Review of Environmental Factors

Proposed Lower Thredbo Valley Track, Bullocks Flat to Thredbo River Picnic Area

A report prepared for NSW Office of Environment and Heritage

Citation

EnviroKey (2015) Review of Environmental Factors: Proposed Lower Thredbo Valley Track, Bullocks Flat to Thredbo River Picnic Area. A report prepared by EnviroKey for NSW Office of Environment & Heritage. Report No. 15.REF-043. Final Report. Version 3.2. 25 August 2015.

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Front Cover Image

Blotched Bluetongue observed adjacent to Gaden Hatchery (Photo: Joshua Wellington)

August 2015

Report No. 15.REF-043

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Definitions & Acronyms used within this REF

AHIP	Aboriginal Heritage Impact Permit
ASL	Above Sea Level
BVT	Biometric Vegetation Type
CMA	Catchment Management Authority
EEC	Endangered Ecological Community
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1995*
FM Act	NSW *Fisheries Management Act 1994*
KNP	Kosciuszko National Park
KNPPoM	Kosciuszko National Park Plan of Management
LGA	Local Government Area
Likely	taken to be a real chance or possibility
Locality	means the area within a 10 kilometre radius of the proposal
Local population (migratory or nomadic fauna)	the population comprises those individuals that are likely to occur in the study area from time to time
Local population (resident fauna)	the population comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to use habitats in the study area
Local population (threatened flora)	the population comprises those individuals occurring in the study area or the cluster of individuals that extend into habitat adjoining and contiguous with the study area that could reasonably be expected to be cross-pollinating with those in the study area
LTVT	Lower Thredbo Valley Track
Migratory species	a species specified in the schedules of the EPBC Act
NP	National Park
NPWS	National Park and Wildlife Service
NP&W Act	NSW *National Parks and Wildlife Act 1974*
NV Act	NSW *Native Vegetation Act 2003*
OEH	NSW Office of Environment & Heritage
PoM	Plan of Management

Proposal	the area to be directly affected by the proposal. That is, the footprint of the proposal, including the construction and operation of the LTVT.
REF	Review of Environmental Factors
Region	means a biogeographical region that has been recognised and documented such as the Interim Biogeographical Regions of Australia (IBRA) (Thackway and Creswell 1995). The study area is located within the South Eastern Highlands Bioregion and the Australian Alps Bioregion.
SEPP	State Environmental Planning Policy
Subject site	the area to be directly affected by the proposal. That is, the footprint of the proposal.
SRSC	Snowy River Shire Council
Study area	the Area of Investigation which includes the subject site and any additional areas that are likely to be affected by the proposal, either directly or indirectly.
TEC	Threatened ecological community (includes those communities listed as vulnerable, endangered or critically endangered).
Threatened biota	means those threatened species, endangered populations or endangered ecological communities considered known or likely to occur in the study area.
Threatened species	a species specified in the schedules of the TSC Act, FM Act or the EPBC Act.
TSC Act	NSW *Threatened Species Conservation Act 1995.*

Declaration

This Review of Environmental Factors provides a true and fair review of the proposed activity in relation to its potential effects on the environment. It addresses to the fullest extent possible, all of the factors listed in Clause 228 of the Environmental Planning and Assessment Regulation 2000.

Signed: 

Name: Steve Sass

Delegation: Director/Principal Ecologist, EnviroKey Pty. Ltd.

Date: 25 August 2015

I have examined this REF and the certification and accept the REF on behalf of NSW Office of Environment & Heritage (OEH).

Signed ……

Name ……

Delegation ……

Date ……

Fees

OEH is the proponent for the proposal. No fees apply.

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Figures, Maps & Tables

1 INTRODUCTION

The NSW National Parks and Wildlife Service (NPWS) propose to extend the recently completed shared use Thredbo Valley Track (TVT) within Kosciuszko National Park (KNP). The track would generally follow the Thredbo River and extend an additional 18 – 20 kilometres downstream, to allow the track to connect onwards to Jindabyne. The proposed extension would be referred to as the Lower Thredbo Valley Track (LTVT) during the planning and construction phase. EnviroKey Pty. Ltd (EnviroKey) was engaged by the New South Wales (NSW) Office of Environment and Heritage (OEH) to prepare a Review of Environmental Factors (REF) for the proposed construction and operation of the LTVT.

The proposal extends between Bullocks Hut adjacent to the Skitube Bridge and Kosciuszko Road (about 5 kilometres north-east of Jindabyne) within the Snowy River Local Government Area (LGA). A regional setting detailing the Area of Investigation ('study area') used for this REF is provided (**Map 1**). A zoomed in representation showing the approximate location of the proposal is shown in **Map 2**. This is an approximate location due to the possibility of a small shift in the exact location of the track such as to avoid significant large trees or areas of extreme erosion risk. However, the proposed track would remain within the study area.

For this REF, the '*Proponents Guidelines for the Review of Environmental Factors'* prepared by the Department of Environment and Climate Change (now Office of Environment and Heritage (OEH)) was followed given that the proposal would be located within Kosciuszko National Park (KNP) and that OEH would be the determining authority (DECC 2008). The standard template for preparing REF in lands reserved or acquired under the NSW *National Parks and Wildlife Act 1974* (NP&W Act) was also adopted in the preparation of this REF (DECCW 2011).

Accordingly, this REF will:

- Undertake an analysis of the environmental, economic, physical and social implications of the proposal; and
- Describe the environmental impacts associated with the proposal and to develop environmental safeguards for each environmental component where deemed necessary.

This REF has been prepared in accordance with the requirements of Section 111 of the *Environmental Planning and Assessment Act* 1979 and Section 228 of the *Environmental Planning and Assessment Regulation 2000* specifying a "duty to consider environmental impact" and was prepared by suitably qualified and experienced personnel details of which are provided within **Appendix 1**.

1.1 BRIEF DESCRIPTION OF THE PROPOSAL

The LTVT will begin at Bullocks Hut. The shared-use track will immediately cross to the northern side of the Thredbo River utilising the pedestrian access on the Skitube Bridge (pending formalisation of an agreement between Perisher Blue Pty Ltd and OEH).

It will run roughly adjacent to the Thredbo River for approximately 20 kilometres and end at the Thredbo River Picnic Area at Kosciuszko Road. Very short sections of the track would be within approximately 10 – 20 metres of the Thredbo River, however the vast majority of the track would be located at least 50 – 100 metres from the river, with some sections being more than 500 metres from the river.

The head of the track is located on the Southern bank of the Thredbo River at Bullocks flat, before it immediately crosses the river. At this point, both banks of the Thredbo River are in KNP. After the track crosses the Thredbo River at Bullocks Flat, the track will remain entirely on the north (national park) side of the river until it exits at either Gaden Trout Hatchery or Thredbo River Picnic Area. The boundary of the Park is the left hand (generally the Northern) bank of the Thredbo River when looking down stream. The Thredbo River Picnic Area is in the Park. In these locations, the river is Crown Land.

The Snowy River Shire Council (SRSC) is currently working with community stakeholders and government to seek approval and fund a bridge-crossing and trail that will link the LTVT to Jindabyne at Gaden Trout Hatchery.

Due to the uncertainty as to whether SRSC will secure the funds or approvals required this REF would need to investigate two contingencies at the lower end of the proposed track:

- Option 1 – Construction of a bridge at the Gaden Trout Hatchery. An external party, likely Snowy River Shire Council, would own the bridge.
- Option 2 – Track to continue past the Gaden Trout Hatchery, join the Pallaibo Track at the lowest point where it crosses Sawpit Creek and continue along the Pallaibo Track to the Thredbo River Picnic Area. This option will require that section of the Pallaibo Track to be re-zoned from a walking track to a multi-use track. Some track modifications and upgrades would be required. The potential re-zoning of the section of the Pallaibo Track would need to be considered and approved during a review of the Kosciuszko National Park Plan of Management.

It is possible that the proposal at completion will encompass both options 1 and 2 above. For the purposes of the assessment for this REF, it has been assumed that both options could be utilised and both have been assessed.

The LTVT will run through a relatively inaccessible part of KNP with the only formal access being from either end of the track. Temporary access for construction and scoping is possible from over the Thredbo River at locations along the track. For this to occur, agreement from landowners would be required. Such access would also rely on the Thredbo

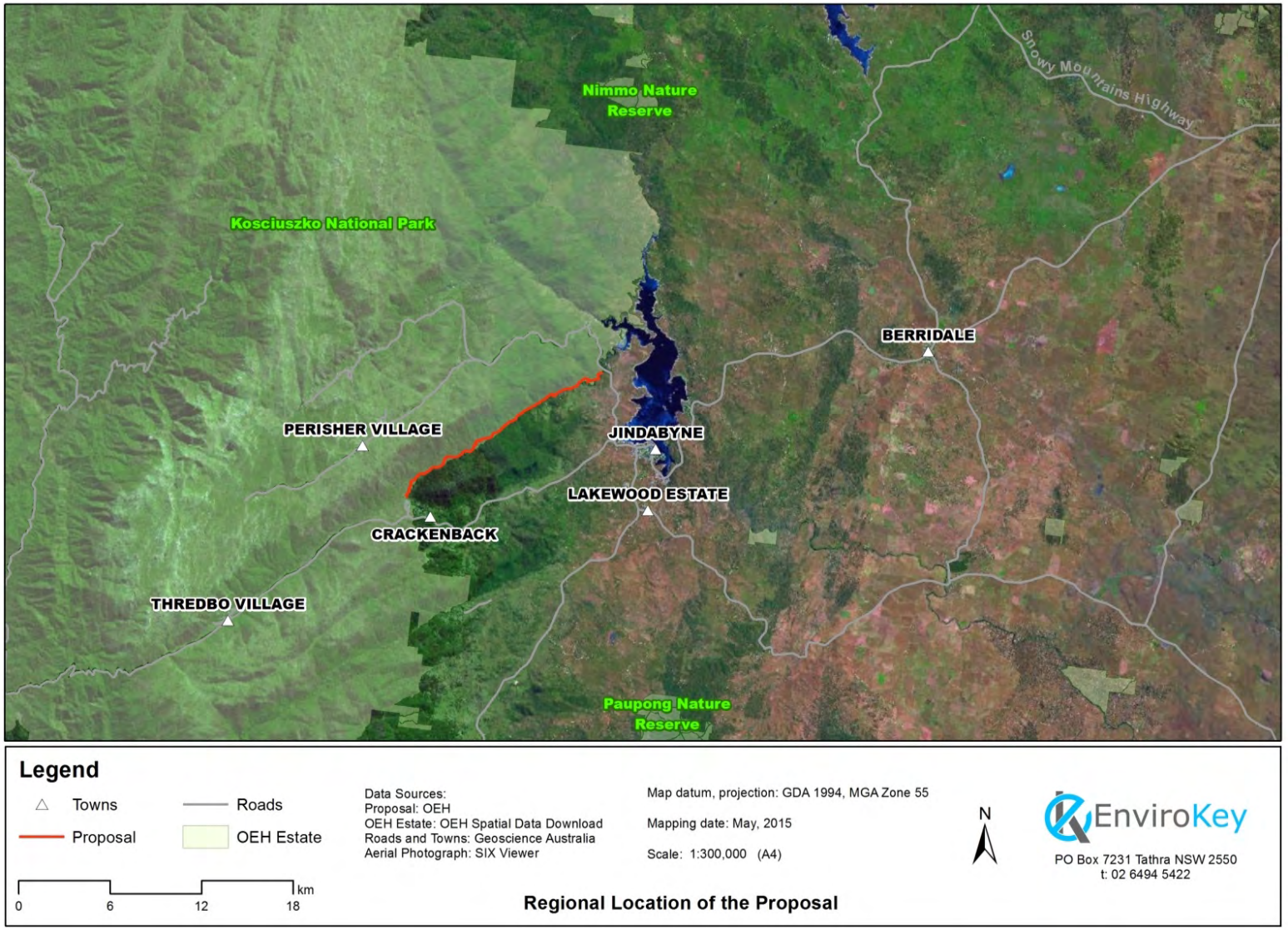
River being at a low enough level to cross. Therefore, considering the possible restrictions, the primary method of access will be via the track as it is constructed.

1.2 PROPONENTS DETAILS

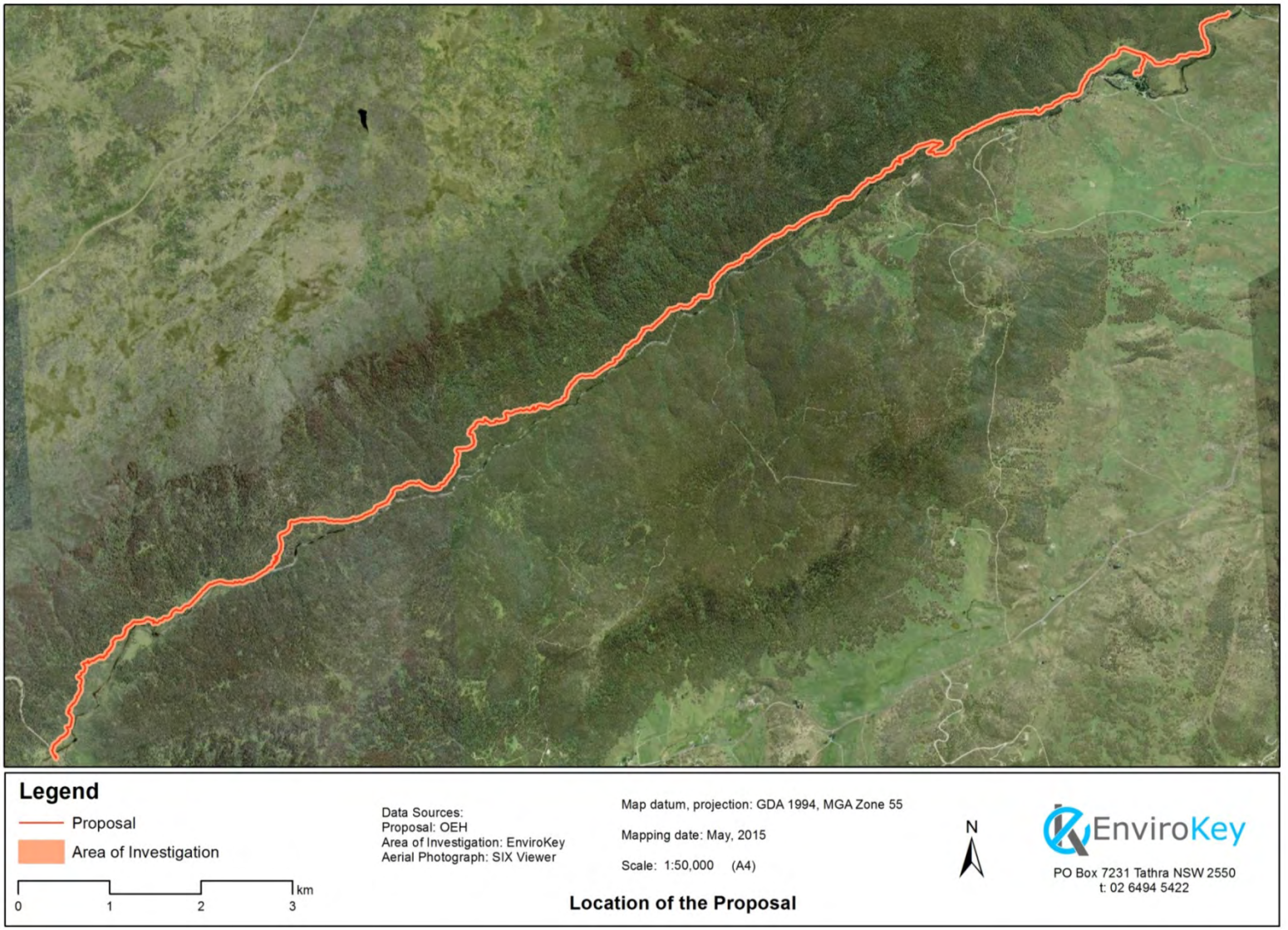
The proponent for the proposal is NSW OEH. Full details of the proponent are provided within **Table 1**.

Table 1: Proponents details.

Item	Details
Proponent	NSW Office of Environment & Heritage (OEH)
Contact	Chris Darlington - Project Manager
Address	PO Box 2228, Jindabyne NSW 2627
Phone	+61 (0)2 6450 5595
Facsimile	+61 (0)2 6456 2291
Email	christopher.darlington@environment.nsw.gov.au



Map 1: Regional setting of the study area applied to this REF.



Map 2: Location of the study area and proposal.

2 PERMISSIBILITY

2.1 LEGAL PERMISSIBILITY

2.1.1 NSW National Parks and Wildlife Act 1974

The NSW *National Parks and Wildlife Act 1974* (NP&W Act) is administered by OEH and provides the basis for the legal protection of flora and fauna in NSW. Unless a licence is obtained under the Act (or the TSC Act), it is an offence to harm any animal that is protected or is a threatened species, population or ecological community. It is also an offence to pick any plant that is protected or is a threatened species, population or ecological community. In addition, a person must not, by act or omission, damage any critical habitat. Activities in accordance with a Part 5 Assessment do not require a licence under the Act. The NP&W Act also protects Aboriginal heritage values.

The following matters have been considered when assessing permissibility under the Act:

Objects of the Act (s.2A)

The proposal is broadly consistent with the objects of the Act. More specifically, the proposal is consistent with the following:

- Clause 1, sub-clause (a) – habitat, ecosystems and ecosystem processes
- Clause 1, sub-clause (c) – fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation.

Objects – Reserve management principles (s.30E – 30K)

The proposal is broadly consistent with management principles for Nature Reserves and State Conservation Areas.

Relevant section of a plan of management

The proposal is broadly consistent with the Kosciuszko National Park Plan of Management (KNPPoM) (OEH 2012) (refer to section 2.2).

Leasing, licensing and easement provisions

The proposal would not conflict with any of these provisions of the Act.

Management powers and responsibilities of NPWS

The proposal is consistent with the management powers and responsibilities specified within the Act.

2.1.2 NSW Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) forms the legal and policy platform for development assessment and approval in NSW and aims to, *inter alia*, 'encourage the proper management, development and conservation of natural and artificial resources'.

The proposal will be determined by OEH under Part 5 of the Act. OEH, as the determining authority, must 'examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity' pursuant to Section 111 of the Act. Clause 228 of the *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation) identifies matters that 'must be taken into account concerning the impact of an activity on the environment'.

Section 5A of the EP&A Act contains seven factors to be considered by determining authorities when considering the significance of impacts on threatened biota associated with activities under Part 5 of the Act (the '7-part test'). Should the 7-part test determine that a '*significant effect*' on any threatened biota listed under the TSC Act is likely, then the authority must prepare a Species Impact Statement. Species which occur or have the potential to occur in the study area have been considered in the 7-part test included in **Appendix 6**.

The EP&A Act provides the framework for environmental planning in NSW and includes provisions to ensure that proposals which have the potential to significantly affect the environment are subject to detailed assessment.

2.1.3 NSW Wilderness Act 1987

The objectives of the NSW *Wilderness Act 1987 are*:

- To provide for the permanent protection of wilderness areas.
- To provide for the proper management of wilderness areas.
- To promote the education of the public in the appreciation, protection and management of wilderness.

The Kosciuszko NP has nine areas listed under the NSW *Wilderness Act 1987*.

None of the areas listed under the NSW *Wilderness Act 1987* in the Kosciuszko NP would be directly or indirectly impacted as a result of this proposal. Wilderness is addressed further in **Section 5.11**.

2.1.4 NSW Threatened Species Conservation Act 1995

The NSW *Threatened Species Conservation Act 1995* (TSC Act) provides legal status for biota of conservation significance. The TSC Act aims to, *inter alia*, 'conserve biological diversity and promote ecologically sustainable development'. It provides for:

- The listing of threatened species, populations and ecological communities.
- The listing of key threatening processes.
- The preparation and implementation of Recovery Plans, Threatened Abatement Plans and Priority Action Statements.
- Guidelines for the preparation of SIS.

The TSC Act has been addressed in this REF by undertaking database searches and desktop analysis for any threatened species, populations or communities previously recorded within the locality and targeted field surveys. Key threatening processes listed under Schedule 3 of the Act relevant to the proposal have been identified as part of assessment of potential impacts.

2.1.5 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) enables the Australian Government to join with the states and territories in providing a national scheme of environment and heritage protection and biodiversity conservation to ensure that actions likely to cause a '*significant impact*' on matters of national environmental significance (NES) undergo an assessment and approval process. Under the Act, an action includes a project, undertaking, development or activity.

An action that has, or is likely to have a significant impact on a matter of NES may not be undertaken within the prior approval from the Australian Government Minister for the Environment (DotE 2013).

The nine matters of NES that are protected under the EPBC Act are:

- Listed threatened species and ecological communities
- Listed migratory species
- Wetlands of international importance
- Commonwealth marine environment
- World heritage properties
- National heritage places
- The Great Barrier Reef Marine Park
- Nuclear actions
- A water resource, in relation to coal seam gas development and large coal mining development.

The Significant Impact Guidelines for the EPBC Act (DotE 2013) set out criteria to assist in determining whether an action requires approval and in particular, whether a proposed action is likely to have a 'significant impact' on a matter of NES.

If a proposed action is likely to have a significant impact on a matter of NES, referral of the proposal to the Department of the Environment (DotE) is required to confirm whether the

Commonwealth considers the proposal a 'controlled action' and subsequently requiring the Ministers approval under the EPBC Act.

This REF provides an assessment to ascertain whether the proposal will require referral to the Commonwealth.

2.1.6 NSW Fisheries Management Act 1994

The NSW *Fisheries Management Act 1994* (FM Act) aims to conserve fish stocks, key habitats, threatened species, populations and ecological communities of fish and marine vegetation. It also aims to promote viable commercial fishing, aquaculture industries and recreational fishing.

As a public authority, the OEH does not require a permit for dredging and reclamation works within 'water land' under Clause 200 (1) of the FM Act. Under this act, 'water land' means land submerged by water, whether permanently or intermittently or whether forming an artificial or natural body of water. Therefore some portions of the track would be classified as 'water land' including those sections closest to Thredbo River which would be submerged intermittently as a result of flooding along with the drainage line crossings as water land is also generally taken to include all drainage lines and waterways that are indicated on 1:25,000 topographic maps. Under the act, 'reclamation work' means using any material (such as sand, soil, silt, gravel, concrete, oyster shells, tyres, timber or rocks) to fill in or reclaim water land, or depositing any such material on water land for the purpose of constructing anything over water land (such as a bridge). Therefore the bridges which would be constructed as part of the proposal to cross drainage lines would fall within this definition.

Under Clause 199 of the FM Act, a public authority must give the Minister written notice of any proposed dredging or reclamation work in 'water land' and must consider any matters concerning the proposed work that are raised by the Minister within 28 days after the giving of the notice (or such other period as is agreed between the Minister and the public authority). The proposal would involve the clearing of surface vegetation and some minor 'reclamation work' in 'water land' as there are numerous bridge crossings of minor drainage lines within in the study area.

2.1.7 NSW Heritage Act 1977

The NSW *Heritage Act 1977* defines 'environmental heritage' as those places, buildings, works, relics, moveable objects and precincts. A property is a heritage item if it is:

- Listed in the heritage schedule of the local council's Local Environmental Plan (LEP).
- Listed on the State Heritage Register, a register of places and items of particular importance to the people of NSW.
- Listed in the National Heritage Database.

Heritage items are considered in this REF in **Section 5.12**.

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

State Environmental Planning Policy (SEPP) No. 44 encourages the conservation and management of natural vegetation areas that provide habitat for Koalas to ensure that permanent free-living populations will be maintained over their present range across 107 local government areas (LGA). Local councils listed under Schedule 1 of SEPP 44 cannot approve development in an area affected by the policy without an investigation of core koala habitat. The policy provides the state-wide approach needed to enable appropriate development to continue, while ensuring there is ongoing protection of koalas and their habitat.

SEPP 44 aims to identify areas of *potential* and *core* Koala Habitat. These are described as follows:

- *Potential Koala Habitat* is defined as areas of native vegetation where the trees listed in Schedule 2 of SEPP 44 constitute at least 15 per cent of the total number of trees in the upper or lower strata of the tree component.
- *Core Koala Habitat* is defined as an area of land with a resident population of koalas, evidenced by attributes such as breeding females, and recent and historical records of a population.

The proposal area is located in Snowy River LGA which is listed under Schedule 1 as a local government area to which this policy applies. Therefore, SEPP 44 is of relevance to the proposal and it is considered further within **Section 5.10** of this REF.

2.2 CONSISTENCY WITH OEH POLICY

2.2.1 The Kosciuszko National Park Plan of Management

The NP&W Act requires that all activities on reserved land are consistent with an adopted plan of management for the area. Under sections 81 and 81A of the NP&W Act, all operations in the park must be in accordance with the plan of management. The 'Kosciuszko NP Plan of Management' (KNPPOM) is made under Section 5 of the NP&W Act. This plan also incorporates the Snowy Management Plan set out in Schedule 2 of the Snowy Management Plan Procedures Agreement dated 3 June 2002 and the objectives set out under Section 40 of the *Snowy Hydro Corporatisation Act 1997* (DEC 2006). The KNPPOM provides a framework of objectives, principles and policies to guide the long-term management of the broad range of values contained in the park.

This plan of management has been prepared to provide a framework of objectives, principles and policies to guide the long-term management of the broad range of values contained in the park (DEC 2006).

Kosciuszko NP (KNP) encompassing 673,542 hectares, is the largest national park in New South Wales and is one of the most complex conservation reserves in Australia (DEC 2006).

The park contains the continent's highest mountains, unique glacial landscapes, and unusual assemblages of plants and animals, a number of which are found nowhere else. The park encompasses significant water catchments, the principal seasonally snow-covered region in Australia and extensive tracts of forest and woodland (DEC 2006).

Specific management objectives relating to the park identified within the KNPPOM are as follows:

- The conservation of biodiversity, the maintenance of ecosystem function, the protection of geological and geomorphological features and natural phenomena, and the maintenance of natural landscapes.
- The conservation of places, objects, features and landscapes of cultural value.
- The protection of the ecological integrity of one or more ecosystems for present and future generations.
- The promotion of public appreciation and understanding of the national park's natural and cultural values.
- Provision for sustainable visitor use and enjoyment that is compatible with the conservation of the national park's natural and cultural values.
- Provision for the sustainable use (including adaptive reuse) of any buildings, structures, or modified natural areas having regard to the conservation of the national park's natural and cultural values.
- Provision for appropriate research and monitoring.

This REF is consistent with the KNPPOM and its recent amendments as it considers core environmental, cultural and recreational values and is allowable under 2014 amendments (OEH 2014).

Amendments were adopted by the Minister for the Environment on 14 December 2014 which allows for "appropriate consideration of sustainable mountain biking opportunities in Kosciuszko National Park consistent with the OEH *Sustainable Mountain Biking Strategy* (OEH 2011), and subject to merit-based statutory environmental assessment through development consent under the EP&A Act. The assessment of applications requiring agency consent will include: formal consideration of potential risks to visitor safety; impacts on threatened species, populations or ecological communities; and impacts on cultural heritage."

Amendment 1 of the KNPPOM is:

"8.11.1.3. Permit cycling on all roads, management trails, purpose-built cycling tracks, shared-use tracks and multiple-use trails within the Visitor Services Zone, Major and Minor Road Corridors and Back Country Zone subject to risk and environmental assessments and approval. Development of new cycling tracks will require risk and environmental assessments and approval."

The area of the proposed track is located in 'Backcountry Zone' as classified under the KNPPOM.

Amendment 6 of the KNPPOM is:

"Prepare a cycling strategy for the park and surrounding areas that is made available for public comment before finalisation and that identifies:

- appropriate cycling networks and strategically identifies appropriate areas for and constraints on the development of purpose-built cycling tracks in the park, particularly in the Back Country Zone
- management and promotional requirements for the cycling network."

This cycling strategy is currently in draft form at the time of writing this REF. Prior to construction, it should be considered whether the proposed project is consistent with the cycling strategy.

If the project extends to the Thredbo River Picnic Area and therefore requires a section of the Pallaibo Track to be reclassified to allow cycling, the KNPPOM would need to be amended.

The KNPPoM is consistent with a number of federal and state biodiversity strategies including the NSW 2021 National Local Government Biodiversity Strategy, Australia's Biodiversity Conservation Strategy, the NSW Biodiversity Strategy, and the Southern Rivers Catchment Action Plan.

2.3 OTHER RELEVANT LEGISLATION, POLICIES OR PLANS

2.3.1 Ecologically Sustainable Development

Ecologically sustainable development (ESD) involves the effective integration of social, economic and environmental considerations in decision-making processes. In 1992, the Commonwealth and all state and territory governments endorsed the *National Strategy for Ecologically Sustainable Development*. In NSW, the concept has been incorporated in legislation such as the EP&A Act and Regulation.

For the purposes of the EP&A Act and other NSW legislation, the Intergovernmental Agreement on the Environment (1992) and the *Protection of the Environment Administration Act* 1991 outline the following principles which can be used to achieve ESD.

(a) The precautionary principle: that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions can be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

(b) Inter-generational equity: that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) Conservation of biological diversity and ecological integrity: that conservation of biological diversity and ecological integrity should be a fundamental consideration,

The aims, structure and content of this REF are guided by these principles. The precautionary principle has been adopted in the assessment of impact; all potential impacts have been considered and mitigated where a risk is present. Where uncertainty exists, measures have been suggested to address it.

2.3.2 Snowy River Local Environmental Plan 2013

The aims of this plan are, but not limited to:

- To protect and enhance, for current and future generations, the ecological integrity, natural resources and environmental significance of Snowy River.
- To provide for small-scale tourism development in areas with access to appropriate tourist activities, services and amenity, such as adjacent to Kosciuszko National Park, Lake Jindabyne and Lake Eucumbene.
- To value, protect and promote the natural, cultural and archaeological heritage of Snowy River by careful management.
- To ensure good management of public assets and to promote opportunities for social, cultural and community activities.
- To retain, and where possible, extend public access to foreshore areas and link existing open space areas for environmental benefits, health benefits and public enjoyment.
- To provide safe and healthy public spaces, attractive neighbourhoods and centres and to ensure development embraces the principles of quality urban design.

The proposal to construct a shared track within the KNP would allow the park to continue to operate as a tourist attraction and continue to provide additional recreational and social activities while minimising the potential impact to natural environmental values. The proposal is consistent with the aims of this plan.

2.3.1 Sustainable Mountain Biking Strategy

A Sustainable Mountain Biking Strategy was published by OEH in 2011 (OEH 2011). The strategy identifies key criteria that when satisfied, can lead to amendments to a POM to allow mountain biking in specific OEH estate. These include:

- Opportunities and demand for mountain biking across the region, including other land tenures
- Appropriateness of the site

- Ecological sustainability
- Provision of a quality experience for riders
- Balancing competing visitor demands
- Availability of resources to provide and maintain the experience
- Visitor safety.

Single-track experiences currently exist within KNP with events including the Threbo Australian Open of Mountain Biking hosted by OEH.

The proposal is consistent with the OEH Sustainable Mountain Biking Strategy.

3 CONSULTATION

3.1 PUBLIC EXHIBITION

The REF will be placed on public exhibition in accordance with OEH policy.

3.2 STATE ENVIRONMENTAL PLANNING POLICY (INFRASTRUCTURE) 2007 (ISEPP)

Part 2 of the *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development.

Clauses 13 to 17 of ISEPP identifies consultation requirements for works which may be carried out without consent but which in the opinion of the public authority trigger the items listed in **Table 2**. If any of these items are triggered, the public authority, or person acting on behalf of the public authority, would not be able to carry out the proposed work unless the authority or the person has:

> "(a) given written notice of the intention to carry out the development to the council for the area in which the land is located, and
>
> "b) taken into consideration any response to the notice that is received from the council within 21 days after the notice is given."

Table 2 details whether these would be substantially impacted by the proposal.

Table 2: Assessment of items of clause 13-17 of the ISEPP.

Clause	Response
Clause 13: 1(a): Substantial impact on stormwater management services provided by a council.	The proposal would not involve impacts to any stormwater system.
Clause 13: 1(b): Likely to generate traffic to an extent that will strain the capacity of the road system in a local government area.	The proposal would not generate additional traffic (either during the construction period or in the long term) that would strain the capacity of any road system.
Clause 13: 1(c): Involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council.	The proposal would not involve any works in relation to a sewerage system owned by the council.
Clause 13: 1(d): Involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council	The proposal would not involve the connection or use of water from a water supply system owned by the council.

Clause	Response
Clause 13: 1(e): Involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential.	The proposal would not require structures that would enclose a public place under council's management or control.
Clause 13: 1(f): Involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the *Roads Act 1993* (if the public authority that is carrying out the development, or on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath).	The proposal would not involve excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the *Roads Act 1993*.
Clause 14: Development that is likely to have an impact that is not minor or inconsequential on a local heritage item (other than a local heritage item that is also a State heritage item) or a heritage conservation area.	The proposal is not likely to have an impact on a local heritage item.
Clause 15: Development on flood liable land.	The proposal would be partially undertaken on flood liable land where the track would be located in close proximity to Thredbo River.
Clause 16: Development adjacent to land reserved under the *National Parks and Wildlife Act 1974.*	The proposal would be undertaken within KNP. Therefore this proposal is considered under the NPW Act. OEH is the proponent and determining authority for the proposal.
Clause 17: Development adjacent to a marine park declared under the *Marine Parks Act 1997.*	The proposal would not be undertaken on land adjacent to a Marine Park.

Therefore, as per the requirements of Clause 13 to 17 (as determined in **Table 2**), consultation with Snowy River Council is considered necessary due to the proposal being undertaken on flood liable land. OEH has discussed the proposal with members of the Council through the association with the Snowies Mountain Bike Destination Group (see **Section 3.4**). Additionally, the proposed bridge access to Gaden Hatchery would require Snowy River Shire Council involvement and approval from Department of Primary Industries Fisheries.

3.3 LANDHOLDERS

OEH has undertaken regular consultation with the landholders located adjacent to the proposal. All of the landholders who own private residences or properties on the southern bank of Thredbo River (opposite the KNP where the track would be located) were advised of the proposed location of the track and offered the opportunity to walk the proposed alignment with the OEH project manager and to make comments regarding the proposed alignment. Several of the landholders had some concerns regarding the proposed track and with the proposed alignment.

Consultation was undertaken in the form of Email correspondence, telephone discussions, one group walk on a section of the proposed track with representatives from three properties and two other landholders have also visited sections of the proposed route with NPWS / OEH representatives.

Concerns about the track included the potential for the track to impact on the privacy of the properties. This appeared to be the most significant concern and was related to the landholders purchasing the properties primarily for the location adjacent to KNP and high level of privacy afforded by the location. One landholder indicated that it would most likely be noise created by users of the track that would travel across the river valley and impact on privacy. One landholder was particularly concerned regarding the alignment of the track impacting on privacy where the track was about 50 metres from the Thredbo River bank. A new alignment has been negotiated between the landholder and NPWS that was determined to be suitable for both parties. A summary of concerns raised and how they would be addressed by NPWS are included in **Table 3** below.

Table 3: Summary of private landholder concerns.

Concern Raised by Landholders	Concerns Addressed by NPWS
Loss of privacy through noise pollution from people utilising the track).	Interpretive signs would be placed at either end of the track indicating that there are private properties along the track and advising people to respect that privacy.
Loss of privacy through track users accessing waterholes also used by private landholders.	The track has been realigned a greater distance from the bank of Thredbo River in response to particular concerns regarding the loss of privacy. This realignment was negotiated between a private landholder and NPWS so that both parties were satisfied with the track location. This realignment also benefited other concerned landholders by increasing the distance of the track from the river, which would also discourage most people from trying to access the river in

Concern Raised by Landholders	Concerns Addressed by NPWS
	these locations.
Increased potential for rubbish pollution.	Interpretive signs would be placed at either end of the track indicating that there are no services along the track and advising people to take out everything that they carry in. A Track Management Plan will be developed by OEH which would provide a framework to ensure that rubbish illegally left is collected and removed.
Increased potential for trespass onto private properties adjacent to the Thredbo River.	Interpretive signs would be placed at either end of the track advising people to stay on the track, to respect the privacy of land holders adjacent to the track and that trespassers onto private property risk prosecution.
Increased potential for fire risk associated with people camping along the track.	Interpretive signs would be placed at either end of the track warning users to be safe with fire and to observe fire bans.
Increased potential for private property access to Thredbo River to be used by recreation users. This applies in particular to a 4WD track through private property to the river created for recreational use by the landholders.	Interpretive signs would be placed at either end of the track advising people to stay on the LTVT, to respect the privacy of land holders adjacent to the track and that trespassing onto private property is prohibited.
Increased potential for human defecation adjacent to the track and the Thredbo River	Interpretive signs would be placed at either end of the track indicating that there are no toilet facilities along the track and that there are toilets at both ends of the track.

3.4 STAKEHOLDERS AND GOVERNMENT AGENCIES

A number of community groups have been consulted with by OEH regarding the proposal. These groups include:

- Jindabyne Mountain Bike Club (received a copy of the proposed route for comment).
- Jindabyne Trail Stewardship (regarding potential involvement in future maintenance).
- Snowies Mountain Bike Destination Group (includes representation from Snowy River Shire Council, NPWS, Kosciuszko Thredbo Pty Ltd, Perisher Blue Pty Ltd, Lake Crackenback Resort, Action Learning Initiatives, Tourism Snowy Mountains and

the Jindabyne Trail Stewardship). This group meets most months and discusses strategies to increase visitation.

- TRC Tourism (tourism and recreation consulting group) (contracted to create a Mountain Bike Strategy for KNP).
- Perisher Blue Pty. Ltd.

Responses from these groups appear to have been mostly positive regarding the proposal. Perisher Blue Pty Ltd. raised concern regarding the safety of the bridge crossing at the Skitube Bridge for pedestrians with bicycles. NPWS would implement appropriate mitigation measures to ensure the safety of pedestrians accessing the track via the Skitube Bridge. At the time of writing this REF, NPWS is still liaising with Perisher Blue Pty Limited regarding safety considerations.

NSW Department of Planning and Environment was consulted through a meeting with the Alpine Resorts Team at the Jindabyne office to ensure that they are aware of the details of the proposal.

Consultation has also been undertaken with fishing stakeholders including the NSW Department of Primary Industries (DPI) who manage the Gaden Trout Hatchery. Members of the Gaden Hatchery Management Sub-Committee and the Snowy Lakes Trout Fishing Strategy Working Group were invited to provide individual comments regarding the concept of the project and the possibility of a bridge being constructed over Thredbo River to connect with the picnic area at the Gaden Trout Hatchery. Both supportive and resistive comments were received. It was confirmed that there are infrastructure issues at Gaden Trout Hatchery that would need to be addressed in order to cope with increased usage of the area. Some of these infrastructure issues include the need to upgrade the BBQ facilities and the existing public toilets. Prior to the bridge being constructed, a formal proposal would need to be provided to the NSW DPI.

4 THE PROPOSAL

4.1 ANALYSIS OF THE OPTIONS

4.1.1 Option 1: Do Nothing

The “do nothing” option is an option that OEH are legally obliged to consider under the EP&A Act. With consideration of the ‘do nothing’ option, the LTVT would not be constructed resulting in a potential economic loss to tourism and no impact to the environment.

Advantages

- Trail corridor remains undisturbed
- No capital expense

Disadvantages

- Overcrowding on existing TVT would remain
- Lost opportunity for economic improvement for the region
- Lost opportunity for increased park visitation
- Jindabyne trails would not be connected to Thredbo and Crackenback
- Key significant community/stakeholder support for the project would not be realised

4.1.2 Option 2: Construct a 1200 - 1500mm machine-benched track, IMBA green circle grade

Option 2 has the proposed track with a machine-benched track to a width of between 1200mm and 1500mm. This would achieve an IMBA grade of green circle or an ‘easy’ rating. This track would be suitable for beginner/ novice mountain bikers, with only basic mountain bike skills required. It would also be suitable for off-road bikes. The IMBA Trail Difficulty Rating System (IMBA Australia 2012) indicates that the track width must be shoulder width or greater (specifically 900mm plus or minus 300mm for tread or bridges), be mostly firm and stable and the trail may have obstacles such as logs, roots and rocks. A fitness level required to use the track would be achieved by most people in good health.

Advantages

- Links Thredbo to Jindabyne
- Higher percentage of population can access the trail
- Easier passing for two-way traffic and multiple users (fishermen, cyclists etc.)
- All-terrain vehicle (ATV) access throughout for construction, maintenance and rescue

Disadvantages

- Significantly higher construction & maintenance expense than a narrower track

- Lack of technical challenge for many cyclists
- Increased disturbance of corridor
- Higher speed of cyclists due to a faster surface, leading to accidents with potentially higher impacts and more severe injuries

4.1.3 Option 3: 450 - 600mm hand-benched track, IMBA blue square grade

Option 3 has the proposed track constructed with both machines and hand. The track's tread would be 'benched' across side-slopes and would be to a width of between 600mm and 1200mm. This would achieve an IMBA grade of blue square or an 'intermediate' rating. This track would be suitable for moderately skilled mountain bikers.. The IMBA Trail Difficulty Rating System (IMBA Australia 2012) indicates that the track width must be handlebar width or greater (specifically 600mm plus or minus 300mm for tread or bridges), with possible sections of rocky or loose tread and the trail will have obstacles such as logs, roots and rocks. A good standard of fitness would be required to use the track.

Advantages

- Links Thredbo to Jindabyne
- Low capital cost compared to Option 2 (green circle)
- Accessible for hikers, runners, moderate and advanced cyclists
- Will attract significant use by cyclists due to the increased challenge of the blue square grade
- Exclusion of beginner cyclists reduces the risk of injury/rescue from the remote valley. The existing Thredbo Valley Track would still provide a safe and enjoyable experience for beginners
- A higher graded track will slow traffic, thus reduce overall risk of collision and injury from high speeds

Disadvantages

- Accessibility challenges for construction, maintenance and rescue
- Beginner cyclists will not be at a suitable level to access the track

4.1.4 Option 4: 300mm hand-benched track, IMBA black diamond grade

Option 4 has the proposal with a hand-benched track to a width of 300mm. This would achieve an IMBA grade of black diamond or an 'advanced' rating. This track would be suitable for experienced mountain bikers with good skills, suitable for better quality mountain bikes. The IMBA Trail Difficulty Rating System (IMBA Australia 2012) indicates that the track width can be less than handlebar width (specifically 300mm plus or minus 150mm for tread or bridges), variable and challenging with unavoidable obstacles such as logs, roots, rocks and drop-offs or constructed obstacles. A higher level of fitness would be required to use the track.

Advantages

- Links Thredbo to Jindabyne
- Lowest construction cost
- Restricted use would reduce maintenance frequency
- Still accessible to hikers and fishermen

Disadvantages

- Risk of injury due to narrow width and technicality
- Exclusion of majority of cyclists

4.1.5 Preferred Option

After careful analysis of each option, OEH as the proponent, have determined that the preferred option is Option 3 600 - 1200mm benched track, built from both machines and hand. The amount of track to be built by machine will depend on budget constraints and the logistical challenges of machinery access. The grading would be IMBA blue square grade. A vegetation corridor would be cleared to a width of 1500 - 1800mm and to a height of 2400 mm.

It is also recommended that three to four kilometres of a slightly wider (1000mm – 1300mm) and lower grade track (at the easy end of IMBA blue square) be constructed at the lower end of the track as it approaches the Gaden Trout Hatchery. This could also be constructed at the trail-head at Bullocks Flat if feasible. This will create the following key benefits:

- Provide a short return route trail for families etc.
- Provide a wider trail to reduce conflict between users
- Enable some ATV access to aid in maintenance and rescues.

The existing TVT provides excellent experiences for users, some of which include families and beginner mountain bikers. Due to the somewhat remote location of the proposed LTVT, it would be preferable to have the trail at a grade that restricts beginner cyclists, fisherman and hikers, yet still provides safe access for intermediate and advanced cyclists with the ability to be self-sufficient in most cases.

Option 3 meets the objectives of the proposal and maintains core environmental values identified within the study area during field surveys.

For the purpose of this REF, Option 3 is the preferred option for the proposal.

4.2 OBJECTIVES OF THE PROPOSAL

The objectives of the LTVT project are:

- To achieve EPIC trail status from the International Mountain Bike Association (IMBA).

- Create Australia's best mountain biking experience whilst providing a world-class hiking and fishing track.
- Increase KNP visitation and revenue.
- Provide a major boost to the Snowy Mountains Region's economy.
- Interlink Jindabyne trails with the TVT, Crackenback and Thredbo's tracks.
- The local area to reach IMBA "Ride Centre" status.
- Disperse TVT trail user traffic to reduce congestion and increase safety.
- Provide users with an exceptional experience in a magnificent location that provides a more 'wilderness feel' than the existing TVT.

4.3 DESCRIPTION OF PROPOSAL

The shared-use track would be constructed in accordance with International Mountain Bike Association (IMBA) guidelines for sustainable trails.

A summary of the track features is included in **Table 4**.

Table 4: Summary of track features and description

Track Feature	Description
Tread width	600mm - 1200mm benched track.
Tread surface	Primarily a firm, stable bare earth surface. Some armouring would be required through unsuitable ground conditions.
Bridges and platforms	Creeks, tributaries, springs and other crossings containing notable moisture would be protected by low-level raised platforms, constructed by steel with fibreglass reinforced plastic (FRP) mesh deck.
Tread landscaping	Many sections of the track, particularly those sections where drainage is limited, the tread will be 'lifted' and 'tilted' to create improved drainage.
Track Corridor (Vegetation Clearance)	1.5m – 1.8m wide, 2.4m high
Average Trail Grade	10% or less
Maximum Trail Grade	15% or greater
Natural Obstacles and Technical Trail Features	Unavoidable obstacles less than 200mm high and bridges minimum 600mm wide

IMBA Trail Difficulty Rating

The track criteria will conform to the IMBA 'More Difficult – Blue Square' trail difficulty rating. There is a significant portion of the mountain biking demographic that fits into the 'Blue Square' grade. Whilst the existing TVT (Thredbo to Bullocks Flat) is mostly IMBA 'Blue

Square' graded, the proposed LTVT will generally be slightly narrower and at a more challenging end of the grade of track that would be classified 'Blue Square'.

It should be noted that the IMBA rating takes in to account only the technical difficulty of the track and not the physical exertion. The trail length and elevation changes result in a moderate physical exertion level.

Target User

The 'Blue Square' technical difficulty and the moderate physical exertion level will suit the target user – intermediate level walkers/riders. The track will also provide good river access opportunities for fishermen.

The intermediate level user has reasonable fitness levels, moderate experience, is self-sufficient, and has an understanding of the inherent risks of the activity and the location.

Track Construction

- Rolling contour track to IMBA specifications
- 1.5 metres to 1.8 metres wide vegetation clearance constructed with brush-cutters, chainsaws and other equipment
- 2.4 metre high track corridor constructed with brush-cutters, chainsaws and other equipment
- Track alignment chosen to ensure good line of sight and enable use in both directions
- 600mm – 1200mm wide benched track constructed with powered and non-powered hand tools by experienced track builder
- Approximately three kilometres of track from Gaden Trout Hatchery upstream would be slightly wider (closer to 1000-1300mm) and slightly lower graded than the remainder of the track
- Potential use of a small excavator for certain sections if access allows
- Onsite materials could be utilised (where available and appropriate and in the accordance with the project Environmental Management Plan (EMP)) for track armouring, creek crossings and bridge approaches
- Many sections of the track, particularly those sections where drainage is limited, the tread would be 'lifted' and 'tilted' to create improved drainage.

Creek and Tributary Crossings

- Steel bridge structures with fibreglass reinforced plastic mesh deck. These may be airlifted to the site by helicopter
- A 'more difficult' IMBA Blue rating will allow bridges to be shorter, narrower and lower as entries that are more technical and exits to the crossing are permissible. Where possible, bridges will be less than 900mm high and most will not require handrails

- Due to experience of target user, deck levels will likely be flooded annually. Construction will be engineered and built to a standard to withstand the force of such flood waters
- 600 - 900mm wide bridge deck is considered adequate. However wider decking at approximately 1300mm will be constructed if budgets allow
- Smaller bridges allow for simpler modular design that requires less technical expertise and minimises onsite construction
- Smaller bridges result in less material and therefore fewer helicopter lifts to deliver to site
- Approaches to bridges will require rock armouring, approximately 500mm either side. Rocks will be transported to site unless there is sufficient rock available on site. Where available, this rock will be collected from the track's tread. If not sufficient rock is available from the tread, the rock can be hand selected from within 20 metres from the side of the track. Rock selected from the side of the track will only be collected in accordance with the criteria:
  - Must not have visible burrows underneath;
  - Must be taken selectively and minimally to create no obvious visual impact;
  - Must not be removed from any slope greater than 20 degrees; and
  - The place where rocks were removed from must be thoroughly covered with leaf litter, leaving no bare soil.

Damp Area Crossings

- Damp areas and springs will mostly be crossed with elevated FRP decking
- The track will not cross over, or through any bogs
- Some shorter crossings may be armoured with stone pitching and decomposed granite. This would require materials to be brought in.

For much of the track there is either a damp area of a creek/tributary crossing every 200 to 300 metres.

The proposed track will be built above the Thredbo River's flood line for the entire route.

Construction/Maintenance

- Loadings and width of platforms may not allow ATV access for the entire route
- Two wheel motorbike at low speed would be ideal, with the possibility of small trailer for equipment and light materials
- Helicopter for heavy materials such as armouring and platforms
- Pedestrian and mountain bike access will be a major form of access for both construction and maintenance
- Limited vehicle access to points near the trail through fire roads from opposite side of the river
- Tethered boat/rafts and pulley systems can be used to bring light materials and fuel across the river

- People can wade across the river in low flows and at designated safe points
- Will require permission from landholders where access is through private property.

4.4 REASON FOR THE PROPOSAL

The reason for the proposal is to extend the existing Thredbo Valley Track which has been immensely popular since it opened and once the extension is complete it will provide a major draw-card for non-winter tourism in the Snowy Mountains. Consultations with community representatives from both businesses and recreation groups have clearly confirmed that this track is pivotal for expanding tourism by providing a major non-winter asset to aid in attracting visitors. Tourism currently injects more than $500M per annum to the Region's economy (Tourism Snowy Mountains Inc., 2013 p. 38).

A summary of the objectives of the proposal:

- Achieve EPIC trail status from the International Mountain Bike Association (IMBA)
- Create one of Australia's best mountain biking experiences, whilst providing a world-class hiking and fishing track
- Increase KNP visitation and revenue
- Provide a major boost to the Snowy Mountains Region's economy
- Interlink Jindabyne trails with the TVT, Crackenback and Thredbo track
- The local area to reach IMBA "Ride Centre" status
- Disperse trail user traffic to reduce congestion and increase safety
- Provide users with an exceptional experience in a magnificent location.

4.5 TIMING OF THE PROPOSAL

Subject to relevant approvals and funding, the work would be undertaken over three years beginning in 2016 and finishing in 2019. Generally, the proposal would be undertaken during the hours 7am to 6pm.

5 EXISTING ENVIRONMENT

5.1 METEOROLOGICAL DATA

The climate at the proposal location is mild in summers and cold in winters due to the elevation of between about 1130 metres above sea level (ASL) and 940 metres ASL. Mean maximum temperatures recorded from Jindabyne range from 28°C in summer down to -12°C in winter (BOM 2015). **Figure 1** represents the average maximum and minimum monthly temperatures recorded at Jindabyne while **Figure 2** details the average monthly rainfall recorded.

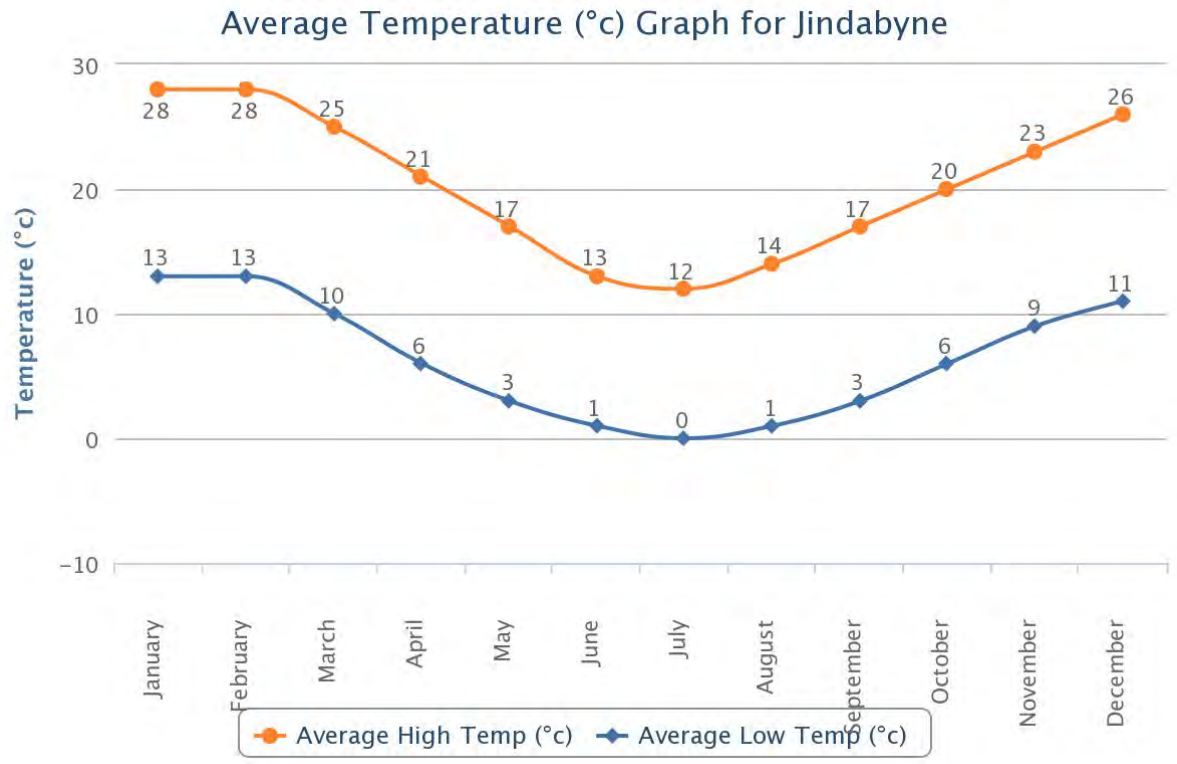


Figure 1: Average monthly temperatures (degrees Celsius) at Jindabyne

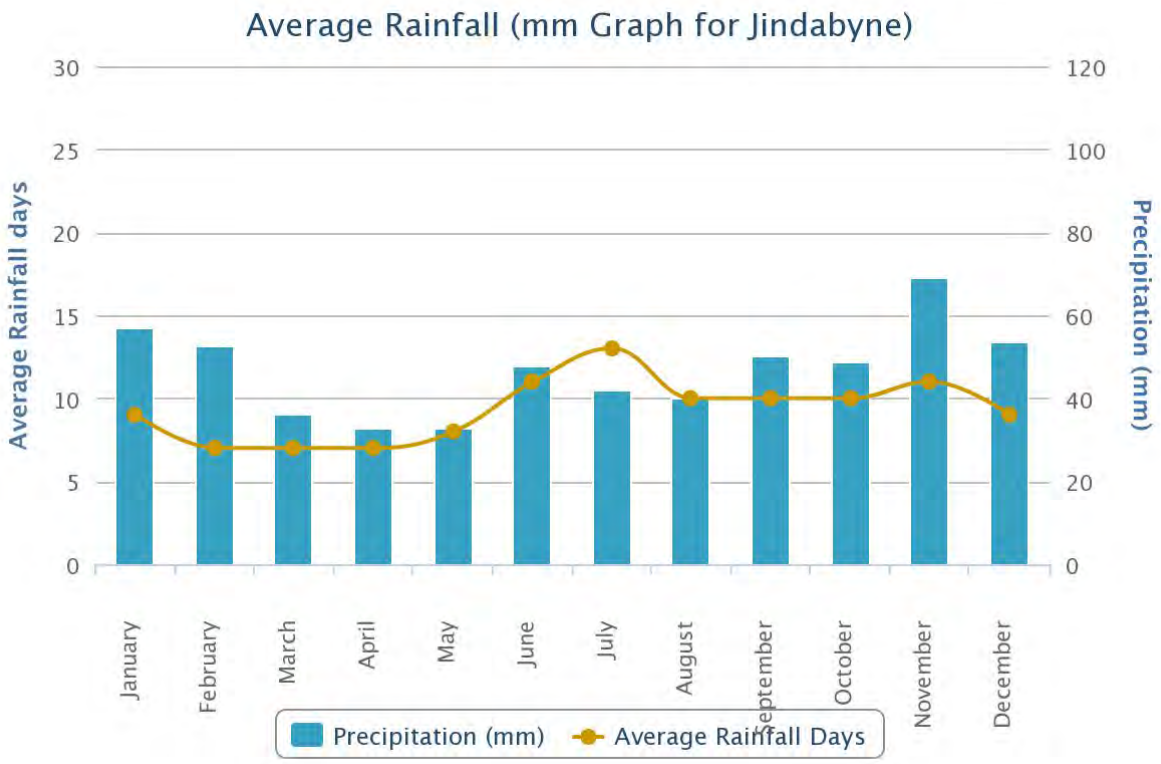


Figure 2: Average monthly rainfall (mm) at Jindabyne

5.2 TOPOGRAPHY

The landform of the study area is highly variable due to the length of the proposed track. In some sections the track follows the relatively flat river plain adjacent to Thredbo River while in other sections the landscape is very steep where the track deviates greater distances from the edge of Thredbo River. Some of these sections would have slopes greater than 25 degrees. The track crosses many small tributaries to Thredbo River most of which are very minor and most likely ephemeral or intermittent and were flowing during field surveys due to the high level of precipitation experienced prior to surveys being undertaken. At the higher elevations of the track, typically above about 1050 metres ASL, there was a distinct lack of surface rock and significant rock outcrops. Below this elevation there was a higher occurrence of rock outcropping and loose surface stone. Generally the surrounding landscape is steep to very steep. Adjacent to the proposal, slopes are consistently greater than 25 degrees. The study area is part of the east-west river valley of the Thredbo River, in between two significant east-west ridge lines with elevations of greater than 1500 metres ASL to the north and 1400 metres ASL to the south.

5.3 SURROUNDING LAND USE

The surrounding land use is entirely native vegetation located within the KNP. On the southern bank of Thredbo River, there is private land with some agricultural grazing though a

large proportion of the land on the southern bank is also significantly vegetated with native woodlands. At the eastern end of the proposal, the track would potentially cross Thredbo River adjacent to the Gaden Trout Hatchery that is owned and operated by the Department of Primary Industries (DPI) - Fisheries and Aquaculture; a part of the NSW State Government.

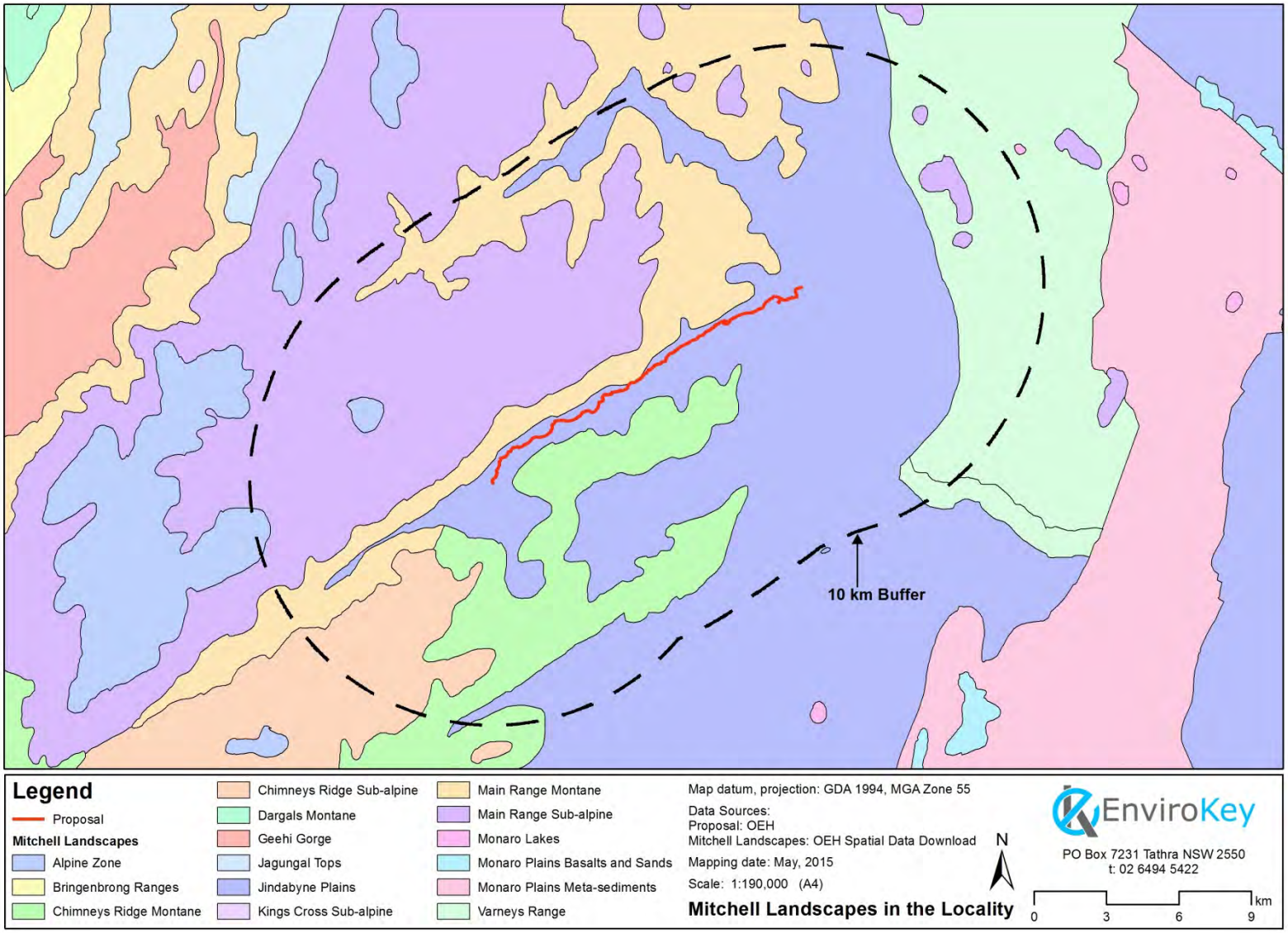
5.4 GEOLOGY/GEOMORPHOLOGY

According to the 1:500,000 Monaro Geology Map the geology of the area is largely foliated granite, leucogranite, adamellite, granodiorite and tonalite consisting of largely massive intrusions. The geological formation that covers the entire length of the proposal is the Kosciuszko Batholith, with the Thredbo River following a large fault line that runs in a north-east direction.

To gain a more detailed understanding of the landscapes within the study area, information was taken from the NSW Mitchell Landscapes (Mitchell 2002). These provide a geological description of the landscapes of each bioregion within NSW. The study area is within the Jindabyne Plains (Jbv) landscape in the South East Highlands (SEH) - Monaro Region. This landscape consists of wide open valleys and plains at a general elevation of 800 to 900 metres with surrounding low ranges and rounded peaks to 1100 metres on massive Silurian-Devonian granite and granodiorite. In one section the study area is close to the edge of the Main Range Montane (Mam) in the Australian Alps (AA) - Montane Region which is described as well-drained steep slopes on Silurian-Devonian gneissic granite, granite and granodiotrite and Ordovician Slat, chert, quartzite and phyllite with a general elevation of 100 to 1500 metres.

5.5 SOIL TYPES AND PROPERTIES

The study area, in its entirety, is within the Jindabyne Plains (Jbv) landscape in the South East Highlands (SEH) - Monaro Region, shown in **Map 3** (Mitchell 2002). The Jindabyne Plains landscape consists of wide open valleys and plains at a general elevation of 800 to 900 metres with surrounding low ranges and rounded peaks to 1100 metres. Soils consist of shallow gravelly loams, extensive red and yellow texture-contrast soils on slopes, two or three terraces marginal to the main streams with dark coloured gritty uniform loams and clays in alluvium (Mitchell 2002). In one section the track is close to the edge of the Main Range Montane (Mam) landscape in the Australian Alps (AA) - Montane Region. The Main Range Montane landscape has soils which are intermediate in character between low elevation texture-contrast profiles and higher elevation organic uniform profiles. Their properties vary with bedrock; gritty clay loams on granites and pedal red to yellow clay subsoils on meta-sediments (Mitchell 2002).



Map 3: Mitchell landscapes of the locality.

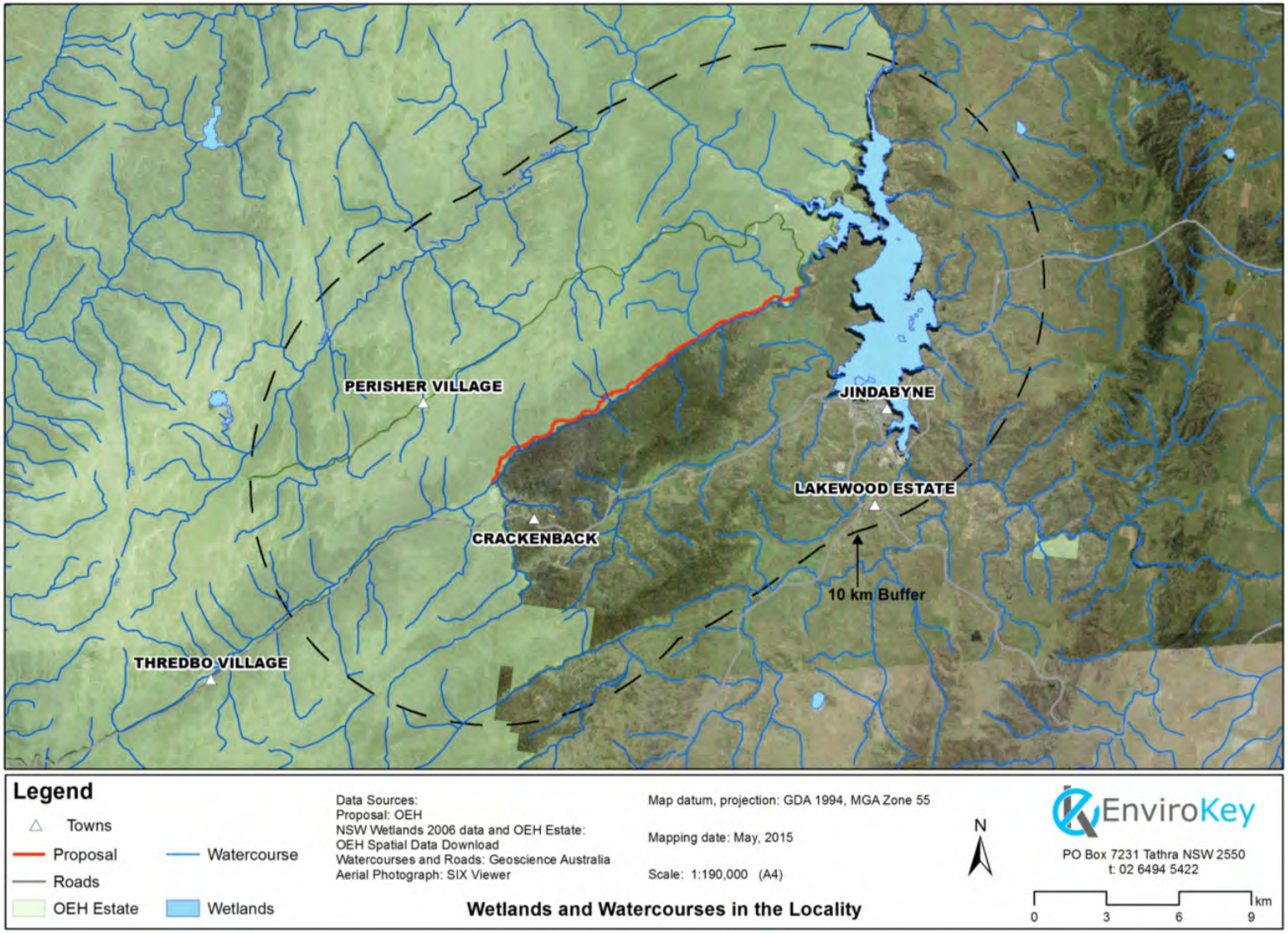
5.6 WATERWAYS

There are is one major waterway in close vicinity to the proposal, the Thredbo River. Additionally, the wetlands and waterways spatial data from Geoscience Australia (2015) indicates there are five other significant waterways or drainage lines that are tributaries to Thredbo River that cross the study area (see **Map 4**). Thredbo River is a perennial river located in the catchment of the Snowy River and flows directly into Lake Jindabyne. The upper Snowy River has a large catchment (of which the Thredbo River is included) of approximately 9,070 square kilometres (DPI 2011). Both the Snowy and Thredbo Rivers are used extensively for recreational activities such as fishing, however much of the flow patterns of the Snowy River has been disrupted through the Snowy River hydro-electric scheme. Thredbo River is impacted by seasonal changes in climate resulting in high flows during the spring snow melt and subject to snow and ice during the winter seasons.

During field surveys there were a high number of drainage lines encountered that are tributaries to Thredbo River. However a high proportion of these would be considered intermittent or ephemeral and would only flow after significant rainfall events. At the time of the field surveys, most of the drainage lines had flowing water attributed to high rainfall prior to the surveys. All the waterways flowed mostly at the surface or close to the ground surface in un-incised channels and contained clear water with a very low sediment load indicating low rates of erosion upstream. This is most likely attributed to the high level of vegetation within the catchment and within the drainage channels.

5.7 CATCHMENT VALUES

The study area is located adjacent to the banks of the Thredbo River, which is a tributary to the Snowy River. A large proportion of the catchment for Thredbo River is located within KNP and therefore the catchment values are very high. Much of the vegetation encountered during field surveys, though recovering from a fire event, appeared to be original, old growth with very large trees. Further, the Thredbo River is one of the few rivers in the alpine areas that have not been affected by the Snowy hydro-electric scheme and is considered extremely valuable for nature conservation, aesthetic values, fishing, white water rafting and other recreational opportunities (DEC 2006).



Map 4: Wetlands and watercourses in the locality

5.8 FLORA AND FAUNA

5.8.1 Approach

Desktop Analysis

A desktop analysis of threatened and migratory biota was completed to source information on threatened and migratory biota that might use the resources of the study area. Information was sought from BioNET - the Atlas of NSW Wildlife (which includes flora) for records of threatened flora and fauna recorded within a 10 kilometre radius of the study area. These records are detailed in **Maps 5-8** at a scale permissible by OEH data licence agreement (1:250,000). Similarly, information on threatened and migratory species listed under the EPBC Act that could occur in the locality was sourced using the Protected Matters Search Tool by applying a 10 kilometre buffer around the study area (**Appendix 4**). A 10 kilometre buffer was chosen to encompass a wide range of habitats and biota. However, it is acknowledged that this area contains habitats and altitudes not found within the Area of Investigation and many may be of no relevance to this REF. Nonetheless, further assessment is provided within this REF.

5.8.2 Field Survey

Flora and vegetation community surveys

A comprehensive flora survey was completed by a qualified and experienced Botanist within the study area between 30 April and 2 May 2015. The flora survey method employed was a random meander survey (Cropper 1993). The survey concentrated on the area which had been flagged as the alignment of the track however it also incorporated an area about 25 metres either side of the track that would allow for minor realignments should any significant flora habitat features, threatened flora or other features need to be avoided.

Along the length of the proposal, active searches for threatened and rare biota were also competed. These included *Discaria nitida, Thesium australe, Carex releighii, Euphrasia scabra, Podocarpus lawrencei, Asterolasia trymalioides* and *Olearia aglossa.* None of these species were recorded during the field survey. A complete flora list of species identified during field surveys is included in **Appendix 2**.

The flora communities were classified using the mapping and vegetation classifications of the *Native Vegetation of the Southern Forest: South-east Highlands, Australian Alps, South West Slopes and SE Corner bioregions* (Gellie 2005). This report maps and classifies the Southern Forests into 206 vegetation groups. The communities were then classified into the corresponding Biometric Vegetation Types (BVT) and mapped as the relevant BVT's.

Fauna surveys

A comprehensive fauna survey was undertaken by a qualified and experienced Ecologist within the subject site and study area between 30 April and 3 May 2015. Weather conditions were mostly sunny during the day with isolated showers with daytime temperatures ranging between below zero to about 15 degrees celcius. Temperatures during the nocturnal surveys were always below 10 degrees celcius.

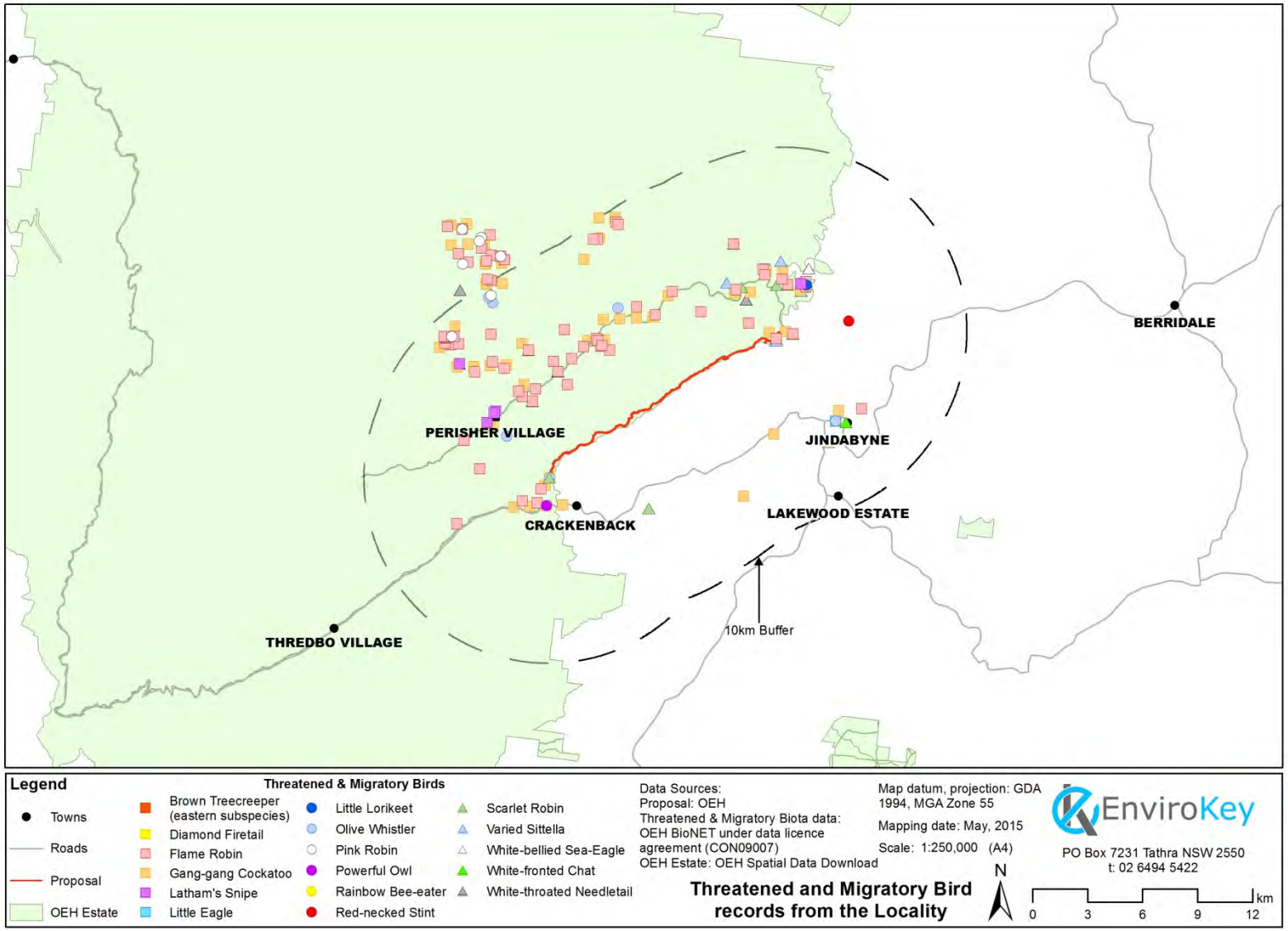
Survey methods and effort completed during these survey periods included 15 diurnal bird surveys, herpetofauna and scat surveys and two nocturnal surveys including spotlighting, call playback and echolocation call recording. The nocturnal surveys were undertaken at either end of the track alignment (i.e. at the western end at Bullocks Flat adjacent to the Skitube Bridge over Thredbo River and at the eastern end at the Picnic Area adjacent to Kosciuszko Road). Habitat assessments along with opportunistic observations were also undertaken during the fauna surveys. These were conducted across the study area.

The location of the fauna surveys undertaken are shown in **Map 9 & 10.**

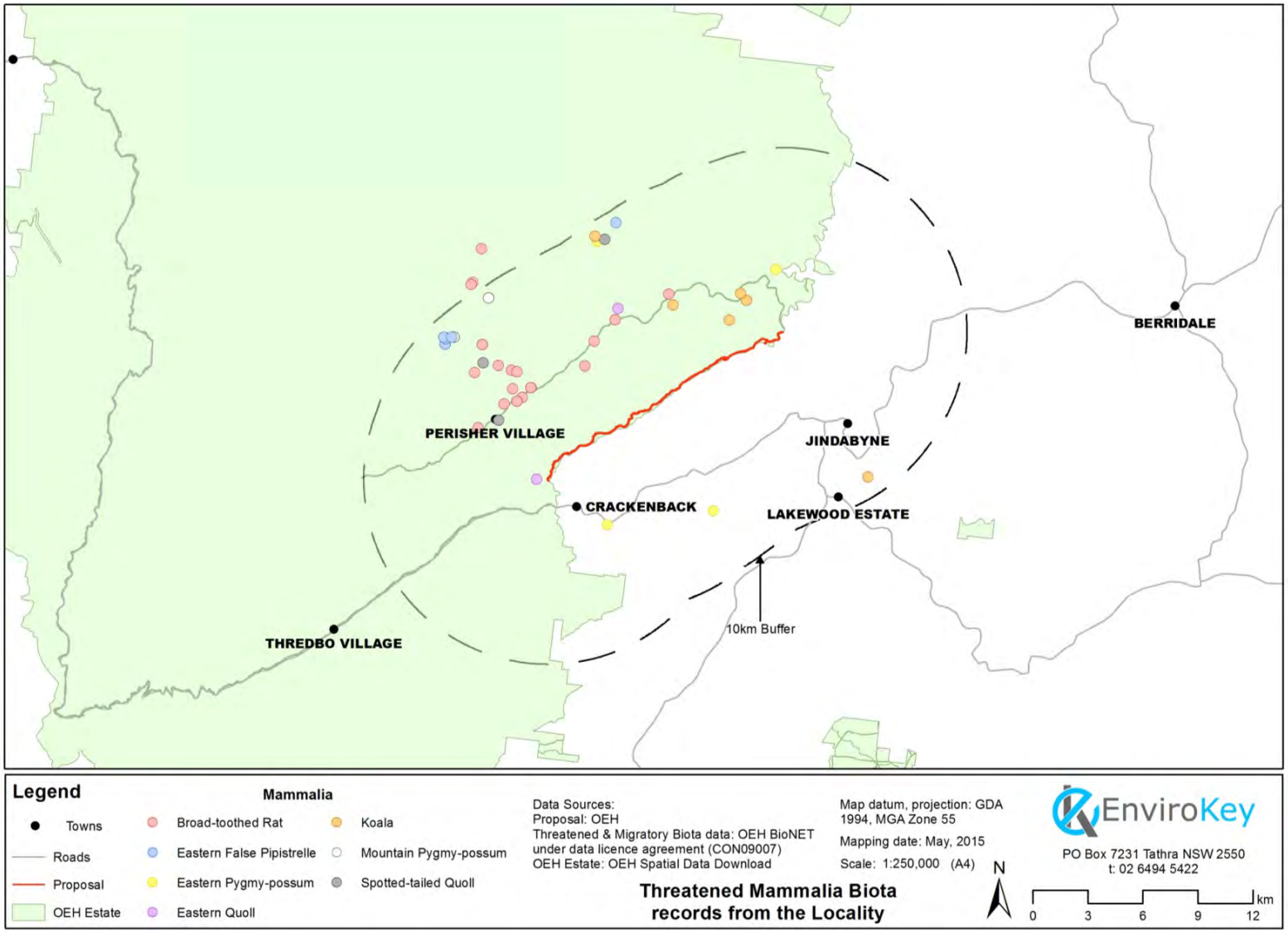
5.8.3 Nomenclature

Flora classification used in the flora list (**Appendix 2**) and this REF follows the online version of the Flora of NSW (PlantNET 2015).

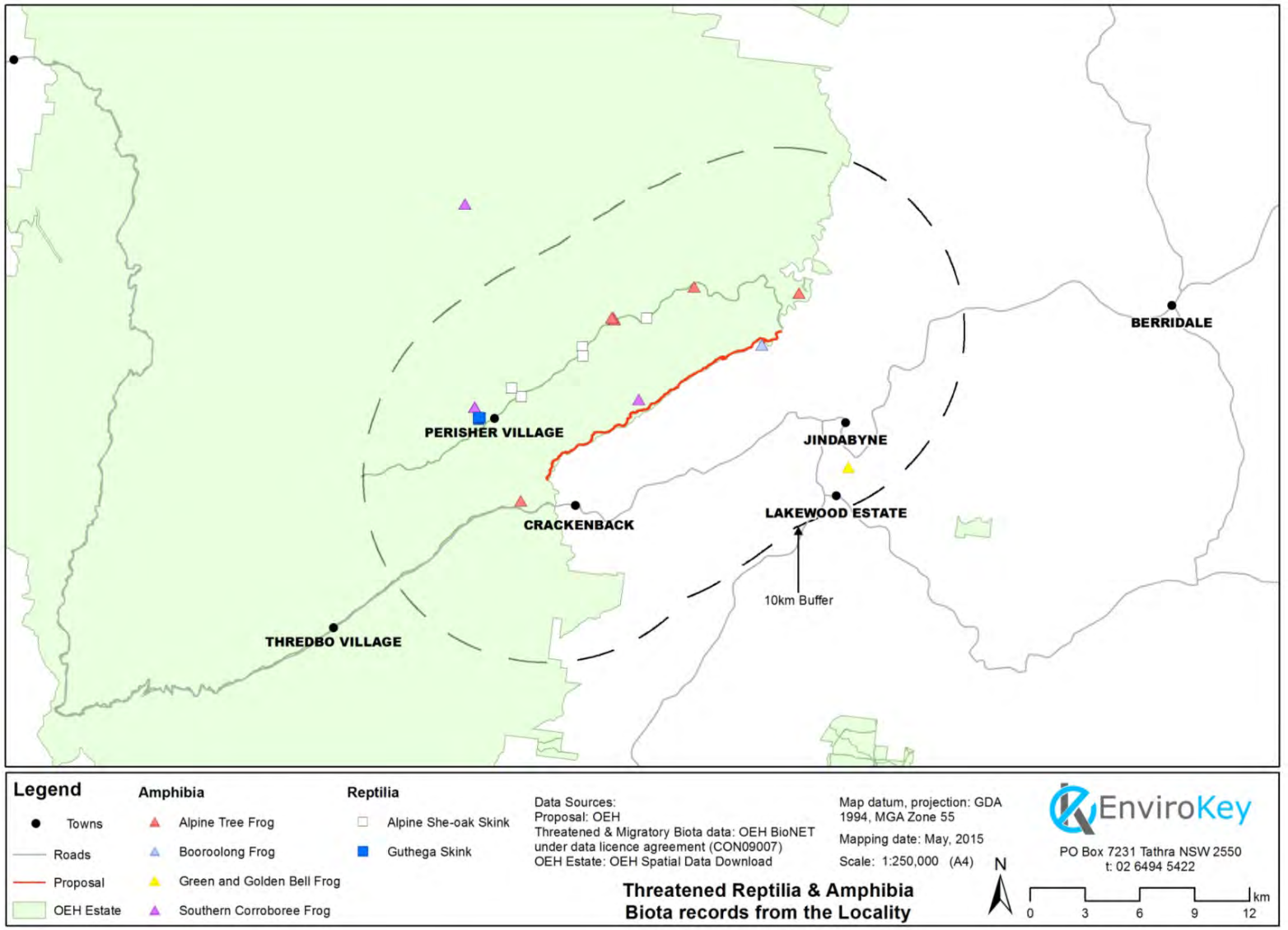
Nomenclature for fauna was guided by the following texts: Birds (Morcombe 2004), Mammals (except microchiropteran bats) (Menkhorst and Knight 2010), Microchiropteran Bats (Churchill 2008), Frogs (Tyler and Knight 2009) and Reptiles (Swan *et al.* 2004) except where modified by recent taxonomic review (Sass 2011a; b; Swan 2013). Where no common name is provided within these texts, a generally accepted name is used.



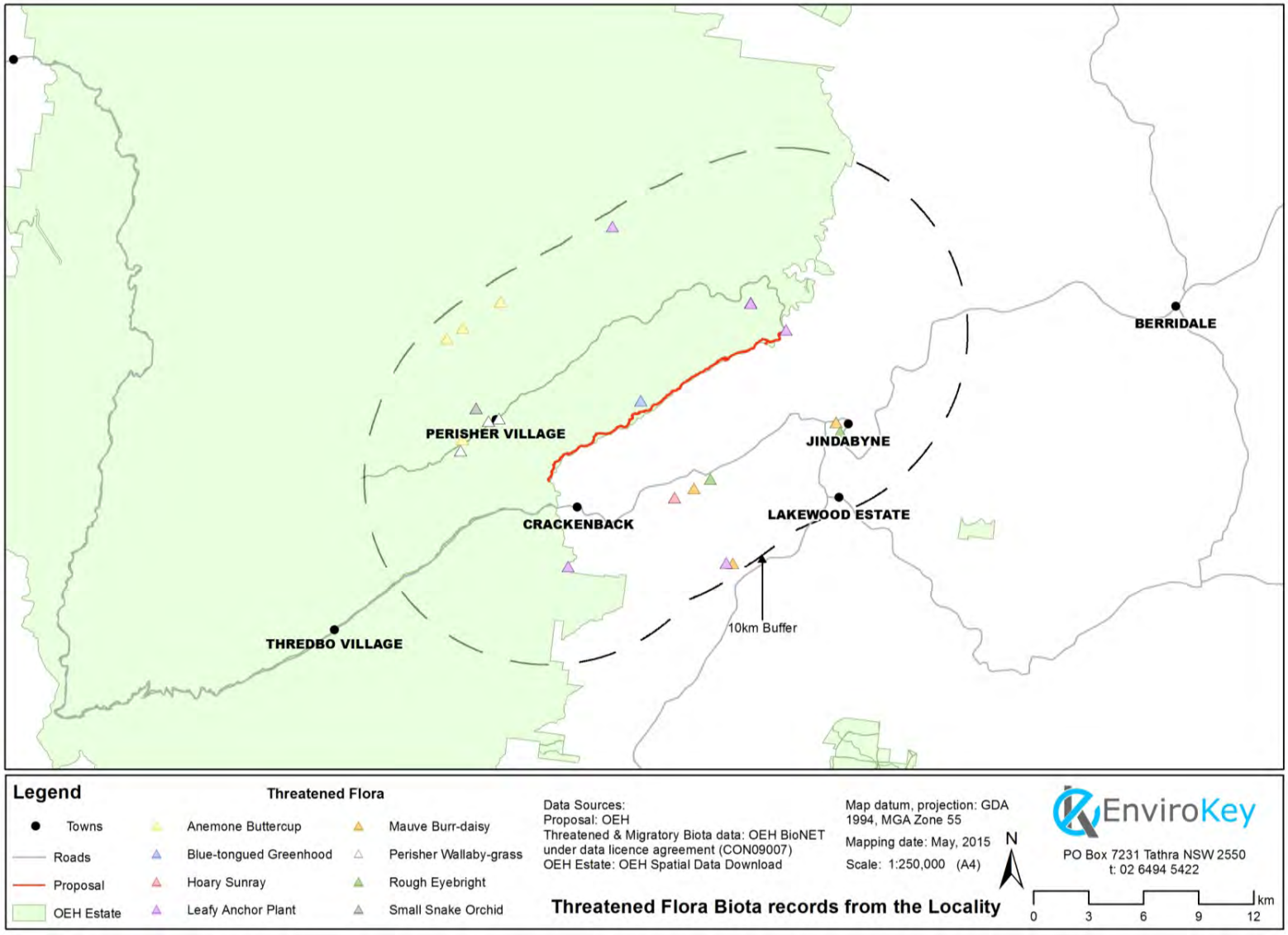
Map 5: Locations of threatened and migratory birds previously recorded in the locality.



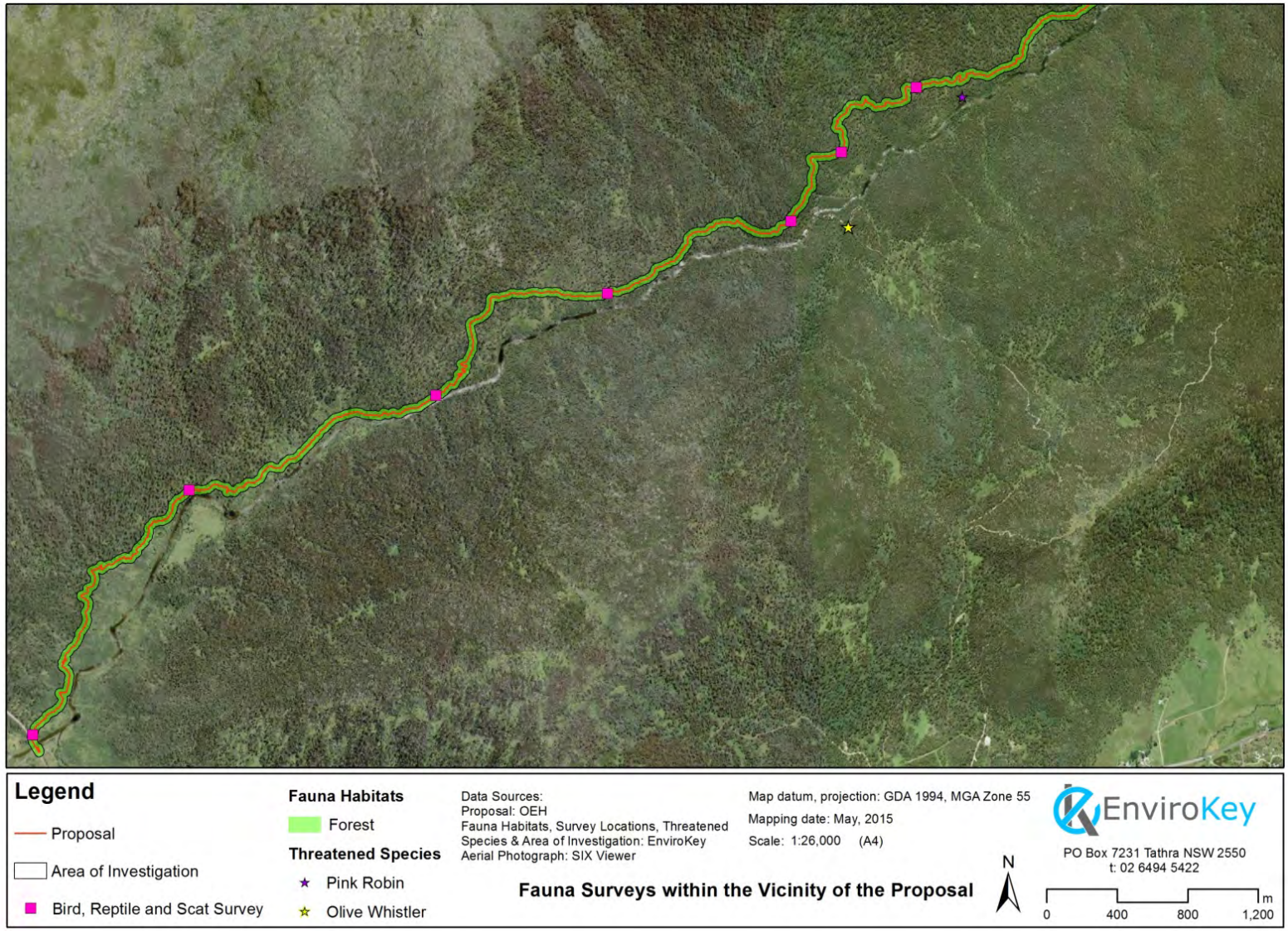
Map 6: Locations of threatened mammals previously recorded in the locality.



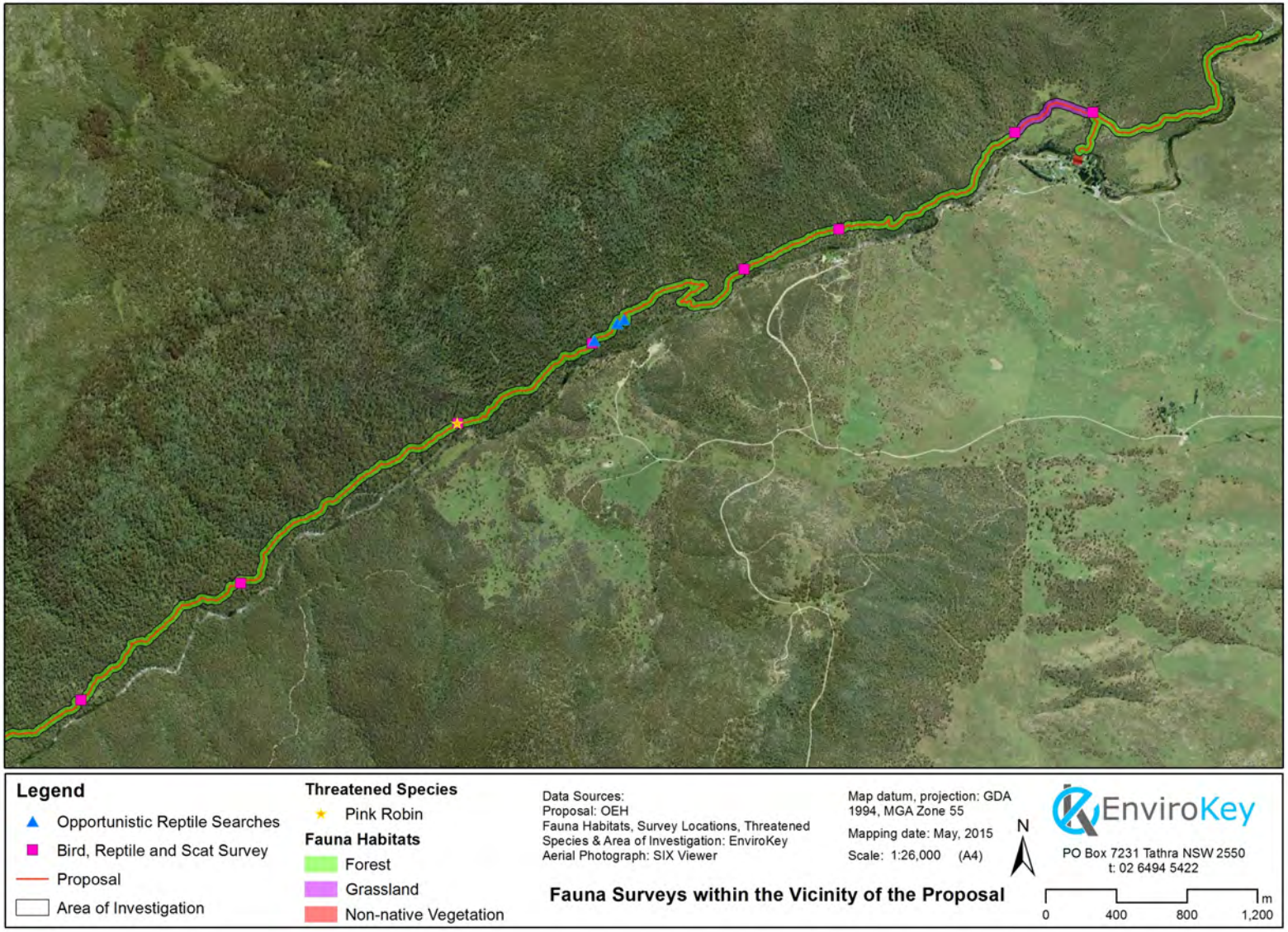
Map 7: Locations of other threatened reptiles and amphibians previously recorded in the locality.



Map 8: Locations of threatened flora previously recorded in the locality.



Map 9: Location of fauna surveys at western end of proposal.



Map 10: Location of fauna surveys at eastern end of the proposal.

5.8.4 Results

5.8.4.1 Flora and Vegetation Communities

Species Richness

The flora survey revealed a total of 91 flora species from the study area, comprising 78 native species and 13 exotic species. The full flora species list is provided within **Appendix 2.**

BioMetric Vegetation Types

The flora survey revealed the presence of three vegetation groups, with four vegetation classes as classified in *Native Vegetation of the Southern Forest: South-east Highlands, Australian Alps, South West Slopes and SE Corner bioregions* (Gellie 2005). These were:

- Vegetation Class 02d Tableland Moist Fern/Herb-Grass Forest
  - Vegetation Group 95: Tableland Acacia Moist Herb Forest
- The vegetation groups from 03d will most likely include:
  - Vegetation Group 87 - Western Escarpment Moist Shrub-Herb-Grass Forest
- The vegetation groups from 04c will most likely include:
  - Vegetation Group 76 - Central Tablelands Shrub-Grass Dry Forest
  - Vegetation Group 98 - Western Montane Moist Shrub Forest

These vegetation groups correspond with the following Biometric Vegetation Types (BVT):

- Vegetation Group 95 = BVT SR638 Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands and Australian Alps
- Vegetation Group 87 = BVT SR502 Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands and Australian Alps
- Vegetation Group 76 = BVT SR637 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands
- Vegetation Group 98 = BVT SR 638 Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands and Australian Alps

The official definition for the above BVTs for the Sothern Rivers CMA as defined by OEH is included in **Table 5**.

A fourth vegetation type was observed that was predominately introduced or non-native vegetation. This is not a BVT.

Table 5: Definition of Biometric Vegetation Types (Source: OEH 2013)

Veg Type ID	Vegetation Type	Dominant Canopy spp.	Main Associated spp.	Landscape Position	Characteristic Mid-storey spp.	Characteristic Ground Cover spp.	Other Diagnostic Features
SR502	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands and Australian Alps	Alpine Ash (*Eucalyptus delegatensis*), Mountain Gum (*Eucalyptus dalrympleana subsp. dalrympleana*)	NA	Occurs in mountainous areas at high altitude mainly in the western and southern parts of Kosciuszko including the Bago-Maragle area	*Coprosma hirtella*, *Daviesia latifolia*, *Polyscias sambucifolia subsp. B*, *Tasmannia xerophila, Acacia obliquinervia*	*Stellaria pungens, Viola betonicifolia*, *Asperula conferta*, *Derwentia derwentiana subsp. derwentiana*, *Derwentia derwentiana subsp. montanum*, *Acaena ovina*, *Clematis aristata, Polystichum proliferum*	Tall to very tall open forest. Occurs on moist plateaux and sheltered slopes along the Kosciuszko escarpment from about the Crackenback, Geehi and Tumut escarpments, and onto the Bago-Maragle plateau.
SR637	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands	Snow Gum (*Eucalyptus pauciflora*), Candle Bark (*Eucalyptus rubida subsp. rubida*)	Black Sallee (*Eucalyptus stellulata*), Ribbon Gum (*Eucalyptus viminalis*), Apple Box (*Eucalyptus bridgesiana*)	Occurs on frost-hollow flats and footslopes in undulating tableland areas between 600 and 1100m.	*Acacia dealbata*, *Acacia melanoxylon*, *Lissanthe strigosa*	Kangaroo Grass (*Themeda australis*), *Gonocarpus tetragynus*, *Microlaena stipoides var. stipoides*, *Hypericum gramineum*, *Chrysocephalum apiculatum*, Snowgrass (*Poa sieberiana var. sieberiana*) *Asperula conferta*, *Elymus scaber*, *Hydrocotyle laxiflora*	Open forest, woodland (or occasionally as grassland patches) with a sparse shrub layer and a dense grassy groundcover.

Veg Type ID	Vegetation Type	Dominant Canopy spp.	Main Associated spp.	Landscape Position	Characteristic Mid-storey spp.	Characteristic Ground Cover spp.	Other Diagnostic Features
SR638	Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands and Australian Alps	Snow Gum (*Eucalyptus pauciflora*), Mountain Gum (*Eucalyptus dalrympleana subsp. dalrympleana*)	Brown Barrel (*Eucalyptus fastigata*), Alpine Ash (*Eucalyptus delegatensis*), *Eucalyptus robertsonii subsp. robertsonii*	Widespread on montane to sub alpine slopes and ridges.	Silver Wattle (*Acacia dealbata*), *Helichrysum scorpioides*, *Persoonia sylvatica*, *Olearia erubescens*, *Daviesia ulicifolia*, *Daviesia mimosoides subsp. mimosoides*, *Polyscias sambucifolia subsp. B,* *Coprosma hirtella*, *Olearia megalophylla*, *Oxylobium ellipticum*, *Daviesia latifolia*, *Platylobium formosum subsp. formosum*	*Poa meionectes*, *Microlaena stipoides var. stipoides*, *Stellaria pungens*, *Lagenifera stipitata*, *Asperula scoparia*, *Viola betonicifolia*, *Dianella tasmanica*, *Geranium neglectum*, Spiny-headed Matt-rush (*Lomandra longifolia*), Snowgrass (*Poa sieberiana var. sieberiana*), *Helichrysum scorpioides*, *Acaena ovina*, *Poranthera microphylla*, *Persoonia chamaepitys*, *Stylidium graminifolium*, *Senecio gunnii*, *Brachycome spathulata*, *Acaena novae-zelandiae*, *Luzula flaccida*	Open to tall open forest with an open shrubby understorey and grassy ground layer.

A description of the BVT's as observed during the field surveys is included below.

SR502: Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands and Australian Alps

Distribution and habitat: This BVT was observed over a small area (1.67 kilometres in length) within the middle of the eastern section of the track alignment extending from the bank of Thredbo River as far upslope as was surveyed for the proposal. The topography was steep to very steep and the vegetation was typical of a forest habitat with an average canopy cover of 60 percent.

Vegetation description: Tall forest (up to 40 metres, up to 70 percent foliage cover), dominated by Mountain Gum (*Eucalyptus dalrympleana subsp. dalrympleana*), with occasional Candlebark (*E. rubida*) and Ribbon Gum (*E. viminalis*). It should be noted that this BVT usually has Mountain Ash (*E. delagatensis*) as a co-dominant in the canopy however none of this species were observed during the field surveys. The vegetation observed fitted with the description of a tall forest and many of the indicator species for the BVT were present. This is often a defiency of the BVT or any vegetation classification system in that not all vegetation communities in a landscape match those in the classification systems. In this instance, SR502 was chosen as it was the 'best fit' based on species composition, landscape position and structure.

Snow Gum or White Sallee (*E. pauciflora*) occurred regularly in the mid-storey with occasional Black Sally (*E. stellulata*). The mid-storey and shrub layer was often mixed including Silver Wattle (*Acacia dealbata*), Coffee Berry (*Coprosma hirtella*), Elderberry Panax (*Polyscias sambucifolia*) and Dogwoods (*Cassinia sp*.) with occasional occurrences of River Lomatia (*Lomatia myricoides*) and Woolly Grevillea (*Grevillea lanigera*). In some areas there were dense stands of Bitter Pea (*Daviesia mimosoides subsp. mimosoides*) interspersed with open grassy areas.

Groundcover species included various *Poa spp.* including *Poa ensiformis* and Prickly Starwort (*Stellaria pungens*), Common Woodruff (*Asperula conferta*), *Veronica derwentiana subsp. maideniana* and Mother Shield Fern (*Polystichum proliferum*).

Figure 3: SR502 Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands and Australian Alps.

SR637: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands

Distribution and habitat: This BVT occurs on the river flats of Thredbo River at both the western and eastern ends of the track alignment over a length of 3.92 kilometres. The canopy was more open and typical of woodland, up to about 40 percent cover.

Vegetation description: Low forest (up to a maximum of 15 metres tall, with 30 - 40 percent canopy cover) co-dominated by Snow Gum or White Sally (*E. pauciflora*), Mountain Gum (*Eucalyptus dalrympleana subsp. dalrympleana*) and Candlebark (*E. rubida*) with regular occurrences of Black Sally (*E. stellulata*).

The shrub layer was often mixed though the most common species was Leafy Bossiaea (*Bossiaea foliosa*) which often occurred in dense stands that were almost entirely made up of this species. Other shrubs included Pale-fruit Ballart (*Exocarpos strictus*), Bitter Pea (*Daviesia mimosoides subsp. mimosoides*), Dagger Wattle (*Acacia siculiformis*), Coffee Berry (*Coprosma hirtella*), Elderberry Panax (*Polyscias sambucifolia*), *Hakea spp*. and Dogwoods (*Cassinia sp*.) with occasional occurrences of Silver Wattle (*Acacia dealbata*) and Alpine Pepperbush (*Tasmannia xerophila*).

Groundcover species included various *Poa spp.*, Kangaroo Grass (*Themeda triandra*) and (*Microlaena stipoides*), with Prickly Starwort (*Stellaria pungens*), Common Woodruff

(*Asperula conferta*), Honeypots (*Acrotriche serrulata*), *Veronica derwentiana subsp. maideniana* and *Hovea linearis*.

N.B.: The existing BVT Mapping for the study area has a small area traversed by the track alignment, adjacent to Gaden Trout Hatchery, mapped as SR501: Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands and Australian Alps which is part of the EEC Montane Peatlands and swamps. However, during the field surveys, this area did not have any characteristics of bog or peat land as it remained well drained even though there had been substantial rains and more closely resembled grassland (see **Figure 5 & 6**). This would most likely be a remnant of historical land clearing practices for agriculture, evidenced by the proximity to Gaden Trout Hatchery and surrounding cleared land and the existing original stone cottage within the grassland patch. Therefore it was mapped as SR637: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands, as this BVT occasionally occurs as grassland patches (OEH 2015) and was also mapped immediately adjacent to the patch.

Figure 4: SR637 Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands.

Figure 5: Groundcover within the grassland component of SR637.

Figure 6: General appearance of grassland component of SR637.

SR638: Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands and Australian Alps

Distribution and habitat: This BVT was the most common along the track alignment and occurred on the steep to very steep sections along Thredbo River over a length of about 14.46 kilometres. The canopy cover was up to about 60 percent cover with a dense shrub layer.

Vegetation description: Low to moderately tall forest (up to about 25 metres tall, with about 60 percent canopy cover) co-dominated by Snow Gum or White Sally (*E. pauciflora*) and

Mountain Gum (*Eucalyptus dalrympleana subsp. dalrympleana*) with Candlebark (*E. rubida*) with occasional occurrences of Black Sally (*E. stellulata*) and Ribbon Gum (*E. viminalis*).

The shrub layer was often mixed though there were stands of Bitter Pea (*Daviesia mimosoides subsp. mimosoides*) that excluded most other species. Other common shrubs were several *Hakea spp*., Pink-tip Daisy-bush (Olearia erubescens) and other Olearia spp., Dagger Wattle (*Acacia siculiformis*), Coffee Berry (*Coprosma hirtella*), Elderberry Panax (*Polyscias sambucifolia*), *Hakea spp*. and Dogwoods (*Cassinia sp*.) with occasional occurrences of Silver Wattle (*Acacia dealbata*) and Alpine Pepperbush (*Tasmannia xerophila*).

Groundcover species included various *Poa spp.* such as *Poa meionectes* and Weeping Grass (*Microlaena stipoides*), with Prickly Starwort (*Stellaria pungens*), Common Woodruff (*Asperula conferta*), Tasman Flax-lily (*Dianella tasmanica*), Native Violet (*Viola betonicifolia*) and Grass Trigger-plant (*Stylidium graminifolium*).

Figure 7: SR638 Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands and Australian Alps.

General Vegetation Observations

The vegetation descriptions by Gellie (2005) for the vegetation groups 76, 87, 95 and 98 all indicate that these groups have an ‘open’ or ‘sparse’ shrub layer. Traversing the vegetation during field surveys found that this was not the case for the vast majority of the track alignment. In most cases the vegetation species present were representative of the

vegetation groups and the BVTs described for the area however in many situations the vegetation observed did not fit the vegetation descriptions. This was most evident in the large patches of incredibly dense shrub growth, which sometimes were almost entirely one species occurring underneath the canopy and excluded many of the groundcover species, defying the 'open' or 'sparse' shrub layer description. The fire that occurred in 2003 is the most likely explanation for this unusual growth with the dense shrub layer growing in response to the fire event. Fire is recognised as an element that can significantly alter an ecosystem; a particular species or ecosystem is likely to respond differently to a regime of high-intensity canopy fires than it would to a regime of low-intensity surface fires, to fires in milder winter or spring conditions than to fires in drier late summer or autumn conditions, or to a series of fires in successive years than to infrequent fires many decades apart (Beeton *et al* 2006). For example, during the field surveys, sections of the track would proceed through areas dominated by a dense growth of the shrub, Leafy Bosseia (*Bosseia foliosa*), only to suddenly open out into an area with very little shrub growth and a grassy understorey, however the other side of the clearing could be dominated by a dense growth of the shrub, Bitter Pea (*Daviesia mimosoides subsp. mimosoides*). It should be noted that where these shrubs were not a dominant feature, the shrub layer was sparse and moderately to highly diverse which fits with the general vegetation descriptions.

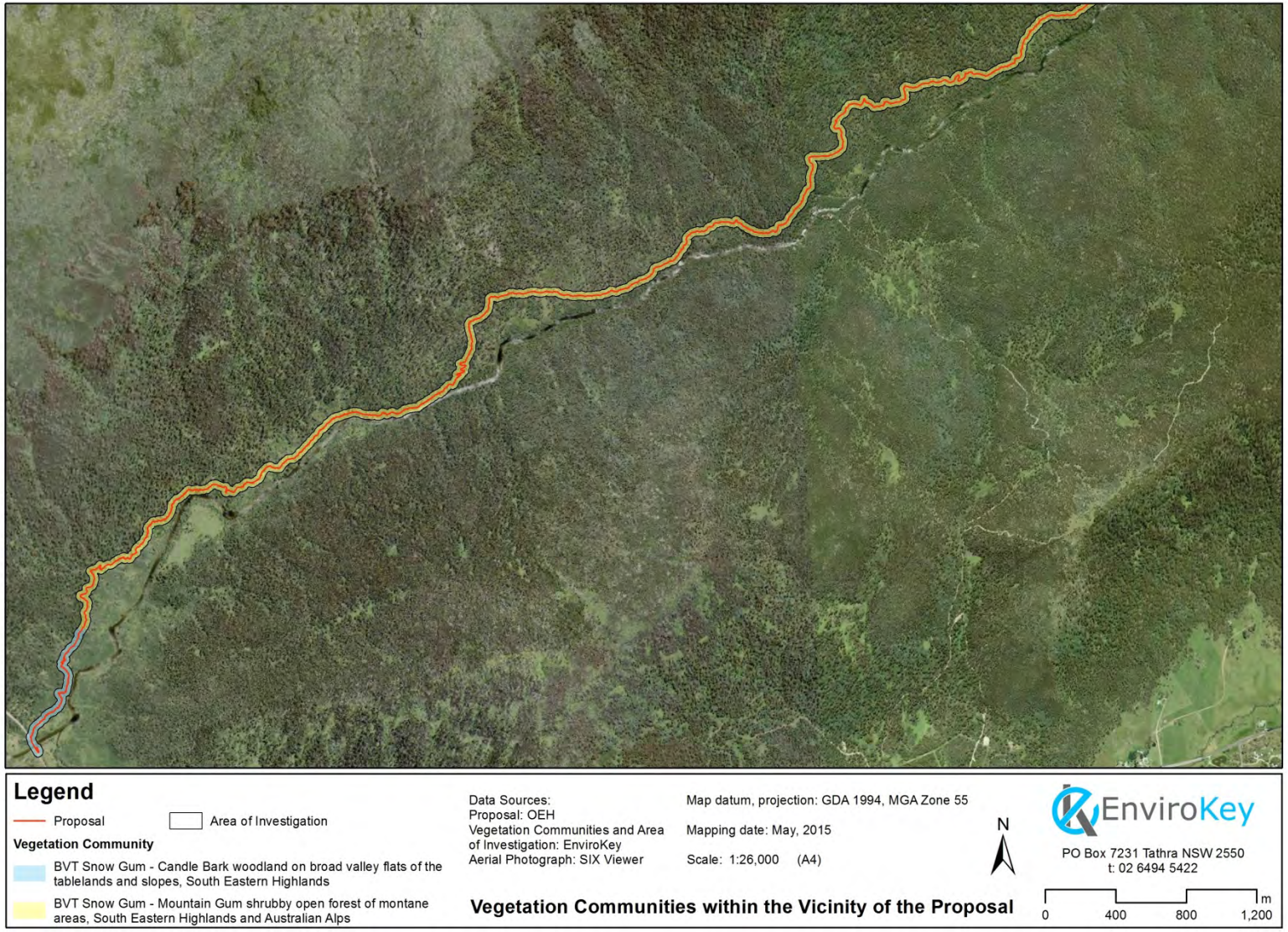
Many of the trees observed during the field surveys had evidence of fire damage and epicormic growths sprouting from low on the trunk while the top of the trunk was dead forming large stags. There was a high density of Eucalyptus saplings observed which would also be a response to the fire experienced in 2003.

The extent of vegetation communities within the study area is shown on **Map 11 & 12** and **Table 6**.

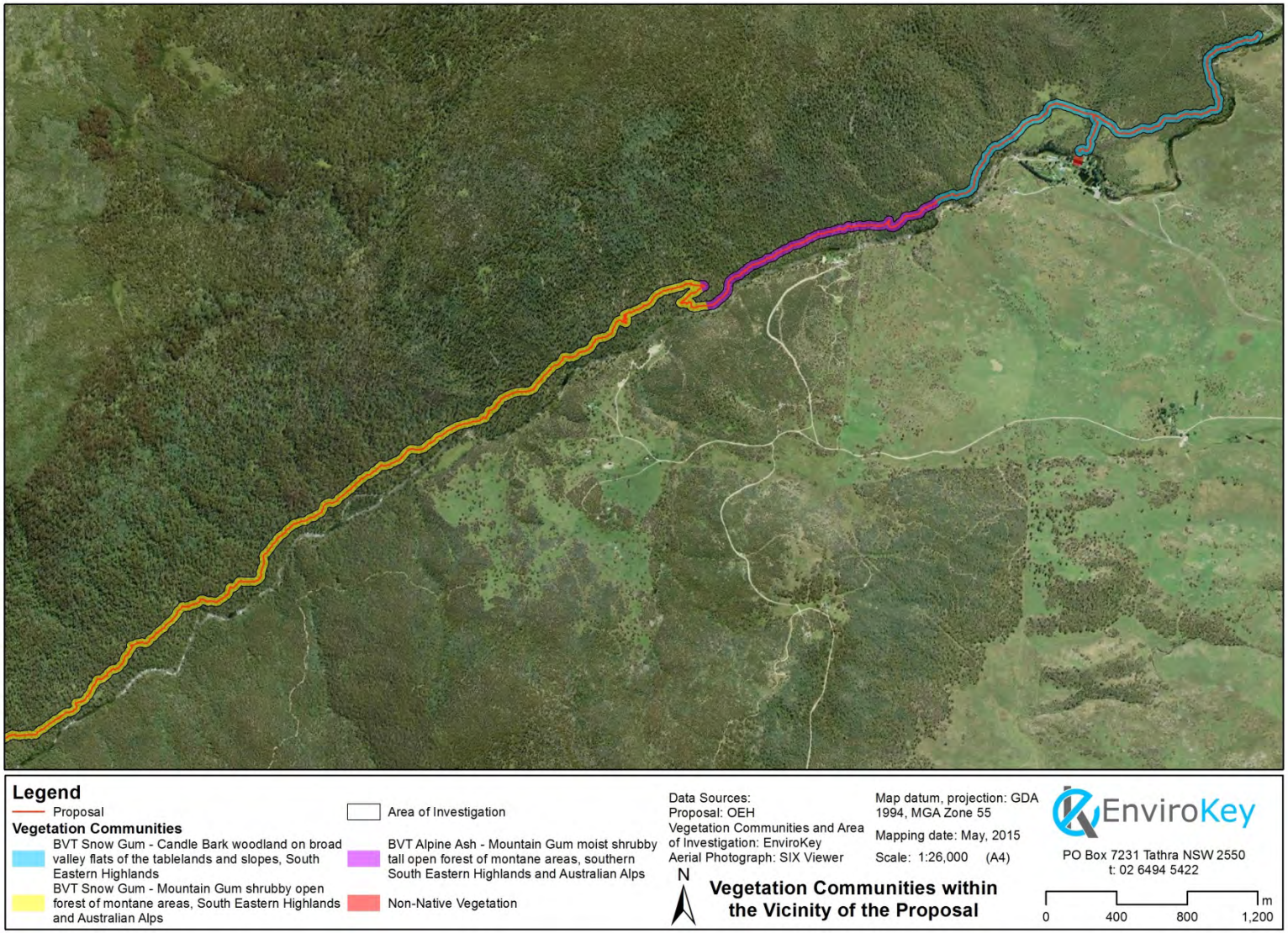
Table 6: Extent of Biometric Vegetation Types within the study area.

BVT Veg Type ID	Vegetation type	Extent in study area (hectares)	Extent impacted (hectares)
SR502	Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands and Australian Alps	8.11	0.334
SR637	Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands	19.14	0.786
SR638	Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands and Australian Alps	68.42	2.892

BVT Veg Type ID	Vegetation type	Extent in study area (hectares)	Extent impacted (hectares)
NA	Non-native Vegetation	0.25	0.006
	Total	95.96	4.016



Map 11: Vegetation communities within the western end of the study area.



Map 12: Vegetation communities within the eastern end of the study area.

Weeds

Weed cover was generally low across the whole track alignment. The most common weeds were grassy weeds such as Browntop Bent (*Agrostis capillaris*) and Sweet Vernal Grass (*Anthoxanthum odoratum*). Other common weeds such as Sheeps Sorrel (*Acetosella vulgaris*) were also present. Though the survey period was not during the peak growth period for the annual weeds that would most likely occur in the sub-alpine and alpine region, some common annual or biennial weeds were still present including Common Centaury (*Centaurium erythraea*), Lamb's Tongues (*Plantago lanceolata*), Dandelion (*Taraxacum officinale*) and Great Mullein (*Verbascum thapsus*).

The following noxious weeds were identified along the track alignment:

- Bugloss (*Echium sp*.) - Class 4 (Locally Controlled Weed: The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread)
- Sweet Briar (*Rosa rubiginosa*) - Class 4 (Locally Controlled Weed: The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed).
- Blackberry (*Rubus fruticosus*) - Class 4 (Locally Controlled Weed: The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed).

The *Echium sp*. was not positively identified due to a lack of flowering and fruiting bodies however there are three species of the *Echium* genera that are listed as noxious (DPI 2015). Therefore any plants in this genera should be treated as noxious if they are discovered. Blackberry and Sweet Briar were not common however they are both scattered along the track alignment and require controlling as part of the track construction and maintenance.

Threatened Flora and Threatened Ecological Communities

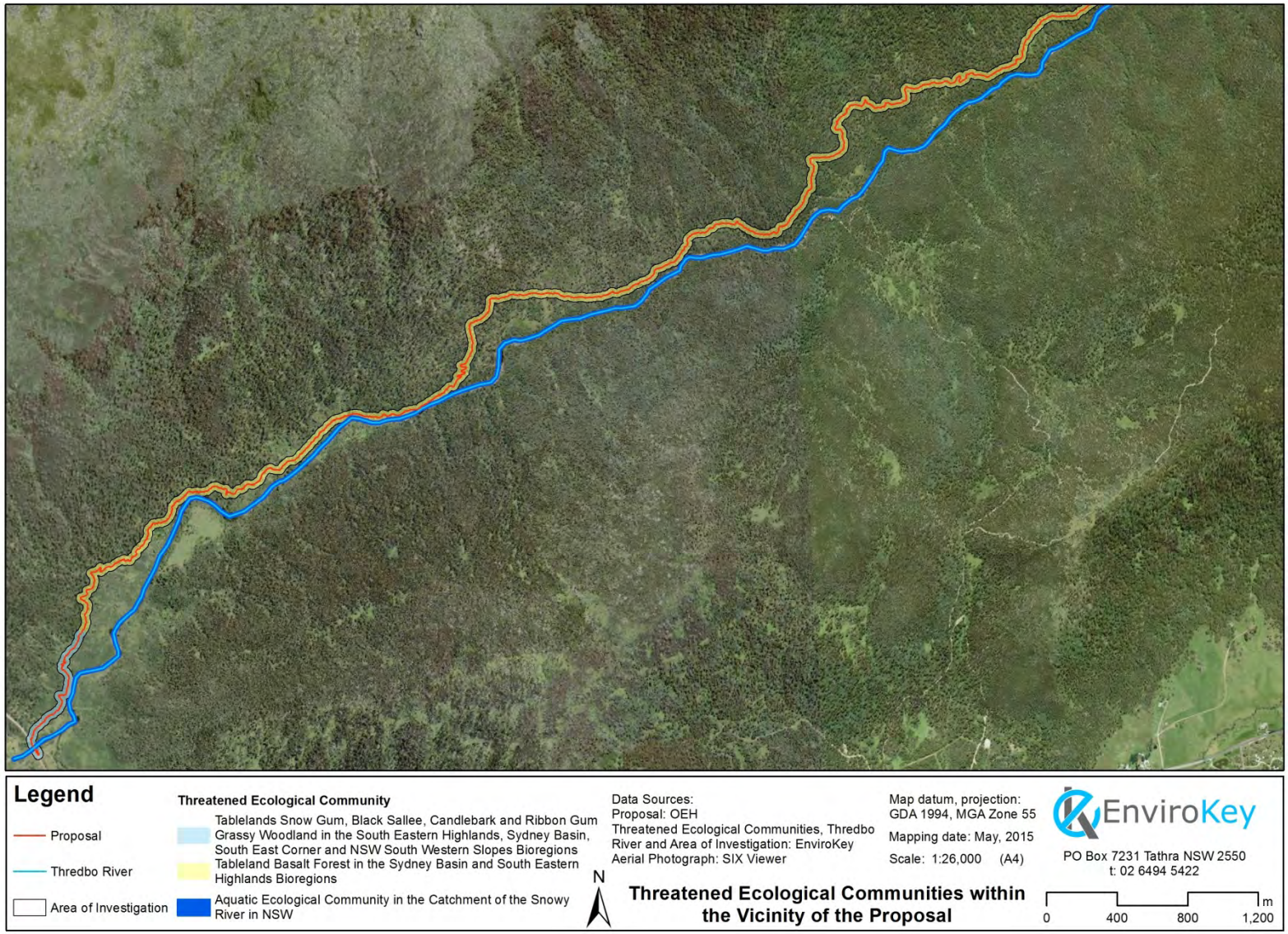
Three Threatened Ecological Communities (TEC) were observed during the field surveys or were determined as being present adjacent to the proposal as a result of the desktop assessments. These were:

- *Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions.*
- *Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions.*
- *Aquatic ecological community in the catchment of the Snowy River in NSW.*

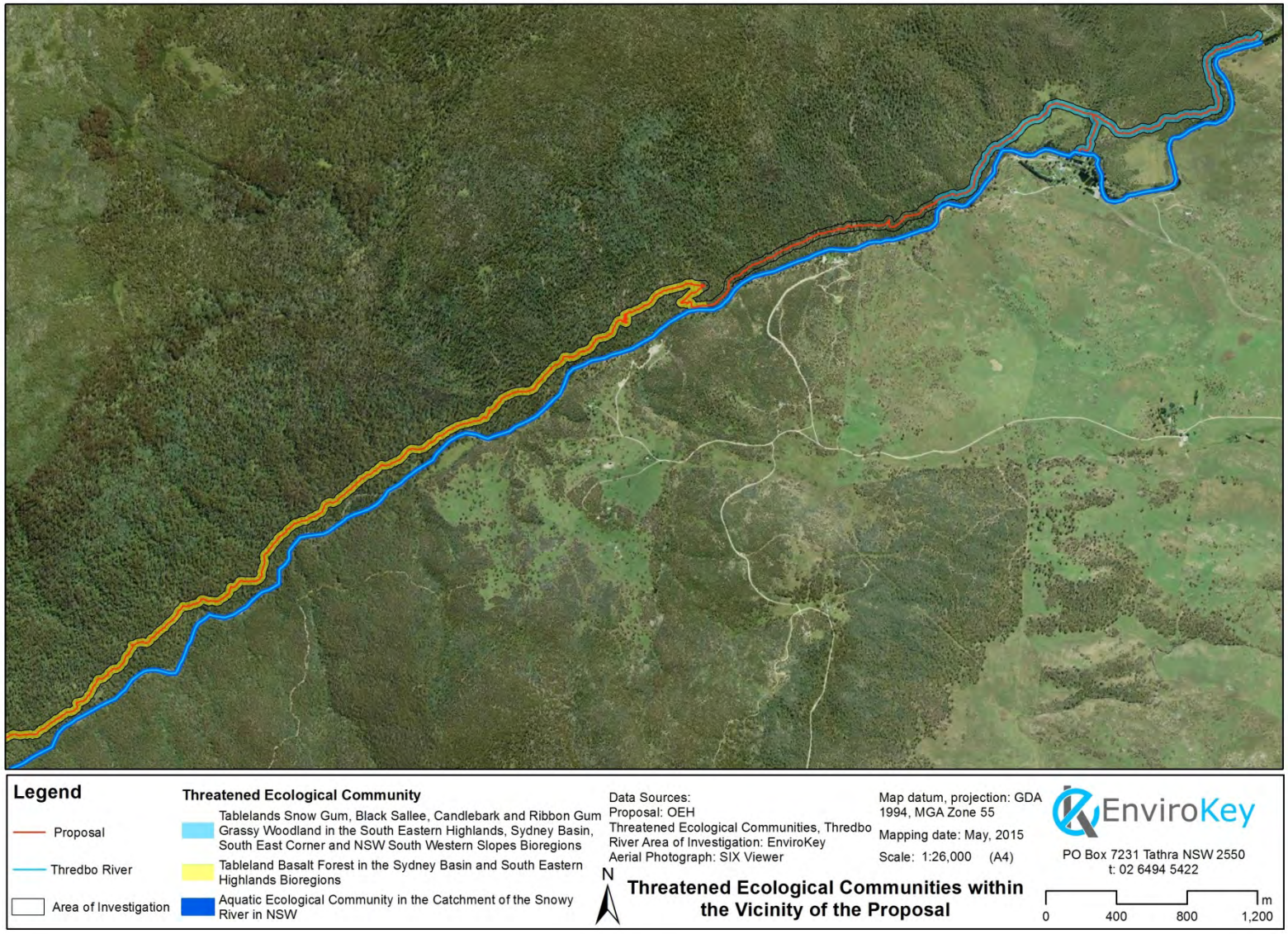
The area of the TECs and the BVT's that they correspond with are included in **Table 7**.

Table 7: TEC listing and corresponding BVT

Threatened Ecological Community	**Listing**	**Biometric Vegetation Type**	**Area (Ha)**	**Approx. area of impact (Ha)**
Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions	Endangered TSC Act	SR637: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands	19.14	0.784
Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions.	Endangered TSC Act	SR638: Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands and Australian Alps	68.42	2.892
Aquatic ecological community in the catchment of the Snowy River in NSW	Endangered FM Act	NA	NA	0
		Total	87.56	3.676



Map 13: Threatened Ecological Communities at the western end of the proposal.



Map 14: Threatened Ecological Communities at the eastern end of the proposal.

5.8.4.2 Fauna and their habitats

Species Richness

Field surveys detected the presence of a total of 44 fauna species in the study area. These comprised:

- 31 species of bird.
- Two species of frogs
- Ten species of mammal (which includes one species of bat).
- One species of reptile.

Of these 44 species, all were detected whilst carrying out surveys within the boundaries of the study area except for one species of bird that was observed opportunistically outside of the study area. However it should be noted that birds were recorded predominately through identification of calls and therefore were not observed directly within the study area. This does not preclude these species from the study area, as all the birds recorded would potentially utilise the study area as it provides potential habitat or foraging opportunities.

A full list of the fauna detected during the field surveys is provided in **Appendix 3**.

Fauna habitats

The study area comprises three general habitat types; this being forest habitat, woodland and grassland. The study area is predominately native vegetation that has not been subject to prior human disturbance such as historical clearing. Though parts of the study are may have been selectively logged in the past by early agricultural pioneers, the practice does not appear to have had any long term effects. Both the western end at Bullocks Flat adjacent to the Skitube Bridge and at the eastern end adjacent to Gaden Trout Hatchery appear to have been subject to some previous disturbance as evidenced by the lack of substantial canopy cover; the area adjacent to Gaden is almost devoid of a canopy and is therefore classed as grassland habitat. The forest habitat appears to be predominately original old growth with the presence of many significant very large trees. There are also indicators of a prior natural fire disturbance including regrowth indicators such as the presence of pioneer shrubs and a high density of canopy species saplings. However the forest would be considered in very good condition despite the fire disturbance and regrowth species. There are very few introduced species present with native groundcovers dominant, there is a high diversity of shrubs however the understorey is often quite dense interspersed with open, grassy areas. There was high density of Eucalyptus species which contain hollows from very small (less than 10 centimetres in diameter) to extra-large (greater than 30 centimetres in diameter). The number and dimensions of the hollows in the HBTs were not recorded as part of this project due to the high number of hollows present and no HBT's or significant large trees would be removed as part of the proposal. There was a high cover of leaf litter and fallen timber including many large logs creating very good micro-habitat structures at ground level. The western end of the track alignment seemed to have a paucity of surface rocks, with most rocks large boulders that were underneath the soil surface. Towards the eastern end of the alignment, loose surface rocks became much more abundant with some significant outcrops which also create a good quality microhabitat structure at ground level.

The grassland habitat, though most likely created by historical land clearing practices, contained a reasonable cover of native species. The area was observed to have been heavily grazed by native species (Eastern Grey Kangaroo and Wombat) and introduced species (Deer and Rabbit).

The spatial extent of habitats within the study area with threatened and migratory fauna records overlain are provided in **Maps 9 & 10**.

Threatened Fauna

The field surveys for this proposal detected two threatened fauna species (**Table 8**). These comprised two species of bird, the Olive Whistler and Pink Robin.

No threatened frog, mammal or reptile species were detected.

The potential for these species and other threatened and migratory species to occur onsite or to be impacted by the proposal has been assessed in the threatened and migratory biota evaluation (**Appendix 5**).

Table 8: Threatened fauna species detected during the field surveys (* denotes presence).

Common Name	Scientific Name	Study Area	Locality
Olive Whistler	*Pachycephala olivacea*		*
Pink Robin	*Petroica rodinogaster*	*	

Olive Whistler calls were recorded opportunistically outside of the study area while carrying out field survey activities, however it was in the locality and this was determined to be close enough to the study area that this species would most likely have been using the habitat there.

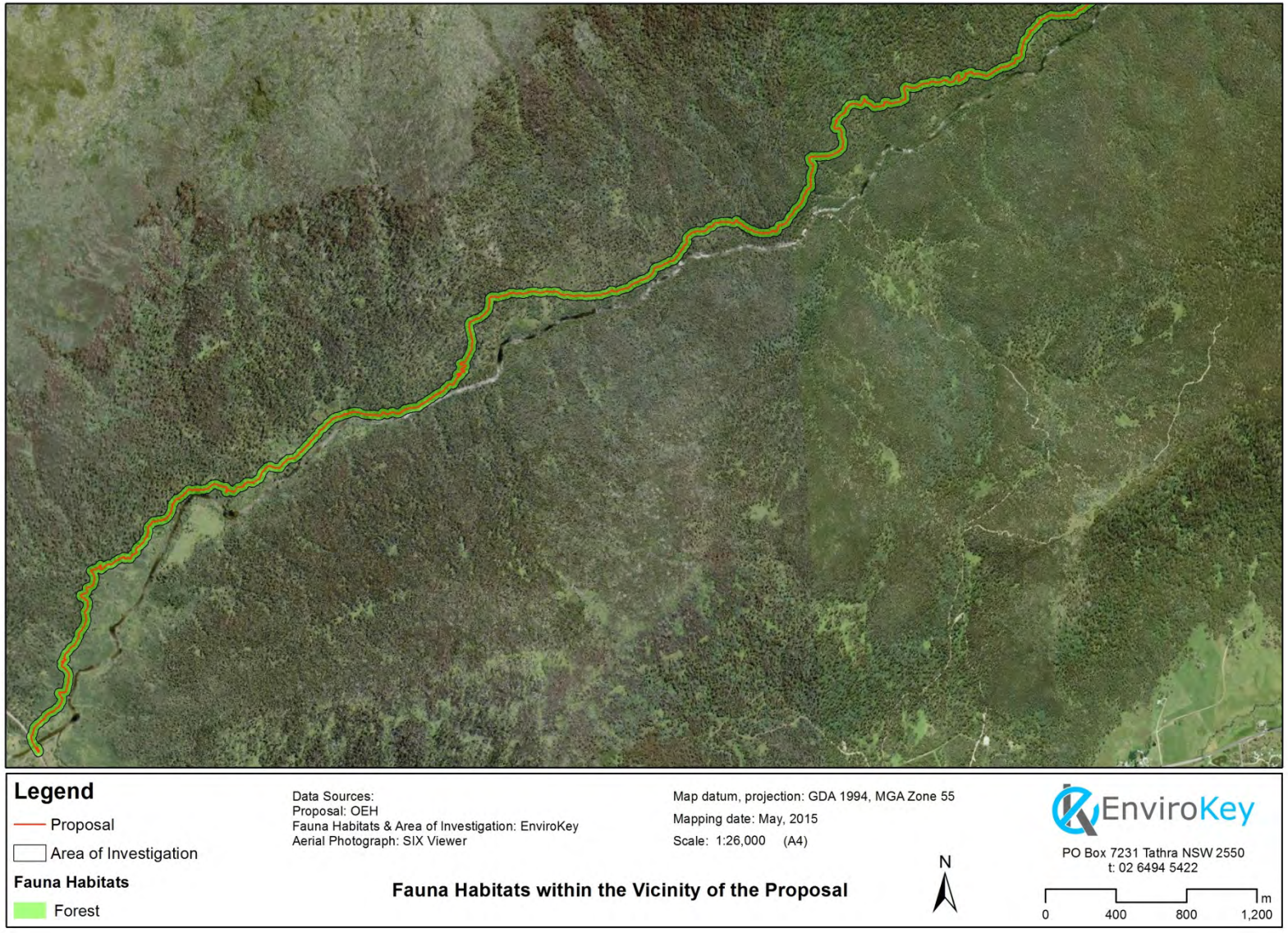
5.8.5 Assessment of Affected Species

Affected species are those considered to have some potential to be impacted by the proposal as they are known to either occur within the study area, or have a high potential to occur within the study area based on available habitat but went undetected. Affected species are identified in the threatened and migratory biota assessment, **Table 13**, **Appendix 5**, and are the subject of detailed impact assessments.

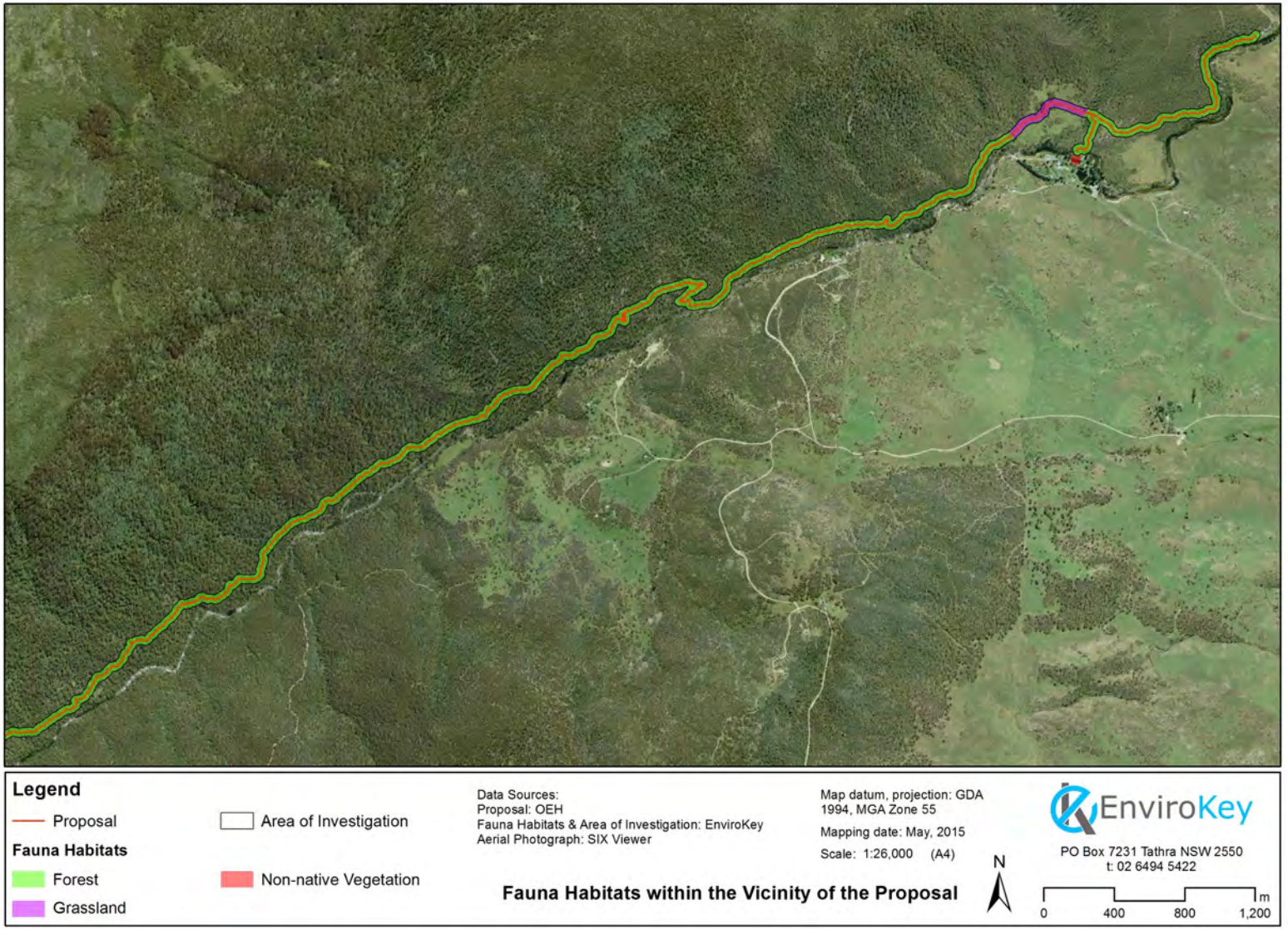
5.8.6 Impact Assessment

This REF provides a detailed assessment of the anticipated potential direct and indirect impacts of the proposal. This REF includes a range of recommended impact amelioration measures designed specifically to mitigate any adverse effect of the proposal on threatened and migratory biota.

This REF assumes that the amelioration measures detailed would be fully implemented should the proposal be approved.



Map 15: Fauna habitats at the western end of study area.



Map 16: Fauna habitats at the eastern end of study area.

5.9 CRITICAL HABITAT

No critical habitat as listed under the TSC Act occurs within the study area. Therefore, critical habitat will not be affected.

5.10 SEPP 44 - KOALA HABITAT PROTECTION

As detailed in Section 2.1.9, Snowy River LGA is listed within Schedule 1 of SEPP 44. Additionally, the Eucalyptus species present in the canopy in the study area, Ribbon Gum (*Eucalyptus viminalis*) is listed under Schedule 2 of SEPP 44. SEPP 44 aims to identify areas of potential and core Koala Habitat. These are described as follows:

- *Potential Koala Habitat* is defined as areas of native vegetation where the trees listed in Schedule 2 of SEPP 44 constitute at least 15 per cent of the total number of trees in the upper or lower strata of the tree component
- *Core Koala Habitat* is defined as an area of land with a resident population of koalas, evidenced by attributes such as breeding females, and recent and historical records of a population.

No evidence of Koala occupation, such as scats, were found within the study area during field surveys for this REF therefore this would indicate that there is not a resident population of Koalas in the area. Though one of the eucalyptus species present, Ribbon Gum (*Eucalyptus viminalis*) is listed as a feed tree species under Schedule 2 of SEPP 44, they do not constitute at least 15 percent of the canopy. However a review of existing BioNet records indicated that there are a number of Koala records along Sawpit Creek within a 10 kilometre radius of the proposal. Therefore, the study area would be considered Potential Koala Habitat as defined by SEPP 44, as there is the potential for this species to occur in the study area.

The proposal would result in the removal of about 4.016 hectares of vegetation, including 0.784 hectares of vegetation that contains the feed tree species for Koala. However it is unlikely that it would be an important resource to a Koala population should one persist near the proposal as the vegetation removed would be predominately saplings, shrubs and groundcover. It is not anticipated that mature, large trees would be removed. Therefore, the potential for the proposal to impact on this species is considered low. An assessment of the significance of this impact has been undertaken in **Appendix 6** and **7**.

5.11 WILDERNESS (NOMINATED OR DECLARED)

There is no area of wilderness (nominated or declared) within or adjoining the study area. However, there are nine areas of wilderness as listed under the NSW *Wilderness Act 1987* within Kosciuszko NP. They are as follows:

- Bimberi Wilderness Area

- Bogong Peaks Wilderness Area
- Byadbo Wilderness Area
- Goobarragandra Wilderness Area
- Indi Wilderness Area
- Jagungal Wilderness Area
- Pilot Wilderness Area
- Western Fall Wilderness Area.

The proposal is unlikely to impact on these wilderness areas as they are beyond the boundaries of the study area.

5.12 HISTORIC HERITAGE

A search of the NSW Heritage Register and Snowy River LEP 2013 revealed that there is one heritage item in the vicinity of the proposal; that of the Gaden Hatchery which is listed under the Snowy River LEP (Item 149). Potential impact to this item by the proposal would only occur if the bridge is constructed over Thredbo River to the picnic area at the Hatchery. At this stage, this is only a proposed option and would therefore by assessed in greater detail after further consultation and assessment in conjunction with NSW DPI.

Other items in close proximity to the proposal include Ashfield (290 Alpine Way, Crackenback), Crackenback Cottage (902 Alpine Way, Crackenback), Crackenback Farm (914 Alpine Way, Crackenback) and Wollondibby Cottage (785 Alpine Way, Crackenback).. The proposal is unlikely to impact on these heritage items.

A search of the Australian Heritage Database within the Snowy River LGA indicated 38 listed items within this LGA; one of these items was also listed within the EPBC matters of NES search:

- Australian Alps National Parks and Reserves (EPBC Act).
- Kosciuszko Alpine Area.
- Kosciuszko NP (1981 boundary).
- Lake Jindabyne.
- Snowy Mountains Scheme.
- Wollondibby Homestead Complex.

The proposal would not impact on the Snowy Mountains Scheme as the Thredbo River is one of only four rivers not subject to the scheme. The impact on the Kosciuszko NP and Australian Alps National Parks and Reserves would be minor due to the design of the project avoiding significant vegetation. The proposed activity would have a positive impact due to the increased access to previously inaccessible parts of Kosciuszko NP.

One item of potential historic significance was encountered during the extensive field surveys conducted within the study area for the REF. The item, known as ‘Collins Hut,’ located about 300 metres north of Gaden Trout Hatchery, was a standing stone chimney and

stone foundations that would possibly have been part of an early settlers or farmer's cottage (see **Figure 6**). This is not listed as a historic heritage item; however, it has the potential to be a significant historic heritage item. The track alignment is located in close proximity to this item and therefore there is the potential to impact through trampling by cyclists and walkers leaving the track to have a closer look at the chimney and foundations. The poor preservation of the item means that it would degrade quickly should foot traffic become too heavy plus the chimney poses a safety threat should it collapse. Mitigation measures to ameliorate the potential impact to this item have been recommended as part of this REF.

The heritage database searches conducted for this REF are provided in **Appendix 8 and 9**.

Figure 8: Potential historic heritage item (Collins Hut) adjacent to proposal.

5.13 ABORIGINAL CULTURAL HERITAGE

An Aboriginal Cultural Heritage Assessment report specific to the proposal was prepared by Sue Feary and Gerard Niemoeller (Feary and Niemoeller 2015).

The assessment report was conducted in accordance with the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*. The assessment report also details a process of Aboriginal community consultation in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010.*

The report recommends that an Aboriginal Heritage Impact Permit (AHIP) is not required for the proposal between Bullocks Flat and the Pallaibo Track where it turns north at Sawpit Creek. However, it recommends that upgrading Pallaibo Track will require an AHIP to harm recorded objects.

This report is provided in full in **Appendix 10.**

5.14 RECREATION VALUES

The KNP are lands reserved under the NP&W Act which encompasses 673,542 hectares; it is the largest national park in New South Wales and one of the most complex conservation reserves in Australia (DEC 2006). The park contains the continent's highest mountains, unique glacial landscapes, and unusual assemblages of plants and animals, a number of which are found nowhere else. The park encompasses significant water catchments, the principal seasonally snow-covered region in Australia and extensive tracts of forest and woodland (DEC 2006). In addition to hiking and cycling, the proposal is likely to increase access for fisherman and potentially experienced kayakers.

The park is perhaps best known as a recreational destination and is one of the most popular national parks in NSW. While the recreational activities undertaken in the park include vehicle-based sightseeing, bushwalking, fishing, canoeing, cycling and caving, the seasonal presence of snow is the principle drawcard for many visitors (DEC 2006).

Additionally, the Gaden Trout Hatchery, located adjacent to the proposal, supplies many of the local water bodies with four species of fish which are a major draw card for local and interstate fishermen.

5.15 SCENIC AND VISUALLY SIGNIFICANT AREAS

The KNP and also adjoining areas including Paddy's Corner provide some of the most arresting scenic panoramas in Australia. Natural beauty, based upon the dramatic vertical relief of the mountains, open vistas, extensive forests, snow-covered landscapes and a sense of wildness (DEC 2006) all contribute to the scenic and visual significance of the area. For many people, a visit to these alpine areas is also a source of inspiration and renewal (DEC 2006).

The study area is not highly visible to any local or main roads however it might be visible to some locally owned private property owners and residents. Though the proposal would alter the character of a small portion of the area, large areas of native vegetation would remain unaffected and it is considered that the benefits to the local community would outweigh this minimal impact. Consultation with affected landholders has resulted in the realignment of two sections of track, with about 3 kilometres of the proposed track being on a different alignment to minimise impacts to landowners (see **Section 3**).

5.16 EDUCATION AND SCIENTIFIC VALUES

KNP conserves a largely intact record of past changes to soils and vegetation, and has a scientific research record extending over many years. The park can also play a major international and national role in measuring ecological responses to climate change (DEC 2006). The large size of the park, its range of ecosystems, and its links with other natural areas give species and communities opportunities to adapt to new situations created by climate change. Current climate change scientific research projects includes climate manipulation such as cloud seeding and artificial snow making (DEC 2006). A management objective of the KNPPoM is to nominate the park for inclusion in the worldwide climate change monitoring program currently being developed by the United Nations Educational Scientific and Cultural Organization (UNESCO). This will be an extension to the Global Observation Research Initiative in Alpine Environments (GLORIA) project already established (DEC 2006). Further, scientific research work across a range of disciplines is regarded as highly significant, encompassing pioneering research in anthropology, botany, ecology, geology, geomorphology, hydrology and meteorology (DEC 2006). The KNPPoM actively encourages research which in turn can guide management principles which are based on the results of the research as opposed to anecdotal evidence (DEC 2006).

5.17 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The Protected Matters Search Tool (EPBC Act) was utilised to provide a summary of Matters of National Environmental Significance (NES) for the study area and a 10 kilometre buffer of the proposal. The Protected Matters Search Tool returned the following results:

- No World Heritage Properties
- One National Heritage Place
- One Wetland of International Importance
- Great Barrier Reef Marine Park (not applicable)
- Commonwealth Marine Parks (not applicable)
- Three Listed Threatened Ecological Communities
- 25 Listed Threatened species
- 11 Listed Migratory Species.

The entities listed within the Protected Matters Report relate to flora and fauna. This REF includes extensive analysis and assessment of threatened ecological communities and listed threatened and migratory species. The assessments identified that some biota listed under the EPBC Act may be affected by the proposal (**Table 13**, **Appendix 5**). For these biota, significance assessments under the TSC Act and under the EPBC Act (if both applicable) is provided in **Appendix 6 and 7.**

The National Heritage Property listed is the Australian Alps National Parks and Reserves. This is assessed further in **Section 5.12**.

No other matters of NES are relevant to the proposal. The listed wetland, Blue Lake, is located about 12 kilometres north-west of the proposal. This is upstream of the proposal and is therefore unlikely to be impacted.

The Protected Matters Report is provided in full in **Appendix 4**.

6 IMPACT ASSESSMENT

6.1 DIRECT IMPACTS

Vegetation clearing as defined by OEH, refers to the cutting down, felling, thinning, logging or removal of native vegetation (DEC 2004). The clearing of native vegetation affects threatened species, population and communities as well as common native species. There are a number of potential impacts as a result of clearing any native vegetation, which include:

- Destruction of habitat resulting in a loss of biodiversity.
- Isolation of populations resulting in limited gene flow between small fragmented populations.
- Reduced potential to adapt to environmental change.
- Erosion leading to sedimentation that can affect both terrestrial and aquatic biota.
- Disturbed habitat may encourage the establishment and spread exotic flora or pioneer species that may displace local native flora.
- Loss of leaf litter which provides habitat for vertebrate and invertebrate fauna.
- Ongoing impacts associated with track surface erosion.
- Potential of the track to facilitate the movement of vertebrate pest species.
- Increased pollution from rubbish and human waste.

With regard to the proposal, vegetation clearing would be directly associated with the proposed track and associated infrastructure (including bridges). 100 percent of the mid-storey vegetation would be removed for the track to a width of about two metres, with selective removal of groundcover associated with 'benching' requiring excavation into steep sections to create a flat surface. Disturbed soil will be stabilised and rehabilitated in accordance with a rehabilitation plan.

The proponent has made a decision to not remove any *E. stellulata* or *E. pauciflora* with a trunk of a greater than 10 cm diameter. There are however limbs from two mature *E.stellulata* that will need to be removed at the Skitube bridge as they are shading the track on the bridge, creating an ice risk and they are beginning to grow too close to the train.

Eucalypts in the Montane areas may be removed if their trunk is smaller than 15 cm in diameter. Eucalypts of any size will only be removed when there is no other feasible alternative. For the most part, Eucalypts will make positive features for the track to curve around.

Limbs from Eucalypts may be removed if they are lower than 2.4 metres above the track. Where feasible, the track will be designed so as to avoid the need to remove any limbs.

No hollow-bearing trees or limbs will be removed.

Based on spatial analysis and allowing for up to 2 metres in vegetation clearance (although likely to be no greater than 1.8 metres), a total of 4.016 hectares of native vegetation would be removed or directly impacted as a result of the proposal. A summary of the vegetation community to be impacted and the extent within the study area and total to be modified by the proposal is shown in **Table 9**.

Table 9: Extent of vegetation to be removed by the proposal.

Biometric Vegetation Type	Extent within the study area (hectares)	TSC Status	EPBC Status	Extent to be cleared) (hectares)	Percentage of study area
SR502: Alpine Ash - Mountain Gum moist shrubby tall open forest of montane areas, southern South Eastern Highlands and Australian Alps	8.11	Not listed	Not listed	0.334	0.35
SR637: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands	19.14	Endangered	Not listed	0.784	0.82
SR638: Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands and Australian Alps	68.42	Endangered	Not Listed	2.892	3.02
Non-native Vegetation	0.25	Not listed	Not listed	0.006	0.006
Total	95.92		Total	4.016	4.196

Potential direct impacts to Aboriginal cultural heritage are discussed further within Section 6.6 and **Appendix 8** of this REF.

6.2 INDIRECT IMPACTS

Indirect impacts as defined by OEH occur "when project-related activities affect species, populations or ecological communities in a manner other than direct loss". Indirect impacts include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertilizer drift or increased human activity within or directly adjacent to sensitive habitat areas" (DECC 2007).

Based on this definition, it is anticipated that the clearing of vegetation associated with the proposal would result in a number of cumulative or secondary effects relating to edge effects, soil erosion and weed invasion. These indirect impacts are considered under separate headings below.

6.2.1 Edge Effects

The removal of vegetation can often result in edge effects; the creation of new environmental conditions that have the potential to have negative impacts on ecological processes along the edges of cleared environments particularly those that originally contained canopy vegetation. Edge effects generally promote the invasion of exotic flora (weeds) and may also promote increased visitation by Red foxes and Feral Cats (Edwards *et al.* 2001; Lindenmayer and Fischer 2006; Miles 2006a; b; Priddel *et al.* 2007).

In general, potential edge effects associated with the proposal may include:

- Changes in microclimate (e.g. temperature, wind, light).
- Creation of new ecotones.
- Invasion by exotic flora.
- Improved access for feral predators.
- Isolation of populations resulting in limited gene flow between small fragmented populations.
- Reduced potential to adapt to environmental change.

A holistic approach to assessing edge effects is not possible given that edge effects can vary between species and communities. However, given the nature of the proposal, with minor vegetation removal, no canopy removal and the impact zone remaining within a larger area of intact vegetation as opposed to the creation of small patches of vegetation or fragmentation from a larger patch of vegetation, this impact is considered unlikely to cause a significant impact.

6.2.2 Soil Erosion

Potential impacts as a result of soil erosion may include, but are not restricted to:

- Topsoil runoff into the drainage lines

- Alterations to habitat
- Topsoil and native seedbank loss during heavy rainfall
- Invasion of weeds
- Wear of the track surface by riders.

These potential impacts are considered to be likely due to the track alignment across steep slopes with a requirement to cut into or excavation into the soil to create flat surfaces. Also the removal of all mid-storey vegetation would require removal of shrubs and seedlings by the roots to minimise regrowth and this would also create soil disturbance exposed to erosion. Though this is considered an indirect impact, it is likely that erosion will represent a significant challenge during the construction and maintenance of the track due to the steepness of the landscape. Even light precipitation events are likely to create runoff in this landscape which increases the potential for erosion. The proposed track would be built to international mountain bike (IMBA) standards which includes the following solutions to assist in minimising erosion:

- Rolling contours with undulations called grade reversals and out-sloped tread (approximately 5-7%)
- Adherence to the 'Half Rule' where the trails grade should not exceed half the grade of the side slope
- No more than 10% average trail grade
- Technical features will be included strategically to slow cycle traffic. This will increase safety and reduce wear and erosion from skidding.

In addition, raised platforms or stone armouring would be used where the proposed track crosses springs and other damp areas.

Design features (such as the retention of groundcover vegetation where possible and the retention of vegetation outside the impact area) and a series of mitigation measures are likely to avoid or limit the potential impacts of soil erosion.

A series of proposed safeguards/measures that will minimise the likelihood of indirect impacts affecting any biota within the study area are provided throughout Section 6 of this REF and in summary within Section 7 of this REF.

6.2.3 Cumulative Impacts

A multi-purpose track has been constructed to the west of this proposal (Upper Thredbo Valley Track) and there is the potential for the track to be extended beyond the Kosciuszko Road to link Thredbo with Jindabyne. Therefore there is the potential for cumulative impacts as a result of the construction of these various tracks. In the future, NPWS would need to consider the cumulative impacts associated with the increased disturbance created by the construction of the tracks.

6.3 PHYSICAL AND CHEMICAL IMPACTS DURING CONSTRUCTION AND OPERATION

Physical and chemical impacts during construction and operation				
	Applicable?*	**Impact level** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
1. Is the proposal likely to impact on soil quality or land stability?	☒	Medium, Negative	Impacts to soil quality and land stability are anticipated to be low to moderate during the proposal. The highest potential will be during vegetation removal and benching of the steep slope sections. Temporary negative impacts on soils or land stability would be confined to the subject site where direct excavation and vegetation removal is required. This is difficult to quantify exactly as the alignment may change slightly to avoid very steep sections or to an area where vegetation removal would be less. With appropriate safeguards, these impacts are expected to be minimised and managed to an appropriate level.	IMBA standards for sustainable trails would be followed at all times. The Contractor is to develop and implement an Erosion and Sediment Control Plan (ESCP) that is to form part of the Environmental Management Plan. The ESCP is to comply with relevant legislation, i.e. it is to include appropriate controls to ensure that sediment is appropriately managed and will not pollute any waterways or bogs. Sediment controls will be installed by the Contractor around stockpiles and on the track prior to the commencement of any construction activities that will create soil disturbance. A variety of sediment interception measures are to be installed down slope from disturbed areas, depending on the location, erosion risk and flow interception needs. Techniques may include: • Weed-free rice straw bales. These may be used mainly around stockpiles of gravel and topsoil at major stockpile sites. • Sediment filtration fences, mostly used at stockpile and platform sites. • Coir logs. These will be used on areas to capture topsoil and as temporary measures across and alongside the track to capture fine sediment that may flow from the newly laid track surface. • Logs and other natural material will be placed on rehabilitated areas across the flowpath to slow and disperse runoff, in accordance with the rehabilitation plan. Sediment controls will be inspected daily during construction by the Contractor and any necessary repairs or upgrades made. Sediment will be removed as necessary and either used on Site as fill or disposed of appropriately.

Physical and chemical impacts during construction and operation				
	Applicable?*	**Impact level** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
				Inspection and maintenance of sediment controls will continue until rehabilitation works have become stable and self-sustainable. Where possible, all foot traffic and light vehicle movements should be confined to the track including bridges and platforms. The contractor, through site inductions, would make all personnel aware of risks and responsibilities related to spills of fuel, oil and other chemicals that may be required onsite. Machinery and vehicles should be inspected on a daily basis giving particular attention to the condition of hoses and connections. The work team would carry and be fully conversant in the use of a petrochemical spills kit.
2. Is the works likely to affect a waterbody, watercourse, wetland or natural drainage system?	☒	low to medium, Negative	Sediment created as a result of vegetation removal has the potential to reach drainage lines, some swamps and Thredbo River. There are numerous drainage lines and several swamps along or adjacent to the proposal, all of which drain into Thredbo River. Therefore turbid runoff has the potential to reach drainage lines and send suspended sediments off-site. Similarly, contamination run-off by petrochemicals is also possible given the proposed use of machinery (most likely brushcutters and chainsaws) which use a series of oils and fuel. Work will be undertaken by some machinery for excavations as well as hand tools. This will minimise the amount of soil exposed at any one time. Also, with appropriate safeguards, these potential impacts are expected to be minimised and managed to an appropriate level.	A Track Management Plan would address potential long-term impacts relating to operation. This would include ongoing monitoring of the trail on completion to ensure that there are no significant erosion points.

Physical and chemical impacts during construction and operation				
	Applicable?*	**Impact level** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
3. Is the works likely to change flood or tidal regimes, or be affected by flooding?	☐	NA	The proposed work would be designed to ensure no impacts to flood regimes would occur. The structures of the proposed track would be engineered to minimise potential impacts by flooding.	Engineer designs would be sought for any structure associated with the track. These must consider flooding impacts.
4. Does the works involve the use, storage, or transport of hazardous substances or the use or generation of chemicals, which may build up residues in the environment?	☒	Negligible, Negative	There is a potential risk of petrochemical spills from the use of machinery that contains oil and fuel, and the potential spread of chytrid and Phytophthora.	A Hygiene Station is already established at Bullocks Flat at the eastern end of the track. A second station should be included at Gaden should the proposed crossing proceed.
5. Does the work involve the generation or disposal of gaseous, liquid or solid wastes or emissions?	☒	Negligible, Negative	Minor negative impacts to air quality may result by the generation of exhaust fumes from hand operated machinery such as chainsaws and brushcutters. Also some fine particulate matter such as dust as a result of the vegetation removal. Emissions would be generated during the operation of the helicopter proposed to drop in larger, heavy components required for the bridge sections. Small amounts of rubbish are also likely to be generated by personnel including human waste. These impacts would be restricted to the period of the proposal and during scheduled maintenance. With appropriate safeguards, these potential impacts are expected to be minimised and managed to an appropriate level.	All machinery (including vehicles) should be periodically inspected and maintained to ensure minimum levels of emissions. Engines would be switched off, rather than left idling for long periods. Rubbish generated during works would be minimised and where generated, would be disposed of in an appropriate manner. Construction workers would be required to carry out all solid human waste.

Physical and chemical impacts during construction and operation				
	Applicable?*	**Impact level** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
6. Will the works involve the emission of dust, odours, noise, vibration or radiation in the proximity of residential or urban areas or other sensitive locations?	☒	Negligible	Some noise may be generated during construction and operation. However, these would be minor given the distances from potential receivers.	Construction hours limited to between 7am and 6pm. Potential receivers of noise would be informed of works commencing.

6.3.1 Proposed Safeguards

EnviroKey recommend the following safeguards in relation to physical and chemical impacts during construction and operation of the proposal:

- IMBA standards for sustainable trails would be followed at all times.
- The Contractor is to develop and implement an Erosion and Sediment Control Plan (ESCP) that is to form part of the Environmental Management Plan. The ESCP is to comply with relevant legislation, i.e. it is to include appropriate controls to ensure that sediment is appropriately managed and will not pollute any waterways or bogs.
- Sediment controls will be installed by the Contractor around stockpiles and on the track prior to the commencement of any construction activities that will create soil disturbance. A variety of sediment interception measures are to be installed down slope from disturbed areas, depending on the location, erosion risk and flow interception needs. Techniques may include:
  - Weed-free rice straw bales. These may be used mainly around stockpiles of gravel and topsoil at major stockpile sites.
  - Sediment filtration fences, mostly used at stockpile and platform sites.
  - Coir logs. These will be used on areas to capture topsoil and as temporary measures across and alongside the track to capture fine sediment that may flow from the newly laid track surface.
  - Logs and other natural material will be placed on rehabilitated areas across the flowpath to slow and disperse runoff, in accordance with the rehabilitation plan.
- Sediment controls will be inspected daily during construction by the Contractor and any necessary repairs or upgrades made. Sediment will be removed as necessary and either used on Site as fill or disposed of appropriately.

- Inspection and maintenance of sediment controls will continue until rehabilitation works have become stable and self-sustainable. Where possible, all foot traffic and light vehicle movements should be confined to the track including bridges and platforms.
- The contractor, through site inductions, would make all personnel aware of risks and responsibilities related to spills of fuel, oil and other chemicals that may be required onsite. Machinery and vehicles should be inspected on a daily basis giving particular attention to the condition of hoses and connections.
- The work team would carry and be fully conversant in the use of a petrochemical spills kit.

6.4 BIOLOGICAL IMPACTS DURING CONSTRUCTION AND OPERATION

Biological Impacts During Construction and Operation			
	Applicable?*	**Impact level** (negligible, low, medium or high; negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of impact, taking into account the receiving environment & proposed safeguards which will limit the impact)
1. Is any vegetation to be cleared or modified? (includes vegetation of conservation significance or cultural landscape value)	☒	Medium, Negative	The proposal will result in direct impacts to 4.016 hectares of native vegetation. This would comprise mostly shrubs and ground cover vegetation. The proposal would result in total removal of vegetation within a strip up to 1.8 metres wide. Indirect impacts are also likely (without appropriate safeguards) including weed invasion and soil erosion. Excavation at the base of large significant trees has the potential to cause stress to the roots.
2. Is the works likely to have a significant effect on threatened **flora and fauna** species, populations, or their habitats, or critical habitat? (refer to threatened species assessment of significance (7-part test))	☒	Negligible, Negative	The proposal would result in the removal of some potential habitat and forage for some threatened and migratory biota. Additional assessment under the TSC Act and EPBC Act is provided in Appendix 6 and 7.

3. Does the works have the potential to endanger, displace or disturb fauna (including fauna of conservation significance) or create a barrier to their movement?	☒	Low, Negative	The potential impacts to fauna resulting from the proposal include: Direct impacts during clearing with the potential to affect less mobile fauna occupying soil and vegetation such as reptiles, invertebrates, frogs and small terrestrial mammals. Habitat loss by the removal of vegetation. Short term disturbance during the works to noise-sensitive species (minimal as no heavy machinery to be used). The proposal would involve the removal or direct impact to 4.016 hectares of native vegetation. Additional assessment for species listed under the TSC Act and EPBC Act that have the potential to be impacted by the proposal is provided in Appendix 6 and 7.
5. Is the works likely to impact on an ecological community of conservation significance?	☐	N/A	NA. The communities present are not known to be of specific conservation significance, but are rather listed as endangered ecological communities (EEC). EEC are detailed in point 5.
6. Is the work likely to have a significant effect on an endangered ecological community or its habitat? (refer to threatened species assessment of significance (7-part test))	☒	Low, Negative	The proposal would impact on three TECs. Additional assessment for communities under the TSC Act, FM Act and EPBC Act that have the potential to be impacted by the proposal is provided in Appendix 6 and 7.
7. Is the work likely to cause a threat to the biological diversity or ecological integrity of an ecological community?	☒	Negligible, Negative	About 4.016 hectares of native vegetation would be impacted by the proposal however this is considered minor in the context of the large remaining areas of native vegetation in the locality and region and that no significant canopy trees would be removed.
8. Is the work likely to introduce noxious weeds, vermin, feral species or genetically modified organisms into an area?	☒	Low, Negative	Weeds have the potential to be become established or increase in abundance. Several weeds of concern were identified onsite including Blackberry, Sweet Briar and an *Echium sp*. However the abundance was very low and mitigation measures including a Track Management Plan would minimise the potential for these species to establish themselves. Potential weeds such as *Anthoxanthum odoratum* may become established long-term. Weeds could also be transported in on boots and access methods (motorcycles or ATV) however mitigation measures detailed in this REF including a boot/hygiene station during operation, and wash down of machinery and vehicles during construction.
9. Is the work likely to affect critical habitat?	☐	N/A	No critical habitat as listed by the TSC Act is present within the study area, nor the Snowy River LGA in which the study area is located.
10. Is the work consistent with any applicable recovery plans or threat abatement plans?	☒	Medium, Positive	Generally, the works are consistent with management plans, recovery plans or actions devised under the Saving Our Species Program in that they minimise impacts through minimising vegetation clearance, and impacts can be ameliorated where appropriate.

11. Is the works likely to affect any joint management agreement entered into under the TSC Act?	☐	N/A	No Joint Management Agreement under the TSC Act is present.

6.4.1 Proposed Safeguards

EnviroKey recommend the following safeguards in relation to biological impacts during construction and operation of the proposal:

- An immediate pre-clearance survey during construction would be completed by suitably qualified persons to minimise the potential for harm during vegetation clearing. This would generally involve inspections of logs, rocks and leaf litter and fallen timber for frogs, reptiles and mammals. Any fauna found would be moved to adjacent habitat. Where threatened flora is located, the track alignment should be micro-sited to minimize impacts to these plants. If this is not possible. OEH would undertake further assessment.
- A pre-clearance survey would be undertaken for the Blue-tongued Greenhood (*Pterostylis oreophila*) during the flowering period between November and January, Leafy Anchor Plant (*Discaria nitida*) in late November to December, the perennial species Hoary Sunray (*Leucochrysum albicans var. tricolor*) prior to summer and for nests of Olive Whistler and Pink Robin.
- NPWS would implement weed control measures as recommended in the KNPoM and as outlined within the Track Management Plan.
- NPWS would implement a Track Management Plan to ensure regular inspection of the track to ensure that no damage has occurred that could result in increased erosion and sedimentation. This is of particular concern in areas with heavy Wombat use and Deer use, both of which would use the track increasing erosion potential and Wombats are likely to excavate into any banks created.
- Any vehicles required for the proposed activity should remain on the track once created. Foot traffic should be minimised outside of the track footprint.
- All vehicles and machinery entering the site (prior to reaching the area of the proposal) would be cleaned by high pressure spray ensuring the removal of any potential weed seeds.
- Boots of workers and other people entering the site during construction need to be washed or brushed clean.
- NPWS would be notified of the locations of any noxious weeds encountered during construction of the proposal.
- The Contractor is to develop and implement an Erosion and Sediment Control Plan (ESCP) that is to form part of the Environmental Management Plan. The ESCP is to comply with relevant legislation, i.e. it is to include appropriate controls to ensure that sediment is appropriately managed and will not pollute any waterways or bogs.

- Sediment controls will be installed by the Contractor around stockpiles and on the track prior to the commencement of any construction activities that will create soil disturbance. A variety of sediment interception measures are to be installed down slope from disturbed areas, depending on the location, erosion risk and flow interception needs. Techniques may include:
  - Weed-free rice straw bales. These may be used mainly around stockpiles of gravel and topsoil at major stockpile sites.
  - Sediment filtration fences, mostly used at stockpile and platform sites.
  - Coir logs. These will be used on areas to capture topsoil and as temporary measures across and alongside the track to capture fine sediment that may flow from the newly laid track surface.
  - Logs and other natural material will be placed on rehabilitated areas across the flowpath to slow and disperse runoff, in accordance with the rehabilitation plan.
- Sediment controls will be inspected daily during construction by the Contractor and any necessary repairs or upgrades made. Sediment will be removed as necessary and either used on Site as fill or disposed of appropriately.
- Inspection and maintenance of sediment controls will continue until rehabilitation works have become stable and self-sustainable. Where possible, all foot traffic and light vehicle movements should be confined to the track including bridges and platforms.
- No excavation greater than 1 metre in depth should take place within the dripline of large, significant trees, or hollow-bearing trees (as determined by ground level inspection).
- With the exception of the limbs of two *E. stellulata* on the northern side of the skitube bridge, no canopy trees or hollow bearing trees would be removed.

6.5 COMMUNITY IMPACTS DURING CONSTRUCTION AND OPERATION

Community impacts during construction and operation				
	Applicable?*	**Likely impact** (negligible, low, medium or high negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
1. Is the works likely to affect community services or infrastructure?	☐	N/A	The site would be accessed via Pallaibo Track or private roads.	Consultation with neighbours and appropriate approvals gained for use of private access roads to the site.

Community impacts during construction and operation				
	Applicable?*	**Likely impact** (negligible, low, medium or high negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
2. Do the works affect sites of importance to local or broader community for their recreational or other values or access to these sites?	☒	Medium, Positive	While native vegetation will be removed, removal of vegetation will not impact the community's ability to utilise the area in the future. The proposal increases the ability of recreational users to use the National Park.	No safeguards are considered necessary.
3. Are the works likely to affect economic factors, including employment, industry and property value?	☒	Medium, Positive	The proposal will attract greater tourism to the area, jobs will be created during construction.	No safeguards are considered necessary.
4. Is the works likely to have an impact on the safety of the community?	☐	N/A	The proposal are not expected to impact on community safety.	No safeguards are considered necessary.
5. Is the works likely to cause a bushfire risk?	☒	Negligible, Negative	There is a very low potential for the proposal to create a bushfire. With appropriate safeguards, potential impacts are expected to be minimised and managed to an appropriate level.	Machinery (chainsaws and brushcutters) are not to be placed on the ground where grass is long after use. No campfires onsite of any kind are permitted during the high fire danger periods. Smoking is prohibited and is banned in Kosciuszko NP. The proponent will include appropriate measures in the conditions of contract for construction to ensure that fire risk is appropriately managed.
6. Will the works affect the visual or scenic landscape?	☒	Negligible, Negative	Due to the nature of the proposal, vegetation will be removed. However this would not be significant in terms of the large areas of vegetation immediately adjacent that would be retained.	No safeguards are considered necessary.

Community impacts during construction and operation				
	Applicable?*	**Likely impact** (negligible, low, medium or high negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
7. Is the works likely to cause noise, pollution, visual impacts, loss of privacy, glare or overshadowing to members of the community, particularly adjoining landowners?	☒	Low, Negative	The proposal would potentially cause some noise, pollution, visual impacts, loss of privacy for members of the community, particularly adjoining landowners . Additionally, during operation of the track, users of the track may create noise that would be heard by adjoining landholders.	The timeframe of work would be minimised by working between 7am and 6pm where possible to reduce amount of time adjacent landholders are exposed to potential noise pollution. Interpretive signs would be placed at the ends of the track to ensure track users respect the privacy of adjoining landholders. Further consultation should occur with landholders to ensure that they would be accepting of access through their private property for potential emergencies.
8. Is the works likely to affect the use of, or the community's ability to use natural resources?	☐	N/A	The proposal is unlikely to affect the use of, or the ability of the community's use of natural resources.	No safeguards are considered necessary.

6.5.1 Proposed Safeguards

EnviroKey recommend the following safeguards in relation to community impacts during construction and operation of the proposal:

- Consultation with neighbours and appropriate approvals gained for use of private access roads to the site.
- Machinery (chainsaws and brushcutters) are not to be placed on the ground where grass is long after use.
- No campfires onsite of any kind are permitted during high fire danger periods. Smoking is prohibited and is banned in Kosciusko NP.
- The timeframe of work would be minimised where possible by working between 7am and 6pm to reduce amount of time adjacent landholders are exposed to potential noise pollution.

- The proponent will include appropriate measures in the conditions of contract for construction to ensure that fire risk is appropriately managed.
- Interpretive signs would be placed at the ends of the track to ensure track users respect the privacy of adjoining landholders.
- Further consultation should occur with landholders to ensure that they will be accepting of access through their private property for potential emergencies.

6.6 NATURAL RESOURCE IMPACTS DURING CONSTRUCTION AND OPERATION

Natural resource impacts during construction and operation				
	Applicable?*	**Likely impact** (negligible, low, medium or high negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
1. Is the works likely to result in the degradation of the reserve or any other area reserved for conservation purposes?	☒	Low, Negative	The proposal will result in the permanent removal of about 4.016 hectares of native vegetation. This impact is considered relatively minor in the context of the extant area of native vegetation of a similar composition in OEH managed estate in the locality and that no significant canopy vegetation would be removed. Weed invasion is a potential likely impact as a result of the proposal.	Impact Amelioration measures include a Weed Management Plan The weed management plan will form a section of the Track Management Plan. Cleared vegetation will need to be stockpiled within the cleared corridor. It will then be stockpiled to the edge of the corridor for track construction to occur. A time limit of seven days will apply for which the cleared vegetation can be stockpiled on living vegetation to the side of the track. Prior to the seven day period expiring, the stockpiled vegetation must either be used for rehabilitation of disturbed soils, or strategically dispersed throughout the areas on each side of the track. Dispersing of materials must avoid all potential flood zones, bogs or other waterways and must not be placed on any shrubs or wood growth. Potential offsetting of impacts to biodiversity as a result of the proposal could include vegetation rehabilitation, weed control and feral animal control.
2. Is the works likely to involve	☒	Low, Negative	The proposal is expected to result in impacts to some natural	The REF already provides a range of safeguards designed to limit impacts

Natural resource impacts during construction and operation				
	Applicable?*	**Likely impact** (negligible, low, medium or high negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
the use, wastage, destruction or depletion of natural resources including water, fuels, timber or extractive materials?			resources. The shrubs that are cleared would be used for revegetation and excess would be strategically dispersed in accordance with a rehabilitation plan. Resources that are non-renewable will be used during the clearing works and ongoing maintenance and will include resources associated with the operation of equipment and motor vehicles.	to natural resources.

6.6.1 Proposed Safeguards

EnviroKey recommend the following safeguards in relation to Natural Resource impacts during construction and operation of the proposal:

- NPWS would implement a Weed Management Plan as a section of the Track Management Plan.
- Cleared vegetation will need to be stockpiled within the cleared corridor. It will then be stockpiled to the edge of the corridor for track construction to occur. A time limit of seven days will apply for which the cleared vegetation can be stockpiled on living vegetation to the side of the track. Prior to the seven day period expiring, the stockpiled vegetation must either be used for rehabilitation of disturbed soils, or strategically dispersed throughout the areas on each side of the track. Dispersing of materials must avoid all potential flood zones, bogs or other waterways and must not be placed on any shrubs or wood growth.
- Potential offsetting of impacts to biodiversity as a result of the proposal could include vegetation rehabilitation, weed control and feral animal control.

6.7 CULTURAL HERITAGE IMPACTS DURING CONSTRUCTION AND OPERATION

An Aboriginal Cultural Heritage Assessment report specific to the proposal was prepared by Sue Feary and Gerard Niemoeller (Feary and Niemoeller 2015).

The assessment report was conducted in accordance with the OEH *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* and the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW*. The assessment report also details a process of Aboriginal community consultation in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010.*

Aboriginal cultural heritage impacts during construction and operation				
	Applicable?*	**Likely impact** (negligible, low, medium or high negative or positive; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)	**Safeguards/Mitigation Measures**
1. Does the activity affect places of significance or importance to the Aboriginal community or other cultural values?	☒	Negligible, Negative	The track has been re-routed to avoid Aboriginal objects, with the exception of the Pallaibo Track which would require an AHIP.	NPWS would implement any mitigation measures as described in the Aboriginal Cultural Heritage Assessment Report. This includes the requirement for an Aboriginal Heritage Impact Permit (AHIP) for the upgrading of the Pallaibo Track section.
2. Is the activity likely to affect wild resources or access to these resources, which are used or valued by the Aboriginal community?	☐	N/A	N/A	N/A
3. Does the activity affect areas nominated or declared as Aboriginal Places?	☐	N/A	N/A	N/A
4. Does the activity affect areas subject to Native Title claims?	☐	N/A	N/A	N/A

Other cultural heritage impacts during construction or operation			
	Applicable?*	**Likely impact**(negligible/ maintenance, minor, major, contentious; or N/A)	**Reasons** (describe the type, nature and extent of the impact, the nature of the receiving environment and any proposed safeguards which will limit the impact)
1. What is the impact on places, buildings, landscapes or moveable heritage items?	☐	N/A	One item of Historic heritage significance is known from the study area, Gaden Trout Hatchery. Additionally one potential heritage item was identified onsite, 'Collins Hut.' Interpretive signage should be installed at Collins Hut and NPWS personnel should complete a risk assessment and implement any appropriate measures to reduce risks of the item collapsing on visitors.
2. Is any vegetation of cultural landscape value likely to be affected (eg gardens and settings, introduced exotic species, or evidence of broader remnant land uses)?	☐	N/A	The relatively minor nature of the proposal and the full adoption and implementation of safeguards throughout this REF strongly suggests that there will be no change in landscape value. No additional safeguards are considered necessary.

6.7.1 Proposed Safeguards

EnviroKey recommend the following safeguards in relation to Aboriginal and cultural heritage impacts during construction and operation of the proposal:

- NPWS would implement any mitigation measures as described in the Aboriginal Cultural Heritage Assessment Report. This includes the requirement for an Aboriginal Heritage Impact Permit (AHIP) for the upgrading of the Pallaibo Track section, if NPWS makes a decision to construct along the Pallaibo Track.
- Interpretive signage should be installed at 'Collins Hut' and NPWS personnel should complete a risk assessment and implement any appropriate measures to reduce risks of the item collapsing on visitors.
- Personnel should be conversant in identifying potential historic heritage items in case they are discovered during the proposal to enable direct impacts to be avoided.

7 ENVIRONMENTAL MANAGEMENT

The potential impacts of the proposal identified within Section 6 of this REF can be mitigated through appropriate safeguards to reduce these to acceptable levels. The safeguards provided throughout this REF are summarised within **Table 10**.

Table 10: Summary of environmental safeguards.

Environmental Component	Proposed Safeguards

Physical and Chemical Impacts	• IMBA standards for sustainable trails would be followed at all times.
	• The Contractor is to develop and implement an Erosion and Sediment Control Plan (ESCP) that is to form part of the Environmental Management Plan. The ESCP is to comply with relevant legislation, i.e. it is to include appropriate controls to ensure that sediment is appropriately managed and will not pollute any waterways or bogs.
	• Sediment controls will be installed by the Contractor around stockpiles and on the track prior to the commencement of any construction activities that will create soil disturbance. A variety of sediment interception measures are to be installed down slope from disturbed areas, depending on the location, erosion risk and flow interception needs. Techniques may include:
	  • Weed-free rice straw bales. These may be used mainly around stockpiles of gravel and topsoil at major stockpile sites.
	  • Sediment filtration fences, mostly used at stockpile and platform sites.
	  • Coir logs. These will be used on areas to capture topsoil and as temporary measures across and alongside the track to capture fine sediment that may flow from the newly laid track surface.
	• Logs and other natural material will be placed on rehabilitated areas across the flowpath to slow and disperse runoff, in accordance with the rehabilitation plan.
	• Sediment controls will be inspected daily during construction by the Contractor and any necessary repairs or upgrades made. Sediment will be removed as necessary and either used on Site as fill or disposed of appropriately.
	• Inspection and maintenance of sediment controls will continue until rehabilitation works have become stable and self-sustainable. Where possible, all foot traffic and light vehicle movements should be confined to the track including bridges and platforms.
	• The contractor, through site inductions, would make all personnel aware of risks and responsibilities related to spills of fuel, oil and other chemicals that may be required onsite. Machinery and vehicles should be inspected on a daily basis giving particular attention to the condition of hoses and connections.
	• The work team would carry and be fully conversant in the use of a petrochemical spills kit.

Environmental Component	Proposed Safeguards
Biological Impacts	• An immediate pre-clearance survey during construction would be completed by suitably qualified persons to minimise the potential for harm during vegetation clearing. This would generally involve inspections of logs, rocks and leaf litter and fallen timber for frogs, reptiles and mammals. Any fauna found would be moved to adjacent habitat. Where threatened flora is located, the track alignment should be micro-sited to minimize impacts to these plants. If this is not possible. OEH would undertake further assessment. • A pre-clearance survey would be undertaken for the Blue-tongued Greenhood (*Pterostylis oreophila*) during the flowering period between November and January, Leafy Anchor Plant (*Discaria nitida*) in late November to December, the perennial species Hoary Sunray (*Leucochrysum albicans var. tricolor*) prior to summer and for nests of Olive Whistler and Pink Robin. • NPWS would implement weed control measures as recommended in the KNPoM and as outlined within the Track Management Plan. • NPWS would implement a Track Management Plan to ensure regular inspection of the track to ensure that no damage has occurred that could result in increased erosion and sedimentation. This is of particular concern in areas with heavy Wombat use and Deer use, both of which would use the track increasing erosion potential and Wombats are likely to excavate into any banks created. • Any vehicles required for the proposed activity should remain on the track once created. Foot traffic should be minimised outside of the track footprint. • All vehicles and machinery entering the site (prior to reaching the area of the proposal) would be cleaned by high pressure spray ensuring the removal of any potential weed seeds. • Boots of workers and other people entering the site during construction need to be washed or brushed clean. • NPWS would be notified of the locations of any noxious weeds encountered during construction of the proposal. • The Contractor is to develop and implement an Erosion and Sediment Control Plan (ESCP) that is to form part of the Environmental Management Plan. The ESCP is to comply with relevant legislation, i.e. it is to include appropriate controls to ensure that sediment is appropriately managed and will not pollute any waterways or bogs. • Sediment controls will be installed by the Contractor around stockpiles and on the track prior to the commencement of any construction activities that will create soil disturbance. A variety of sediment interception measures are to be installed down slope from disturbed areas, depending on the location, erosion risk and flow interception needs. Techniques may include: • Weed-free rice straw bales. These may be used mainly around stockpiles of gravel and topsoil at major stockpile sites.

Environmental Component	Proposed Safeguards
	• Sediment filtration fences, mostly used at stockpile and platform sites. • Coir logs. These will be used on areas to capture topsoil and as temporary measures across and alongside the track to capture fine sediment that may flow from the newly laid track surface. • Logs and other natural material will be placed on rehabilitated areas across the flowpath to slow and disperse runoff, in accordance with the rehabilitation plan. • Sediment controls will be inspected daily during construction by the Contractor and any necessary repairs or upgrades made. Sediment will be removed as necessary and either used on Site as fill or disposed of appropriately. • Inspection and maintenance of sediment controls will continue until rehabilitation works have become stable and self-sustainable. Where possible, all foot traffic and light vehicle movements should be confined to the track including bridges and platforms. • No excavation greater 1 metre in depth should take place within the dripline of large, significant trees, or hollow-bearing trees (as determined by ground-level inspection). • With the exception of the limbs of two E. stellulata on the northern side of the skitube bridge, no canopy trees or hollow bearing trees would be removed.
Community Impacts	• Consultation with neighbours and appropriate approvals gained for use of private access roads to the site. • Machinery (chainsaws and brushcutters) are not to be placed on the ground where grass is long after use. • No campfires onsite of any kind are permitted during high fire danger periods. Smoking is prohibited and is banned in Kosciuszko NP. • The timeframe of work would be minimised where possible by working between 7am and 6pm to reduce amount of time adjacent landholders are exposed to potential noise pollution. • The proponent will include appropriate measures in the conditions of contract for construction to ensure that fire risk is appropriately managed. • Interpretive signs would be placed at the ends of the track to ensure track users respect the privacy of adjoining landholders. • Further consultation should occur with landholders to ensure that they will be accepting of access through their private property for potential emergencies.
Natural Resource Impacts	• NPWS would implement a Weed Management Plan as a section of the Track Management Plan. • Cleared vegetation will need to be stockpiled within the cleared corridor. It will then be stockpiled to the edge of the corridor for track construction to occur. A time limit of seven days will apply for which the cleared vegetation can be stockpiled on living vegetation to the side of the track. Prior to the seven day period expiring, the stockpiled vegetation must

Environmental Component	Proposed Safeguards
	either be used for rehabilitation of disturbed soils, or strategically dispersed throughout the areas on each side of the track. Dispersing of materials must avoid all potential flood zones, bogs or other waterways and must not be placed on any shrubs or wood growth. • Potential offsetting of impacts to biodiversity as a result of the proposal could include vegetation rehabilitation, weed control and feral animal control.
Aboriginal Cultural Heritage Impacts	• NPWS would implement any mitigation measures as described in the Aboriginal Cultural Heritage Assessment Report. This includes the requirement for an Aboriginal Heritage Impact Permit (AHIP) for the upgrading of the Pallaibo Track section.
Other Cultural Heritage Impacts	• Interpretive signage should be installed at 'Collins Hut' and NPWS personnel should complete a risk assessment and implement any appropriate measures to reduce risks of the item collapsing on visitors. • Personnel should be conversant in identifying potential historic heritage items in case they are discovered during the proposal to enable direct impacts to be avoided.

8 SUMMARY OF IMPACTS

This section of the REF summaries the impacts identified and considers the cumulative impacts of the works in accordance with OEH guidelines. It considers the document "Is an EIS required", best practice guidelines for Part 5 of the EP&A Act, and assists in deciding whether proposal are likely to have significant environmental impacts. **Table 11** summarises the impacts and considers the cumulative impacts of the works based on the classification of individual impacts as negligible, low, medium or high, negative or positive.

Table 11: Summary of the significance of impacts associated with the proposal.

Category of Impact	Significance of impacts		
	Extent of impact	**Nature of impact**	**Environmentally sensitive features**
Physical and Chemical	Low (-)	Low (-)	Low (-)
Biological	Low (-)	Low (-)	Low (-)
Community	Medium (+)	Medium (+)	N/A
Natural Resources	Low (-)	Low (-)	Low (-)
Cultural Heritage	Negligible (-) (provided AHIP sought by NPWS)	Negligible (-) (provided AHIP sought by NPWS and avoidance	Negligible (-) (provided AHIP sought by NPWS
Works as a whole	Negligible to Low negative impact	Negligible to Low negative impact	Negligible to Low negative impact

Based on the summary present in **Table 11**, an Environmental Impact Statement (EIS) is not required. This REF includes a range of impact amelioration measures designed specifically to mitigate any adverse effect of the proposal on threatened biota. This REF assumes that the amelioration measures detailed would be fully implemented should the proposal be approved.

8.1 CLAUSE 228 CHECKLIST

In addition to the requirements of the *Is an EIS required?* guideline, the following factors, listed in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000*, have also been considered to assess the likely impacts of the proposal on the natural and built environment (**Table 12**).

Table 12: Clause 228 Checklist.

CLAUSE 228 CHECKLIST		IMPACT
a	**any environmental impact on a community**	

CLAUSE 228 CHECKLIST		IMPACT
The proposal will result in the removal of 4.016 hectares of native vegetation (about 3.676 ha TEC).		Low negative impact.
b	**any transformation of a locality**	
Visibly, the clearing works will impact, however, the remainder of the locality will remain unchanged, there are residential areas in the vicinity however impact would be minimal.		Negligible negative impact.
c	**any environmental impact on the ecosystems of the locality**	
There will be a loss of 4.016 hectares of native vegetation. Safeguards detailed in this REF have been developed to minimise direct and indirect impacts.		Low negative impact.
d	**any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality**	
The proposal would impact 4.016 hectares of native vegetation. Impact to aesthetic for existing dwellings in the locality would be negligible. Some positive impact for recreational and scientific (in terms of access).		Negligible negative effect.
e	**any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations**	
Aboriginal Cultural Heritage Assessment has identified some aboriginal objects. An AHIP would be required for a portion of the proposed works.		Negligible negative effect
f	**any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)**	
Threatened fauna species were recorded within the study area. Impact would be minimal.		Low negative effect
g	**any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air**	
There will be a loss of 4.106 hectares of native vegetation. Safeguards detailed in this REF have been developed to minimise direct and indirect impacts.		Negligible negative effect
h	**any long-term effects on the environment**	
There will be a loss of 4.106 hectares of native vegetation. Safeguards detailed in this REF have been developed to minimise direct and indirect impacts.		Low negative effect
i	**any degradation of the quality of the environment**	

CLAUSE 228 CHECKLIST		IMPACT
The proposal would have a low impact on the quality of the environment.		Medium negative effect
j	**any risk to the safety of the environment**	
There will likely be some chemicals or fuel used on site during the works however, given the safety measures in place, it is unlikely that there will be a risk to the environment.		Minor short term negative.
k	**any reduction in the range of beneficial uses of the environment**	
The usability of the study area for recreational use will be increased.		Long term positive
l	**any pollution of the environment**	
There is the potential for pollution of the environment however mitigation measures described in Section 7 would mitigate this potential impact.		Minor short term negative
m	**any environmental problems associated with the disposal of waste**	
Waste generated on the site, general, chemical or vegetative, will be disposed of in an appropriate manner and where relevant will follow the guidelines for the disposal of waste in accordance with the EPA approved methods.		Nil Mitigation measures implemented to address any potential impacts.
n	**any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply**	
The proposal would not increase demands on resources in short supply.		Nil
o	**any cumulative environmental effect with other existing or likely future activities**	
The overall objective of the proposal is to produce a positive outcome for the local community in terms of fire protection. No negative cumulative impacts are anticipated and the mitigation measures included in this REF reduce any potential impact.		Nil
p	**any impact on coastal processes and coastal hazards, including those under projected climate change conditions**	
This proposal are unlikely to impact on coastal process and coastal hazards.		Nil

9 CONCLUSION

This REF has been completed under Part 5 of the EP&A Act, and describes the level of impact that the proposal may have. This REF addresses the duty of OEH in respect to considering the environmental impact of the proposal under section 111 of the *EP&A Act* and section 228 of the *Environmental Planning and Assessment Regulation* 2000.

In conclusion, this REF provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible, all of the factors listed in Clause 228 of the *Environmental Planning and Assessment Regulation* 2000.

The potential impacts of the proposal identified within the REF can be mitigated through appropriate safeguards to reduce these to acceptable levels. A detailed assessment of the anticipated direct and indirect impacts in accordance with s5A of the EP&A Act, the TSC Act and EPBC Act has been undertaken in this REF. A range of impact amelioration measures designed specifically to mitigate any adverse effect of the proposal on threatened biota are also included. This REF assumes that the amelioration measures detailed would be fully implemented should the proposal be approved.

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B. Sc (Environmental)

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