Hawkesbury City Council

attachment 1
to
item 53

Roadside Vegetation Management Plan

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Hawkesbury City Council Roadside Vegetation Management Plan

Management and Conservation of Remnant Bushland

Prepared for
Hawkesbury City Council

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Abbreviations

ABBREVIATION	DESCRIPTION
AHIMS	Aboriginal Heritage Information Management System
BFRMP	Bush Fire Risk Management Plan
DCP	Development Control Plan
DEWHA	Department for the Environment, Heritage and the Arts
EEC	Endangered Ecological Community
EIA	Environmental Impact Assessment
GIS	Geographic Information System
HCC	Hawkesbury City Council
LALC	Local Aboriginal Land Council
LEP	Local Environment Plan
LGA	Local Government Area
REF	Review of Environmental Factors
RTA	Roads and Transport Authority
RVMP	Roadside Vegetation Management Plan
SIS	Species Impact Statement
WoNS	Weeds of National Significance

Executive Summary

This Roadside Vegetation Management Plan (RVMP) has been prepared for the Hawkesbury Local Government Area. The development of this RVMP involved an analyst of existing information for the road network and included Hawkesbury LGA Vegetation Mapping, threatened species records, land ownership, geology and soils mapping. This analyst identified priority roads to be surveyed during the roadside vegetation surveys and grouped roads into one of three classes, high, medium or low conservation priority. During the survey 364 km of roads were surveyed, including all high priority roads, 18 medium priority roads and 11 low priority roads. These results have been mapped in a series of map books and identify the condition of the roads assessed as determined through the surveys.

The surveys recorded a total of 364 plant species, including 244 native species, three of which are listed under the NSW *Threatened Species Act 1972* and two of these are listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. A total of 83 introduced species of flora were observed, of which 14 are listed as Noxious Weeds under the NSW *Noxious Weeds Act 1993*. Additional to this five of these weed species are Weeds of national Significance (WoNS).

This RVMP outlines broad management prescriptions to be undertaken for road construction and maintenance activities in a way which will have minimal impact on the biodiversity of roadsides. Other roadside activities that are addressed here include management of Ecological Communities, weed management, fauna habitat management, management of road construction stockpiles, fire management, the installation of utilities and erosion and sedimentation prevention works.

As part of this RVMP a roadside signage strategy has been developed to identify high priority conservation areas and some medium priority conservation areas. This enables work crews to take precautions in areas of high and medium conservation priority areas so as to have minimal impacts on native vegetation on roadsides. Associated with this is the development of a fact sheet to educate council workers and community members about the importance of roadside vegetation.

1 Introduction

1.1 BACKGROUND

Roads and roadside environments have a number of roles and support a number of values. Some of these roles include their roles as transport, communication, and utility routes, while environmental values include habitat for flora and fauna and their role as wildlife corridors. These values are both utilitarian and intrinsic: roadside environments may provide a number of ecosystem services, as well as support endangered ecological communities, threatened flora and fauna species, and cultural and heritage relics. Roadside environments may also be a source of local provenance native seed, and act as a buffer against disturbance to intact contiguous vegetation (HCCREMS 2007).

As roadside environments have a number of roles and values, and that these are often disjunct in terms of their management, it is not surprising that conflicts sometimes arise in the management of roads. At times, it is necessary for some functions or values to take precedence over others, particularly where the safety of road users are at risk.

It is important that both the functional roles and conservation values of road environments be protected, both for the present and the future. As such, there is an urgent need to develop a strategic approach to the management of roadside vegetation, which recognises all relevant functions and values.

Hawkesbury City Council (HCC) is responsible for the management of 1028 km of roads, of which 806 km are in the rural road network and 222 km are in the urban road network. Approximately 502 km of sealed roads and 304 km of unsealed roads occur within HCC's rural road network. Many of these roads pass through or are adjacent to conservation areas; indeed, approximately 71 % of the Hawkesbury Local Government Area (LGA) is contained within National Parks, Nature Reserves and State Conservation Areas (HCC 2009). It is imperative that HCC has a plan to manage all their roads to provide for safe transport, efficient infrastructure, and biodiversity conservation in the present and into the future.

1.2 AIM

The key aim of this Roadside Vegetation Management Plan (RVMP) is to provide a detailed strategy for where and how road and biodiversity management works are to be undertaken along rural roads in the Hawkesbury LGA. This will contribute to the improved protection and management of roadside environments in the area.

Additional aims of this RVMP are to develop a signage strategy (as appropriate) for use on rural roads within the Hawkesbury LGA, and an information brochure to promote awareness of the benefits of roadside vegetation.

1.3 WHAT IS A ROADSIDE ENVIRONMENT?

The roadside environment, as used in this RVMP, is the area directly adjacent to the road extending to the property boundary adjacent to the road. As such, the roadside environment is an area of variable dimensions.

The definition of a roadside environment in this Plan differs from that used by the NSW Roadside Environment Committee, formed in 1994 and comprised of 11 organisations representing bodies responsible for managing roadsides and other linear reserves in NSW. The Committee has defined a roadside environment as "that area adjacent to the road and extending to a maximum distance of 20m from the edge of the road surface but specifically excluding areas of private land within this proximity". The definition, as used in this Plan, is preferred over that defined by the NSW Roadside Environment Committee as HCC must consider the whole context of the road environment within which it is working where its activities may have an impact. It is not constrained by a maximum distance of 20m.

1.4 IMPORTANCE OF ROADSIDES

Roadside environments comprise a diverse range of environmental, economic, social and heritage values and provide a range of beneficial environmental and ecosystem services. In NSW, they comprise around 5 % of the total land area of NSW, which, when combined with travelling stock routes and reserves, is almost equivalent to the total area of National Parks in NSW (NSW Roadside Environment Committee).

The values and services provided by well-managed roadside environments have been documented in many other RVMPs and roadside environment management strategies (notably the Hunter Councils Roadside Strategy; HCCREMS 2007, and the Casey Roadside Vegetation Management Plan; Ecology Australia 2002), as well as other sources (Forman *et al.* 2003). Some of the key values and services provided by well-managed roadside environments include:

Biodiversity conservation: In many areas roadside environments may contain the primary source of remnant native vegetation, seed and wildlife habitat due to previous logging and clearing practices in the surrounding landscape. Even in less heavily cleared landscapes, remnant roadside vegetation often provides important links between larger patches of habitat that enable the movement of fauna species between these areas, thus contributing greatly to their ongoing survival.

Conservation of items of cultural & historical significance: Items of cultural, historical or Aboriginal significance are often located in roadside environments. The appropriate management of these environments can therefore play an important role in the protection of these historically and culturally significant items. Examples of Aboriginal cultural heritage items that may be found within the roadside environment include middens and scar trees, while items of European heritage may include historical sites or monuments, such as the routes of early explorers and settlers, or bridges.

Waterway and catchment health, and conservation of adjacent ecosystems: The quality and quantity of water runoff from roads can have a significant impact on the quality of downstream waterways and adjacent ecosystems. Well vegetated roadside environments and appropriate road construction, maintenance and drainage practices and systems can play a significant role in reducing the extent of sediments and other pollutants that are discharged into local waterways from both sealed and unsealed road surfaces. They can also provide an effective buffer against edge effects and disturbance factors including weeds and sediment runoff that would otherwise degrade these environments.

Aesthetic, and amenity values: Roadside vegetation contributes considerably to the natural and rural amenity of the landscape. In addition to breaking the monotony of overly cleared landscapes, well vegetated roadsides soften the harshness of the road environment and provide points of interest for motorists. They also provide shelter and shade for livestock, reduce the impacts or strong winds and reduce the impacts of noise and dust (from unsealed roads) on adjoining land owners and residents.

Recreational: In many locations, roadside vegetation provide opportunities for motorist rest stops, community recreation and enjoyment. These activities may include picnicking and walking, and in areas adjacent to waterways, the launching of boats and recreational fishing.

Prevention of land degradation: Well vegetated roadside environments can contribute to the prevention of land degradation issues including wind and water erosion of soil by reducing wind strength and providing well vegetated surfaces to bind the soil. They can also play a role in reducing the impacts of soil salinity by assisting in the maintenance of ground water levels.

Potential to reduce roadside maintenance costs: The protection and restoration of roadside vegetation in the road environment has the potential to reduce ongoing maintenance costs for roadside authorities. Roadside mowing is a significant maintenance cost that is typically incurred by councils. This activity and its associated costs can be reduced by promoting the regeneration and rehabilitation of native vegetation in the road environment.

Native seed source: In many parts of the region, roadside vegetation is the only or most significant example of the vegetation communities that once existed prior to their widespread clearing. These communities are very important in providing information as to the kinds of species and their distribution that previously occurred, and often provide the only source of local provenance seed that can be used for propagating plants for use in local land rehabilitation projects. They may conserve the genetic variation of plants and animals for their potential economic and scientific value and long-term viability.

Fire control: Roadside vegetation can assist in fire control through the slowing down of wind speed and rate of fire spread (NSW RFS 2006a).

Education: As some roadside remnants are at times the last remaining examples of particular vegetation communities, they play a role in improving public awareness of nature conservation. They also provide opportunities for education in botany and ecology.

1.5 PREPARATION OF THIS ROADSIDE VEGETATION MANAGEMENT PLAN

In June 2009, HCC commissioned a desktop assessment of roadside vegetation values and management issues on rural roads within the Hawkesbury LGA, and a selective on-ground assessment of roadside vegetation on some of its rural roads, for the development of a RVMP. The project involved the development of a priority matrix for HCC's rural roads to identify high, medium and low conservation priority roads, and driving surveys of some of the resulting high, medium and low conservation priority rural roads within the Hawkesbury LGA, to rapidly determine ecological values, assess the quality of vegetation and habitat, and identify management issues by applying fixed criteria to each road section. Methods are outlined in Section 4.

It should be noted that while some significant species on HCC's rural roadsides were noted, further intensive assessments of high and moderate conservation value roadsides are recommended and are likely to yield further records of significant species that were otherwise overlooked during this study due to the rapid survey methodology used.

1.6 SCOPE OF THIS ROADSIDE VEGETATION MANAGEMENT PLAN

This RVMP covers all rural roads within the Hawkesbury LGA, spatially defined in Figure 1, which are managed by HCC. Rural roads were the focus for the RVMP as roadside reserves within rural areas often support the greatest biodiversity values in these landscapes. Urban roads are often landscaped and there is less conflict between road management for transport and utilities, and management for biodiversity and other values. It should be noted, however, that all HCC activities in urban road

reserves require assessments of environmental impacts prior to undertaking these activities, regardless of its urban or rural location.

This RVMP focuses on the management of vegetation within the roadside environment while taking a balanced approach to manage and maintain vehicle and pedestrian traffic in a safe manner within the road environment. The RVMP considers road safety, road maintenance, strategic planning issues, endangered ecological communities, threatened flora and fauna, wildlife management, erosion and sedimentation, water catchments and pollution, scenic, cultural and recreational values, fire management, and utilities.

Through its strategic management actions and adherence to codes of practice, this RVMP is designed to support and guide HCC in the effective management of roadside environments, whilst meeting its budgetary and legislative and policy obligations in regard to roadside construction and maintenance. This RVMP provides HCC with all the information and prescriptions for the management of its roadside vegetation.

Information includes spatial data for low, medium and high priority conservation rural roads in the Hawkesbury LGA which can be incorporated into HCC's Geographical Information System (GIS). This data, in conjunction with more detailed assessments, can be used as a guide when determining appropriate roadside management. Prescriptions for management include identification of actions for high, medium and low conservation priority roads. Actions incorporate other road reserve design treatments and management practices to determine cost-effective solutions to the management of roads and roadside vegetation, which promote roadside maintenance and construction activities that do not degrade the environmental values of the roadside.

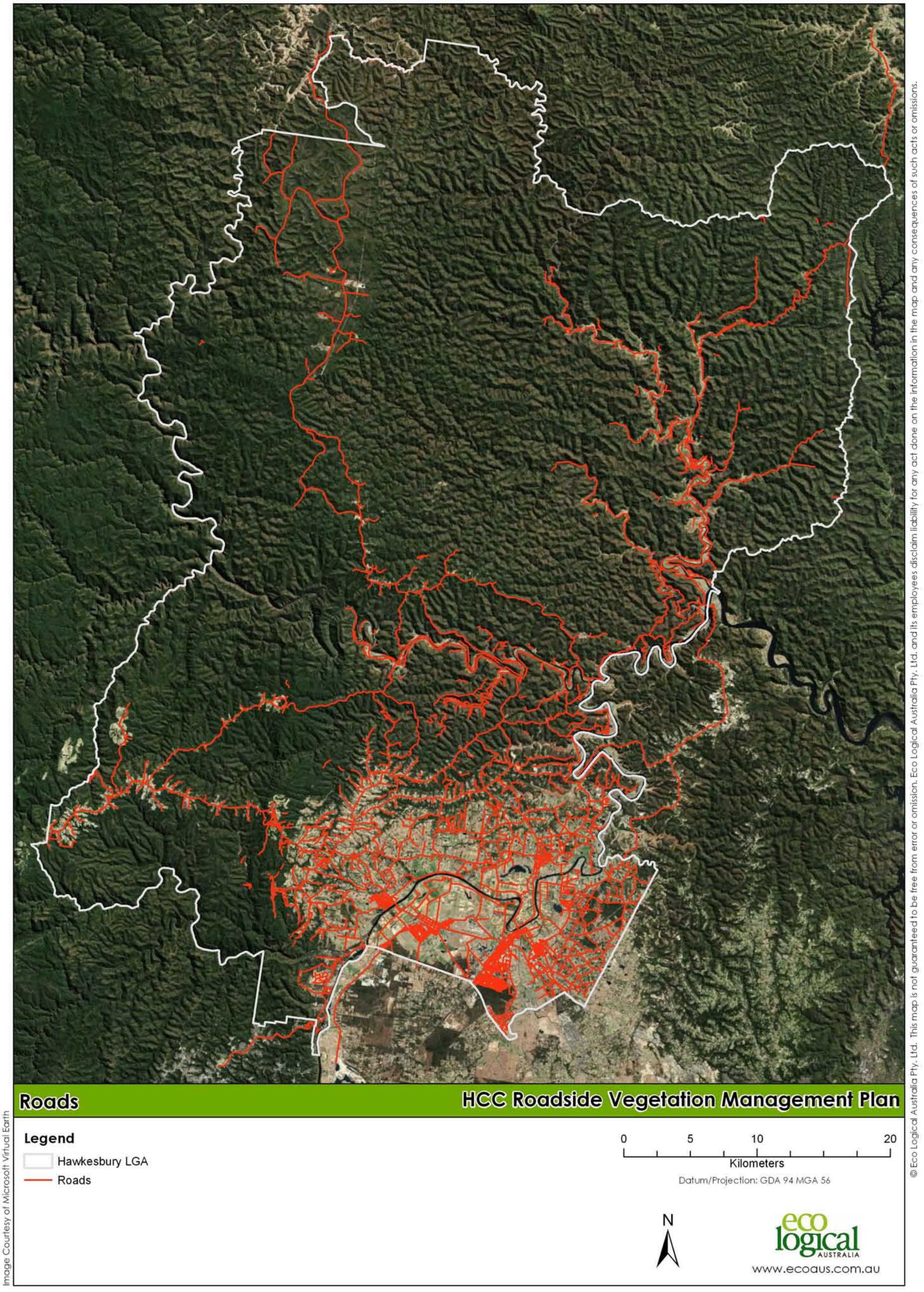


Figure 1: Road network of the Hawkesbury LGA

2 Statutory Requirements

A wide range of legislation, policies, strategies, and plans relate to the assessment, planning and management of roadside vegetation within the Hawkesbury LGA, which allow for both the management of road verges for the conservation of remnant vegetation, and the maintenance of the functional role of these reserves.

This information was reviewed and an overview of relevant legislation applicable to HCC's activities is provided along with HCC's responsibilities in regard to this legislation when maintaining roadside environments and performing road works and maintenance.

The overview defines which activities in roadside environments require environmental assessments and/or permits. Further, for each activity, the overview provides the circumstances and triggers that will help determine the level and type of assessment required.

Legislation and policies reviewed included:

Commonwealth

- Environment Protection & Biodiversity Conservation Act 1999; and
- Draft National Biodiversity Strategy 2010-2020.

State

- NSW Environmental Planning and Assessment Act 1979;
- NSW Threatened Species Conservation Act 1995;
- NSW Fisheries Management Act 1994;
- NSW Protection of the Environment Operations Act 1997;
- NSW Contaminated Land Management Act 1997;
- NSW Native Vegetation Act 2003;
- NSW Water Management Act 2000;
- NSW Rural Fires Act 1997;
- NSW Roads Act 1993;
- NSW Heritage Act 1997;
- NSW National Parks and Wildlife Act 1974;
- NSW Noxious Weeds Act 1993;
- NSW Local Government Act 1993;
- NSW Rural Lands Protection Act 1998;
- State Environmental Planning Policy (Infrastructure) 2007;
- State Environmental Planning Policy No.19 – Bushland in Urban Areas;
- State Environmental Planning Policy No.44 – Koala Habitat Protection;
- NSW Biodiversity Strategy 1999;
- State Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No. 2 – 1997); and
- Hawkesbury-Nepean Catchment Action Plan.

Local

- Hawkesbury Local Environment Plan 1989
- Hawkesbury Development Control Plan

2.1 COMMONWEALTH LEGISLATION

2.1.1 Environment *Protection and Biodiversity Conservation Act 1999*

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a national scheme for protecting the environment and conserving biodiversity values.

Approval from the Commonwealth Environment Minister is required for significant impacts on matters considered to be matters of National Environmental Significance (NES matters). NES matters include species and ecological communities that are listed under the Act, migratory species protected under international agreements, wetlands under international agreements, commonwealth marine environments, World Heritage properties, National Heritage places, and nuclear actions.

The Department of the Environment, Water, Heritage and the Arts (DEWHA) has produced 'Significant Impact Guidelines' for determining significant impacts on NES matters (see http://www.environment.gov.au/epbc/publications/nes-guidelines.html). The criteria for determining significant impacts differ depending on the NES matter. For example, there are separate criteria for migratory birds, threatened species and endangered ecological communities. For actions that have the potential to have a significant impact on a NES matter, a referral to the Minister is required in order for DEWHA to decide if the activity will be a 'controlled action'.

It should be noted that where activities are deemed 'controlled actions', the Commonwealth and NSW governments have recently entered into a bilateral agreement relating to assessments under the EPBC Act. This agreement allows Commonwealth examination of environmental assessments prepared under NSW law, with the exception of BioBanking.

Where actions occur on Commonwealth land, there are additional requirements to consider the whole environment. However, this is unlikely to occur with roadside verges.

HCC's Responsibilities in Managing Roadsides

- Identify if any NES matters have the potential to be impacted on by the activities proposed (http://www.environment.gov.au/erin/ert/epbc/index.html);
- Assess the potential impact of the activity against the EPBC significant impact criteria (http://www.environment.gov.au/epbc/publications/nes-guidelines.html); and
- Refer matters to DEWHA that could significantly impact on NES matters.

2.1.2 Draft *National Biodiversity Strategy 2010-2020*

The Draft *National Biodiversity Strategy 2010-2020* builds on the 1996 National Biodiversity Strategy, as well as on international commitments, such as the United Nations Convention on Biological Diversity, and National, State and Territory policies developed since the original 1996 National Biodiversity Strategy.

The Draft *National Biodiversity Strategy 2010-2020* outlines activities that must begin straight away and those that are needed to effect longer-term change with a minimum 10-year outlook. All actions sit within a list of six 'priorities for change'. These priorities—building ecosystem resilience, mainstreaming biodiversity, knowledge for all, getting results, involving Indigenous peoples and measuring success—reflect the essential changes that must be made to achieve the strategy's vision. Each priority for change is linked to objectives, actions and results which will guide the development of biodiversity conservation approaches for National, State, Territory and Local Governments, and for businesses,

non-government organisations and community groups. The listed results are the expected 'on-ground' consequences of successful implementation of the actions.

Local initiatives are important for achieving ecologically sustainable development. Local Government is therefore a valuable and ongoing contributor to efforts to conserve biodiversity through its role in local and regional planning and, increasingly, through its role in environmental management, monitoring and reporting. However, Local Government engagement in the strategy is likely to be managed through the relevant State and Territory Government mechanisms. As such, in relation to HCC, the Draft *National Biodiversity Strategy 2010-2020* provides direction only on the principles and objectives of biodiversity planning and management.

HCC's Responsibilities in Managing Roadsides

- The Draft *National Biodiversity Strategy 2010-2020* provides direction only on the principles and objectives of biodiversity planning and management. HCC does not have a legislative obligation to observe this Strategy.

2.2 NSW STATE LEGISLATION, STRATEGIES AND POLICIES

2.2.1 NSW *Environmental Planning and Assessment Act 1979*

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) is the principal planning legislation for the state. It provides a framework for overall environmental planning and the assessment of development proposals. Various legislation and instruments, such as the NSW *Threatened Species Conservation Act 1995* (TSC Act), are integrated with the EP&A Act. The EP&A Act also provides for the making and implementation of environmental planning instruments created by State Environmental Planning Policies, Regional Environmental Plans and Local Environmental Plans.

The EP&A Act places a duty on the consent/approval authority to adequately address a range of environmental, social and economic matters including maintenance of biodiversity and the likely impact of activities or developments on threatened species, populations or ecological communities (or their habitat) listed under the TSC Act or NSW *Fisheries Management Act 1994* (FM Act).

In the case of the management of roadsides within the Hawkesbury LGA, HCC is responsible for administering various sections of the EP&A Act and its subordinate legislation. The management of roadsides, including construction and maintenance works, may impact on the environment, biodiversity and/or threatened species, populations or ecological communities listed under the TSC Act or FM Act. HCC must therefore consider the impacts on such matters. Considerations and approvals must be considered pursuant to Part 5 of the EP&A Act (it is unlikely that considerations and approvals would be considered pursuant to Part 3A of the EP&A Act. Part 3A relates to major projects significant to the state such as infrastructure, utilities and port related facilities. Typically the RTA will be responsible for these larger infrastructure approvals).

In accordance with the environmental assessment processes under the EP&A Act (i.e. Part 5 of the Act), environmental assessments by Councils may be in the form of a Review of Environmental Factors (REF), an Environmental Impact Assessment (EIA) and/or Species Impact Statements (SIS). EIAs and SISs are generally prepared when impacts are considered to be significant.

The preparation of REF or EIA is the key mechanism through which Council can generally fulfil its responsibilities under the Act. REFs and EISs provide a means through which Council can identify,

understand and assess the likely impacts of its activities, and make decisions about the kinds of strategies that need to be implemented to avoid or mitigate impacts on the environment.

Integrated Development

A range of environmental permits, approvals and licences issued by government agencies have been integrated with the development approval process. Section 91 of the EP&A Act lists the approvals of agencies which are included in the integrated development assessment (IDA) process.

Of direct relevance to roadside environmental management are the requirements under the *Roads Act 1993* (s 138) for RTA consent to:

(a) erect a structure or carry out a work in, on or over a public road, or
(b) dig up or disturb the surface of a public road, or
(c) remove or interfere with a structure, work or tree on a public road, or
(d) pump water into a public road from any land adjoining the road, or
(e) connect a road (whether public or private) to a classified road

The exception from this is when the development to be carried out requires consent of a Council and the approval of the same Council.

HCC's Responsibilities in Managing Roadsides

- Determine if other integrated environmental approvals, consultation or permits are required (s91); and
- Prepare a REF to determine if a significant impact is likely, if so prepare an EIS and/or SIS.

2.2.2 NSW *Threatened Species Conservation Act 1995*

The NSW *Threatened Species Conservation Act 1995* (TSC Act), as amended, aims to conserve biological diversity by protecting and encouraging the recovery of threatened species, populations and communities listed under the Act. The Act also aims to protect the critical habitat, and eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities. The Act encourages the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

The TSC Act establishes that it is an offence to cause damage to the habitat of a threatened species, endangered population or endangered ecological community, and that a person must not, by an act or an omission, do anything that causes damage to any habitat (other than a critical habitat) of a threatened species, an endangered population or an endangered ecological community if the person knows that the land concerned is habitat of that kind.

The TSC Act inserts provisions to the EP&A Act approvals processes where if there is likely to be a 'significant effect' on matters listed on the TSC Act, a Species Impact Statement (SIS) is required. The consent or determining authority must seek the concurrence of the Director-General of National Parks and Wildlife where there is likely to be a significant effect on threatened species, populations or endangered ecological communities, or their habitats or where the proposal impacts on identified critical habitat or contributes to the operation of a key threatening process.

A Recovery Plan or Priority Action Statement prepared under the TSC Act may also bind Council to certain actions or activities on Council owned land. The Recovery Plans seek to involve land managers such as Council to co-operatively protect, manage and promote the recovery of the threatened species, population or ecological community.

HCC's Responsibilities in Managing Roadsides

- Assess the potential environmental impacts of proposed activities;
- Seek the concurrence of the Director-General where significant effects are likely; and
- Take all recovery plans, priority action statements, threat abatement plans and key threatening processes into consideration when planning activities.

2.2.3 NSW *Fisheries Management Act 1994*

The NSW *Fisheries Management Act 1994* (FM Act) provides for the protection, conservation and recovery of threatened species defined under the Act. It also makes provision for the management of threats to threatened species, populations and ecological communities defined under the Act, as well as the protection of fish and fish habitat in general. Community input into management strategies for threatened species conservation is a cornerstone of the legislation.

Any potential harm to marine vegetation (including mangroves and saltmarsh) requires a permit from NSW Fisheries, and if a development of activity has the potential to impact on threatened species, an assessment is required (pursuant to Part 4 or 5 of the EP&A Act). Assessments may also need to consider the Department of Primary Industries (Fisheries) policies that fish passage not be obstructed.

The consent or determining authority must seek the concurrence of the Director-General where there is likely to be a significant effect on matters listed on the FM Act.

HCC's Responsibilities in Managing Roadsides

- Assess the potential environmental impacts of proposed activities;
- Seek the concurrence of the Director-General where significant effects are likely; and
- Take all recovery plans, habitat protection plans and threat abatement plans into consideration when planning activities.

2.2.4 NSW *Protection of the Environment Operations Act 1997 No. 156*

The key objectives of the NSW *Protection of the Environment Operations Act 1997* (POEO Act) are to protect, restore and enhance the quality of the environment in NSW, having regard to the need to maintain ecologically sustainable development, and to reduce risks to human health and prevent the degradation of the environment. The POEO Act replaces previous controls in the *Clean Air Act 1961*, *Clean Waters Act 1971*, *Environmental Offences and Penalties Act 1989*, *Noise Control Act 1975*, *Pollution Control Act 1970*, and *Waste Minimisation and Management Act 1995*.

The POEO Act was previously administered by the NSW Environmental Protection Authority (EPA), now part of the NSW Department of Environment, Climate Change, and Water (DECCW). It provides a single licensing arrangement to replace the different licences and approvals under existing separate Acts relating to air pollution, water pollution, noise pollution and waste management. The POEO Act

contains a core list of 'scheduled activities' that require a licence. This list includes road construction, however the definition is restricted to roads that are of 4 or more lanes. Scheduled activities can be viewed at http://www.austlii.edu.au/au/legis/nsw/consol_act/poteoa1997455/sch1.html but generally relate to known or large pollution and hazard based activities that would be detected during development assessment.

The POEO Act broadly allocates responsibilities for pollution prevention and control to local councils and other public authorities. In nearly all other cases, the appropriate regulatory authority is the relevant local council who appoints officers who have the authority to issue penalty notices under the *Protection of the Environment Operations (Penalty Notices) Regulation 2004*. Such environmental protection notices (s90) can be issued for:

- clean-up
- prevention
- prohibition
- compliance costs
- smoke abatement
- noise control
- to provide information and records

All these penalty notices can be enforced on activities and operations related to roadside management within the Hawkesbury LGA.

HCC's Responsibilities in Managing Roadsides

- Obtain necessary licenses in relation to proposed activities (if required); and
- Ensure operations and activities are in compliance with approvals.

2.2.5 NSW *Contaminated Land Management Act 1997*

The general objective of the NSW *Contaminated Land Management Act 1997* (CLM Act) is to establish a process for investigating and (where appropriate) remediating land areas where contamination presents a significant risk of harm to human health or some other aspect of the environment.

The CLM Act is applicable in establishing the process for identification, and if found or known, the management of contamination within road corridors. Likely sources of contamination within road corridors (such as disused underground fuel storage at service stations, previous batching plants or chemical storage areas, and car parks) may require investigation if disturbed or pose a significant risk.

Related to the CLM Act are the requirements of SEPP 55 – Remediation of Land. Under SEPP 55, planning authorities are required to consider the potential for contamination to adversely affect the suitability of a site for its proposed use. SEPP 55 makes remediation permissible across NSW, defines when consent is required, requires all remediation to comply with standards, ensures land which is going through the development consent process is investigated if contamination is suspected (for instance, based on site history) and requires Councils to be notified of all remediation proposals.

A set of guidelines has been produced for SEPP 55 – Remediation of Land (see http://www.environment.nsw.gov.au/resources/clm/gu_contam.pdf).

If contamination is suspected, commonly a 'Phase 1 Environmental Site Assessment' is undertaken in line with NSW EPA (now DECCW) (1995) *Guidelines for Consultants Reporting on Contaminated Sites* to identify potential sources and nature of contamination. Known sites of contamination will be recorded on s149 certificates held by Council.

HCC's Responsibilities in Managing Roadsides

- Consider the potential for contamination; and
- Comply with SEPP 55 – Remediation of Land.

2.2.6 NSW *Native Vegetation Act 2003 No. 103*

The NSW *Native Vegetation Act 2003* (NV Act) provides for, encourages, and promotes the management of native vegetation on a regional basis in the social, economic and environmental interests of the State. It aims to prevent broad-scale clearing unless it improves or maintains environmental outcomes, protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation, improve the condition of existing native vegetation, particularly where it has high conservation value, and encourage the revegetation and rehabilitation of land with appropriate native vegetation, in accordance with the principles of ecologically sustainable development.

The NV Act does not apply to National Park estate and other conservation areas, State Forest land, or urban areas. Further, the NV Act does not apply to the clearing of native vegetation in rural areas if clearing is performed in accordance with authorisation under the NSW *Rural Fires Act 1997*, TSC Act, FM Act, NSW *National Parks and Wildlife Act 1974*, NSW *Water Management Act 2000*, and / or NSW *Roads Act 1993*.

The NV Act does, however, provide guidance in regard to offsetting (through the development of Property Vegetation Plans) and the requirements under the 'improve or maintain' principle in relation to development and activities under the EP&A Act.

HCC's Responsibilities in Managing Roadsides

- The NV Act does not apply to the clearing of native vegetation in rural areas if clearing is performed in accordance with authorisation under the NSW *Rural Fires Act 1997*, TSC Act, FM Act, NSW *National Parks and Wildlife Act 1974*, NSW *Water Management Act 2000*, and / or NSW *Roads Act 1993*. However, the NV Act provides guidance in regard to offsetting (through the development of Property Vegetation Plans) and the requirements under the 'improve or maintain' principle in relation to development and activities under the EP&A Act.

2.2.7 NSW *Water Management Act 2000*

The *Rivers and Foreshores Improvement Act 1948* has recently been repealed and the controlled activity provisions in the *Water Management Act 2000* (WM Act) have now commenced. A controlled activity approval under the WM Act is required for certain types of developments and activities that are carried out in or within 40m of a river, lake or estuary.

The WM Act provides a number of mechanisms for protection of water sources via the water management planning process. If a 'controlled activity' is proposed on 'waterfront land', an approval is required under Section 91 (2) of the WM Act. 'Controlled activities' include; the construction of buildings or carrying out of works; the removal of material or vegetation from land by excavation or any other means; the deposition of material on land by landfill or otherwise. 'Waterfront land' is defined as 'the bed of any river or lake, and any land lying between the river or lake and a line drawn parallel to and 40m inland from either the highest bank or shore'.

Approvals for controlled activities are administered by DECCW. A set of guidelines has been developed to assist applicants who are considering carrying out a controlled activity on waterfront land. The guidelines provide information on the design and construction of a controlled activity, and other mechanisms for the protection of waterfront land, and include:

- In-stream works;
- Laying pipes & cables in watercourses;
- Outlet structures;
- Riparian corridors;
- Vegetation Management Plans; and
- Watercourse crossings.

The permit typically requires the preparation of a Vegetation Management Plan (VMP). The proponent's responsibility under the WM Act is to assess impact and adjacency to 'waterfront land' i.e. within 40m and to apply guidelines for permits required under s91 of the WM Act.

Roadside management works within the Hawkesbury LGA may occur within and adjacent to waterfront land. As such, HCC may need to prepare VMPs for these areas and approvals sought from DECCW.

HCC's Responsibilities in Managing Roadsides

- Assess impact and adjacency to 'waterfront land' i.e. within 40m; and
- Apply guidelines for permits required under s91 of the WM Act.

2.2.8 NSW *Rural Fires Act 1997 No. 65*

Bushfire issues are regulated by the NSW *Rural Fires Act 1997* (RF Act). Both the EP&A Act and the RF Act were modified by the *Rural Fires and Environmental Assessment Legislation Amendment Act 2002*.

The RF Act aims to prevent, mitigate and suppress bush and other fires in Local Government Areas (or parts of areas) and other parts of the State constituted as rural fire districts. It also aims to co-ordinate bushfire fighting and bushfire prevention throughout the State, and protect persons from injury or death, and property from damage, arising from fires (partly through the *Bush Fire Environmental Assessment Code for NSW* and partly through *Planning for Bush Fire Protection: a Guide for Councils, Planners, Fire Authorities, and Developers*). Further, it aims to protect the environment by requiring certain activities to be carried out having regard to the principles of ecologically sustainable development described in section 6 (2) of the *Protection of the Environment Administration Act 1991*.

Under the RF Act, it is the duty of a public authority to take the notified steps (if any) and any other practicable steps to prevent the occurrence of bushfires on, and to minimise the danger of the spread of

a bushfire on or from any highway, road, street, land or thoroughfare, the maintenance of which is charged on the authority. Thus, it is HCC's responsibility to conduct fire prevention works on its roadsides, taking in consideration of threatened species issues (ie. following the conditions relating to the use of fire and forms of mechanical hazard reduction provided in the lists for ecological communities, and flora and fauna species, within the *Bush Fire Environmental Assessment Code for NSW*).

The RF Act may also be relevant to the placement of fuel or temporary works depots. The Act will generally only be triggered where bushfire prone lands have been mapped. There will also be operation considerations during total fire bans. These requirements are typically outlined in the Bushfire Risk Management Plans from local Fire Control Centres.

HCC's Responsibilities in Managing Roadsides

- Consideration of fuel and temporary work depots in bushfire prone lands; and
- Operational guidelines during total fire bans.

2.2.9 NSW *Roads Act 1993 No. 33*

The objects of the NSW *Roads Act 1993 No. 33* (Roads Act) are to set out the rights of members of the public and adjacent land owners to use the road; to establish the procedures for the opening and closing of a public road, to provide for the classification of roads, to provide the declaration of the Roads and Traffic Authority (RTA) and other public authorities as road authorities for classified and non-classified roads, to confer certain functions (in particular the function of carrying out road work) on road authorities, to regulate the carrying out of various activities on public roads, and to provide for the distribution of functions conferred by the Act between the RTA and other roads authorities.

The RTA is the road authority responsible for freeways. Local Councils are generally the road authority for all public roads within their areas, except for any freeways or Crown roads in their areas, and any public roads in their areas for which some other public authority is declared by the regulations to be the road authority. However, for some road work, particularly major road work, Local Councils must notify the RTA and obtain the RTA's consent.

Under the Roads Act, HCC may, despite any other Act or law to the contrary:

- remove or lop any tree or other vegetation that is on or overhanging a public road if, in its opinion, it is necessary to do so for the purpose of carrying out road work or removing a traffic hazard;
- alter landform of land adjoining a public road so as to ensure the stability of the road;
- carry out drainage work in or on any land in the vicinity of the road;
- direct the occupier of land from which sand, soil or other such matter has been washed or blown onto a public road to take such action as is necessary to remove the obstruction and prevent its recurrence;
- direct the occupier of any land in the vicinity of the public road to alter a fence, or provide floodgates in a fence, to prevent obstruction to the free flow of surface drainage from a public road, or to the free flow of a watercourse that crosses a public road;
- direct any person who is entitled to place utility services in, on or over the road to locate any new or replacement services in any such conduit, and pay to the roads authority such

proportion as may be prescribed by the regulations of the costs incurred by the roads authority in connection with the construction of the conduit;

- direct an irrigation corporation, a private irrigation board, a private drainage board or a private water trust to repair or maintain any water supply work or drainage work;
- direct any person by whom a public road is dug up to restore the road to its previous condition or pay the cost to repair the damage; and
- direct the owner or occupier of land to erect or install fences, lights or other equipment on or around any premises on the land that are, in the opinion of the roads authority, in a sufficiently dangerous condition to threaten the safety of persons or property on a public road in the vicinity of the premises.

HCC's Responsibilities in Managing Roadsides

- Public reserves that are not classed as 'operational land' require a Plan of Management; and
- Clearing to remove traffic hazards may be exempt.

2.2.10 NSW *Heritage Act 1997*

The NSW *Heritage Act 1997* sets out the process by which items or places of State and Local Heritage Significance are protected and managed. Items are considered significant in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item.

Approval must be gained from the Department of Planning – Heritage Branch when making changes to a heritage place listed on the State Heritage Register or covered by an interim heritage order, or when excavating any land in NSW where you might disturb an archaeological relic. If the works are only minor in nature, and will have minimal impact on the heritage significance of the place, they may be exempted from the requirement to submit a Section 60 or Section 140. The schedule of exemptions can be found at:

http://www.heritage.nsw.gov.au/docs/info_standardexemptions2006.pdf

HCC's Responsibilities in Managing Roadsides

- protection of non-Aboriginal archaeological sites;
- the need to record heritage items on the Council's Heritage Register;
- the need to maintain minimum standards of maintenance and repair for items on the State Heritage Register;
- maintenance of identified heritage items in accordance with the best practice heritage management principles issued by the Minister for Planning and guidelines issued by the Heritage Council; and
- obtain excavation permits where works are likely to expose a relic unless this requirement has been waived by the Minister for Planning.

2.2.11 NSW *National Parks and Wildlife Act 1974*

The objects of the NSW *National Parks and Wildlife Act 1974* (NPW Act) are as follows:

- the conservation of nature, including, but not limited to, the conservation of:
  - habitat, ecosystems and ecosystem processes,

  - biological diversity at the community, species and genetic levels,
  - landforms of significance, including geological features and processes, and
  - landscapes and natural features of significance including wilderness and wild rivers;
- the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including, but not limited to:
  - places, objects and features of significance to Aboriginal people,
  - places of social value to the people of New South Wales, and
  - places of historic, architectural or scientific significance;
- fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation; and
- providing for the management of land reserved under this Act in accordance with the management principles applicable for each type of reservation.

The objects of this Act are to be achieved by applying the principles of ecologically sustainable development. In carrying out functions under this Act, the Minister, the Director-General and the Service are to give effect to the following:

- the objects of this Act,
- the public interest in the protection of the values for which land is reserved under this Act and the appropriate management of those lands.

Keeping in mind that specific Aboriginal cultural heritage issues, either tangible or other, and the required management thereof, vary on a case by case basis, the following advice is given as a general rule. Consultation with the relevant Local Aboriginal Land Council (LALC) and the local Aboriginal community should always be undertaken when carrying out work in roadside reserves. In addition an Aboriginal Heritage Information Management System (AHIMS) search should be conducted to determine the potential presence of Aboriginal relics. An archaeological assessment is generally required, this may include excavation works within sites with known, or clearly identified potential to contain, Aboriginal objects or places. Aboriginal Heritage should always be assessed on a case by case basis. In the event that an Aboriginal object or place is identified, approval is required by DECCW to continue works in accordance with Part 6 of this Act.

HCC's Responsibilities in Managing Roadsides

- protection of Aboriginal places, sites and objects; and
- protection of lands administered under the NPW Act.

2.2.12NSW *Noxious Weeds Act 1993*

The *Noxious Weeds Act 1993* (NW Act) defines the roles of government, councils, private landholders and public authorities in the management of noxious weeds. The Act sets up categorisation and control actions for the various noxious weeds, according to their potential to cause harm to our local environment.

Weeds that are declared noxious are those weeds that have potential to cause harm to the community and individuals, can be controlled by reasonable means and has the potential to spread within an area and to other areas. These weeds may also be environmental weeds, weeds of national significance (WONS see www.dpi.nsw.gov.au/agriculture/pests-weeds).

The administration of noxious weed control is the responsibility of the Minister for Primary Industries but is implemented and enforced by the Local Control Authority for the area, usually local government. The Act imposes obligations on occupiers of land to control noxious weeds declared for their area. There are five classes of noxious weeds identified in the Act (see below). All Noxious Weeds in NSW are listed in the Noxious Weeds database.

CONTROL CLASS	WEED TYPE	EXAMPLE CONTROL REQUIREMENTS
Class 1	Plants that pose a potentially serious threat to primary production or the environment and are not present in the State or are present only to a limited extent.	The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.
Class 2	Plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies and are not present in the region or are present only to a limited extent.	The plant must be eradicated from the land and the land must be kept free of the plant. The weeds are also "notifiable" and a range of restrictions on their sale and movement exist.
Class 3	Plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area.	The plant must be fully and continuously suppressed and destroyed.*
Class 4	Plants that pose a potentially serious threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area.	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.*
Class 5	Plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State.	There are no requirements to control existing plants of Class 5 weeds. However, the weeds are "notifiable" and a range of restrictions on their sale and movement exists.

These obligations extend to local control authorities and public roads under s14, 17 and 36A of the Roads Act 1993.

HCC's Responsibilities in Managing Roadsides

- Suppression, control or eradication of noxious weeds.

2.2.13NSW *Local Government Act 1993 No. 30*

The NSW *Local Government Act 1993* (LG Act) gives Local Councils the ability to provide goods, services and facilities, and to carry out activities, appropriate to the current and future needs of local communities and of the wider public. Further, the LG Act gives councils a role in the management, improvement and development of the resources of their areas, as well as responsibility for administering some regulatory systems under this Act. The LG Act requires councils, councillors and council employees to have regard to the principles of ecologically sustainable development in carrying out their responsibilities.

In relation to biodiversity conservation, Council has a particular charter (Section 8(1)):

"to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ecologically sustainable development".

Plans of management are required to be prepared for public lands in the LGA under the LG Act. Typically, these plans include environmental management provisions that inform Council Operations. There are also provisions (s36B and C) which relate Council's obligations in responding to recovery planning, threatened species habitat and areas of natural value.

Councils also have responsibilities in relation to development of flood liable land for the purposes of section 733 of the LG Act. The Floodplain Development Manual (2005) incorporates the NSW Flood Prone Land Policy, which aims to reduce the impact of flooding on individual owners and occupiers of flood prone property and to reduce private and public losses resulting from floods. The policy also recognises the benefits of use, occupation and development of flood prone land.

It should be noted that, while the main functions of Councils are provided for under the LG Act, Councils also have functions under other Acts. Some of the functions conferred or imposed on Councils by other Acts include:

- NSW Environmental Planning and Assessment Act 1979;
- NSW Protection of the Environment Operations Act 1997;
- NSW Recreational Vehicles Act 1983;
- NSW Roads Act 1993; and
- NSW Rural Fires Act 1997.

Thus, through these other Acts, HCC must consider the environment and threatened species, populations and communities, control pollution, restrict the use of recreational vehicles, manage roads and roadside vegetation, and prevent the occurrence of bushfires on, and to minimise the danger of the spread of a bushfire on or from any road for which it is responsible.

HCC's Responsibilities in Managing Roadsides

- Consideration of the impacts of flooding;
- Consideration of Ecologically Sustainable Development principles; and
- Be aware of Part 2 of LG Act where Council may issue orders under the *Roads Act* and POEO Act.

2.2.14 NSW *Rural Lands Protection Act 1998 No. 143*

The NSW *Rural Lands Protection Act 1998* (RLP Act) relates to livestock health and pests, establishing livestock health and pest districts, conferring functions and funds on livestock health and pest authorities through a system of rates, and providing for the control of pests by way of pest control orders and eradication orders. The RLP Act also provides for the sustainable management of travelling stock reserves and stock watering places, and regulates the movement of stock. The RLP Act was recently modified by the NSW *Rural Lands Protection Amendment Act 2008*.

Under the RLP Act, the responsible authorities for the regulation of use of travelling stock routes along public roads are local Councils. An authorised HCC officer may therefore issue a permit (a stock permit) to walk stock on a public road or travelling stock reserve, or graze stock on a public road or

controlled travelling stock reserve (note that public roads do not include freeways, which are managed by the RTA). However, if the public road is a Crown road, a permit to graze stock must occur with the concurrence of the Minister administering the *Crown Lands Act 1989*. If a public road occurs within the boundaries of a national park or historic site, the concurrence of the Minister administering the *National Parks and Wildlife Act 1974* is required prior to the issue of a grazing permit.

HCC's Responsibilities in Managing Roadsides

- Manage travelling stock routes along roads in a sustainable fashion;
- Regulate movement and grazing of stock along roads;
- Obtain approval for issuing stock permits, as necessary.

2.2.15NSW *Energy and Utilities Act 1987*

The NSW Energy and Utilities Act 1987 allow a Corporation associated with the supply of energy, via appropriate utilities, throughout the state of NSW. This act aims to provide energy through utilities safely, economically and sustainably to the community.

Under the act the Corporations that are authorised to install and maintain utilities are permitted to enter any land or place (not a dwelling) on any land used in connection with locating or the development, extraction, production, provision, supply, transportation, distribution or utilisation of energy or energy at any time when the place is being used for that purpose. This allows Corporations permitted to install or manage energy utilities to enter any land in order to undertake the work required to supply energy to the community.

In regards to HCC's responsibility in managing roadsides, there are no requirements for HCC to maintain or install utilities in roadways. However, these Corporations and the work they undertake have the potential to affect the management of roadsides and roadside vegetation.

2.2.16State Environmental Planning Policy (Infrastructure 2007)

This SEPP commenced in January 2008 and applies to the state of NSW. It provides a planning regime for infrastructure including roads under the EP&A Act. The infrastructure SEPP:

- provides flexibility in locating infrastructure services by broadening the range of zones where types of infrastructure are permitted;
- allows for development, redevelopment or disposal of Government owned land by permitting additional uses or allowing adjacent land uses to be undertaken on State land;
- outlines approval processes and assessment requirements for infrastructure proposals; and
- identifies works of minimal environmental impact as exempt or complying development to improve turnaround times for maintenance and minor upgrades.

This SEPP has specific planning positions and development controls for the following types of roadside infrastructure:

- Electricity transmission and distribution;
- Emergency services facilities and bushfire hazard reduction;
- Flood mitigation works;
- Gas transmission and distribution;

- Parks and other public reserves;
- Rail infrastructure facilities;
- Road and traffic facilities;
- Sewerage systems;
- Soil conservation works;
- Stormwater management systems;
- Telecommunication networks;
- Travelling stock reserves;
- Water or resource management facilities; and
- Water supply systems.

This SEPP specifically deals with development in or adjacent to road corridors and road reservations (Division 17). It allows for development to be carried out without consent by a public authority (definition pursuant to the EP&A Act) on a public road (or adjoining land) that is unzoned land for any purpose. Thus, the development is to be assessed in accordance with Part 5 of the EP&A Act with the preparation of a Review of Environmental Factors (REF). Significant impact identified within the REF may require the preparation of an Environmental Impact Statement (EIS).

Further, the following maintenance and management activities carried out by a public authority have been classified as exempt and complying:

- construction, maintenance or repair of bus stops or bus shelters;
- security fencing;
- safety barriers or systems, including Jersey barriers;
- directional, safety or other advisory signs;
- pedestrian and cyclist facilities;
- minor slope stability works;
- minor road pavement or shoulder work;
- street furniture;
- roadside facilities and rest areas;
- street lighting;
- pavement and road surface markings, detection loops and traffic counters;
- kerb and guttering;
- culverts, drains and other works to improve the quality or control of stormwater runoff;
- repair or replacement of lighting, mechanical systems, electrical equipment or air monitoring equipment, replacement of screening of overhead bridges and removal of graffiti or debris;
- temporary structures;
- investigation (including geotechnical and other testing, surveying and sampling); and
- emergency works to protect a road or road infrastructure facilities, the environment or the public, but only if they involve no greater disturbance to soil or vegetation than necessary.

In relation to environmental issues the SEPP defines upgrading or maintenance of landscaping, or vegetation management (such as weed spraying, slashing and pruning), as exempt and complying provided that the works does not involve construction and existing material are replaced.

Development may only be carried out on land to which SEPP 14 – Coastal Wetlands or SEPP 26 – Littoral Rainforest applies under clauses 41 (2) (b), 79 (2) (b) and 94 (2) (b) of this Policy if any adverse effect on the land is minimised.

HCC's Responsibilities in Managing Roadsides

- Consider the planning and approvals process in relation to routine activities

2.2.17State Environmental Planning Policy No.19 – Bushland in Urban Areas

The general aim of *State Environmental Planning Policy No 19 – Bushland in Urban Areas* (SEPP 19) is to protect and preserve bushland that is zoned or reserved for public open space purposes within the urban areas referred to in Schedule 1 because of its value to the community as part of the natural heritage, its aesthetic value, and its value as a recreational, educational and scientific resource.

The specific aims of this policy are:

- to protect the remnants of plant communities which were once characteristic of land now within an urban area;
- to retain bushland in parcels of a size and configuration which will enable the existing plant and animal communities to survive in the long term;
- to protect rare and endangered flora and fauna species;
- to protect habitats for native flora and fauna;
- to protect wildlife corridors and vegetation links with other nearby bushland;
- to protect bushland as a natural stabiliser of the soil surface;
- to protect bushland for its scenic values, and to retain the unique visual identity of the landscape;
- to protect significant geological features;
- to protect existing landforms, such as natural drainage lines, watercourses and foreshores;
- to protect archaeological relics;
- to protect the recreational potential of bushland;
- to protect the educational potential of bushland;
- to maintain bushland in locations which are readily accessible to the community; and
- to promote the management of bushland in a manner which protects and enhances the quality of the bushland and facilitates public enjoyment of the bushland compatible with its conservation.

Under Clause 6 subclause 2(d), consent under this policy is not required for the purpose of constructing or maintaining a main road. A main road is defined as a road that is declared to be a main road by an order in force under section 46 of the *Roads Act 1993*. Section 46 of the *Roads Act 1993* states; the Minister may, by order published in the Gazette, declare to be a main road:

- any public road, or
- any other road that passes through public open space and joins a main road, highway, freeway, tollway, transitway or controlled access road.

HCC's Responsibilities in Managing Roadsides

- Have regard to the aims of the policy.

2.2.18State Environmental Planning Policy No.44 – Koala Habitat Protection

Where Local Government Areas are listed on Schedule 1 of *State Environmental Planning Policy 44 – Koala Habitat Protection* (SEPP 44) and the site is greater that 1ha, then the likelihood of koala habitat needs to be assessed as part of the environmental assessment process. The Hawkesbury LGA is listed as a Council to which SEPP 44 applies.

Under SEPP 44, *potential koala habitat* means areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. If potential koala habitat is identified then there is a requirement to assess the site for the occurrence of *core koala habitat*. *Core koala habitat* means an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.

HCC's Responsibilities in Managing Roadsides

- Assess Koala habitat when site is greater than 1ha.

2.2.19NSW Biodiversity Strategy

The *NSW Biodiversity Strategy* recognises the collaborative responsibility of the community, local and state government and the importance of local planning in biodiversity conservation. The *NSW Biodiversity Strategy* provides a considerable list of 'strategic goals', 'core objectives', principles and targets. The targets have not been developed for application to a LGA scale and are not quantifiable but provide direction on the principles and objectives of biodiversity planning and management.

HCC's Responsibilities in Managing Roadsides

- the *NSW Biodiversity Strategy* provides direction only on the principles and objectives of biodiversity planning and management. HCC does not have a legislative obligation to observe this Strategy.

2.2.20State Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No 2 – 1997)

The *State Regional Environmental Plan No 20 – Hawkesbury-Nepean River (No 2 – 1997)* applies to certain lands in the Greater Metropolitan Region that are within a number of Local Government Areas, including the Hawkesbury LGA. The aim of this plan is to protect the environment of the Hawkesbury-Nepean River system by ensuring that the impacts of future land uses are considered in a regional context.

Specific planning policies and recommended strategies for the plan have been set out under the broad areas of total catchment management, environmentally sensitive areas, water quality, water quantity, cultural heritage, flora and fauna, riverine scenic quality, agriculture/aquaculture and fishing, rural residential development, urban development, recreation and tourism, and metropolitan strategy.

HCC's Responsibilities in Managing Roadsides

- The *State Regional Environmental Plan No. 20 – Hawkesbury-Nepean River (No 2 – 1997)* is legally binding. However, works carried out by HCC will not necessarily have to adhere to it as works will fall under assessment under Part 5 of the EP&A Act. Nevertheless, HCC is encouraged to consider strategies under this plan.

2.2.21 Hawkesbury Nepean Catchment Action Plan

The *Hawkesbury Nepean Catchment Action Plan* (Hawkesbury Nepean CAP) sets the direction for the activities and investment of the Hawkesbury Nepean Catchment Management Authority (Hawkesbury Nepean CMA) over the next ten years. It was approved by the Minister for Environment and Climate Change in March 2008.

The Hawkesbury Nepean CAP is the first stage of managing the catchment in a way that will improve river health, protect biodiversity, and encourage best practice soil and land management. The goals of the CAP are underpinned by community and partnership programs which build community awareness and capacity, and support Indigenous community involvement.

The Hawkesbury Nepean CAP sets clear targets and a timetable for the Hawkesbury Nepean CMA's action and investment and is designed to be responsive to the changing needs of the catchment and the community. The Hawkesbury Nepean CAP operates across the same area as the Hawkesbury Nepean CMA's boundary.

HCC's Responsibilities in Managing Roadsides

- The *Hawkesbury Nepean CAP* is a non-regulatory statutory plan created under the NSW *Catchment Management Authorities Act 2003*, but local governments are strongly encouraged to work closely with and cooperate with the HNCMA

2.3 LOCAL GOVERNMENT PLANNING POLICIES

2.3.1 Hawkesbury Local Environment Plan 1989 and Hawkesbury Development Control Plan

Along with Commonwealth and State legislation, strategies, and policies outlined above, Hawkesbury's Local Environmental Plan (LEP) and Development Control Plan (DCP) will influence the level and type of assessment required for particular activities. These are prepared pursuant to the EP&A Act.

Additionally, Council Occupational Health and Safety requirements will need to be complied with for any roadside activities.

These requirements will need to be investigated prior to the commencement of any roadside activities, however are beyond the scope of this guide.

2.4 OTHER MATTERS

2.4.1 Regionally Significant Species

Species of regional significance refer to the flora and fauna species that are not identified on national or state legislation and therefore not specifically protected. They may be considered vulnerable in the region and not commonly found locally. They may refer to species that do not have a large area of

habitat reserved or protected in the locality and may be indicators of a particular habitat type that is diminishing. They may also be species at the edge of their known range and therefore may be of importance for maintenance of genetic diversity.

HCC's Responsibilities in Managing Roadsides

- Assess the potential impacts of proposed activities on regionally significant species.

2.5 ROADSIDE ACTIVITIES AND THEIR ASSESSMENT

All roadside activities require some form of environmental impact assessment. In NSW there are four types commonly used documents, they include:

- Statement of Environmental Effects (SEE) – under Part 4 of the EP&A Act;
- Review of Environmental Factors (REF) - under Part 5 of the EP&A Act;
- Environmental Impact Statement (EIS) where a development is defined as designated development under Part 4 (refer EP&A Regulations, Schedule 3) or likely to significantly impact on the environment (refer EP&A Act S112); and
- Referral or Controlled Action – Under the EPBC Act.

The context of the assessment will determine the types of issues that require assessment. For example in areas near residents, noise and vibration will be important, whereas in more natural areas, threatened species and their habitat may require more assessment. In many instances, common conditions of consent will apply to the same activities, for example sedimentation control and erosion prevention for excavation.

This section provides a general summary of potential roadside management activities and the assessments that may be required. As this is a RVMP for works conducted by HCC, assessment under Part 5 of the EP&A Act is applicable.

Table 1 summarises the required assessments for roadside activities. This table should be used as a guide only. Approval and assessment of the various works to be undertaken should always be cross referenced with current legislation requirements applicable to the site and works.

Table 1: Summary of required assessment of roadside activities or impacts undertaken by HCC.

COUNCIL ACTIVITIES / POTENTIAL IMPACTS	LEGISLATIVE TRIGGER	ASSESSMENT REQUIRED
Roads and Traffic	Infrastructure SEPP	REF / EIS
Geotechnical and surveying investigations	Infrastructure SEPP	REF / EIS
Provision of road safety and traffic management facilities	Infrastructure SEPP Roads Act	REF / EIS
Rehabilitation and maintenance activities requiring the use of land	Infrastructure SEPP	REF / EIS
Quarries and gravel pits	POEO Act licences (above thresholds) Infrastructure SEPP permits ancillary winning of spoil	REF / EIS
Concrete batching plants	POEO Act licences (above thresholds)	REF / EIS

Crushing, grinding or separating works	Infrastructure SEPP permits ancillary uses	REF / EIS
Disturbing ground features (eg filling or excavation)	S87, S90 NPW Act Acid Sulphate Soils (Hawkesbury LEP) POEO Act Licence (above set thresholds)	REF
Activity likely to affect a water body, watercourse, wetland or natural drainage system	S91 Permit under WM Act	Vegetation Management Plan to accompany permit application. Permit only granted after development consent.
Likely to change flood or tidal regimes, or be affected by flooding	Flooding (LG Act) Flood Plain Management Plan	REF
Use, storage, or transport of hazardous substances	*Environmentally Hazardous Chemicals Act 1985*	Soon to be repealed by the POEO Act.
Generation or disposal of gaseous, liquid or solid wastes or emissions	POEO Act Contaminated Lands Act	REF
Affect threatened species	TSC Act Fisheries Management Act	7 part test as part of REF
Impact on Marine Vegetation	FM Act	Permit
Potential significant impact on a threatened species, population or community	TSC Act FM Act	Species Impact Statement (DECCW concurrence)
Impact on a Matter of National Environmental Significance	EPBC Act Significance Impact Assessment Guidelines	Assessment of significance and Referral
Removal of Vegetation (rural area)	NV Act EP&A Act	DA to CMA accompanied by a Property Vegetation Plan (PVP) + REF
Impact on Koala Habitat	SEPP 44 TSC Act	Assessment pursuant to SEPP44. Assessment under Part 5A EP&A Act (7-part Test)
Bushfire Risk	RF Act *Planning for Bushfire Protection* Guidelines	Part of REF if Bushfire Prone Consult with RFS
Activities potentially creating noise	The assessment of noise impacts must be conducted in accordance with the NSW Industrial Noise Policy and Environmental Criteria for Road Traffic Noise	Part of REF
Activities affecting air quality	POEO (Clean Air) Regulation 2002 Approved Methods for the Modelling and Assessment of Air Pollutants in NSW	Part of REF
Activities potentially causing vibration	Assessing vibration: a technical guideline is based on guidelines contained in BS 6472-1992	Part of REF
Activities impacting community	LEP or REP	Assessed through the approval process. Part of REF
Activities affecting Visual or Scenic qualities	LEP or REP	Assessed through the approval process. Part of REF
Activities impacting Historic items	Heritage Act	Conservation assessment or plan as part of REF Consult with Heritage Branch (DoP)
Mowing	TSC Act NV Act	Could impact on Threatened species or native grasslands. Consider as a part of combined REFs for larger areas.

Weed Control	TSC Act NV Act NW Act	Could impact on Threatened species or native grasslands or vegetation. Consider as a part of combined REFs for larger areas.

3 Key Considerations in Roadside Vegetation Management

3.1 ROAD CONSTRUCTION AND MAINTENANCE ACTIVITIES, ROAD SAFETY, AND DRAINAGE

The primary function of the road is to provide a safe carriageway for vehicles to travel. HCC needs to balance this primary function where possible with the conservation values, as well as other values, of roadside environments. Thus, roadside vegetation will need to be maintained to prevent encroachment onto the road and allow for clear visibility for users of the road (i.e. roads will need to remain trafficable), while allowing for vegetation to simultaneously provide habitat for plants and animals and continue to perform its various roles of providing ecosystem and other services.

Careful planning is required before any road construction or maintenance works are undertaken to ensure that the conservation of roadside vegetation is achieved. Road construction and maintenance works can have substantial impacts on roadside vegetation, depending on the scale of works. Works may include lopping or pruning of vegetation, but apart from direct removal of vegetation, road works can destroy vegetation through changes in soil levels, compaction of soil, and altered drainage resulting in water-logging. Inappropriate road maintenance practices can also have an adverse effect on the conservation and condition of roadside vegetation, through the inadvertent spread of weed propagules or plant pathogens (e.g. Phytophthora).

HCC's road construction and maintenance crews/contractors have an important role in maintaining clean machinery and implementing work practices that will monitor and prevent the spread of noxious and environmental weeds along roadside corridors. HCC's road construction and maintenance crews/contractors also have an important role in ensuring that proper measures are in place during road construction and/or maintenance to prevent alterations to stormwater runoff resulting in erosion, sedimentation, changes in soil moisture levels and/or land degradation. Drainage must also be adequate and designed to minimise vegetation loss, land degradation, and soil erosion.

3.2 STRATEGIC PLANNING ISSUES

The management of roadside environments can potentially conflict with strategic plans, such as HCC's Local Environmental Plan, which are designed to allow for the protection of sensitive environmental areas, while allowing for particular activities to occur in particular areas. For example, the management of roadside environments within land zoned as environmental protection areas could degrade the ecological values protected within these areas through vegetation clearing for road safety purposes, or fire prevention and control. The management of roadside environments in these areas should aim to conserve and enhance roadside vegetation and protect wildlife habitat, particularly as roadside environments within environmentally sensitive areas are likely to act as buffers from disturbance to intact and contiguous vegetation adjacent to these road environments.

Besides conflicts between areas zoned for environmental protection and roadside management, any plans for allowing subdivisions, or for land to be re-zoned, can conflict with how roads will be managed in the future in comparison to how they may currently be managed. Road reserves may require alterations for the provision of utilities leading to any subdivisions or areas to be rezoned, and this can conflict with biodiversity conservation. Any alterations in the management of roadsides as a result of

subdivisions or changes in area zonings will need to be balanced with the conservation of road reserve values.

In addition to the above considerations, consideration of State and Commonwealth biodiversity conservation legislation, such as the TSC Act, EP&A Act and EPBC Act, are required when planning for the management of roadside vegetation. This is because while the planning component of roadside vegetation management will not significantly impact matters protected under these Acts, the undertaking of works may result in significant impacts on protected matters.

3.3 ENDANGERED ECOLOGICAL COMMUNITIES

There are a number of Endangered Ecological Communities (EECs) present within the Hawkesbury LGA, which are also present within HCC's roadside reserves. These EECs need to be conserved since they have been heavily cleared in the past and represent the last examples of vegetation communities of their type. The EECs that have been recorded in the Hawkesbury LGA (NSW NPWS 2002; DECC 2008) include:

- Blue Gum High Forest;
- Castlereagh Swamp Woodland;
- Cooks River Castlereagh Ironbark Forest;
- Cumberland Plain Woodland;
- Freshwater Wetlands;
- River-Flat Eucalypt Forest on Coastal Floodplains;
- Shale/Gravel Transition Forest;
- Shale Sandstone Transition Forest;
- Swamp Oak Floodplain Forest;
- Turpentine-Ironbark Forest; and
- Western Sydney Dry Rainforest.

Conservation of EECs within roadside environments must be balanced against other essential roadside management requirements (road safety, fire protection, suppression and control, and/or utility provision). Management of roadside environments supporting EECs should also ensure that in addition to the protection of EECs, threats to the integrity of the EECs, such as weed invasion and disease, are considered, with steps taken to minimise these risks.

3.4 THREATENED FLORA AND FAUNA

A total of 34 threatened flora species and 52 threatened or migratory fauna (1 invertebrate, 7 frogs, 2 reptiles, 2 fish, 35 birds, and 15 mammals, 7 of which are bats), listed under the TSC or EPBC Acts, have been recorded within the Hawkesbury LGA (DECCW 2009; DEWHA 2009). Some of these may be present within roadside reserves under HCC's management, or directly adjacent to these areas, and thus, the management of flora and fauna habitat needs to be considered and balanced against other road management works for road safety or fire protection and prevention.

Threatened flora species and threatened fauna and migratory species that have been recorded within the Hawkesbury LGA are listed in Appendix A.

3.5 NATIVE WILDLIFE / FAUNA HABITAT MANAGEMENT

Wildlife habitat, in its broadest definition, includes any vegetation or other physical structure that meets an animal's needs for food, shelter, and/or reproduction. Habitat provided by indigenous vegetation

usually provide the best habitat, as they are richest in diversity and, resources for indigenous fauna species. However, disturbed and degraded areas can provide habitat for native flora and fauna species.

Wildlife habitat can be comprised of a number of elements. These include intact canopy, mid-storey and understorey layers in a vegetation community, particular plant species which may provide food or shelter resources for fauna species, hollows and cracks in living or dead trees, fallen logs and woody debris, deep leaf litter, exposed sandstone rocks supporting water seeps, and caves. Different resources for food, shelter, and reproduction occur in these habitat elements that may satisfy the varied needs of a particular species, or, more often, the needs of a number of different species.

When roadsides are disturbed or managed for road safety or fire prevention and control, some of these components may be removed, reducing the overall quality of the habitat. Any disturbance places additional competition or pressure on available resources. The potential for weed invasion increases as soil is disturbed. With loss or degradation of habitat, the overall area of habitat available is reduced, and hence population sizes of fauna, and the long-term viability of a species or a number of species, are reduced.

Aside from the habitat elements that roadside vegetation can provide, any remnant vegetation on roadsides which link larger areas of natural vegetation has an important role to play in the conservation of wildlife. By linking larger areas of native vegetation, roadsides provide corridors of vegetation that can facilitate the movement of animals from one area to another, allowing them to disperse to other areas to feed, seek refuge from areas that have been disturbed, or breed with individuals from different populations.

Given that roadside vegetation provides habitat for flora and fauna species, and can act as corridors for fauna movement, habitat elements within areas of roadside vegetation with high conservation value need to be conserved. It should be noted however, that where areas of high conservation value vegetation abuts roads, probabilities of collisions between vehicles and native fauna increase, resulting in road kill. Careful management of these areas is required.

3.6 WEED MANAGEMENT

Roadsides are particularly vulnerable to weed invasion as they often experience a build-up in nutrients over time, and they have a large perimeter (or ‘edge') in proportion to their overall area, making them vulnerable to invasion. Roadside 'edges' are subject to disturbance, and the spread of weeds is aided by:

- machinery and vehicles;
- the movement of water in drains;
- the movement and dumping of spoil / rubbish / garden waste;
- grading of road shoulders; and
- maintenance and installation of utilities.

Weed invasion is also encouraged by burning, clearing, grazing, ploughing of firebreaks, and service installation that may occur within roadside reserves. Any of these disturbances may create conditions suitable for the spread and growth of weeds.

Weeds pose a serious threat to established and regenerating remnant vegetation. This is because weeds can out-compete native species, alter vegetation community structure and habitat, and displace native plant and animal populations through the creation of conditions under which native species can

not compete. Weeds can also spread from roadsides to adjacent remnant bushland or agricultural land, which degrades natural environments and is a potential problem for agriculture.

Weeds can be categorised according to the areas in which they occur and the type of threat they pose. Weed categories include noxious weeds, environmental weeds, agricultural weeds, and Weeds of National Significance (WoNS). Noxious weeds are plant species which are considered to be (or have the potential to become) a serious threat to primary production, Crown Land, the environment or community health, and can spread within an area and to other areas. Environmental weeds are plant species (native or introduced) that occur outside of their geographic range which can have a significant impact on native vegetation communities and flora and fauna species. Agricultural weeds are plant species that pose a threat to agricultural production. Weeds of National Significance are weeds that are considered to be the worst weed species in Australia because of their invasiveness, potential for spread, and economic and environmental impacts (NSW Department of Primary Industries website).

Given that weeds pose a serious threat to vegetation communities and flora and fauna habitat, limiting the spread of weeds needs to be a priority in roadside vegetation management. Under the NW Act, HCC has an obligation to control the spread of noxious weeds in its management areas. However, there are no legislative requirements that bind HCC to control environmental weeds, some WoNS or agricultural weeds.

It is recommended that the HCC provide a copy of this RVMP to all relevant Corporations authorised to install and maintain utilities in roadsides to make them aware of the document and their role in preventing the spread of weeds and other plant pathogens along roadsides.

3.7 PLANT PATHOGEN MANAGEMENT

Phytophthora (*Phytophthora cinnamomi*) is a serious fungal pathogen which has caused the destruction of many indigenous and exotic flora species. The fungus is soil-borne, and encysting (dormant) spores are readily transported in soil adhered to vehicles, particularly earth moving machinery. A typical symptom of Phytophthora is one of dieback of the upper branches as Phytophthora destroys the structure of the root tissues, "rotting" the root, and preventing the plant from absorbing water and nutrients.

When Phytophthora dieback spreads to native plant communities, it kills many susceptible plants, resulting in a permanent decline in the biodiversity and a disruption of ecosystem processes. It can change the composition of a vegetation community by increasing the number of resistant plants and reducing the number of susceptible plant species. Native animals that rely on susceptible plants for survival are reduced in numbers or are eliminated from sites infested by Phytophthora dieback.

To date, dieback from Phytophthora has not been a major problem in the Hawkesbury LGA. However, given that Phytophthora is soil-borne pathogen, there is high potential for the fungus to be spread as a soil-borne contaminant on machinery, vehicles, or horse hooves. Once present, there is potential for further spread, particularly during wet periods as Phytophthora is more readily dispersed in moist soil.

The maintenance of clean machinery is the most effective method of preventing the introduction and spread of Phytophthora from one area to another. There are no treatments available that can be used to treat Phytophthora infestations; hence, preventing infestations becoming established is the best management action for this issue.

3.8 STOCKPILE / DUMPSITE MANAGEMENT

A number of locations on roadsides are designated for use as stockpile sites, where gravel, soil or road-work refuse may be retained for later use or removal. Stockpiling, when well contained, should have little impact on nearby remnant vegetation. However, when stockpile sites are located within high value remnants, the risk of vegetation damage is increased due to heavy vehicle activity, particularly if care is not taken to keep vehicles within the designated stockpile area. Further, if stockpiles contain weed propagules or plant pathogens, there is a high risk that weed species and plant pathogens will spread from stockpiles, infecting and degrading remnant vegetation.

Stockpile sites often become invaded by exotic flora and naturalised indigenous species. When road materials (gravel, soil) are then transported to other areas, new infestations are likely to establish.

Stockpile sites are often unsightly, and may encourage the dumping of domestic waste, or the use of the site for non-designated recreational activities such as four-wheel-driving. Thus, these sites can be further degraded through inappropriate uses and activities.

Given the issues associated with stockpiling, care should be taken to place stockpiles in appropriate locations. Care should also be taken to manage stockpiles as appropriate to discourage the spread of weeds when soil is later transported and prevent unlawful use.

3.9 FIRE MANAGEMENT

Roads and roadsides play a significant role in fire prevention and suppression in rural areas. However, in managing rural roads to prevent the spread of fire in rural areas, HCC must also conserve vegetation communities, flora and fauna species, and their habitat. HCC has dual responsibilities for managing the spread of fire along roadsides under the RF Act and conserving ecological values under the EP&A Act.

Fire management is generally facilitated through the removal or substantial reduction of vegetation to create fire breaks. This can encourage weed growth and prevent the recruitment of shrubs and trees, thus degrading native vegetation communities and flora and fauna habitat. Fire is often a trigger for regeneration for native flora species, thus prevention of fire along roads can be detrimental to biodiversity conservation in these areas.

Achieving both the goals of fire prevention and control and biodiversity conservation requires careful planning and thorough evaluation of all issues involved. To achieve all the goals there is a need to balance the fire prevention needs against conservation objectives.

3.10 EROSION AND SEDIMENTATION, WATER CATCHMENTS AND POLLUTION

The incidence of erosion on HCC's rural road reserves is relatively low. However, erosion and subsequent sedimentation may occur as a result of disturbance from roadside maintenance activities, including removal of native vegetation, and from inappropriate placement of stockpile sites that may in turn lead to heavy use of the area by roadside maintenance machinery, and poorly placed turning and parking areas.

Drainage from roads is often high in sediment and pollutants such as oil and fuel residues. This is particularly true in built up semi-urban areas. This may affect water quality, and may contribute to pollution in the water catchment and degrade vegetation communities and flora and fauna habitat. Where there is potential for this to occur further investigations into Water Sensitive Urban Design (WSUD) is required to capture any pollutants before they enter natural water ways, which is external to

the management of roadside vegetation. Where this is observed or has potential to occur, consultation with appropriate people within the HCC is required.

As high water velocities and bare ground are the principal causes of erosion, especially in combination with dispersive soils, road management work need to aim at minimising water velocities by dissipating flows, minimising areas of disturbed ground, and retaining vegetation cover where possible. It is acknowledged that non-native vegetation, particularly grasses can provide soil stability and prevent soil erosion. If weed control has the potential to increase soil erosion along roadsides, weed control is not recommended to be undertaken. Rather weed maintenance preventing the spread of weeds and a detailed site management plan to remove the weeds, revegetate the site with native vegetation and prevent soil erosion will be required.

3.11 SCENIC AND CULTURAL VALUES

Roadside environments contribute greatly to the quality and aesthetics of the landscape. Vegetation may help define the local landscape character of the area, contribute to the natural beauty of an area, and frame vistas across the broader landscape. Roadside environments may also support sites of cultural significance to Indigenous people, and sites of historical or archaeological significance.

The management of roadside vegetation provides opportunities to enhance landscape and cultural heritage values, including opportunities for visitors to learn about the cultural heritage sites and enjoy these areas and landscapes. Where possible, the upgrading, maintenance and retention of the visual amenity and landscape value of roadsides, and preserving sites of cultural and historic significance, are important aspects of roadside management. However, this needs to be undertaken in consideration with the requirements of road safety. Inappropriate landscape treatments can all contribute to the visual degradation of the roadside, and the loss or degradation of significant cultural and historic sites.

3.12 RECREATIONAL ACTIVITIES

Use of roadside environments for recreational activities, such as bike and horse riding can degrade roadside environments. These activities may contribute to erosion, sedimentation and habitat degradation, and encourage weed invasion, as activities typically occur on or form tracks through vegetation remnants.

Recreational activity levels need to be managed to minimise the occurrence of erosion and habitat degradation, which can in turn lead to sedimentation and weed invasion. It is recommended that all recreational activities that are undertaken in roadsides be confined to the carriage way to prevent damage to roadside vegetation being caused. This requires further consideration regarding recreational use of roadsides and road safety by the HCC.

3.13 UTILITIES

Many utility assets (e.g. electricity, telecommunications, water, sewerage and gas) are located within roadside environments as roads provide ready-made access points to service points, and represent inexpensive easements. Maintenance requirements for utility assets vary from underground piping, requiring only access to certain pits, to overhead powerlines requiring regular tree cutting and lopping to maintain sufficient clearance to minimise the risk of fires.

It is important that when utility agencies are planning the installation or maintenance of assets, roadside conservation values and possible location alternatives that minimise disruption to conservation values are considered. Thus, where utilities are installed or maintained, clearance of native vegetation should be kept to a minimum. Disturbance to understorey vegetation and soil should also be kept to a

minimum. In addition, earthmoving machinery should be properly maintained to minimise the spread of weeds or plant pathogens (e.g. *Phytophthora*). It is recommended that utilities are made aware of this RVMP and that they follow actions identified in the RVMP to prevent the spread of weeds and plant pathogens along roadsides.

3.14 LANDUSE (AGRICULTURAL USE – TRAVELLING STOCK ROUTES)

The use of rural roadside environments as travelling stock routes are allowable under the RLP Act, and stock permits can be issued by HCC to facilitate this. Permits allow stock to walk or graze within rural roadside environments, and, within low conservation value roadsides, where rare, threatened or significant vegetation are less likely to occur, grazing by stock can be an effective means of reducing fuel loads. However, care must be taken to ensure that roadside environments are protected from damage by grazing stock. Stock may directly damage rare, threatened or significant plants and ringbark trees, which decreases biodiversity. They may also contribute to changes in the nutrient status of soil, leaving roadside environments more vulnerable to weed invasion, contribute to erosion, and change local hydrology.

3.15 EDUCATION / COMMUNITY AWARENESS, TRAINING

Central to the protection and maintenance of native vegetation on roadsides, is the education of road users and workers of the need to preserve, protect and enhance the roadside vegetation. Road users and workers include Council staff, contractors operating within the road reserves, utility agencies operating within the road reserves, emergency service personal, planners, people who are planning works within road reserves, and adjacent property owners.

Education and community awareness initiatives, as well as training for road users should be considered by the HCC. An important component of this Roadside Management Plan is the information brochure and signage strategy. These aim to make road users aware of sensitive areas and the importance of roadsides in biodiversity conservation.

4 Methods for Developing This Roadside Vegetation Management Plan

4.1 DATA AUDIT AND LITERATURE REVIEW

4.1.1 Data Layers Reviewed

Data layers reviewed include the following:

- HCC Updated Vegetation Mapping (HCC 2007a);
- HCC Conservation Significance Assessment Mapping (HCC 2007b);
- Atlas of NSW Wildlife Records (DECCW 2009);
- Ownership, property boundaries and cadastre;
- Roads;
- Waterways;
- Geology;
- Soil landscapes;

The layers (shapefile (ESRI) format) were reviewed within ArcGIS. Aerial imagery of the Hawkesbury LGA (Virtual Earth) was also reviewed to investigate the extent of vegetation cover, landscape features, land use, and other possible management issues surrounding rural roads within the Hawkesbury LGA.

4.1.2 Literature Supplied and Reviewed

A number of documents were supplied by HCC, and a number were sourced by Eco Logical Australia. These included:

- Bass Coast Shire Council Roadside Management Plan (BCSC 2003);
- Bega Valley Shire Council Guide to the Management of Roadside Sites with Significant Roadside Vegetation (BVSC 2004);
- City of Casey Roadside Vegetation Management Plan (Ecology Australia 2002);
- Greater Shepparton City Council Roadside Management Strategy (GSCC 2008a);
- Greater Shepparton City Council Community Roadside Management Handbook (GSCC 2008b);
- Greater Shepparton City Council Roadside Environmental Code of Practice Handbook – Road Construction and Maintenance Contractors and Workers (GSCC 2008c);
- Hunter Councils Roadside Strategy (HCCREMS 2007);
- Hunter Councils Roadside Environment Guides 1 to 13 (HCCREMS 2009a-m);
- Kangaroo Island Council Roadside Vegetation Management Plan (KIC 2007);
- Surf Coast Shire Rural Roadside Management Strategy (SCS 2003a); and
- Surf Coast Shire Code of Environmental Practice for Works on Rural Roadsides (SCS 2003b).

The documents were generally Local Council Roadside Vegetation Management Plans and Codes of Practices for the management of roadside vegetation for LGAs in Victoria, although there were also

RVMPs and Strategies and Guides from South Australia and NSW. The documents were reviewed for best practice road design treatments and strategic roadside vegetation management actions.

In addition to the above documents, the following documents were also reviewed:

- Western Sydney Urban Bushland Biodiversity Survey (NSW NPWS 1997);
- Western Sydney Vegetation Interpretation Guidelines (NSW NPWS, 2002a);
- Hawkesbury City Council Updated Vegetation Mapping (ELA 2007).

These documents were used to determine communities, populations and species listed as regionally significant. They also provided background information on the composition and condition of vegetation communities within the Hawkesbury LGA.

4.2 PRIORITY MATRIX – DEVELOPMENT OF ROAD MANAGEMENT CATEGORIES

4.2.1 Overview

The method used aimed to identify roads of high, medium or low conservation priority within the Hawkesbury LGA, taking into account all rural roads, federal and state legislation, weed plumes, and a previous assessment of conservation significance of vegetation (which incorporated information on the position of vegetation in the landscape: core vegetation, support for core etc.). Factors such as degree of past or current disturbance, width of road reserve, presence of cultural and indigenous heritage, and presence of habitat elements were not considered, as, although useful for determining conservation priority, data were not readily available for input into the method.

Both a score-based system and a count-based system were used, where scores were allocated to a particular road depending on the conservation significance and type of vegetation, and counts for the number of threatened flora and fauna species previously recorded were tallied for a particular road, to signify its conservation priority level. If several data sources indicated a road had conservation priority (threatened species had been previously recorded and EECs were present and of high conservation significance), or supported weed plumes, then the scores were summed to produce a combined score/count for the road. This score/count was then ranked to produce a rank of low, medium or high conservation priority.

4.2.2 Data Inputs

The following inputs were considered essential for inclusion into the priority matrix. The inputs covered a series of scales (Federal and State legislation), as well as the conservation significance of vegetation communities recorded along HCC's rural roads.

The inputs included the following key datasets. These datasets and their source are expanded on below.

- Hawkesbury City Council Updated Vegetation Mapping (HCC 2007a);
- Hawkesbury City Council Conservation Significance Assessment Mapping (HCC 2007b);
- EPBC Act Protected Matters Search Tool (DEWHA 2009); and
- Atlas of NSW Wildlife Records (DECCW 2009).

Hawkesbury City Council Updated Vegetation Mapping

Both Aerial Photo Interpretation (API) (ELA 2005), and site data collection (ELA 2007) were used to develop HCC's Updated Vegetation Mapping (HCC 2007a). Site data collection was conducted between 2006 and 2007. The vegetation mapping aimed to:

- Update vegetation mapping previously held by HCC within the Hawkesbury LGA;

- Provide an updated map layer (1:10 000) to HCC;
- Provide greater certainty and rigour to the environmental impact assessment process;
- Provide sufficient information to guide the identification of core and complementary conservation areas.

Over 2393 sites were surveyed for general rapid survey, wetland survey, koala survey, threatened species survey, roadside validation, and riparian validation, to develop the HCC Updated Vegetation Mapping layers (ELA 2007). The HCC Updated Vegetation Mapping layer formed the basis of the priority matrix for this project. It was used to identify vegetation communities listed under the EPBC and TSC Acts, other areas of native bushland, and weed plume areas.

Hawkesbury City Council Conservation Significance Assessment Mapping

HCC's Conservation Significance Assessment (CSA) mapping was completed in 2007. The methodology used to develop the CSA layer for vegetation in the Hawkesbury LGA followed that used by the NSW National Parks and Wildlife Service in 2002 to develop a CSA layer for Western Sydney Vegetation (NSW NPWS 2002b). The methodology ranked areas into Core, Support for Core, Urban Remnant Trees and Other Native Vegetation depending on:

- Vegetation community legal status (NSW TSC Act);
- Patch size; and
- Condition.

As part of the method to develop a priority matrix for HCC rural roads, scores were allocated to Core, Support for Core and Other Native Vegetation (Section 4.2.4). The definitions of these categories are provided below:

- 'Core Habitat'; defined as "areas that constitute the backbone of a viable conservation network across the landscape; or areas where the endangered ecological communities are at imminent risk of extinction"
- 'Support for Core Habitat'; "areas that provide a range of support values to the Core Habitat, including increasing remnant size, buffering from edge effects, and providing corridor connections"
- 'Other Remnant Vegetation'; "all native vegetation that does not fall within the above significance categories".

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act is the central piece of environmental legislation for the Federal Government. The Act defines NES matters, including nationally and internationally important flora, fauna and ecological communities. Section 2.1.1 outlines the EPBC Act in more detail.

EPBC listed communities were identified as occurring along rural roads in the Hawkesbury LGA using the vegetation community mapping obtained from the HCC Updated Vegetation Mapping Project (HCC 2007a). The EPBC threatened species records were extracted from the NSW Wildlife Atlas. Records older than 1980 were excluded from the analysis as DECCW define "recent sightings" as records obtained since 1980 and consider records previous to this to be less accurate and reliable.

The method used for incorporating Federal-listed EECs into the priority matrix was based on a score system. Incorporation of threatened species into the priority matrix was based on a counting system (Section 4.2.4).

NSW *Threatened Species Conservation Act 1995*

The TSC Act identifies and protects animals and plants within NSW at risk of becoming extinct. Section 2.2.2 outlines the TSC Act in more detail.

Digital data on the extent of vegetation communities listed on the TSC Act were obtained from the HCC Updated Vegetation Mapping Project (HCC 2007a). Individual threatened species records were obtained from the NSW Wildlife Atlas. As with the EPBC species records older than 1980 were excluded from the analysis.

The method used for incorporating State-listed EECs into the priority matrix was based on a score system. Incorporation of threatened species into the priority matrix was based on a counting system (Section 4.2.4).

4.2.3 Polygon and Point Data

The methodology used two GIS data types: polygon data layers (vegetation types and CSA), and point data layers (threatened flora and fauna species).

The final conservation priority data layer was a polygon data layer. Therefore, the following rule was followed when working with point data sources:

- A threatened species record (buffered point data) was considered to be located on a road when any part of the buffered 100 m or 500 m point was within a road polygon.

4.2.4 Scoring and Counting Systems

A scoring system for vegetation and CSA was used to indicate a road's conservation priority. A counting system was used for all other input layers. Table 2 and Table 3 show the scores allocated for the vegetation and CSA data layer classes. These were scaled to reflect the relative importance, or conservation priority, of each class.

Table 2: Conservation Priority Scores for Vegetation Classes.

CLASS	SCORE
EEC	3
Other Native Vegetation	2
Weed Plumes	1
No Vegetation	0

Table 3: Conservation Priority Scores for CSA Classes.

CLASS	SCORE
Core	4
Support for Core	3
Other Native Vegetation	2

In regards to the counting system for counts of threatened species under Federal and State legislation, records were first buffered (by 100 m for all threatened flora species records and 500 m for all threatened fauna species records, except Cumberland Land Snail *Meridolum corneovirens*, which was buffered by 100 m). Numbers of records for flora and fauna species within each rural road were then tallied (note, the number of records were counted, not the number of different species), and these numbers were used to indicate a road's conservation priority according to Federal and State legislation.

The method required the addition of scores/counts allocated or calculated for each input layer per road. The combined score/count simply considered all inputs in the calculation.

It is acknowledged that the use of a scoring system for the classification of threatened species (vulnerable or endangered) may have been used as an alternative measure to input into the

conservation priority matrix. Another option may have been to use a counting system for the number of different species along a road. However, the tally or count-based approach for threatened species records was chosen for use in the method due to time constraints associated with this project.

4.2.5 Conservation Priority Ranking

The combined score/count per road ranged between 0 and 242. However, the majority of roads had low combined scores/counts. As the purpose of this RVMP was to provide strategies for where and how roads should be managed, with the basis of the RVMP centred on the conservation ranking of roads, it was important to meaningfully delineate categories in a way that demarcated between low, medium and high conservation roads.

The delineation of these categories took some consideration, as the classification significantly influenced the maps produced and the potential interpretation of the maps. In order to function as an appropriate classification, the categories used had to perform the following:

- Accurately represent the conservation level of each road; and
- Identify between areas of differing conservation levels to allow informed management decisions to be made.

An analysis of the number of roads allocated each combined score/count was thus conducted to identify any trends in the data and classify the categories appropriately.

Table 4 outlines the results of this analysis. As can be seen in the table, the majority of scores/counts were between 0-13 (90 %), with only a very small proportion outside this range.

Table 4: Number of Roads Allocated to Each Combined Score/Count.

COMBINED SCORE/COUNT	NUMBER OF ROADS
0	70
1	48
2	17
3	25
4	22
5	88
6	82
7	119
8	47
9	35
10	26
11	18
12	17
13	14
14	8
15	8
16	7
17	6
18	4
19	2
20	5
21	2

COMBINED SCORE/COUNT	NUMBER OF ROADS
22	2
23	1
24	2
26	2
27	3
28	3
29	1
31	3
33	1
35	1
36	1
38	1
39	1
44	1
45	1
54	1
57	1
84	1
117	1
223	1
242	1

Two options were considered for the categories, including;

- Option 1: Breaking the combined scores/counts proportionally between the three categories based on the number of roads assigned to each combined score/count; and
- Option 2: Breaking the combined scores/counts into three approximately equal categories between 0 and 242.

Further analysis was undertaken into the two options to determine if they met the two requirements of the maps listed above. Table 5 and Table 6 display the categories allocated for each option, along with the number of polygons assigned to each category. The conservation priority ranking is shown in Figure 2.

Table 5: Categories Assigned for Option 1

CATEGORY (COMBINED SCORE/COUNT)	NO. OF ROADS
0-5 (Low)	271 (39 %)
6-7 (Medium)	200 (29 %)
8-242 (High)	229 (33 %)

Table 6: Categories Assigned for Option 2.

CATEGORY (COMBINED SCORE/COUNT)	NO. OF ROADS
0-13 (Low)	628 (90 %)
14-28 (Medium)	55 (8 %)
29-242 (High)	17 (2 %)

Option 1 categories were determined by calculating the number of roads assigned to each combined score/count, and then proportionally allocating (as evenly as possible) the combined scores/counts to a category. The result is a much more even spread of combined scores/counts within each category. Thus, 33 % of roads have been allocated to the High category, with 29 % and 39% allocated a Medium and Low classification, respectively.

Option 2 categories were assigned by evenly grouping adjacent scores across the 0-242 range. Therefore, each category represents approximately 14-15 scores. The categories assigned using Option 2 are heavily biased towards the lower scores, with 90 % of roads being assigned a Low category. At the other end of the scale, only 2 % of roads have been assigned to the High category. The Medium category contained 8 % of roads.

From the analysis above it was decided that Option 2 would be used to generate the conservation priority categories for roads. Option 2 better reflects the requirements of the conservation priority analysis and the needs of HCC as it:

- More effectively differentiates the conservation priority of the polygons within rural roads (based on the combined score/count); and
- Limits the range of combined score/counts per group.

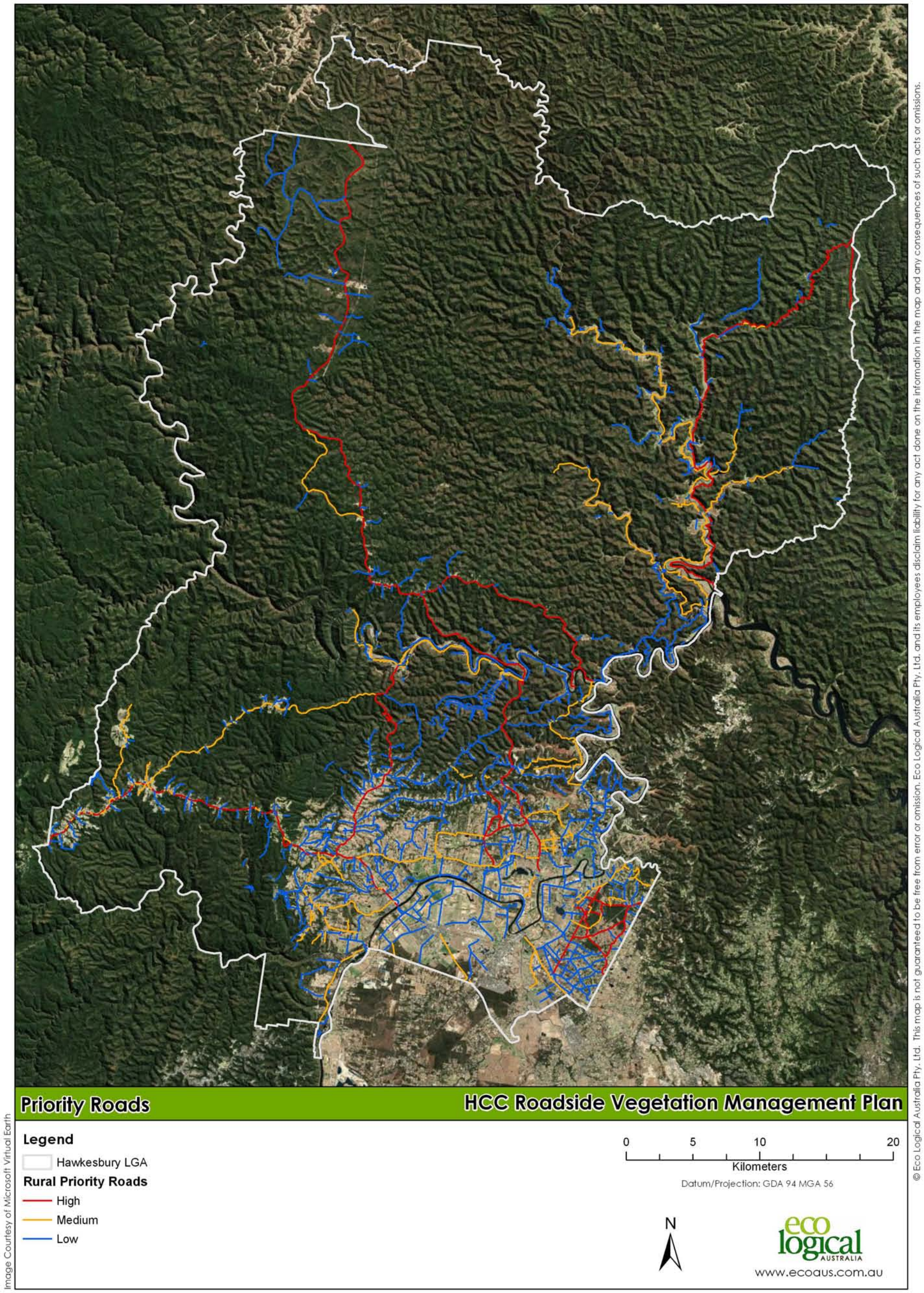


Figure 2: Results of the Prioritisation Matrix for the HCC

4.3 ROADSIDE SURVEYS

Roadside surveys were conducted over 6 days between the 25th and 27th August 2009, and 1st and 3rd September 2009, by Eco Logical Australia's ecologists, Lucas Geelen and Dr. Enhua Lee. Roadside surveys were conducted via drive-by survey from a 4-wheel drive travelling at 20-30 km/h along roads with light traffic, and up to 60 km/h along roads with heavy traffic, although the speed at which surveys were conducted varied depending on the complexity of vegetation assemblages (composition and number of vegetation communities) occurring adjacent to roads and management issues observed.

Field survey was undertaken to confirm results from the desktop review (mainly verification of vegetation communities), and gather data pertaining to the roadside environments surveyed within low, medium and high conservation priority roads. Data recorded included:

- the width of the roadside environment;
- road surface (sealed or unsealed);
- dominant flora species in the canopy, mid-storey and ground-storey layers of roadside vegetation;
- weeds and threatened flora species present within roadside vegetation;
- habitat elements available (hollow-bearing trees, stags leaf litter, rocks/caves, water bodies) within roadside environments; and
- management issues along roads surveyed (e.g. erosion issues and use of roadside environments for recreational activities).

Low, medium and high conservation roads were surveyed in road segments, as many roads surveyed varied in respect to vegetation communities present, road surface, width of roadside environments, fauna habitat elements present, condition, or management issues along their length. New road segments were begun when a difference was observed in one of the variables recorded. For each road segment, start and end odometer readings and GPS positions were recorded along with the other data collected.

Data were entered directly into an electronic spreadsheet (Microsoft Excel 2007). To ensure survey consistency, all driving was conducted by Enhua Lee, with data entry conducted by Lucas Geelen. Both surveyors identified dominant flora species, habitat elements and management issues along roads.

All roads identified by the prioritisation matrix as high conservation priority roads were surveyed (approximately 238 km). However, due to the size of the study area and time constraints, just over a third of the roads identified as medium conservation priority roads (covering approximately 95 km) were surveyed, with only 2 % of roads identified as low conservation priority roads (covering approximately 30 km) surveyed.

4.4 MAPPING

The outputs of the prioritisation analysis and roadside surveys were translated into mapping products. All roads that were and were not surveyed are identified in the attached maps. Using the combination of information from the prioritisation matrix and roadside surveys, these maps were produced to illustrate areas of high, medium and poor conservation value. Information has also been extracted on high priority management actions, particularly weed infestations.

The council area has been split into a series of maps which illustrate the results from the roadside survey in a spatial format, using several map books, depending on the survey results being mapped.

5 Results

5.1 ROADSIDE SURVEYS

During the survey a total of 49 roads within the HCC road network were surveyed. This totalled approximately 364 km of roads being surveyed. All high priority roads (237 km), as identified in the prioritisation matrix, were surveyed, along with 18 medium priority roads (95 km) and 11 low priority roads (30 km). A list of the roads surveyed, and their conservation priority levels as determined through the prioritisation matrix, is provided in Table 7.

Table 7: Roads surveyed during road side surveys.

Road	Conservation Priority Level	Road Length (km)
Avondale Road	High	2.26
Bells Line Of Road	High	32.70
Bulga Street	High	0.31
Comleroy Road	High	20.73
Creek Ridge Road	High	6.13
Great Northern Road	High	1.56
Hebron Road	High	1.72
Lamrock Avenue	High	1.33
Midson Road	High	3.31
Old East Kurrajong Road	High	4.38
Old Pitt Town Road	High	6.89
Old Stock Route Road	High	5.72
Pitt Town - Dural Road	High	4.74
Putty Road	High	71.56
Scheyville Road	High	5.33
Settlers Road	High	19.49
Wheelbarrow Ridge Road	High	19.70
Wollombi Road	High	29.98
Argents Road	Medium	1.38
Blacktown Road	Medium	2.99
Browns Road	Medium	1.03
Cobcroft Road	Medium	0.20
Coobah Road	Medium	4.09
Evans Road	Medium	0.32
Hanlons Road	Medium	1.24
Kurmond Road	Medium	14.32
Mount Tootie Road	Medium	3.97
Mountain Lagoon Road	Medium	15.10
Mulgrave Road	Medium	1.84
Salters Road	Medium	1.13
Schofield Road	Medium	1.42

Road	Conservation Priority Level	Road Length (km)
Spinks Road	Medium	5.62
Stannix Park Lane	Medium	0.75
Stannix Park Road	Medium	5.19
The Driftway	Medium	6.79
Upper Colo Road	Medium	14.56
West Portland Road	Medium	13.40
Boundary Road	Low	1.56
Broos Road	Low	1.41
Bull Ridge Road	Low	4.91
Coburg Road	Low	0.55
Commercial Road	Low	3.72
Glebe Road	Low	0.92
Kurrajong Road	Low	1.66
Menin Road	Low	1.61
Packer Road	Low	3.59
Pitt Town Road	Low	3.30
Sackville Road	Low	4.49
Stahls Road	Low	2.40

Along each road, the condition of vegetation changed, along with the vegetation community. These 49 roads were split into a further 218 segments based on either their condition (poor, moderate and good condition) and/or a change in the vegetation community. This resulted in 54 segments of vegetation being categorised in good condition, 73 segments being categorised in moderate condition and 88 segments being categorised in poor condition. The condition of roads surveyed is illustrated in the attached maps.

The longest segment was 25.9 km in length along Putty Rd. This segment consisted of the vegetation community Sydney Sandstone Ridgetop Woodland. The site was in very good condition with the only weeds observed being Coolatai Grass (*Hyparrhenia hirta*) and Whiskey Grass (*Andropogon virginicus*) present. The shortest segment was 0.25km along Old Stock Route Rd. This section of road was in poor condition, and consisted of Alluvial Woodland vegetation community, which was largely dominated by weed species, particularly Rhodes Grass (*Chloris gayana*).

5.2 MAPPING

The data from the roadside surveys has been used to a produce a series of detailed maps to identify:

- Roads surveyed;
- Roadside of conservation significance, and good, medium and poor condition roadside vegetation;
- Conservation priority and vegetation condition;
- The location of threatened weed species; and
- The location of significant weed species.

These maps have been produced for use with the management prescriptions below in Section 6, to manage roads and the associated roadside vegetation effectively without compromising the biodiversity

value of roadside vegetation or the functioning of roads. This information can also be used to establish the locations of roadside signage, discussed in Section 8.

5.3 VEGETATION

During the surveys a total of 327 species of plants were recorded. Of these, 244 species were native species and 83 species were introduced species that are not native to the Hawkesbury LGA.

5.3.1 Native Flora

A review of the DECCW Database (DECCW database July 2009) identified 31 species listed under the TSC Act and 16 species listed under the EPBC Act as being present in the Hawkesbury LGA (Appendix A). Of the 244 species of native flora recorded during the survey, three flora species were observed which are listed under the TSC Act. Two of these are also accorded protection under the EPBC Act (Table 8).

Table 8: Threatened species observed during the survey.

Common Name	Species Name	TSC Act	EPBC Act	Roads
Downy Wattle	*Acacia pubescens*	Vulnerable	Vulnerable	Mountain Lagoon Rd Broos Rd
	Grevillea juniperina ssp. *juniperina*	Vulnerable		Avondale Rd
	Persoonia hirsuta ssp. *hirsuta*	Endangered	Endangered	West Portland Rd

5.3.2 Introduced Flora

During the road side surveys, 83 species of weeds were recorded. Of these, 14 species are listed as Noxious Weeds in the Hawkesbury LGA under the NW Act, while five species are WoNS (Table 9). The most abundant weed species recorded were African Lovegrass (*Eragrostis curvula*), Fireweed (*Senecio madagascariensis*) and Kikuyu (*Pennisetum clandestinum*). The most significant weed species are listed in Table 10. It is recommended that further surveys for significant weed species be undertaken. Due to the limited abundance and distribution of these species, they have the potential to be eradicated from the Hawkesbury LGA. The distribution of these weed species are shown in the attached maps.

Table 9: Noxious weed species recorded during the survey.

Common Name	Species Name	Noxious Weed Category	WoNS
Bridal Creeper	*Asparagus asparagoides*	5	Yes
Mother of Millions	*Bryophyllum delagoense*	3	
Green Cestrum	*Cestrum parqui*	3	
Boneseed	*Chrysanthemoides monilifera* ssp. *monilifera*		Yes
Pampas Grass	*Cortaderia selloana*	3	
Patterson's Curse	*Echium plantagineum*	4	
Lantana	*Lantana camara*	5	
Large Leaf Privet	*Ligustrum lucidum*	4	
Small Leaf Privet	*Ligustrum sinense*	4	
African Boxthorn	*Lycium ferocissimum*	4	
African Olive	*Olea europaea* ssp. *cuspidata*	4	
Prickly Pear	*Opuntia* sp.	4	
Blackberry	*Rubus fruiticosus* agg.	4	Yes
Willows	*Salix* spp.	5	Yes
Salvinia	*Salvinia molesta*	3	Yes

Table 10: Significant weed species recorded during the surveys

Common Name	Species Name	Location
Coolatai Grass	*Hyparrhenia hirta*	Putty Rd
Boneseed	*Chrysanthemoides monilifera* ssp. *monilifera*	West Portland Rd
Trad	*Tradescantia fluminensis*	Pitt Town – Dural Rd Wheel-barrow Ridge Rd Settlers Rd Bells Line of Road West Portland Rd Upper Colo Rd Comeleroy Rd Stannix Park Rd
Camphor Laurel	*Cinnamomum camphora*	Old Pitt Town Rd Creek ridge Rd Wollombi Rd Stannix Park Rd Salters Rd Sackville Rd Gorricks Lane
Salvinia	*Salvinia molesta*	Argents Rd
Blue Periwinkle	*Vinca major*	Sackville Rd

6 Roadside Vegetation Management Plan – Strategic Management Actions

6.1 ROAD SAFETY

Adequate road verge maintenance is the key to ensuring that roads remain trafficable and safe. The following actions should be followed to ensure that a safe carriageway is provided. The road envelope consists of the lanes, shoulder, road verge and batter. The lands, shoulder and verge are to be devoid of vegetation. The batter is to be, while vegetation on the batter is not to be removed. It is imperative that these guidelines are followed strictly to ensure impacts on roadside vegetation are minimised.

Intersections

- Austroads has a number of guidelines/standards in relation to sight distances for different situations and sight triangles at intersections. Sight distances and sight triangles at intersections are to be managed in accordance with Austroad standards (Austroads 2009). Standards for adequate sight distance for different situations can be found in "Guide to Traffic Engineering Practice" Published by Austroads.
- Where vegetation removal is required, assessment as to whether the vegetation to be cleared is an EEC is required. If so further assessments will be required from DECCW and appropriate offsets may be required.

Sealed Roads

- On sealed roads, the road envelope will have a minimum vertical height of 5.5 m[1] except on designated high clearance routes where it will be 6 m (Austroads 2009).
- The width of the road envelope will be from 500 mm on the outer side of the white road post, to 500 mm on the outer side of the white road post, on the other side of the road. This provides for two lanes each being 3.5 m wide, the shoulder being 1.5 – 2.0 m wide (depending on the volume of traffic) and the road verge width being 1 m (Austroads 2009). The batter will have a minimum width of 1 m and up to 6 m depending on the slope of the batter or if a greater sight distance is required (Austroads 2009) (Figure 3).
- Vegetation outside of these clearance distances (heights and widths) should not be cleared or disturbed, unless a full assessment of their impacts are performed and approval given.

Unsealed Roads

- On unsealed roads, the road envelope will have a vertical height of 5.5 m (Austroads 2009).

[1] Austroads (2009) does not provide clearance heights for vegetation. Hence the standard clearance heights for major roads and other roads have been adopted for clearance heights of vegetation.

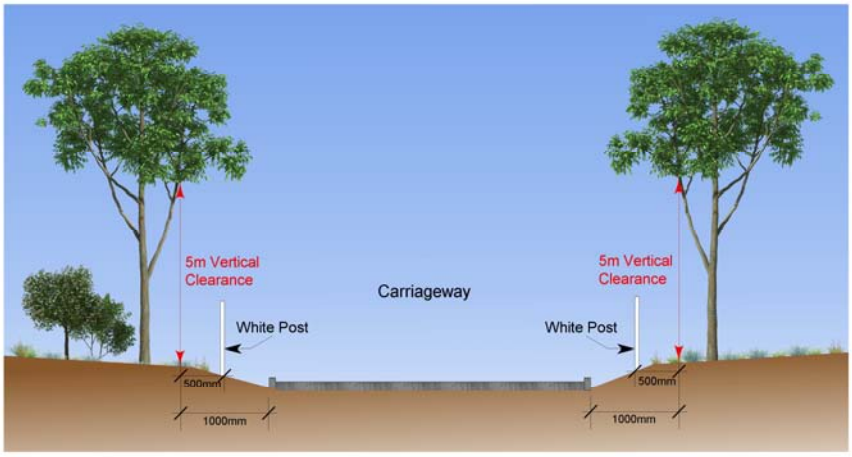


Figure 3: Visual representation of height and width of carriageway for sealed roads

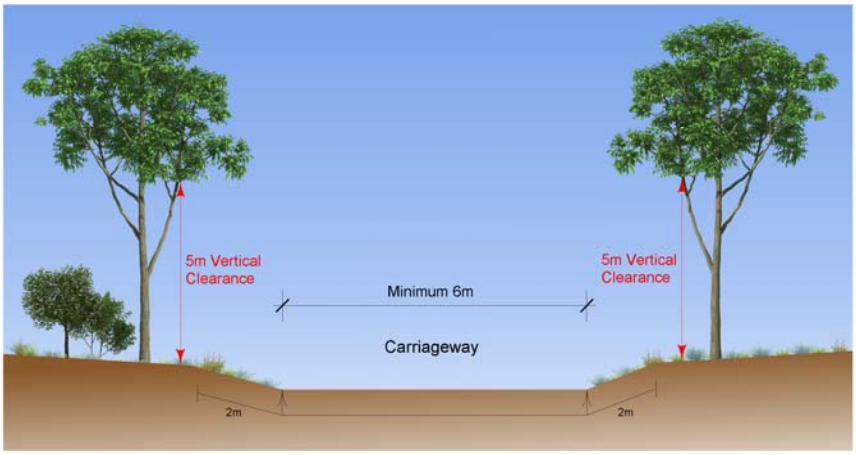


Figure 4: Visual representation of height and width of carriageway for unsealed roads

- The width of the road envelope will be the width of the road (minimum 6.2 m width) plus a 2 m shoulder on either side of the road (Austroads 2009), this provides for two lanes each being 3.1 m wide and the shoulder being 1.5 m wide (Figure 4);
- Vegetation outside of these clearance distances (heights and widths) should not be cleared or disturbed, unless a full assessment of their impacts are performed and approval given.

6.2 ROAD CONSTRUCTION OR WIDENING

Road construction and widening works can have substantial impacts on roadside vegetation, depending on the scale of works (see Section 3.1). The following actions should be taken when constructing roads.

- Prior to preparation of plans for road construction or widening, investigate the relevant permit requirements (e.g. is work occurring near a waterbody).
- Carry out site inspections with all interested parties prior to the preparation of road construction or widening plans on roads of high and medium conservation value. This will ensure that the most appropriate methods to minimise vegetation loss will be included and will assist to plan the rehabilitation of the site after works are completed.
- Conduct an assessment to determine impacts on environmental and other values (REF or EIS) prior to road construction or widening works being carried out. The environmental assessment should involve Council staff from design, planning and works walking the entire route to identify significant roadside vegetation and other environmental considerations. The process should, among other things, identify:
    - all construction activities and where they will take place, including stockpiles and dump sites, site sheds, machinery storage and turn around points, vehicle parking sites, access roads;
    - sites of environmental or cultural significance that are not to be disturbed; and
    - the location and type of erosion and sediment control measures.
- Consider modifying the design to reduce vegetation loss (e.g. different alignments, pavement and shoulder widths, use of kerb and channel);
- Plan the construction phase to occur at the optimum time of year to minimise impacts (e.g. erosion). To minimise erosion, undertake (where appropriate) construction works in stages so as to expose the smallest work area for the shortest time;
- Prior to commencement of works:
    - identify all boundaries and use fencing, barricades or other markers to delineate these;
    - inform all workers and contractors of permit conditions; and
    - train workers and contractors in erosion control, vegetation removal and vegetation protection measures prior to commencement of works.
- Apply general principles during road construction that will assist in protecting roadside vegetation:
    - Stay within limits of construction (disturbance) zones;
    - avoid using or storing heavy machinery on all native roadside vegetation where possible;
    - keep construction machinery out of high and medium priority roadside vegetation sites;
    - keep machinery, equipment or material on designated storage places clear of native trees, shrubs and grasses, and use designated turning circles. Use of areas supporting native vegetation by machinery, equipment or material can damage the groundcover vegetation and cause soil compaction, which damages tree roots;

- protect the trunk, branches and roots of native trees by not placing any material or machinery within the drip line (the area under the canopy) of the tree;
- retain natural soil levels under trees by not spreading or removing soil within the drip line of the tree;
- avoid placing fill or excavating within the drip line of the tree;
- ensure materials required for road works are obtained from clean fill sites and are weed-free;
- construct table drains to follow natural drainage lines to reduce water velocity and run-off and prevent water from flooding the road;
- consider grassed road shoulders on gravel roads and on less used sealed roads as a means of reducing silt run-off;
- where topsoil is removed from work areas, store it separately to subsoils and return it to the site during rehabilitation. Control erosion by minimising vegetation removal, minimising soil disturbance from machinery and implementing appropriate stormwater controls;
- Chip and spread native vegetation removed from the site back over the disturbed area;
- Stack vegetation or material to be burnt at the site away from native vegetation, preferably on bare ground or on areas supporting exotic grasses such as kikuyu; and
- wash down machinery before moving to the next site to minimise the spread of weeds and plant pathogens.

6.3 ROAD MAINTENANCE (VERGE AND ENVELOPE, DRAINAGE)

Road maintenance works are necessary for road safety and for conserving other road functions. The following actions detail how roadside vegetation and the road surface should be maintained.

- In relation to maintaining roadside vegetation:
  - prune or remove the minimum amount of native vegetation required to improve or maintain sight distance (see Section 6.1);
  - avoid pruning parts of trees supporting hollows that may provide important habitat for fauna;
  - Chip and spread native vegetation removed from the site back over the site. Avoid chipping and spreading any plants with weed propagules; and
  - Stack vegetation or material to be burnt at the site away from native vegetation, preferably on bare ground.
- In relation to grading unsealed roads:
  - undertake grading only when required to maintain a stable, smooth running surface and to retain the original surface drainage. Over-grading results in unnecessary erosion and increases road surface rock wear through repeated stripping of the road surface;
  - contain grading activities within the current road width. This will minimise soil disturbance and damage to roadside vegetation;
  - commence road grading from the table drain or road edge and work inwards, creating windrows of surplus material along the road centerline;
  - import any additional required material. Do not obtain additional material from the roadside as this will involve significant soil disturbance;

- surplus material that cannot be recycled into the road pavement or shoulder should be placed in an appropriate location away from drainage lines and removed to another maintenance site;
- ensure that continued grading over time does not cause the road profile to become entrenched below the general level of the surrounding land, thereby creating a drainage channel. This eventuality needs to be corrected as it will increase flow volumes at drainage lines and can cause localised flooding, both potential contributors to soil erosion;
- apply erosion and sediment controls such as sediment fencing, if works are within 20 metres of a waterway, or rainy conditions are expected;
- compact the work area immediately after grading. If moisture content is too low, apply water or postpone grading until rainfall occurs;
- protect tree trunks and avoid knocking bark off the base of trees with the grader blade. Damage to the tree trunk can result in disease or decay entering the tree trunk;
- avoid excavating or piling soil material within tree drip lines;
- avoid pushing loose soil up into native vegetation on the roadside as this encourages weed invasion;
- turn grading machines only at road intersections, landholder driveways or within the road envelope; and
- undertake hygiene practices (eg. for the control of Phytophthora) when a new section of road is graded.

6.4 ENDANGERED ECOLOGICAL COMMUNITIES AND THREATENED FLORA AND FAUNA SPECIES

As identified in Section 3.3 and 3.4, a number of EECs and threatened flora and fauna species have been previously recorded on HCC's rural roads. Further, *Acacia pubescens* (Downy Wattle), *Grevillea juniperina* spp. *juniperina* and *Persoonia hirsuta* ssp. *hirsuta* (Geebung) were recorded during the roadside surveys of selected rural roads within the Hawkesbury LGA.

The following actions detail how roadside environments should be managed for the protection of EECs and threatened flora and fauna species.

- Utilise the results from the roadside vegetation survey to identify where EECs and threatened species under State and Federal legislation are located and add to this data when possible;
- Where present
  - it is recommended to confine construction or maintenance works to construction or maintenance area
  - Ensure that an assessment is undertaken for the EECs and threatened species present for any construction or maintenance works;
  - develop road maintenance and vegetation management techniques that protect EECs and threatened species, avoid damage to the EEC and threatened species' habitat, and enhance the survival of the EEC and threatened species. HCC may need to consult with DECCW to determine the requirements of EECs and threatened species;
  - minimise native vegetation that must be removed within the road batter;
  - avoid disturbing soil with any machinery in the batter outside of the maintenance or construction zone;
  - maintain natural hydrology;

- retain habitat elements in situ for fauna species unless they pose a identifiable risk to road safety after which they should be relocated to a suitable area;
- encourage regeneration of native vegetation through weed control;
- reduce threats from weed control activities and plant pathogens; and
- utilise signage to identify the presence of significant vegetation.

6.5 FAUNA HABITAT MANAGEMENT

It is important that as many habitat components as possible are retained along HCC's roadsides in a manner that also allows for road safety and fire protection and suppression. This is particularly important where roadsides act as wildlife corridors through a fragmented and degraded landscape (see Section 3.5).

The following actions detail how roadside environments should be managed for the maintenance of fauna habitat.

- Plan activities and works to result in minimal vegetation removal. Consider:
  - alternative sites (e.g. sides of road, private land);
  - options for services (e.g. underground, aerial bundled cable, zigzagging, shared easements);
  - clearance requirements on individual roads (e.g. bus routes may require more clearance); and
  - options to keep works vehicles on the formed road pavement.
- Plan activities and works to result in minimal changes to natural hydrology;
- Inspect, identify and mark all vegetation to be removed before starting any works. Fence off or mark areas of native vegetation to be protected. Tree drip lines of native vegetation to be protected should be avoided to minimise root damage or soil compaction in this area;
- Select machinery which will suit the size/type of the task and result in minimal impact on surrounding earth and vegetation;
- Remove the least amount of vegetation necessary to do the works;
- Use personnel with appropriate horticultural training when removing the vegetation;
- Wherever possible, vehicles used during removal works are to remain on the road formation (if this is not practical, consider gaining permission to use cleared private land adjacent to roadside);
- Unless posing a safety hazard or conflict with fire prevention and suppression requirements, retain dead trees and fallen limbs (avoid "tidying up" of areas). Similarly, retain larger felled vegetation containing hollows on site or relocate to another area to provide additional wildlife habitat;
- Fell vegetation in a direction that minimises damage to surrounding vegetation (preferably onto the road formation or a cleared area);
- When disposing of felled vegetation (e.g. by sawing, splitting or chipping) minimise disturbance to the understorey. Consider recycling felled material by:
  - chipping and returning to site (Note: do not stockpile mulch around tree bases as this encourages collar-rot; do not apply a layer of mulch to indigenous ground flora that will result in smothering of vegetation);
- If felled material cannot be recycled, burn or dispose of the excess material at a designated tip site;
- Rehabilitate and facilitate regeneration of indigenous vegetation in any areas beyond the works zone which have been accidentally disturbed during removal of vegetation;
- Ensure weeds do not establish in any work areas; and

- If work areas are within high or medium conservation priority roads or near protected areas, prevent livestock within roadside environments.

6.6 NATIVE FAUNA MANAGEMENT

As noted in Section 3.5, where areas of high conservation value vegetation abuts roads, probabilities of collisions between vehicles and native fauna can increase, resulting in road kill of native fauna. Roads may also act as barriers to fauna movement across the landscape. Thus, there are issues relating to native fauna management that are related to the maintenance of fauna habitat within roadside environments, but these are slightly different management issues.

There are a number of spatio-temporal factors which contribute to the incidence of road kill along roads. Some of these factors include season, time of day, roadside features (presence of cover, curves, road cuttings, drainage lines), fauna behaviour, traffic speed and traffic volume (Forman *et al*. 2003). There are also a number of factors which contribute to roads preventing fauna from crossing them (eg. fauna behaviour, and traffic speed and volume). As many of these factors are unrelated to roadside environments or may involve providing or building structures along roads (such as fences, overpasses, and underpasses), a full prescription of management actions attempting to prevent or reduce the incidence of road kill is outside of the scope of this RVMP. Even so, some management actions relating to roadside vegetation are provided below.

- While observing the vertical clearance identified in section 6.1 for road safety purposes, allow for tree branches (which are deemed safe) above identified height to extend over the road unless they are deemed unsafe (i.e. hollow, burnt out, trunk is not thick enough to hold the weight of the branch). This will allow for arboreal mammals to move across the road at height rather than at ground level;
- Do not mow or slash vegetation directly adjacent to roads along high and medium conservation priority roads outside of the road safety prescriptions identified in section 6.1. This encourages many fauna species to move to roadsides, making them more susceptible to being killed by passing vehicles.

It should be noted that comprehensive management of roadside environments for the prevention of collisions between vehicles and fauna resulting in road kill involves more than the management of roadside vegetation and provision of mitigating road structures. For example, driver education and driver management influencing driver behaviour is an effective means by which road kill can be reduced.

6.7 WEED MANAGEMENT

The general principal behind the actions provided is to prevent weed spread into areas not currently infested. It is important that work practices which reduce the spread of weeds into areas not currently infested, including wash down and decontamination of vehicles, importation of weed free soils and road making materials, training staff in appropriate identification of weed species and appropriate methods of control, are adopted. This work will be undertaken by the local control authority, the Hawkesbury River County Council.

The following actions detail how weeds should be managed.

- Monitor outbreaks of declared noxious weeds, WoNS and significant environmental weeds in the Hawkesbury LGA, particularly near roadsides;
- Produce a strategy to control (and where possible eradicate) such outbreaks;

- Monitor outbreaks of other weed species in the Hawkesbury LGA, particularly near roadsides and with reference to the potential threats that such species place on indigenous vegetation;
- Train personnel conducting weed control to recognise noxious weeds, WoNS and other weeds in the Hawkesbury LGA;
- Give priority to weed control on high and medium conservation value roadsides. This must be undertaken using minimal disturbance techniques;
- Ensure that the type of weed control undertaken is appropriate for the site, roadside conservation values, and weeds present, and where herbicide is used, it is undertaken in accordance with the requirements as detailed on the label and in statutory requirements;
- Avoid ploughing, cultivation or broad acre herbicide application for weed control on roadsides. Use cut and paint or drill and fill methods where possible for selected woody weeds;
- Maintain records of chemical sprayed, location and date of spraying, weather conditions and target species;
- Avoid herbicide spraying in drains and near waterways to prevent contamination of water bodies;
- Avoid indigenous understorey and regeneration areas when spraying. Spray only the target plants and spray low to the ground to avoid spray drift;
- Integrate roadside spraying programs with other agencies and adjacent landholders operating in the area;
- Avoid slashing weeds that are in seed and avoid removal of weeds in seed as there is a high risk of viable seed being spread by machinery. If it is necessary to remove weeds when they are seeding, dispose of at a designated disposal site and cover during transportation to prevent weed seeds blowing away and colonising new areas;
- Obtain advice from DPI prior to undertaking control of new species of weeds;
- Prevent soil and healthy vegetation on roadsides from being disturbed. Disturbance of the soil or the existing vegetation is the main factor in soil erosion, and weed invasion;
- Do not use or park heavy machinery on roadside vegetation;
- Store road construction materials, including sediment from drains and culverts, away from native vegetation, and preferably on existing disturbed sites or designated stockpile areas;
- After working in weed affected areas, clean vehicles and machinery of soil and plant debris prior to working elsewhere;
- Do not use plants known to be environmental weeds (listed in HCC's website) in any landscape project in the Hawkesbury LGA.
- Develop community awareness programs to ensure landholders understand their responsibilities regarding weed control; and
- Encourage and support Landcare and other local environment groups to undertake long-term weed control.

6.8 STOCKPILE / DUMPSITE MANAGEMENT

Given the issues associated with stockpiling (see Section 3.8), stockpiles should be established in appropriate locations. Care should be taken to manage stockpiles as appropriate to discourage the spread of weeds when soil is later transported, and prevent unlawful use of stockpile areas (for rubbish dumping or recreation).

The following actions detail how stockpiles should be managed.

- Designate a set number of stockpile or dump sites at strategic locations (selected and approved by the relevant Council officer) for:
  - storing road work materials (e.g. Road metal, topsoil, gravel, mulch);
  - storing excess material from road construction or maintenance operations;
  - disposal of pest plants and other materials.
- Avoid using the following as stockpile or dump sites;
  - areas adjacent to high conservation priority roads, National Parks and public reserves;
  - way side stop sites; and
  - drainage lines, floodways or culverts.
- When selecting new stockpile or dump sites consider locating them:
  - on roadsides or public land of low conservation value;
  - in areas which have previously been cleared of vegetation; and
  - in areas which can be screened from view.
- Provide all statutory authorities and contractors undertaking road works with a list and location map of designated stockpile and dump sites;
- Define the extent of stockpile or dump sites. Use the minimum space necessary to store/dump materials and maintain access. Establish a buffer zone around stockpiles or dump sites if possible;
- Mark the boundaries of stockpile sites clearly and (when practical) fence, barricade or screen (using appropriate indigenous plantings) from the roadside;
- Ensure that plant equipment and vehicles accessing stockpiles and dumpsites only access stockpiles on already cleared or disturbed areas. Tree drip lines should be avoided to minimise root damage or soil compaction in this area;
- Ensure stockpile sites comply with Rural Fire Service (RFS) requirements for fire access. Check with local brigades to ensure turning space, height clearance and access is suitable;
- Control any weed species prior to stockpiling materials on a new site. Monitor area for any subsequent weed growth and undertake follow up weed control if necessary;
- Discourage use of stockpile sites by local community and visitors to the area;
- Restore former stockpile or dump sites using appropriate indigenous vegetation; and
- Nominate an officer responsible for:
  - ensuring materials are dumped only at designated sites;
  - allocating new locations (as required);
  - monitoring and controlling weed growth and plant pathogens at stockpile and dump sites; and
  - organising phase out and rehabilitation of old sites.

6.9 FIRE MANAGEMENT

Achieving both the goals of fire prevention and control along with biodiversity conservation requires careful planning and thorough evaluation of all issues involved. It is understood HCC is currently revising their Bush Fire Risk Management Plan (BFRMP) in conjunction with the NSW RFS. The BFRMP is concerned with reducing the risk of bush fires to the community. In regards to the management of roadsides, the principals the BFRMP should:

- Consider combining areas dedicated to fuel hazard reduction for fire mitigation with power/utility easements to minimise the area of vegetation disturbance;
- Prior to any fire mitigation works on roadsides being undertaken, identify and ensure adequate protection is provided to EECs, threatened flora and fauna species. If areas to

be managed have conditions specified on their Hazard Reduction Certificates which relate to the protection of threatened flora and fauna species, these must be followed;
- Consider the most appropriate fuel reduction method that protects the conservation value of roadside vegetation and minimises potential impacts to weed and soil issues;
- Follow the NSW Bushfire Environmental Assessment Code (RFS 2006), which provides guidance for the prevention of soil erosion and instability, and protection of riparian buffers, native vegetation, biodiversity, heritage, other significant environmental protection areas and weeds; and
- Where slashing is required for Asset Protection Zones (APZ), it should be undertaken on a yearly basis during autumn or winter and in a manner that enhances growth of indigenous understorey and avoids regenerating trees and shrubs.

General recommendations that should be followed in regards to fire mitigation works on roadsides for the protection of biodiversity include:

- Using hygiene practices which prevent the further spread of weed propagules or soil pathogens (i.e. Phytophthora) at all times;
- Design slashing programs to begin with clean machinery in high conservation priority areas and work towards the more degraded sites to prevent the further spread of weeds;
- On high and medium conservation priority roads, slashing is to be restricted to APZ and the immediate road verge unless otherwise specified;
- Slashing on low priority conservation roadsides is generally not detrimental; and
- Using information collected through the roadside vegetation surveys, identify the location of weeds which may produce higher fuel loads (i.e. Coolatai Grass) and take steps to remove and prevent their spread through appropriate weed control programmes.

6.10 EROSION AND SEDIMENTATION, WATER CATCHMENTS AND POLLUTION

Road management activities can increase the level of erosion from roadside environments and lead to sedimentation and pollution of water catchments (see Section 3.10). The following actions detail how roadside environments should be managed to minimise erosion, sedimentation and pollution of water catchments, and habitat degradation.

- Ensure that drains follow natural drainage lines. Avoid steep batters and steep drainage lines;
- Use rip-rap (i.e. rock structures) lining of drainage lines where necessary;
- Ensure that table drains, culverts and mitre/cut off drains retain some vegetation cover to maximize filtering of runoff water, and that soil disturbance is minimal;
- Avoid concentrated flows onto adjacent areas as this increases the likelihood of erosion and poor filtration;
- When constructing or maintaining drains ensure that a wide, shallow profile is created and maintained. This will reduce water velocities;
- Use energy dissipating devices at outfalls;
- Create artificial wetland areas to dissipate flow where possible;
- Capture silt by use of silt traps, silt fencing, barriers, sedimentation ponds or retarding basins;
- Divert stormwater away from loose or exposed soil;
- Avoid blocking drainage lines with soil or vegetation stockpiles or windrows;
- Direct drainage water away from wetland areas to avoid contamination and alteration to water levels;

- Prepare contingency plans for large storms (e.g. retention basins) to minimise effects on waterways;
- Have contingency plans in place that plan for potential risks during abnormal circumstances and anticipate potential risk;
- Plant disturbed/exposed areas with cover crops such as sterile rye grass to provide interim vegetation cover or rehabilitate disturbed areas with native plants as works proceed;
- When importing new material to the site for re-sheeting and repairs, select high quality materials, which are more resistant to erosion and produce less sediment runoff. Material should comprise a mixture of fine and coarse granular particles that when compacted produces a dense, stable layer, which are not subject to chemical or physical breakdown;
- During shoulder grading works, ensure the width of works is limited to the minimum required for driver safety as this will minimise soil disturbance and damage to roadside vegetation. This width will vary with road type, speed limit and level of usage;
- When cleaning drains,
    - remove sediment build up or vegetation from drains only where it clearly restricts efficient drainage of water from the road surface. The least amount of soil should be exposed, and scalping of the ground during slashing operations should be avoided;
    - avoid making the drain deeper or wider. Alternative methods such as reed buckets are also available that can remove vegetation without disturbing soil. Mowing (slashing) may also be an alternative to excavation;
    - avoid using herbicides in drain maintenance works as this exposes the soil and increases erosion risk;
    - where mechanical grading is required to remove sediment from drains, avoid placing fine silts and clays on the road; and
- Undertake weed and Phytophthora hygiene practices at all times when undertaking erosion, and/or sedimentation control measures.

6.11 SCENIC, CULTURAL AND RECREATIONAL VALUES

Use of areas along roadsides for viewing the landscape and scenic opportunities, as well as viewing cultural heritage and using roads for recreational activities can impact the environment and landscape leading to a number of degrading processes (see Sections 3.11 and 3.12). The following actions detail how roadside environments should be managed to retain their scenic, cultural and recreational values while minimising harm to roadside environments.

- Prepare a register of landscape, cultural and heritage sites linked to standard Council databases, and use this register when planning works to protect those sites;
- Plan works (including revegetation programs) to ensure that important landscape values recognised on the landscape, and cultural and heritage registers, are not lost or disturbed;
- Once it has been decided how many wayside stops and parking bays will be required, provide wayside stops and parking bays that maximise the interest of the area while protecting the conservation values of the immediate vicinity. Ensure the areas are maintained at a minimal fire risk;
- Consider the natural, cultural or historical features of the roadside when selecting locations for wayside stops;
- Locate new wayside stops on sites that will have minimum impact on surroundings. Stops on low and medium conservation roads should be considered before any consideration is given to locating them on high conservation priority roads;
- Require commercial trail ride operators to obtain Council approval to use a road reserve. Specify, in the permit, the routes to be used and any trail maintenance to be undertaken;

- Liaise with horse riders, trail ride operators, and clubs to develop further guidelines to manage horse riding on roadsides and to protect significant roadsides to design a network of bridle trails, avoiding high and medium conservation value roadsides and highly erodible areas. Publicise this network to the horse riding community;
- Where heavy use by riding schools or commercial trail ride occurs, reduce impacts by providing mulched or tanbark trails. Construct pine rail or other fencing to restrict horses to the trail where necessary for safety reasons or to protect indigenous vegetation;
- Implement measures to control impacts of drainage runoff, if necessary;
- Signpost and fence areas of high conservation value, where threatened by horse riding; and
- Monitor the impacts of horse riding on vegetation, soil erosion, and drainage and undertake mitigation measures to prevent further impacts.

6.12 UTILITIES

Where utilities are installed or maintained along roads, clearance of native vegetation and other disturbance may occur within the roadside environment. Often, the installation and maintenance of utility routes are undertaken by utility companies. The HCC may have a limited role in planning for the location of new utility routes and enforcing how utility routes are managed. Even so, the following detail actions for the planning and management of utility installation and maintenance.

- Consider the following when planning utility routes:
  - national, state or regional strategies or policies;
  - significant flora and fauna record information;
  - sites of cultural heritage significance; and
  - location of underground assets in the vicinity (via local service providers).
- Incorporate the following costs when planning for new works:
  - tree removal/pruning/root pruning;
  - measures to protect and minimise damage or stress to remaining vegetation; and
  - any rehabilitation works required, including weed control and plant replacement for 1-2 years after completion of the works.
- Ensure that utility companies prioritise (when practicable) the location of their utility routes to be on low conservation priority roads;
- Ensure that utility companies consider all options to minimise vegetation loss when vegetation removal is proposed on high or medium conservation roads;
- Where there is potential conflict over removal of roadside vegetation from the installation of utility services, liaise with interested parties to address any issues;
- Ensure that where utility providers carry out works, they are being carried out with best environmental practices and are working within the relevant Code of Practice and any code adopted for road construction and maintenance;
- Ensure (with penalty clauses in contracts) that contractors and staff from service authorities involved in the installation or maintenance of services (particularly on high conservation value roadsides) are trained in and apply:
  - methods to minimise disturbance to soils and native vegetation (e.g. removing trees by (i) use of chain saws rather than bulldozers (ii) cutting stumps to ground level and painting with herbicide);
  - methods to minimise the spread of weeds;
  - hygiene measures for Phytophthora control;
  - correct pruning techniques to maintain healthy trees;
  - removal of noxious and environmental weeds;

  - anticipated tree growth rates and mature heights (to minimise pruning); and
  - rehabilitation techniques.
- Where existing indigenous vegetation is disturbed during works, ensure that contractors and staff rehabilitate works areas to (as close as practical) the condition prior to commencement of works. Use species of robust indigenous ground cover species that are naturally present in vegetation communities in works areas rather than exotic grass species. Provide replacement indigenous plants naturally present in vegetation communities in works areas to compensate for any trees removed during installation works. Monitor site rehabilitation and vegetation re-establishment, control weeds and replace any lost planted stock for 12 months after completion of works, as part of the contract; and
- During trenching works, ensure that contractors salvage, store and respread topsoil to match the original soil profile. Also, ensure that works areas are stabilised with revegetation using indigenous species that are naturally present in vegetation communities in works areas or alternatively a sterile cereal rye grass. Rather than severely pruning trees (e.g. cut to near ground level) growing directly under any power lines, encourage removal of the tree and replacement with indigenous species naturally present in vegetation communities in works areas that do not require such pruning.

6.13 LANDUSE (AGRICULTURAL USE – TRAVELLING STOCK ROUTES)

As grazing by stock can have negative effects on biodiversity and contribute to erosion or change the nutrient status of soil or local hydrology (see Section 3.14), the issuing of stock permits must be carefully considered. The following actions detail how roadside environments should be managed for grazing.

- Develop a roadside grazing policy specifically outlining the conditions under which roadside grazing will be approved and the issues of consideration when determining approval. Issues of consideration may include:
  - the sensitivity of vegetation or environment in the proposed grazing area and along the route;
  - the nature of any weeds in the area and the potential for livestock to contribute to weed spread; and
  - driver safety.
- Require that all people who have been issued with a stock permit to display their stock permit on any nearby fencing within the area that is being grazed;
- Only permit roadside grazing in low conservation priority roadsides unless a Fire Management Plan or Weed Control Plan allows for limited grazing on medium conservation priority roadsides, avoiding:
  - areas that allow access to natural waterways and drainage lines;
  - areas near sensitive areas such as wetlands and national parks;
  - areas where regeneration of native vegetation is occurring; and
  - areas comprising EECs.
- Only permit grazing where soil stability is sound. Avoid:
  - areas lacking a stable vegetation cover;
  - areas where soils are wet;
  - areas which contain steep surfaces such as road batters; and
  - areas highly exposed to wind and water run off.
- Restrict grazing between September - October and late January so that native grasses and other plants can flower and set seed;

- Restrict stock to within approved areas in the road reserve to avoid damage to vegetation outside the designated grazing area; and
- Monitor areas that are being grazed to ensure that stock do not overgraze and cause damage to native vegetation.

6.14 EDUCATION / COMMUNITY AWARENESS, TRAINING

As education is central to the protection and maintenance of native vegetation on roadsides (see Section 3.15), it is important that information about the roles and values of roadside environments is disseminated to road users and workers. The following actions should be taken to educate road users and workers on the values and roles of roadside environments.

- Provide copies of this RVMP and the information brochure to all:
  - relevant Council staff
  - utility service authorities
  - relevant staff within the Hawkesbury-Nepean Catchment Management Authority
  - Landcare Groups and relevant community groups operating in the Hawkesbury LGA.
- Inform residents and ratepayers about the RVMP and aspects that may affect their use of roadsides;
- Distribute copies of the information brochure on the roles and values of roadsides to members of the community and landowners;
- Provide training for all Council staff working on roadsides, including Planning, Engineering, Contracting and Outdoor staff by holding workshops on best practice Roadside Management techniques (e.g. proper pruning techniques, weed control techniques, weed and plant pathogen hygiene practices);
- Implement a road signage system to ensure road users are aware of the significance of particular areas along roads and can obtain relevant information;
- Organise training and educational programs on roadside management for staff, service authorities, RFS volunteers, local Landcare groups and the broader community;
- Provide information to landholders and agencies working on roadsides, about responsibilities for weed control, technical advice, identification of species, and promote revegetation in areas where weed control has occurred;
- Consider producing separate fact sheets on various sections of this Plan;
- Inform Council staff, Government agencies, landowners and road workers of any new documents relating to roadside management (e.g. classification of low, medium and high conservation priority roadsides);
- Review the current standard Council contract specifications to ensure that when renewing contracts or re-tendering contracts for works on roadsides that the relevant clauses are inserted to protect remnant native vegetation and threatened flora and fauna species and their habitats;
- Prevent any contractors not trained in accordance with this plan from undertaking works on a road reserve;
- Review and update the conservation assessments of roadsides every five years, or as road construction and maintenance activities affect them; and
- Review the Plan and the actions at a minimum of every five years ensuring that the expected Management Objectives are being met and that any new data is incorporated into the Plan.

7 Roadside Vegetation Management Plan – Process

The steps outlined below are designed to put into practice the aims of this Plan: to manage rural roads in the Hawkesbury LGA to provide for safe transport, efficient infrastructure, fire protection and suppression, biodiversity conservation, maintenance of functional ecological processes, and cultural and heritage values in the present and into the future.

The steps are also designed to prevent or mediate any conflicts that may arise.

7.1 CO-ORDINATION

- Nominate, in each authority involved in this Plan, a contact officer/position who will have a co-ordinating role in the implementation of the Plan within their organisation;
- Publicise the RVMP and Operations Manual within Council, other roadsides managers, and the community;
- Establish and inform all relevant parties about the notification, referral and consultation process for works planning affecting roadsides;
- Compile and regularly update a register of interested parties for notification and consultation about roadsides works;
- Encourage a multi-disciplinary team approach and/or use of specialist advice in planning of works on roads;
- Initiate or support, and monitor the implementation of the action recommendations for the RVMP, including on-ground works, training, vegetation management, information and controls; and
- Advise and assist community groups and landholders in roadside management projects (e.g. weed control, fuel reduction, rubbish removal, re-vegetation).

7.2 PLANNING / DESIGN STAGE (FOR ROAD WORKS, UTILITIES INSTALLATION, FIRE PREVENTION)

- Enlist appropriate specialist skills, e.g. in land and vegetation management, landscape design, etc. to assist in plan preparation;
- Check the RVMP maps for the status of road/s under consideration, and the implications of this for the proposed works;
- If the project will involve excavation, contact local service providers for information on underground assets in the vicinity;
- Contact relevant bodies for information on known Aboriginal sites and other cultural heritage sites. Commission a survey by qualified archaeologists if necessary;
- Prepare REFs or EISs for proposed works;
- If proposed works are approved, prepare draft plans, incorporating measures to protect conservation values and existing assets;
- Undertake notifications and consultation as required, including on-site meetings if necessary;
- Obtain any permits that may be required; and

- Finalise plans. Prepare contract specifications. Include requirements for compliance with the RVMP and penalties for breaches.

7.3 WORKS STAGE

- Ensure that works crews are properly trained in appropriate roadside management techniques;
- Supervise works and enforce penalties if necessary;
- If conflicts occur with community or other organisations during works, project manager to arrange discussions (preferably on site) with all interested parties, including road authority; and
- Check works on completion, and ensure that site rehabilitation is completed and maintained.

8 Signage Strategy

The installation of significant roadside environment signage is a strategy that has often been used in conjunction with the development and implementation of roadside environmental management strategies around Australia (HCCREMS 2007). The signage strategy will consist of roadside markers that identify sites of environmental, historic and cultural significance so that these sites can be avoided and protected during road works and other public utility works. The main purpose of such signage is to increase the awareness of council staff and work maintenance crews to the importance of sites of environmental, historic and cultural significance along road sides. Road side markers can assist council operational staff in identifying the physical location of significant roadside environments or environmental issues in the field that have been identified and mapped during earlier planning processes. This can provide a field-based trigger for operational staff to undertake the appropriate management strategies.

Roadside markers would aim to assist Council and other agencies to protect remnant native stands, and to comply with the requirements of Commonwealth and State conservation, heritage, vegetation, fire and pollution legislation. Information on such signage could include special work practice requirements supporting best practice management for roadside native vegetation. Roadside signage of this type could also be given unique identifiers which could be linked to a Council database. This would obviously help Council keep records of the location of significant roadside features and their associated management needs, although more importantly, it could allow work crews obtain additional details from the Council's database regarding the implementation of appropriate management methods to avoid unnecessary damage to the site and its values.

In regards to educating members of the community about the importance of roadside vegetation, an information brochure about the development of the RVMP and associated road side signage has been developed. This is further discussed in Section 9. Given that signage can lead to improved protection of values within roadside environments, the implementation of a consistent roadside marker program throughout the region is likely to complement the general objectives of this strategy. A consistent approach throughout the Hawkesbury LGA to such a program would substantially increase its potential for impact.

8.1 INSTALLATION OF SIGNS

Within any given road, there may be sections of road which are of high, medium and low conservation significance. It is recommended that HCC install roadside markers along all sections of roads that have been identified through the roadside vegetation survey as high priority areas for conservation and medium priority roads which contain and EEC or threatened species. It is recommended that roadside markers mark the beginning and end of each section of high priority areas for conservation and medium priority roads which contain and EEC or threatened species. It is also recommended that roadside markers be installed in areas where items of significant historic and cultural significance along roadsides can be found.

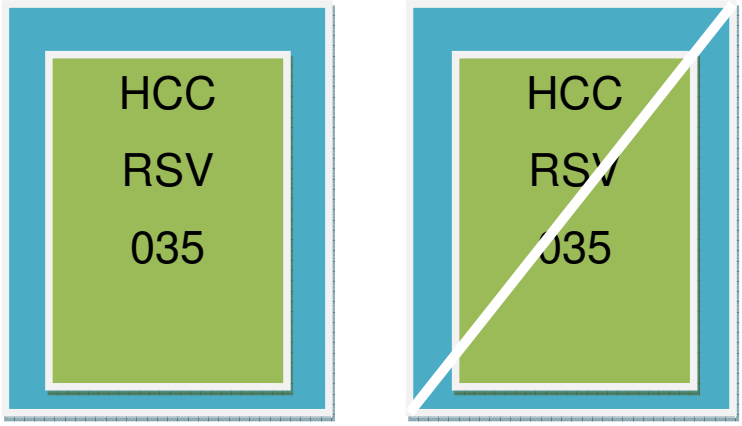
Roadside markers should consist of a marker plate fastened to a post outside of the road envelope, which will be visible from the road carriage. These will discreetly mark the site for operational reference and highlight to council staff and maintenance crews that there is significant roadside vegetation in this

section and strict protocols are to be adhered to while undertaking work in this section of roadside. Markers will differentiate the beginning and end of segments, with end markers comprising a diagonal line to indicate that the significant section of roadside vegetation has ended. The information on the sign will indicate that it is in the Hawkesbury City Council (HCC) area, the presence of significant Road Side Vegetation (RSV) and the unique identification number (035) that is recorded in the data base. A visual example of the marker plate to be used as a roadside marker is provided in Figure 5.

The location of each roadside marker should be recorded and stored in a data base that records the location of significant roadside features and provides details of each site's special feature and/or management requirements. The register of roadside markers can then be used by staff during planning of road works to advise road maintenance crews of the location of significant sites and special work practice requirements. The roadside markers will enable Council and agency work crews to respond to identified sites by retrieving details from the Council's roadside marker data base, and implement appropriate management methods and constraints to avoid unnecessary damage to the site.

Additional to the roadside marker scheme areas that have been identified as wildlife crossings or wildlife areas are recommended to be marked with appropriate signage to advise road uses of the presence of wildlife in the area. The aim of this is to reduce the incidence of collisions between motor vehicles and wildlife.

Figure 5: Example of roadside marker



9 Information Brochure

An information brochure developed for community members will assist with increasing community awareness and appreciation of road values. Information brochures represent a rapid form of information dissemination, and can provide information on the importance and values of roadside environments, the need for appropriate and balanced road management, and the legislative obligations of roadside authorities managing roads. They can also direct readers to where they can seek more information, should they have a desire to learn more about the management of roadside environments.

Through an information brochure, HCC will be able to promote awareness of the major management issues along roads. Further, HCC will be able to inform the community of the benefits of well-managed roadside environments. This may lead to a decrease in the collection of firewood, wildflowers or bush rock by the community, which may in turn lead to an improvement or maintenance of fauna habitat.

An information brochure outlining the values and roles of roads, the need to manage roads appropriately, and other information is provided below. HCC should distribute this information brochure to all Council members, other roadsides managers, and the community.

Managing Roadside Environments within the Hawkesbury Local Government Area (LGA).

Importance of Roadside Environments: Why Protect Roadside Environments?

Roadside environments comprise a diverse range of environmental, economic, social and heritage values, and perform a range of beneficial environmental and ecosystem services. In NSW, they comprise around 5 % of the total land area, which, when combined with travelling stock routes and reserves, is almost equivalent to the total area of National Parks in NSW (NSW Roadside Environment Committee).

Specifically, roadside environments can:

- Provide links for animal movement;
- Provide locations for service assets;
- Support wildlife habitat;
- Support biological diversity, and contain native seed sources;
- Provide foundations for landscape connectivity and restoration;
- Contain important historic, cultural and natural landscape values;
- Support aesthetic and amenity values;
- Perform ecosystem services (assist with the control of land degradation, and water and catchment health);
- Provide windbreaks and shelter belts;
- Support areas for recreation; and
- Provide opportunities for education in botany and ecology.

It is important that both the functional roles and conservation values of road environments be protected, both for the present and the future.

Roadside Environments in the Hawkesbury LGA. Do They Support Any Values or Perform Important Roles?

Many roadside environments within the Hawkesbury LGA support Endangered Ecological Communities (EECs) and threatened plant and animal species. Further, many roadside environments support intact vegetation, and thus provide ecosystem services, habitat for wildlife, biological diversity, and aesthetic, amenity and recreational values. Given the position of many of the roads in the Hawkesbury LGA, roadside vegetation also acts as corridors for wildlife to move through the landscape.

Who is Responsible for Managing Roadside Environments in the Hawkesbury LGA?

The NSW Roads and Traffic Authority (RTA) is the road authority responsible for freeways within the Hawkesbury LGA.

However, for all other public roads within the Hawkesbury LGA, Hawkesbury City Council (HCC) is the road authority responsible for the management of roads.

Some public authorities may work within roadside environments e.g. electricity and communication providers. These public authorities have a legal obligation to ensure that their activities do not significantly impact on the environment.

Road users and landholders adjacent to roadside environments are not responsible for managing roadside environments. Therefore, management activities by road users and landholders should not be undertaken, except where approval is given for specific activities by HCC.

How are Roadside Environments Being Managed in the Hawkesbury LGA?

Roadside Vegetation Management Plan

Given that HCC is responsible for managing the majority of roads within the Hawkesbury LGA, HCC has recently completed a Roadside Vegetation Management Plan (RVMP) for the management of vegetation along rural roads in the Hawkesbury LGA. Rural roads were the focus of the plan as these contain the most

values which need to be appropriately managed. The RVMP outlines a strategic approach to the management of roadside vegetation in rural areas, which recognises all relevant functions and values of roadside environments.

In developing the RVMP, all rural roads within the Hawkesbury LGA were classified into low, medium or high conservation priority roads. Data for some of these roads were collated, and these data, in conjunction with more detailed assessments, can be used as a guide when determining appropriate roadside management actions.

Prescriptions for management have been included in the RVMP. These include identification of actions for high, medium and low conservation priority roads. Actions incorporate other road reserve design treatments and management practices for the effective management of roads and roadside vegetation, which promote roadside maintenance and construction activities that do not degrade the environmental values of the roadside.

Management actions in relation to vegetation management are provided for:

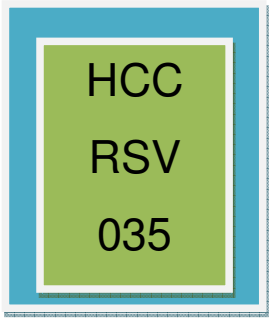
- Road safety;
- Road construction and widening;
- Road maintenance;
- Endangered Ecological Communities;
- Threatened plant and animal species;
- Native wildlife and wildlife habitat;
- Weed control;
- Plant pathogens;
- Stockpiles and dumpsites;
- Fire;
- Erosion and sedimentation, water catchments and pollution;
- Scenic, cultural, and recreational values;
- Utilities;
- Travelling stock routes; and
- Training and education of road workers and users.

Roadside Signage

Roadside signage is widely used in conjunction with RVMPs and can provide a trigger for the promotion of improved on-ground practices by road construction and maintenance crews. They can also contribute to raising community awareness and appreciation of the location and values of species roadside environments.

Thus, HCC plans to erect roadside markers at areas of high environmental significance and other environmentally sensitive areas as well as sites of historic and cultural significance. This road side marker system will be designed for road construction and maintenance crews, and will discreetly mark sites with operational references.

Example roadside marker.



Council Contacts

For more information on the management of roads in the Hawkesbury LGA, contact:

Hawkesbury City Council

Phone: (02) 4560 4444

366 George Street Windsor

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Appendix A

Threatened flora species previously recorded within the Hawkesbury LGA.

Common Name	Species Name	TSC Act	EPBC Act
Bynoe's Wattle	*Acacia bynoeana*	Endangered	Endangered
	Acacia gordonii	Endangered	Endangered
Downy Wattle	*Acacia pubescens*	Vulnerable	Vulnerable
	Ancistrachne maidenii	Vulnerable	
White-flowered Flax Plant	*Cynanchum elegans*	Endangered	Endangered
	Dillwynia tenuifolia	Vulnerable	
Narrow-leaf Finger Fern	*Grammitis stenophylla*	Endangered	
	Grevillea juniperina ssp. juniperina	Vulnerable	
Spreading Guinea Flower	*Hibbertia procumbens*	Endangered	
Spreading Guinea Flower	*Hibbertia superans*	Endangered	
	Keraudrenia corollata var. *denticulata*	Endangered	
	Kunzea rupestris	Vulnerable	Vulnerable
	Lasiopetalum joyceae	Vulnerable	Vulnerable
	Leucopogon fletcheri ssp. *fletcheri*	Endangered	
Deanes Paperbark	*Melaleuca deanei*	Endangered	Endangered
	Micromyrtus blakelyi	Vulnerable	
	Micromyrtus minutiflora	Endangered	Endangered
	Olearia cordata	Vulnerable	Vulnerable
Tall Knotweed	*Persicaria elatior*	Vulnerable	
Needle Geebung	*Persoonia acerosa*	Vulnerable	Vulnerable
	Persoonia hirsuta ssp. hirsuta	Endangered	Endangered
	Persoonia nutans	Endangered	
	Pimelea curviflora var. *curviflora*	Vulnerable	
Spiked Rice-flower	*Pimelea spicata*	Endangered	Endangered
Brown Pomaderris	*Pomaderris brunnea*	Vulnerable	Vulnerable
Sydney Plains Greenhood	*Pterostylis saxicola*	Endangered	
	Pultenaea parviflora	Endangered	
Magenta Lilly Pilli	*Syzygium paniculatum*	Endangered	
	Tetratheca glandulosa	Vulnerable	Vulnerable
Black-eyed Susan	*Tetratheca juncea*		

Common Name	Species Name	TSC Act	EPBC Act
	Velleia perfoliata	Vulnerable	Vulnerable
Wollemi Pine	*Wollemia nobilis*	Endangered	Endangered
	Zieria involucrata	Endangered	Endangered

Threatened fauna previously recorded within the Hawkesbury LGA.

Scientific Name	Common Name	TSC Act	EPBC Act
Apus pacificus	Fork-tailed Swift		Migratory
Ardea alba	Great Egret		Migratory
Ardea ibis	Cattle Egret		Migratory
Botaurus poiciloptilus	Australasian Bittern	Vulnerable	
Burhinus grallarius	Bush Stone-curlew	Endangered	
Cacatua leadbeateri	Major Mitchell's Cockatoo	Vulnerable	
Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	
Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	
Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable
Climacteris picumnus	Brown Tree Creeper	Vulnerable	
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Vulnerable
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	
Glossopsitta pusilla	Little Lorikeet	Vulnerable	
Grantiella picta	Painted Honeyeater	Vulnerable	
Haliaeetus leucogaster	White-bellied Sea-Eagle		Migratory
Heleioporus australiacus	Giant Burrowing Frog	Vulnerable	Vulnerable
Hirundapus caudacutus	White-throated Needletail		Migratory
Hoplocephalus bungaroides	Broad-headed Snake	Endangered	Endangered
Irediparra gallinacea	Comb-crested Jacana	Vulnerable	
Ixobrychus flavicollis	Black Bittern	Vulnerable	
Lathamus discolor	Swift Parrot	Endangered	Endangered
Limosa limosa	Black-tailed Godwit	Vulnerable	
Litoria littlejohni	Littlejohn's Tree Frog	Vulnerable	Vulnerable
Lophoictinia isura	Square-tailed Kite	Vulnerable	
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	
Meridolum corneovirens	Cumberland Plain Land Snail	Endangered	
Merops ornatus	Rainbow-Bee-eater		Migratory
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable	
Monarcha melanopsis	Black-faced Monarch		Migratory
Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable	
Myiagra cyanoleuca	Satin Flycatcher		Migratory
Myotis adversus	Large-footed Myotis	Vulnerable	
Neophema pulchella	Turquoise Parrot	Vulnerable	

Scientific Name	Common Name	TSC Act	EPBC Act
Ninox connivens	Barking Owl	Vulnerable	
Ninox strenua	Powerful Owl	Vulnerable	
Pandion haliaetus	Osprey	Vulnerable	
Petalura gigantea	Giant Dragonfly	Endangered	
Petaurus australis	Yellow-bellied Glider	Vulnerable	
Petaurus norfolcensis	Squirrel Glider	Vulnerable	
Petrogale penicillata	Brush-tailed Rock-wallaby	Endangered	Endangered
Petroica rodinogaster	Pink Robin	Vulnerable	
Phascolarctos cinereus	Koala	Vulnerable	
Polytelis swainsonii	Superb Parrot	Vulnerable	
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	
Pseudophryne australis	Red-crowned Toadlet	Vulnerable	
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable
Pyrrholaemus sagittatus	Speckled Warbler	Vulnerable	
Rhipidura rufifrons	Rufous Fantail		Migratory
Rostratula benghalensis	Painted Snipe		Migratory
Rostratula benghalensis australis	Painted Snipe (Australian subspecies)	Endangered	
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	
Sterna fuscata	Sooty Tern	Vulnerable	
Stictonetta naevosa	Freckled Duck	Vulnerable	
Tyto capensis	Grass Owl	Vulnerable	
Tyto novaehollandiae	Masked Owl	Vulnerable	
Tyto tenebricosa	Sooty Owl	Vulnerable	
Varanus rosenbergi	Rosenberg's Goanna	Vulnerable	
Xanthomyza phrygia	Regent Honeyeater	Endangered	Endangered

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Suite 4, Level 1
2-4 Merton Street
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F 02 9993 0573

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Coffs Harbour Jetty NSW 2450
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F 02 6651 6890

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Armidale NSW 2350
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T 1300 646 131

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Perth WA 6000
T 08 9227 1070
F 08 9227 1078

WOLLONGONG
Level 2
25 Atchison Street
Wollongong NSW 2500
T 02 8536 8615
F 02 4254 6699

Singleton/Putty Road

HOWES SWAMP

G

GIBBA SWAMP

G

Singleton/Putty Road

G

Conservation Priority and Vegetation Condition - Map 1

Hawkesbury City Council

Legend

Roads

- Surveyed
- Not Surveyed

Significant Weeds Present

- *Hyparrhenia hirta*

Threatened Flora

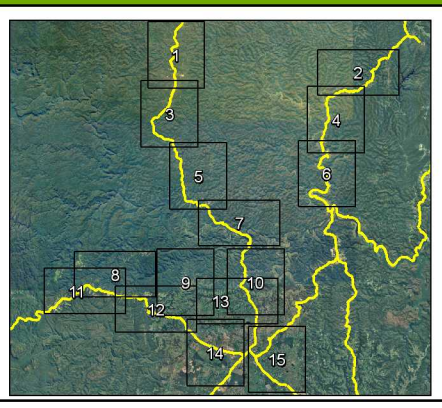
- Acacia pubescens (ELA)
- Grevillea juniperа subspecies juniperа (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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Kilometres

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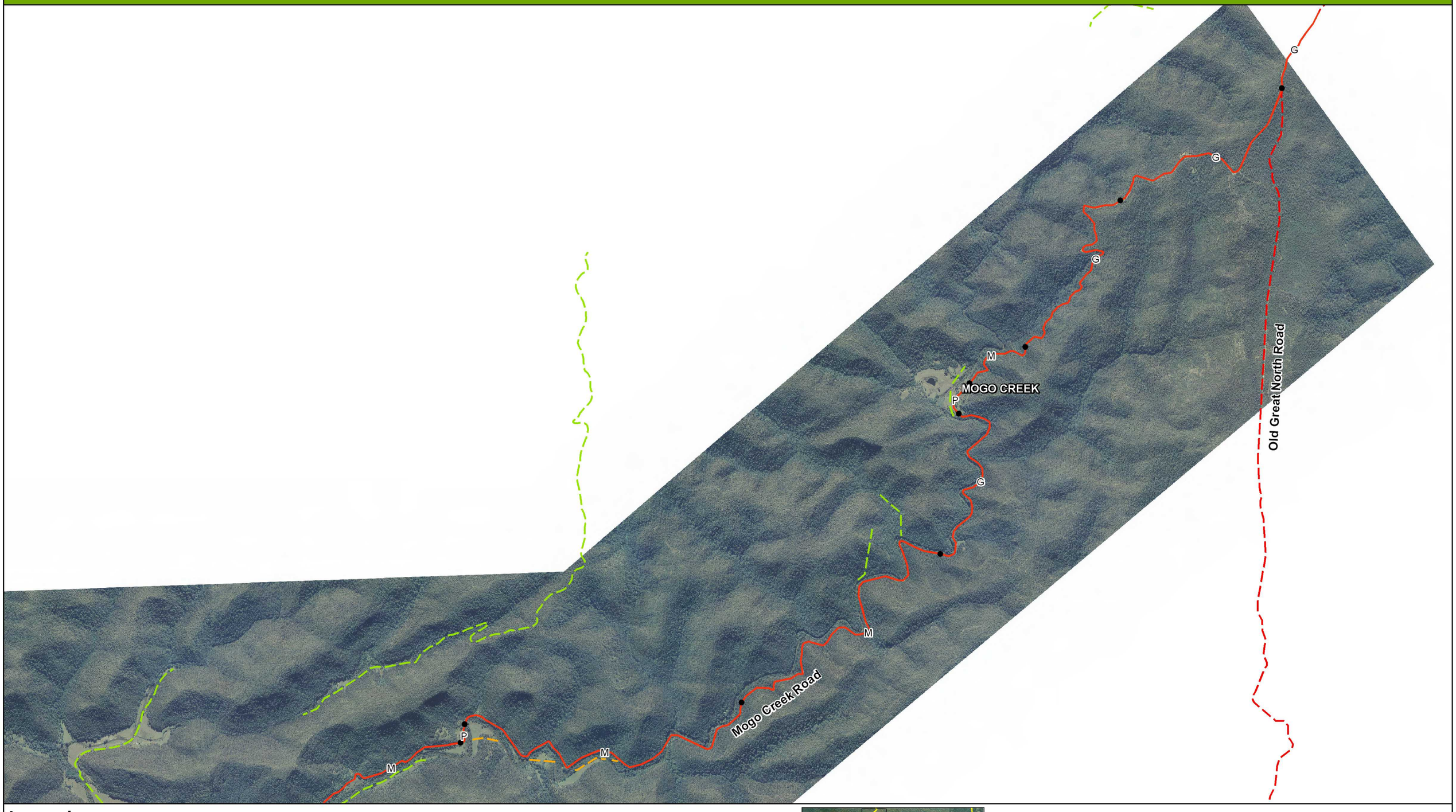
Conservation Priority and Vegetation Condition - Map 2

Hawkesbury City Council



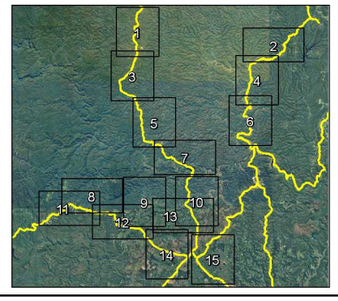
Legend

Roads
- Surveyed
- Not Surveyed

Threatened Flora
- Acacia pubescens (ELA)
- Grevillea juniperа subspecies juniperа (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority
- High
- Medium
- Low

Condition
- G Good
- M Medium
- P Poor



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Singleton/Putty Road

G

Singleton/Putty Road

Conservation Priority and Vegetation Condition - Map 3

Hawkesbury City Council

Legend

Roads

- Surveyed
- Not Surveyed

Significant Weeds Present

- *Hyparrhenia hirta*

Threatened Flora

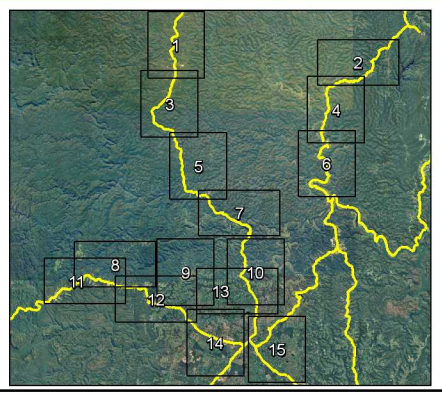
- Acacia pubescens (ELA)
- Grevillea junipera subspecies junipera (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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FERNANCES
Mogo Creek Road
DOMINICKS BIGHT
SULLIVANS BIGHT
MOLLS BIGHT
ST ALBANS COMMON
UPPER MACDONALD
Upper Macdonald Road
Wallambine Street
ST ALBANS
M
P

Conservation Priority and Vegetation Condition - Map 4

Hawkesbury City Council

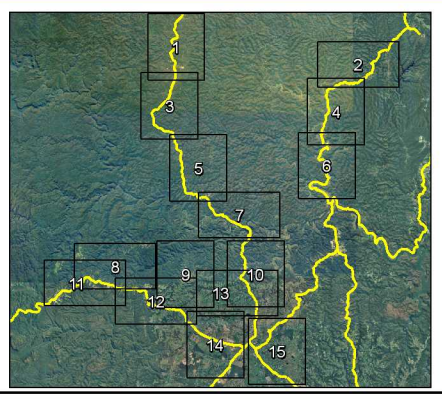
Legend

Roads
- Surveyed
- Not Surveyed

Threatened Flora
- Acacia pubescens (ELA)
- Grevillea juniperа subspecies juniperа (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority
- High
- Medium
- Low

Condition
- G Good
- M Medium
- P Poor



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Singleton/Putty Road

G

NEW YARD

MILE RIDGE

PARSONS FOREST

PARRS BRUSH

M

Singleton/Putty Road

M

G

G

G

Wheelbarrow Ridge Road

G

Conservation Priority and Vegetation Condition - Map 5

Hawkesbury City Council

Legend

Roads

- Surveyed
- Not Surveyed

Significant Weeds Present

- *Hyparrhenia hirta*

Threatened Flora

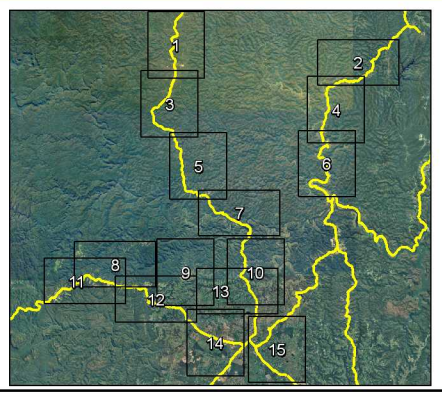
- Acacia pubescens (ELA)
- Grevillea junipera subspecies junipera (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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P
M
M
ST ALBANS
P
P
M
P
M
St Albans Road
Wrights Creek Road
Settlers Road
CENTRAL MACDONALD
M
BOOKS FERRY
P
M
BUTLERS CROSSING
Settlers Road
G
Webbs Creek Road
St Albans Road
G

Conservation Priority and Vegetation Condition - Map 6

Hawkesbury City Council

Legend

Roads

- Surveyed
- Not Surveyed

Significant Weeds Present

- *Tradescantia fluminensis*

Threatened Flora

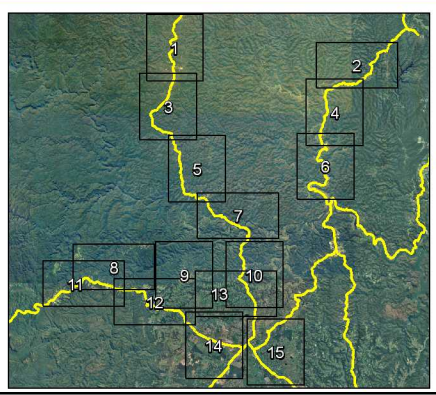
- Acacia pubescens (ELA)
- Grevillea junipera subspecies junipera (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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Conservation Priority and Vegetation Condition - Map 7

Hawkesbury City Council

COLO HEIGHTS
Wheelbarrow Ridge Road
Singleton/Putty Road
BULLOCKS WHARF
CENTRAL COLO
Upper Colo Road
UPPER COLO
COLO
MOUNT ANDREW
LOWER PORTLAND

Legend

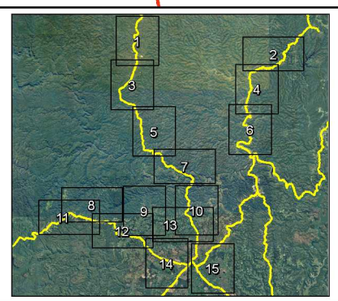
Roads
- Surveyed
- Not Surveyed

Significant Weeds Present
- *Chrysanthemoides monilifera subsp. monilifera; Tradescantia fluminensis*
- *Tradescantia fluminensis*

Threatened Flora
- Acacia pubescens (ELA)
- Grevillea junipera subspecies junipera (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority
- High
- Medium
- Low

Condition
- G Good
- M Medium
- P Poor



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Conservation Priority and Vegetation Condition - Map 8

Hawkesbury City Council

MOUNT TOOTIE

ITCHENSTOKE

MOUNTAIN LAGOON

BILPIN

WARAWARALONG

Mount Tootie Road

Mountain Lagoon Road

Bells Line of Road

Bells Line of Road

Legend

Roads

- Surveyed
- Not Surveyed

Threatened Flora

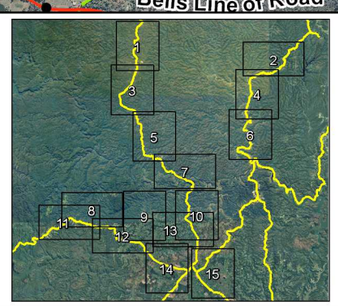
- Acacia pubescens (ELA)
- Grevillea juniperina subspecies juniperina (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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Mountain Lagoon Fire Trail
Comleroy Road
Blaxlands Ridge Road
BLAXLANDS RIDGE
East Kurrajong Road
KURRAJONG HILLS
Comleroy Road
TENNYSON
Bells Line of Road

Conservation Priority and Vegetation Condition - Map 9

Hawkesbury City Council

Legend

Roads

- Surveyed
- Not Surveyed

Significant Weeds Present

- *Cinnamomum camphora*
- *Tradescantia fluminensis*

Threatened Flora

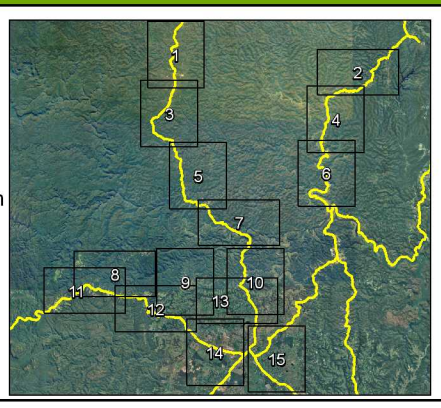
- Acacia pubescens (ELA)
- Grevillea junipera subspecies junipera (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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Singleton/Putty Road
West Portland Road
Packer Road
Blaxlands Ridge Road
Bull Ridge Road
STANLEY PARK
Old East Kurrajong Road
Sackville Road
Creek Ridge Road
Singleton/Putty Road
EBENEZER
SACKVILLE NORTH

Conservation Priority and Vegetation Condition - Map 10

Hawkesbury City Council

Legend

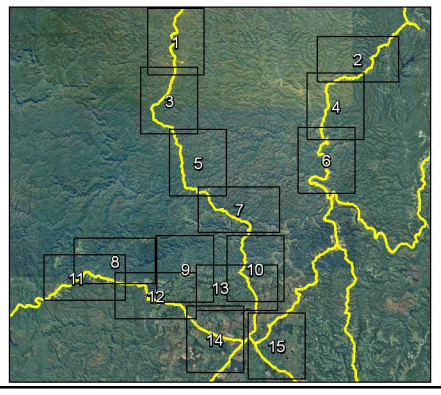
Roads
- Surveyed
- Not Surveyed

Significant Weeds Present
- *Cinnamomum camphora*
- *Cinnamomum camphora; Vinca major*
- *Salvinia molesta*
- *Tradescantia fluminensis*

Threatened Flora
- Acacia pubescens (ELA)
- Grevillea junipera subspecies junipera (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority
- High
- Medium
- Low

Condition
- G Good
- M Medium
- P Poor



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Conservation Priority and Vegetation Condition - Map 11

Hawkesbury City Council

Legend

Roads

- Surveyed
- Not Surveyed

Significant Weeds Present

- *Tradescantia fluminensis*

Threatened Flora

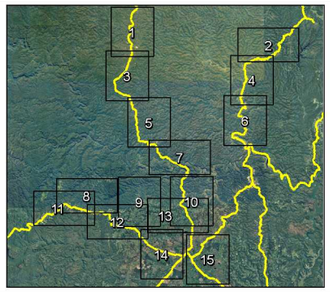
- Acacia pubescens (ELA)
- Grevillea junipera subspecies junipera (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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Kilometres

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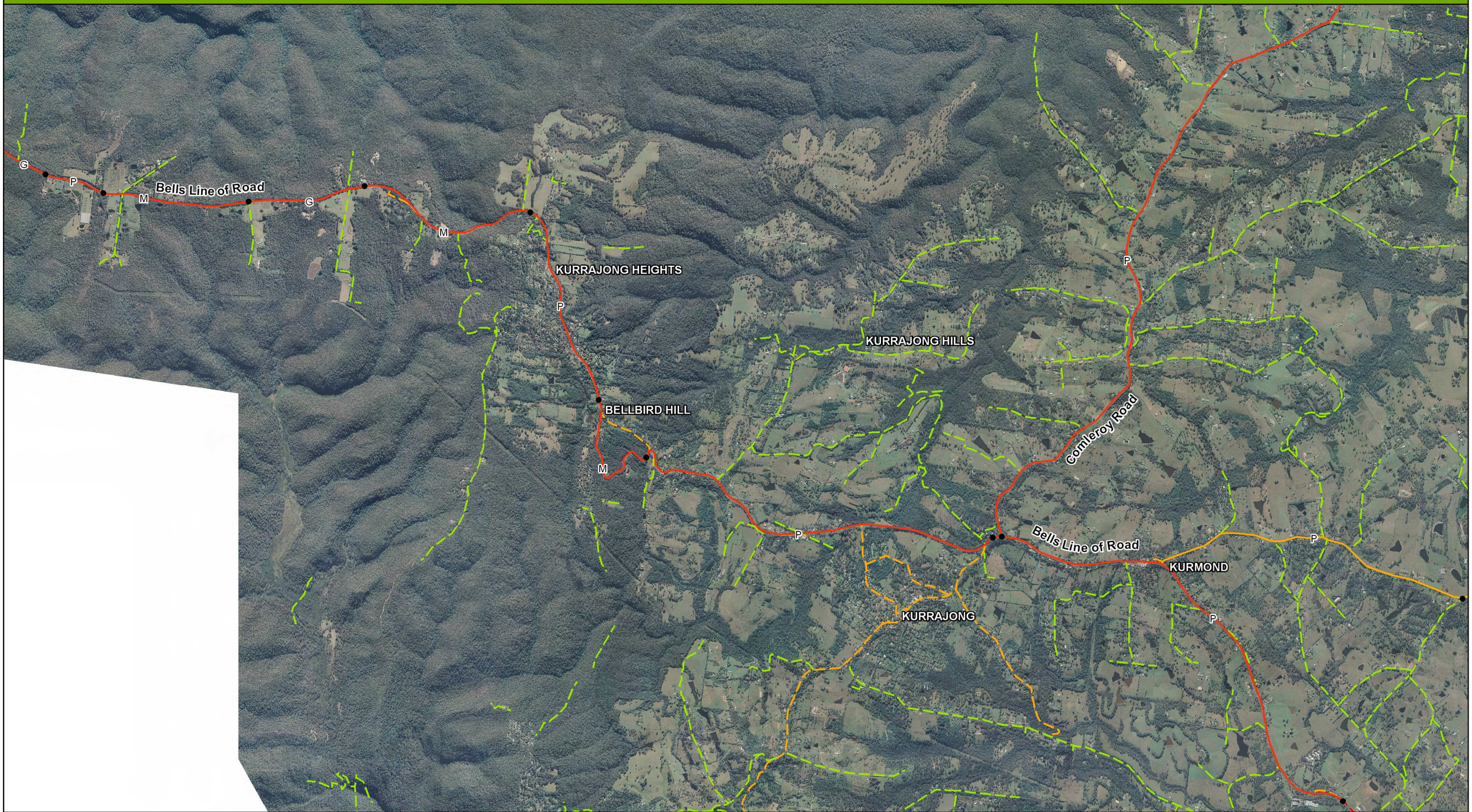
Conservation Priority and Vegetation Condition - Map 12

Hawkesbury City Council



Legend

Roads

- Surveyed
- Not Surveyed

Threatened Flora

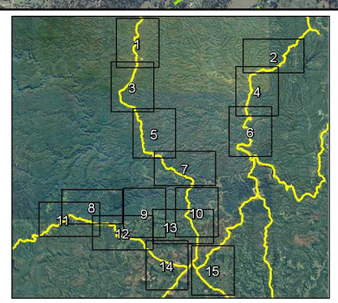
- Acacia pubescens (ELA)
- Grevillea juniperina subspecies juniperina (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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Kilometres

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Datum/Projection: GDA 94 MGA 56

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Conservation Priority and Vegetation Condition - Map 13

Hawkesbury City Council

BLAXLANDS RIDGE
STANLEY PARK
EAST KURRAJONG
East Kurrajong Road
Old East Kurrajong Road
Creek Ridge Road
Spinks Road
GLOSSODIA
TENNYSON
Kurmond Road
FREEMANS REACH
Singleton/Putty Road
EBENEZER
WILBERFORCE

Legend

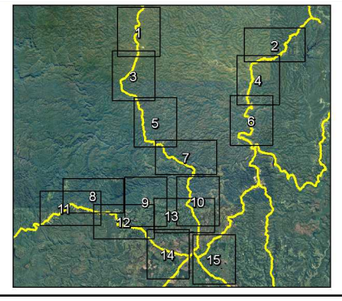
Roads
- Surveyed
- Not Surveyed

Significant Weeds Present
- *Cinnamomum camphora*
- *Cinnamomum camphora; Vinca major*
- *Salvinia molesta*
- *Tradescantia fluminensis*

Threatened Flora
- Acacia pubescens (ELA)
- Grevillea juniperа subspecies juniperа (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority
- High
- Medium
- Low

Condition
- G Good
- M Medium
- P Poor



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Kilometres

1:35 000 Printed @ A3

Datum/Projection: GDA 94 MGA 56

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THE TERRACE
LOWLANDS
Kurmond Road
FREEMANS REACH
Bells Line of Road
NORTH RICHMOND
Cornwalls lane
Cornwalls Road
CORNWALLIS
Kurrajong Road
RICHMOND
Dight Road
AGNES BANKS
Blacktown Road
Bonner Road
Richmond Road

Conservation Priority and Vegetation Condition - Map 14

Hawkesbury City Council

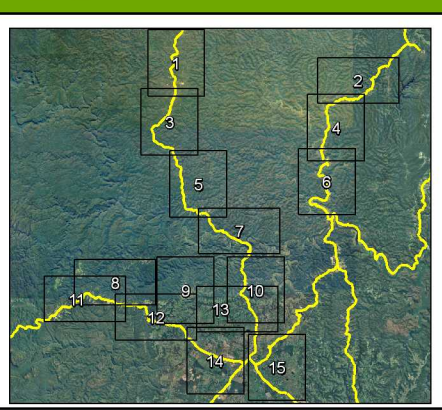
Legend

Roads
- Surveyed
- Not Surveyed

Threatened Flora
- Acacia pubescens (ELA)
- Grevillea juniperа subspecies juniperа (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority
- High
- Medium
- Low

Condition
- G Good
- M Medium
- P Poor



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Conservation Priority and Vegetation Condition - Map 15

Hawkesbury City Council

Legend

Roads

- Surveyed
- Not Surveyed

Significant Weeds Present

- *Cinnamomum camphora*

Threatened Flora

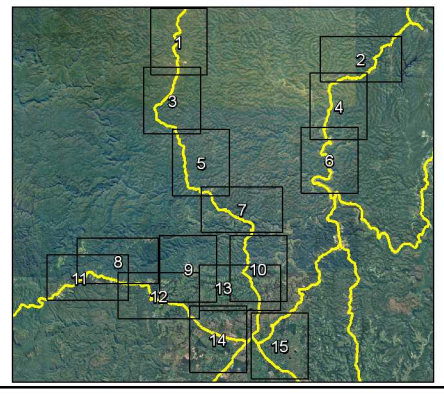
- Acacia pubescens (ELA)
- Grevillea junipera subspecies junipera (ELA)
- Acacia pubescens (DECCW)
- Grevillea juniperina subsp. juniperina (DECCW)
- Other (DECCW)

Conservation Priority

- High
- Medium
- Low

Condition

- G Good
- M Medium
- P Poor



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