Melaleuca
Woodlands

Peppermint
Woodlands

Regilla_Grevillea
Heaths

Regilla_Pericalumma
Heaths

N

0.0 0.6 1.2 1.8 2.4 3.0 km

Figure 3.

Ruabon Tutunup Rail Reserve

Vegetation Communities.

Figure 4.

Ruabon Tutunup Rail Reserve

Vegetation Condition.

Figure 5.

Ruabon Tutunup Rail Reserve

Management Zones.

Figure 6.

Ruabon Tutunup Rail Reserve

Environmental Weeds
Jan 2006.

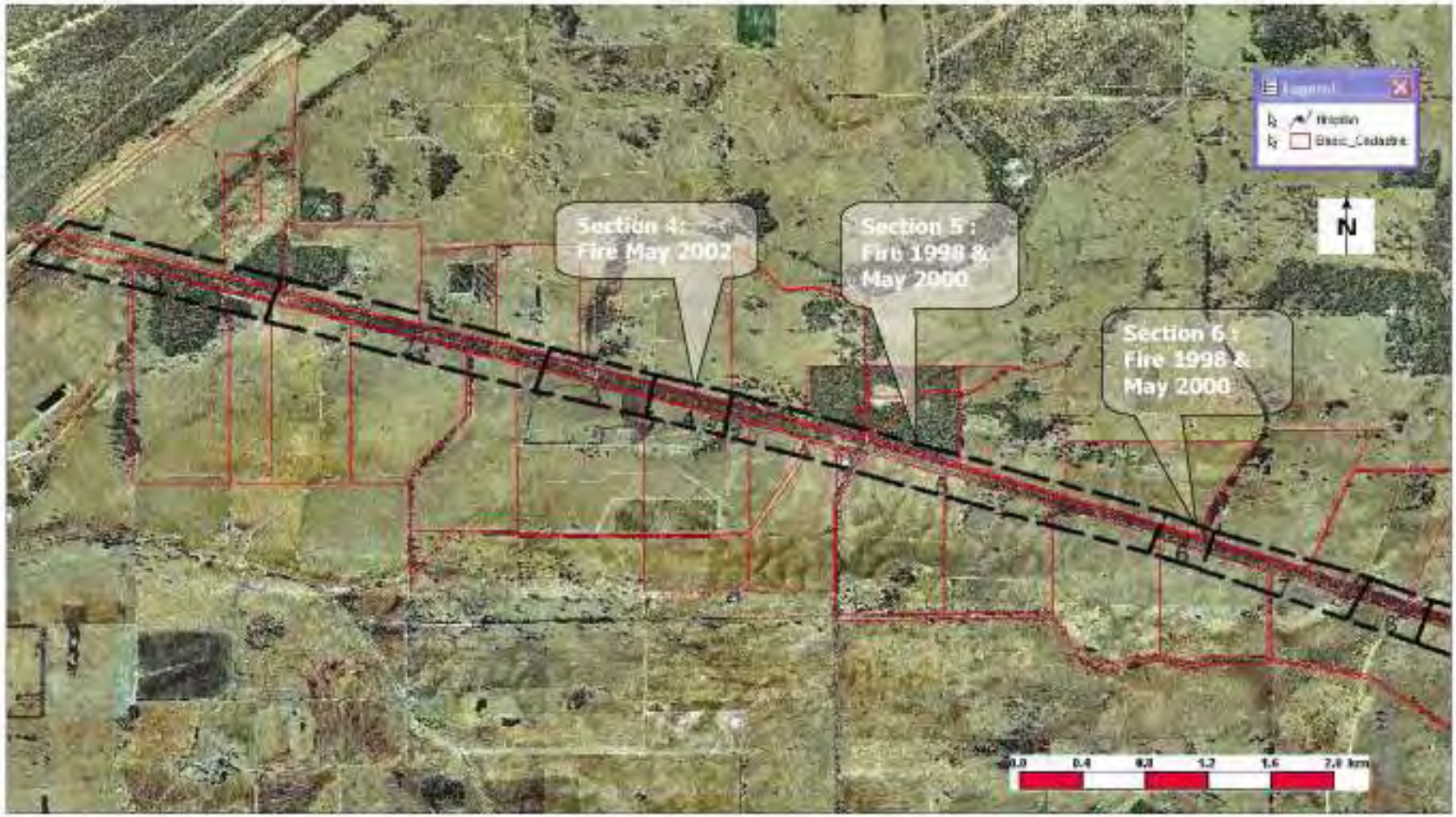


Figure 7: Recent Fire Activity: Zones 1 - 7

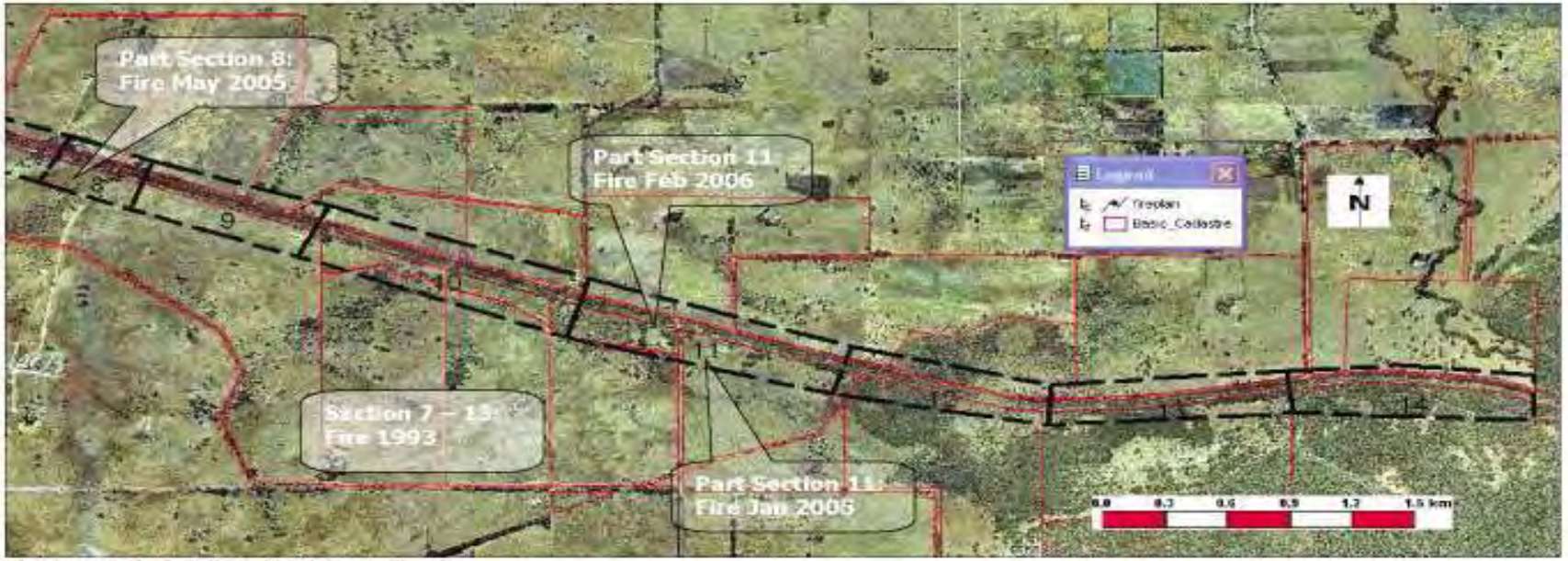


Figure 8: Recent Fire activity Zones 8 -14

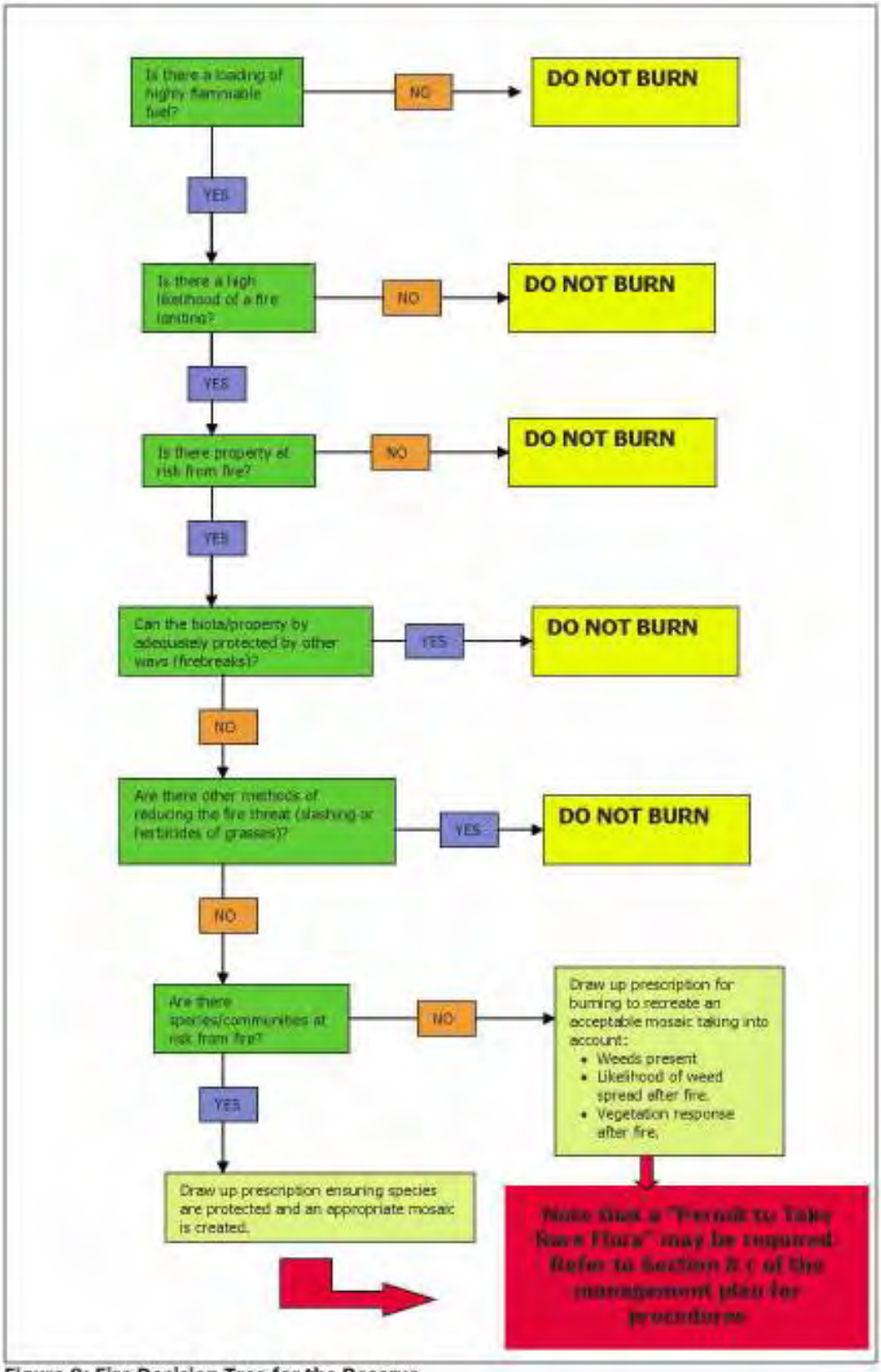


Figure 9: Fire Decision Tree for the Reserve

Figure 10.

Ruabon Tutunup Rail Reserve

Management Zone 1

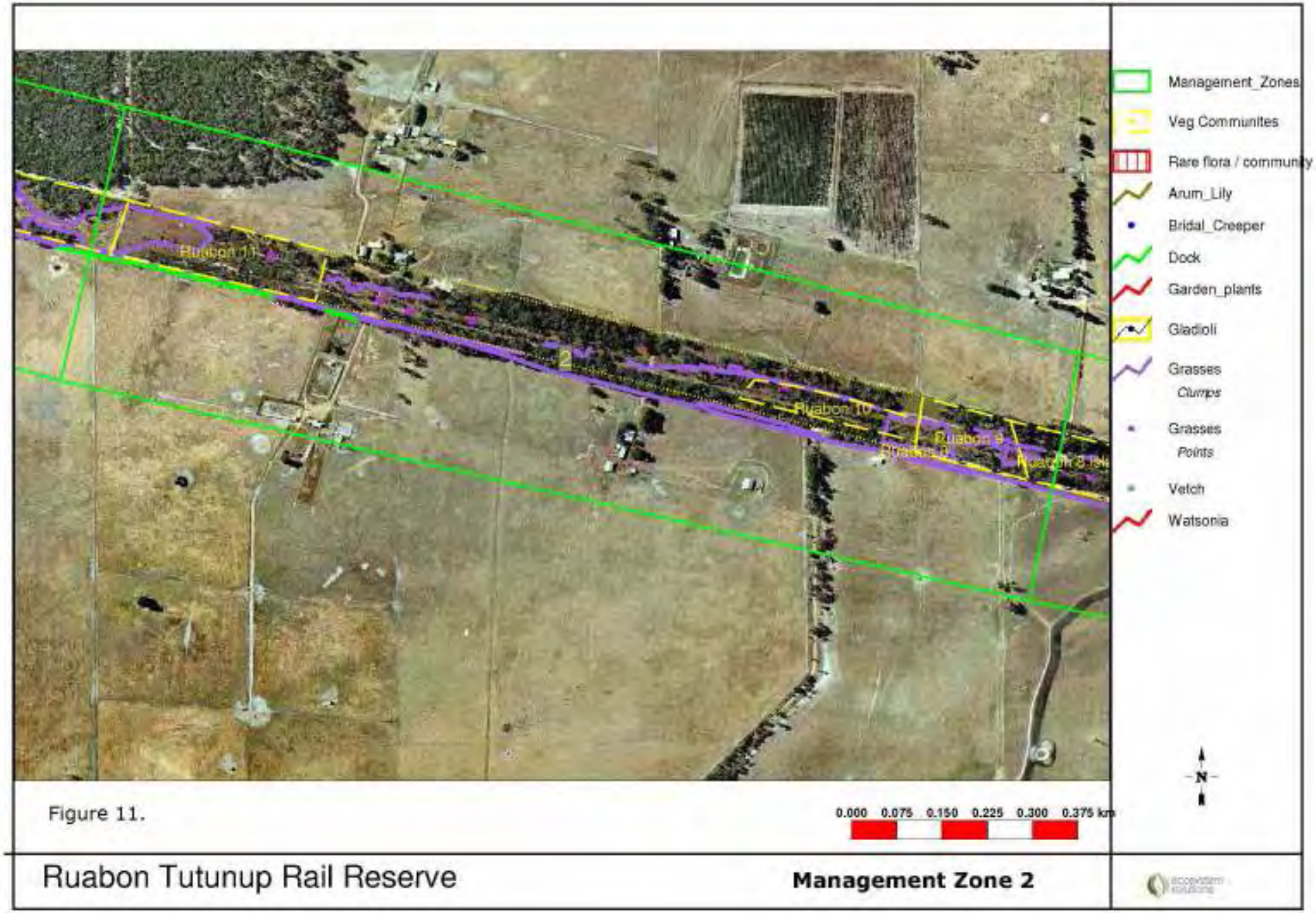


Figure 11.

Ruabon Tutunup Rail Reserve

Management Zone 2

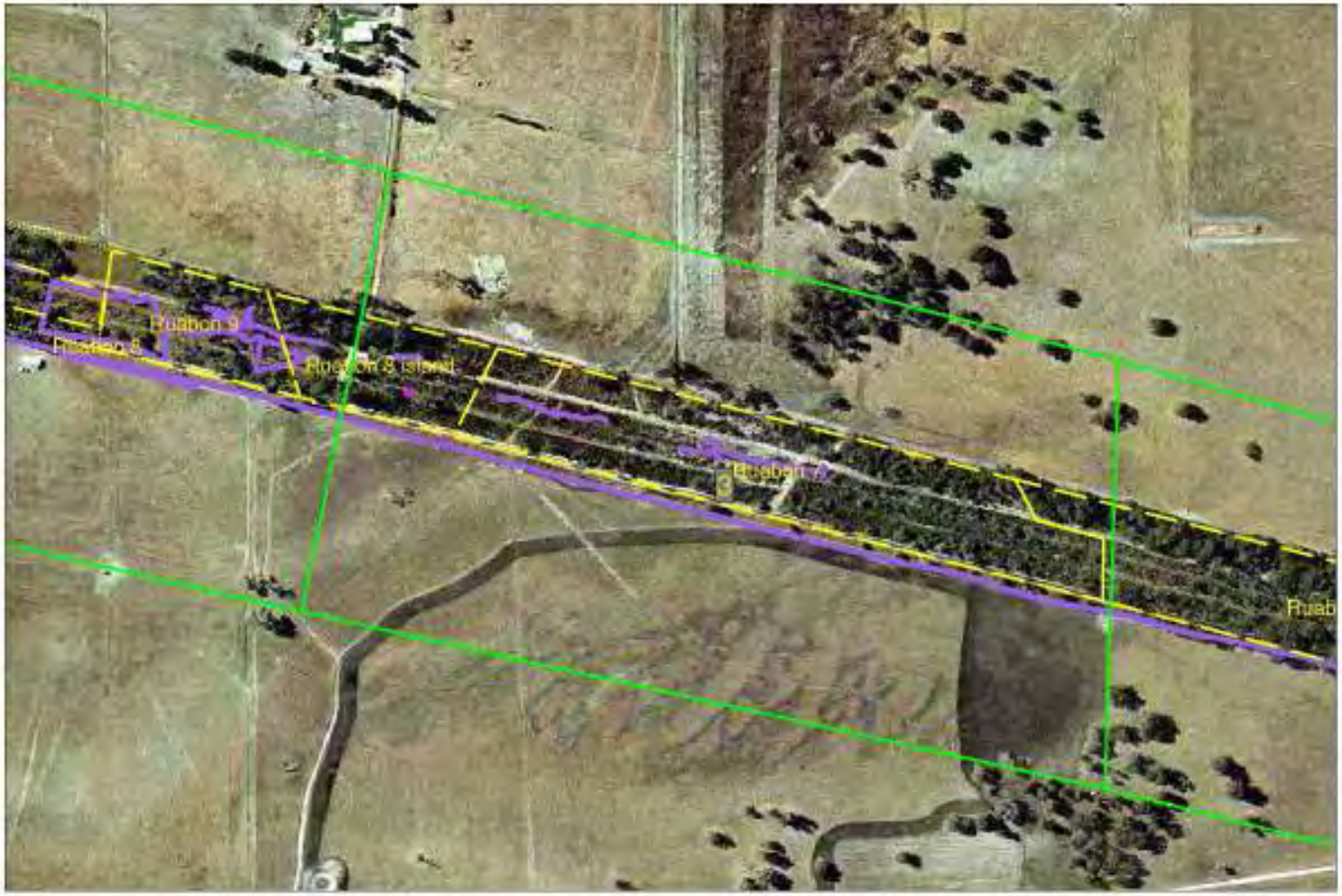


Figure 12.

Ruabon Tutunup Rail Reserve

Management Zone 3

Management_Zones
Veg Communities
Rare flora_Comm
Arum_Lily
Bridal_Creeper
Dock
Garden_plants
Gladioli
Grasses
Clumps
Grasses
Points
Vetch
Watsonia

0.00 0.05 0.10 0.15 0.20 0.25 km

N

Figure 13.

Ruabon Tutunup Rail Reserve

Management Zone 4

Figure 14.

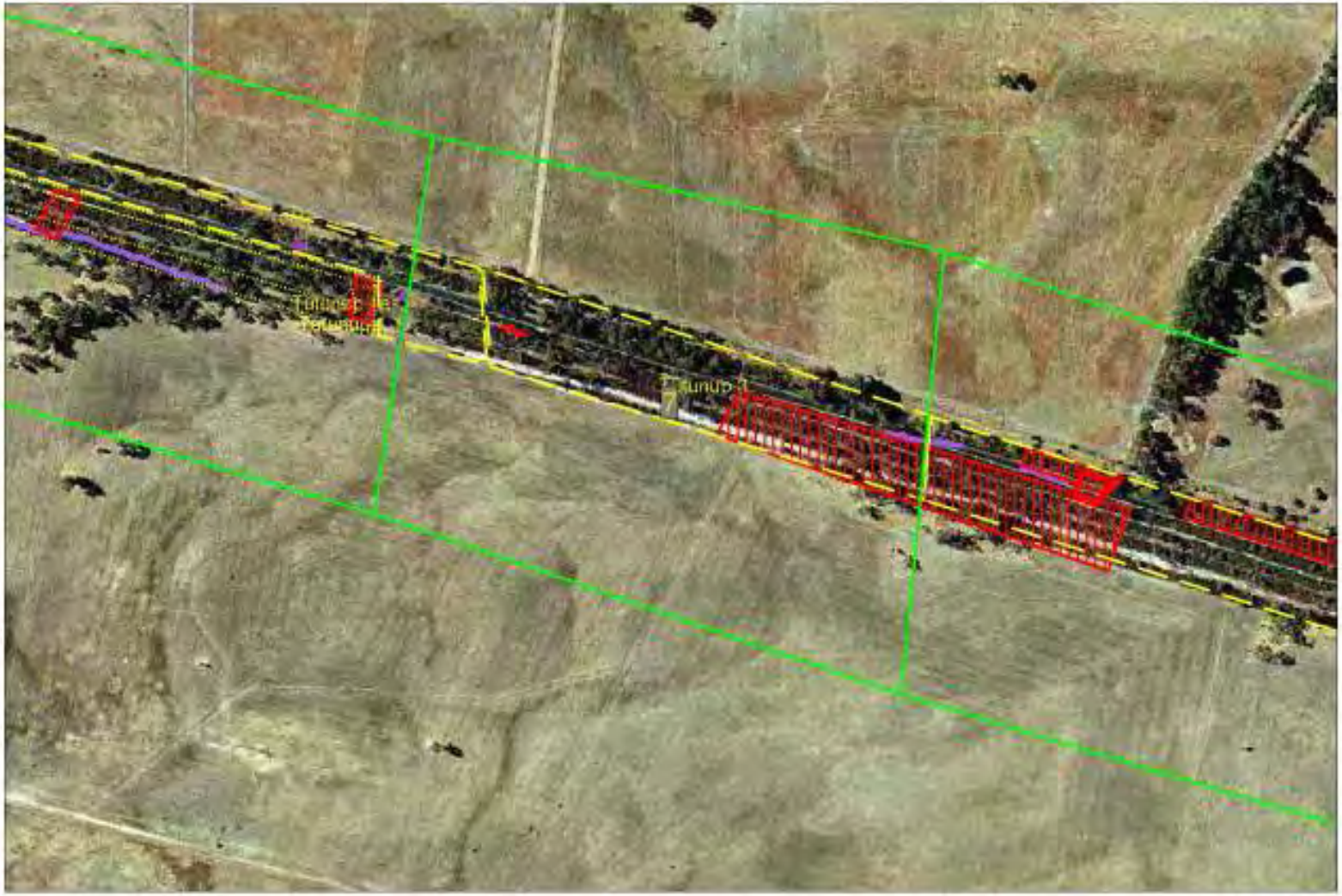
Ruabon Tutunup Rail Reserve

Management Zone 5

Figure 15.

Ruabon Tutunup Rail Reserve

Management Zone 6



Management_Zones
Veg Communities
Rare flora_Comm
Arum_Lily
Bridal_Creeper
Dock
Garden_plants
Gladioli
Grasses
Clumps
Grasses
Points
Vetch
Watsonia

0.00 0.05 0.10 0.15 0.20 0.25 km

N

Figure 16.

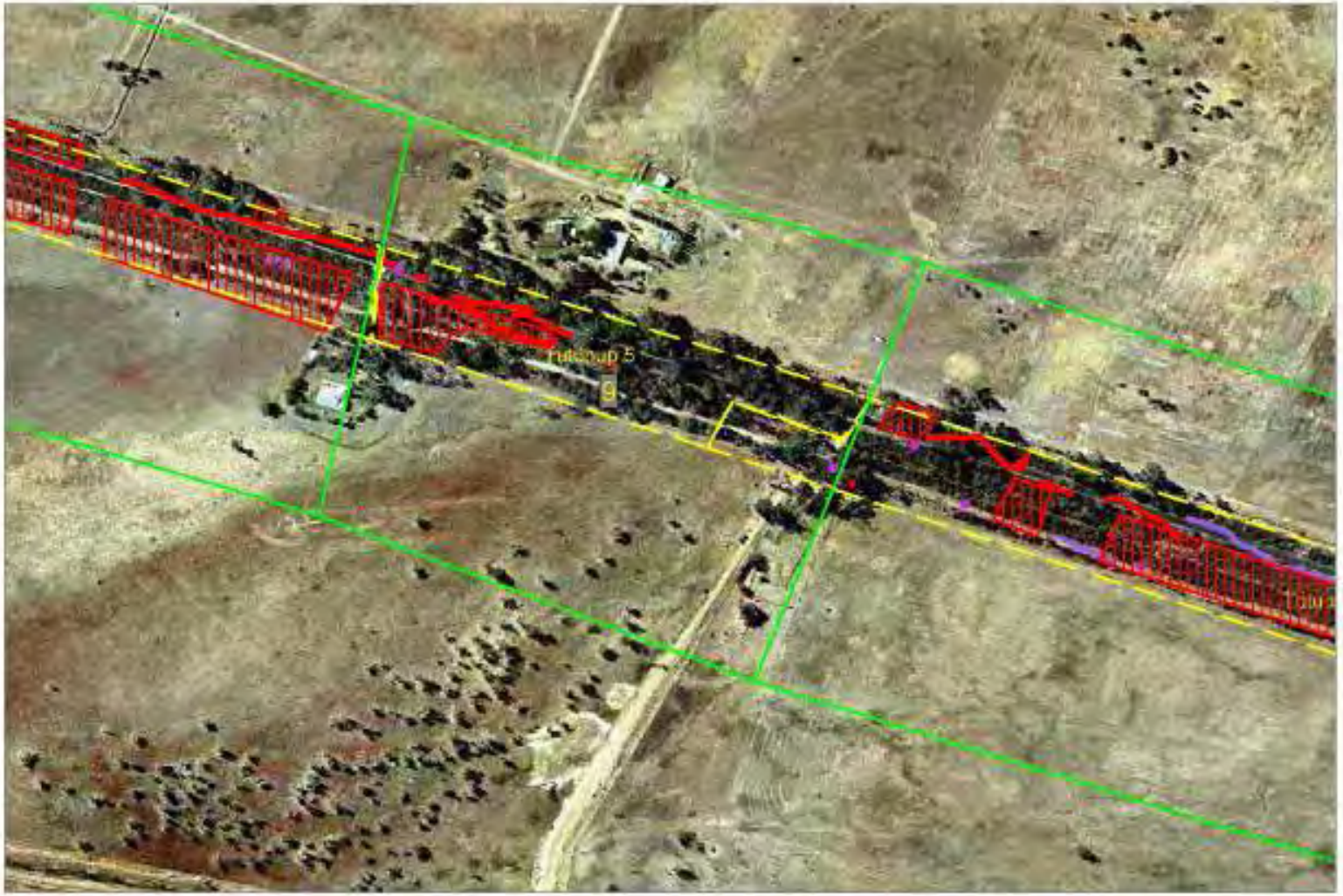
Ruabon Tutunup Rail Reserve

Management Zone 7

Figure 17.

Ruabon Tutunup Rail Reserve

Management Zone 8



Management_Zones
Veg Communites
Rare flora_Comm
Arum_Lily
Bridal_Creeper
Dock
Garden_plants
Gladioli
Grasses
Clumps
Grasses
Points
Vetch
Watsonia

0.00 0.04 0.08 0.12 0.16 0.20 km

N

Figure 18.

Ruabon Tutunup Rail Reserve

Management Zone 9

Management_Zones
Veg Communities
Rare flora_Comm
Arum_Lily
Bridal_Creeper
Dock
Garden_plants
Gladioli
Grasses Clumps
Grasses Points
Vetch
Watsonia

0.00 0.06 0.12 0.18 0.24 0.30 km

N

Figure 19.

Ruabon Tutunup Rail Reserve

Management Zone 10

Management_Zones
Veg Communites
Rare flora_Comm
Arum_Lily
Bridal_Creeper
Dock
Garden_plants
Gladioli
Grasses
Clumps
Grasses
Points
Vetch
Watsonia

0.00 0.04 0.08 0.12 0.16 0.20 km

N

Figure 20.

Ruabon Tutunup Rail Reserve

Management Zone 11

Figure 21.

Ruabon Tutunup Rail Reserve

Management Zone 12

Figure 22.

Ruabon Tutunup Rail Reserve

Management Zone 13

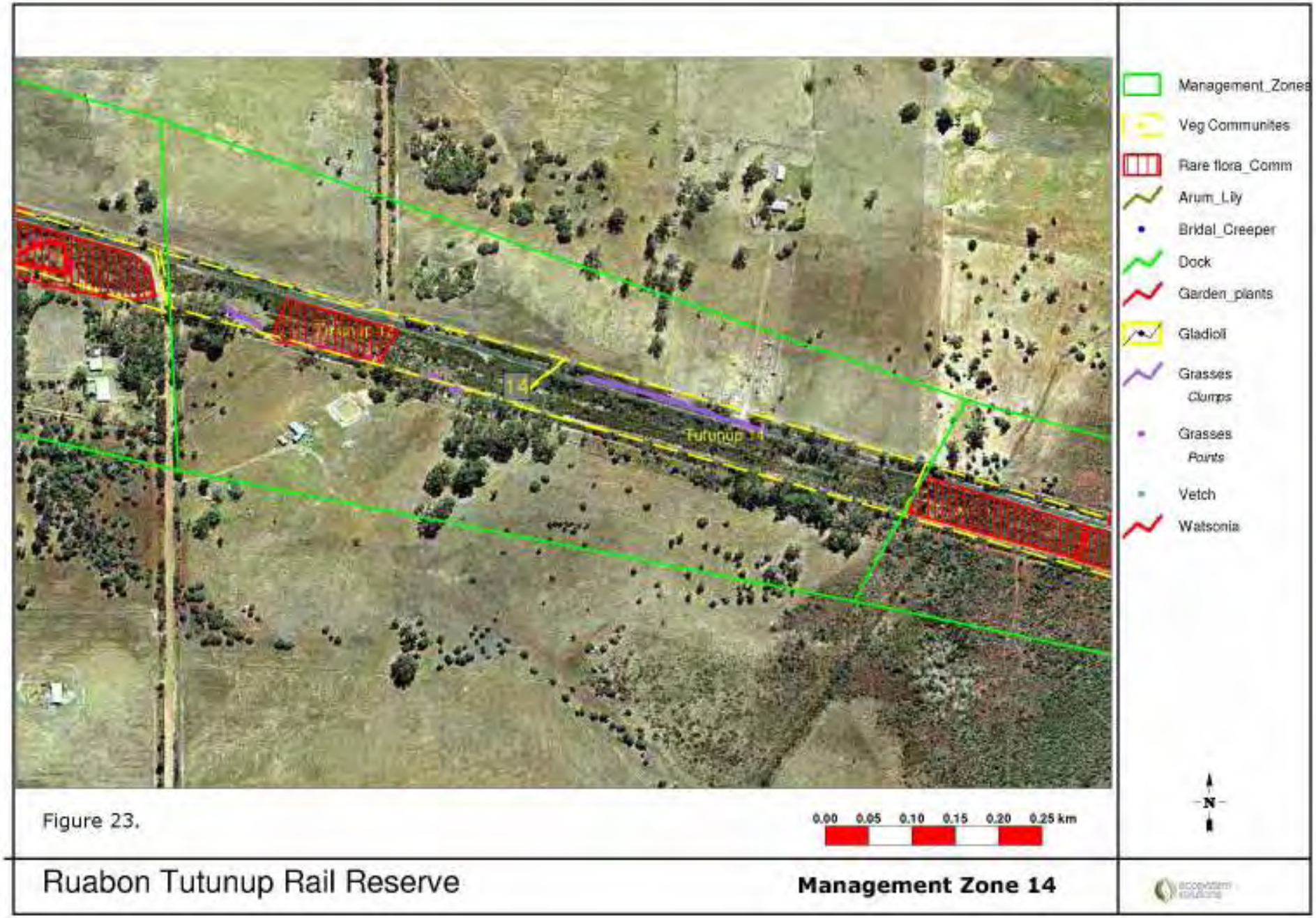


Figure 23.

Ruabon Tutunup Rail Reserve

Management Zone 14

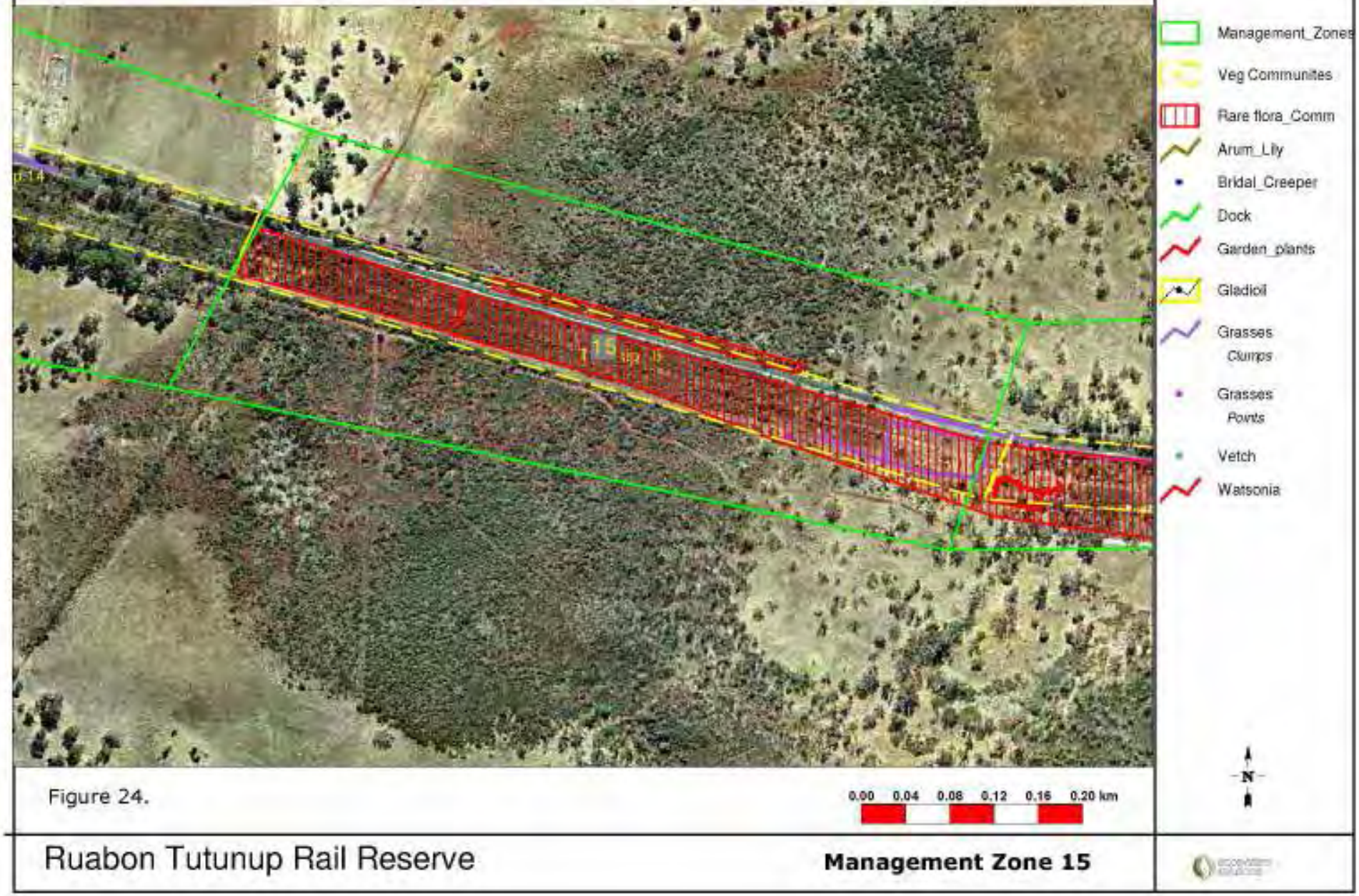


Figure 24.

Ruabon Tutunup Rail Reserve

Management Zone 15

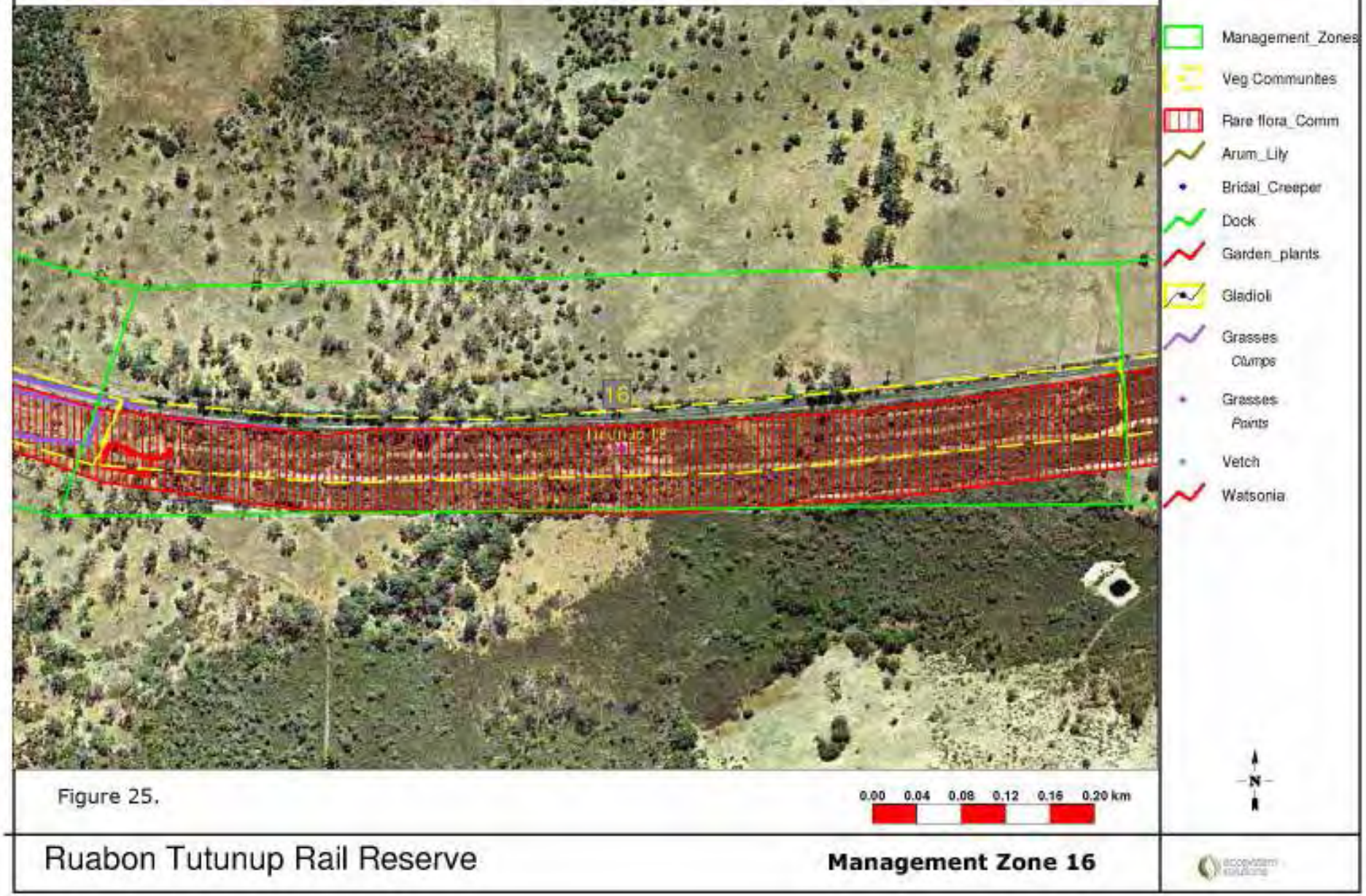


Figure 25.

Ruabon Tutunup Rail Reserve

Management Zone 16

Figure 26.

Ruabon Tutunup Rail Reserve

Management Zone 17

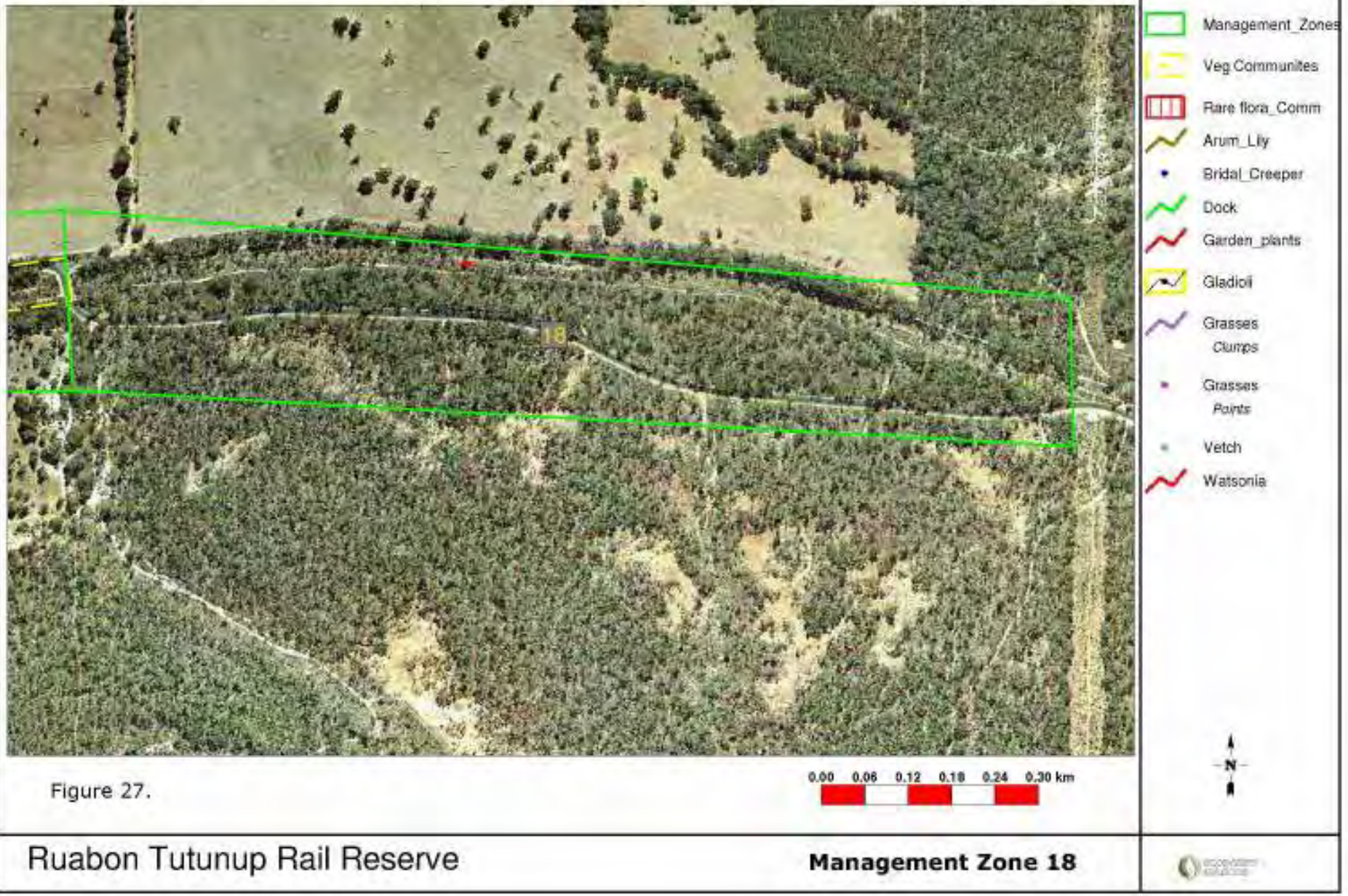


Figure 27.

Ruabon Tutunup Rail Reserve

Management Zone 18

Management Plan for the Ruabon – Tutunup Rail Reserve: Appendices

August 2007

Table of Appendices

Appendix A: Flora species found in the reserve (Grouped by Family).

Agavaceae
* Agave americana
Amaryllidaceae
* Leucojum aestivum
Anthericaceae
Agrostocrinum hirsutum
Arthropodium curvipes
Caesia micrantha
Caesia occidentalis
Chamaescilla corymbosa
Johnsonia acaulis
Laxmannia minor
Laxmannia sessiliflora
Sowerbaea laxiflora
Thysanotus arbuscula
Thysanotus manglesianus
Thysanotus multiflorus
Thysanotus patersonii
Thysanotus tenellus
Thysanotus thyrsoideus
Thysanotus triandrus
Tricoryne elatior
Tricoryne humilis
Apiaceae
Apium annuum
Hydrocotyle callicarpa
Pentapeltis peltigera
Platysace haplosciadia
Trachymene pilosa
Xanthosia candida
Xanthosia ciliata
Xanthosia huegelii
Apocynaceae
* Nerium sp.
Araceae
* Zantedeschia aethiopica
Arecaceae
* Phoenix dactylifera
Asparagaceae
* Asparagus asparagoides
Asteraceae
* Arctotheca calendula
Asteraceae sp.
Blennospora doliiformis
* Conyza sp.
* Cotula coronopifolia
* Cotula turbinata
Hyalosperma cotula
* Hypochaeris glabra
Lagenophora huegelii
Myriocephalus helichrysoides
Podolepis gracilis
* Pseudognaphalium luteoalbum
Senecio quadridentatus
Siloxerus humifusus
Siloxerus multiflorus
* Sonchus asper
* Sonchus oleraceus
* Ursinia anthemoides
Waitzia suaveolens
Boryaceae
Borya scirpoidea
Brassicaceae
* Brassica tournefortii
* Heliophila pusilla
Cactaceae
* Opuntia stricta
Caesalpiniaceae
Labichea punctata
Campanulaceae
* Wahlenbergia capensis
Caryophyllaceae
* Silene gallica
Casuarinaceae
Allocasuarina humilis
Allocasuarina microstachya
Allocasuarina thuyoides
Centrolepidaceae
Aphelia brizula
Aphelia cyperoides
Aphelia drummondii
Centrolepis aristata
Chenopodiaceae
* Chenopodium album
Halosarcia sp.
Colchicaceae
Burchardia multiflora
Burchardia umbellata
Commelinaceae
Cartonema philydroides
Crassulaceae
Crassula decumbens
Cyperaceae
Baumea juncea
Caustis dioica
Chorizandra enodis
Cyathochaeta avenacea
Cyathochaeta equitans
Cyathochaeta sp.
* Cyperus tenellus
* Isolepis marginata
Lepidosperma carphoides
Lepidosperma leptostachyum
Lepidosperma longitudinale
Lepidosperma squamatum
Mesomelaena graciliceps
Mesomelaena tetragona
Schoenus benthamii
Schoenus brevisetis
Schoenus efoliatus
Schoenus pennisetis
Schoenus rigens
Schoenus sp.
Schoenus sp.
Schoenus subbarbatus
Tetraria capillaris
Tetraria octandra
Tricostularia neesii
Dasypogonaceae
Baxteria australis
Calectasia narragara
Dasypogon bromeliifolius
Dasypogon hookeri
Kingia australis
Lomandra hermaphrodita
Lomandra micrantha
Lomandra nigricans
Lomandra purpurea
Lomandra sericea
Lomandra sonderi
Lomandra suaveolens
Dennstaedtiaceae
Pteridium esculentum
Dilleniaceae
Hibbertia acerosa
Hibbertia aurea
Hibbertia diamesogenos MS
Hibbertia hypericoides
Hibbertia racemosa
Hibbertia stellaris
Hibbertia stowardii
Hibbertia vaginata
Droseraceae
Drosera gigantea
Drosera glanduligera
Drosera macrantha
Drosera marchantii subsp. marchantii
Drosera menziesii
Drosera sp.
Drosera stolonifera
Epacridaceae
Andersonia ferricola MS
Andersonia involucrata
Andersonia sp.
Astroloma pallidum
Conostephium pendulum
Leucopogon conostephioides
Leucopogon glabellus
Leucopogon propinquus
Leucopogon sp.
Euphorbiaceae
Phyllanthus calycinus
Fumariaceae
* Fumaria muralis
Gentianaceae
* Cicendia filiformis
Geraniaceae
* Geranium dissectum
* Pelargonium capitatum
Goodeniaceae
Dampiera linearis
Goodenia coerulea
Goodenia micrantha
Lechenaultia expansa

Scaevola calliptera
Scaevola glandulifera
Haemodoraceae
Anigozanthos manglesii
Anigozanthos viridis
Conostylis aculeata
Conostylis serrulata
Conostylis setigera
Haemodorum discolor
Haemodorum laxum
Haemodorum simplex
Haemodorum sparsiflorum
Haemodorum spicatum
Phlebocarya ciliata
Phlebocarya filifolia
Haloragaceae
Haloragis tenuifolia
Myriophyllum echinatum
Iridaceae
* Babiana stricta
* Freesia alba x leichtlinii
* Gladiolous sp.
Patersonia juncea
Patersonia occidentalis
Patersonia sp. Swamp form (N. Gibson & M. Lyons 544) PN
Patersonia umbrosa
* Romulea rosea
* Sparaxis bulbifera
* Watsonia sp.
Juncaceae
* Juncus capitatus
Juncus kraussii
* Juncus microcephalus
Juncus pallidus
Juncus sp.
Juncaginaceae
Triglochin linearis
Triglochin protuberans
Lamiaceae
Hemiandra pungens
Hemiandra pungens
Hemigenia rigida
Lauraceae
Cassytha glabella
Cassytha pomiformis
Cassytha racemosa
Lentibulariaceae
Utricularia inaequalis
Utricularia multifida
Lindsaeaceae
Lindsaea linearis
Lobeliaceae
Lobelia rhombifolia
* Monopsis debilis
Loganiaceae
Logania serpyllifolia
Phyllangium paradoxum
Loranthaceae
Nuytsia floribunda
Lythraceae
* Lythrum hyssopifolia
Menyanthaceae
Villarsia capitata
Villarsia parnassifolia
Mimosaceae
Acacia alata
Acacia applanata
Acacia benthamii
* Acacia decurrens
Acacia extensa
Acacia flagelliformis
Acacia incurva
Acacia pulchella
Acacia saligna
Acacia semitrullata
Acacia stenoptera
Acacia uliginosa
Myrtaceae
Actinodium cunninghamii
Agonis flexuosa
Astartea fascicularis
Baeckea rosea MS
Calothamnus lateralis
Calothamnus sanguineus
Calothamnus sp. Whicher (B.J. Keighery & N. Gibson 2301) PN
Calytrix sp.
Calytrix sp. Tutunup (G.J. Keighery & N. Gibson 2953) PN
Chamelaucium roycei MS
* Chamelaucium uncinatum
Darwinia oederoides
Eucalyptus calophylla
Eucalyptus haematoxylon
Eucalyptus marginata
Eucalyptus rudis
Hypocalymma angustifolium
Hypocalymma robustum
Kunzea ericifolia
Kunzea micrantha
Kunzea recurva
Melaleuca cuticularis
Melaleuca incana
Melaleuca lateritia
Melaleuca pauciflora
Melaleuca preissiana
Melaleuca rhaphiophylla
Melaleuca scabra
Melaleuca thymoides
Melaleuca uncinata
Melaleuca viminea
Pericalymma ellipticum
Regelia ciliata
Verticordia attenuata
Verticordia habrantha
Verticordia pennigera
Verticordia plumosa var. ananeotes
Verticordia plumosa var. vassensis
Verticordia sp.
Orchidaceae
Caladenia attingens
Caladenia chapmanii
Caladenia flava
Caladenia latifolia
Caladenia marginata
Caladenia paludosa
Caladenia speciosa
Diuris laxiflora
Elythranthera brunonis
Elythranthera emarginata
Lyperanthus serratus
Microtis media
* Monadenia bracteata
Pterostylis vittata
Pyrorchis nigricans
Thelymitra benthamiana
Thelymitra cornicina
Thelymitra crinita
Thelymitra flexuosa
Thelymitra sp.
Orobanchaceae
* Orobanche minor
Oxalidaceae
* Oxalis glabra
Oxalis perennans
Papilionaceae
Bossiaea eriocarpa
Bossiaea pulchella
Bossiaea sp. Waroona (B.J. Keighery & N. Gibson 229) PN
Brachysema praemorsum
Chorizema aciculare
Daviesia divaricata
Daviesia incrassata
Daviesia inflata
Daviesia physodes
Daviesia preissii
Daviesia rhombifolia
* Dipogon lignosus
* Erythrina x sykesii
Euchilopsis linearis
Eutaxia virgata
Gompholobium capitatum
Gompholobium knightianum
Gompholobium marginatum
Gompholobium ovatum
Gompholobium polymorphum
Gompholobium preissii
Gompholobium tomentosum
Gompholobium venustum
Hardenbergia comptoniana
Hovea chorizemifolia
Hovea trisperma
Hovea trisperma var. grandiflora
Jacksonia furcellata
Jacksonia horrida
Jacksonia lehmannii
Jacksonia sparsa MS
Kennedia coccinea
Kennedia prostrata
* Lotus angustissimus
* Lotus sp.

* Melilotus sp.
Mirbelia dilatata
Nemcia capitata
* Ornithopus compressus
Sphaerolobium medium
Sphaerolobium sp.
* Trifolium angustifolium
* Trifolium campestre
* Trifolium sp.
* Trifolium subterraneum
* Vicia sativa
Viminaria juncea

Philydraceae

Philydrella drummondii
Philydrella pygmaea

Pinaceae

* Pinus pinaster

Pittosporaceae

Marianthus tenuis
* Pittosporaceae sp.
Sollya heterophylla

Plantaginaceae

* Plantago lanceolata

Poaceae

* Aira caryophyllea
Amphibromus nervosus
Amphipogon sp.
Amphipogon turbinatus
* Anthoxanthum odoratum
Austrodanthonia acerosa
Austrodanthonia setacea
Austrostipa compressa
* Avena barbata
* Briza maxima
* Briza minor
* Bromus diandrus
* Bromus hordeaceus
* Cynodon dactylon
* Ehrharta calycina
* Ehrharta longiflora
* Eragrostis curvula
* Holcus lanatus
* Holcus setiger
* Hordeum sp.
* Lolium sp.
Microlaena stipoides
Neurachne alopecuroidea
* Paspalum sp.
* Pennisetum clandestinum
* Pentaschistis airoides
* Polypogon monspeliensis
Polypogon tenellus
* Sporobolus indicus
* Stenotaphrum secundatum
Tetrarrhena laevis

Podocarpaceae

Podocarpus drouynianus

Polygalaceae

Comesperma calymega
Comesperma confertum
Comesperma virgatum

Polygonaceae

* Acetosella vulgaris
* Persicaria sp.
* Rumex sp.

Primulaceae

* Anagallis arvensis

Proteaceae

Adenanthos barbiger
Adenanthos meisneri
Adenanthos obovatus
Banksia attenuata
Banksia grandis
Banksia ilicifolia
Banksia littoralis
Conospermum caeruleum
Conospermum flexuosum
Conospermum teretifolium
Dryandra lindleyana
Dryandra nivea subsp. nivea
Dryandra nivea subsp. uliginosa
Dryandra squarrosa subsp. argillacea
Grevillea brachystylis subsp. brachystylis
Grevillea diversifolia
Grevillea elongata
Grevillea quercifolia
Grevillea trifida
Hakea ceratophylla
Hakea cyclocarpa
Hakea marginata
Hakea oldfieldii
Hakea prostrata
Hakea ruscifolia
Hakea sulcata
Hakea varia
Isopogon buxifolius var. buxifolius
Isopogon formosus subsp. dasylepis
Isopogon sphaerocephalus
Persoonia elliptica
Persoonia longifolia
Persoonia saccata
Petrophile latericola MS
Petrophile linearis
Petrophile media
Petrophile squamata
Stirlingia latifolia
Strangea stenocarpoides
Synaphea floribunda
Synaphea gracillima
Synaphea petiolaris
Synaphea petiolaris subsp. simplex
Xylomelum occidentale

Restionaceae

Anarthria gracilis
Anarthria laevis
Anarthria prolifera
Chaetanthus leptocarpoides
Chordifex sp.
Cytogonidium leptocarpoides
Desmocladus fasciculatus
Harperia lateriflora
Hypolaena exsulca
Hypolaena pubescens
Leptocarpus tenax
Lepyrodia macra
Loxocarya cinerea
Loxocarya magna
Lyginia barbata
Stenotalis ramosissima
Tremulina tremula

Rubiaceae

Opercularia apiciflora
Opercularia spermacocea
* Sherardia arvensis

Rutaceae

Boronia dichotoma
Eriostemon spicatus

Sapindaceae

Dodonaea ceratocarpa

Scrophulariaceae

* Bellardia trixago
* Dischisma capitatum
Gratiola pubescens
* Parentucellia viscosa

Solanaceae

* Solanum nigrum

Stackhousiaceae

Stackhousia monogyna
Tripterococcus brunonis

Sterculiaceae

Thomasia grandiflora

Stylidiaceae

Levenhookia pusilla
Levenhookia stipitata
Stylidium amoenum
Stylidium bulbiferum
Stylidium calcaratum
Stylidium crassifolium
Stylidium diversifolium
Stylidium ecorne
Stylidium glaucum
Stylidium junceum
Stylidium lateriticola
Stylidium petiolare
Stylidium piliferum
Stylidium pulchellum
Stylidium repens
Stylidium sp.

Thymelaeaceae

Pimelea angustifolia
Pimelea imbricata
Pimelea lehmanniana
Pimelea preissii

Tremandraceae

Platytheca galioides
Tetratheca hispidissima

Xanthorrhoeaceae

Xanthorrhoea brunonis
Xanthorrhoea gracilis
Xanthorrhoea preissii

Zamiaceae
Macrozamia riedlei

*: Denotes an introduced species.

Appendix B: Fauna species within the Reserve

FROGS

Species	Common Name
Crinia georgiana	Quacking Frog
Crinia glauerti	Glauert's Froglet
Crinia insignifera	Brown Froglet
Heleioporus eyrie	Moaning Frog
Limnodynastes dorsalis	Banjo Frog
Pseudophryne guentheri	Crawling Frog
Litoria adelaidensis	Slender Tree Frog

GECKOS

Species	Common Name
Diplodactylus polyopthalmus	Speckled Stone Gecko
Phyllodactylus marmoratus	Marbled Gecko

LEGLESS LIZARDS

Species	Common Name
Aprasia pulchella	Granite Legless Lizard
Aprasia repens	Sandplain Legless Lizard
Lialis burtonis	Burton's Legless Lizard

DRAGON LIZARDS

Species	Common Name
Pogona minor minor	Western Bearded Dragon

SKINKS

Species	Common Name
Bassiana trilineata	South-West Skink
Ctenotus impar	Odd-Striped Ctenotus
Ctenotus labillardieri	South West Ctenotus
Egernia kingii	King's Skink
Hemiergis peronii	Peron's Earless Skink
Lerista distinguenda	SW Orange-Tailed Slider
Menetia greyii	Common Dwarf Skink
Morethia lineoocellata	West Coast Morethia
Tiliqua rugosa rugosa	Shingleback

MONITORS

Species	Common Name
Varanus rosenbergi	Rosenberg's Monitor

BLIND SNAKES

Species	Common Name
Ramphotyphlops australis	Southern Blind Snake

SNAKES

Species	Common Name
Notechis scutatus	Tiger Snake
Pseudonaja affinis affinis	Dugite
Rhinoplocephalus nigriceps	Mitchell's Short-tailed Snake

MAMMALS

Species	Common Name
Isoodon obesulus	Southern Brown Bandicoot
Trichosurus vulpecular	Brushtail Possum
Macropus fuliginosus	Western Grey Kangaroo
* *Mus musculus*	House mouse
* *Vulpes vulpes*	Fox
* *Oryctolagus cuniculus*	Rabbit
Pseudocheirus occidentalis	Western Ringtail Possum
Sminthopis fuliginosa	Dunnart
Dasyurus geoffroii	Chuditch
Phascogale tapoatafa	Brushtailed Phascogale
Antechinus flavipes	Yellow Footed Antechinus (Mardo)
Cercartetus concinnus	Western Pygmy Possum
Tarsipes rostratus	Honey Possum
Macropus irma	Western Brush Wallaby

BIRDS

Family	Species	Common Name
Anatidae	*Tadorna tadornoides*	Australian Shelduck
	Chenonetta jubata	Australian Wood Duck
	Anas superciliosa	Pacific Black Duck
	Anas gibberifrons	Grey Teal
Ardeodae	*Ardea noveahollandiae*	White-faced Heron
Threskornithidae	*Threskiornis spinicollis*	Straw-necked Ibis
	Threskiornis molucca	White Ibis
Accipitridae	*Aquila audax*	Wedge-tailed Eagle
Columbidae	*Phaps chalocoptera*	Common Bronzewing
	Ocyphaps lophotes	Crested Pigeon

Cacatuidae	*Calyptorhynchus banksia* *Calyptorhynchus sp*	Red-tailed Black Cockatoo White-tailed Black Cockatoo
Psittacidae	*Polytelis anthopeplus* *Barnardius zonarius* *Purpureicephalus spurious*	Regent Parrot Australian Ring-necked Parrot Red-capped Parrot
Cuculidae	*Cuculus pallidus* *Cacomantis flabelliformis* *Chrysococcyx lucidus*	Pallid Cuckoo Fan-tailed Cuckoo Shing Bronze Cuckoo
Halcyonidae	* *Dacelo novaeguineae* *Todirhamphus sancta*	Laughing Kookaburra Sacred Kingfisher
Meropidae	*Merops ornatus*	Rainbow Bird
Maluridae	*Malurus splendens*	Splendid Fairy Wren
Pardalotidae	*Padalotus striatus* *Gerygone fusca* *Acanthiza apicalis* *Acanthiza chrysorrhoa*	Striated Pardalote Western Gerygone Inland Thornbill Yellow-rumped Thornbill
Melophagidae	*Anthochaera carunculata* *Lichmera indistincta* *Phylodonyris noveahollandiae* *Acanthorhynchus superciliosus*	Red Wattlebird Brown Honeyeater New Holland Honeyeater Western Spinebill
Pachycephalidae	*Pachycephala rufientris*	Rufous Whistler

Family	Species	Common Name
Dicruridae	*Grallina cyanoleuca* *Rhipidura fuliginosa* *Rhipidura leucophrys*	Magpie Lark Grey Fantail Willie Wagtail
Campephagidae	*Coracina noveahollandiae*	Black-faced Cuckoo-shrike
Artamidae	*Artamus cinereus* *Cracticus torquatus* *Gymnorhina tibicen*	Black-faced Wood Swallow Grey Butcherbird Australian Magpie
Corvidae	*Corvus coronoides*	Australian Raven
Hirundinidae	*Hirundo neoxena* *Hirundo nigricans*	Welcome Swallow Tree Martin

Sylviidae	*Cinclorhamphus mathewsi*	Rufous Songlark
Zosteropidae	*Zosterops lateralis*	Silvereye

Appendix C: Revegetation Guide by Species and Vegetation type.

Species name	Common Name	Form	Height m	Ironstone Heaths	Regelia/Grevillea Heaths	Regelia/Pericalymma Heaths	Melaleuca woodlands	Jarrah/Marri over woodlands/sedges	Jarrah Marri over low heaths	Jarrah/ Marri over Heath	Peppermint woodland
Acacia alata	Winged wattle	Low shrub	0.5-1					✓			
Acacia applanata		Low shrub	0.5-1		✓				✓		
Acacia extensa	Wiry wattle	Shrub	1-2	✓	✓			✓	✓	✓	✓
Acacia incurva		Low shrub	0.2-0.5	✓	✓						
Acacia pulchella	Prickly moses	Low shrub	0.5-1	✓	✓	✓		✓	✓	✓	✓
Acacia saligna	Orange wattle	Tall shrub	1.5-4	✓	✓	✓		✓			
Acacia semitrullata								✓			✓
Adenanthos barbiger											
Adenanthos meisneri				✓	✓	✓		✓	✓	✓	✓
Agonis flexuosa	Peppermint	Tree	4-10		✓	✓		✓		✓	✓
Allocasuarina humilis	Dwarf sheoak	Shrub	2	✓	✓			✓	✓		✓
Allocasuarina microstachya								✓			
Allocasuarina thuyoides	Horned sheoak	Shrub	1.5-2.0	✓							
Anarthria prolifera							✓				✓
Andersonia ferricola ms				✓	✓						
Anigozanthos manglesii	Mangle's kangaroo paw	Herb	0.2-1.1		✓	✓		✓	✓		
Anigozanthos viridis	Green kangaroo paw	Herb	0.1-0.8	✓	✓	✓		✓	✓		✓
Aotus gracillima		Herb	0.6-2	✓	✓						
Astartea fascicularis		Shrub	0.3-3	✓		✓	✓				
Austrostipa compressa		Grass	0.2-0.7	✓	✓	✓		✓	✓	✓	
Banksia attenuata	Candle banksia	Tree	8-10					✓			✓
Banksia grandis	Bull banksia	Tree	8-10		✓	✓		✓	✓		✓
Banksia ilicifolia								✓			✓
Banksia littoralis					✓	✓		✓	✓	✓	✓
Baumea juncea	Bare twig-rush	Sedge	0.8-1.0		✓			✓			✓

Species name	Common Name	Form	Height m	Ironstone Heaths	Regelia/Grevillea Heaths	Regelia/Pericalymma Heaths	Melaleuca woodlands	Jarrah/Marri over woodlands/sedges	Jarrah Marri over low heaths	Jarrah/ Marri over Heath	Peppermint woodland
Boronia dichotoma				✓	✓				✓	✓	
Bossiaea eriocarpa	Common brown pea	Low shrub	0.2-1					✓	✓		✓
Bossiaea pulchella		Low shrub	1.0-1.5								
Burchardia multiflora					✓	✓		✓			
Burchardia umbellata	Milkmaids	Herb	0.1-0.6		✓			✓	✓		✓
Caesia micrantha				✓	✓				✓	✓	
Caladenia flava					✓			✓	✓		✓
Calothamnus lateralis					✓						
Calothamnus sanguineus	Silky leaved bloodflower	Shrub	0.2-2					✓			
Calothamnus sp.Whicher(B.J.Keighery & N.Gibson 230)				✓					✓	✓	
Chamelaucium roycei ms				✓	✓		✓		✓	✓	✓
Chorizema aciculare	Needle leaved chorizema	Low shrub	0.7-1.0						✓		
Conospermum caeruleum					✓					✓	
Conostylis aculeata	Prickly conostylis	Herb	0.1-0.2	✓	✓	✓	✓	✓		✓	✓
Conostylis serrulata				✓	✓	✓		✓	✓		✓
Cotula coronopifolia	Waterbuttons	Herb	0.2			✓		✓			
Cyathochaeta avenacea				✓	✓	✓		✓		✓	✓
Cyathochaeta equitans						✓		✓			
Dasypogon bromeliifolius				✓	✓	✓		✓	✓	✓	✓
Dasypogon hookeri									✓		
Daviesia divaricata								✓			✓
Daviesia incrassata								✓			
Daviesia inflata						✓					
Daviesia physodes					✓	✓		✓			✓
Daviesia preissii					✓	✓		✓	✓	✓	✓
Daviesia rhombifolia					✓			✓	✓		

Species name	Common Name	Form	Height m	Ironstone Heaths	Regelia/Grevillea Heaths	Regelia/Pericalymma Heaths	Melaleuca woodlands	Jarrah/Marri over woodlands/sedges	Jarrah Marri over low heaths	Jarrah/ Marri over Heath	Peppermint woodland
Desmocladus fasciculatus				✓	✓	✓		✓	✓	✓	✓
Drosera glanduligera				✓				✓			
Dryandra lindleyiana				✓	✓	✓		✓	✓	✓	✓
Dryandra nivea subsp. nivea									✓		
Dryandra nivea subsp. uliginosa				✓	✓					✓	
Eriostemon spicatus					✓	✓		✓	✓		✓
Eucalyptus calophylla				✓	✓	✓		✓	✓	✓	✓
Eucalyptus haematoxylon											
Eucalyptus marginata	Jarrah	Tree	5-20		✓			✓	✓		✓
Eucalyptus rudis	Flooded gum	Tree	5-20	✓	✓					✓	
Euchilopsis linearis	Swamp pea	Shrub	0.1-1.2								✓
Eutaxia virgata		Low shrub	0.3-1	✓	✓	✓	✓			✓	
Gompholobium capitatum	Yellow pea	Shrub	0.2-1	✓	✓	✓		✓	✓	✓	✓
Gompholobium knightianum								✓			✓
Gompholobium marginatum		Low Shrub	0.1-0.4						✓		
Gompholobium ovatum								✓			
Gompholobium polymorphum								✓			✓
Gompholobium preissii											
Gompholobium tomentosum								✓			✓
Gompholobium venustum				✓		✓		✓	✓		
Goodenia micrantha										✓	
Gratiola pubescens				✓							
Grevillea brachystylis subsp. brachystylis					✓						
Grevillea diversifolia				✓	✓		✓	✓	✓	✓	
Grevillea elongata				✓	✓						
Grevillea quercifolia											

Species name	Common Name	Form	Height m	Ironstone Heaths	Regelia/Grevillea Heaths	Regelia/Pericalymma Heaths	Melaleuca woodlands	Jarrah/Marri over woodlands/sedges	Jarrah Marri over low heaths	Jarrah/ Marri over Heath	Peppermint woodland
Grevillea trifida											
Haemodorum discolor					✓			✓			✓
Haemodorum simplex				✓	✓	✓		✓		✓	✓
Hakea ceratophylla	Horned-leaf hakea	Shrub	0.5-2	✓	✓	✓	✓	✓	✓	✓	
Hakea ceratophylla											
Hakea cyclocarpa	Ramshorn	Tall Shrub	1.5-2.5								
Hakea marginata		Shrub	0.3-1.5	✓	✓		✓				
Hakea oldfieldii		Shrub	2.5	✓	✓						
Hakea prostrata	Harsh hakea	Shrub	0.3-5	✓	✓	✓		✓			✓
Hakea ruscifolia	Candle hakea	Shrub	0.5-3	✓	✓	✓		✓	✓	✓	✓
Hakea sulcata	Furrowed hakea	Shrub	0.4-2	✓	✓			✓			
Hakea varia	Variable leaved hakea	Shrub	0.5-3	✓	✓	✓	✓		✓	✓	
Hardenbergia comptoniana	Native wisteria	Climber						✓			✓
Hemiandra pungens	Snakebush	Low shrub	0.1-1	✓				✓	✓	✓	✓
Hemigenia rigida								✓			
Hovea chorizemifolia								✓			✓
Hovea trisperma					✓			✓			✓
Hypocalymma angustifolium	White myrtle	Low shrub	0.2-1	✓		✓	✓	✓	✓	✓	✓
Hypocalymma robustum	Swan River myrtle	Low shrub	0.4-1					✓	✓		✓
Isopogon formosus subsp. dasylepis				✓	✓		✓	✓		✓	
Jacksonia furcellata	Grey stinkwood	Shrub	0.4-4	✓	✓	✓		✓	✓	✓	✓
Jacksonia horrida						✓					
Jacksonia lehmannii									✓		
Juncus kraussii	Sea rush	Rush	0.3-1.2			✓					
Juncus pallidus	Pale rush	Rush	0.5-2			✓		✓		✓	
Kennedia coccinea	Coral vine	Twiner			✓			✓			✓

Species name	Common Name	Form	Height m	Ironstone Heaths	Regelia/Grevillea Heaths	Regelia/Pericalymma Heaths	Melaleuca woodlands	Jarrah/Marri over woodlands/sedges	Jarrah Marri over low heaths	Jarrah/ Marri over Heath	Peppermint woodland
Kennedia prostrata	Scarlet runner	Twiner						✓	✓		✓
Kingia australis				✓	✓	✓	✓	✓	✓	✓	✓
Kunzea ericifolia	Spearwood	Shrub	1-4		✓						
Kunzea glabrescens						✓		✓	✓		✓
Kunzea micrantha		Shrub	1-2	✓	✓	✓	✓	✓	✓	✓	
Kunzea recurva		Shrub	0.3-2					✓	✓		✓
Labichea punctata		Low shrub	0.2.1								
Lechenaultia expansa											✓
Lepidosperma longitudinale	Pithy sword sedge	Sedge	0.5-2	✓	✓	✓			✓	✓	
Lepidosperma squamatum		Sedge	0.2-1	✓		✓		✓	✓		✓
Leucopogon glabellus								✓			
Lomandra micrantha	Small flowered knot rush	Herb	0.1-0.7	✓				✓			✓
Lomandra purpurea					✓			✓		✓	✓
Lyginia barbarta				✓	✓	✓	✓	✓	✓	✓	✓
Macrozamia riedlei	Zamia	Cycad	0.5-2					✓		✓	✓
Melaleuca cuticularis					✓						
Melaleuca incana	Grey honeymyrtle	Shrub	0.7-3	✓	✓					✓	
Melaleuca lateritia	Robin redbreast bush	Shrub	0.4-2							✓	
Melaleuca pauciflora		Shrub	0.5-1.5	✓	✓						
Melaleuca preissiana	Moonah	Tree	2-9	✓	✓	✓		✓		✓	✓
Melaleuca rhaphiophylla	Swamp paperbark	Tree	2-10	✓	✓		✓				
Melaleuca scabra				✓	✓				✓		
Melaleuca thymoides		Shrub	0.4-2	✓	✓	✓		✓		✓	✓
Melaleuca uncinata	Broom bush Use local seed only	Shrub	0.5-3	✓	✓	✓	✓				
Melaleuca viminea	Mohan	Shrub	0.6-5	✓	✓		✓				

Species name	Common Name	Form	Height m	Ironstone Heaths	Regelia/Grevillea Heaths	Regelia/Pericalymma Heaths	Melaleuca woodlands	Jarrah/Marri over woodlands/sedges	Jarrah Marri over low heaths	Jarrah/ Marri over Heath	Peppermint woodland
Mesomelaena stygia				✓		✓		✓	✓		
Mirbelia dilatata	Holly-leaved mirbelia	Shrub	0.5-3						✓		
Nuytsia floribunda				✓	✓	✓	✓	✓	✓	✓	✓
Patersonia juncea								✓			✓
Patersonia occidentalis	Purple flag	Herb	0.3-0.7	✓	✓	✓	✓	✓	✓	✓	✓
Patersonia umbrosa var. xanthina	Yellow flags	Herb	0.4-0.7					✓			
Pericalymma ellipticum	Swamp teatree	Shrub	3	✓	✓	✓	✓	✓	✓	✓	✓
Persoonia elliptica								✓			
Persoonia longifolia								✓			✓
Persoonia saccata											✓
Petrophile linearis					✓			✓			✓
Pimelea angustifolia					✓						
Podocarpus drouynianus											✓
Regelia ciliata		Shrub	0.8-2	✓	✓	✓	✓	✓	✓	✓	✓
Scaevola calliptera				✓	✓	✓		✓	✓	✓	✓
Scaevola glandulifera											✓
Sollya heterophylla									✓		
Sowerbaea laxiflora					✓					✓	✓
Synaphea floribunda						✓	✓	✓			
Synaphea gracillima				✓		✓					
Tetraria capillaris								✓	✓	✓	✓
Tetraria octandra				✓	✓	✓	✓	✓	✓	✓	✓
Trachymene pilosa					✓			✓			✓
Verticordia attenuata						✓		✓			✓
Verticordia habrantha						✓					
Viminaria juncea	Swishbush	Tall shrub	1-4	✓	✓	✓	✓		✓	✓	

Species name	Common Name	Form	Height m	Ironstone Heaths	Regelia/Grevillea Heaths	Regelia/Pericalymma Heaths	Melaleuca woodlands	Jarrah/Marri over woodlands/sedges	Jarrah Marri over low heaths	Jarrah/ Marri over Heath	Peppermint woodland
Xanthorrhoea gracilis	Graceful grasstree	Grasstree	1-2	✓	✓	✓	✓		✓	✓	
Xanthorrhoea preissii	Grasstree	Grasstree	1-5	✓	✓	✓	✓	✓	✓		✓
Xylomelum occidentale	Woody pear	Tree	2-8		✓	✓		✓			✓

Appendix D: Iluka Emergency Response Protocol

Wonnerup – Tutunup Road Haulage: Emergency Procedure

Order of events in case of an accident:

1. Life and limb
2. Contact contractor transport supervisor
3. Contact Iluka haulage supervisor-contact Mine Manager, Operations Manager, Mining Manager
4. Contact Rehabilitation Section
5. Site inspection to determine impact and remedial works- contact CALM and neighbours
6. Contact Iluka mine manager
7. Cleanup any hydrocarbon leak
8. Cleanup and repair damage to truck and trailer
9. Cleanup any mineral loss onto the road and return to minesite for reprocessing
10. Repair pavement and edges (hot mix and limestone ONLY)
11. Extract mineral from bush with vacuum technology NO incursion into bush with machinery
12. Assess area for elevated radiation levels.

Appendix E: Extract from Cable Sands (Bemax) Emergency Preparedness & Response Plan (Revision No13: July 2006).

4.5 SPILLAGE OF MINERAL SANDS PRODUCT

Emergencies associated with the spillage of material will normally be associate with a traffic incident and initial management must centre around the management of the incident scene so as to prevent further injury to the people involved in the incident, those responding to the incident and in some instances further damage to flora and fauna (e.g. Tutunup Road).

Spilt material or the spreading of material need not interfere with the RESCUE OR TREATMENT of injured persons. Both injured persons or damaged equipment can be moved through the material in an emergency.

Action plan for the control, containment and removal of product includes:

- CONTROL
  - Unless the incident has occurred during an extreme weather event, once spilt it will not spread.
  - Control the movement of other vehicles through the product.

- CONTAINMENT
  - If the continued movement of a damaged vehicle (damaged tail gate) will spread the material contact one of the persons listed below.

- REMOVAL. After consultation with one of the persons listed below:
  - Shovel or load material into containers
  - Sweep up area manually or mechanically
  - RETURN all spilt material to the premises of CABLE SANDS (WA) PTY LTD.

4.6 SPILLAGE OF MINERAL SANDS CONCENTRATE LSA1

Emergencies associated with the spillage of material will normally be associate with a traffic incident and initial management must center around the management of the incident scene so as to prevent further injury to the people involved in the incident, those responding to the incident and in some instances further damage to flora and fauna (e.g. Tutunup Road).

Spilt material or the spreading of material need not interfere with the RESCUE OR TREATMENT of injured persons. Both injured persons or damaged equipment can be moved through the material in an emergency. PREVENT non-essential contact with this material.

Action plan for the control, containment and removal of product includes:

- CONTROL
  - Unless the incident has occurred during an extreme weather event, once spilt it will not spread. All reasonable steps must be taken to prevent the spread of this material. In extreme weather events it may be necessary to control the flow of water through the material or in high winds cover the material to prevent losses associated with wind.

  - Control the movement of other vehicles through the product.

- CONTAINMENT
  - If the continued movement of a damaged vehicle (damaged tail gate) will spread the material movement is prohibited unless for emergencies.

- REMOVAL. Under the direct supervision of one of the persons listed below:
  - Shovel or load material into containers
  - Sweep up area manually or mechanically
  - RETURN all spilt material to the premises of CABLE SANDS (WA) PTY LTD.
  - Wear clothing and take safety precautions appropriate for sweeping/shoveling sand.
  - On completion, wash hands and face and thoroughly de-dust clothing.

CONTACTS

ORGANISATION	LOCATION	ASK FOR	TELEPHONE
Cable Sands (WA) Pty Ltd	Bunbury	Brad Offer	(08) 97210200
		Herb Graf	
		Garry Fee	
AFTER HOURS:			
		Brad Offer	0429 868 257
		Herb Graf	0419 915 867
		Garry Fee	0417 902 674
Material Safety Data Sheets are available from Cable Sands. Phone 97210200			

Appendix F: Potential Funding Sources

Fund Name	Provider	Locality	Funding Limit	Deadline	Further Information
ANZ Staff Foundation	ANZ	Australia-wide	None	30 June & 31 December	1800 808 910 or www.anz.com/australia/charitabletrusts/guidelines
Australian Government Envirofund	Natural Heritage Trust	Australia-wide	$50,000	TBA	1800 303 863 or www.nht.gov.au/envirofund
BHP Billiton Corporate Community Program	BHP Billiton	Australia-wide	$100,000	1 March, 1 August & 1 November	03 9609 3596 or www.bhpbilliton.com
Community Grants	Australian Ethical Investment	Australia-wide	$5,000	August	02 6201 1988 or www.austethical.com.au
Communityhelp Grants Program	NRMA	Australia-wide	$5,000	TBA	1300 306 496 or www.nrma.com/grants
Holden Community Support Program	GM Holden Limited	Australia-wide	None	1 February, 1 May, 1 August & 1 November	1800 033 349 or www.holden.com.au
Local Environment Fund of Australia	The Perpetual Foundation	Australia-wide	None	31 March & 30 September	1800 501 227 or www.perpetual.com.au
Macquarie Bank Foundation	Macquarie Bank Foundation	Australia-wide	None	Continuous	02 8232 9673 or www.macquarie.com.au
National Action Plan for Salinity & Water Quality	Dept of Agriculture, Fisheries and Forestry	Australia-wide	None	TBA	www.napswq.gov.au
National Feral Animal Control Program	Dept of Agriculture, Fisheries and Forestry	Australia-wide	$100,000	Continuous	02 6272 3801 or www.daff.gov.au
National Landcare Program Community Support	Dept of Agriculture, Fisheries and Forestry	Australia-wide	None	July	1800 657 220 or www.daff.gov.au
Small Grants for Small Rural Communities	The Foundation for Rural and Regional Renewal	Australia-wide	$5,000	31 March & 30 September	1800 170 020 or www.frrr.org.au
The Bundaberg Rum Bush Fund	Bundaberg Rum	Australia-wide	$5,500	TBA	02 9412 1040 or www.landcareaustralia.com.au
The George Alexander Fund	The George Alexander Fund	Australia-wide	$150,000	1February, 1 May, 1 August & 1 November	03 9650 3188 or www.gafoundation.org.au

The Ian Potter Foundation	The Ian Potter Foundation	Australia-wide	None	1February, 1 May, 1 August & 1 November	03 9650 3188 or www.ianpotter.org.au
The Indigenous Protected Area Program	Dept of Environment and Heritage	Australia-wide	None	Continuous	02 6274 1111 or www.deh.gov.au
The Mullum Trust	The Mullum Trust	Australia-wide	None	March, June, September & December	03 9615 8500 or www.researches.unimelb.edu.au
The Natural Heritage Trust Regional Competitive Component	Natural Heritage Trust	Australia-wide	None	March	02 6274 1319 or www.nht.gov.au
The Norman Wettenhall Foundation	The Norman Wettenhall Foundation	Australia-wide	None	March, June, September & December	03 9650 3188 or www.nwf.org.au
Threatened Species Network Community Grants	World Wildlife Fund	Australia-wide	$50,000	TBA	02 8202 1216
Tourism and Conservation Partnerships	Dept of Industry, Tourism & Resources	Australia-wide	$70,000	Continuous	02 6213 7029
Australian Bird Environment Foundation	Bird Observers Club of Australia	Australia-wide	$3,500	31 May & 31 October	03 9877 5342 or www.birdobservers.org.au
Australia Post Community Development Grant	Australia Post	Australia-wide	$3,300	31 May & 29 September	03 9299 4112 or www.landcareonline.com
Westpac Operation Bavkyard	Westpac	Australia-wide	None	Continuous	02 9608 5499 or www.westpac.com.au
Coastwest Grants Program / Community Grant / Regional Fund	WA Planning Commission	WA	Varies	Continuous	08 9264 7730 or www.wapc.wa.gov.au
Gordon Reid Conservation of Natural Heritage Grants	Lotterywest	WA	$15,000	Continuous	08 9340 5270 or www.lotterywest.wa.gov.au
Community Conservation Grants	Dept of Conservation & Land Management	WA	$5,000	Last quarter of year	08 9334 0455 or www.naturebase.com.au

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

Appendix G: Application to Take Rare Flora

APPLICATION FOR APPROVAL TO TAKE DECLARED RARE FLORA IN MANAGEMENT OPERATION

(Pursuant to Section 23F of the Wildlife Conservation Act 1950, as amended)

Note:
Please complete all sections. Any section may be extended on an attached typed sheet.
Further information may be obtained from the Department's Administrative Officer, Flora on 9334 0422.

In this form, DRF = Declared Rare Flora.

1. Scientific name(s) of DRF to be taken (if more than one taxon please list all):

_____

_____

2. Date(s) of the proposed activity which will result in taking of DRF:

_____ to _____

3. Nature of the proposed activity:

_____

_____

_____

4. (i) Location of proposed activity:

_____

_____

_____

4. (ii) CALM Population Number/s of the DRF: _____

5. (i) Purpose of and need for the proposed activity:

_____

_____

(ii) Consequence of not carrying out the operation:

_____

_____

6. Cost of alternative measures (eg, to exclude DRF from burning; include any change in fire risks):

_____

_____

_____

8. **Total number(s) and condition of plants in DRF population(s) subject to the proposed activity (include reproductive maturity):**

9. **Number(s) of plants and parts of plants likely to be taken (e.g. leaves, flowers, fruits, seeds on ground, stem, roots, above ground plants, whole plants) at the time proposed:**

10. **Number of populations, number of plants and condition of the species on all other lands in the Shire and/or CALM District:**

11. **Detail regenerative characteristics of the DRF, e.g. recovery after fire:**

12. **Detail proposals for monitoring the effect of the activity on the DRF:**

13. **Other relevant information (eg discussion with Species and Communities Branch or Research Division):**

14. **Additional comments in support of application:**

15. Name of the individual to whom a permit is to be issued:

_____

_____

16. Address of permit holder:

_____ **Postcode** _____

Contact Numbers:

Work: _____

Home: _____

Email: _____@_____

17. Rare Flora Report Form:

Please attach a copy of a recent Rare Flora Report Form relating to the species/population described in 1 and 4 above. (NB: an inspection of the site may be required)

18. Signed _____

Date:_____/_____/_____

Note:
- Applications to take Declared Rare Flora must be submitted at least 4 weeks prior to the "taking" of the plants.
- Application to be forwarded to:

Department of Conservation and Land Management
c/- Administrative Officer Flora
Species and Communities Branch
Locked Bag 104
Bentley Delivery Centre WA 6983

_____

Revised: January 2006

Appendix H: Contact Details

Contact	Ph:
Bemax (Cable Sands)	9721 0200
Department of Agriculture and Food: Bunbury	9780 6100
Department of Agriculture and Food: Vasse	9753 0333
Department of Environment and Conservation: Bunbury	9725 4300
Department of Environment and Conservation: Busselton	9752 5555
Dieback Working Group: Project Officer	9257 9937
Geographe Catchment Council	9781 0111
Iluka Resources: Capel	9360 4700
Shire of Busselton: Environmental Officer	9781 0444
Water Corporation: Busselton	9752 1308

Appendix I: Environmental Impacts Checklist for the Biodiversity Values of the Ruabon Tutunup Rail Reserve

Proponent to complete

Proponent Name & Contact details: _____

_____

_____

Description of Proposed Activity: _____

_____

_____

_____

_____

Proposed Date of Activity: _____

With reference to the Management Plan

Management Plan Zone where activity is proposed: _____

Lat/Long and/or distance from nearest road junction _____

Tenure of Site: DEC ☐ Water Corp ☐ Main Rds ☐ Shire ☐ Other: ☐

Recognized Conservation values of zone: _____

Proposed Methods to reduce impact of proposal:

_____

_____

_____

_____

_____

_____

_____

_____

Management Committee assessment

Check-list for the proposal

Value	Yes	No	Details & Management Committee recommendations to reduce impact
Rare/Priority Flora			
Threatened Ecological Communities			
Threatened and Priority Fauna			
Significant Flora			
Significant Fauna			
Highly cleared Vegetation complex			
Fauna Habitat Areas			
Fire Research Sites			
Weed Research Sites			
Dieback Research Sites			
Translocation Areas			
1080 baiting sites			
Revegetation sites			
Other important sites			

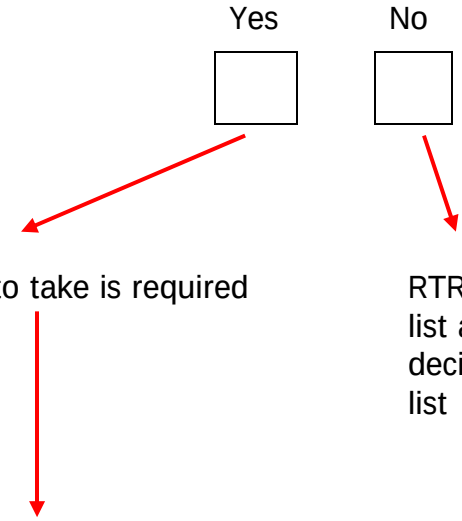
Additional issues to consider

Issue	Yes	No	Details & Management Committee recommendations to reduce impact
Hydrology impacts			
Erosion potential			
Weed invasion			
Feral animals			
Dieback (PC)			
Acid Sulphate soils			
Adjoining land uses			
Public Utilities			
Heritage sites			
Fire History			
Other			

Management Committee determination on proposal

If approved, proponent requirements to ensure impacts are minimized

Does the proposed activity potentially impact rare or priority flora or threatened ecological communities:



Date permit applied for: _____

Date permit received: _____

Checklist completed by: _____

Date completed: _____

We acknowledge that we have reviewed the proposed activity/activities and agree on the decision and recommendations as outlined within the decision and recommendations of the check-list.

Signed:

Chair: R-T RRPG	**Name**	**Date**
DEC: Authorised Representative	**Name**	**Date**
Shire of Busselton: Authorised Representative	**Name**	**Date**