

6. Environmental assessment

6.1 Biodiversity

A detailed impact assessment of the proposal, as described in Chapter 3. The assessment report details the methods, biodiversity field survey results and assessment used to identify the extent and magnitude of potential ecological impacts associated with the proposal for the study area as defined in *the Medlow Bath Upgrade Great Western Highway Biodiversity Assessment* (RPS, 2021a), which is provided in Appendix D. A summary of this assessment is provided below.

6.1.1 Methodology

Background research of mapping, datasets and database searches was undertaken to collect and review publicly available information on the presence or likelihood of occurrence (within a 10 kilometre radius) of:

- threatened and protected terrestrial and aquatic flora and fauna species and their habitat
- threatened ecological communities
- important habitat for migratory species
- declared areas of outstanding biodiversity value.

The list of threatened species and ecological communities (threatened biodiversity) identified by database searches were subject to a habitat assessment. A field inspection of the main proposal area was undertaken by an ecologist on 10 December 2020 (as well as an additional visit on 14 May 2021 for the proposed Bellevue Crescent option). This field work aimed at ground-truthing the results of the background research and habitat assessment.

Five 'likelihood of occurrence' categories were applied to the threatened biodiversity listed in Table 6-1 with regard to:

- habitat descriptions as provided in the Threatened Species Profile Database and whether habitat features or components associated with the species occur within the proposal area
- geographic distribution of the species is known or predicted
- the recency of threatened species observations (ie recent being less than five years) and proximity to the proposal area (ie landscape factors such as patch size and connectivity)
- habitat value and condition as determined through the site inspection
- the results of targeted surveys (where performed)
- the likely effect of existing key threatening process (KTPs).

Table 6-1: Likelihood of occurrence criteria

Likelihood	Criteria
Recorded	The species was observed in the study area during the current survey
High	It is highly likely that a species inhabits the study area and is dependent on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10 km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.
Moderate	Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the study area. It may be an occasional visitor (fauna) and is not dependent on available habitat (ie for breeding or important life cycle periods such as winter flowering resources) or for plants the site is sufficiently disturbed such that plant propagules are not likely to be present in the soil seed bank. Specific habitat is not present in the study area or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
None	Suitable habitat is absent from the study area.

6.1.2 Existing environment

The proposal area is located in the Wollemi subregion of the Sydney Basin bioregion. Soil and water catchment details are described in Section 6.3 and Section 6.4.

The proposal area typically comprises vegetation that is in a moderate to highly modified state, ranging from areas of bushland with edge effects apparent to fully cleared and managed roadside verges land and parklands. The best condition native vegetation is located along the western margin of the proposal area south of Bellevue Crescent, with higher condition vegetation and habitat occurring in this location.

Plant community types

The native vegetation observed within the proposal area is comprised of one vegetation community, which has been assigned a plant community type (PCT). The PCT identified within the proposal area is listed in Table 6-2 and shown in Figure 6-1.

Table 6-2: Native vegetation community types within the proposal area

Plant community type (PCT)	Condition class	Threatened ecological community	Area (ha) in proposal area	Area (ha) in study area
PCT 1248 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion	Moderate	None	0.34	1.87
	Poor	None	0.02	0.02
Total			0.36	1.89

The identified PCT has been classified according to condition class (ie moderate or poor) and does not correlate to a threatened ecological community (TEC).

Other forms of vegetation cover not consistent with a naturally occurring PCT that were observed in the proposal area are listed below:

- 0.08 ha of native (landscaped)
- 1.06 ha of exotic (tree cover)
- 1.49 ha of exotic (groundcover).

Threatened ecological communities

No TECs were identified within the proposal area. The only State and Commonwealth listed TEC occurs outside and northeast of the study area in the Temperate Highland Peat Swamp on Sandstone (THPSS) endangered ecological community (EEC).

The location of this TEC relative to the proposal area is shown in Figure 6-2. This community provides unique habitat conditions for species such as the Blue Mountains Water Skink (*Eulamprus leuraensis*), Giant Dragonfly (*Petaleura gigantea*) and *Carex klaphakei*.

Groundwater dependent ecosystems

No groundwater dependent ecosystems were observed within the proposal area as the identified vegetation does not have high potential for groundwater dependency.

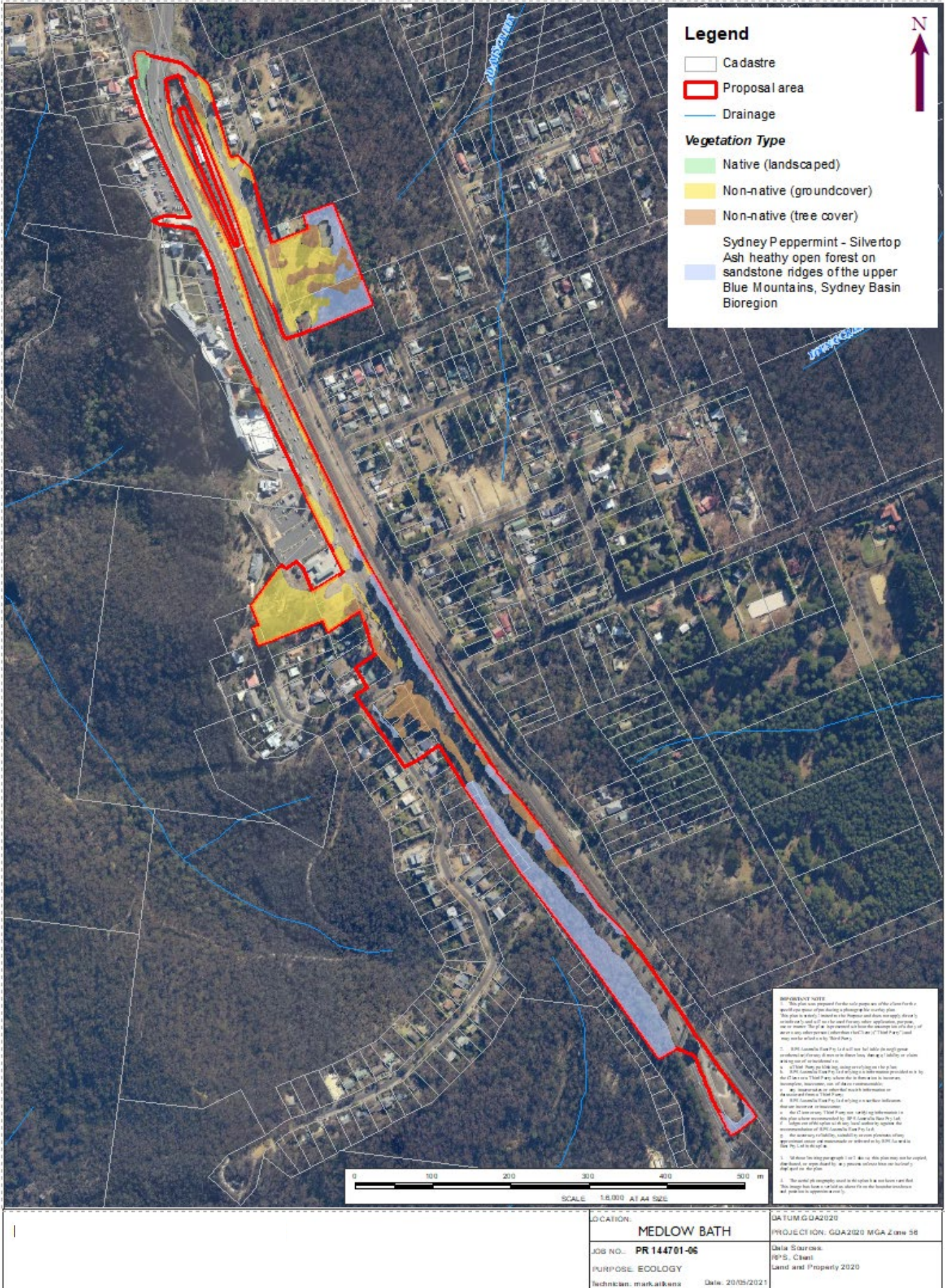


Figure 6-1: Vegetation cover within the proposal area (RPS, 2021a)

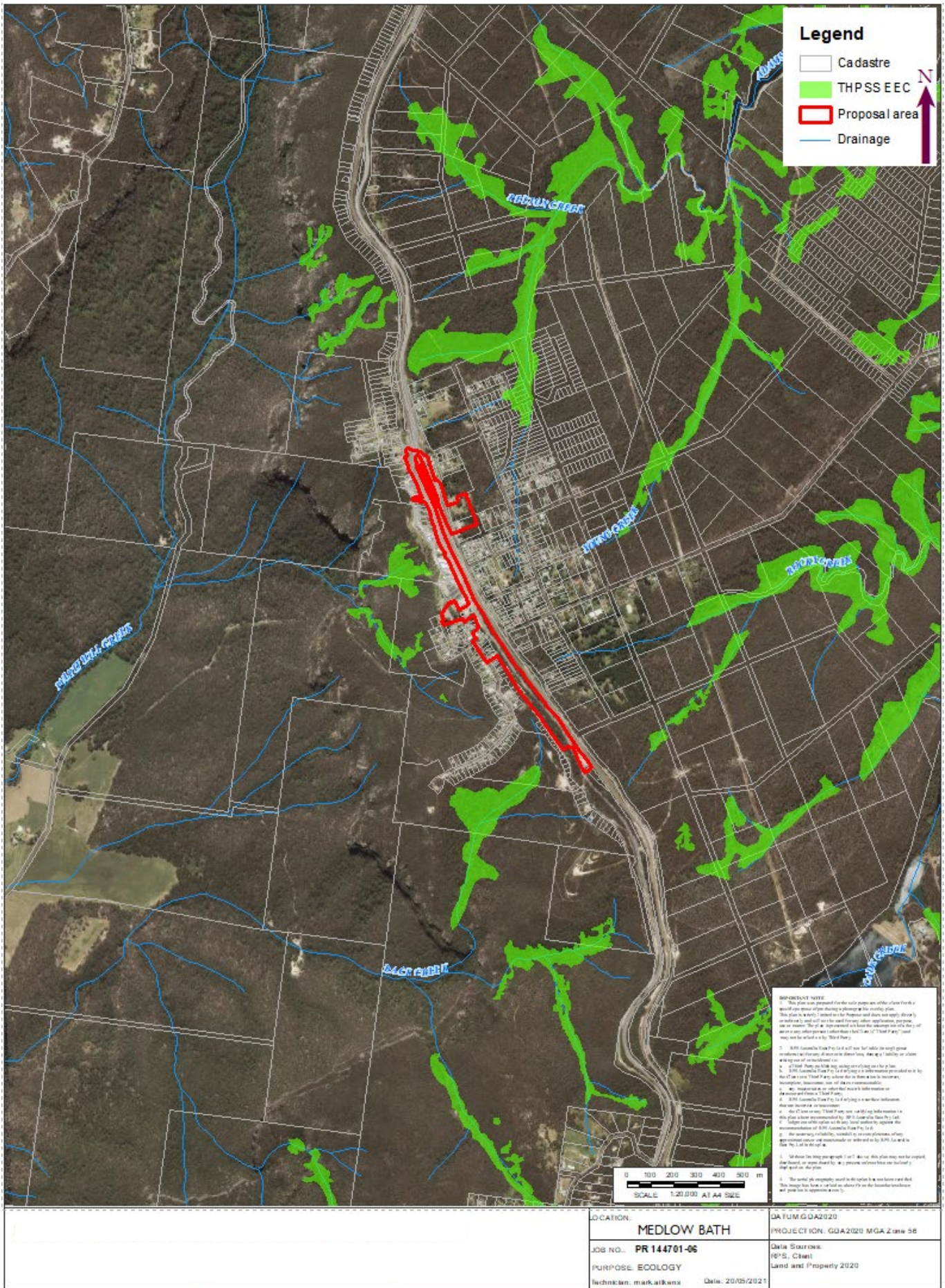


Figure 6-2: Threatened ecological communities within proximity to the proposal area (RPS, 2021a)

Threatened species and populations

Four threatened species were found to have a high likelihood of occurring on site and eighteen threatened species have a moderate likelihood. A summary of the likelihood of occurrence analysis is provided in Table 6-3. None of these species listed were observed during the field investigations.

Table 6-3: Likelihood occurrence analysis for threatened species within proposal area

Scientific name	Common name	Status – BC Act	Status – EPBC Act	Likelihood of occurrence
<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	V	V	Moderate
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	Moderate
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	-	Moderate
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	-	Moderate
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	-	High
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	Moderate
<i>Petroica boodang</i>	Scarlet Robin	V	-	High
<i>Petroica phoenicea</i>	Flame Robin	V	-	Moderate
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	High
<i>Ninox connivens</i>	Barking Owl	V	-	Moderate
<i>Ninox strenua</i>	Powerful Owl	V	-	Moderate
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	-	High
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	V	E	Moderate
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E	E	Moderate
<i>Phascolarctos cinereus</i>	Koala	V	V	Moderate
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Moderate
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Moderate
<i>Miniopterus australis</i>	Little Bentwing-bat	V	-	Moderate
<i>Miniopterus schreibersii oceanensis</i>	Large Bent-winged Bat	V	-	Moderate
<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	Moderate
<i>Persoonia marginata</i>	Clandulla Geebung	V	-	Moderate
<i>Zieria murphyi</i>	Velvet zieria	V	-	Moderate

V = vulnerable
E = endangered

Aquatic environment

The proposal area does not contain defined drainages that would classify as waterway habitat.

Areas of outstanding biodiversity value

No areas of outstanding biodiversity value (AOBV) occur within or in the vicinity of the proposal area and AOBV would not be impacted by the proposal.

Wildlife connectivity corridors

The well vegetated upper Blue Mountains provides for relatively unconstrained wildlife connectivity in within the local area with local barriers to movement being limited to the developed parts of Medlow Bath and the Great Western Highway/railway line corridors. These barriers are considered minor and of no regional consequence.

Matters of National Environmental Significance

Commonwealth listed threatened and migratory species with a likelihood of occurrence of 'moderate' or 'greater' within the proposal area are outlined in Table 6-4. None of the species listed below were observed during the field investigation.

No EPBC listed wetlands of importance or threatened ecological communities were identified within the proposal area. One Commonwealth listed TEC is located 250 to 500 metres downstream of the study area.

Table 6-4: Likelihood of occurrence analysis for Commonwealth-listed threatened species within proposal area

Scientific name	Common name	Status – BC Act	Status – EPBC Act	Likelihood of occurrence
<i>Litoria littlejohni</i>	Littlejohn's Tree Frog	V	V	Moderate
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	V	Moderate
<i>Apus pacificus</i>	Fork-tailed Swift	-	M	Moderate
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	M	Moderate
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	V	E	Moderate
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V	Moderate
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E	E	Moderate
<i>Petauroides volans</i>	Greater Glider	-	V	Moderate
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Moderate
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Moderate

V = vulnerable
E = endangered

6.1.3 Potential impacts

Construction

The construction of the proposal is likely to result in the following impacts:

- removal of native vegetation
- removal of threatened fauna habitat
- removal of threatened flora
- aquatic impacts
- fauna injury or mortality
- impacts from construction noise, light and vibration.

Removal of native vegetation

The proposal is estimated to result in the clearing of 0.36 hectares of native vegetation consistent with a PCT classification. An additional 0.08 hectares of native (landscaped) vegetation would also be removed. A summary of the native vegetation loss by PCT classification is shown in Table 6-5. No TECs would be removed by the proposal.

Table 6-5: Impacts on native vegetation

Plant community type (PCT)	BC Act status	EPBC Act status	Percent cleared ¹	Proposal area ² (hectares)
1248 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion (moderate)	-	-	20	0.34
1248 Sydney Peppermint - Silvertop Ash heathy open forest on sandstone ridges of the upper Blue Mountains, Sydney Basin Bioregion (poor)	-	-	20	0.02
Total				0.36

1- Based on the Vegetation Information System classification database.

2- Area to be cleared based on ground-truthed vegetation mapping within the study area.

Removal of threatened fauna habitat

The potential habitat of threatened fauna species with a moderate or greater likelihood of occurrence to be removed by the proposal is outlined in Table 6-6.

Table 6-6: Impacts on threatened fauna and potential habitat

Threatened species	Ecosystem or species credit species	BC Act status	EPBC Act status	Likelihood of occurrence	Potential Habitat to be impacted (ha)
Littlejohn's Tree Frog	Species	V	V	Moderate	0.32
Giant Burrowing Frog	Species	V	V	Moderate	0.32
Red-crowned Toadlet	Species	V	-	Moderate	0.32
Fork-tailed Swift	Ecosystem	-	M	Moderate	0.32
White-throated Needle-tail	Ecosystem	-	M	Moderate	0.32
Dusky Woodswallow	Ecosystem	V	-	Moderate	0.32
Gang-gang Cockatoo	Species	V	-	High	0.32
Varied Sittella	Ecosystem	V	-	Moderate	0.32
Scarlet Robin	Ecosystem	V	-	High	0.32
Flame Robin	Ecosystem	V	-	Moderate	0.32
Little Lorikeet	Species	V	-	High	0.32
Barking Owl	Species	V	-	Moderate	0.32
Powerful Owl	Ecosystem	V	-	Moderate	0.32
Eastern Pygmy-possum	Species	V	-	High	0.32
Spotted-tailed Quoll	Ecosystem	V	E	Moderate	0.32
New Holland Mouse	Ecosystem	-	V	Moderate	0.32
Southern Brown Bandicoot (eastern)	Ecosystem	E	-	Moderate	0.32
Koala	Species	V	V	Moderate	0.32
Greater Glider	Ecosystem	-	V	Moderate	0.32
Grey-headed Flying-fox	Ecosystem	V	V	Moderate	0.32
Large-eared Pied Bat	Species	V	V	Moderate	0.32
Little Bentwing-bat	Ecosystem/ Species	V		Moderate	0.32
Large Bentwing-bat	Ecosystem/ Species	V		Moderate	0.32

V = vulnerable

E = endangered

Removal of threatened flora

The potential habitat of threatened flora species with a moderate or greater likelihood of occurrence to be removed by the proposal is outlined in Table 6-7.

Table 6-7: Impacts on threatened flora and potential habitat

Threatened species	Ecosystem or species credit species	BC Act status	EPBC Act status	Likelihood of occurrence	Potential Habitat to be impacted (ha)
Hairy Geebung	Species	E	E	Moderate	0.32
<i>Persoonia marginata</i>	Species	V	V	Moderate	0.32
<i>Zieria murphyi</i>	Species	V	V	Moderate	0.32

Removal of migratory species habitat

The potential habitat of migratory species with a moderate or greater likelihood of occurrence to be removed by the proposal is outlined in Table 6-8.

Table 6-8: Impacts on migratory species and potential habitat

Threatened species	Ecosystem or species credit species	BC Act status	EPBC Act status	Likelihood of occurrence	Potential Habitat to be impacted (ha)
Fork-tailed Swift	-	-	M	Moderate	0.32
White-throated Needletail	-	-	M	Moderate	0.32

Aquatic impacts

Impacts to waterways and aquatic habitats may include:

- temporary displacement of fauna
- loss of riparian and aquatic habitat, including removal or relocation of snags
- changes to flooding regimes, hydrology, turbidity and sedimentation
- changed hydrology including excessive flow velocities, modified depths of waterways, increase water turbulence, in stream structures, realignment of creeks, alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands, and channelization, piping, concrete lining or scour protection of waterways
- changes in shading regime and temperature.

No direct impact on aquatic habitat is expected. Changes to water quality and quantity may emerge in Adams Creek following redirection of overland flows into that drainage. Provided these flows are appropriately mitigated and managed measures it is considered that downstream impacts will be minor and inconsequential.

Injury and mortality

Fauna injury or death has the greatest potential to occur during construction when vegetation clearing would occur. The extent of this impact would be proportionate to the extent of vegetation that is cleared. Less mobile species (eg ground dwelling reptiles), or those that are nocturnal and nest or roost in trees during the day (eg arboreal mammals and microchiropteran bat species), may find it difficult to rapidly move away from the clearing when disturbed. The study area is known to contain several arboreal species such as birds that may be injured or killed during vegetation removal. Reptiles and frogs may also be injured or killed during construction as habitat is cleared.

Noise, light and vibration

The proposal may result in impacts to fauna from noise and vibration during construction, which may result in fauna temporarily avoiding habitats adjacent to the construction. The magnitude of this impact would be low and mitigation measures are not deemed necessary.

Lighting would be used at night to enable work to be completed that may result in impacts to nocturnal fauna. Nocturnal species such as possums and microbats may avoid the habitat in the proposal area during construction as temporary 'daylight' conditions would be created by the mobile lighting system. This impact is considered temporary and would not have long lasting effects on the biodiversity of the proposal area. The magnitude of this impact would be low and mitigation measures are not deemed necessary.

Operation

The proposal is likely to result in the following operational/indirect impacts:

- reduced wildlife connectivity and habitat fragmentation
- edge effects on adjacent native vegetation
- invasion and spread of weeds, pests, pathogens and disease
- changes to hydrology
- impacts to groundwater dependent ecosystems
- cumulative biodiversity impacts.

Wildlife connectivity and habitat fragmentation

Potential impacts to wildlife connectivity may occur where roads affect the movement of plants and animals between habitats. Wildlife connectivity issues include blocking fish passage, preventing migration of a species, decreasing the opportunity for dispersal or increasing roadkill. The proposal has been identified as having the following impacts on wildlife connectivity and habitat fragmentation:

- loss of overhanging/ adjacent tree canopy and widening of existing tree canopy gaps
- barrier effects due to construction of new road and road widening
- edge effects
- genetic isolation
- life cycle requirements of species potentially impacted by the proposal
- changes to culverts and bridges resulting in wildlife connectivity impacts
- the scale, frequency, intensity and duration of potential wildlife connectivity impacts including direct and indirect impacts and the difference between construction (temporary) and operational (long-term) impacts
- cumulative impacts on corridors and movement.

The proposal is mostly restricted to the existing urban parts of Medlow Bath and consequently would have no discernible impact on wildlife connectivity within the local area. Additional contributions to habitat fragmentation are minor and inconsequential. No adverse impacts on wildlife populations, key habitat resources, genetic interchange, and population viability for some species is expected.

Edge effects on adjacent native vegetation and habitat

The development of linear infrastructure is known to cause disturbance in terms of reducing habitat quality in adjacent areas. This is due to the greater potential for edge effects and habitat fragmentation and barrier effects due to the high perimeter to area ratio of linear developments. Edge effects typically take the form of weed invasion, increased light levels, increased wind speeds, and greater temperature fluctuations.

The proposal would be built in an area that is subject to a high level of edge effects from the existing roadways and other development. The vegetation patches within the study area affected by high weed

invasion and other edge effects along existing edges, typically extending five to seven metres from the existing road formation and other clearings. There are likely to be additional edge effects resulting from the proposal as the new edges would typically be in areas only currently experiencing low to moderate weed invasion and other edge effects.

Invasion and spread of weeds and pests

Proliferation of weed and pest species would be an indirect impact (ie not a direct result of proposal activities). The most likely causes of weed dispersal and importation associated with the proposal include earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery during all phases. The proposal area contains significant weed growth, in all areas, particularly on agricultural land and along minor roads and tracks. As such, the spread and proliferation of weeds would need to be managed during construction.

Proposal activities also have the potential to disperse pest species out of the proposal area across the surrounding landscape. Machinery entering the site would need to be cleaned to remove plant propagules so as to limit the likelihood of importation into the proposal area. The magnitude of this impact is likely to be low and mitigation measures are likely to be effective.

Invasion and spread of pathogens and disease

Several pathogens known from NSW have potential to impact on biodiversity as a result their movement and infection during construction. Of these, three are listed as a key threatening process under either the EPBC Act and/or BC Act including:

- dieback caused by *Phytophthora* (Root Rot; EPBC Act and BC Act)
- infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis (EPBC Act and BC Act)
- introduction and establishment of exotic Rust Fungi of the order Pucciniales on plants of the family Myrtaceae (BC Act).

While these pathogens were not observed in the proposal area, the potential for pathogens to occur should be treated as a risk during construction. The most likely causes of pathogen dispersal and importation associated with the proposal include earthworks, movement of soil, and attachment of plant matter to vehicles and machinery during all phases (construction and operation). Pathogens would need to be managed within the proposal area according to the *Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects* (Roads and Traffic Authority, 2011a).

Changes to hydrology

The proposal would involve the redirection of waters into Adams Creek thereby increasing water quantity and possible changes to water quality along this drainage. The proposal is likely to cause changes to affect the volume and peak runoff rates into waterways from the upstream catchments. The following recommendations have been made to minimise these impacts:

- provide all runoff discharge locations with level spreaders for limits on the scour potential of runoff entering the existing watercourses
- runoff discharge locations are proposed to have attenuation basins for mitigation of the discharge peak flows to no greater than under the existing conditions. Bioretention is proposed to be integrated into the basin floor to provide stormwater quality filtration and treatment.

Minor and inconsequential impacts on the THPSS EEC located 250 to 500 metres downstream of the proposal are predicted because of these works. No changes in ecosystem functionality and composition are expected.

Operational noise, light and vibration

The existing levels of noise and vibration from the existing Medlow Bath area and other roads by vehicles are substantial, with the proposal unlikely to significantly increase noise and vibration during operation of the road that would result in any increased impacts to biodiversity within the proposal area.

Impacts to groundwater dependent ecosystems

The proposal is not likely to have any direct impacts on groundwater dependent ecosystems. However, alteration to the hydrology of Adams Creek through the direction of increased flows into the watercourse may have an impact on THPSS EEC, which is a groundwater dependent ecosystem. Impacts to this TEC are likely to be minor and inconsequential.

Cumulative impacts

The potential biodiversity impacts of the proposal must be considered as a consequence of the construction and operation of the proposal within the existing environment. The proposal would not act alone in causing impacts to biodiversity. The incremental effects of multiple sources of impact (past, present and future) are referred to as cumulative impacts and provide an opportunity to consider the proposal within a strategic context.

Conclusion on significance of impacts

Even though some clearance of vegetation is required, the proposal is not likely to significantly impact threatened species or ecological communities or their habitats, within the meaning of the BC Act or FM Act and therefore a Species Impact Statement or Biodiversity Development Assessment Report is not required.

The proposal is not likely to significantly impact threatened species, ecological communities or migratory species, within the meaning of the EPBC Act.

Biodiversity offsets

The proposal is not likely to have a significant impact on threatened species, ecological communities and their habitats. Residual impacts are to be minimised and mitigated. A Biodiversity Offset Strategy is not required for this proposal.

6.1.4 Safeguards and management measures

Table 6-9: Safeguards and management measures – Biodiversity

Impact	Environmental safeguards	Responsibility	Timing	Reference
Biodiversity	<p>A Flora and Fauna Management Plan will be prepared in accordance with TfNSW's <i>Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a) and implemented as part of the CEMP. It will include, but not be limited to:</p> <ul style="list-style-type: none"> plans showing areas to be cleared and areas to be protected, including exclusion zones, protected habitat features and revegetation areas requirements set out in the <i>Landscape Design Guideline</i> (Roads and Maritime Services, 2018a) pre-clearing survey requirements procedures for unexpected threatened species finds and fauna handling procedures addressing relevant matters specified in the <i>Policy and guidelines for fish habitat conservation and management</i> (Department of Primary Industries Fisheries, 2013) protocols to manage weeds and pathogens. 	Contractor	Detailed design / Pre-construction	Section 4.8 of QA G36 <i>Environment Protection</i>
Removal of native vegetation	Areas for native vegetation and habitat removal will be minimised through detailed design.	Contractor	Detailed design	Appendix D
Removal of native vegetation	<p>Pre-clearing surveys and habitat removal will be undertaken in accordance with <i>Guide 1: Pre-clearing process</i> of the <i>Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a).</p> <p>Where possible, hollow bearing trees should be retained or relocated.</p>	Contractor	Pre-construction	Appendix D
Removal of native vegetation	Vegetation removal will be undertaken in accordance with <i>Guide 4: Clearing of vegetation and removal of bushrock</i> of the	Contractor	Construction	Appendix D

Impact	Environmental safeguards	Responsibility	Timing	Reference
	<i>Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a).			
Removal of native vegetation	Native vegetation will be re-established in accordance with <i>Guide 3: Re-establishment of native vegetation of the Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a).	TfNSW	Post construction	Appendix D
Removal of native vegetation	The unexpected species find procedure will be followed under the <i>Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal area.	Construction contractor	Construction	Appendix D
Aquatic habitat	Aquatic habitats will be protected in accordance with <i>Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a) and Section 3.3.2 Standard precautions and mitigation measures of the <i>Policy and guidelines for fish habitat conservation and management Update 2013</i> (Department of Primary Industries Fisheries, 2013).	Contractor	Construction	Appendix D
Injury and mortality of fauna	Fauna will be managed in accordance with <i>Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a).	Contractor	Construction	Appendix D
Invasion and spread of weeds	Weed species will be managed in accordance with <i>Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a).	Contractor	Construction	Appendix D
Invasion and spread of pests	Pest species will be managed within the proposal area.	Contractor	Construction	Appendix D
Invasion and spread of pathogens and disease	Pathogens will be managed in accordance with <i>Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity of RTA projects</i> (Roads and Traffic Authority, 2011a).	Contractor	Construction	Appendix D