

Appendix G Summary of typical management measures

Implementing the avoid, minimise, mitigate and offset hierarchy

Summary of typical management measures

The following is a summary of the typical types of management measures applied in practice by Roads and Maritime to avoid, minimise, mitigate and offset the environmental impacts of road activities. These cover all stages of a project from initial inception and options investigation, to on-the-ground delivery and operation.

This is not an exhaustive list, nor is it intended to indicate that all measures will be applied in every case. In practice, each road activity is considered on its merits and with regard to the particular environmental impacts that may arise. Some measures that are appropriate to one proposal may therefore not be relevant to another.

In addition to project specific measures, Roads and Maritime also aims to improve environmental awareness and build capacity and skills in the broader industry. To that end, Roads and Maritime continues to work with industry partners in a range of areas. Examples include: a series of publicly available best practice videos targeting environmental management during construction (via the Roads and Maritime Construction Works channel on YouTube); and establishment of pre-qualified consultant panels that have been determined to have appropriate professional expertise and experience to undertake environmental assessments for road projects.

More detailed advice on the range of management measures is included in the various Roads and Maritime environmental impact and biodiversity guidelines and procedures that will support delivery of the Program commitments (refer section 3.9).

Avoiding impacts

Roads and Maritime aims to avoid environmental impacts as the highest priority during project planning. Key typical measures include:

- Up-front identification of environmental constraints and risks to inform project options and alternatives, and support early consultation with the community and stakeholders, prior to preparation of the REF. That can include preparation and public display of:
 - strategic corridor plans or reviews
 - preliminary environmental investigations, including desktop and on-ground survey
 - detailed analysis of potential route options and alignments
 - preferred project option reports.

These measures provide a critical means to identify the known or potential presence of the Specified Protected Matters and to take steps to avoid possible impacts at an early stage in investigating feasible options and alternatives. Expected outcomes can include ruling out project options that may otherwise: impact habitat critical to the survival of threatened species; affect high conservation priority populations; or fragment and degrade habitat.

Project example – Mona Vale Road West Upgrade

Roads and Maritime is planning to upgrade 3.2 kilometres of Mona Vale Road West, in Sydney's northern beaches, to provide a four lane dual carriageway. This section of Mona Vale Road suffers traffic congestion in peak periods and requires upgrading to increase

carrying capacity and reduce travel times.

The area of the proposed road activity includes a number of identified environmental constraints, including steep terrain with geotechnical challenges, national parks, state and national listed biodiversity matters, Aboriginal heritage, and adjoining sensitive land uses.

Planning for the upgrade has been on-going for several years and has involved preliminary surveys, design feasibility studies, environmental investigations and community discussions. Key steps have included:

- release of the *Mona Vale to Macquarie Park Corridor Strategy* in 2009, a 25 year strategic framework for the management of the entire corridor
- initial community consultation for Mona Vale West between mid and end 2011, followed by release of a Community Consultation Summary Report (April 2012)
- preliminary environment investigation and technical studies (September 2011)
- public consultation on an Options Report (released October 2012), followed by a Community Consultation Summary Report (May 2013)
- public consultation on a Preferred Options Report (August 2013), also supported by release of a report of consultation outcomes.

The Options Report included a preliminary ecological assessment that was undertaken via:

- a search of NSW and Federal databases, and a review of previous studies
- on-ground field survey, GIS mapping and specimen collection for identification.

The preliminary assessment identified the presence of both state and nationally listed biodiversity matters that may be impacted by the project. That included three threatened plant species listed under the EPBC Act: *Microtis angusii* (Angus's Onion Orchid); *Grevillea caleyi* (Caley's Grevillea); and *Pimelea curviflora var. curviflora*. The Report identified biodiversity issues as one of the most important constraints for the development of route options. It particularly acknowledged the high risks to Angus's Onion Orchid given the entire known population occurs within the study area.

The Preferred Options Report documented the biodiversity impacts of the alternative options and the reasons for choice of the preferred route (Option 2 – Northern alignment). That included: opportunities for fauna connectivity between the two national parks; minimising vegetation fragmentation and impacts to threatened species; and scope to include a currently isolated bushland area into one of the national parks.

While the unique characteristics and constraints of the area mean that not all impacts will be avoided, the above process has informed key decisions on possible route alignments, supporting a preferred option outcome that balances the protection of environmental values with the safety and design objectives for the project. The accompanying public consultation processes have ensured options have been openly investigated with the community, ensuring transparency in decision-making.

The next step in the assessment process will be to prepare an REF to assess potential impacts in detail and support further refinement of the proposal, including additional opportunities to avoid impacts to the EPBC Act listed threatened species. The REF will take into account:

- assessments of significance for the nationally listed species, prepared using the *EPBC Act – Significant Impact Guidelines* and any relevant species-specific guidelines
- consideration of relevant conservation advice and plans, including the national recovery plans for *Microtis angusii* and *Grevillea caleyi*
- safeguards and mitigation measures to reduce potential risks to nationally listed

biodiversity matters

- a biodiversity offset strategy to address any residual significant impacts to nationally listed biodiversity matters, with any required offsets to be calculated in accordance with methods set out in the NSW Bilateral Agreement regarding environmental assessment.

The REF will be publicly displayed for comment for a minimum of thirty days; together with a species impact statement (SIS) addressing significant impacts to state-listed biodiversity matters.

Further project information is available at: <http://www.rms.nsw.gov.au/projects/sydney-north/mona-vale-road/index.html>

Minimising impacts

Despite applying best endeavours during strategic planning and options analysis for road projects, it is often the case that some level of unavoidable biodiversity impact may still occur. Roads and Maritime takes steps to limit the extent of such impacts through targeted application of appropriate and feasible design measures. Examples include:

- use of retaining walls rather than embankments to reduce the project footprint
- using bridging options rather than culverts
- where culverts are required, using designs that facilitate fauna crossing opportunities (including the provision of fauna furniture and reducing lengths)
- minimising the width of road shoulders (where safety and design standards provide some flexibility)
- minimising clearing zone requirements and vegetation removal through risk analysis and inclusion of safety barriers (eg. steel wire rope)
- adjusting the start and end points for road projects
- staging of works to avoid impacts to species during key seasons (eg. breeding)
- locating ancillary facilities (such as storage areas) or temporary construction works (such as access tracks or sediment basins) in existing cleared locations.

Project example – Barton Highway road boundaries and concept design

This project involves the planned duplication of the Barton Highway between the Australian Capital Territory border and the existing dual carriageway south of the Yass River. A preliminary environmental investigation of the potential road corridor was undertaken in 2009, followed by the public display of preferred road boundaries and a concept design in 2010.

During these processes, potential impacts to White Box Yellow Box Blakely's Red Gum Grassy Woodland (an endangered ecological community under the EPBC Act) were identified. As a result of the consultation process, a series of design refinements were made at key locations along the proposed route, which are identified in the Preferred Road Corridor Boundaries Report (November 2011). These included significant reductions to the extent of vegetation clearance by altering the location of proposed carriageways (moving them from one side of the road to the other). Those revisions will result in lower level of potential impact to the EPBC listed endangered ecological community.

The project will proceed to detailed environmental assessment via an REF at an appropriate future date subject to funding and infrastructure priorities. During the REF process, the

following will occur:

- database and literature searches will be undertaken to confirm up-to-date background information on current EPBC Act listings and the presence or likely occurrence of both national and state-listed biodiversity matters
- targeted field surveys using published methods and guidelines, including consideration of the *EPBC Act Policy Statement – White Box – Yellow Box - Blakely's Red Gum Grassy Woodland and derived native grasslands* and accompanying species list
- assessments of significance for nationally listed biodiversity matters, prepared using the *EPBC Act – Significant Impact Guidelines*
- safeguards and mitigation measures to reduce potential risks, including rehabilitation options identified in the *EPBC Act Policy Statement*
- if residual significant impacts to nationally listed biodiversity matters are likely, development of a biodiversity offset strategy using calculation methods set out in the NSW Bilateral Agreement regarding environmental assessment.

If the activity is identified as likely to have a significant impact on nationally listed biodiversity, the REF would be publicly displayed (minimum thirty days).

The work undertaken to date to avoid and minimise impacts to the ecological community during options development will inform the REF process.

Further project information is available at: <http://www.rms.nsw.gov.au/projects/south-western/barton-highway/project-documents.html>

Mitigating impacts

Roads and Maritime applies mitigation measures once all practicable steps have been taken to avoid and minimise impacts to biodiversity. The range of mitigation measures typically considered are detailed in Roads and Maritime's Biodiversity Guidelines. Examples include:

- pre-clearing checks by qualified and experienced ecologists
- installation of structures to reduce risks to fauna and flora, such as: exclusion fencing around construction sites; road-side fencing (temporary or permanent); and road escape points
- engagement of fauna spotters during construction, supported by implementation of comprehensive unexpected finds procedures
- application of biosecurity and hygiene procedures to reduce risks to fauna from pathogens, such as wash-down facilities, use of certified disease-free materials and access restrictions
- installation of road signage to warn drivers of the presence of fauna and support reduced potential for road-kill
- design of new structures (such as bridges) to accommodate supplementary habitat features where practicable (for example, unsealed crevices), and installation of nest boxes to provide additional opportunities for hollow-dependent fauna species
- provision of specific fauna crossing structures, including underpasses, climbing poles, canopy bridges and land bridges
- provision of fish-friendly designs in waterway structures (for examples, low flow channels and fish resting areas)
- water quality monitoring before, during and after construction

- construction of supplementary habitat, including frog breeding ponds
- weed management, including physical removal and on-going control using appropriate techniques (such as targeted herbicide application)
- revegetation of disturbed areas at project conclusion, including re-use of woody debris and bushrock
- on-going monitoring of species populations, together with review and adjustment of mitigation measures (where practicable) in response to monitoring outcomes.

Project example – Realignment of the Olympic Highway at Kapooka

Roads and Maritime is constructing a new four land road-over-rail bridge on the Olympic Highway at Kapooka. The proposal also includes the realignment of around 2.7 kilometres of the highway and intersection upgrades.

Ecological assessments for the project identified potential impacts to nationally listed biodiversity, including:

- White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland) (listed as an endangered ecological community under the EPBC Act)
- Superb Parrot (*Polytelis swainsonii*) (listed as vulnerable under the EPBC Act).

A Squirrel Glider (*Petaurus norfolcensis*) population (listed under NSW legislation) was also identified on Commonwealth land in the nearby Kapooka Military Area.

Impacts to these matters were assessed in accordance with the EPBC Act significant impact guidelines, taking into account relevant information from the national species profile and threats database and field surveys. The assessment was presented in the REF for the activity, the species impact statement prepared to meet NSW statutory requirements, and preliminary documentation submitted to the Australian Government.

A range of measures were proposed in the environmental assessment documentation to mitigate the unavoidable impacts of the project. These included:

- a detailed biodiversity management plan, incorporating the following elements (amongst others)
- construction of rope bridges in consultation with a Squirrel Glider expert
- revegetation and plantings under the bridge and on batter slopes using species consistent with Box-Gum Woodland
- placement of fallen logs in accordance with set benchmark levels
- retention of tall trees on the edge of the development site to assist connectivity for Squirrel Gliders
- establishment of a fenced exclusion zone
- retention of hollow-bearing trees where possible, complemented by nest boxes for any loss of hollows, with 70% to be installed six months before clearing occurs
- staged clearing with an experienced wildlife carer or ecologist present
- weed control in accordance with management practices detailed in the national recovery plan for Box-Gum Woodland.

Other safeguards were also detailed that would provide complementary protection for biodiversity, including erosion and sediment control measures. In addition, offsets were also proposed to address residual significant impacts to Box-Gum Woodland and Superb Parrot habitat.

The preliminary documentation was publicly displayed between February and March 2014.

No submissions were received.

The project received Federal Government approval in May 2014, which included conditions to ensure actions with respect to revegetation, exclusion zones and offsets were implemented.

Further project information is available at: <http://www.rms.nsw.gov.au/projects/south-western/kapooka/index.html>

Offsetting impacts

As detailed in Program Commitment 2, Roads and Maritime will provide offsets where a road activity will have residual, unavoidable and significant impacts to the Specified Protected Matters. The required offset will be determined in accordance with a method identified in a bilateral agreement or otherwise endorsed by the Federal Minister for the Environment.

A revised NSW bilateral agreement regarding environmental assessment came into effect in February 2015. The bilateral agreement identifies two endorsed offset methods for actions that will have a residual significant impact on nationally listed threatened species, ecological communities and migratory species:

1. the *NSW Biodiversity Offsets Policy for Major Projects* and accompanying *Framework for Biodiversity Assessment*, or
2. the Biobanking assessment methodology established under the *Threatened Species Conservation Act 1995* or *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management*.

In accordance with Program Commitment 2, Roads and Maritime intends to provide offsets that are calculated using the methods described above. Roads and Maritime will implement this commitment via updated internal guidelines and procedures.

Project example – Great Western Highway, Forty Bends Upgrade

Roads and Maritime is undertaking an upgrade of the Great Western Highway at Forty Bends. This is one of a series of on-going upgrades of the highway as part of a joint commitment by the NSW and Australian Governments to improve road safety and accessibility for communities in the Blue Mountains and central west NSW. A key purpose of this section of road-work is to upgrade intersections and construct retaining walls and basins to minimise the risk of black ice.

The REF for the activity identified potential impacts to a nationally listed threatened species: the Purple Copper Butterfly. Following public display of the REF, further design refinements were made to decrease the extent of impact, including: reducing the length of proposed road works; reducing the number of water quality basins; and amending retaining walls. The concept design changes allowed for some avoidance of areas of potential Purple Copper Butterfly habitat.

However, despite these revisions and proposed mitigation measures such as pre-clearing surveys and exclusion fencing, it was considered that there was still a potential to have a significant impact on the species and the proposal was referred to the Australian Government. Between January and February 2014 a management plan and offset strategy were publicly displayed. The strategy assessed the impacts of the proposal (including the quantum of required offsets), identified an appropriate offset (11 hectares to offset 3.83 hectares of impacted habitat), and committed to working to establish an in-perpetuity Biobanking agreement over the offset site (including a management plan).

In May 2014 the Australian Government granted approval for the activity, subject to conditions requiring delivery of the offset commitments.

Further project information is available at: <http://www.rms.nsw.gov.au/projects/western-nsw/katoomba-lithgow/project-documents/forty-bends.html>