succession ecology

Native Vegetation Clearance

Horrocks Highway (Sevenhill-Penwortham OTL)

(VSN: 2022/059)

Data Report

Clearance under the *Native Vegetation Regulations 2017*

31/01/2023

Prepared by Abhishek Gopalakrishnan, Lucy Wood & Briony Horner

Table of contents

1. Application information

1.1 Application details

Applicant:	Department of Infrastructure and Transport (DIT)		
Key contact:	Melissa Salt (TONKIN)		
Landowner:	Multiple (Government and private)		
Site Address:	Horrocks Highway between Penwortham and Sevenhill		
Local Government Area:	Clare and Gilberts Valley Council	**Hundred:**	Clare

1.2 Summary of proposed clearance

Purpose of clearance	The Department of Infrastructure and Transport (DIT) proposes to construct a new overtaking lane (OTL) on the Horrocks Highway between Penwortham and Sevenhill. This section of Horrocks Highway experiences heavy traffic and the addition of OTLs will improve road safety.
Native Vegetation Regulation	Regulation 12, Schedule 1, clause 34, Infrastructure
Description of the vegetation under application	This application includes seven vegetation associations along the roadside corridors: Site 1 (VA1): *Eucalyptus* woodland with *Acacia pycnantha* and a weedy understorey. Site 2 (VA2): Open *Eucalyptus* woodland with *Melaleuca acuminata*, *Acacia pycnantha* and native grasses (*Austrostipa* and *Rytidosperma*) in the understorey. Site 3 (VA3): *Eucalyptus* open woodland with *Allocasuarina verticillata* and *Acacia pycnantha*, along with native grasses and weeds in the understorey. Site 4 (VA4): *Eucalyptus leucoxylon ssp. pruinosa* open woodland. Site 5 (VA5): Heavily degraded woodland with *Acacia pycnantha* regeneration and *Exocarpos cupressiformis*. Site 6 (VA6): Very degraded woodland with native plantings and weedy understorey. Site 7 (VA7): *Eucalyptus* open woodland with *Acacia pycnantha* with mistletoe growth.
Total proposed clearance - area (ha) and number of trees	The proposed clearance is 1.8555 ha, with seven vegetation associations, 23 scattered trees and clusters (removal and pruning impacts).
Level of clearance	Level 4

Overlay (Planning and Design Code)	N/A
Mitigation hierarchy	Construction of this OTL is necessary to improve safety. The site is constrained by two small townships separated by approximately 2km requiring the overtaking lane to take up the entire section of road between these towns. Alternative locations were considered to the north and south of these townships, but no feasible options were identified which would avoid native vegetation clearance. A range of design options have been considered with the final design reducing impacts to trees by 38 trees. To achieve this, the design incorporated a range of additional measures such as steepening of batters, underground SAPN lines (in some instances), minimizing median widths and tapers, including guardrails, and widening to the east and west sides rather than just one side of the road. The Contractor will also prepare and implement a Construction Environmental Management Plan to minimize impacts to the surrounding environment including retained vegetation. Furthermore, opportunities to revegetate land will be investigated with surrounding property owners. The clearance should not significantly reduce the availability of habitat resources for species with the area containing many large Eucalyptus plants and patches of remnant vegetation.
SEB Offset proposal	A payment into the fund of $84,500.02, and an admin fee of $4,514.09

2. Purpose of clearance

2.1 Description

The Department of Infrastructure and Transport (DIT) is proposing the construction of a new overtaking lane (OTL) on Horrocks Highway between Penwortham and Sevenhill. The OTL will improve road safety by providing safe overtaking opportunities both inbound and outbound. The OTL is proposed to be 3 km long and will require clearance of native vegetation along both sides of the road.

2.2 Background

Horrocks Highway is a major arterial road connecting Adelaide's northern rural areas to South Australia's mid-north. Construction of this OTL is necessary to improve safety. The site is constrained by two small townships separated by approximately 2km requiring the overtaking lane to take up the entire section of road between these towns. Surrounding land uses include agriculture (livestock and cropping), horticulture and rural residential.

The major constraints of this site are:

- Native Vegetation – A line of roadside remnant vegetation generally located in the road reserve to the east side of the Horrocks Highway.
- Acquisition / potential noise impact – House "8065 Horrocks Hwy" impacts where widening may occur on the western side.

Alternative locations were considered to the north and south of these townships, but no feasible options were identified which would avoid native vegetation clearance.

2.3 General location map

The road safety upgrade sites occur within the Clare and Gilbert Regional Council along the Horrocks Highway between Penwortham and Sevenhill. The 3 km stretch planned for the OTL starts approximately 800 meters south of Sevenhill (Figure 1).

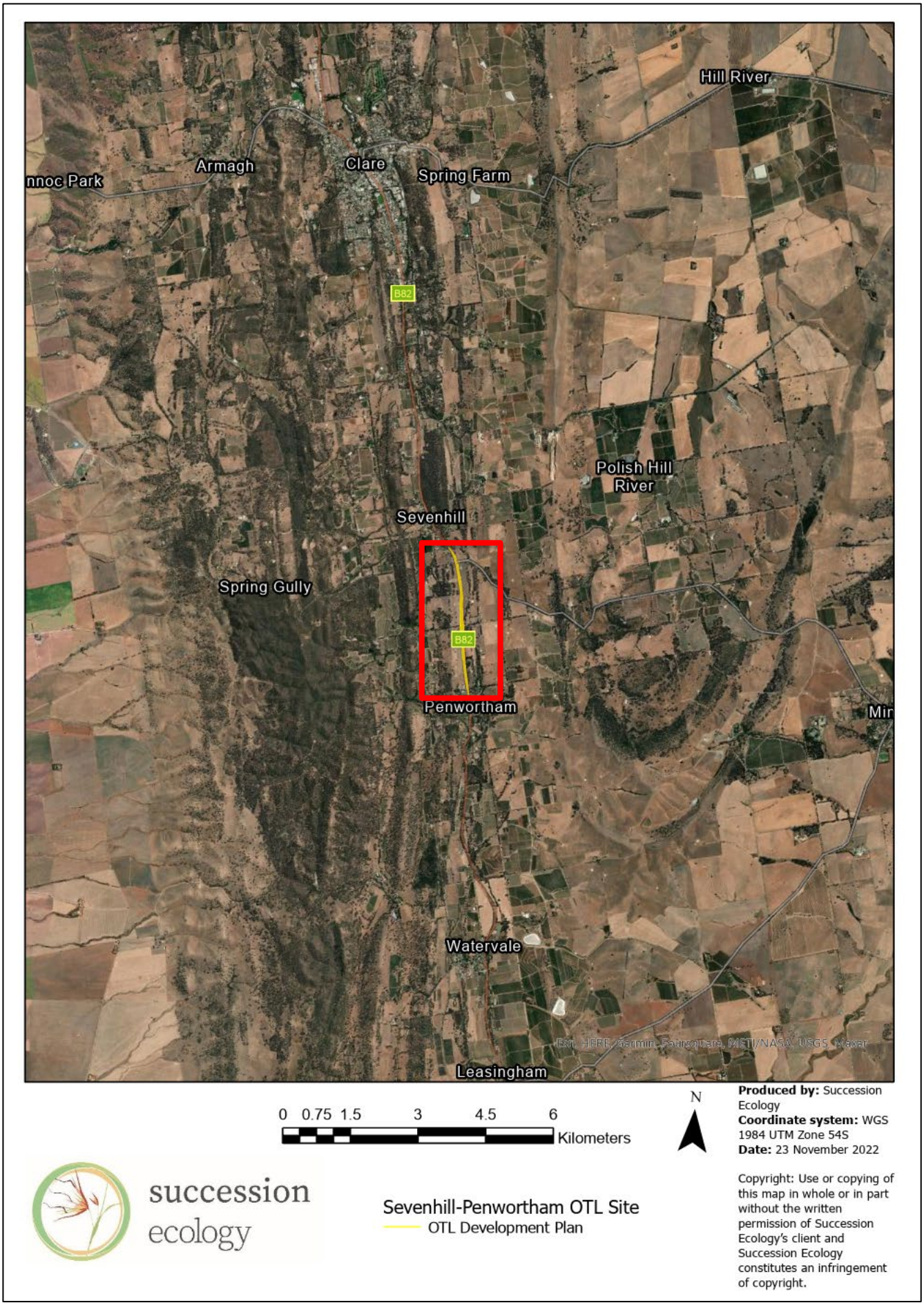

Figure 1: Map of Horrocks highway site location.

succession ecology

0 0.03 0.05 0.1 0.15 0.2 Kilometers

N

VA1
VA2
VA3
VA4
VA5
VA6
VA7
Individual Scattered Trees
Scattered Tree Cluster

Produced by: Succession Ecology
Coordinate system:
Date:

succession ecology

0 0.03 0.05 0.1 0.15 0.2 Kilometers

N

VA1
VA2
VA3
VA4
VA5
VA6
VA7
Individual Scattered Trees
Scattered Tree Cluster

Produced by: Succession Ecology
Coordinate system:
Date:

Copyright: Use or copying of this map in whole or in part without the written permission of Succession Ecology's client and Succession Ecology constitutes an infringement of copyright.

succession ecology

Kilometers
0 0.03 0.05 0.1 0.15 0.2

N

VA1
VA2
VA3
VA4
VA5
VA6
VA7
Individual Scattered Trees
Scattered Tree Cluster

Produced by: Succession Ecology
Coordinate system:
Date:

succession ecology

Kilometers
0 0.03 0.05 0.1 0.15 0.2

N

VA1
VA2
VA3
VA4
VA5
VA6
VA7
Individual Scattered Trees
Scattered Tree Cluster

Produced by: Succession Ecology
Coordinate system:
Date:

Copyright: Use or copying of this map in whole or in part without the written permission of Succession Ecology's client and Succession Ecology constitutes an infringement of copyright.

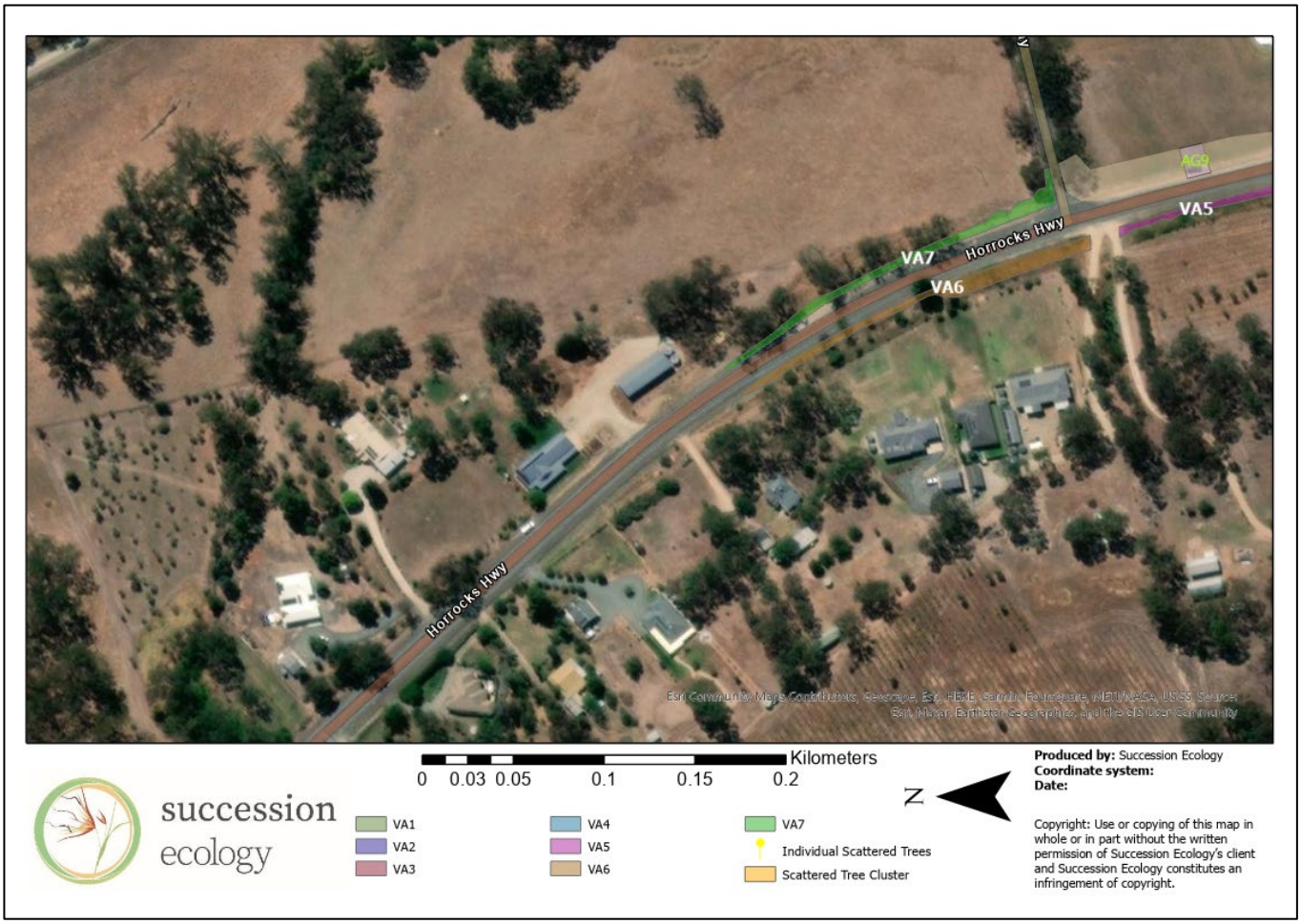

Figure 2: Map of the proposed impact area for OTL construction along the Horrocks Highway between Sevenhill and Penwortham.

2.4 Details of the proposal

This project involves impacts on both sides of the road with native vegetation patches and scattered trees on both sides. The southbound lane will involve conventional widening (left-hand side of the road – west side in this case) as the widening can be achieved simply by "extension of crossfall" thus retaining the existing pavement surface levels. This is the least expensive option for an overtaking lane.

Widening on the right-hand side of the road (east side in this case) results in the crown of the road being located in the wrong position (in the middle of the southbound lanes) and will therefore require corrective treatments to the surface levels (road overlay) to realign the crown of the road to the new centre of the road. Therefore, generally this would be avoided due to additional project costs unless there were geometric or environmental reasons to justify the additional costs.

Vegetation clearance on both sides of the road will allow for the additional land width and batters. Further clearance will facilitate the relocation and ongoing maintenance of the South Australian Power Networks (SAPN) overhead transmission line. The project also includes the upgrade of Jolly Way intersection at the northern extent of the OTL. Extensive sections of w-beam guard rails have been included in the design on the eastern side of the road to reduce batter impacts on native vegetation and property acquisition.

Four (4) Concept Options were developed:

- Option 1 – full length lane widened on alternating sides of road full length lane (avoided house acquisition on the west side and trees to the east side, although it is acknowledged that to avoid the house has resulted in a section of tree removals on the east side of road).
- Option 2 - full length lane widened on the west side only (avoided trees but not the house and impacts most of the SAPN poles).

- Option 3 – full length lane widened on the east side only (avoided the house and SAPN impacts but required extensive native tree removals).
- Option 4 – a version of Option 1 but shortened overtaking lane (this option ultimately did not conform to the length or merging sight line requirements).

Option 1 was taken to final design as it negated demolition of a house and minimised the vegetation impacts as far as practicable. Following this, there have been extensive sections of new safety barrier proposed for installation in the latest design, in lieu of moderately sloping batters that would otherwise require tree removals. This design option has resulted in the retention of 38 native trees.

In addition, later in the design, SAPN power line realignment design (generally on SAPN poles) has had a section of undergrounding to reduce impacts to native trees located around Willow Glen Road. This has resulted in the retention of 2 native trees. (Refer to the attachment, at Willowglen Road SAPN has undergrounded between poles 5 – 7).

2.5 Design

The design is currently in the final stage and is not expected to change (Figure 2). Any changes will be supplied.

2.6 Approvals required or obtained

Approval to clear amenity vegetation will be sought through DIT under their Vegetation Impact Assessment Guideline (DIT 2021). No other approvals with regards to native vegetation clearance are required.

2.7 Native vegetation regulation

The proposed clearance will be assessed under Regulation 12, Schedule 1, clause 34, Infrastructure.

3. Method

3.1 Flora assessment

3.1.1 Desktop assessment

Database searches were used to determine the range of threatened flora species and ecological communities, protected under the *Environment Protection and Biodiversity Conservation* (*EPBC*) *Act 1999* and *National Parks and Wildlife (NPW) Act 1972*, that are likely to occur in the area within a 5 km buffer. The search tools used include:

- A Protected Matters Search to identify matters of national significance under the *EPBC Act 1999,* including threatened species and ecological communities.
- A Biological Database of South Australia (BDBSA) search using NatureMaps and Atlas of Living Australia (ALA) to determine flora species recorded within a 5 km radius of the site and species listen under the *NPW ACT 1972*.
- Appendices in the NVC Bushland and Scattered Tree Assessment Manuals to determine scattered trees species that provide suitable habitat for threatened fauna and threatened Ecosystems protected under *NPW Act 1972*.
- DEH (in progress) unpublished and provisional list of Threatened Ecosystems to identify threatened and rare ecosystems.

Vegetation types were assessed using satellite imagery and vegetation community data obtained through NatureMaps. All maps were generated using ArcGIS Pro.

3.1.2 Field survey

Vegetation surveys were conducted across February 2020, August and November 2022 to support changes in design. Vegetation was surveyed using the Bushland (<0.5 ha) and Scattered Trees Assessment Methodologies.

3.2 Fauna assessment

3.2.1 Desktop assessment

A Desktop Assessment was used to determine the range of fauna species that are likely to occur in the area (5 km buffer) and determine whether any threatened fauna may be present. Search tools included:

- A Protected Matters search to identify matters of national significance under the *EPBC Act 1999*, including threatened species.
- A BDBSA search using NatureMaps and ALA to determine fauna species recorded within 5 km radius of the site and species listed under the *NPW Act 1972*.

3.2.2 Field survey

The fauna assessment conducted for this project was an opportunistic observation-based survey and was conducted to identify any fauna species using this vegetation as habitat. Opportunistic observations included incidental records of non-target species observed while conducting the specified survey technique, or while walking to or from a survey site.

4. Assessment outcomes

4.1 Vegetation assessment

4.1.1 General description of the vegetation, the site and matters of significance.

The site is a linear corridor of road-side vegetation along Horrocks Highway, between Penwortham and Sevenhill. Patches of clearance along this corridor include *Eucalyptus leucoxylon* open woodland with scattered *Allocasuarina verticillata* and *Acacia pycnantha* and low *Acacia pycnantha* woodland. The vegetation associations are in poor condition, with limited biodiversity in comparison to the benchmark community. Scattered trees include *Eucalyptus leucoxylon, Allocasuarina verticillata* and *Acacia pycnantha*. They are in varying conditions, with 0-50% dieback. Weeds are present across the site, with declared weeds present in each Vegetation Association.

There are many remnant patches occurring within a 5km radius of the site, as well as NPWSA Reserves: Spring Gully Conservation Park (3km) and Martindale Hall Conservation Park (10km).

4.1.2 Details of the vegetation associations and scattered trees proposed to be impacted

Vegetation Association	**VA1: *Eucalyptus* woodland with *Acacia pycnantha* and a weedy understorey**

Figure 3: Bushland Assessment area (VA1 – green polygon) on the eastern side of Horrocks Highway, north of Penwortham. The areas impacted by the works are marked by the white lines.

Vegetation Association	VA1: *Eucalyptus* woodland with *Acacia pycnantha* and a weedy understorey

Figure 4: Image of VA1 on the inbound side of the Horrocks Highway, taken facing South.

Figure 5: (LEFT) Acacia pycnantha (Golden Wattle) and (RIGHT) weedy undergrowth with declared species such as Broom (Genista monspessulana) observed on site VA1.

Vegetation Association	**VA1: *Eucalyptus* woodland with *Acacia pycnantha* and a weedy understorey**				
General description	*Eucalyptus leucoxylon* was the dominant species with *Acacia pycnantha* in the mid-storey. There was little native understorey, while a high diversity and density of weed species was present. These included declared species such as *Pinus halepensis*, *Olea europaea* and *Fraxinus angustifolia*.				
Threatened species or community	Threatened Ecological Communities This vegetation association is not classified as a threatened ecological community. Threatened Fauna A 5 km NatureMaps search of the block showed eleven threatened fauna species as being recorded within the area since 1995. This included one species which is listed as Endangered under the *NPW Act 1972* (Pygmy Bluetongue Lizard), two listed as Vulnerable (Little Eagle and Flame Robin) and eight as Rare (Brown Toadlet, White-winged Chough, Peregrine Falcon, Eastern Shriketit, Blue-billed Duck, Painted Buttonquail, Scarlet Robin, and Common Brushtail Possum). The Pygmy Bluetongue Lizard is also protected under the *EPBC Act 1999,* listed as Endangered. A 5 km Protected Matters search further identified one threatened fauna species protected under the *EPBC Act 1999* as being known, or having habitat known to occur within the area. This species is the Australian Painted Snipe (listed as Endangered). Threatened Flora Nineteen threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. These include eleven species listed as Rare, four as Vulnerable, three as Endangered and one as Critically Endangered. The White-beauty Spider Orchid, the Inland Green-comb Spider Orchid and Osborn's Eyebright are also protected under the *EPBC Act 1999*, listed as Endangered, along with the Pale-leek Orchid, which is listed as Vulnerable. One additional EPBC-listed flora species (Silver Daisy-bush), listed as Vulnerable was identified from NatureMaps or PMST searches.				
Landscape context score	1.19	**Vegetation Condition Score**	15.94	**Conservation significance score**	1.10
Unit biodiversity Score	20.86	**Area (ha)**	0.2498	**Total biodiversity Score**	5.21

Vegetation Association	**VA2: Open *Eucalyptus* woodland with *Melaleuca acuminata*, *Acacia pycnantha* and native grasses (*Austrostipa* and *Rytidosperma*)**

Figure 6: Bushland Assessment area (VA2) on the eastern side of Horrocks Highway, north of Penwortham. The areas impacted by the works are marked by the white lines.

Figure 7: Site image of VA2 on the outbound side of Horrocks Highway. Image was taken facing North.

Vegetation Association	**VA2: Open *Eucalyptus* woodland with *Melaleuca acuminata*, *Acacia pycnantha* and native grasses (*Austrostipa* and *Rytidosperma*)**
	 *Figure 8: Declared weed species Olea europaea (Olive)*
General description	*Eucalyptus leucoxylon* is the dominant upperstorey species with *Acacia pycnantha* in the midstorey. There is limited native understorey with some *Austrostipa sp.* and *Rytidosperma sp.* A high diversity of weed species occur in each strata including declared weeds *Olea europaea* and *Rosa canina*. The vegetation is in poor condition, with native plants representing less than 10% of the benchmark community. No regeneration was observed, and there was low amount of canopy cover, tree hollows and fallen timber.
Threatened species or community	<u>Threatened Ecological Communities</u> This vegetation association is not classified as a threatened ecological community. <u>Threatened Fauna</u> A 5 km NatureMaps search of the block showed eleven threatened fauna species as being recorded within the area since 1995. This included one species which is listed as Endangered under the *NPW Act 1972* (Pygmy Bluetongue Lizard), two listed as Vulnerable (Little Eagle and Flame Robin) and eight as Rare (Brown Toadlet, White-winged Chough, Peregrine Falcon, Eastern Shriketit, Blue-billed Duck, Painted Buttonquail, Scarlet Robin, and Common Brushtail Possum). The Pygmy Bluetongue Lizard is also protected under the *EPBC Act 1999,* listed as Endangered. A 5 km Protected Matters search further identified one threatened fauna species protected under the *EPBC Act 1999* as being known, or having habitat known to occur within the area. This species is the Australian Painted Snipe (listed as Endangered).

Vegetation Association	**VA2: Open *Eucalyptus* woodland with *Melaleuca acuminata*, *Acacia pycnantha* and native grasses (*Austrostipa* and *Rytidosperma*)**				
	Threatened Flora Nineteen threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. These include eleven species listed as Rare, four as Vulnerable, three as Endangered and one as Critically Endangered. The White-beauty Spider Orchid, the Inland Green-comb Spider Orchid and Osborn's Eyebright are also protected under the *EPBC Act 1999*, listed as Endangered, along with the Pale-leek Orchid, which is listed as Vulnerable. One additional EPBC-listed flora species (Silver Daisy-bush), listed as Vulnerable was identified from NatureMaps or PMST searches.				
Landscape context score	1.13	**Vegetation Condition Score**	8.61	**Conservation significance score**	1.10
Unit biodiversity Score	10.70	**Area (ha)**	0.2483	**Total biodiversity Score**	2.66

Vegetation Association	VA3: *Eucalyptus* open woodland with *Allocasuarina verticillata* and *Acacia pycnantha*

Figure 9: Bushland Assessment area (VA3) on the eastern side of Horrocks Highway, south of Sevenhill. The areas impacted by the works are marked by the white lines.

Figure 10: Site image of VA3 on the inbound side of the Horrocks Highway. Image was taken facing South.

Vegetation Association	**VA3: *Eucalyptus* open woodland with *Allocasuarina verticillata* and *Acacia pycnantha***  *Figure 11: Densely packed Eucalyptus leucoxylon with mostly weedy understorey.*
General description	*Eucalyptus leucoxylon ssp. pruinosa* was the dominant species in the upperstorey with scattered *Allocasuarina verticillata* and *Acacia pycnantha* in the mid-storey. Native understorey was spare, with Austrostipa sp. being the only species being observed. The vegetation in fair condition, with few tree hollows and moderate canopy cover. There is a high density of weed understorey biomass, with native plant diversity only covering 31-40% of the benchmark community.
Threatened species or community	<u>Threatened Ecological Communities</u> This vegetation association is not classified as a threatened ecological community. <u>Threatened Fauna</u> A 5 km NatureMaps search of the block showed eleven threatened fauna species as being recorded within the area since 1995. This included one species which is listed as Endangered under the *NPW Act 1972* (Pygmy Bluetongue Lizard), two listed as Vulnerable (Little Eagle and Flame Robin) and eight as Rare (Brown Toadlet, White-winged Chough, Peregrine Falcon, Eastern Shriketit, Blue-billed Duck, Painted Buttonquail, Scarlet Robin, and Common Brushtail Possum). The Pygmy Bluetongue Lizard is also protected under the *EPBC Act 1999,* listed as Endangered. A 5 km Protected Matters search further identified one threatened fauna species protected under the *EPBC Act 1999* as being known, or having habitat known to occur within the area. This species is the Australian Painted Snipe (listed as Endangered). <u>Threatened Flora</u>

Vegetation Association	**VA3: *Eucalyptus* open woodland with *Allocasuarina verticillata* and *Acacia pycnantha***				
	Nineteen threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. These include eleven species listed as Rare, four as Vulnerable, three as Endangered and one as Critically Endangered. The White-beauty Spider Orchid, the Inland Green-comb Spider Orchid and Osborn's Eyebright are also protected under the *EPBC Act 1999*, listed as Endangered, along with the Pale-leek Orchid, which is listed as Vulnerable. One additional EPBC-listed flora species (Silver Daisy-bush), listed as Vulnerable was identified from NatureMaps or PMST searches.				
Landscape context score	1.19	**Vegetation Condition Score**	22.44	**Conservation significance score**	1.10
Unit biodiversity Score	29.38	**Area (ha)**	0.6057	**Total biodiversity Score**	17.79

Vegetation Association	VA4: *Eucalyptus leucoxylon ssp. pruinosa* open woodland

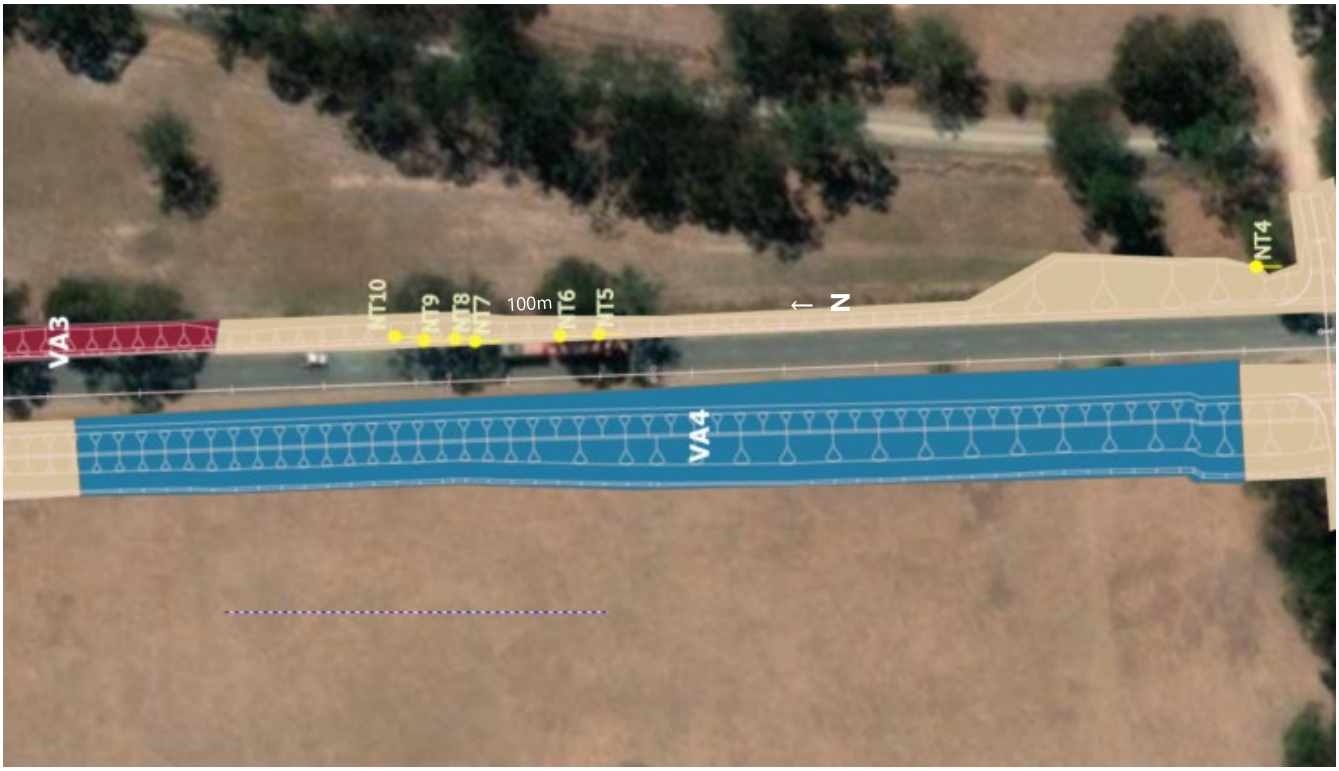

Figure 12: Bushland Assessment area (VA4) on the western side of Horrocks Highway, south of Sevenhill. The areas impacted by the works are marked by the white lines.

Figure 13: Images of VA4 facing North.

Vegetation Association	**VA4: *Eucalyptus leucoxylon ssp. pruinosa* open woodland**

Figure 14: Prunus sp. and Eucalyptus leucoxylon ssp. pruinosa on site VA4.

General description	*Eucalyptus leucoxylon* is the dominant species in the upperstorey with scattered *Allocasuarina verticillata*. The mid-storey consists of *Acacia pycnantha* and *Melaleuca acuminata*. Native understorey is spare, with the only species being *Austrostipa sp.* and *Rytidosperma sp.* This vegetation is in moderate-low condition. There is a high biomass of exotic understorey species, no tree hollows and little tree canopy cover. Native plant species diversity is 41-50% of the benchmark community.
Threatened species or community	Threatened Ecological Communities This vegetation association is not classified as a threatened ecological community. Threatened Fauna A 5 km NatureMaps search of the block showed eleven threatened fauna species as being recorded within the area since 1995. This included one species which is listed as Endangered under the *NPW Act 1972* (Pygmy Bluetongue Lizard), two listed as Vulnerable (Little Eagle and Flame Robin) and eight as Rare (Brown Toadlet, White-winged Chough, Peregrine Falcon, Eastern Shriketit, Blue-billed Duck, Painted Buttonquail, Scarlet Robin, and Common Brushtail Possum). The Pygmy Bluetongue Lizard is also protected under the *EPBC Act 1999,* listed as Endangered. A 5 km Protected Matters search further identified one threatened fauna species protected under the *EPBC Act 1999* as being known, or having habitat known to occur within the area. This species is the Australian Painted Snipe (listed as Endangered).

Vegetation Association	**VA4: *Eucalyptus leucoxylon ssp. pruinosa* open woodland**				
	Threatened Flora Nineteen threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. These include eleven species listed as Rare, four as Vulnerable, three as Endangered and one as Critically Endangered. The White-beauty Spider Orchid, the Inland Green-comb Spider Orchid and Osborn's Eyebright are also protected under the *EPBC Act 1999*, listed as Endangered, along with the Pale-leek Orchid, which is listed as Vulnerable. One additional EPBC-listed flora species (Silver Daisy-bush), listed as Vulnerable was identified from NatureMaps or PMST searches.				
Landscape context score	1.13	**Vegetation Condition Score**	15.19	**Conservation significance score**	1.10
Unit biodiversity Score	18.88	**Area (ha)**	0.5389	**Total biodiversity Score**	10.18

Vegetation Association	VA5: Heavily degraded woodland with Acacia pycnantha regeneration and Exocarpos cuppressiformis

Figure 15: Bushland Assessment area (VA5) on the western side of Horrocks Highway, south of Sevenhill. The areas impacted by the works are marked by the white lines.

Figure 16: Site image of VA5 showing Acacia pycnantha (Golden Wattle) and the weedy understorey. Image was taking facing west.

Vegetation Association	**VA5: Heavily degraded woodland with Acacia pycnantha regeneration and Exocarpos cuppressiformis**				
General description	The Golden Wattle (*Acacia pycnantha*) and Exocarpos cuppressiformis were the dominant species in the mid and upperstorey, while the understorey was dominated by exotic grasses such as *Trifolium arvense*, *Bromus diandrus* and *Avena fatua*. There was also presence of high densities of declared weed species such as *Fraxinus angustifolia* and *Rosa canina* in the vegetation.				
Threatened species or community	Threatened Ecological Communities This vegetation association is not classified as a threatened ecological community. Threatened Fauna A 5 km NatureMaps search of the block showed eleven threatened fauna species as being recorded within the area since 1995. This included one species which is listed as Endangered under the *NPW Act 1972* (Pygmy Bluetongue Lizard), two listed as Vulnerable (Little Eagle and Flame Robin) and eight as Rare (Brown Toadlet, White-winged Chough, Peregrine Falcon, Eastern Shriketit, Blue-billed Duck, Painted Buttonquail, Scarlet Robin, and Common Brushtail Possum). The Pygmy Bluetongue Lizard is also protected under the *EPBC Act 1999,* listed as Endangered. A 5 km Protected Matters search further identified one threatened fauna species protected under the *EPBC Act 1999* as being known, or having habitat known to occur within the area. This species is the Australian Painted Snipe (listed as Endangered). Threatened Flora Nineteen threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. These include eleven species listed as Rare, four as Vulnerable, three as Endangered and one as Critically Endangered. The White-beauty Spider Orchid, the Inland Green-comb Spider Orchid and Osborn's Eyebright are also protected under the *EPBC Act 1999*, listed as Endangered, along with the Pale-leek Orchid, which is listed as Vulnerable. One additional EPBC-listed flora species (Silver Daisy-bush), listed as Vulnerable was identified from NatureMaps or PMST searches.				
Landscape context score	1.19	**Vegetation Condition Score**	2.93	**Conservation significance score**	1.10
Unit biodiversity Score	3.83	**Area (ha)**	0.0586	**Total biodiversity Score**	0.22

Vegetation Association	VA6: Very degraded woodland with native plantings and weedy understorey

Figure 17: Bushland Assessment area (VA6) on the western side of Horrocks Highway, south of Sevenhill. The areas impacted by the works are marked by the white lines.

Figure 18: Site image of VA6 showing Acacia pycnantha regeneration. Image was taken facing West.

General description	*Acacia pycnantha* (Golden Wattle), is the dominant upperstorey species. The understorey is dominated by exotic grasses and other weed species with *only* scattered native grasses (*Rytidosperma sp., Austrostipa sp.)* and *Dianella revoluta*. The vegetation is in poor condition, with only 5-10% native plant species diversity in comparison to the benchmark community. No regeneration was present, and a low number of hollows, mature trees, and canopy cover. Declared weeds are present at this site.

Vegetation Association	**VA6: Very degraded woodland with native plantings and weedy understorey**				
Threatened species or community	Threatened Ecological Communities This vegetation association is not classified as a threatened ecological community. Threatened Fauna A 5 km NatureMaps search of the block showed eleven threatened fauna species as being recorded within the area since 1995. This included one species which is listed as Endangered under the *NPW Act 1972* (Pygmy Bluetongue Lizard), two listed as Vulnerable (Little Eagle and Flame Robin) and eight as Rare (Brown Toadlet, White-winged Chough, Peregrine Falcon, Eastern Shriketit, Blue-billed Duck, Painted Buttonquail, Scarlet Robin, and Common Brushtail Possum). The Pygmy Bluetongue Lizard is also protected under the *EPBC Act 1999,* listed as Endangered. A 5 km Protected Matters search further identified one threatened fauna species protected under the *EPBC Act 1999* as being known, or having habitat known to occur within the area. This species is the Australian Painted Snipe (listed as Endangered). Threatened Flora Nineteen threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. These include eleven species listed as Rare, four as Vulnerable, three as Endangered and one as Critically Endangered. The White-beauty Spider Orchid, the Inland Green-comb Spider Orchid and Osborn's Eyebright are also protected under the *EPBC Act 1999*, listed as Endangered, along with the Pale-leek Orchid, which is listed as Vulnerable. One additional EPBC-listed flora species (Silver Daisy-bush), listed as Vulnerable was identified from NatureMaps or PMST searches.				
Landscape context score	1.19	**Vegetation Condition Score**	5.63	**Conservation significance score**	1.10
Unit biodiversity Score	7.36	**Area (ha)**	0.0846	**Total biodiversity Score**	0.62

Vegetation Association	VA7: *Eucalyptus* open woodland with Acacia pycnantha and some mistletoe growth

Figure 19: Bushland Assessment area (VA7) on the eastern side of Horrocks Highway, south of Sevenhill. The areas impacted by the works are marked by the white lines.

Figure 20: Site image of VA7. Image was taken facing East.

Vegetation Association	**VA7: *Eucalyptus* open woodland with Acacia pycnantha and some mistletoe growth**				
	 *Figure 21: Gazania sp. in VA7.*				
General description	*Eucalyptus leucoxylon ssp. pruinosa* is the dominant upperstorey species with *Acacia pycnantha* regenerating in the mid-storey. The understorey is dominated by weed species, including declared weeds such as *Gazania sp.*, *Fraxinus angustifolia* and *Genista monspessulana*.				
Threatened species or community	Threatened Ecological Communities This vegetation association is not classified as a threatened ecological community. Threatened Fauna A 5 km NatureMaps search of the block showed eleven threatened fauna species as being recorded within the area since 1995. This included one species which is listed as Endangered under the *NPW Act 1972* (Pygmy Bluetongue Lizard), two listed as Vulnerable (Little Eagle and Flame Robin) and eight as Rare (Brown Toadlet, White-winged Chough, Peregrine Falcon, Eastern Shrike-tit, Blue-billed Duck, Painted Buttonquail, Scarlet Robin, and Common Brushtail Possum). The Pygmy Bluetongue Lizard is also protected under the *EPBC Act 1999,* listed as Endangered. A 5 km Protected Matters search further identified one threatened fauna species protected under the *EPBC Act 1999* as being known, or having habitat known to occur within the area. This species is the Australian Painted Snipe (listed as Endangered). Threatened Flora Nineteen threatened flora species have been recorded within 5 km of the site since 1995, as shown by a NatureMaps search. These include eleven species listed as Rare, four as Vulnerable, three as Endangered and one as Critically Endangered. The White-beauty Spider Orchid, the Inland Green-comb Spider Orchid and Osborn's Eyebright are also protected under the *EPBC Act 1999*, listed as Endangered, along with the Pale-leek Orchid, which is listed as Vulnerable. One additional EPBC-listed flora species (Silver Daisy-bush), listed as Vulnerable was identified from NatureMaps or PMST searches.				
Landscape context score	1.19	**Vegetation Condition Score**	12.99	**Conservation significance score**	1.10
Unit biodiversity Score	17.01	**Area (ha)**	0.0696	**Total biodiversity Score**	1.18

Tree(s) 1 (Clump A)	
Eucalyptus camaldulensis	
Number of trees – 10	
Height (m) – 15	
Hollows – 3	
Diameter (cm) – 20	
Canopy dieback (%) – 0	
Total Biodiversity Score – 11.16	

Figure 22: Eucalyptus camaldulensis on the inbound side of the Horrocks highway (photo taken facing North).

These trees are in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding and nesting.

Pruning and root impacts are likely on the side of the tree closest to the site of works.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 2 (NT1)	
Eucalyptus camaldulensis	
Number of trees – 1	
Height (m) – 30	
Hollows – 2	
Diameter (cm) – 60	
Canopy dieback (%) – 0	
Total Biodiversity Score – 7.19	

Figure 23: Eucalyptus camaldulensis on the inbound side of the Horrocks highway (photo taken facing North).

This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

Pruning and root impacts are likely on the side of the tree closest to the site of works.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 3 (NT2)
Eucalyptus camaldulensis
Number of trees – 1
Height (m) – 10
Hollows – 0
Diameter (cm) – 17
Canopy dieback (%) – 0
Total Biodiversity Score – 0.43

Figure 24: Eucalyptus camaldulensis on the inbound side of the Horrocks highway (photo taken facing North).

This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 4 (NT3)	
Eucalyptus leucoxylon ssp. pruinosa	
Number of trees – 1	
Height (m) – 2	
Hollows – 0	
Diameter (cm) – 15	
Canopy dieback (%) – 0	
Total Biodiversity Score – 0.24	

Figure 25: Eucalyptus leucoxylon ssp. pruinosa on the outbound side of the Horrocks highway (photo taken facing South).

This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree(s) 5 (Clump B)	
Acacia pycnantha	
Number of trees – 2	
Height (m) – 3	
Hollows – 0	
Diameter (cm) – 4	
Canopy dieback (%) – 20%	
Total Biodiversity Score – 9.27	

Figure 26: Acacia pycnantha on the outbound side of the Horrocks highway (photo taken facing North).

These trees are in fair condition with one tree is suffering from the breaking of a branch (as seen in the figure above). They provide little habitat due to their size and lack of hollows but may be used for perching and feeding purposes.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 6 (NT4)	
Eucalyptus leucoxylon ssp. leucoxylon	
Number of trees – 1	
Height (m) – 27	
Hollows – 3	
Diameter (cm) – 112	
Canopy dieback (%) – 40	
Total Biodiversity Score – 6.88	*Figure 27: Eucalyptus leucoxylon ssp. leucoxylon* on the inbound side of the Horrocks highway (photo taken facing East).

This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 7 (NT5)	
Eucalyptus leucoxylon ssp. pruinosa	*Figure 28: Eucalyptus leucoxylon ssp. pruinosa* on the inbound side of the Horrocks highway (photo taken facing South).
Number of trees – 1	
Height (m) – 30	
Hollows – 3	
Diameter (cm) – 54	
Canopy dieback (%) – 20	
Total Biodiversity Score – 4.09	

This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 8 (NT6)	
Eucalyptus leucoxylon ssp. pruinosa	
Number of trees – 1 (4 stems)	
Height (m) – 30	
Hollows – 0	
Diameter (cm) – 42	
Canopy dieback (%) – 0%	
Total Biodiversity Score – 0.61	

Figure 29: Eucalyptus leucoxylon ssp. pruinosa on the inbound side of the Horrocks highway (photo taken facing East).

This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 9 (NT7)	
Eucalyptus leucoxylon ssp. pruinosa	
Number of trees – 1 (2 stems)	
Height (m) – 7	
Hollows – 0	
Diameter (cm) – 31	
Canopy dieback (%) – 90%	
Total Biodiversity Score – 4.25	

Figure 30: Eucalyptus leucoxylon ssp. pruinosa on the inbound side of the Horrocks highway (photo taken facing East).

This tree is in poor condition, however, together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 10 (NT8)	
Eucalyptus leucoxylon ssp. pruinosa	
Number of trees – 1 (2 stems)	
Height (m) – 25	
Hollows – 0	
Diameter (cm) – 47	
Canopy dieback (%) – 0%	
Total Biodiversity Score – 4.42	

Figure 31: Eucalyptus leucoxylon ssp. pruinosa on the inbound side of the Horrocks highway (photo taken facing North).

This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 11 (NT9)
Eucalyptus leucoxylon ssp. pruinosa
Number of trees – 1 (2 stems)
Height (m) – 27
Hollows – 0
Diameter (cm) – 52
Canopy dieback (%) – 10%
Total Biodiversity Score – 4.82

Figure 32: Eucalyptus leucoxylon ssp. pruinosa on the inbound side of the Horrocks highway (photo taken facing North).

This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 12 (NT10)	
Eucalyptus leucoxylon ssp. pruinosa	
Number of trees – 1	
Height (m) – 25	
Hollows – 0	
Diameter (cm) – 63	
Canopy dieback (%) – 90%	
Total Biodiversity Score – 0.47	

Figure 33: Eucalyptus leucoxylon ssp. pruinosa on the inbound side of the Horrocks highway (photo taken facing East).

This tree is in poor condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting.

No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.

Tree 13 (NT11)	
Allocasuarina verticillata	*Figure 34: Allocasuarina verticillata* on the outbound side of the Horrocks highway (photo taken facing West).
Number of trees – 1 (3 stems)	
Height (m) – 4	
Hollows – 0	
Diameter (cm) – 20	
Canopy dieback (%) – 0%	
Total Biodiversity Score – 0.69	
This tree is in good condition and together with nearby trees, would provide habitat for mammals, birds, small reptiles, bats, and invertebrates, in the form of shelter, perching/roosting, feeding, and nesting. No Threatened ecological communities were present at the site. Eleven fauna and nineteen flora species listed as threatened under the *NPW Act 1972* have been identified in a 5km radius within the last 25 years.	

Photo log

Photos of the vegetation community and scattered trees are provided in the descriptions above.

4.2 Threatened species assessment

4.2.1 Threatened ecological communities.

No threatened ecological communities were present at this site.

4.2.2 Threatened fauna

A 5 km NatureMaps search of the block showed eleven threatened fauna species as being recorded within the area since 1995. This included one species which is listed as Endangered under the *EPBC Act 1999* (Pygmy Bluetongue Lizard). Species listed under the NPW Act 1972 include two listed as Vulnerable (Little Eagle and Flame Robin) and eight as Rare (Brown Toadlet, White-winged Chough, Peregrine Falcon, Eastern Shrike-tit, Blue-billed Duck, Painted Buttonquail, Scarlet Robin, and Common Brushtail Possum).

A 5 km Protected Matters search further identified one threatened fauna species protected under the *EPBC Act 1999* as being known, or having habitat known to occur within the area. This species is the Australian Painted Snipe (listed as Endangered).

Table 1: A summary of the fauna species observed on site or recorded within 5km of the application area since 1996.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
AMPHIBIA						
Pseudophryne bibronii (Brown Toadlet)	R		3	2003	Dry forest, woodland, shrubland and grassland. They shelter under leaflitter and other debris in moist soaks and depressions.[1]	Unlikely – area is not a moist soak, and grassland is highly degraded
AVES						
Corcorax melanorhamphos (White-winged Chough)	R		3	2007	Woodland and tall mallee, with a preference for wetter areas with leaf-litter for feeding and mud for building nests[2].	Likely – seen within the last 20 years and habitat suitable.
Falco peregrinus (Peregrine Falcon)	R		3	2007	Use a broad range of habitats from rainforest to arid. Need abundant prey and secure nest sites[3]	Likely – recorded within the last 20 years and broad habitat preference.
Falcunculus frontatus frontatus (Eastern Shriketit)	R		3	2008	Eucalypt woodlands and forests [4]	Likely – recorded within the last 20 years and habitat suitable.
Hieraaetus morphnoides (Little Eagle)	V		3	2000	Open eucalypt forest, woodland, or open woodlands. Also known to use Sheoak or *Acacia* woodlands and riparian woodlands. Nests in tall living trees[5]	Likely – recorded within the last 20 years and habitat suitable.

1 Frogs of Australia 2020 – *Pseudophryne bibroni*, Bibron's Toadlet
2 DEH 2014, AMLR Threatened Species Profile Corcorax melanorhamphos
3 DEH 2009-15. Threatened species profile – Falco Peregrinus
4 DEW 2019, Threatened species fact sheet – Falcunculus frontatus frontatus, Eastern Shriketit
5 DEH NSW 2019. Threatened Species Profile – Hieraaetus morphnoides, Little Eagle

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments
Melithreptus gularis (Black-chinned Honeyeater)	R		3	2006	Eucalyptus woodland and mallee and Acacia shrubland[6]	Possible – recorded within the last 20 years.
Microeca fascinans (Jacky Winter	R		3	2006	Open woodland with an open shrub layer and lots of bare ground[7]	Possible – recorded within the last 20 years.
Petroica boodang boodang (Scarlet Robin)	R		3	2007	Eucalypt forests and woodlands[8]	Unlikely – lack of suitable habitat
Petroica phoenicea (Flame Robin)	V		3	2001	Eucalypt forests and woodlands, with access to open areas during breeding season, and feeds in open areas such as pasture.[9]	Unlikely – unsuitable habitat.
Turnix varius (Painted Buttonquail)	R		3	2006	Temperate and eastern tropical forests and woodlands. Prefers closed canopies with some understory and deep leaf litter on the ground[10]	Possible – recorded within the last 20 years.
MAMMALIA						
Trichosurus vulpecula (Common Brushtail Possum)	R		3	2020	Eucalyptus and Allocasuarina woodland, using trees with hollows for nesting.[11]	Highly likely – recorded within the last two years and presence of suitable habitat.
REPTILIA						
Tiliqua adelaidensis (Pygmy Bluetongue)	E	EN	3	2007	Remnant native grassland or grassy woodland and spider holes[12]	Unlikely – the site does not provide suitable habitat.
Source; 1- BDBSA, 2 - AoLA, 3 – NatureMaps, 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others NP&W Act; E= Endangered, V = Vulnerable, R= Rare EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable						

6 DEH 2014, AMLR Threatened Species Profile Melanodryas cucullata cucullata
7 DEW 2019, Threatened species fact sheet – Microeca fascinans, Jacky Winter
8 DEW 2019, Threatened species fact sheet – Pterotic boodang boodang, Scarlet Robin
9 Birdlife International 2020, Species factsheet – Petroica phoenicea.
10 Birds in Backyards 2020 – Turnix varius, Painted Button-quail
11 DEN 2014, AMLR Threatened Species Profile Trichosurus vulpecula
12 DENR 2012, National Recovery Plan for the Pygmy Bluetongue Lizard (Tiliqua adelaidensis)

Table 2: Criteria for the likelihood of occurrence of species within the survey area.

Likelihood	Criteria
Highly Likely/Known	Recorded in the last 10 years, the species does not have highly specific niche requirements, the habitat is present and falls within the known range of the species distribution or; The species was recorded as part of field surveys.
Likely	Recorded within the previous 20 years, the area falls within the known distribution of the species and the area provides habitat or feeding resources for the species.
Possible	Recorded within the previous 20 years, the area falls inside the known distribution of the species, but the area provides limited habitat or feeding resources for the species. Recorded within 20 -40 years, survey effort is considered adequate, habitat and feeding resources present, and species of similar habitat needs have been recorded in the area.
Unlikely	Recorded within the previous 20 years, but the area provides no habitat or feeding resources for the species, including perching, roosting or nesting opportunities, corridor for movement or shelter. Recorded within 20 -40 years; however, suitable habitat does not occur, and species of similar habitat requirements have not been recorded in the area. No records despite adequate survey effort.

4.2.3 Threatened flora

A protected matters search identified five threatened species protected under the *EPBC Act 1999* with habitat known to occur within a 5 km radius of the site (Table 3). In addition, a NatureMaps search identified a further 16 threatened species protected under the *NPW Act 1972*. None of these species were observed at the site. As this survey was conducted in both spring and summer, it is reasonable to expect that the threatened species listed in Table 3 and or their habitat would have been identified during these surveys. Table 3 provides a summary of the likelihood of the species occurring at the site using the metric described in Table 2.

Table 3: A summary of the flora species observed on site or recorded within 5km of the application area since 1996.

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments (Table 2)
Caladenia argocalla (White-beauty Spider-orchid)	E	EN	5&3	2019	Hills and slopes in Eucalyptus and *Allocasuarina verticillata* open woodland with herb understorey	Possible – woodlands present but lacking herb understorey
Caladenia tensa (Greencomb Spider-orchid)		EN	5,3&2	1992	Grows in dry woodlands and mallee on sandy loams	Unlikely – not recorded in the last 20 years
Crassula peduncularis (Purple Crassula)	R		3	1999	Found in permanently wet or damp areas	Unlikely – unsuitable habitat
Dianella longifolia var. grandis (Pale Flax-lily)	R		3	1999	Grassy woodland	Unlikely – not recorded in the last 20 years and habitat degraded by introduced grasses
Diuris behrii (Behr's Cowslip Orchid)	V		3	2004	Native grassland, open woodland and grassy forest; grows on more fertile soils,	Unlikely – unsuitable habitat

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments (Table 2)
					especially amongst Kangaroo Grass and Triodia on gentle slopes and flats	
Eryngium ovinum (Blue Devil)	V		3	1997	Wetter parts of the Mount Lofty Ranges and a few sites in the lower South-East in South Australia, growing in open woodland on damp clay and sandy soils.	Unlikely – not recorded in the last 20 years
Eucalyptus macrorhyncha ssp. macrorhyncha (Red Stringybark)	R		3	2015	Highly localized, grows on gravelly loams in hilly terrain	Possible – recent record but unsuitable habitat
Euphrasia collina ssp. osbornii (Osborn's Eyebright)	E	EN	5&3	2007	Generally found in Mallee scrub but also in woodlands and coastal heath	Possible - recent record but unsuitable habitat
Isoetes drummondii ssp. drummondii (Plain Quillwort)	R		3	2000	Wet depressions subject to flooding in spring and winter	Unlikely – unsuitable habitat
Leptorhynchos elongatus (Lanky Buttons)	E		3	2000	Woodland and grassland on sandy-to-sandy loam soils	Possible – suitable habitat but no recent records
Olearia pannosa ssp. pannosa (Silver Daisy-bush)	V	VU	5		Mallee woodland and forest communities often found using roadsides with small numbers of individuals.	Unlikely – no records found from AoLA or NatureMaps
Prasophyllum pallidum (Pale Leek-orchid)	R	VU	5&3	1999	Fertile soils of woodland and well-grassed open forests	Unlikely – unsuitable habitat
Rytidosperma tenuius (Short-awn Wallaby-grass)	R		3	2013	Boggy creek lines	Unlikely – unsuitable habitat
Thelymitra batesii	R		3	2002	Heathy woodlands and heathy open forest on sandy and gravelly clay loam soils	Unlikely – unsuitable habitat
Thelymitra holmesii (Blue Star Sun-orchid)	V		3	2001	Sandy heathlands around swamp margins in high rainfall areas. Also associated with *Leptospermum continentale* shrubland with sedge and fern understorey and creeklines.	Unlikely – unsuitable habitat
Thelymitra peniculata (Blue Star Sun-orchid)	V		3	2005	Wide range of habitats including grassy woodland, open forest, and heathland	Possible – suitable but degraded habitat

Species (common name)	NPW Act	EPBC Act	Data source	Date of last record	Species known habitat preferences	Likelihood of use for habitat – Comments (Table 2)
Thysanotus tenellus (Grassy Fringe-lily)	R		3	2007	Stable population in Kaiserstuhl Conservation Park and Forest Reserves	Unlikely – restricted range
Anogramma leptophylla (Annual Fern)	R		3	2020	Grows in shallow soil layers over rock on outcrops in dry or damp sclerophyll forest (Nature Values Atlas, 2019).	Unlikely – restricted range
Centrolepis glabra (Smooth Centrolepis)	R		3	1999	Generally in mud around temporary freshwater pools and stream margins (Department of Environment and Heritage 2014).	Unlikely - absence of suitable habitat
Thelymitra aristata (Great Sun-orchid)	E		3	2020	Occurs singly or in small groups in clay or gravel soils in forest or scrubland or in the SE in damp sand around swamp margins. (Electronic Flora of South Australia, 2022)	Unlikely – absence of suitable habitat
Thelymitra grandiflora (Great Sun-orchid*)	R		3	2010	Occurs singly or in small groups, in clay or gravel soils in forest or scrubland, or in the SE in damp sand around swamp margins (Electronic Flora of SA, 2022).	Unlikely – swampy areas absent hence unsuitable habitat
Source; 1- BDBSA, 2 - AoLA, 3 – NatureMaps 4 – Observed/recorded in the field, 5 - Protected matters search tool, 6 – others NP&W Act; E= Endangered, V = Vulnerable, R= Rare EPBC Act; Ex = Extinct, CR = Critically endangered, EN = Endangered; VU = Vulnerable *Same common name as *T. aristata*, however, *T. grandiflora* is a different species of sun-orchid						

4.3 Cumulative impact

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must consider the potential cumulative impact, both direct and indirect, that is reasonably likely to result from a proposed clearance activity.

The cumulative impact of clearing is the gradual reduction of remnants in the area, a loss of connectivity between remnant patches and the reduction of available habitat to threatened flora and fauna. While vegetation remnancy is 2% in the clearance area, much of this roadside vegetation is not an effective representation of remnant vegetation. Most of the plants along this roadside are planted for amenity or a very poor-quality representation of remnant vegetation.

The building of OTL and extension of existing lanes is the only development planned for the area at this time and will not require additional works in the future. While development will impact scattered trees and remnant bushland, DIT has worked to reduce this impact by restricting works to areas with poor quality vegetation or no native vegetation where possible.

DIT has been progressively undertaking safety upgrades along Horrocks Highway between Wilmington and Gawler. The upgrades have included shoulder sealing in the general area (betwewen Clare and Undalya) which has also required vegetation clearance. The clearance was approved by NVC in 2021 and the project is now complete.

4.4 Address the mitigation hierarchy

When exercising a power or making a decision under Division 5 of the Native Vegetation Regulations 2017, the NVC must have regard to the mitigation hierarchy. The NVC will also consider, with the aim to minimize, impacts on biological diversity, soil, water and other natural resources, threatened species or ecological communities under the EPBC Act or listed species under the NP&W Act.

a) Avoidance – outline measures taken to avoid clearance of native vegetation

Horrocks Highway is a major arterial road connecting Adelaide's northern rural areas to South Australia's mid-north. Construction of this OTL is necessary to improve safety. The site is constrained by two small townships separated by approximately 2km requiring the overtaking lane to take up the entire section of road between these towns. Alternative locations were considered to the north and south of these townships, but no feasible options were identified which would avoid native vegetation clearance.

b) Minimization – if clearance cannot be avoided, outline measures taken to minimize the extent, duration, and intensity of impacts of the clearance on biodiversity to the fullest possible extent (whether the impact is direct, indirect, or cumulative).

Vegetation impacts have been minimized with the impacts on trees reduced from 61 to 23 over the period of the project. Where possible native vegetation will be retained to the boundary fence and weed management will be implemented to improve the condition of the vegetation that remains. The design also ensures that impacts to native vegetation will be minimized by accommodating additional measures such as steepening of batters, underground SAPN lines (in some instances), minimizing median widths and tapers, including guardrails, and widening to the east and west sides rather than just one side of the road. The Contractor will also prepare and implement a Construction Environmental Management Plan to minimize impacts to the surrounding environment including retained vegetation.

c) Rehabilitation or restoration – outline measures taken to rehabilitate ecosystems that have been degraded, and to restore ecosystems that have been degraded, or destroyed by the impact of clearance that cannot be avoided or further minimized, such as allowing for the re-establishment of the vegetation.

Opportunities to revegetate land will be investigated with surrounding property owners.

d) Offset – any adverse impact on native vegetation that cannot be avoided or further minimized should be offset by the achievement of a significant environmental benefit that outweighs that impact.

DIT will contribute an SEB payment into the Native Vegetation fund to support restoration and conservation works in the region.

The NVC will only consider an offset once avoidance, minimization and restoration have been documented and fulfilled. The SEB Policy explains the biodiversity offsetting principles that must be met.

4.5 Principles of clearance (*Schedule 1, Native Vegetation Act 1991*)

The Native Vegetation Council will consider Principles 1(b), 1(c) and 1(d) when assigning a level of Risk under Regulation 16 of the Native Vegetation Regulations. The Native Vegetation Council will consider all the principles of clearance of the Act as relevant, when considering an application referred under the *Planning, Development and Infrastructure Act 2016*.

Principle of clearance	**Considerations**
Principle 1a - it comprises a high level of diversity of plant species	Relevant information *VA1 to VA7: < 10 native plant species*
	Assessment against the principles *Not at Variance (All)*
	Moderating factors that may be considered by the NVC
Principle 1b - significance as a habitat for wildlife	**Relevant information** *Threatened species that are known to or likely to use the habitat:* *Listed as threatened in SA (NPW Act 1972).* • *Corcorax melanorhamphos* (White-winged Chough) • *Falco peregrinus* (Peregrine Falcon) • *Falcunculus frontatus frontatus* (Eastern Shriketit) • *Hieraaetus morphnoides* (Little Eagle) *Patches* *Threatened Fauna Score:* *VA1 to VA7: 0.1* *Trees* *Fauna Habitat Score: 1.4* *Total Biodiversity Scores: 54.54*
	Assessment against the principles *Seriously at Variance (All)*
	Moderating factors that may be considered by the NVC *This clearance should not have a significant impact on fauna:* • *The grassland is too degraded to suit the PBT and no spider holes were observed during the fauna survey.* • *A significant proportion of the large, planted Eucalyptus leucoxylon will remain along the road to provide habitat resources.* • *Healthier remnant vegetation exists on several neighboring roadsides.* *The clearance is not expected to impact:* • *population size, extent, structure, continuity, or survivability* • *the area of occupancy of a species* • *habitat critical to the survival of a species*

	• *recovery of a species* • *presence of invasive species*
Principle 1c - plants of a rare, vulnerable or endangered species	**Relevant information** *Threatened species that are known to or likely to use the habitat:* *Threatened Flora Score =0*
	Assessment against the principles *Not at Variance (All)*
	Moderating factors that may be considered by the NVC *N/A*
***Principle 1d - the vegetation comprises the whole or part of a plant community that is Rare, Vulnerable or endangered*:**	**Relevant information** *Threatened communities* *None* *Threatened Community Score =1*
	Assessment against the principles *Not at Variance (All)*
	Moderating factors that may be considered by the NVC *N/A*
Principle 1e - it is significant as a remnant of vegetation in an area which has been extensively cleared.	Relevant information IBRA Association Remnancy Scores 8% Total Biodiversity Score – 92.38
	Assessment against the principles At Variance
	Moderating factors that may be considered by the NVC This roadside is not an accurate representation of vegetation remnancy in the region due to its poor quality. Also, a significant proportion of the large, planted Eucalyptus leucoxylon will remain along the road to provide habitat resources. Healthier remnant vegetation exists on several neighboring roadsides.
Principle 1f - it is growing in, or in association with, a wetland environment.	Relevant information The vegetation is not associated with a wetland, nor is there presence of a wetland within 5km of the site.
	Assessment against the principles *Not At Variance (All)*
	Moderating factors that may be considered by the NVC *N/A*
Principle 1g - it contributes significantly to the	Relevant information The vegetation is adjacent to a main road (Horrocks Highway), and close to a town (Sevenhill). Although most of the vegetation along the roadside will be removed, the DIT and designers (WGA / Tonkin) have tried to avoid large trees such as Eucalypts.

amenity of the area in which it is growing or is situated.	*At Variance (All)*
	Moderating factors that may be considered by the NVC While the site is close to a town and some large Eucalypts and remnant vegetation will be impacted, the broader site supports bands of roadside vegetation that will continue to provide amenity value.

Principles of Clearance (h-m) will be considered by comments provided by the local NRM Board or relevant Minister. The Data Report should contain information on these principles where relevant and where sufficient information or expertise is available.

4.6 Risk assessment

Determine the level of risk associated with the application

Total clearance	No. of scattered trees	23
	Area (ha)	1.855
	Total biodiversity Score	54.52
Seriously at variance with principle 1(b), 1(c) or 1 (d)		1(b)
Risk assessment outcome		Level 4

4.7 NVC guidelines

Provide any other information that demonstrates that the clearance complies with any relevant NVC guidelines related to the activity.

NA

5. Clearance summary

Bushland Clearance area(s) summary table

Block	Site	Species diversity score	Threatened Ecological community Score	Threatened plant score	Threatened fauna score	UBS	Area (ha)	Total Biodiversity score	Loss factor	Loadings	Reductions	SEB Points required	SEB payment	Admin Fee
1	VA1	6	1	0	0.1	20.86	0.2498	5.21	1			5.47	$4,661.81	$256.40
1	VA2	6	1	0	0.1	10.70	0.2483	2.66	1			2.79	$2,328.63	$128.07
1	VA3	6	1	0	0.1	29.38	0.6057	17.79	1			18.68	$15,918.23	$875.50
1	VA4	6	1	0	0.1	18.88	0.5389	10.18	1			10.69	$8921.49	$490.68
1	VA5	6	1	0	0.1	3.83	0.0586	0.22	1			0.24	$200.71	$11.04
1	VA6	6	1	0	0.1	7.36	0.0846	0.62	1			0.65	$539.73	$29.69
1	VA7	3	1	0	0.1	17.01	0.0696	1.18	1			1.24	$1,025.73	$56.41
						Total	**1.8555**	**37.86**				**39.76**	**$33,596.33**	**$1,847.79**

Scattered trees summary table

Tree or Cluster ID	Number of trees	Fauna Habitat score	Threatened flora score	Total Biodiversity score	Loss factor	SEB Points required	SEB Payment	Admin Fee
Clump A	10	1.4	0	11.16	1	11.72	$10,416.67	$765.25
NT1	1	1.4	0	7.19	1	7.55	$6,708.87	$76.52
NT2	1	1.4	0	0.43	1	0.46	$405.41	$76.52
NT3	1	1.4	0	0.24	1	0.25	$226.01	$11.84
Clump B	2	1.4	0	9.27	1	9.74	$8,655.60	$33.92
NT4	1	1.4	0	6.88	1	7.23	$6,423.81	$239.89
NT5	1	1.4	0	4.09	1	4.29	$3,813.35	$239.89
NT6	1	1.4	0	0.61	1	0.65	$573.36	$239.89
NT7	1	1.4	0	4.25	1	4.46	$3,965.69	$239.89
NT8	1	1.4	0	4.42	1	4.65	$4,129.70	$239.89
NT9	1	1.4	0	4.82	1	5.06	$4,498.19	$239.89
NT10	1	1.4	0	0.47	1	0.49	$439.47	$239.89
NT11	1	1.4	0	0.69	1	0.73	$647.56	$23.02
Total	**23**			**54.52**		**57.28**	**$50,903.69**	**$2,666.30**

Total summary table

	Total Biodiversity score	Total SEB points required	SEB Payment	Admin Fee	Total Payment
Application	92.38	97.04	$84,500.02	$4,514.09	$89,014.11

Economies of Scale Factor	0.500
Rainfall (mm)	633

6. Significant Environmental Benefit

A Significant Environmental Benefit (SEB) is required for approval to clear under Division 5 of the *Native Vegetation Regulations 2017*. The NVC must be satisfied that as a result of the loss of vegetation from the clearance that an SEB will result in a positive impact on the environment that is over and above the negative impact of the clearance.

ACHIEVING AN SEB

Indicate how the SEB will be achieved by ticking the appropriate box and providing the associated information:

☐ Establish a new SEB Area on land owned by the proponent.

☐ Use SEB Credit that the proponent has established. Provide the SEB Credit Ref. No. _____

☐ Apply to have SEB Credit assigned from another person or body. The application form needs to be submitted with this Data Report.

☐ Apply to have an SEB to be delivered by a Third Party. The application form needs to be submitted with this Data Report.

☒ Pay into the Native Vegetation Fund.

7. Appendices

Appendix 1: Bushland and scattered tree assessment scoresheets associated with the proposed clearance.

Appendix 2: Site maps as shape files