***RANGES* Environmental Consulting**

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Three Chain Road Fire Risk Mitigation Action Plan

June 2019

Report:	Roadside Action Plan Three Chain Road – Carlsruhe to Lancefield
Report no:	17107
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Date:	19 June 2019

Cover Photos	
Top Left	Three Chain Road Significant Roadside – East of Boundary Road
Top Right	Spotted Sun-orchid *Thelymitra ixioides* Photo: Karl Just
Bottom Left	Milkmaids *Burchadia umbellata* Photo: Greg James
Bottom Right	Heading west along Three Chain Road towards Carlsruhe

The Authors of this report would like to thank the Project Working Group who were instrumental in the development of this plan	
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1 Introduction

Macedon Ranges Shire Council (MRSC) facilitated a community consultation process and formed a Project Working Group to guide the development of the Three Chain Road – Roadside Action Plan. This project is funded by the Victorian State Government through their Safer Together program.

A detailed Ecological Assessment and Fire Risk Assessment (Ranges Environmental Consulting 2018a, 2018b) helped to guide decision making by the Project Working Group. Based on these assessments and the local knowledge of residents and members of MRSC, Landcare, the Country Fire Authority (CFA), Regional Roads Victoria and Third Element Consulting, the project working group identified a Vision for the management of Three Chain Road and a series of objectives:

VISION

Fire Risk is mitigated as much as possible on moderate and high fire risk days while protecting and, where possible, enhancing conservation values

Objective 1	Objective 2	Objective 3
Minimise the chance of ignitions	Fires that start on or close to the road can be contained	Enable safe access during a fire for emergency vehicles and road users
Objective 4	**Objective 5**	**Objective 6**
Minimise the spread of high threat weeds both within the road reserve and on adjoining lands	Protect and enhance conservation values and threatened species populations	Provide for recreation activities in appropriate locations

How to achieve these objectives

1. Implement a range of fuel management treatments that reduce both fuel loads and fuel continuity
2. Control introduced woody weeds and high threat grassy weeds
3. Prioritise protection of 'high' and 'moderate' conservation value roadside areas and facilitate works that protect and enhance roadside conservation values
4. Educate the community about remnant native vegetation on roadsides, what constitutes a fire risk, the objectives of this plan and what action they can take

1.1 Study Area

Three Chain Road extends 22 kilometres from Carlsruhe to the west and Lancefield to the east. The study area incorporates the road reserve on both sides of Three Chain Road across its entire length (refer to figure 1 on the following page).

Three Chain Road is an important road linking the townships of Carlsruhe and Lancefield as well as providing access to properties in Cadello, Newham, Cobaw and Benloch. Most of the roadsides support intact native vegetation although substantial areas have been significantly modified with minimal cover of native canopy and understorey.

Private properties adjoining Three Chain Road are mostly large lots generally between 20-50 hectares. The use of these lots varies from farming, cropping to primarily conservation management. Residential dwellings are associated with most of these lots. Properties under one hectare are limited to the western extent of the study area within a kilometre of Cobb and Co Road.

Across its 22km length, Three Chain Road traverses a relatively consistent elevation ranging from 540m above sea level (ASL) at the Carlsruhe end to 450m ASL at the Lancefield end. The peak of Cobaw Forest is approximately 760m ASL, within 3km of the roadside

Areas of public land adjoining the road reserve are limited to small areas of creek frontage including Dry Creek in the Newham region and Deep Creek in the Cobaw / Lancefield region.

1.2 Landscape Context

Map A (Page 7) provides a landscape overview of the study area including location references for more detailed maps provided in Attachment 1 to this report.

Catchment Management Regions

The study area lies within two Catchment Management Authority (CMA) regions; the North Central Region (from Cob and Co Road to Boundary Road) and the Port Phillip and Western Port Catchment Region (east of Boundary Road).

Bioregions

Bioregions are a landscape-scale approach to classifying the environment using a range of attributes such as climate, geomorphology, geology, soils and vegetation. There are 28 bioregions identified within Victoria (DELWP 2017a). The study area mostly falls within the Central Victoria Uplands Bioregion. The Victorian Volcanic Plains Bioregion covers the eastern extent (approximately 3 kilometres) of the study area

Cobaw Biolink

The Cobaw State Forest lies to the north of the study area and is more than 2,500 hectares. Its most southerly extent is within 200 metres of Three Chain Road to the east of Croziers Road.

The central portion of the study area lies within the Cobaw Biolink and is zoned for Rural Conservation. The Cobaw Biolink is an important network of native vegetation linking Cobaw State Forest with Macedon Regional Park and is recognized in the MRSC Planning Scheme (clause

21.05), the Draft Macedon Ranges Biodiversity Strategy and strategy documents of North Central CMA and Port Philip and Western Port CMA.

1.3 Cobaw-Lancefield Fires

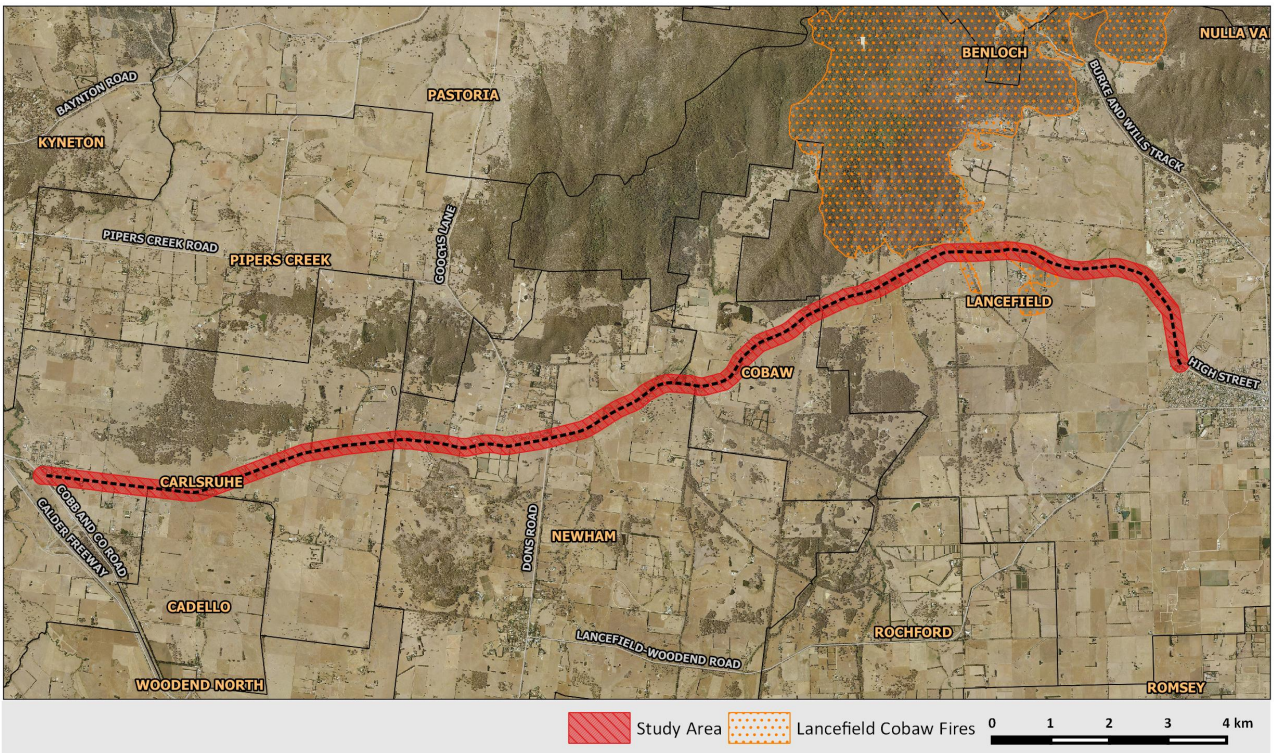
The Cobaw State Forest and several nearby private properties were impacted by the 2015 Lancefield-Cobaw Bushfires. The fire was ignited by a planned fuel reduction burn by the Department of Environment, Land, Water and Planning (DELWP). Fuel reduction burning began on 30 September 2015 and escaped containment lines on 3 October 2015.

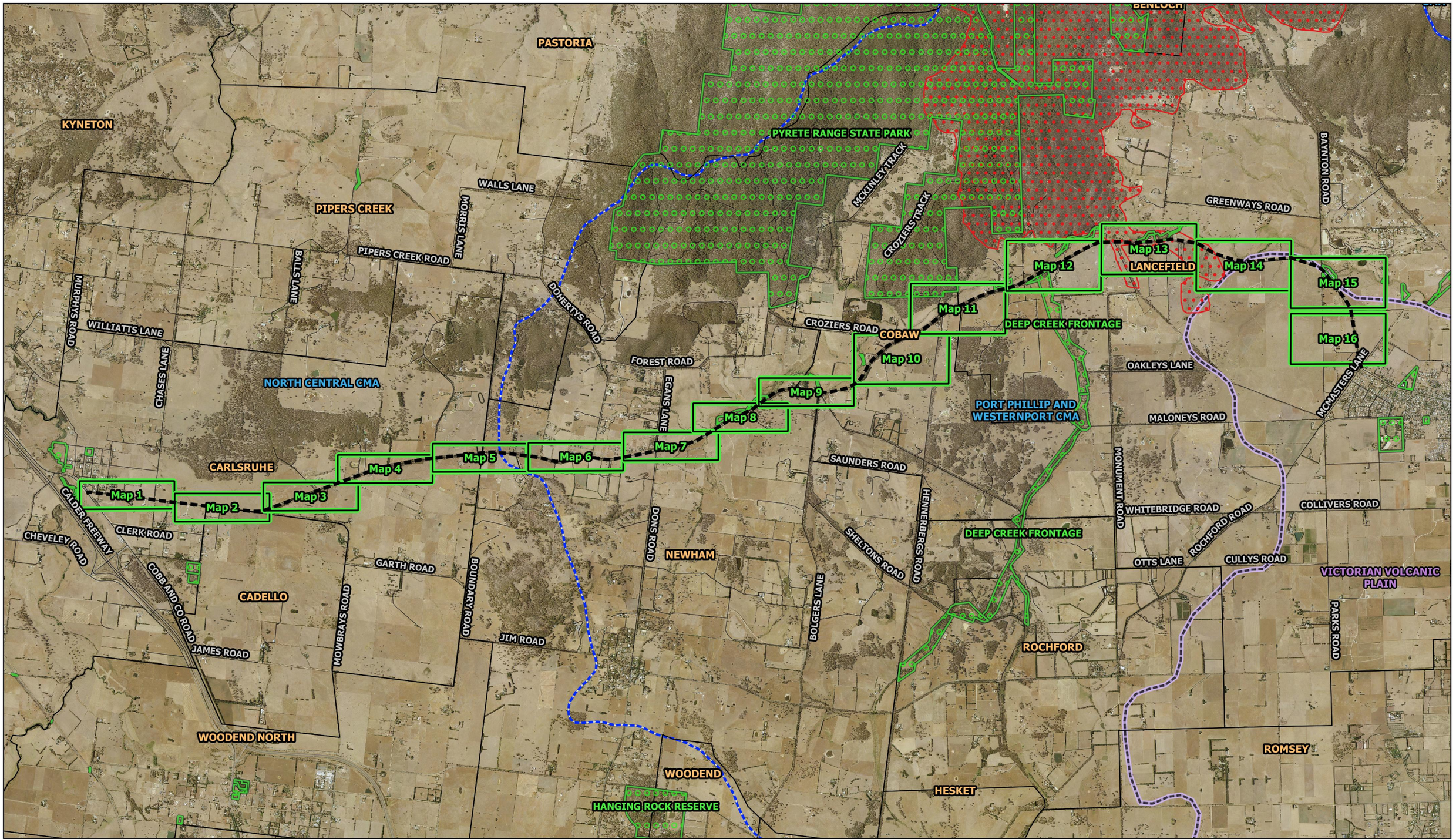
The Bushfire was not fully contained until 13 October 2015. It burnt over 3000 hectares and destroyed several dwellings, sheds and many kilometres of fencing. It impacted on lifestyles, livestock and livelihoods and caused considerable economic and social upheaval in the surrounding communities (Emergency Management Victoria 2016).

The bushfire directly affected private properties in Cobaw, Lancefield and Benloch to the north of Cobaw State Forest. The fire also impacted approximately 2.4 km of mostly high-quality roadside vegetation including 750 metres of Bridies Lane and 1.6 kilometres of Three Chain Road.

In part, this Action Plan is driven by the impacts of the 2015 fires and a desire for fire prevention while protecting and enhancing sites of ecological significance.

Figure 1. Study Area – Carlesruhe to Lancefield





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Legend

- Map Reference
- Public Land
- Locality Boundary
- Lancefield Cobaw Fires
- Bioregion Boundary
- CMA Boundary
- Three Chain Road

Date: 30 October 2018
Created by: Greg James
Map Program: QGIS 2.18
Base Layers provided by Macedon Ranges Council

Map A - Overview of Study Area

Three Chain Road - Carlsruhe to Lancefield

N

Scale (A3): 1:54,000

0 1 2 3 4 km

2 Summary of Key Issues

2.1 Roadside Management Considerations

Causes of Bushfire

A recent study of bushfires in south-eastern Australia sampled more than 113,000 bushfires ignited between 1997 and 2009 in 144 bioregions across New South Wales and Victoria (Collins et al 2015). Of the fires with a known cause, 47 per cent were due to accidental causes, for example, cigarettes, escaped burn-offs and campfires, or sparks from equipment or powerlines. Forty per cent were deliberately lit and 13 per cent were caused by lightning. The cause of 31 per cent of fires was undetermined.

Given that many of these causes occur on roadsides, management of roadsides should consider preventative actions that reduce the likelihood of ignitions as well as facilitate the ability to control a fire should it start.

Roadside vegetation management

Three Chain Road is the primary access road that allows for emergency services to control wildfires.

Roadside vegetation management at Three Chain Road can play an important role in reducing fuel loads and the probability of bushfire. The roadside provides a potential ignition source and a fuel corridor into broader areas of vegetation on neighbouring private property and public land. Neighbouring lands may also contribute substantial fuel loads that could increase the fire vulnerability of roadside vegetation. Therefore, risk assessments have been considered in a broader landscape context.

MRSC encourages adjoining land owners to contribute to fire mitigation through fuel reduction (typically mowing / slashing) in the lead up to the fire danger period to ensure reduced fire risk across multiple land tenures.

The Case for Roadside Conservation Management

In Victoria, roadsides are widely recognised as significant refuges for flora and fauna, serving as major sources for biodiversity. This is particularly the case for the relatively fertile grassy landscapes, where the land has been heavily cleared, degraded and fragmented for agricultural use. In many cases, roadsides support some of the best remaining examples of endangered vegetation communities due to their history of protection from grazing and cropping practices (Karl Just 2016).

Roadside vegetation remnants within the study area, and across many roadsides within the Macedon Shire, are exposed to a range of threatening processes. The linearity of the road reserve and the proximity to land used for agriculture and residential use renders these remnants particularly vulnerable to 'edge effects' and fragmentation.

The Three Chain Road Reserve Vegetation provides important ecological processes and scenic values including:

- significant fauna habitat, corridors of connectivity and foraging resources
- a refuge for conservation of vegetation communities that are depleted elsewhere in the local area or the broader region
- provision of shade and visual screening between the road and neighbouring properties
- an attractive natural setting in keeping with the local rural character

The Case for Roadside Fuel Reduction

Given the recent fire history and the impacts to the community, it is clear that MRSC needs an integrated roadside management plan that prioritises vegetation management for fire mitigation while protecting the important ecological values within the road reserve. Key threats for fire mitigation and emergency response along Three Chain Road include:

- Long sections of well vegetated road reserves without fuel breaks influence the speed, intensity and spread of fire and the capacity of emergency services to control fires
- Trees with unstable trunk or limb structure may fall during high wind events and block road access or impact powerlines
- Vegetated road reserves may increase fire hazards in the landscape if land adjoining the road reserve is unmanaged (e.g. tall pastures, excessive woody weed loads or absence of fuel breaks)
- Lack of options or knowledge of options for emergency access and evacuation
- Evacuation and refuge options need to be communicated to residents.

Policy Context

Roadside management within the Shire Macedon Ranges is also a part of a broad policy context. Appendix 1 provides details of policy context at local, State and National level.

2.2 Fire History

All known wildfires in the local area started from the north of Three Chain Road within the Cobaw Ranges or adjacent private lands. These include several landscape scale fires occuring between 1965 and 1967. The cause of these fires is unknown.

More recent landscape scale fires started as controlled burns in the Cobaw State Forest that escaped containment lines. These include a wildfire in 2003 which burnt over 1,000 hectares and more recently, wildfires in 2015 that burnt over 3,000 hectares. Both of these caused considerable economic and social upheaval to local communities. Northerly winds propelled these fires towards Three Chain Road. The 2003 fire was contained within the roadside, however, the 2015 fire burned through 70 hectares to the south of the road.

According to the Fire History database accessed via data.vic.gov.au, no wildfires have occurred within 9-10 kilometres south of Three Chain Road, the nearest being the Ash Wednesday Fires in the Mount Macedon area. It is predicted that if a fire originated within 5km south of Three Chain

Road, emergency services would have a greater opportunity to supress fire compared to the northern region around Cobaw State Forest due to:

- The sparser and more fragmented stands of forests and woodlands
- The generally flatter undulating terrain which reduces fire spread and intensity
- Better opportunities for emergency access through designated roads and open farmlands.

2.3 Phoenix Fire Modelling

Phoenix Rapid Fire (Phoenix) is a modelling tool that simulates bushfire behaviour in different vegetation types, topographies and weather conditions. The CFA generated a report from this modelling based on nine fire scenarios resulting from hypothetical ignitions north of Three Chain Road (from 0.3 – 5km). Some of the CFA findings from the nine hypothetical ignitions include:

- All ignitions breached Three Chain Road and resulted in spot fire activity well south of Three Chain Road within 1.5 hours of fire development.
- Based on projected flame height, it is predicted that a fuel break would need to be at least 5.6m wide to account for a forest fire under extreme fire danger conditions (FFDI 75).
- If a fuel break along Three Chain Road was enough to stop a head fire, it is still likely that spot fires would ignite further south
- Ignitions which are simulated to begin 2.5-5km north of Three Chain Road and move through forest could ignite spot fires up to 10km south under an Extreme FFDR day
- There is no clear evidence that a fuel break alongside Three Chain Road would be effective at stopping a fire. Reduction of fuel loads on the north side of Three Chain Road might reduce spread or intensity along the road corridor and therefore increase the chances of suppression and allow safer access and egress.

It is important to realise the limitations of managing a linear roadside reserve for fire mitigation given the broader landscape factors that influence fire behaviour.

2.4 Considerations for Bushfire Mitigation

Vegetation (Fuel) Types

The road reserve width varies from 5-30 metres either side of Three Chain Road with vegetation types and fuel loads varying markedly across the entire length. The vegetation on the roadside and adjoining lands ranges from grasslands, scrubs, woodlands and forests with some areas of modified vegetation (e.g. cropped lands and well grazed pastures) that bear low fire risk. In most areas, vegetation in the road reserve is vulnerable to ignition from vehicles or machinery as well as from a fire approaching from adjoining private properties or public land.

Fuel Load Assessments

The entire roadside was subject to fuel load assessments consistent with the *Overall fuel hazard assessment guide* (Hines 2010). A total of 104 subsections of the roadside were identified during the assessment. These sections represent various fuel types and vegetation classes which provide guidance for various management approaches. There are 5 fuel load categories applied to the roadside assessments:

- Bark Hazard
- Elevated fuels
- Near-surface fine fuels
- Surface Fine Fuels
- Fuel load connectivity across the landscape

Appendix 2 provides further details of this assessment methodology. Figures 2-7 provide some example of fuel types encounter within the roadside.

Figure 2. Example of high levels of near surface fuels within the road reserve

Figure 3. Example of very high levels of surface fuels and Ribbonbark within the road reserve

Figure 4. Example of woody weeds dominating the elevated fuel layer

Figure 5. Post fire canopy regrowth presents high levels of elevated fuels

Figure 6. Unmanaged grassland between the road reserve and Cobaw Forest

Figure 7. Typical woodland within the road reserve with dense groundstorey and open

2.5 Native Vegetation

Approximately 65% of vegetation within the study area is considered to be native vegetation patch i.e. either vegetation with at least 25% native understorey or areas with a continuous Eucalypt and Wattle canopy. Of these areas, approximately 70% is considered moderate to high ecological condition i.e. vegetation with at least 50% native understorey cover and benchmark diversity with low to moderate weed cover.

The ecological values and conservation significance of the roadsides are a key consideration for decision making on the type of fuel reduction works.

The most significant ecological findings from recent site assessments along Three Chain Road include:

- A total of 216 species of local indigenous flora observed within the study area either during the recent assessment or from surveys documented by Karl Just in 2016.
- Three Ecological Vegetation Classes (EVCs) were identified. Swampy Riparian Woodland and Plains Grassy Woodland are both endangered within the Central Victorian Uplands and Victorian Volcanic Plains bioregions and Valley Grassy Forest is listed as vulnerable.
- Two nationally significant EPBC listed flora species including 34 locations of Matted Flax-lily *Dianella amoena* and 1 large population of Basalt Peppercress *Lepidium hyssopifolium*
- Four species listed under the FFG Act; Basalt Tussock-grass *Poa labillardierei var. (Volcanic Plains)*, Pale-flower Crane's-bill *Geranium sp. 3*, Floodplain Fireweed *Senecio campylocarpus* and Austral Crane's-bill *Geranium solanderi var. solanderi s.s.*
- Sixteen flora species considered to be regional significance
- Suitable habitat for a range of fauna species (birds, mammals, reptiles and frogs) including potential foraging habitat for some threatened fauna
- High levels of recruitment of canopy species and understorey trees within fire affected areas.

Appendix 3 outlines the assessment methodology applied to ecological assessments throughout the roadside. Appendix 4 includes all flora records from combined surveys (Ranges Environmental Consulting 2018 and Karl Just 2016). Appendix 5 provides a summary of all 104 sections of the roadside which combine fuel load assessments including of EVCs, canopy and native understorey cover, weed invasion and ecological condition. These zones (each with a numeric identifier) are shown on maps presented in Attachment 1.

Figures 8-13 provide photographic samples of some of the rare or threatened flora found during the survey.

Figure 8. EPBC listed Basalt Peppercress *Lepidium hyssopifolium* (photo: Mark Shepherd)

Figure 9. Shiny Everlasting *Xerochrysum viscosum* (photo: Mark Shepherd)

Figure 10. Austral Crane's-bill *Geranium solanderi var. solanderi* (photo: Mark Shepherd)

Figure 11. EPBC listed Matted Flax-lily *Dianella ameona* (photo: Karl Just)

Figure 12. Alpine Shaggy-pea (photo: Karl Just)

Figure 13. Blue Grass-lily (photo: Karl Just)

2.6 Fauna Habitat

Considerations of fauna habitat and significance was evaluated by undertaking a roadside and landscape habitat assessment and reviewing local records in the Victorian Biodiversity Atlas (VBA). The VBA provides a database of observed and recorded fauna species across all of Victoria.

The study area provides a diversity of habitats for a range of fauna species. The continuous eucalypt cover including old trees with hollows across large portions of the study area provide nesting and foraging habitat for a range of hollow dependent birds and arboreal mammals. There is however limited canopy connectivity beyond the road reserve. Canopy connectivity to larger forest and woodland habitats is limited to narrow road corridors that intersect Three Chain Road and this would limit the mobility range for foraging by arboreal mammals that rely on gliding or leaping between trees. Nevertheless, the central portion of the study area forms the Cobaw Biolink which is part of a large contiguous area available for fauna movement and foraging across a diverse landscape including creek corridors, farm dams, seasonal swamps and wetlands, paddock trees and open grasslands.

Dense understorey among dry and swampy terrain provides suitable cover for a range of frogs, reptiles and ground dwelling mammals. Although mostly treeless, many properties adjoining the road reserve provide suitable connecting habitat for ground dwelling species e.g. dense tussock cover, drainage lines and small ephemeral wetlands and dams.

Unlike the local flora database, there is a good representation of fauna records in the locality. The most frequently sampled areas include the Cobaw Forest, the Lancefield Reservoir / Deep Creek areas south of Whitebridge Road and woodlands between Three Chain Road and Jim Road.

A review of local database records indicate that the area is well frequented by various mammal species such as Koala *Phascolarctos cinereus,* Black Wallaby *Wallabia bicolor*, Sugar Glider *Petaurus breviceps* and a range of forest bats such as Chocolate Wattled Bat *Chalinolobus morio* and Large Forest Bat *Vespadelus darlingtonia*. Sightings or evidence of more common mammal

species during the surveys included Short-beaked Echidna, Wombat *Vombatus ursinus* and Common Brushtail Possum *Trichosurus vulpecula*.

A review of local bird records indicates that the area is well frequented by several birds of prey including though not limited to Wedge-tailed Eagle Aquila audax, Grey Currawong *Strepera versicolor* and Pied Currawong *Strepera graculina*. Frequently occurring smaller birds that may rely on dense understorey cover within the study area include Brown Thornbill *Acanthiza pusilla*, Eastern Spinebill *Acanthorhynchus tenuirostris*, Grey Fantail *Rhipidura albiscarpa*, Striated Thornbill *Acanthiza lineata*, White-browed Scrubwren *Sericornis frontalis* and Superb Fairy-wren *Malurus cyaneus*.

Although there have been only a few local database records of frog species, suitable habitat within swampy areas and drainage lines may be utilised by species such as Common Froglet *Crinia signifera* and Southern Brown Tree Frog *Litoria ewingii*.

Threatened Fauna

A total of 57 threatened fauna records including 16 species have been recorded within 5km of the study area since 1950. None of these species are highly likely to reside within the study area although some species are predicted to forage there. Several of these records are wetland birds that are unlikely to rely upon the habitats within the road reserve given the lack of substantial and/or permanent water bodies. The lack of connectivity in most of the study area may also confine movement and foraging opportunities of species such as Eastern Pygmy-possum and Brushtail Phascogale beyond the Cobaw State Forest. This emphasises the importance of maintaining these limited fauna corridors as well as providing opportunities to expand these links.

Other more mobile species may occasionally forage within the site including the Powerful Owl and the Swift Parrot.

It is also important to note that the lack of threatened fauna records listed in the VBA is not always a reflection of lack of presence. For example, there is considerably more anecdotal evidence of Brushtail Phascogale in the local area than what the formal records would suggest. Brushtail Phascogales have been recorded recently on two properties on Monument Creek within 1km of Three Chain Road and noted multiple times on Whitebridge Road near Hennerbergs Road. Phascogale-like nests have also been established in several nest boxes installed by *Newham District Landcare Group* along a gully northeast of the Jim Jim (although no sightings of the species have been confirmed to date).

2.7 High Threat Weeds

Weed populations are a significant threat to roadsides within the study area, adjoining properties and nearby state parks, waterways and conservation reserves. Although weed cover varies markedly across different sections of the road reserve (varying from less than 10% of plant cover to greater than 90% cover), no sections of the road reserve were free from the threat of weed invasion.

Many sections of the study area contain significant levels of high threat weeds, either consistently occurring across a given area or occurring as a significant population in more isolated locations.

In some cases, weed invasion in the roadside is exacerbated by large weed populations on adjoining properties.

Some areas of moderate to high quality native vegetation have low occurrence of woody and noxious weeds (less than 1% cover). These areas include sites between Boundary Road and Wisemans Lane (Map 5-6 of Attachment 1) and vegetation in the Croziers Road area (Map 10-11).

Weed mapping has been undertaken to assist MRSC with targeted weed control including early intervention of new weed populations regardless of vegetation quality and areas where high threat weeds occur in high priority conservation areas. In some cases, large weed populations provide a management focus which will contribute to fuel reduction objectives.

High threat weeds on Three Chain Road are detrimental to native vegetation and areas of pasture. The most substantial threats along the roadside include:

- A range of woody weeds that have a broad distribution across the study area, the most pervasive threats are Gorse **Ulex europaeus*, Montpellier Broom **Genista monspessulana*, and to a lesser extent, Hawthorn **Crataegus monogyna* and Sweet Briar **Rosa rubiginosa*, English Broom **Cytisus scoparius* (all are declared noxious species)
- Several populations of Chilean Needle-grass *Nassella neesiana* were found on the roadside including two areas between Chases Lane and Rutters Lane (Map 1-2) one opposite the intersection of Three Chain Road and Bolgers Lane (Map 9), one near the intersection of Three Chain Road and Salisbury Lane (Map 15) and a couple of infestations at the most easterly end of the road towards High Street (Map 16). The latter two locations had several hundred individual plants[1]
- There was one very small infestation of Serrated Tussock *Nassella trichotoma* that was removed last spring opposite 2162 Three Chain Road (Map 16). It is likely that other infestations would emerge in this location or nearby
- Blackberry was identified in more than 50 locations including some large infestations in the vicinity of Mooneys Lane and scattered smaller infestations across the study area

The spread of high threat weeds can be intensified by machinery (e.g. mowing or earthworks by road maintenance contractors). The incremental spread of Chilean Needle-grass and Serrated Tussock are prime examples of how machinery increased weed invasion throughout the roadside.

Woody Weeds

In some cases, woody weeds occupy 10-20% of the groundstorey among areas of native vegetation and are the most actively recruiting woody weeds with many young populations occurring within forested and treeless areas. In addition to the noxious woody weeds listed

[1] The maps that show location points of Chilean Needle-grass is not a full representation of its extent or risk along Three Chain Road. Multiple populations of Chilean Needle-grass have been found along the entire length of Three Chain Road.

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above, several other high threat woody weeds occur in various locations on the roadside. These include Spanish Heath **Erica lusitanica,* Crack Willow **Salix fragilis* (declared noxious), Cootamundra Wattle **Acacia baileyana*, White Sallow-wattle *#Acacia floribunda*, Sallow Wattle *#Acacia longifolia subsp. longifolia*, European Privet **Ligustrum vulgare*, Tree Lucerne **Chamaecytisus palmensis*, Cherry Plum **Prunus cerasifera* and Monterey Pine **Pinus radiata*. Several areas of the roadside or adjoining property boundaries are lined with old plantings of Monterey Pine and wildlings and new recruits are present in all these areas.

Grassy and Herbaceous Weeds

Grassy and herbaceous weeds prevail over the entire study area with only a few locations that occupy less than 10% overall groundstorey cover. Where an area is classified as native vegetation, grassy and herbaceous weeds generally occupy 20-60% of overall groundstorey cover. Typical high threat grassy and herbaceous weeds include Brown-top Bent **Agrostis capillaris var. capillaris*, Sweet Vernal-grass *Anthoxanthum odoratum,* Great Brome **Bromus diandrus,* Cocksfoot *Dactylis glomerata,* Greater Plantain *Plantago major*, and Toowoomba Canary-grass **Phalaris aquatic*. Control of these weed species is not required under Catchment and Land Protection Act 1994 (CaLP Act) but they are invasive and constitute a significant fuel load. In addition, they have a strong competitive advantage over native ground flora which may be greatly reduced by their presence or lost entirely without ongoing management intervention.

Declared noxious herbaceous/grassy weeds are limited in their extent although *Spiny Rush *Juncus acutus subsp. acutus* has a significant detrimental impact where it occurs. It is generally associated with low lying swampy areas or drainage lines, usually where there are large populations on neighbouring property. Other sparsely occurring noxious weeds include *St John's Wort *Hypericum perforatum subsp. veronense* and Spear Thistle **Cirsium vulgare,* however these are prone to spread rapidly in favourable conditions.

Chilean Needle-grass is the most persistent high threat grassy weed on the roadside. It is a weed of national significance and is listed as noxious under the CaLP Act. Chilean Needle-grass was first identified locally around 10 years ago and still persists in several locations despite concerted control efforts. Some recent locations were recorded around newly constructed infrastructure (opposite 709 Three Chain Road and around a culvert in Whitebridge Road), making it highly likely that the seed was brought in by machinery (Karl Just 2016). These infestations were promptly controlled during the 2018 spring/summer period and over the previous year. However, a strong possibility remains that the species will continue to emerge from soil stored seed over the next several years.

Scrambler / Climber weeds

Scrambler/climber weeds are generally robust species with training stems, rhizomes or canes that smother native vegetation. Fortunately, such species are sparsely occurring across the study area and appear to be limited to English Ivy **Hedera helix* and Common Blackberry **Rubus anglocandicans*.

Blackberry was identified in more than 50 locations with several large infestations within the Deep Creek Frontage east of Mooneys Lane (see map 12 of Attachment 1). However, most other infestations were small and consisted of semi-mature canes or younger germinates.

English Ivy currently has minimal impact on native vegetation and occurs as a few small infestations between Wisemans Lane to Bolgers Lane.

2.8 Other Roadside Management Considerations

Although a balanced approach to bushfire mitigation and conservation management is a key objective of the Roadside Action Plan, a range of other roadside management issues are also considered in this plan as outlined below:

Grazing impacts

Rabbits and Hares are common in the local area. Both species can have a potentially serious impact on ground flora and at the time of assessment some moderate impacts were evident in terms of grazing and digging.

Given the roadside includes intact native vegetation within a highly modified landscape, macropod grazing by Eastern Grey Kangaroo and Black Wallaby potentially increases grazing pressure on road reserve vegetation. At the time of the recent assessments, macropod grazing did not appear to be high impact along most of the roadside perhaps due to limited grazing habitat on some neighbouring properties.

In a large bush block adjoining open paddocks to the north of Three Chain Road, three grazing exclusion fences constructed by Newham Landcare demonstrate a significant contrast between protected and grazed areas.

Horse-Riding

Horse-riding is the main recreational use along Three Chain Road that needs to be directed to areas of minimal ecological impact. Unmitigated horse riding can create trails that destroy native ground flora, create soil compaction or pugging and expose areas to weed invasion. Horses also commonly introduce a variety of weed species (particularly exotic grasses) through their droppings and on hooves (Just 2016).

Road Works

Some past roadside works have resulted in unauthorised vegetation removal and discarded materials or soil stock piles have led to erosion or weed invasion. Other incidents include unauthorised slashing and the creation of tracks that have involved vegetation removal.

Illegal dumping

Although not a common occurrence on Three Chain Road, illegal dumping of waste has occurred on occasions. Not only does hard waste have a detrimental impact on the environment, green waste typically contains weed seed and plant propagules (e.g. bulbs, corms and rhizomes) that can propagate and spread.

3 Management Priorities

3.1 Decision Guidelines for Determining Management Priorities

The project working group has sought to identify priorities for the management of Three Chain Road. Issues that have been considered as a result of this action plan include:

- Prioritisation of works that complement other fuel management works undertaken on neighbouring private land
- Prioritisation of areas of high fuel loads within roadsides of low conservation significance where fuel reduction can be undertaken with minimal constraints
- Priorities for protecting populations of threatened flora
- The importance of controlling high threat noxious weeds that impact Council managed land and private property
- That due to the surrounding landscape risks, any fire mitigation activities on the roadside cannot guarantee control of bushfire on high to severe fire risk days.

3.2 Fuel Reduction

Prior to the development of this Action Plan, fuel reduction during the fire danger period on Three Chain Road has included the following treatments

- a 3-metre slash from the road verge from the east of Mowbrays Road to the Lancefield Area south of Green Ways Road (refer to Overview Map A). This treatment accounts for most of the roadside (approximately 14.8 kilometres)
- A full roadside slash has been implemented to the west of Mowbrays road to the intersection of Cob and Co Road (2.6 km) and the most easterly section of Three Chain Road leading into the township (4.8 km)

Fuel Management Objectives

The background ecological and fuel load assessments identified greater opportunities for fuel reduction compared to the ongoing management regime up until the end of the 2018/19 fire season. The actions outlined below and further detailed in Section 5 aim to meet the following objectives:

Objective 1	Objective 2
Minimise the chance of ignitions	Fires that start on or close to the road are more likely to be contained

Most sections of conservation significance can sustain some form of increased fuel reduction such as small fuel breaks, targeted biomass reduction or ecological thinning, if not a full roadside slash. Under this plan, fuel reduction is generally limited to a 3-metre roadside slash where:

- There are significant populations of national, state and regional significant flora species
- Where native vegetation is of high quality and/or significance

Fuel Management Treatments included in this plan

In addition to extending mowing and slashing to various sections of the roadside, a broader range of fuel reduction techniques are included in this plan as outlined below:

Weed Control for Fuel Reduction – While reduction of high threat weeds is a primary aim, there are some instances where large areas of woody weeds or robust grassy weeds substantially contribute to fuel loads among areas of native vegetation. Weed control will control contribute to biomass reduction in these areas where a more targeted approach is required rather than machine slashing (e.g. selective slashing with a brushcutter or selective low-volume herbicide application)

Ecological Thinning – Selective thinning refers to targeted removal of the midstorey, to provide ecological benefits in addition to fuel reduction outcomes. This management treatment is recommended within areas of dense post-fire vegetation to provide a break in fuel load continuity. Regrowth areas since the 2015 Cobaw-Lancefield Fires currently support dense thickets of shrubby regrowth, mainly consisting of Eucalypt and Wattle species. The current state of the vegetation is likely to be more fire prone compared to its pre-burnt condition. Selective thinning of the emerging Eucalypts and Wattles will create a break in the continuity of elevated fuels.

This plan recommends that ecological thinning is undertaken at three separate locations:

- Both sides of the road opposite 1651 and 1602 Three Chain Road (refer to Map 12)
- Both sides of the road opposite 1697 and 1752 Three Chain Road (refer to Map 13)
- The northern side of the road opposite 1779 Three Chain Road (Map 13)

These sites currently occupy up to 75% elevated fuels dominated by post-fire regrowth (generally less than 3-metres high). The prescriptions for ecological thinning at the nominated locations are to:

- Use the EVC benchmark as a guide to modifying the emerging canopy and midstorey canopy layer (all nominated areas are classified Valley Grass Forest EVC 47)
- Refer to benchmark cover for canopy, understory trees, medium and small shrubs to achieve an appropriate cover (benchmark canopy cover is 20% and combined benchmark understorey tree/shrub cover is 25%)
- Reduce post-fire shrub and tree regrowth to less than 20% overall cover
- At least 40% of the remaining post-fire regrowth is to be canopy species
- Create gaps in post fire regrowth by retaining small clumps of emerging shrubs/trees (no more than 5 x 5m) with at least 20 metres between each clump

- Ensure retention of tree/shrub species includes a proportionate representation of all species currently regenerating.

Ecological thinning needs to be undertaken in a sensitive and strategic manner and is best implemented by a qualified bushland contractor. Removal of post-fire regrowth is to be undertaken by hand (i.e. cut and paint) or by the use of a blade brushcutter (targeted spraying of regrowth from cut stems may also be required). Removal of post-fire regrowth with a machine slasher is considered inappropriate given the need for a strategic approach and sensitive management of native groundstorey vegetation. Ecological thinning is likely to be a labour-intensive process that may be resource dependent. If resources are limited, works could be performed on smaller sections of the nominated sites as a trial.

Once trial areas of ecological thinning are undertaken, the sites should be monitored on a bi-annual basis to assess the natural changes in vegetation structure. Monitoring of the sites should consider and respond to:

- The rate of regrowth and the need for repeat treatment
- The degree of natural generation and diversity of grassy and herbaceous species in place of shrub and tree recruits
- The degree of weed infestation as a result of ecological thinning and necessary actions for control.

Providing these areas are monitored and managed adaptively, it is predicted that the site will mature into a natural open grassy forest rather than a dense high-fuel load shrubland that is currently evident.

Ecological thinning of native species will require a planning permit under Clause 52.17 of the Planning Scheme as well as under the Vegetation Protection Overlay (VPO) which applies to most of Three Chain Road (generally from Mowbray Street to Baynton Road).

Trial of direct seeding of native grasses – Some treeless areas along the road reserve support large robust pasture grasses with high biomass. To reduce this biomass and reduce ongoing maintenance, it is suggested that selected areas are transitioned to native grasses. This could be implemented by scalping the soil profile to remove the exotic grasses and their soil seedbank and then re-sowing the area with low biomass native grasses (e.g. Wallaby Grasses and Weeping Grass). This technique has been applied with success across many sites in Victoria.

Ecological Burns - Council will consider future opportunities for ecological fuel reduction burns and lead the process in consultation with the CFA. Under this plan, a section of road reserve between Dons Road and Bolgers Lane is nominated for a trial controlled burn (refer to map 8). This site and potentially other sites could lead to desirable fuel reduction and biodiversity outcomes. However, prospects for ecological burns need to be carefully planned with ecological assessments undertaken prior to burning. An understanding of composition and types of flora species present and their biological response to fire will be critical in determining the timing of the burn.

Ecological burns could be conducted in two ways:

1. A cool grass burn conducted in Autumn or Spring (as indicated in map 8). The benefits of this method include:
    - Reduction of fuel loads and lower the likelihood of a hot fire occurring
    - increase in soil nutrient levels
    - reduction of dominant species and stimulation of greater species-diversity
    - promoting flora species that rely on fire for re-seeding and re-sprouting
    - reducing the cover of fire-adverse weed species
    - improved capacity to control weeds that regenerate after fire
2. Bark Candling - a process of charring the bark, usually to a height of at least 5 metres. The benefits of this method are:
    - Substantial reduction of bark hazard which otherwise provides ladder fuels from the base of the tree to the crown
    - Substantial reduction of surface and elevated fine fuels around base of trees to break the continuity between ground level fuels and tree trunks
    - There are also benefits for fire dependent ground flora

    At this stage, no specific site is being considered for bark candling, but this may be considered in the future. A trail grass burn and ecological thinning in nominated locations will be trialled before any bark candling is undertaken.

Before deciding on the appropriateness of an ecological burn at any given location, Council and CFA must consider:

- The practicality of a burn on the road reserve and methods of traffic management
- Location of strategic fuel breaks to ensure the burn is contained
- A pre-burn ecological assessment to determine the risks and benefits (i.e. what plant species would benefit from a fire and what species may be averse to fire)
- The most appropriate seasonal and climatic conditions for the burn.

A formal Burn Plan will need to be developed and approved prior to undertaking any burns.

Controlled Slashing by Contractors and Residents

Recommendations for fuel reduction in this plan must be clearly communicated to Council operational staff, contractors and residents. Previous agreements between Council and slashing contractors need to be adjusted in accordance with this plan. If there have been previous agreements between Council and residents that slash their own section of the road reserve, such activity may need to be reviewed, particularly in light of the significant flora species identified in this study.

Some slashing and mowing of roadside vegetation is undertaken by residents (presumably without the formal consent of Council). These areas of roadside need to be assessed for Chilean Needle Grass and their ecological significance, and a decision made in each case as to whether continued mowing/slashing by the landowner is appropriate or not. However, it appears that some areas slashed by residents have little significance and minimal cover of native vegetation.

Roadside environmental works by Residents and Landcare

Some residents and local Landcare members have expressed interest in undertaking weed control and conservation management works on the Three Chain Road Reserve and the MRSC is keen to facilitate such activities. Whether residents are planning fuel reduction or conservation works, a permit from MRSC must be sought prior to undertaking the works. MRSC is in the process of developing a clearer permit process for landholders to work on public roadsides. Factors to be considered as a part of this process include:

- Ensuring that residents have appropriate knowledge and training for the tasks to be undertaken e.g. distinguishing between native vegetation and weeds.
- Ensuring that residents are using appropriate equipment and are undertaking tasks safely
- Ensuring that activities undertaken complement the works undertaken by Council
- Ensuring individuals using herbicides hold the appropriate chemical users permit

3.3 Protection of Native Vegetation

Objective 5

Protect and enhance conservation values and threatened flora populations

Protecting Vegetation of Conservation Significance

Approximately 37% of the roadside supports vegetation of high quality and approximately 27% is moderate quality. With few exceptions, these areas are not to be treated with a full roadside slash, however, alternative fuel management options are available in some instances including:

- Targeted control of woody and herbaceous weeds for biomass reduction
- Selective thinning in fire affected areas and,
- Some opportunities to create fuel breaks between areas of conservation significance (e.g. areas of degraded treeless grassland such as site 32 and 34, site 21-22)

Managing threatened flora populations

Most threatened species populations occur within areas of intact native vegetation that is not recommended for a full roadside slash. However, there are limited sections in the east of the study area that are recommended for a full slash which contain recently discovered populations of state and nationally listed species including Matted Flax-lily, Floodplain Fireweed and Pale-flower Crane's-bill *Geranium sp. 3*. These areas should be marked onsite or even fenced off to ensure that they are protected from slashing regimes.

In addition to protecting threatened flora from slashing, management priorities should include:

- Strategies to protect them from weed invasion
- Monitoring of flora populations to determine their future viability (e.g. are local populations increasing or declining)
- Consider options for translocation in cases where small populations may not be viable in the long-term

The Newham District Landcare Group may have a role in threatened species monitoring and/or translocation of plants into sites with longer term viability for conservation.

Significant Roadside Vegetation Signage

Signage that identifies areas of conservation significance serves to notify the public and road maintenance contractors of the importance of roadside vegetation and the constraints on any activity that is detrimental to conservation objectives. There are currently two *Significant Roadside Protection Signs* on Three Chain Road, however, these signs do not account for the full extent of significant roadside vegetation.

Placement of signage should be reviewed as a part of the Action Plan so that all areas of conservation significance are appropriately signed.

Data Collection and Monitoring

To provide a reference point for roadside management, 104 sub-sections have been identified to represent varying ecological and fuel load conditions. Each of these sub-sections have a unique identification number and detailed information on fuel load components (bark hazard, elevated fuel and surface/near surface fine fuels), Ecological Vegetation Class (EVC), native vegetation condition (canopy cover, understorey cover and diversity, natural recruitment) and cover of weeds (woody, grassy and herbaceous weeds). This information provides baseline data for comparative assessments in the future to compare fuel load composition and ecological condition.

3.4 Weed Control

Objective 4

Minimise the spread of high threat weeds both within the road reserve and on adjoining lands

Weed management is a priority of MRSC and is a regular activity undertaken on the road reserve. However, with the development of this plan, including mapping of high threat weeds and significant flora across the study area, there is an opportunity for a more integrated weed control plan that complements conservation and fuel management objectives.

Weed management priorities in the short term to medium term should include:

- Control of new populations of Chilean Needle-grass and Serrated Tussock while monitoring of areas of previous infestations

- Control of new infestations of high threat woody weeds, particularly Gorse, Blackberry, Montpellier Broom, Spanish Heath and English Broom
- Targeting of larger infestations of woody and grassy weeds within bushland areas will also contribute to fuel reduction objectives. Most of this work would require more manual labour rather than machine slashing (using hand mowers, small herbicide applicators or brushcutting).
- Education and incentive programs offered to landholders to control high threat weeds close to significant roadsides.
- In some cases, enforcement action on landholders may be necessary where large infestations of noxious weeds occur (in accordance with the Catchment and Land Protection (CaLP) Act

Mapping of the most significant weeds is illustrated on Maps 1-16 of Attachment 1, with notes on weed species and cover. This provides a visual guide to the distribution of high threat weeds across the study area, either as point locations or broader areas.

Section 5 provides more detail on weed management actions as applied to specific sections of the roadside

3.5 Recreational Use

Objective 6

Provide for recreation activities in appropriate locations

Horse riding is the main recreational use along Three Chain Road that needs to be managed and limited to low conservation areas. Horse riding through roadside vegetation has had localised but high impacts to native ground flora within the study area.

A shire wide strategy for horse trails is required in order to direct horse riders to appropriate roadsides and reserves. This strategy should direct horse riding away from very high, high and medium conservation value roadsides. It is noted that currently there is no Local Law or other legislation preventing horse riders from utilising roads or road reserves.

Until a shire-wide strategy is developed, it is recommended that:

- Council install permanent fencing and signage where necessary to protect high quality vegetation from horses, providing that it does not cause safety issues for horse riders
- Direct horse riders to appropriate trails in the area

3.6 Tree Inspections

Objective 3

Enable safe access during a fire for emergency vehicles and road users

Fallen trees are a significant threat to safe access or egress in the event of a fire. Tree failure is common during high fire danger conditions following periods of dryness where limbs become brittle and high winds can destabilise trees. Proactive inspections and management can minimise the likelihood of trees obstructing the road in the event of a fire or storm and can reduce the need for reactive works following a fire or weather event. Inspections of hazardous trees on the road edge should be undertaken by Council every 3-4 years.

Assessments of tree health and consideration of removal or lopping should adopt the Quantified Tree Risk Assessment (QTRA) system or similar methodology to determine:

- Risk of harm i.e. the likelihood and consequences of tree failure
- Establishing a framework for Tolerability of Risk
- Costs and benefits of risk control

3.7 Impact of waste or unauthorised roadworks

Objective 5

Protect and enhance conservation values and threatened flora populations

Recent incidents of roadworks in the local area have inadvertently caused damage to roadside vegetation. This includes the creation of fire access roads on Boundary Road North and Hennebergs Lane South. Roadside works such as new tracks, crossovers or maintenance of infrastructure are necessary but not always well executed in terms of minimising environmental impacts.

Authorised construction activity needs appropriate planning and induction of staff to minimise impacts to roadside vegetation. A clear line of communication from infrastructure managers, environmental managers and contractors needs to be established to ensure roadworks (e.g. drainage works, re-sealing etc.) is conducted in a manner that minimises erosion, compaction and impacts to native vegetation. This includes requirements for roadworks contractors to remove any waste offsite to a designated waste transfer facility. In areas of medium and high conservation significance, planned construction activity should include designated turning and parking areas for large equipment and machinery that avoids impacts to significant vegetation.

Illegal dumping of waste by individuals is a more difficult process to mitigate. Increased signage, penalties, education and, where possible, monitoring are the best forms of prevention against illegal dumping activity.

3.8 Education and Community Preparedness

Recent experience has demonstrated that the local area is prone to landscape scale fires that hold no guarantee of early containment. Phoenix modelling reflects the inherent risks across the landscape and the limitations of fire mitigation undertaken within the road reserve under high fire danger conditions. For these reasons, fuel management should not be relied upon as the primary bushfire mitigation measure on Three Chain Road.

Community education and preparedness is essential for local residents and emergency services in the event of potential or actual bushfire.

Bushfire mitigation is about managing risks to communities and the environment. Managing the natural environment while reducing the likelihood of wildfire requires the following systematic approach:

Planning, Preparedness, Response and Recovery (PPRR)

These principles can be adopted by Council, CFA and residents as outlined below:

PPRR for Residents

- Residents should develop their own personal bushfire emergency plan
- Residents should plan for evacuation options and be aware of available Neighbourhood Safer Places[2]
- Residents should attend community meetings on bushfire preparedness (held at least annually)
- Residents should prepare and respond to bushfire mitigation objectives by undertaking appropriate fuel reduction on their land (residents should also check with Macedon Ranges Council if any permit requirements apply to fuel reduction works on their land prior to undertaking any works)

PPRR for Council

- Council is to prepare a communications plan to residents to inform of upcoming fuel reduction works and information sessions
- Council should plan and prepare any additional opportunities for community education and training
- Council is to plan and prepare for seasonal fuel reduction works and coordinate actions by staff, contractors and residents
- Council will continue to develop response and recovery plans in the event of bushfire and seek a coordinated approach with other organisations such as the CFA, DELWP. Victoria Police and the Department of Health and Human Services
- Council will continue to undertake emergency response and recovery training of staff members

[2] An NSP is an area or premises that may, as a last resort, provide some sanctuary from the threat of fire. The nearest NSP is in Lancefield at the Mechanics Institute. Buffalo Stadium in Woodend is the other local NSP approximately 10km by road from the west end of Three Chain Road

PPRR for CFA

- The CFA should plan and prepare by investigating all options for emergency access and egress (refer to section 3.9)
- CFA to continue to hold community information sessions to help residents plan and prepare
- CFA to work with Council in planning and preparation of small-scale fuel reduction burns
- CFA to continue to develop response and recovery plans in collaboration with Council and other authorities

3.9 Fire Access Tracks

Map 4 of the Municipal Fire Management Plan shows that 4 fire access tracks extend from Three Chain Road. These include:

- A track that runs south of Three Chain Road through to Rochford Road close to the Lancefield Township
- A track running north of Three Chain Road towards the Cobaw Forest near Bridies Lane
- A track running north of Three Chain Road from Boundary Road to Pipers Creek Road
- A track running north of Three Chain Road near the Mowbrays Road intersection

Other established access tracks near Three Chain Road include:

- A track though private property from Boundary Rd to Institute Rd, Carlsruhe
- A track though private property off Three Chain Road to Greenways Road, Lancefield
- Bridies Lane, Lancefield starting 500m south from Three Chain Road to Oakleys Lane
- McMasters Road, Lancefield, Three Chain Road to Salisbury Lane

In addition to designated access tracks, there are several other access points from Three Chain Road into private property, if necessary, in the event of emergency. As a part of this project, any crossovers and gates into private property that could be realistically accessed by emergency vehicles from the road were identified and mapped. This information is provided to the CFA and Council.

4 Roadside Action Plan

The roadside action plan includes two main components, firstly, there is the implementation of the works and secondly, but not least is the community engagement plan which encourages residents to contribute to bushfire mitigation and roadside conservation in collaboration with management authorities. Each component of this plan is outlined below.

4.1 Implementation of the Roadside Works

Most of the roadside works will be undertaken in the Spring and Summer period as these seasons are critical for fuel reduction and weed control. A yearly action plan is outlined in table 1 with more detailed management actions set out in table 2.

Table 1. Yearly Schedule of Works

Activity	Time of Year
Letter to adjoining residents to notify them of the upcoming weed control and fuel management works	August
Control of Chilean Needle Grass and Serrated Tussock through the following steps: 1. Send out letters to landholders on the Chilean Needle Grass / Serrated Tussock program and request that they do not mow on the roadsides 2. Audit for infestations during spring 3. Council treats infestations 4. Landcare follow-up of infested areas missed by Council 5. Roadside slashing following treatment	September – Early summer
Control of High Threat Woody Weeds (including Gorse, Broom, Sweet Briar and Blackberry)	September – January
Ecological burns – Spring	October to November (as appropriate and subject to conditions)
Annual Roadside Slashing Program	November – December
Ecological burns – Autumn	March to May (as appropriate and subject to conditions)
Coordinate activities of roadworks contractors so that impact to significant areas are minimized and all waste taken offsite	As required
Inspect roadsides for illegally dumped waste and remove where found	As required
Apply for a planning permit for ecological thinning	Year 1 and as required

For the purpose of this plan, Three Chain Road is divided into 16 sections represented on Maps 1-16 of Attachment 1. A total of 104 sub-sections have been identified to represent varying ecological and fuel load conditions. Each of these sub-sections have a unique identification number. Details of fuel load and ecological condition assessments are provided in Appendix 5.

Table 2 on the following page provides details on the management approach for each of the 16 sections of roadside to accompany Maps 1-16.

Table 2. Management Actions per Roadside Section

Map 1 Cob and Co Road to Chasers Lane Area - Sections 1-7	
Vegetation Description	Grassland and scrub. Generally Low Fuel and low ecological condition dominated by introduced pasture
Ecological Vegetation Class	Nil
Fuel Load Landscape Connectivity	Low - Medium
Management Goals	1. Manage fuel loads through roadside slashing 2. Manage woody weed infestations and prevent further spread 3. Eradicate Chilean Needle-grass infestations (e.g. in Section 6)
Recommended Slashing Regime	Full Roadside Slash
Weed Control Recommendations	1. Control Chilean Needle-grass prior to slashing. Monitor regrowth of Control Chilean Needle-grass in known locations and other sections of the roadside. 2. Control Gorse and Broom and other high threat weeds. 3. Notify adjacent landholders if Chilean Needle-grass infestations are present on their land

Map 2 - Chasers Lane to Mowbrays Road - Sections 8-12	
Vegetation Description	Grassland and Scrubs and Open Woodland. Generally Low Fuel and generally low ecological condition
Ecological Vegetation Class	Nil
Fuel Load Landscape Connectivity	Moderate
Management Goals	1. Manage fuel loads through roadside slashing 2. Eradicate Chilean Needle-grass infestations (e.g. Section 4) 3. Manage woody weed infestations and prevent further spread 4. Protect native vegetation in site 11
Recommended Slashing Regime	Full Roadside Slash

Map 2 - Chasers Lane to Mowbrays Road - Sections 8-12	
Weed Control Recommendations	1. Control Chilean Needle-grass prior to slashing and monitor regrowth in known locations and other sections of the roadside. 2. Control Gorse around the Steed St intersection. 3. Notify adjacent landholders if Chilean Needle-grass infestations are present on their land.

Map 3 - North of Mowbrays	Sections 12-24
Vegetation Description	Patchy native woodland vegetation of varying ecological condition, generally low diversity though it does support a nationally significant flora population (Matted Flax-lily). High cover of woody weeds. Open grassy areas are in the poorest condition.
Ecological Vegetation Class	Modified remnants of EVC 55 Plains Grassy Woodland and EVC 83 Swampy Riparian Woodland
Fuel Load Landscape Connectivity	Moderate
Management Goals	1. Protect and manage populations (i.e. facilitate natural recruitment to expand the population) of Matted Flax-lily. 2. Preserve and enhance sites of moderate ecological condition. 3. Manage woody weed infestations and prevent further spread 4. Manage fire risk along road margins 5. Reduce biomass through woody weed control and trialing the reintroduction of native grasses in select areas.
Recommended Slashing Regime	Areas of low or very low value to receive full roadside slash to reduce fuel continuity (except for areas of Matted Flax-lily). Other areas to receive 3 metre slash.
Weed Control Recommendations	1. Undertake control of all woody weeds (including Blackberry) and St John's Wort. 2. Trial the re-introduction of native grasses in sections 20 and21 by trialing scalping and direct seeding or an alternative method.

Map 4 - West of Institute Road	Sections 22-26
Vegetation Description	Significant roadside woodland/forest vegetation with flora populations of State and National Significance. Moderate ecological condition with woody weeds posing a significant threat. A few sections of open woodland in poor condition. Generally moderate fuel loads
Ecological Vegetation Class	Modified remnants of EVC 55 Plains Grassy Woodland and EVC 83 Swampy Riparian Woodland

Map 4 - West of Institute Road	Sections 22-26
Fuel Load Landscape Connectivity	Moderate - High
Management Goals	1. Protect and manage populations[3] of Matted Flax-lily *Dianella amoena* and Floodplain Fireweed *Senecio campylocarpus*. 2. Preserve and enhance sites of moderate ecological condition. 3. Manage fire risk along road margins 4. Reduce biomass through woody weed removal.
Recommended Slashing Regime	Maintain 3-metre slash for most of this section. Increase slash width where ever possible in section 24
Weed Control Recommendations	1. Undertake control of all woody weeds and prioritise control of Gorse 2. Control woody weeds including Blackberry and Sweet Briar.

Map 5 - Boundary Road Region	Sections 26-41
Vegetation Description	Significant remnant woodland in moderate condition and some non-native grassy areas. Generally moderate fuel loads
Ecological Vegetation Class	EVC 55 Plains Grassy Woodland and EVC 83 Swampy Riparian Woodland
Fuel Load Landscape Connectivity	Moderate - High
Management Goals	1. Protect and manage populations[4] of Matted Flax-lily *Dianella amoena,* Pale-flower Crane's-bill *Geranium sp.3* and Floodplain Fireweed *Senecio campylocarpus* 2. Preserve and enhance sites of moderate ecological condition. 3. Reduce fuel on road margins and create fuel breaks (i.e. full roadside slash) where indicated on the plans. 4. Manage woody weeds and prevent further spread 5. Prevent access to high conservation areas through fencing off access tracks and entry points
Recommended Slashing Regime	Sites 28, 29, 32,34 and 39 to receive full roadside width fuel breaks. Otherwise limit slashing to the 3-metre road edge

[3] Protect from threatening processes (e.g. slashing, herbicide application). Facilitate natural recruitment of the species to allow for increased viability of the populations

Map 5 - Boundary Road Region	Sections 26-41
Weed Control Recommendations	1. Undertake control of all woody weeds, prioritising control of Gorse 2. Remove non-indigenous native species (Melaleuca sp.) planted by previous land owners (section 37-41) 3. Support Landcare efforts to control Phalaris where it may spread into high or moderate conservation areas.

Map 6 - West of Wisemans Road - Sections 42-46	
Vegetation Description	West of Wisemans Lane - High significance remnant forest/woodland vegetation in moderate to high ecological condition. Several populations of Matted Flax-lily. Moderate overall fuel loads. East of Wisemans lane, non-native vegetation, low/moderate fuel loads.
Ecological Vegetation Class	EVC 83 Swampy Riparian Woodland
Fuel Load Landscape Connectivity	Low - Moderate
Management Goals	1. Protect and manage populations of Matted Flax-lily (i.e. facilitate natural recruitment to expand the population) and all significant remnants. 2. Manage woody weeds and prevent further spread. 3. Preserve and enhance sites of moderate ecological condition. 4. Manage fire risk through roadside slashing, particularly east of Wisemans Road 5. Cypress trees in section 44 to be managed for road safety by progressively lopping or removal as specimens age
Recommended Slashing Regime	Maintain 3-metre slash west of Wisemans Lane. Implement full slash east of Wisemans Lane where possible. Slash to the tree line within section 46
Weed Control Recommendations	Undertake control of all woody weeds. Remove smaller conifers that have naturally established on the roadside (i.e. not including mature conifers)

Map 7 - Dons Road / Egans Lane Region - Sections 47 - 54	
Vegetation Description	Mostly non-native vegetation, low significance and low-moderate fuel loads. Dry Creek / Deep Creek traverses Sections 49 and 52.
Ecological Vegetation Class	Very limited remnants of EVC 83 Swampy Riparian Woodland
Fuel Load Landscape Connectivity	Low - Moderate

Map 7 - Dons Road / Egans Lane Region - Sections 47 - 54	
Management Goals	1. Manage fuel loads through roadside slashing 2. Enhance the natural values along Deep Creek and Dry Creek 3. Cypress trees in section 48 to be managed for road safety by progressively lopping or removal as specimens age
Recommended Slashing Regime	Implement full roadside slash for all areas except for section 54.
Weed Control Recommendations	Undertake control of all woody weeds. Remove smaller conifers that have naturally established on the roadside (i.e. not including mature conifers)
Other Recommendations	Rehabilitate Deep Creek through ongoing weed control and revegetation with indigenous species

Map 8- Dry Creek Reserve Region - Sections 53 - 57	
Vegetation Description	Grassland and open woodland in low ecological condition. Mostly non-native vegetation except for site 57 that supports grassland and grassy wetlands
Ecological Vegetation Class	Limited remnants of EVC 55 Plains Grassy Woodland and EVC 47 Valley Grassy Forest
Fuel Load Landscape Connectivity	Moderate
Management Goals	1. Manage fuel loads through roadside slashing 2. Protect and enhance conservation values of the creek corridor and areas of moderate conservation value (Section 57).
Recommended Slashing Regime	Implement full roadside slash for areas of low/very low condition. Selective brushcutting along the creek corridor (Section 53) and around native groundstorey in sections 54, 57 and58 Consider an ecological burn of sections 57 and58
Weed Control Recommendations	Undertake control of all woody weeds.

Map 9 - Bolgers Lane - Whitebridge Road Region - Sections 58 - 69	
Vegetation Description	Significant remnant woodland in moderate condition though high in weed cover that contribute high level fuel loads. Largely non-native grassland persists opposite Bolgers land and further east
Ecological Vegetation Class	Varying conditions of EVC 55 Plains Grassy Woodland and EVC 47 Valley Grassy Forest
Fuel Load Landscape Connectivity	Moderate - High

Map 9 - Bolgers Lane - Whitebridge Road Region - Sections 58 - 69	
Management Goals	1. Ecological restoration of areas of moderate and high conservation value through woody weed control. 2. Manage fuel loads through roadside slashing in low and very conservation areas and woody weed control throughout 3. Eradiate Chilean Needle-grass infestation/s (e.g. Section 64)
Recommended Slashing Regime	Implement full roadside slash for areas of low/very low condition. Other areas to receive 3-metre roadside slash.
Weed Control Recommendations	1. Control Chilean Needle-grass prior to slashing. 2. Control all woody weeds (including Blackberry), particularly where high in biomass such as sections 60-61 Minimise spread and impact of grassy and herbaceous weeds by targeted herbicide application

Map 10 - Croziers Road Region	Sections 70-75
Vegetation Description	Sites south of 1277 Three Chain Road is remnant vegetation in poor condition but worth preserving. Highly significant remnant vegetation to the east. Overall fuel load is high
Ecological Vegetation Class	Mostly high quality EVC 47 Valley Grassy Forest
Fuel Load Landscape Connectivity	Moderate - High
Management Goals	1. Ecological restoration and biomass reduction of woody and grassy weeds through selective slashing to the south of 1277 Three Chain Road. 2. Protection and enhancement of the areas of high conservation significance 3. Manage fire risk on road margins
Recommended Slashing Regime	Limit slashing to the 3-metre road edge due to high value native vegetation except for sections 70-71
Weed Control Recommendations	1. Undertake extensive woody weed control for biomass reduction in sections 70-71. 2. Undertake general woody weed and blackberry control in other areas. 3. Minimise the spread and impact of grassy and herbaceous weeds through targeted herbicide application

Map 11 - West of Mooneys Lane	Sections 74 - 77
Vegetation Description	High quality and significant native vegetation with populations of rare flora. Overall fuel load is high
Ecological Vegetation Class	EVC 47 Valley Grassy Forest
Fuel Load Landscape Connectivity	Moderate
Management Goal	1. Protect and enhance areas of moderate, high and very high conservation value 2. Manage fire risk on road margins 3. Reduce biomass through woody weed control and ecological thinning within sections 76-77 as indicated
Recommended Slashing Regime	Limit slashing to the 3-metre road edge due to high value native vegetation.
Weed Control Recommendations	Undertake control of all woody weeds (including Blackberry), Spiny Rush and St John's Wort.

Map 12 - East of Mooneys Lane	Sections 76 - 81
Vegetation Description	High quality and significant native vegetation with populations of rare and nationally significant flora. Overall fuel load is high
Ecological Vegetation Class	EVC 47 Valley Grassy Forest and EVC 83 Swampy Riparian Woodland
Fuel Load Landscape Connectivity	Moderate
Management Goals	1. Protect and enhance areas of moderate, high and very high conservation value 2. Manage fire risk on road margins and create full roadside slash in section 80 (low conservation significance) 3. Reduce biomass through woody weed control 4. Undertake ecological thinning as indicated (part of section 79 and 81).
Recommended Slashing Regime	Limit slashing to the 3-metre road edge due to high value native vegetation except undertake full roadside slash for site 80
Weed Control Recommendations	1. Control of all woody weeds, Blackberry + St John's Wort. 2. Minimise the spread and impact of other grassy and herbaceous weeds 3. Notify adjacent landholders where infestations occur

Map 13 - East of Bridies Lane	Sections 82 - 83
Vegetation Description	High significance fire affected native vegetation with populations of State significant flora. Overall fuel load is high largely due to post fire regrowth
Ecological Vegetation Class	EVC 47 Valley Grassy Forest
Fuel Load Landscape Connectivity	High
Management Goals	1. Protect and enhance areas of medium, high and very high conservation areas 2. Manage fire risk on road margins 3. Reduce biomass through woody weed control and ecological thinning where indicated on the plans
Recommended Slashing Regime	1. Limit slashing to the 3-metre road edge due to high value native vegetation. 2. Undertake selective ecological thinning in dense post-fire regeneration areas as indicated.
Weed Control Recommendations	Control of all woody weeds (including Blackberry).

Map 14 - South of Greenways Road - Sections 84 - 94	
Vegetation Description	Patchy native vegetation among areas dominated by introduced pasture grass. Some locations of State and Nationally Significant flora. Overall fuel load low to moderate
Ecological Vegetation Class	Modified remnants of EVC 55 Plains Grassy Woodland and EVC 83 Swampy Riparian Woodland
Fuel Load Landscape Connectivity	Moderate
Management Goal	1. Manage fuel loads with roadside slashing and woody weed control 2. Protect areas of native vegetation and stands of state and nationally significant flora species
Recommended Slashing Regime	A variety of treatments as indicated in Map 14, including full roadside slash, 3-metre road verge slash and selective slashing around native vegetation.
Weed Control Recommendations	Undertake control of all woody weeds (including Blackberry) and St John's Wort.

Map 14 - South of Greenways Road - Sections 84 - 94	
Other recommendations	Fence off areas within Section 85 containing state and nationally threatened species to prevent inadvertent slashing by contractors and / or residents.

Map 15 - Baynton Road Region	Sections 95 - 101
Vegetation Description	Patchy native vegetation among areas dominated by introduced pasture grass. Overall fuel load low to moderate
Ecological Vegetation Class	Limited remnants of EVC 55 Plains Grassy Woodland and EVC 83 Swampy Riparian Woodland
Fuel Load Landscape Connectivity	Moderate
Management Goals	1. Manage fuel loads with roadside slashing and woody weed control 2. Protect areas of native vegetation and stands of state and nationally significant flora species 3. Eradiate Chilean Needle-grass
Recommended Slashing Regime	A variety of treatments as indicated in map 15, including full roadside slash and selective slashing around native vegetation and protection / fencing around significant flora.
Weed Control Recommendations	1. Control of all woody weeds, including Blackberry 2. Control Chilean Needle Grass prior to slashing. 3. Notify adjacent landholders if Chilean Needle-grass infestations are present on their land

Map 16 - South of Salisbury Lane - Sections 102 - 104	
Vegetation Description	The western side consists of patches of native trees/shrubs with a ground layer dominated by introduced pasture. The east almost entirely introduced pasture with some scattered native trees
Ecological Vegetation Class	Very limited remnants of EVC 55 Plains Grassy Woodland
Fuel Load Landscape Connectivity	Low - Moderate
Management Goals	1. Manage fuel loads with roadside slashing and woody weed control 2. Eradicate Chilean Needle-grass and Serrated Tussock
Recommended Slashing Regime	Maintain full roadside slash except for areas of trees and shrubs that form native vegetation patches which will require selective brushcutting (e.g. sections 102-103)

Map 16 - South of Salisbury Lane - Sections 102 - 104	
Weed Control Recommendations	1. Control of all woody weeds, including Blackberry. 2. Control Chilean Needle-grass and Serrated Tussock prior to slashing. 3. Notify adjacent landholders of Chilean Needle-grass and Serrated Tussock infestations are present on their land

4.2 Community Engagement Plan

Table 3 provides an outline of the various means that Council and the CFA will facilitate community engagement in the foreseeable future.

Table 3. Community Engagement Plan

Time of Year	Activity - Three Chain Road	Frequency
Spring	Annual Letter to be sent out to residents adjoining Three Chain Road that includes the following information: ▪ Outcome of Three Chain Road Action Plan (first year only) ▪ Chilean Needle-grass control scheduled (including request not to mow) ▪ Woody weed control scheduled ▪ Slashing program scheduled and rationale ▪ Any other fuel reduction works planned	Annually
Spring	Workshops for residents adjoining Three Chain Road including: ▪ *What's on My Roadside* workshop to include targeted walk and talk on Three Chain Road to promote the implementation of the Action Plan ▪ Chilean Needle Grass ID and Treatment workshop	2019, then as required Every 3-5 Years
	Activity – Whole of Shire	
N/A	Develop Fire Risk Management Brochure - information about Council's slashing program and its rationale	N/A
N/A	Develop Vegetation and Fire Risk Fact Sheet / Frequently Asked Questions (FAQ) - information about the different fire risk presented by different plants and vegetation types - e.g. native versus non-native grasses etc.	N/A
N/A	Update Roadside Brochure - update with information about Environmental Works on Roadside Approval process (currently in development). This will establish a process to enable Council to assess land owner requests to undertake works, such as fuel reduction on roadsides.	N/A

Spring	Conduct workshops and information sessions covering topics such as: ▪ Vegetation and fire risk ▪ Fire and biodiversity ▪ *What's on My Roadside* workshop rotating to different roadsides each year ▪ Weed control - general and species-specific workshops	Annually
TBC	Internal training of Council Staff ▪ Biodiversity and flora identification ▪ How to minimise environmental impacts of roadside works	Annually
	Activity – Whole of Shire	
Spring & Summer	CFA Fire Ready Meetings including information about bushfire preparedness and property management	Annually (existing activity)
Spring	Communications including: ▪ ShireLife Article - Spring Edition - Fire season planning ▪ Social media - Fire season planning ▪ Community Newsletters - Fire season planning ▪ Fact Sheet / FAQ - Fire season planning and risk reduction	Annually (existing activity)
Spring & Summer	Issuing of Fire Prevention Notices to private property, including information and FAQs about fire risk management for private property.	Annually (existing activity)

4.3 Monitoring and Review

Monitoring the effectiveness of this plan is important to ensuring the actions are successful in achieving the plan's objectives and are adapted as needed or as resources become available or new opportunities arise.

Monitoring

The following **indicators** will be used to monitor success:

1. Woody weed presence and percentage cover
2. Chilean Needle-grass and Serrated Tussock presence and percentage cover
3. Threatened flora species presence and extent
4. Roadside conservation values
5. Community requests relating to fuel management
6. Incidence of ignitions along the Three Chain Road roadside and their extent

7. Incidence of obstructions across Three Chain Road from fallen trees and limbs during an emergency

The following **monitoring program** will be implemented to measure the above indicators:

1. Annual woody weed audit of the roadside identifying noxious weed species present and percentage cover.
2. Annual Chilean Needle-Grass assessment identifying change in cover at existing and previous infestations, and identifying new infestations as relevant.
3. Bi-annual monitoring of threatened species populations identifying continued presence and extent.
4. Pre-and post-works flora and fuel load assessments and photo-point monitoring for areas targeted for native seed re-introductions, ecological burns and ecological thinning.
5. Re-assessment of roadside conservation values every 5 years
6. Record of community requests relating to fuel management
7. Record of ignitions along Three Chain Road
8. Record reactive road clearance and tree management required along Three Chain Road after a fire or storm

Review

Throughout the life of the plan, actions may change to adjust to changes in the environment and Council resourcing.

A more comprehensive review will occur after 5 years (in 2024) to determine whether it achieved its objectives. The Plan will be modified as required.

5 References

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VBRC (2010) 2009 Victorian Bushfire Royal Commission, State Printer of Victoria, Parliament of Victoria. www.royalcommission.vic.gov.au.

Appendix 1. Policy Context

This section provides a summary of all legislation and policy implications of roadside vegetation management at a local, state and national level.

Local Policies and Strategies

Protection of conservation values within Three Chain Road is supported by MRSC at operational level and policy level. A summary of relevant policies and strategies are outlined below.

Level	Item	Description
Macedon Ranges Planning Scheme	Clause 21.05 – Environment and Landscape Values	Sets out key objects and strategic guidelines for biodiversity, native vegetation management, significant environments and landscapes
Local Policy Framework	Clause 42 - Environmental Overlays (Significant Landscape, Vegetation Protection and Environmental Significance)	The entire roadside and most adjoining properties are protected by one of the following environmental overlays: ▪ Environmental Significance Overlay – Clause 42.01 (extending from Cob and Co Rd to just east of Boundary Road) ▪ Vegetation Protection Overlay – Clause 42.02 (extending from Mowbrays Rd to Baynton Rd) ▪ Significant Landscape Overlay – Clause 42.03 (extending from Croziers Rd to Whalans Track)
Macedon Ranges Strategic Documents	The Macedon Ranges Municipal Fire Management Plan (MFMP)	▪ Increasing understanding of the realistic fire risks of the shire and better decision making across the whole community by making relevant data and tools available. ▪ To build the capability of individuals, communities, businesses and the environment to prepare, respond and recover from bushfires and structure fires ▪ Timely and relevant communication with agencies, organisations and communities to support effective fire preparation, response and recovery by all. ▪ Further strengthen the proactive partnerships between all key agencies who can support fire planning, response and recovery in the shire. ▪ Identify and implement actions to improve bushfire and structure fire outcomes for the Macedon Ranges community. ▪ Use fire effectively for ecological purposes, when and where appropriate.

Level	Item	Description
	Macedon Ranges Draft Biodiversity Strategy 2018	This Strategy considers the natural values of biodiversity in the Macedon Ranges Shire, the threats to these values, and actions Council can take to protect and enhance biodiversity (both directly and by working with others).
	Macedon Ranges Draft Environment Strategy 2018	The Strategy outlines visions, strategic directions and objectives of 4 key areas: Biodiversity, Land and Water Management, Climate Change and Recourse Efficiency
	Weed and Pest Animal Strategy 2014 - 2024	The Strategy outlines actions and strategic directions with the vision of shire wide management of weeds and pest animals to improve native vegetation quality, biodiversity, productive farmland, landscape values and waterway habitats
Operational Level	MRSC Roadside Weeds and Pest Program (RWPP)	The entire roadside is managed as a part of Councils the Roadside Weeds and Pest Program (RWPP). The RWPP provides funding support to councils to plan and implement control activities for the long-term management of prohibited and restricted weeds and pests on rural roadsides.

State Level Regulations

As summarised below, regulations at state level include the Victorian Planning Provisions under the Macedon Ranges Planning Scheme, the Flora and Fauna Guarantee Act 1988 and the Catchment and Land Protection Act 1994

Level	Regulations	Description
Victorian Planning Provisions	Clause 52.17 – Native Vegetation of the Macedon Ranges Planning Scheme	A permit is generally required the removal of native vegetation on land owned or managed by Council. Application for a permit must meet information requirements of the *Guidelines for the removal, destruction or lopping of native vegetation* 2017
Victorian Planning Provisions	Clause 13.02 Bushfire	the study area and surrounding regions is a designated Bushfire Prone Area (BPA) Clause 13.02 Bushfire of the States Planning Policy Framework must be applied to all planning and decision making within a BPA. The key objectives of clause 13.02 include: ▪ Identification of areas where the bushfire hazard warrants bushfire protection measures to be implemented. ▪ Applying the precautionary principle when assessing the risk to life, property and community infrastructure from bushfire.

Level	Regulations	Description
		▪ Applying the best available science to identify vegetation, topographic and climatic conditions that create a bushfire hazard.
Roadside Exemptions	Specified in clause 52.17-7 The *Roadside Vegetation Management for Bushfire Risk Mitigation Purposes* (DSE 2012) provides decision guidelines for fuel reduction works on roadsides	The specified exemption overrides permit requirements if the vegetation removal is for: minimising the risk to life and property from bushfire on a roadside of a public road managed by the relevant responsible road authority and carried out by or on behalf of that authority, in accordance with the written agreement of the Secretary to the Department of Environment, Land, Water and Planning (as constituted under Part 2 of the Conservation, Forests and Lands Act 1987).
State Legislation	Country Fire Authority Act 1958	Under the CFA Act, Councils have a responsibility to prevent fires on roadsides and to contain roadside fires. The CFA Roadside Fire Management Guidelines (CFA 2001) lists four fire management objectives in relation to bushfire management on roadsides which were supported by the 2009 Victorian Bushfires Royal Commission. These objectives are: ▪ prevent fires on roadsides ▪ contain roadside fires ▪ manage safety of road users ▪ provide control lines.
State Legislation	The Flora and Fauna Guarantee ACT 1988 (FFG Act)	The FFG Act was established to ensure the continued survival of all Victorian species of flora and fauna and all Victorian communities of plants and animals. Unless a permit exemption applies, the Department of Environment, Land, Water and Planning (DELWP) is the referral authority for matters under the FFG Act. The Matted Flax-lily *Dianella amoena* and Basalt Peppercress *Lepidium hyssopifolium* are present on the site and are both listed as protected species under the FFG Act
State Legislation	The Catchment and Land Protection (CaLP) Act 1994	The CaLP Act requires all land holders including the Crown, public authorities and licensees of Crown lands, must, take all reasonable steps to: ▪ eradicate regionally prohibited weeds ▪ prevent the growth and spread of regionally controlled weeds ▪ prevent the spread of, and as far as possible, eradicate established pest animals. A range of regionally controlled (or noxious) weeds are identified within the study area and require on going control in accordance with the CaLP Act.

National Level Regulations

Level	Regulations	Description
Federal Legislation	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act applies to sites where proposed developments or works may have a significant impact on matters of National Environmental Significance (NES). The Matted Flax-lily *Dianella amoena* and Basalt Peppercress *Lepidium hyssopifolium* are present on the site and are both listed as protected species under the EPBC Act. Although clause 52.17 provides permit exemptions at state level, the *Roadside Vegetation Management* guidelines state that: a) Any action likely to have a significant impact on a matter of NES is required to be referred to the Commonwealth Environment Minister (through DSEWPaC – now DoEE) for a decision about whether assessment and approval is required under the Act. b) If road authorities think that bushfire risk mitigation activities might result in a significant impact, then they must refer the proposal. If they are not certain, they can still refer the application and are encouraged to do so by DoEE.

Appendix 2. Fire Risk Assessment Criteria

The site assessment was undertaken in late October which provided a fair indication of fire risk in the lead up to the declared High Fire Danger Period (scheduled for November 12).

The fuel risk was determined based on the current site condition not the projected fuel risk following implementation of Council's annual roadside slashing program.

Assessments of vegetation within the Three Chain Road reserve and surrounding lands included specific vegetation hazard assessments and broader landscape assessments as described below.

Vegetation Classification

Vegetation classification is consistent with the *Australian Standard for construction in Bushfire Prone Areas* AS-3959 with reference to typical Victorian vegetation types described in *Vegetation Classes – Bushfire Management Overlay* (CFA 2014).

Classification of vegetation was considered at within the road reserve and on adjoining land within 150 metres of the road reserve boundaries

Fuel Load Classification

Fuel load classification is consistent with the *Overall fuel hazard assessment guide* (Hines 2010). The purpose of this guide is to allow assessors to:

- make a rapid, visual assessment of fuel arrangement, and
- gain an understanding of how this will affect the chances of controlling a bushfire.

Field data collection for this project sought to establish fuel risk by applying vegetation classification outlined in AS-3959 and fuel load assessments outlined in Hines 2010. All levels of vegetation strata (Bark hazards, elevated fuels, near surface and surface fine fuels) were considered during the assessment. Different roadside zones were assigned in the field where changes to vegetation type and structure were evident.

Table 5 outlines all parameters applied to the fuel risk assessment.

Table 4. Data Collection Summary

Data Field and Categories	Categorisation System and Descriptions	Additional Comments
Vegetation Type	Based on AS-3959	
Forest Woodland Scrub Grassland Modified Low Threat	These categories indicate likely fire behaviour that may arise from different vegetation types. These vegetation types are listed from highest to lowest risk.	The five categories are based on the most common vegetation classifications within Macedon Ranges Shire Council. Modified vegetation refers to Forest or Woodland types with minimal fuel loads. This may include plantations (i.e. Conifer Forest)
Eucalypt Canopy Cover %	As per Habitat Hectare Method (DSE 2004)	
nil <5 5-15 >15	Percentage cover based on projective foliage cover of the canopy	As Eucalypt canopy is the primary vegetation type that can ignite and sustain a crown fire, canopy cover (and corresponding bark hazard) is a critical component of overall risk assessment.
Eucalypt Bark Hazard	Based on Overall Fuel Hazard Guide (Hines et. al 2010)	
Extreme Very High High Moderate Low	Bark on tree trunks and branches, from ground level to canopy.	The severity of bark hazard influences the volatility from ember attack and from a groundstorey fire.
Bark Type	Based on Overall Fuel Hazard Guide (Hines et. al 2010)	
Box / Stringybark Ribbon bark Other	Stringybark and Ribbonbark are particularly hazardous eucalypt bark types based on ease of ignition, bark quantity and thickness and burnout time. 'Other' bark types include many different species (such as smooth bark gums, paperbarks and pines). These bark types produce only limited quantities of short distance spotting.	
Elevated Fine Fuels	Based on Overall Fuel Hazard Guide (Hines et. al 2010)	
Low Moderate High Very High Extreme	Elevated Fuels are mainly upright in orientation. Generally, most of the plant material is closer to the top of this fuel layer. It sometimes contains suspended leaves, bark or twigs. Fuels that have a clear gap between them and the surface fuels.	Influences the flame height and rate of spread of a fire.
Near Surface Fine Fuels	Based on Overall Fuel Hazard Guide (Hines et. al 2010)	
Low Moderate High Very High	Live and dead fuels, effectively in touch with the ground, but not lying on it. Fuel has a mixture of vertical and horizontal orientation. Can	Influences the flame height and rate of spread of a fire. A Low-intensity fire (flame

Data Field and Categories	Categorisation System and Descriptions	Additional Comments
Extreme	include suspended leaves, bark or twigs.	height of less than 0.5m) will consume most or all of this fuel.
Surface Fine Fuels	Based on Overall Fuel Hazard Guide (Hines et. al 2010)	
Low Moderate High Very High Extreme	Leaves, twigs, bark and other fine fuel lying on the ground. Mostly horizontal orientation.	Influences the rate of spread of a fire.
Connectivity to Classified Vegetation		
High Risk Moderate Risk Low Risk	Risk rating in this category is based on types, connectivity and extent of vegetation beyond the road reserve boundaries (within 150 metres)	Low Risk – adjoining areas are well grazed or cropped within low levels of ground fuels with classified vegetation accounting for less than 20% of the areas and at least 50 metres from the road reserve Moderate risk – adjoining areas are classified grassland comprised of infrequently grazed pastures among native grasses with high levels of thatch and tussock cover High Risk - adjoining areas are a combination of grasslands with high biomass and forests and/or woodlands with several layers of fuel strata (shrubs, elevated fuels, near-surface fuels etc.)
Overall Fire Risk	Based on Hines 2010 and Landscape Factors	
Low Moderate High Very High	Combined Rating based on Bark Hazard, Elevated Fuels, Near surface Fine Fuels, Surface Fine Fuels and connectivity	

Appendix 3. Native Vegetation Survey Criteria

Site investigations for this study was undertaken by Greg James, Karl Just and Mark Shepherd from 21-24 October 2018. Tasks undertaken included general ecological condition assessments, flora surveys and identification of priority high threat weeds. Site features, management zones and significant native flora or weed populations were mapped onsite using QGIS 2.18 with a GPS receiver (within 2-3 metres accuracy).

Flora Survey

Data collection for flora surveys included:

- A list of all indigenous and exotic flora observed.
- All significant plant species (regional, state and national) and notable high threat weeds were recorded with a GPS's.

All plant species identified in the 2018 surveys and previous surveys are combined into a comprehensive flora list presented in Appendix 3.

Plant taxonomy is consistent with the Victorian Biodiversity Atlas (VBA) (DELWP 2018).

Victorian Rare and Threatened Flora

Three listings apply for rare or threatened flora in Victoria including the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) and the *Advisory List of rare or threatened plants in Victoria* (DEPI 2014) administered by DELWP.

Table 5 outlines the criteria for identification and mapping of significant flora during the surveys.

Table 5. Criteria for significant flora

National Significance	Species listed under the EPBC Act as Vulnerable, Endangered or Critically Endangered
State Significance	Species listed under the FFG Act or the Advisory List of rare or threatened plants in Victoria as endangered, vulnerable, rare or poorly known
Regional Significance	Species determined to be uncommon or rare in the region based on an analysis of data base records, cross-referenced with the local knowledge of Karl Just. The region is defined as the area bounded by Tylden in the west, Pastoria in the north, Macedon in the south and the eastern extent of Lancefield (an area roughly 20km from north to south and 30km from east to west).

Native Vegetation Assessment Criteria

For this study, Native vegetation was assessed in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) (*the 'Guidelines')* to determine areas that met the definition of a *Native Vegetation Patch* within a defined *Ecological Vegetation Class*.

Native vegetation patch

A patch of native vegetation is either:

- an area of vegetation where at least 25 per cent of the total perennial understory plant cover is native
- any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy

Ecological Vegetation Classes

An Ecological Vegetation Class (EVC) is a native vegetation type classified on the basis of floristic, life form, environmental and ecological characteristics (DELWP 2017). The benchmark for an EVC describes the attributes of the vegetation type in its mature natural state, which reflects pre-settlement conditions. Modelled EVCs produced by DELWP and accessible via Nature Kit Online.

EVC's were identified based on observable attributes in the field with reference to EVC modelling and descriptions in Oates and Tarranto 2001.

Ecological Condition Assessments

Ecological condition assessments applied elements of the habitat hectare methodology (DSE 2004) to create a rapid assessment method. Sections within the study area were given an ecological condition rating of high, moderate, low or very low based on canopy and understorey cover and diversity, natural recruitment, weed invasion or other threatening processes.

Table 6 outlines the methodology used to determine ecological condition.

Table 6. Methodology Ecological Condition Assessments

Data Field and Categories			Categorisation System and Descriptions
Ecological Condition Assessments	**Classified Native Vegetation Patch**		**Adopted from Habitat Hectare Method (DSE 2004)**
	Yes	No	As defined in the Native Vegetation Assessment Guidelines
	EVC		**As per DELWP Benchmark Descriptions**
	Valley Grassy Forest		Identified in the field with reference to Benchmarks, EVC modelling and Oates and Taranto 2006
	Understorey Cover		**Adopted from Habitat Hectare Method (DSE 2004)**
	0-5%	25-50%	The average percentage foliage cover of all native understorey within the area occupied by vegetation (not including bare ground)
	5-25%	>50%	
	Understorey Diversity		**Taken from DSE Rapid Habitat Assessment Method**
	< 25% diversity	< 50%	Based on the average percentage diversity for forests and woodlands
	Up to75 %	Benchmark	
	Groundstorey Weed Cover		**As per Habitat Hectare Method (DSE 2004)**
	0-5%	25-50%	The average percentage foliage cover of all weeds within the area occupied by vegetation (not including bare ground)
	5-25%	>50%	
	Woody Weed Cover		**As per Habitat Hectare Method (DSE 2004)**
	0-5%	25-50%	The average percentage foliage cover of woody weeds in the midstorey (compared to indigenous vegetation)
	5-25%	>50%	
	Recruitment of Woody Species		**As per Habitat Hectare Method (DSE 2004)**
	<30% of species	30% - 70%	Recruitment based on EVC benchmarks for woody lifeforms
	>70%	Absent	
	Overall Ecological Condition		**Based on all measurables**
	Low	High	Vegetation quality, diversity and EVC conservation significance
	Moderate	Very High	
	Current Management Treatment		
	General Mow/Slash	3-metre road edge slash	Fuel management regimes currently implemented by MRSC
	Potential Management Treatment		
	None	Weed Control	Recommended management treatments with consideration of fuel reduction treatments where relevant
	General Mow/Slash	Selective thinning	

Appendix 4. Flora Survey Results

Legend

Origin	EPBC Act listing	FFG Act Listing	Advisory List of Threatened Flora (DEPI 2014)	CaLP Listings (Noxious weed status)
* Introduced species # Victorian species outside their natural range	E - Endangered V – Vulnerable CR – Critically Endangered	L - listed	e - endangered v - vulnerable r - rare	RC - Regionally controlled species RR - Regionally restricted species

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
	Acacia aculeatissima	Thin-leaf Wattle						X	X	
*	Acacia baileyana	Cootamundra Wattle								X
	Acacia baileyana x dealbata subsp. dealbata	Cootamundra Wattle x Silver Wattle hybrid								X
	Acacia dealbata subsp. dealbata	Silver Wattle						X	X	
#	Acacia floribunda	White Sallow-wattle								X
#	Acacia longifolia subsp. longifolia	Sallow Wattle								X
	Acacia melanoxylon	Blackwood						X	X	X
	Acacia provincialis	Wirilda					X			
	Acacia verniciflua	Varnish Wattle					X			
	Acaena agnipila	Hairy Sheep's Burr					X			
	Acaena echinata var. echinata	Sheep's Burr						X	X	X
	Acaena novae-zelandiae	Bidgee-widgee						X	X	

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
	Acaena ovina	Australian Sheep's Burr					X			
*	Acetosella vulgaris	Sheep Sorrel						X	X	
	Acrotriche prostrata	Trailing Ground-berry						X	X	X
	Acrotriche serrulata	Honey-pots							X	
*	Agapanthus praecox subsp. orientalis	Agapanthus							X	
*	Agrostis capillaris var. capillaris	Brown-top Bent						X	X	X
*	Aira cupaniana	Quicksilver Grass					X			
*	Aira elegantissima	Delicate Hair-grass						X	X	
	Ajuga australis	Austral Bugle						X		
	Alisma plantago-aquatica	Water Plantain								X
	Allittia cardiocarpa	Swamp Daisy	Regional				X			X
*	Allium triquetrum	Angled Onion								X
*	Alopecurus pratensis	Meadow Fox-tail							X	X
	Amphibromus nervosus	Common Swamp Wallaby-grass					X			
	Amyema miquelii	Box Mistletoe					X			
	Amyema pendula	Drooping Mistletoe					X			
*	Anagallis arvensis var. arvensis	Scarlet Pimpernel						X	X	X
*	Anthemis cotula	Stinking Mayweed						X	X	X
	Anthosachne scabra s.l.	Common Wheat-grass					X			
*	Anthoxanthum odoratum	Sweet Vernal-grass						X	X	X

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Aphanes arvensis	Parsley Piert								X
*	Aponogeton distachyos	Cape Pondlily								X
*	Arctotheca calendula	Cape Weed						X	X	X
	Arthropodium milleflorum s.s.	Pale Vanilla-lily					X			
	Arthropodium strictum s.l.	Chocolate Lily					X			
	Arthropodium strictum s.s.	Chocolate Lily						X	X	
*	Asparagus officinalis	Asparagus								X
	Asperula conferta	Common Woodruff					X			
	Astroloma humifusum	Cranberry Heath					X	X	X	X
	Austrostipa mollis	Supple Spear-grass					X			
	Austrostipa pubinodis	Tall Spear-grass								X
	Austrostipa rudis subsp. rudis	Veined Spear-grass					X			
	Austrostipa semibarbata	Fibrous Spear-grass					X	X	X	
	Austrostipa stuposa	Tasmanian Spear-grass							X	
*	Avena barbata	Bearded Oat					X			
	Bossiaea prostrata	Creeping Bossiaea					X		X	
*	Briza maxima	Large Quaking-grass					X	X	X	X
*	Briza minor	Lesser Quaking-grass					X	X	X	
*	Bromus catharticus	Prairie Grass					X			
*	Bromus diandrus	Great Brome					X	X	X	

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Bromus hordeaceus subsp. hordeaceus	Soft Brome					X			
*	Bromus madritensis	Madrid Brome					X			
	Brunonia australis	Blue Pincushion					X	X	X	X
	Bulbine bulbosa	Bulbine Lily					X	X	X	X
	Burchardia umbellata	Milkmaids					X	X	X	X
	Caesia calliantha	Blue Grass-lily	Regional				X			
*	Callitriche brutia subsp. brutia	Thread Water-starwort								X
	Callitriche sonderi	Matted Water Star-wort	Regional						X	
*	Callitriche stagnalis	Common Water-starwort							X	
	Calytrix tetragona	Common Fringe-myrtle	Regional				X			
	Carex appressa	Tall Sedge					X	X	X	
	Carex breviculmis	Common Grass-sedge					X			
	Carex chlorantha	Green-top Sedge							X	
	Carex gaudichaudiana	Fen Sedge								X
	Carex inversa	Knob Sedge					X	X	X	X
	Carex iynx	Tussock Sedge					X	X		X
	Cassinia arcuata	Drooping Cassinia					X	X	X	X
*	Centaurium erythraea	Common Centaury					X		X	
*	Centaurium tenuiflorum	Slender Centaury					X			
	Centella cordifolia	Centella					X		X	
	Centipeda cunninghamii	Common Sneezeweed					X			
	Centipeda elatinoides	Elatine Sneezeweed								X

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Cerastium comatum	Levantine Mouse-ear Chickweed							X	
*	Cicendia filiformis	Slender Cicendia								X
*	Cirsium vulgare (C)	Spear Thistle					X	X		X
*	Claytonia perfoliata	Miner's Lettuce							X	X
	Clematis decipiens	Slender Clematis								X
	Convolvulus angustissimus subsp. angustissimus	Blushing Bindweed					X			X
	Coronidium scorpioides	Button Everlasting					X	X	X	
	Crassula decumbens var. decumbens	Spreading Crassula						X	X	
	Crassula helmsii	Swamp Crassula								X
*	Crataegus monogyna subsp. monogyna (C)	Hawthorn					X	X	X	
*	Crepis vesicaria subsp. taraxacifolia	Bladder Hawksbeard								X
*	Cupressus macrocarpa	Monterey Cypress								
	Cycnogeton procerum (narrow floating leaf variant)	Common Water-ribbons								X
*	Cynara cardunculus subsp. Flavescens (C)	Artichoke Thistle								X
	Cynoglossum suaveolens	Sweet Hound's-tongue					X		X	X
	Cyperus gunnii subsp. gunnii	Flecked Flat-sedge								X
*	Cytisus scoparius (C)	English Broom								X

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Dactylis glomerata	Cocksfoot					X	X		
	Daviesia leptophylla	Narrow-leaf Bitter-pea					X	X	X	X
	Deyeuxia quadriseta	Reed Bent-grass					X		X	
	Dianella admixta	Black-anther Flax-lily					X	X	X	
	Dianella amoena	Matted Flax-lily	National	En	L	e	X			
	Dillwynia cinerascens s.l.	Grey Parrot-pea					X		X	
	Dillwynia cinerascens s.s.	Grey Parrot-pea							X	
	Diuris chryseopsis	Golden Moths	Regional				X	X	X	
	Drosera aberrans	Scented Sundew						X	X	
	Drosera auriculata	Tall Sundew					X	X	X	X
	Drosera peltata	Pale Sundew					X	X	X	
	Drosera peltata	Pale Sundew					X			
	Eleocharis acuta	Common Spike-sedge					X		X	X
	Eleocharis pusilla	Small Spike-sedge							X	
	Eleocharis sphacelata	Tall Spike-sedge								X
	Epilobium hirtigerum	Hairy Willow-herb					X	X	X	X
*	Erica lusitanica (C)	Spanish Heath					X	X	X	X
*	Erodium botrys	Big Heron's-bill								X
	Eryngium vesiculosum	Prickfoot	Regional				X			X
#	Eucalyptus crenulata	Buxton Gum	Planted							X
	Eucalyptus dives	Broad-leaf Peppermint								X
	Eucalyptus melliodora	Yellow Box					X			
	Eucalyptus ovata	Swamp Gum							X	X

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
	Eucalyptus ovata var. ovata	Swamp Gum					X			
	Eucalyptus pauciflora subsp. pauciflora	White Sallee	Regional				X			X
	Eucalyptus radiata subsp. radiata	Narrow-leaf Peppermint					X	X	X	X
	Eucalyptus rubida	Candlebark						X	X	
	Eucalyptus rubida subsp. rubida	Candlebark						X		
	Eucalyptus viminalis	Manna Gum					X		X	X
	Eucalyptus viminalis subsp. viminalis	Manna Gum							X	
	Euchiton collinus s.s.	Creeping Cudweed						X		
	Euchiton involucratus s.s.	Star Cudweed								X
	Euchiton japonicus	Creeping Cudweed					X	X	X	
	Exocarpos cupressiformis	Cherry Ballart					X		X	X
*	Festuca arundinacea	Tall Fescue					X		X	
*	Fumaria bastardii	Bastard's Fumitory							X	
*	Fumaria muralis subsp. muralis	Wall Fumitory								X
	Gahnia sieberiana	Red-fruit Saw-sedge								X
*	Galium aparine	Cleavers					X	X	X	X
	Galium spp.	Bedstraw							X	
*	Genista monspessulana (C)	Montpellier Broom					X	X	X	X
	Geranium gardneri	Rough Crane's-bill						X	X	

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
	Geranium retrorsum s.l.	Grassland Crane's-bill					X	X	X	
	Geranium solanderi var. solanderi s.s.	Austral Crane's-bill	State			v				X
	Geranium sp. 2	Variable Crane's-bill						X		X
	Geranium sp. 3	Pale-flower Crane's-bill	State			r	X	X	X	
	Geranium sp. 5	Naked Crane's-bill								X
	Glossodia major	Wax-lip Orchid	Regional							X
	Glyceria australis	Australian Sweet-grass					X		X	X
	Gompholobium huegelii	Common Wedge-pea							X	X
	Gonocarpus tetragynus	Common Raspwort					X	X	X	X
*	Grevillea spp.	Grevillea (cultivar)					X			
	Haloragis heterophylla	Varied Raspwort					X			X
	Hardenbergia violacea	Purple Coral-pea					X		X	X
*	Hedera helix	English Ivy						X		
	Hemarthria uncinata var. uncinata	Mat Grass					X	X	X	
*	Holcus lanatus	Yorkshire Fog					X	X	X	X
	Hovea heterophylla	Common Hovea					X	X	X	X
	Hydrocotyle laxiflora	Stinking Pennywort					X	X	X	X
	Hypericum gramineum	Small St John's Wort					X	X	X	X
*	Hypericum perforatum subsp. veronense	St John's Wort					X		X	
*	Hypochaeris glabra	Smooth Cat's-ear					X	X		

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Hypochaeris radicata	Flatweed					X	X	X	
	Hypoxis hygrometrica	Golden Weather-glass							X	
	Isolepis fluitans	Floating Club-sedge							X	X
	Isolepis hookeriana	Grassy Club-sedge					X	X	X	
*	Isolepis hystrix	Awned Club-sedge					X		X	X
	Isolepis inundata	Swamp Club-sedge					X		X	X
*	Isolepis levynsiana	Tiny Flat-sedge							X	X
	Isolepis marginata	Little Club-sedge					X	X		
*	Juncus acutus subsp. acutus (C)	Spiny Rush					X		X	X
	Juncus amabilis	Hollow Rush					X	X	X	X
*	Juncus articulatus	Jointed Rush					X			
	Juncus australis	Austral Rush					X			
	Juncus bufonius	Toad Rush						X	X	X
*	Juncus bulbosus	Bulbous Rush								X
*	Juncus capitatus	Capitate Rush						X	X	
	Juncus gregiflorus	Green Rush								X
	Juncus holoschoenus	Joint-leaf Rush					X		X	X
	Juncus pallidus	Pale Rush					X	X	X	X
	Juncus planifolius	Broad-leaf Rush							X	X
	Juncus sarophorus	Broom Rush					X			
	Juncus subsecundus	Finger Rush					X		X	
	Kennedia prostrata	Running Postman							X	X
	Lachnagrostis filiformis s.l.	Common Blown-grass					X			

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Lactuca serriola	Prickly Lettuce								X
*	Lathyrus tingitanus	Tangier Pea							X	
*	Leontodon taraxacoides subsp. taraxacoides	Hairy Hawkbit					X		X	
*	Lepidium africanum	Common Peppercress								X
	Lepidium hyssopifolium	Basalt Peppercress	National	EN	L	e				X
	Leptorhynchos squamatus subsp. squamatus	Scaly Buttons	Regional				X			
	Leptorhynchos tenuifolius	Wiry Buttons					X		X	
	Leptospermum continentale	Prickly Tea-tree								X
	Leptospermum lanigerum	Woolly Tea-tree								X
*	Ligustrum vulgare	European Privet								X
	Lobelia pedunculata s.s.	Matted Pratia					X			
	Lobelia pratioides	Poison Lobelia							X	
*	Lolium perenne	Perennial Rye-grass							X	
*	Lolium rigidum	Wimmera Rye-grass								X
	Lomandra filiformis subsp. coriacea	Wattle Mat-rush					X	X	X	
	Lomandra filiformis subsp. filiformis	Wattle Mat-rush						X		
	Lomandra longifolia subsp. exilis	Cluster-headed Mat-rush							X	X

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
	Lomandra longifolia subsp. longifolia	Spiny-headed Mat-rush						X		
	Lomandra multiflora subsp. multiflora	Many-flowered Mat-rush	Regional							X
	Lomandra nana	Dwarf Mat-rush					X			X
*	Lotus subbiflorus	Hairy Bird's-foot Trefoil								X
*	Lotus uliginosus	Greater Bird's-foot Trefoil								X
	Luzula meridionalis var. densiflora	Common Woodrush					X	X	X	
	Luzula meridionalis var. flaccida	Common Woodrush							X	
	Luzula meridionalis var. meridionalis	Common Woodrush					X			
	Lycopus australis	Australian Gipsywort								X
	Lythrum hyssopifolia	Small Loosestrife					X	X	X	
*	Malus pumila	Apple					X		X	X
#	Melaleuca parvistaminea	Rough-barked Honey-myrtle					X			
	Melicytus dentatus s.l.	Tree Violet							X	
	Melicytus dentatus s.s.	Tree Violet								X
	Microlaena stipoides var. stipoides	Weeping Grass					X	X	X	
	Microseris sp. 3	Yam Daisy					X		X	X
	Microseris walteri	Yam Daisy							X	X
	Microtis arenaria	Notched Onion-orchid							X	
	Microtis unifolia	Common Onion-orchid						X	X	
*	Moenchia erecta	Erect Chickweed					X			

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
	Montia australasica	White Purslane	Regional						X	X
*	Myosotis discolor	Yellow-and-blue Forget-me-not							X	X
	Myriophyllum crispatum	Upright Water-milfoil								X
	Myriophyllum simulans	Amphibious Water-milfoil								X
*	Nassella neesiana (C)	Chilean Needle-grass					X			
	Opercularia ovata	Broad-leaf Stinkweed								X
*	Oxalis articulata	Sourgrass								X
	Oxalis corniculata s.l.	Yellow Wood-sorrel						X	X	X
	Oxalis exilis	Shady Wood-sorrel						X	X	X
*	Oxalis incarnata	Pale Wood-sorrel								X
	Oxalis perennans	Grassland Wood-sorrel					X	X	X	
*	Parapholis strigosa	Slender Barb-grass						X		
*	Parentucellia latifolia	Red Bartsia							X	
*	Paspalum dilatatum	Paspalum					X			
	Persicaria decipiens	Slender Knotweed								X
*	Phalaris aquatica	Toowoomba Canary-grass					X			X
	Pimelea humilis	Common Rice-flower					X	X	X	X
	Pimelea linifolia subsp. linifolia	Slender Rice-flower							X	
*	Pinus radiata var. radiata	Radiata Pine					X	X		
*	Plantago coronopus	Buck's-horn Plantain					X	X	X	

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Plantago coronopus subsp. coronopus	Buck's-horn Plantain					X			
*	Plantago lanceolata	Ribwort						X	X	X
	Plantago varia	Variable Plantain					X	X	X	
*	Poa bulbosa	Bulbous Meadow-grass						X		
	Poa labillardierei var. (Volcanic Plains)	Basalt Tussock-grass	State			K	X		X	X
	Poa labillardierei var. labillardierei	Common Tussock-grass					X		X	
	Poa morrisii	Soft Tussock-grass					X			
*	Poa pratensis	Kentucky Blue-grass							X	
	Poa sieberiana var. hirtella	Grey Tussock-grass					X			
	Poa sieberiana var. sieberiana	Grey Tussock-grass						X	X	
	Podolobium alpestre	Alpine Shaggy-pea	Regional				X			X
	Podolobium procumbens	Trailing Podolobium	Regional							X
	Poranthera microphylla s.l.	Small Poranthera						X	X	X
*	Prunus cerasifera	Cherry Plum					X		X	
	Pteridium esculentum	Austral Bracken					X		X	X
	Pterostylis nutans	Nodding Greenhood							X	
*	Pyrus communis	Pear					X			
	Ranunculus amphitrichus	Small River Buttercup	Regional							X
*	Ranunculus repens	Creeping Buttercup								X

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Romulea rosea var. australis s.s.	Common Onion-grass					X	X	X	X
*	Rosa rubiginosa (C)	Sweet Briar					X	X	X	X
*	Rostraria cristata	Annual Cat's-tail						X		
*	Rubus anglocandicans (C)	Common Blackberry					X	X	X	
	Rumex brownii	Slender Dock								X
*	Rumex crispus	Curled Dock					X	X		X
	Rytidosperma caespitosum	Common Wallaby-grass					X		X	X
	Rytidosperma duttonianum	Brown-back Wallaby-grass					X		X	X
	Rytidosperma erianthum	Hill Wallaby-grass					X		X	
	Rytidosperma fulvum	Copper-awned Wallaby-grass					X			
	Rytidosperma geniculatum	Kneed Wallaby-grass					X	X	X	X
	Rytidosperma laeve	Smooth Wallaby-grass					X			
	Rytidosperma pallidum	Silvertop Wallaby-grass					X	X	X	X
	Rytidosperma racemosum var. racemosum	Slender Wallaby-grass					X			
	Rytidosperma setaceum var. setaceum	Bristly Wallaby-grass					X			
	Rytidosperma spp.	Wallaby Grass					X	X	X	
*	Salix fragilis (C)	Crack Willow					X			

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Salix matsudana 'Tortuosa'	Tortured Willow					X			
	Schoenus apogon	Common Bog-sedge					X	X	X	
	Senecio campylocarpus	Floodplain Fireweed	State			r	X			X
	Senecio glomeratus	Annual Fireweed					X		X	X
	Senecio glomeratus subsp. glomeratus	Annual Fireweed					X			
	Senecio hispidulus s.s.	Rough Fireweed						X	X	
	Senecio prenanthoides	Beaked Fireweed								X
	Senecio quadridentatus	Cotton Fireweed					X		X	
	Senecio squarrosus	Leafy Fireweed	Regional							X
*	Sisymbrium officinale	Hedge Mustard					X			
	Solenogyne dominii	Smooth Solenogyne					X			
*	Sonchus asper s.l.	Rough Sow-thistle					X	X	X	X
*	Sonchus oleraceus	Common Sow-thistle					X	X		
*	Sparaxis tricolor	Tricolor Harlequin-flower								X
	Stackhousia monogyna s.s.	Creamy Candles						X	X	
	Stylidium armeria subsp. armeria	Common Triggerplant								X
	Stylidium graminifolium s.s	Grass Triggerplant					X		X	X
*	Taraxacum officinale spp. agg.	Garden Dandelion					X		X	
*	Taraxacum Sect. Hamata	Garden Dandelion					X			

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
	Taraxacum spp.	Dandelion							X	X
	Tetratheca ciliata	Pink-bells							X	
	Thelymitra arenaria	Forest Sun-orchid					X	X	X	
	Thelymitra arenaria x rubra	Forest Sun-orchid x Salmon Sun-orchid						X		
	Thelymitra brevifolia	Peppertop Sun-orchid					X	X	X	
	Thelymitra ixioides s.l.	Spotted Sun-orchid					X			
	Thelymitra pauciflora s.l.	Slender Sun-orchid								X
	Thelymitra pauciflora s.s.	Slender Sun-orchid					X	X	X	
	Thelymitra peniculata	Trim Sun-orchid					X			
	Thelymitra rubra	Salmon Sun-orchid					X	X		
	Thelymitra spp.	Sun Orchid					X			
	Themeda triandra	Kangaroo Grass					X	X	X	X
	Thysanotus patersonii	Twining Fringe-lily					X	X		
	Thysanotus tuberosus	Common Fringe-lily								X
	Thysanotus tuberosus subsp. tuberosus	Common Fringe-lily					X		X	X
*	Tragopogon porrifolius subsp. porrifolius	Salsify					X			
	Tricoryne elatior	Yellow Rush-lily					X	X	X	X
*	Trifolium angustifolium var. angustifolium	Narrow-leaf Clover					X			
*	Trifolium campestre var. campestre	Hop Clover					X			

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
*	Trifolium dubium	Suckling Clover					X	X		
*	Trifolium glomeratum	Cluster Clover						X		
*	Trifolium repens var. repens	White Clover					X		X	X
*	Trifolium striatum	Knotted Clover					X			
*	Trifolium subterraneum	Subterranean Clover					X	X	X	
	Triglochin procera s.l.	Water Ribbons							X	
	Triglochin striata	Streaked Arrowgrass								X
	Typha domingensis	Narrow-leaf Cumbungi					X			X
	Typha orientalis	Broad-leaf Cumbungi								X
*	Ulex europaeus (C)	Gorse					X	X	X	
	Veronica calycina	Hairy Speedwell							X	
	Veronica gracilis	Slender Speedwell					X		X	
*	Vicia hirsuta	Tiny Vetch							X	X
*	Vicia sativa	Common Vetch							X	
*	Vicia sativa subsp. nigra	Narrow-leaf Vetch						X		
*	Viola arvensis	Field Pansy							X	
	Viola betonicifolia subsp. betonicifolia	Showy Violet						X		X
	Viola hederacea sensu Entwisle (1996)	Ivy-leaf Violet							X	
*	Vulpia bromoides	Squirrel-tail Fescue					X			X
*	Vulpia myuros	Rat's-tail Fescue					X		X	
*	Vulpia myuros f. myuros	Rat's-tail Fescue					X			

Origin	Scientific name	Common name	Significance	EPBC	FFG	VROT	Mowbrays Rd to Wisemans Lane	Wisemans Lane to Bolgers Lane	Whitebridge Rd to Hennerbergs Rd	East of Hennerbergs Rd
	Wahlenbergia gracilis	Sprawling Bluebell						X		
	Wurmbea dioica subsp. dioica	Common Early Nancy					X	X		
	Wurmbea latifolia subsp. vanessae	Broad-leaf Early Nancy	Regional				X			
	Xerochrysum viscosum	Shiny Everlasting					X	X	X	X

Appendix 5. Ecological Condition and Fuel Load Assessments

id	Road Section	Native Vegetation Patch	Ecological Vegetation Class	Native understorey cover	Understorey Diversity	Recruitment (woody species)	Canopy Cover	Groundstorey weed cover	Woody Weed Cover	Overall Condition
1	North	No	Not Applicable	0-5%	Not Applicable	Absent	0%	50-75%	0-5%	Very Low
2	South	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Low
3	South	No	Not Applicable	0-5%	Not Applicable	Absent	0%	50-75%	0-5%	Low
4	North	No	Not applicable	0-5%	Not Applicable	Absent	<5%	75-100%	Nil	Low
5	South	No	Not applicable	0-5%	Not Applicable	Absent	<5%	75-100%	0-5%	Low
6	South	No	Not applicable	0-5%	< 25% diversity	Low	5 to 15%	75-100%	Nil	Low
7	South	No	Not applicable	0-5%	Not Applicable	Absent	<5%	75-100%	Nil	Low
8	South	No	Not applicable	0-5%	< 25% diversity	Low	<5%	75-100%	0-5%	Low
9	South	No	Not applicable	0-5%	< 25% diversity	Low	0%	75-100%	0-5%	Low
10	South	Yes	SRW EVC 83	25-50%	< 25% diversity	Low	0%	50-75%	5-25%	Low
11	South	Yes	SRW EVC 83	25-50%	< 50% diversity	Moderate - Low Diversity	<5%	50-75%	0-5%	Moderate
12	North	No	Not applicable	0-5%	< 25% diversity	Moderate - Low Diversity	<5%	75-100%	5-25%	Low
13	South	Yes	PGW EVC 55	25-50%	< 25% diversity	>70%	0%	25-50%	0-5%	Low
14	South	Yes	PGW EVC 55	5-25%	< 25% diversity	Moderate - Low Diversity	<5%	50-75%	0-5%	Moderate
15	South	No	Not applicable	5-25%	< 25% diversity	Absent	0%	50-75%	0-5%	Low
16	North	No	SRW EVC 83	25-50%	< 25% diversity	Moderate - Low Diversity	5 to 15%	50-75%	5-25%	Low
17	South	Yes	PGW EVC 55	>50-75%	Up to75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	Moderate
18	North	No	Not applicable	Nil	Not Applicable	Absent	0%	50-75%	Nil	Very Low
19	North	Yes	PGW EVC 55	0-5%	< 25% diversity	Absent	15 to 25%	75-100%	Nil	Low
20	North	No	Not applicable	Nil	Not Applicable	Absent	0%	50-75%	Nil	Very Low
21	South	No	Not applicable	0-5%	< 25% diversity	Moderate - Low Diversity	<5%	75-100%	0-5%	Very Low

id	Road Section	Native Vegetation Patch	Ecological Vegetation Class	Native understorey cover	Understorey Diversity	Recruitment (woody species)	Canopy Cover	Groundstorey weed cover	Woody Weed Cover	Overall Condition
22	North	Yes	VGF EVC 47	0-5%	< 25% diversity	Absent	15 to 25%	75-100%	0-5%	Low
23	South	Yes	PGW EVC 55	>50-75%	< 50% diversity	Moderate - Low Diversity	5 to 15%	25-50%	0-5%	Moderate
24	South	No	Not applicable	0-5%	< 25% diversity	Absent	<5%	75-100%	0-5%	Low
25	South	Yes	SRW EVC 83	>50-75%	< 50% diversity	Moderate - Low Diversity	5 to 15%	25-50%	0-5%	Moderate
26	North	Yes	SRW EVC 83	>50-75%	Up to 75 % diversity	Moderate - Low Diversity	15 to 25%	25-50%	5-25%	Moderate
27	North	Yes	SRW EVC 83	5-25%	< 25% diversity	Low	15 to 25%	50-75%	0-5%	Low
28	North	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	Nil	Very Low
29	South	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	Nil	Very Low
30	South	Yes	SRW EVC 83	25-50%	< 50% diversity	Moderate - Low Diversity	15 to 25%	50-75%	0-5%	Low
31	South	Yes	SRW EVC 83	25-50%	< 50% diversity	Moderate - Low Diversity	15 to 25%	50-75%	0-5%	Low
32	North	No	Not applicable	5-25%	< 25% diversity	Absent	<5%	50-75%	0-5%	Very Low
33	South	Yes	PGW EVC 55	>50-75%	< 50% diversity	Low	5 to 15%	25-50%	0-5%	Moderate
34	South	No	Not applicable	5-25%	< 25% diversity	Absent	0%	50-75%	0-5%	Very Low
35	North	Yes	PGW EVC 55	40-60%	< 50% diversity	Absent	0%	40-60%	0-5%	Moderate
36	South	Yes	PGW EVC 55	25-50%	< 50% diversity	Low	5 to 15%	25-50%	0-5%	Low
37	North	Yes	PGW EVC 55	40-60%	< 50% diversity	Moderate - Low Diversity	5 to 15%	40-60%	0-5%	Moderate
38	South	Yes	PGW EVC 55	40-60%	< 50% diversity	Moderate - Low Diversity	5 to 15%	40-60%	0-5%	Moderate
38	South	Yes	PGW EVC 55	40-60%	< 50% diversity	Moderate - Low Diversity	5 to 15%	40-60%	0-5%	Moderate
39	South	Yes	SRW EVC 83	0-5%	< 25% diversity	Absent	15 to 25%	75-100%	Nil	Low
40	South	Yes	PGW EVC 55	>50-75%	Benchmark Diversity	Moderate - Low Diversity	15 to 25%	25-50%	0-5%	High

id	Road Section	Native Vegetation Patch	Ecological Vegetation Class	Native understorey cover	Understorey Diversity	Recruitment (woody species)	Canopy Cover	Groundstorey weed cover	Woody Weed Cover	Overall Condition
41	North	Yes	PGW EVC 55	>50-75%	Benchmark Diversity	Moderate - Low Diversity	15 to 25%	25-50%	0-5%	High
42	North	Yes	SRW EVC 83	40-60%	< 50% diversity	Moderate - Low Diversity	15 to 25%	40-60%	0-5%	Moderate
43	South	Yes	SRW EVC 83	>50-75%	< 50% diversity	Moderate - Low Diversity	5 to 15%	25-50%	0-5%	Moderate
44	South	No	Not Applicable	0-5%	Not Applicable	Low	<5%	0-5%	0-5%	Very Low
45	North	No	Not applicable	Nil	Not Applicable	Absent	<5%	0-5%	Nil	Very Low
46	North	Yes	SRW EVC 83	5-25%	< 25% diversity	Moderate - Low Diversity	15 to 25%	50-75%	5-25%	Low
47	North	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Very Low
48	South	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Very Low
49	North	No	Not applicable	0-5%	< 25% diversity	Low	<5%	75-100%	0-5%	Very Low
51	South	Yes	SRW EVC 83	5-25%	< 25% diversity	Low	<5%	75-100%	0-5%	Low
52	South	No	Not applicable	0-5%	< 25% diversity	Low	<5%	75-100%	0-5%	Low
53	North	Yes	VGF EVC 47	40-60%	< 25% diversity	Moderate - Low Diversity	<5%	40-60%	5-25%	Low
54	South	Yes	VGF EVC 47	40-60%	< 25% diversity	Moderate - Low Diversity	<5%	40-60%	5-25%	Low
55	North	Yes	PGW EVC 55	25-50%	< 25% diversity	Absent	0%	50-75%	0-5%	Low
56	South	Yes	PGW EVC 55	25-50%	< 25% diversity	Absent	0%	50-75%	0-5%	Low
57	North	Yes	PGW EVC 55	40-60%	Up to 75 %	Absent	0%	40-60%	0-5%	Moderate
58	North	Yes	SRW EVC 83	40-60%	< 50% diversity	Moderate - Low Diversity	5 to 15%	40-60%	0-5%	Moderate
59	South	Yes	VGF EVC 47	>50-75%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	5-25%	Moderate
60	North	Yes	SRW EVC 83	25-50%	< 25% diversity	Moderate - Low Diversity	15 to 25%	50-75%	25-50%	Low
61	North	Yes	VGF EVC 47	40-60%	< 50% diversity	Moderate - Low Diversity	5 to 15%	40-60%	25-50%	Moderate

id	Road Section	Native Vegetation Patch	Ecological Vegetation Class	Native understorey cover	Understorey Diversity	Recruitment (woody species)	Canopy Cover	Groundstorey weed cover	Woody Weed Cover	Overall Condition
62	North	Yes	VGF EVC 47	>50-75%	< 50% diversity	Moderate - Low Diversity	5 to 15%	25-50%	5-25%	Moderate
63	South	Yes	VGF EVC 47	>75%	Benchmark Diversity	Moderate - Low Diversity	15 to 25%	5-25%	0-5%	High
64	North	Yes	VGF EVC 47	25-50%	< 50% diversity	Absent	<5%	50-75%	0-5%	Low
65	South	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Very Low
66	North	Yes	SRW EVC 83	40-60%	< 25% diversity	Low	5 to 15%	40-60%	5-25%	Moderate
67	South	Yes	SRW EVC 83	40-60%	< 25% diversity	Low	5 to 15%	40-60%	5-25%	Moderate
68	North	No	Not applicable	5-25%	< 25% diversity	Absent	<5%	50-75%	0-5%	Very Low
69	South	No	Not applicable	5-25%	< 25% diversity	Absent	<5%	50-75%	0-5%	Very Low
70	North	Yes	VGF EVC 47	40-60%	< 50% diversity	Moderate - Low Diversity	<5%	40-60%	5-25%	Low
71	South	Yes	VGF EVC 47	40-60%	< 50% diversity	Moderate - Low Diversity	<5%	40-60%	5-25%	Low
72	North	Yes	VGF EVC 47	>75%	Benchmark Diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	High
73	South	Yes	VGF EVC 47	>75%	Benchmark Diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	High
74	North	Yes	VGF EVC 47	>50-75%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	High
75	South	Yes	VGF EVC 47	>50-75%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	High
76	North	Yes	SRW EVC 83	40-60%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	5-25%	Moderate
77	South	Yes	SRW EVC 83	40-60%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	5-25%	Moderate
78	North	Yes	VGF EVC 47	>50-75%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	High
79	South	Yes	VGF EVC 47	>50-75%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	High

id	Road Section	Native Vegetation Patch	Ecological Vegetation Class	Native understorey cover	Understorey Diversity	Recruitment (woody species)	Canopy Cover	Groundstorey weed cover	Woody Weed Cover	Overall Condition
80	North	Yes	VGF EVC 47	>50-75%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	Very Low
81	North	Yes	VGF EVC 47	>50-75%	Up to 75 % diversity	Moderate - Low Diversity	5 to 15%	5-25%	0-5%	High
82	North	Yes	VGF EVC 47	>50-75%	Up to 75 %	High	<5%	5-25%	0-5%	High
83	South	Yes	VGF EVC 47	>50-75%	Up to 75 %	High	<5%	5-25%	0-5%	High
84	North	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Very Low
85	South	Yes	SRW EVC 83	>50-75%	< 50% diversity	High	<5%	5-25%	0-5%	Low
86	South	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Very Low
87	South	Yes	PGW EVC 55	>50-75%	< 25% diversity	High	<5%	5-25%	0-5%	Moderate
88	North	Yes	PGW EVC 55	>50-75%	< 50% diversity	Low	5 to 15%	25-50%	0-5%	Moderate
89	North	No	Not applicable	0-5%	< 25% diversity	Moderate	0%	75-100%	0-5%	Low
90	South	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Low
91	North	No	Not applicable	Nil	Not Applicable	Absent	15 to 25%	50-75%	0-5%	Low
92	North	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	Nil	Very Low
93	South	Yes	PGW EVC 55	>50-75%	< 50% diversity	High	0%	5-25%	0-5%	Moderate
94	North	Yes	PGW EVC 55	>50-75%	< 50% diversity	High	0%	25-50%	Nil	Moderate
95	North	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	Nil	Very Low
96	South	No	Not applicable	0-5%	< 25% diversity	Low	<5%	75-100%	0-5%	Low
97	North	Yes	SRW EVC 83	25-50%	< 25% diversity	High	0%	50-75%	0-5%	Moderate
98	North	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Very Low
99	East	No	Not applicable	0-5%	< 25% diversity	Low	0%	75-100%	0-5%	Low
100	West	Yes	PGW EVC 55	>50-75%	< 50% diversity	High	5 to 15%	5-25%	0-5%	Moderate
101	West	No	Not applicable	0-5%	Not Applicable	Absent	0%	75-100%	0-5%	Low
102	West	No	Not applicable	5-25%	< 25% diversity	Low	<5%	50-75%	25-50%	Low
103	East	Yes	PGW EVC 55	25-50%	< 25% diversity	Moderate	<5%	50-75%	0-5%	Low
104	East	No	Not applicable	0-5%	< 25% diversity	Moderate	<5%	75-100%	0-5%	Low

Attachment 1. Maps 1-16

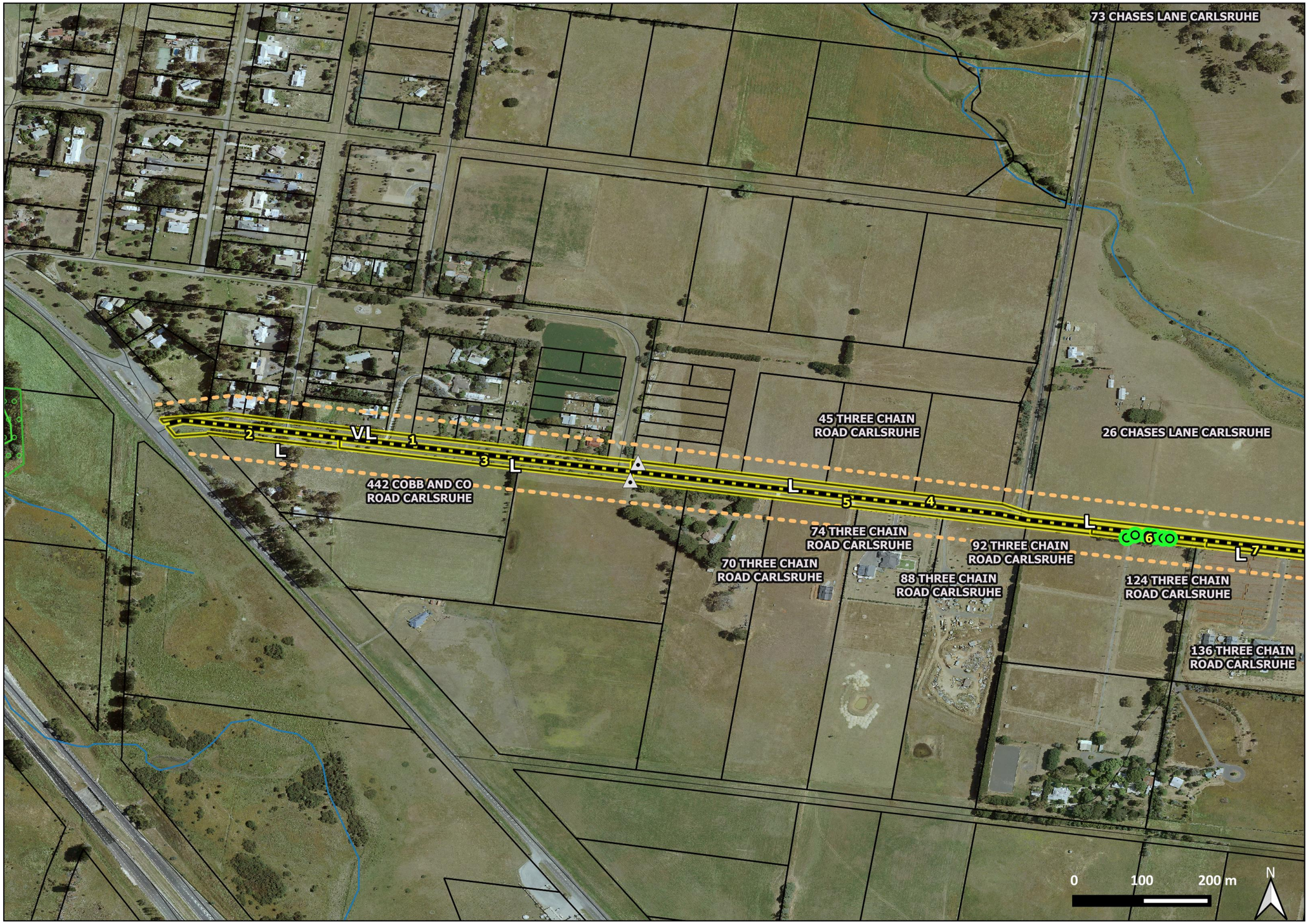
Data collection in the field utilised GPS enabled tablets using Quantum GIS (QGIS) software with existing spatial layers available from previous surveys and from government and non-government databases including.

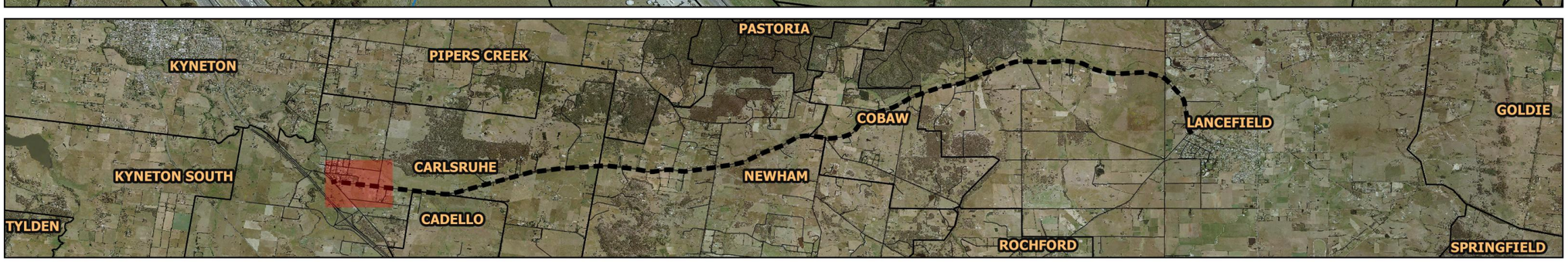
- Aerial photography available through Google Earth (AusMap) and Nearmap
- DELWP biodiversity layers (pre-1750 EVC modelling, VBA data, bioregions and CMA regions)
- VicMap layers (parcel, roads, waterways and locality boundaries)
- Victorian Bushfire Layers (Fire History Layers)
- MRSC produced data including fuel reduction regimes and roadside conservation significance layers
- Significant flora data provided by Karl Just

Map production utilised GIS QGIS 3.6 and incorporated the results of spatial data collection and layers provided by others. Due to the large study area, there are some limitations in representing all spatial information graphically. However, all spatial data collected for this project is provided to MRSC in GIS format and excel.

Map 1 - Cob and Co Road to Chasers Lane

Three Chain Road Action Plan





- Three Chain Road
- Watercourse
- Chilean Needle-grass
- Montpellier Broom

Recommended Management Treatments

- Full Roadside Slash

Former Roadside Treatments

- Full Roadside Slash

Ecological Condition

- L Low
- VL Very Low

Weed Management Actions

Control Chilean Needle-grass prior to slashing. Monitor regrowth in known locations and other sections of the roadside. Control Gorse and Broom.

Date: 15-04-2019

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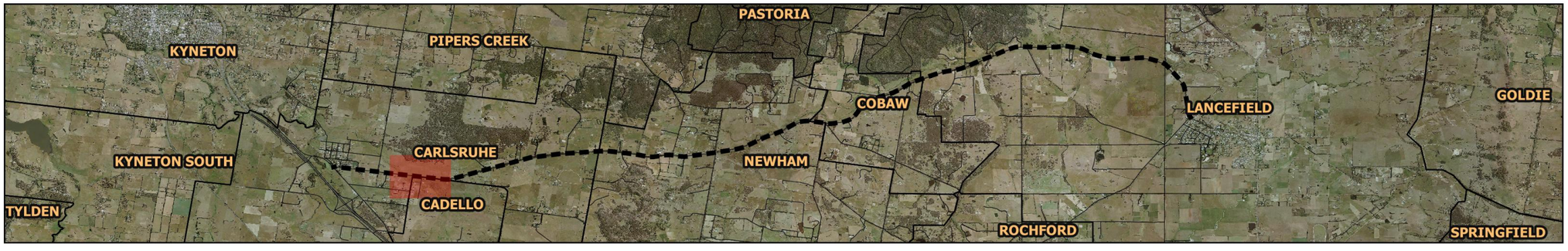
Map 2 - Chasers Lane to Mowbrays Road

Three Chain Road Action Plan



- Three Chain Road
- Watercourse
- Chilean Needle-grass
- Gorse
- Montpellier Broom
- Sweet Briar

Recommended Management Treatments

- Full Roadside Slash
- Selective slash around native vegetation

Former Roadside Treatments

- 3 metre edge slash
- Full Roadside Slash

Ecological Condition

- M Moderate
- L Low

Weed Management Actions

Control Chilean Needle-grass prior to slashing. Monitor regrowth in known locations and other sections of the roadside. Control Gorse around the Steed Street intersection.

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359 THREE CHAIN ROAD CARLSRUHE
405 THREE CHAIN ROAD CARLSRUHE
429 THREE CHAIN ROAD CARLSRUHE
361 THREE CHAIN ROAD CARLSRUHE
289 THREE CHAIN ROAD CARLSRUHE
25 MOWBRAYS ROAD CARLSRUHE
101 MOWBRAYS ROAD CARLSRUHE
119 MOWBRAYS ROAD CARLSRUHE
0 100 200 m
N

PASTORIA
KYNETON
PIPERS CREEK
COBAW
LANCEFIELD
GOLDIE
KYNETON SOUTH
CARLSRUHE
NEWHAM
CADELLO
TYLDEN
ROCHFORD
SPRINGFIELD

Map 3 - North of Mowbrays Road

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Blackberry
- Gorse
- St Johns Wort
- Sweet Briar

State Significant Flora

- Senecio campylocarpus

National Significance Flora

- Dianella amoena

Recommended Management Treatments

- 3-metre Roadside Slash
- Full Roadside Slash
- Selective slash around native vegetation
- Direct Seeding of native grass following exotic grass removal

Former Roadside Treatments

- 3 metre edge slash

Ecological Condition

- M Moderate
- L Low
- VL Very Low

Weed Management Actions

Undertake control of all woody weeds and St Johns Wort. Remove exotic grasses from section 20-21

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405 THREE CHAIN ROAD CARLSRUHE

439 THREE CHAIN ROAD CARLSRUHE

429 THREE CHAIN ROAD CARLSRUHE

475 THREE CHAIN ROAD CARLSRUHE

426 THREE CHAIN ROAD CARLSRUHE

20 L

21 L

22 L

23 M

24 L

25 M

26 M

0 100 200 m N

PASTORIA
PIPERS CREEK
KYNETON
COBAW
LANCEFIELD
GOLDIE
CARLSRUHE
NEWHAM
KYNETON SOUTH
CADELLO
TYLDEN
ROCHFORD
SPRINGFIELD

Map 4 - West of Institute Road

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Blackberry
- Sweet Briar

State Significant Flora

- Senecio campylocarpus

National Significance Flora

- Dianella amoena

Recommended Management Treatments

- 3-metre Roadside Slash
- Full Roadside Slash

Former Roadside Treatments

- 3 metre edge slash

Ecological Condition

- M Moderate
- L Low

Weed Management Actions

Undertake control of all woody weeds
prioritise control of Gorse

Date: 15-04-2019

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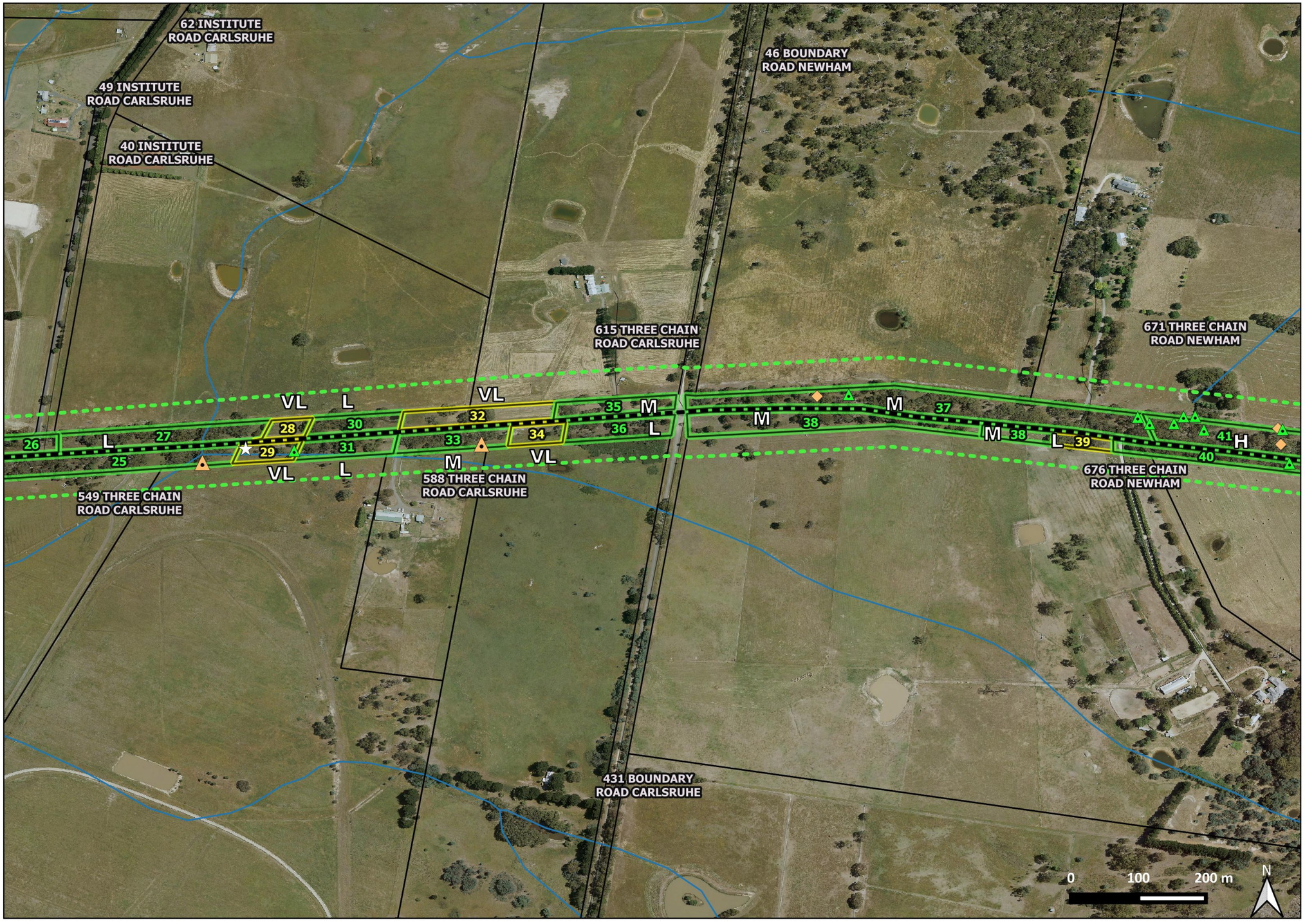

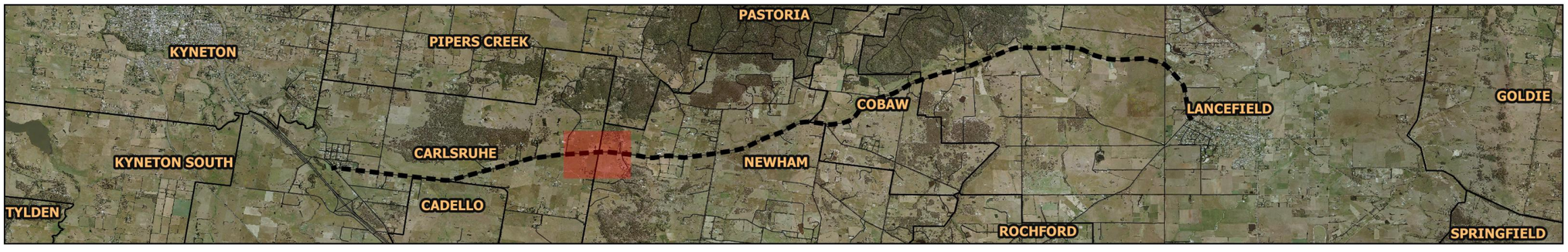

Map 5 - Boundary Road Region

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Sweet Briar

State Significant Flora

- Geranium sp. 3
- Senecio campylocarpus

National Significance Flora

- Dianella amoena

Recommended Management Treatments

- 3-metre Roadside Slash
- Full Roadside Slash

Former Roadside Treatments

- 3 metre edge slash

Ecological Condition

- H High
- M Moderate
- L Low
- VL Very Low

Weed Management Actions

Undertake control of all woody weeds
Prioritise control of Gorse

Date: 15-04-2019

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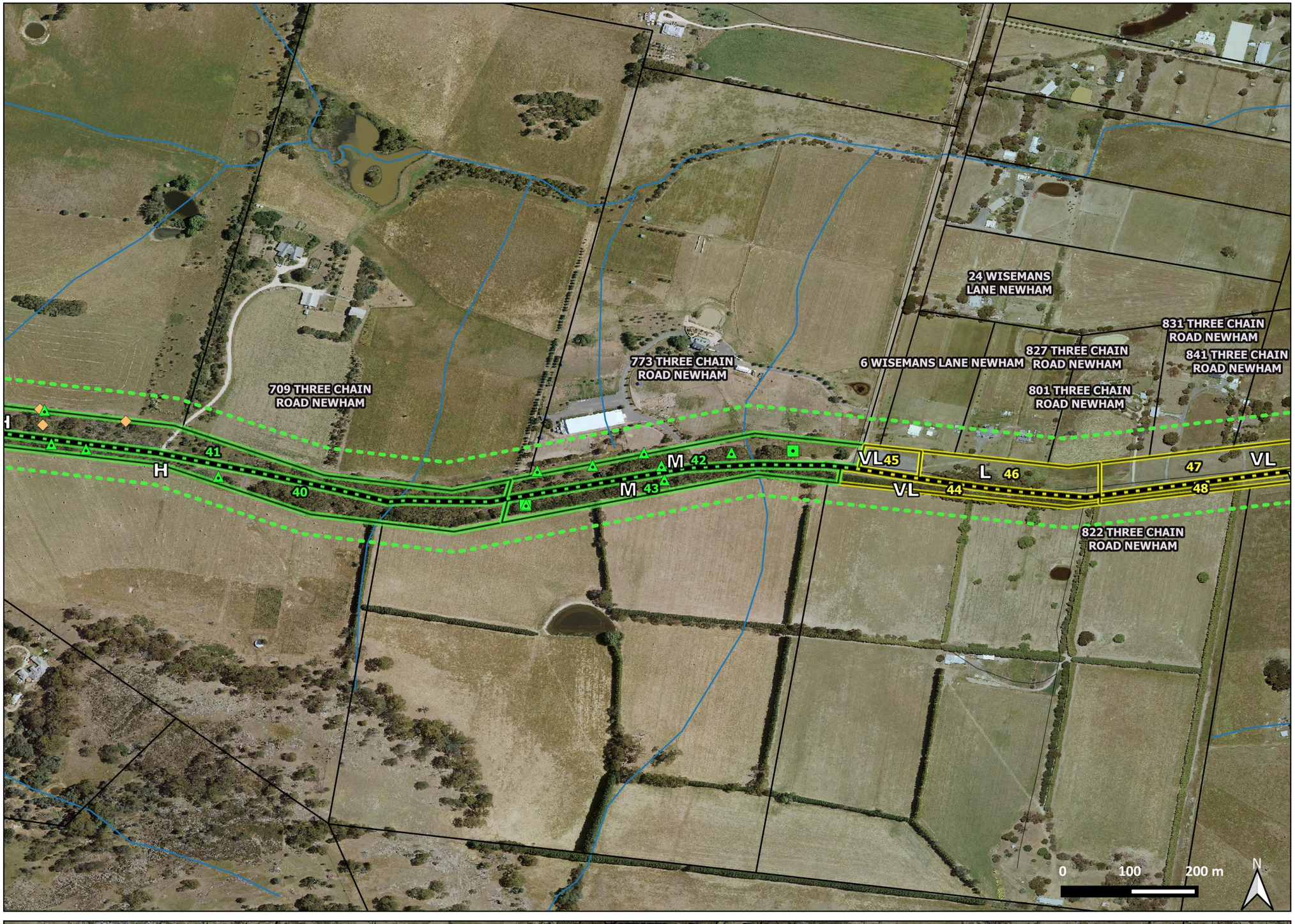

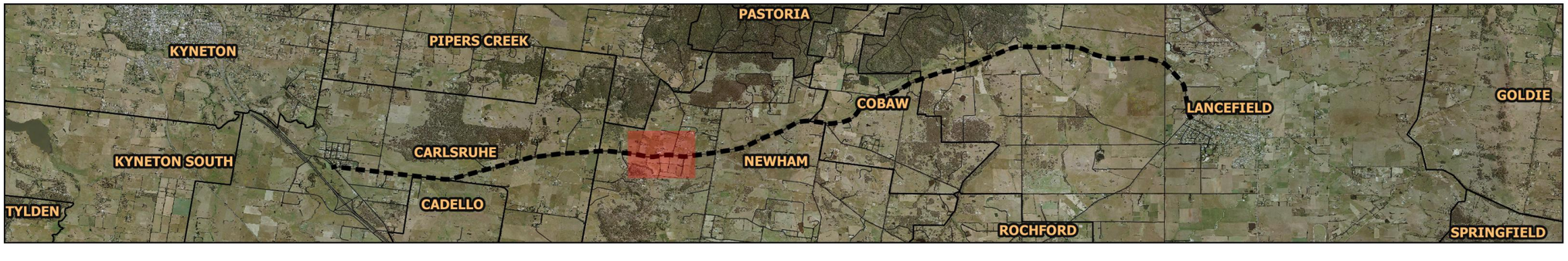

Map 6 - West of Wisemans Lane

Three Chain Road Action Plan

Three Chain Road

Watercourse

State Significant Flora

Geranium sp. 3

Poa labillardierei var. Volcanic Plains

National Significance Flora

Dianella amoena

Recommended Management Treatments

3-metre Roadside Slash

Full Roadside Slash

Former Roadside Treatments

3 metre edge slash

Ecological Condition

H High

M Moderate

L Low

VL Very Low

Weed Management Actions

Undertake control of all woody weeds. Remove conifers that have recruited on the roadside

Date: 15-04-2019

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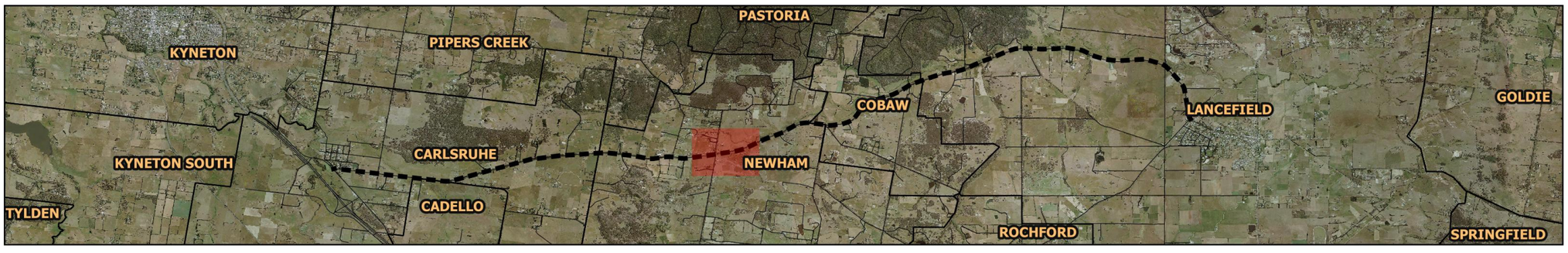
Map 7 - Dons Road - Egans Lane Region

Three Chain Road Action Plan



- Three Chain Road
- Watercourse

Recommended Management Treatments

- Full Roadside Slash

Former Roadside Treatments

- 3 metre edge slash

Ecological Condition

- L — Low
- VL — Very Low

Weed Management Actions

Undertake control of all woody weeds. Remove conifers that have recruited on the roadside

Date: 15-04-2019

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Map 8 - Dry Creek Reserve Region

Three Chain Road Action Plan

Three Chain Road

Watercourse

Public Land

Recommended Management Treatments

3-metre Roadside Slash

Full Roadside Slash

Selective slash around native vegetation

Potential Ecological Burn

Former Roadside Treatments

3 metre edge slash

Ecological Condition

M Moderate

L Low

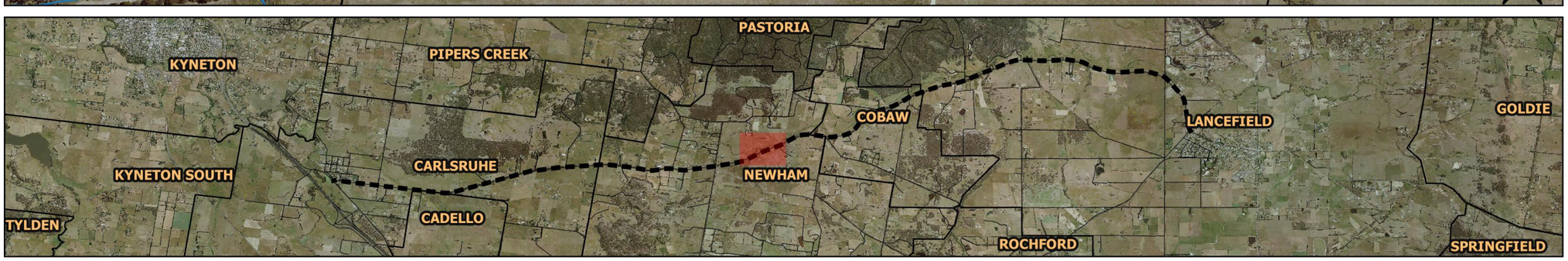
DRY CREEK

DEEP CREEK

49 52 53 54 55 56 57 58 59 60

VL L M L L M M L

0 80 160 m N



Weed Management Actions

Undertake control of all noxious and woody weeds.

Date: 15-04-2019

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Map 9 - Bolgers Lane Region

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Public Land
- Chilean Needle-grass
- Gorse
- Montpellier Broom
- Spanish Heath
- Sweet Briar

State Significant Flora

- Geranium sp. 3
- Poa labillardierei var. Volcanic Plains

Recommended Management Treatments

- 3-metre Roadside Slash
- Full Roadside Slash

Former Roadside Treatments

- 3 metre edge slash

Ecological Condition

- H High
- M Moderate
- L Low
- VL Very Low

Weed Management Actions

Control Chilean Needle-grass prior to slashing. Control all woody weeds, particularly where high in biomass such as sections 60-61

Date: 15-04-2019

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Map 10 - Croziers Road Region

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Public Land
- Gorse
- Montpellier Broom

Recommended Management Treatments

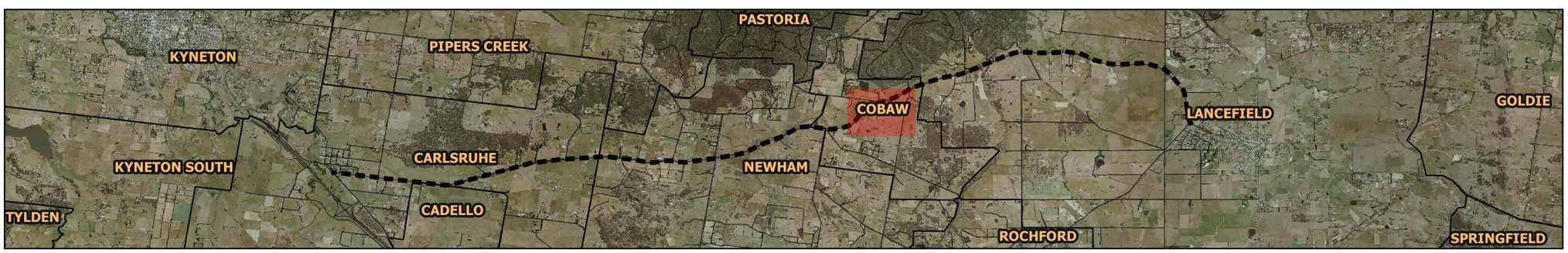
- 3-metre Roadside Slash
- Full Roadside Slash

Former Roadside Treatments

- 3 metre edge slash

Ecological Condition

- H High
- L Low



Weed Management Actions

Undertake extensive woody weed control for biomass reduction in sections 70-71.
Undertake general woody weed control in other areas.

Date: 15-04-2019

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Map 11 - West of Mooneys Lane

Three Chain Road Action Plan

DRY CREEK

1481 THREE CHAIN ROAD LANCEFIELD

1399 THREE CHAIN ROAD COBAW

1404 THREE CHAIN ROAD COBAW

1390 THREE CHAIN ROAD COBAW

74 75 76 77

H H M M

0 100 200 m N

PASTORIA KYNETON PIPERS CREEK COBAW LANCEFIELD GOLDIE KYNETON SOUTH CARLSRUHE NEWHAM TYLDEN CADELLO ROCHFORD SPRINGFIELD

- Three Chain Road
- Watercourse
- Public Land
- Blackberry
- Cotoneaster
- English Broom
- Gorse
- Montpellier Broom
- St Johns Wort
- Sweet Briar

State Significant Flora

- Geranium sp. 3
- Senecio campylocarpus

Recommended Management Treatments

- 3-metre Roadside Slash
- Ecological Thinning

Former Roadside Treatments

- 3 metre edge slash

Ecological Condition

- H High
- M Moderate

Weed Management Actions

Undertake control of all woody weeds, Blackberry and St Johns Wort.

Date: 15-04-2019

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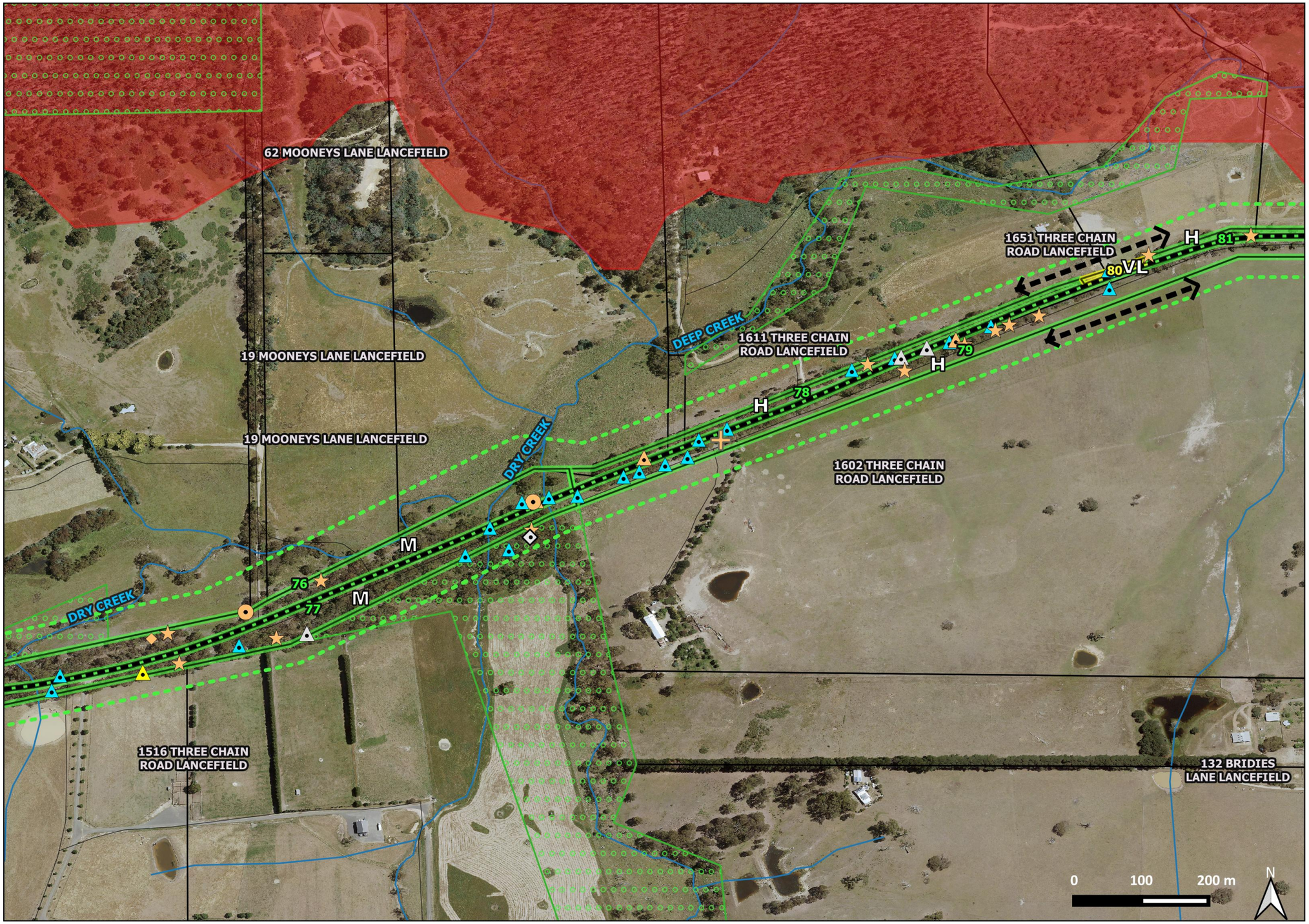

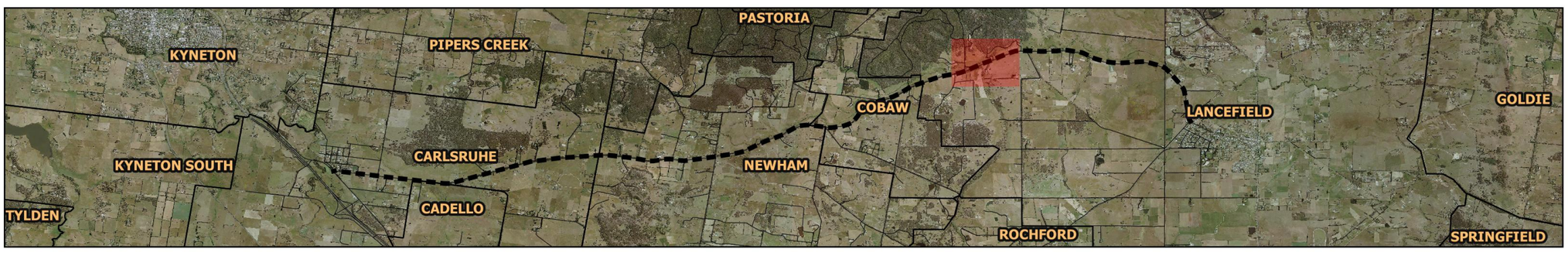

Map 12 - East of Mooneys Lane

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Cobaw Fires 2015
- Public Land
- Blackberry
- English Broom
- Gorse
- Montpellier Broom
- Spanish Heath
- St Johns Wort
- Sweet Briar

State Significant Flora

- Geranium sp. 3

National Significance Flora

- Lepidium hyssopifolium

Recommended Management Treatments

- 3-metre Roadside Slash
- Full Roadside Slash
- Ecological Thinning

Former Roadside Treatments

- 3 metre edge slash

Ecological Condition

- H High
- M Moderate
- VL Very Low

Weed Management Actions

Control of all woody weeds, Blackberry + St Johns Wort.

Date: 15-04-2019

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1697 THREE CHAIN ROAD LANCEFIELD
1779 THREE CHAIN ROAD LANCEFIELD
DEEP CREEK
81
79
82
83
1752 THREE CHAIN ROAD LANCEFIELD
1796 THREE CHAIN ROAD LANCEFIELD
1802 THREE CHAIN ROAD LANCEFIELD
39 BRIDIES LANE LANCEFIELD
126 BRIDIES LANE LANCEFIELD
0 100 200 m
N

PASTORIA
KYNETON
PIPERS CREEK
COBAW
LANCEFIELD
GOLDIE
KYNETON SOUTH
CARLSRUHE
NEWHAM
CADELLO
TYLDEN
ROCHFORD
SPRINGFIELD

Map 13 - East of Bridies Lane

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Cobaw Fires 2015
- Public Land
- Blackberry
- English Broom
- Gorse
- Montpellier Broom
- Sallow Wattle
- Sweet Briar
- Tree Lucern

State Significant Flora

- Geranium solanderi var. solanderi s.s.
- Senecio campylocarpus
- Xerochrysum viscosum

Recommended Management Treatments

- 3-metre Roadside Slash
- Ecological Thinning

Former Roadside Treatments

- 3 metre edge slash
- Full Roadside Slash

Ecological Condition

- H High

Weed Management Actions
Control of all woody weeds and Blackberry

Date: 15-04-2019

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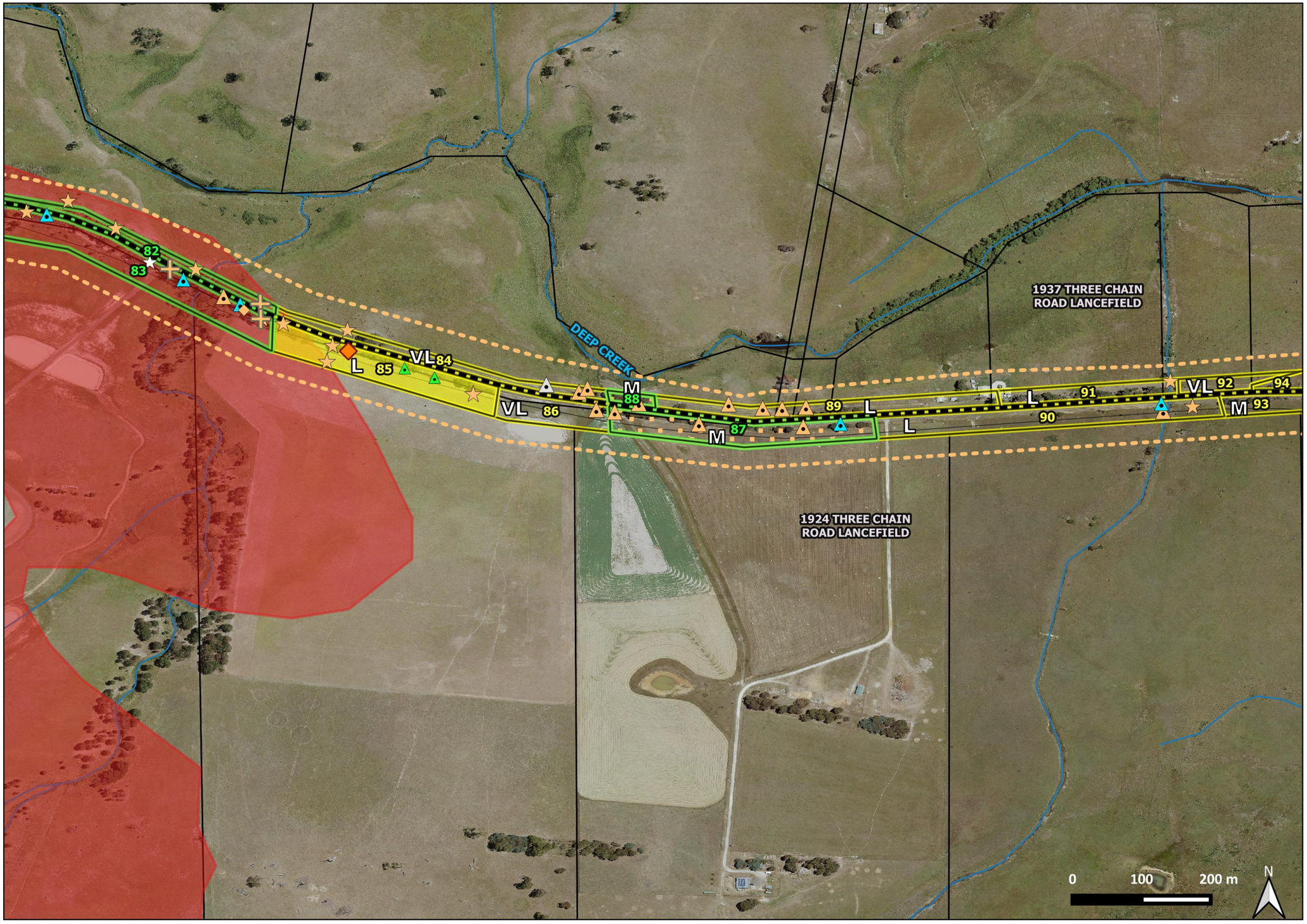

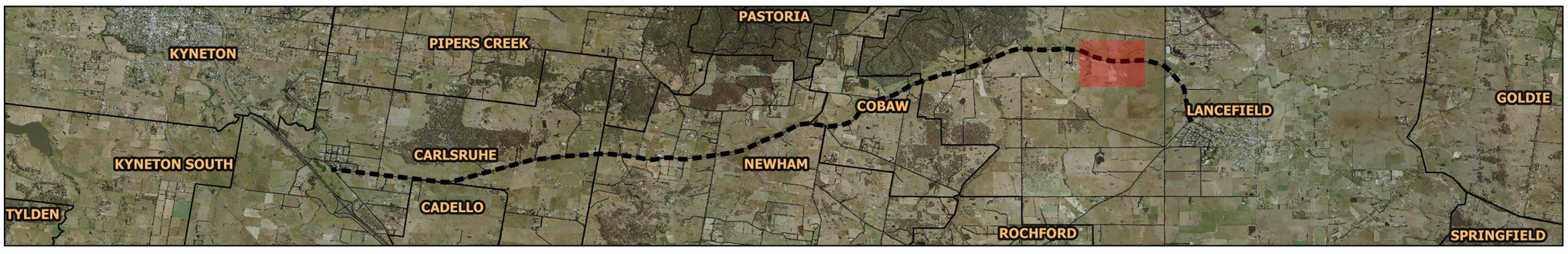

Map 14 - South of Greenways Road

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Cobaw Fires 2015
- Blackberry
- Gorse
- Montpellier Broom
- St Johns Wort
- Sweet Briar

State Significant Flora

- Geranium sp. 3
- Senecio campylocarpus
- Xerochrysum viscosum

National Significance Flora

- Dianella amoena

Recommended Management Treatments

- 3-metre Roadside Slash
- Full Roadside Slash
- Fence-off significant flora. Slash remainder of roadside width
- Selective slash around native vegetation

Former Roadside Treatments

- Full Roadside Slash

Ecological Condition

- M Moderate
- L Low
- VL Very Low

Weed Management Actions

Undertake control of all woody weeds, Blackberry and St Johns Wort.

Date: 15-04-2019

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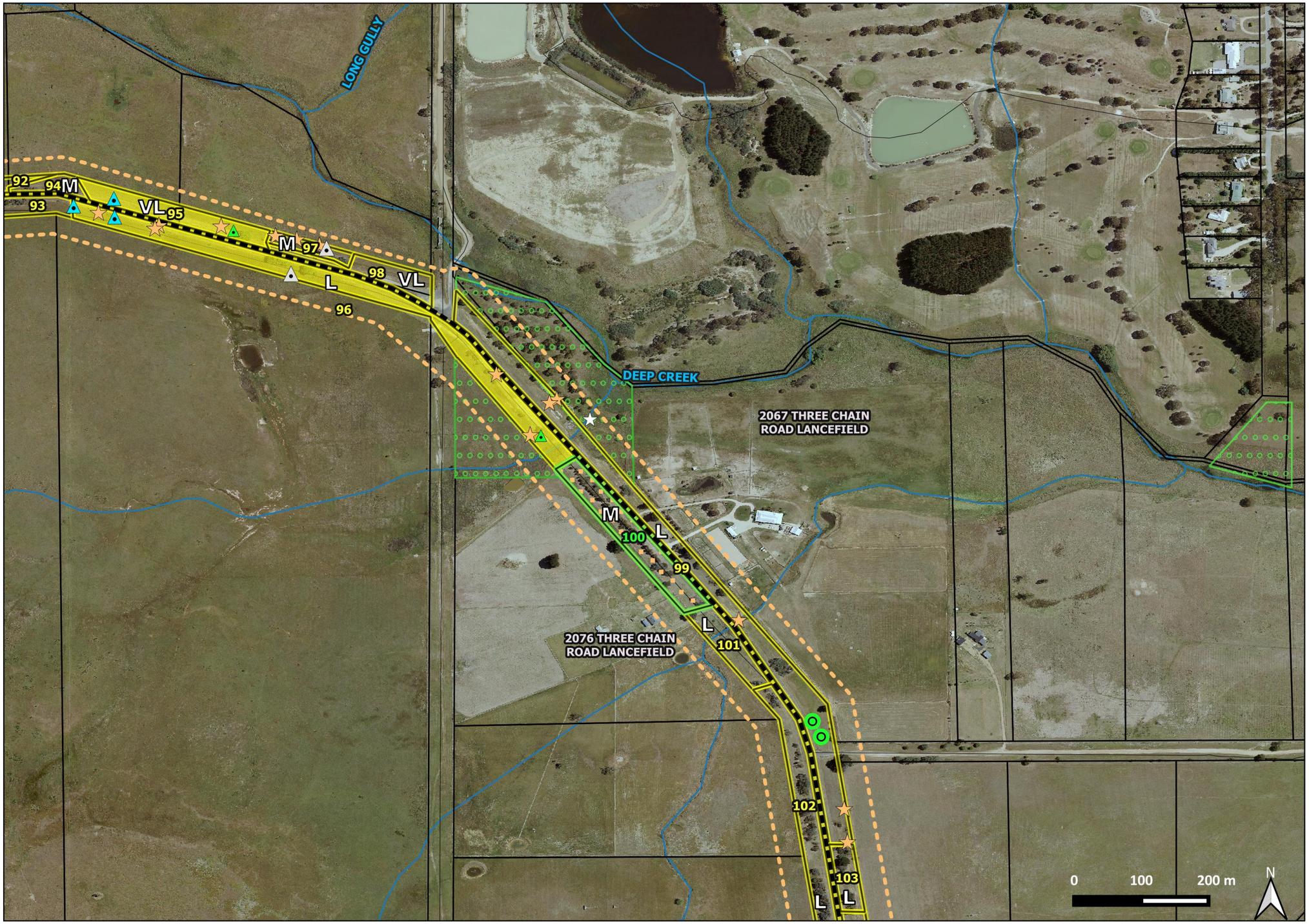

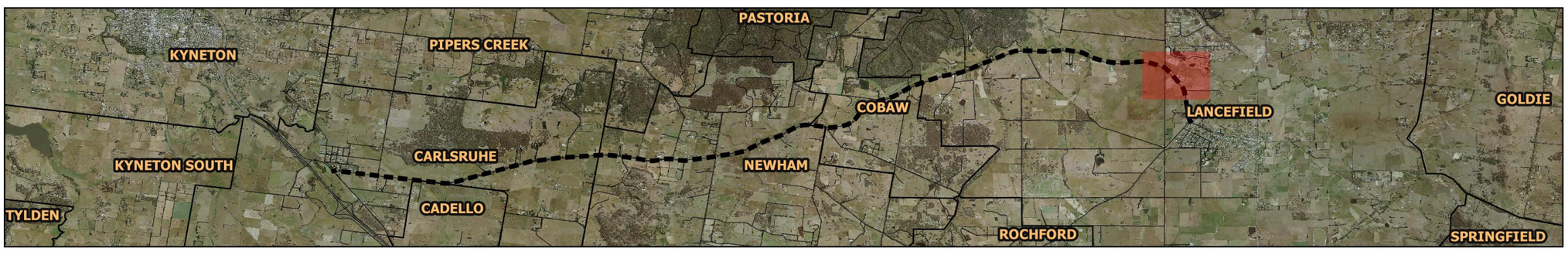

Map 15 - Baynton Road Region

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Public Land
- Blackberry
- Chilean Needle-grass
- Gorse
- Montpellier Broom

State Significant Flora

- Senecio campylocarpus

National Significance Flora

- Dianella amoena

Recommended Management Treatments

- 3-metre Roadside Slash
- Full Roadside Slash
- Fence-off significant flora. Slash remainder of roadside width
- Selective slash around native vegetation

Former Roadside Treatments

- Full Roadside Slash

Ecological Condition

- M Moderate
- L Low
- VL Very Low

Weed Management Actions

Control of all woody weeds, Blackberry. Control Chilean Needle Grass prior to slashing.

Date: 15-04-2019

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Map 16 - South of Salisbury Lane

Three Chain Road Action Plan

- Three Chain Road
- Watercourse
- Chilean Needle-grass
- Gorse
- Serrated Tussock

Recommended Management Treatments

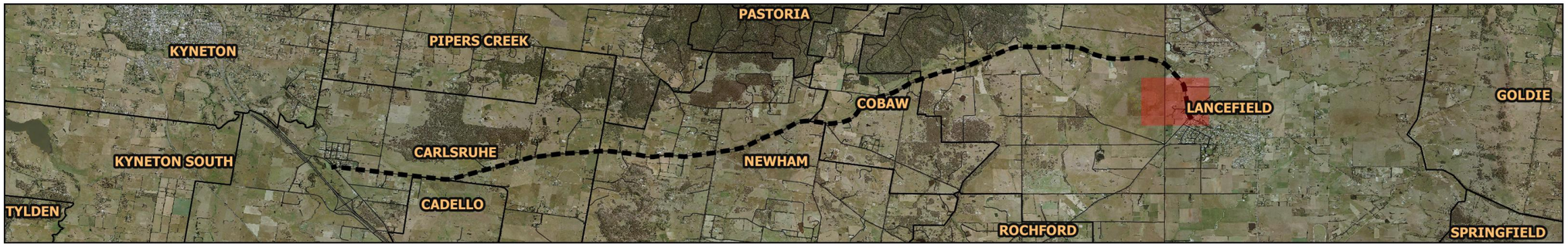
- Full Roadside Slash

Former Roadside Treatments

- Full Roadside Slash

Ecological Condition

- L — Low



Weed Management Actions

Control of all woody weeds, Blackberry.
Control Chilean Needle Grass and Serrated Tussock prior to slashing.

Date: 15-04-2019

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