Appendix V

Terrestrial ecology

MARINUS LINK

Terrestrial Ecology Impact Assessment – Marinus Link

Marinus Link Pty. Ltd.

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Glossary and abbreviations

Term	Meaning
AoD	Area of disturbance; the area in which construction and operation works will occur and therefore result in direct impacts to ecological values.
Construction	The project stage of construction includes design, any pre-construction activities that inform construction or to establish baseline conditions, temporary works, work site establishment, reinstatement, rehabilitation of construction areas, and any commissioning activities.
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEECA	Department of the Environment, Energy, and Climate Action
DELWP	Department of the Environment, Land, Water, and Planning
EE Act	*Environment Effects Act 1978.* Victorian legislation that requires the environmental effects of certain works to be assessed.
EIS/EES	Environmental Impact Statement/Environment Effects Statement
ELA	Eco Logical Australia Pty. Ltd.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth). National legislation to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.
EPR	Environmental Performance Requirement
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988.* Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes.
GDE	Groundwater Dependant Ecosystem
HBT	Hollow Bearing Tree
HDD	Horizontal Directional Drilling
HVAC	High voltage alternating current
HVDC	High voltage direct current
HW	Hazelwood, as defined in AEMO network diagrams.
KP	Kilometre Point
kV	kilo volt or 1,000 volts
LWD	Large Woody Debris
MNES	Matter of National Environmental Significance as defined under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).
MW	Megawatt or 1,000 kilowatts
Nationally significant	A Matter of National Environmental Significance (MNES) listed as critically endangered, endangered or vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth).
NEM	National Electricity Market
PMST	Protected Matters Search Tool

Term	Meaning
Priority habitat	High-quality habitats containing features and resources which are consistent with threatened species preferred habitat requirements and also support a wide range of flora and fauna species
Project works	Any physical activities undertaken for site establishment, construction, operation or decommissioning of the project.
State significant	Listed under the Victorian *Flora and Fauna Guarantee Act 1988* (Vic)
Study Area	An area sufficient to allow a determination of the likelihood of occurrence of ecological values within the survey area. This equates to roughly a 10 km search radius either side of the survey area depending on the nature of the landscape and the values in question.
Survey area	An approximately 220 m wide corridor encompassing the AoD in which the final project alignment and associated infrastructure will occur. This area extends from the beach crossing on the shore of Waratah Bay to the greater Hazelwood area.
TEC	Threatened Ecological Community
TPZ	Tree Protection Zone
VBA	Victorian Biodiversity Atlas
VQA	Vegetation Quality Assessment

Executive summary

Background

Marinus Link Pty. Ltd. proposes to construct a high voltage direct current electricity interconnector (comprised of dual transmission lines) between Tasmania and Victoria, including a subsea cable and onshore cable and converter facilities.

The purpose of this report is to present the findings of the detailed ecological investigations, and associated impact assessment, for the Victorian section of the proposed Marinus Link project.

Project description

In Victoria, the shore crossing is proposed to be located at Waratah Bay with the project alignment crossing at the Waratah Bay–Shallow Inlet Coastal Reserve. From the land-sea joint located behind the coastal dunes, the land cable would extend underground for approximately 90 km to the converter station. From Waratah Bay the cable would run northwest to the Tarwin River Valley and then travel to the north to the Strzelecki Ranges. The alignment crosses the ranges between Dumbalk and Mirboo North before descending to the Latrobe Valley where it turns northeast to Hazelwood. The Victorian converter station would be at either a site south of Driffield or Hazelwood adjacent to the existing terminal station.

The land cables would be directly laid in trenches or installed in conduits in the trenches. A construction area of 20 to 36 m wide would be required for laying the land cables and construction of joint bays. Under major roads, railways, major watercourses and substantial patches of native vegetation, cables will be laid using Horizontal Directional Drilling where geotechnical conditions permit. Temporary roads for accessing the construction area and temporary laydown areas would also be required to support construction. Where possible, existing roads and tracks would be used for access, for example, farm access tracks or plantation forestry tracks.

Methods

The ecology impact assessment involved the following steps:

- A desktop review to identify ecological values which may occur within the ‘study area’, drawing information from biological databases, spatial datasets, aerial imagery, and relevant reports, guidelines, standards and scientific literature.
- Detailed field surveys involving vegetation quality and habitat condition assessments, and targeted surveys for threatened flora and fauna species, where access was available within the ‘survey area’.
- An analysis of direct impacts to ecological values based on the current Area of Disturbance and associated construction approach. This analysis involved a ‘significance of impact’ approach and included the development of Environmental Performance Requirements to avoid and mitigate impacts identified as part of the analysis.

Access agreements for some land parcels were not in place during the field survey program (ending December 2022). As a result, sections of the survey area were not able to be assessed in detail on-ground, with the presence of potential values, and the resulting impacts, established based on

observations from adjoining land parcels, and extrapolation from aerial imagery and desktop review. To ensure potential impacts to threatened species and native vegetation are not misrepresented, where any doubt remains, the relevant values have been assumed to be present and impacts assessed under the relevant Commonwealth and state guidelines.

Results

The region through which the Victorian section of the align runs is dominated by productive agricultural landscapes, comprised primarily of intensive pastoral or horticultural operations, with higher elevation sections in the Strzelecki Ranges supporting dense softwood plantations. As a result, the vast majority of native vegetation (scrubs, woodlands and forests) and associated habitat that would have once covered South Gippsland has been cleared, leaving small, fragmented patches remaining along road reserves, property boundaries and creek lines, and scattered trees in paddocks. In some sections, such as the hills around Waratah Bay, the Great Southern Rail Reserve and the Strzelecki Ranges, larger patches of native vegetation persist in the landscape in private and public land, representing important areas of priority habitat for flora and fauna species.

Taking into account the desktop review, field surveys involving vegetation quality and habitat condition assessments, and the additional targeted surveys for threatened species in suitable habitats, key ecological values that are considered to be present within the survey area and used to inform the impact assessment, are summarised in Table A.

Key locations supporting high-quality native remnants and habitats include (Appendix 1: Figure 5 and Figure 6):

- Coastal scrub vegetation restricted to the foreshore and coastal dunes of Waratah Bay (KP 0).
- Lowland forests between Waratah Road and Fish-Creek Walkerville Road (KP 2.3 – 6.4) and within private land north of Fish-Creek Walkerville Road (KP 8.0 – 8.9).
- Swamp scrubs, swampy woodlands and lowland forest in the Great Southern Rail Trail reserve and intersecting waterways, including stony creek and adjoining private land (KP 21.4-30.1).
- Lowland forests between Mirboo North and Stony Creek (KP57-57.5, 58.5-59.8, 60.5-61.1, 61.3-62.0, 62.2-63.7).
- Tall forests along Ten Mile Creek Road and Strzelecki Highway (KP64.6-71.8).
- Floodplain and grassy woodlands associated with Morwell River and nearby terraces (KP77.9-78.4).
- Grassy woodlands within McFarlane Road, road reserve at (KP 79.7).

Table A. Ecological values considered present within the survey area for the purpose of the impact assessment

Value	Species and Communities
Native vegetation	A total of 201.90 ha of native vegetation was recorded within the survey area, including of 102.85 ha with a bioregional conservation status of endangered and 1084 large trees (scattered and in patches) (Appendix 1: Figure 6).
Nationally significant threatened species	**Fauna:** Australasian bittern, blue-winged parrot, Caspian tern, cattle egret, crested tern, double-banded plover, dwarf galaxias, eastern curlew, gang-gang cockatoo, grey-headed flying-fox, growling grass frog, hooded plover, Latham's snipe, red-capped plover, red-necked stint, rufous fantail, sanderling, satin flycatcher, swamp antechinus, swamp skink, white-bellied sea-eagle, white-throated needletail.

Value	Species and Communities
	Flora: Eastern spider orchid, river swamp wallaby-grass, thick-lipped spider-orchid, Strzelecki gum, dense leek-orchid, green-striped greenhood, leafy greenhood. Priority habitats for these species are shown in Appendix 1: Figure 5.
State significant threatened species	**Fauna:** Grey goshawk, Narracan burrowing crayfish, South Gippsland spiny crayfish, glossy grass skink, southern toadlet, lace monitor, hardhead, little eagle, flinders pygmy perch, powerful owl, platypus, white-footed dunnart. **Flora:** Coast wirilda, coast bitter-bush, silver everlasting, lizard orchid, orange-tip finger-orchid, slender pink-fingers, coast colobanth, spurred helmet-orchid, fringed helmet-orchid, bog gum, Yarra gum, currant-wood, dune wood-sorrel, coast fescue, cobra greenhood, rush lily, alpine sun-orchid, slender fork-fern, oval fork-fern, small fork-fern. Priority habitats for these species are shown in Appendix 1: Figure 5.
Threatened ecological communities	A single patch of the EPBC Act listed *Gippsland Red Gum (Eucalyptus tereticornis subsp. mediana) Grassy Woodland and Associated Native Grassland community* and equivalent FFG Act listed *Forest Red Gum Grassy Woodland community* was identified within the McFarlane Road, road reserve at (KP 79.7; Appendix 1: Figure 5).

Impacts

A 'significance of impact' approach has been used to assess impacts to ecological values within the survey area, which considers the sensitivity of the value and magnitude of the impact. This approach takes into account pre-mitigation impacts, based on the current design and construction approach, along with post-mitigation impacts which assume implementation of the EPRs developed to avoid and minimise impacts to ecological values. The recommended Environmental Performance Requirements are listed in Table B.

Table B. Environmental Performance Requirements for avoiding and minimising impacts to ecological values

EPR ID	Environmental Performance Requirement	Project Stage
EC01	**Avoid or minimise native vegetation and habitat loss and degradation** Prior to commencement of project works and to inform the design: • Complete vegetation quality assessments at locations that could be impacted by the areas of disturbance of the final design and require further assessment to confirm vegetation type and extent. Areas to be surveyed, if impacted, include those shown in Figure 6 of Technical Appendix V: Terrestrial Ecology Assessment. • Complete habitat assessments and targeted surveys at locations that could be impacted by the areas of disturbance of the final design and required further assessment to determine habitat suitability and/or presence/absence of threatened species. Areas to be surveyed, if impacted, include those shown in Figure 5 of EIS/EES Technical Appendix V. • Complete fauna utilisation surveys of all impacted hollow-bearing trees within areas of priority habitats shown in Figure 5 of EIS/EES Technical Appendix V, to identify nesting sites and minimise removal of hollow bearing trees. • Develop and implement measures to avoid or otherwise minimise impacts on native vegetation and priority habitats, so far as reasonably practicable, through detailed design and appropriate construction methods, at locations shown in Figure 6 of EIS/EES Technical Appendix V. Where feasible, measures will include: o Minor realignment of the Area of Disturbance. o Reducing the width of the Area of Disturbance.	Design and construction

EPR ID	Environmental Performance Requirement	Project Stage
	○ Use of trenchless technologies such as HDD. • Develop and implement construction methods that avoid impacts to the Gippsland Red Gum (Eucalyptus tereticornis subsp. mediana) Grassy Woodland and Associated Native Grassland Threatened Ecological Community including the related FFG Act listed Threatened Ecological Community located along McFarlane Road, Hazelwood as shown in Figure 5.42 of EIS/EES Technical Appendix V. • Prior to construction and to inform detailed design, complete an arboriculture assessment of trees impacted due to consequential losses and encroachment of tree protection zones, as shown in Figure 6 of EIS/EES Technical Appendix V. Inspections by qualified arborists must be undertaken to inform measures which may minimise the likelihood of trees being lost. • Obtain native vegetation offsets in accordance with the *Guidelines for removal, destruction or lopping of native vegetation* (DELWP 2017) for the native vegetation to be removed based on the detailed design.t.	
EC02	**Develop and implement a biodiversity management plan** Prior to commencement of project works develop a biodiversity management plan to avoid or otherwise minimise impacts to flora and fauna values. The vegetation and habitat management measures must cover, but not be limited to: • Identification and protection of native vegetation and priority habitats to be retained as shown in Figures 5 and 6 of EIS/EES Technical Appendix V. This must include pre-construction assessment to flag vegetation to be removed and retained and establishment of no-go zones to a standard suitable to prevent access during construction. • Implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds and diseases during construction in areas supporting native vegetation, priority habitats and threatened ecological communities, as shown in Figures 5 and 6 of EIS/EES Technical Appendix V including relevant approved EPBC Act threat abatement plans. • Manage all work areas to maintain landform stability and avoid or minimise erosion and sedimentation, and avoid storage of excess soil or fill material upslope or adjacent to native vegetation and priority habitats (to the extent not already addressed under EPR GM02, GM03, GM06, GM07, GM08). • Use of sedimentation and pollution controls to prevent uncontrolled releases into retained native vegetation and priority habitats, as shown in Figures 5 and 6 of EIS/EES Technical Appendix V (to the extent not already addressed under EPR GM08 and SW01). • Use of locally indigenous species in revegetation or plantings, particularly in areas where habitat is removed that is suited to the landscape context and associated native species requirements. • Where possible, avoid removal or disturbance of root systems associated with native vegetation in areas of priority habitat, to prevent impacts to ground-dwelling fauna (e.g. crayfish). • Incident management protocols for addressing accidental clearing of vegetation or habitat through assisted regeneration or additional offsets. The flora and fauna species management measures must cover, but not be limited to: • Undertaking pre-clearing inspections by a suitably qualified ecologist to confirm the on-site location of fauna immediately prior to habitat removal. • Salvage and re-location of fauna, if required prior to construction, in accordance with the *Wildlife Act 1975* (Vic) and *EPBC Act* (Cwlth) where required. • Daily inspections of open trenches or pits for trapped animals, such as reptiles and small-ground dwelling mammals.	Construction

EPR ID	Environmental Performance Requirement	Project Stage

	• Utilising night lighting to a minimum amount required to safely operate the site and to reduce light pollution and adverse effects to nocturnal species in accordance with Night Light Pollution Guidelines for Wildlife (DCCEEW 2023). This must include using:
	  • light shields to direct light and reduce light spill.
	  • low beam vehicle lights except where safety is compromised.
	• Work restrictions during sensitive life-stages (e.g. breeding, nesting, etc.) within 100m of priority habitats, as shown in Figure 5 of EIS/EES Technical Appendix V, to avoid and minimise disturbance to native fauna (with a particular focus on noise and light pollution). This may include restrictions on work activities during a season (e.g., spring), species life stage (e.g., breeding or nesting) or time of day (e.g., night-time), based on the ecology of the species and proximity to habitats. Where work restrictions are not feasible, develop and implement alternative control measures (e.g. light shields).
	• Installation of temporary wildlife barriers near priority habitats to prevent the movements of ground-dwelling fauna into high-risk areas, such as access tracks.
	• Ensuring speed limits within works areas are restricted to appropriate levels, and enforced, to minimise the risk of faunal strikes.
	• Managing native fauna that may be displaced due to habitat removal, in compliance with the *Wildlife Act 1975* (Vic).
	• Procedures if unexpected threatened species are identified during construction.
	The biodiversity management plan must be a sub plan of the CEMP and must be implemented during construction.	

EC03	**Implement aquatic habitat protection measures** Avoid and minimise impacts to aquatic habitat, so far as reasonably practicable, through adopting trenchless construction methods (such as HDD) or project alignment changes at the following waterway crossing locations: Morwell River, Tarwin River East Branch, tributaries of the Tarwin River East Branch, Stony Creek, Buffalo Creek and Fish Creek, as shown in Figure 6 of EIS/EES Technical Appendix V. If any flowing or ephemeral waterways that are deemed to be potential habitat for threatened species are proposed to be open-cut or directly impacted, conduct aquatic surveys prior to commencement of project works to inform design and construction methods. Where direct impacts to waterways are likely to occur, prepare a site environmental management plan with reference to the plan prepared to manage erosion and surface water in accordance with EPR SW01 and in consultation with the West Gippsland Catchment Management Authority covering: • Details for retention and protection of riparian and instream vegetation, dead and alive standing trees and fallen timber and other habitat values. • Requirements for salvage and translocation of aquatic fauna prior to construction, in accordance with the *Wildlife Act 1975* (Vic). • Approach for the implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds and diseases during construction in aquatic habitats. • Document the locations of where measures must be applied. The plan must be a sup plan of the CEMP and be implemented in construction.	Construction

Prior to adopting any mitigation measures a total of 10.56 ha of native vegetation, containing 49 large trees, will be directly impacted (removed) through construction, and a further 10.69 ha of native vegetation consequentially lost over time, including 135 large trees. Through applying mitigation measures to comply with EPRs it is expected that the impact on native vegetation and habitats could be

measures to minimise indirect impacts during construction, post-mitigation impacts to ecological values are summarised in Table C.

In some instances, the impacts to threatened species could not be mitigated fully due to uncertainty remaining with regards to their presence within the study area. In these instances, further on-ground assessments are required to inform the impact assessment, and a precautionary approach has been adopted for this report.

Table C. Summary of the significance of impacts to ecological values within the survey area

Value	Post-mit. Impact	Discussion
Native vegetation	**LOW**	Due to the significant ability to avoid and minimise indirect impacts and associated consequential losses (e.g. encroachment of tree protection zones) based on successful implementation of the EPRs, post-mitigation impacts are estimated to be as little as: • Direct impacts involving 6.20 ha of native vegetation removed, including 39 large trees, representing approximately 3.1% of the native vegetation within the survey area. • Indirect impacts in the form of consequential losses of 0.55 ha of native vegetation, including 12 large trees, representing approximately 0.27% of the native vegetation within the survey area. Consequential losses will occur over the medium to long-term and will not lead to a reduction in the extent of habitat.
Owls, raptors and other fauna with large ranges, including the threatened powerful owl, grey goshawk, little eagle, white-bellied sea eagle, grey-headed flying fox and lace monitor.	**LOW**	These species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).
Ground-dwelling fauna, including the threatened swamp skink, glossy grass skink, swamp antechinus, white-footed dunnart and southern toadlet.	**MODERATE**	Areas of potential habitat within the survey area for these species have not been assessed on-ground due to land access constraints. These species may not occur within the survey area, and particularly so within the disturbed edges of patches where impacts will occur. Despite this, a precautionary approach has been taken and these species are assumed to occur within habitat that may be impacted. Irrespective, direct and indirect impacts will likely be avoided through further refinement of the designs and construction controls. A post-mitigation magnitude of minor (rather than negligible) has been used for the impact assessment to account for the remaining uncertainty, with the overall significance of impact being determined as 'moderate'.
Aquatic fauna, including the threatened dwarf galaxias, Flinders pygmy perch, growling grass frog, Narracan burrowing crayfish, South Gippsland spiny crayfish and platypus	**LOW**	These species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).

Value	Post-mit. Impact	Discussion
Shorebirds, including the threatened eastern curlew, hooded plover, sanderling, red-necked stint, double-banded plover, red-capped plover, Caspian tern and crested tern	**MODERATE (Low)**	Direct impacts to foreshore and dune habitat in Waratah Bay will be avoided through HDD of these areas (Appendix 1: Figure 5) and construction controls to avoid disturbance during sensitive periods (e.g. nesting). The residual post-mitigation impact is moderate due the critically endangered EPBC Act listed eastern curlew being within this group, and is Very high sensitivity rating pushing up the significance of the post-mitigation impacts. However, materially impacts will be negligible to these species due to the temporary nature of works and avoidance of all areas of habitat. The significance of impacts to these species is therefore considered to be low.
Waterbirds and waders, including the threatened Australasian bittern, cattle egret, Latham's snipe and hardhead.	**LOW**	These species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).
Woodland birds, including the threatened gang-gang cockatoo, blue-winged parrot, satin flycatcher, rufous fantail	**LOW**	These species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).
Coastal flora, including the threatened coast wirilda, coast bitter-bush, coast colobanth, dune wood-sorrel, coast fescue	**LOW**	The removal or degradation of habitat will be avoided through HDD of the dunes and beach. The elevated nature of the dunes means impacts due to the release of pollutants or sediment is considered unlikely.
Waratah Bay woodland flora, including eastern spider orchid, thick-lipped spider-orchid, dense leek-orchid, green-striped greenhood, leafy greenhood, silver everlasting, lizard orchid, orange-tip finger-orchid, slender pink-fingers, spurred helmet-orchid, fringed helmet-orchid, currant-wood, cobra greenhood, rush lily and small fork-fern	**MODERATE**	Areas of potential habitat within the survey area for these species have not been assessed on-ground due to land access constraints. These species may not occur within the survey area, and particularly so within the disturbed edges of patches where impacts will occur. Despite this, a precautionary approach has been taken and these species area assumed to occur within habitat that may be impacted. Irrespective, direct and indirect impacts will likely be avoided through further refinement of the designs and construction controls. A post-mitigation magnitude of minor (rather than negligible) has been used for the impact assessment to account for the remaining uncertainty, with the overall significance of impact being determined as 'moderate'.
Strzelecki Ranges damp forest flora, including the threatened alpine sun-orchid, slender fork-fern and, oval fork-fern	**LOW**	If present, these species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).
Strzelecki gum and **Yarra gum**	**LOW**	Potential impacts include a single Strzelecki Gum and three Yarra Gum. These impacts can be avoided through design refinement and implementation of appropriate construction controls.

Value	Post-mit. Impact	Discussion
Bog gum	**HIGH**	Potential impacts to Bog Gum include removal of numerous trees from multiple, large populations and potential for further losses in habitat not yet surveyed. Whilst it may be feasible to avoid impacts through refinement of project design and construction controls, the uncertainty regarding the extent of the population and feasibility of avoidance means the extent to which impacts to this species can be mitigated is unable to be determined at this stage. Further on-ground assessments and refinement of the project design is required before a final impact assessment can be made.
River swamp wallaby-grass	**MODERATE**	Uncertainty still remains regarding the presence of River Swamp Wallaby-grass within the survey area in priority habitat south of Mirboo North, due to access constraints. In addition, the close proximity of the AoD (and associated HDD entry/exit pit) to a significant population at KP 78.2 means a high-level of uncertainty regarding the nature of impacts remains. Taking this uncertainty into account, the post-mitigation significance of impact is considered to be moderate.
Threatened ecological communities	**MODERATE (LOW)**	The *Gippsland Red Gum (Eucalyptus tereticornis subsp. Mediana) Grassy Woodland and Associated Native Grassland community* and equivalent FFG Act listed *Forest Red Gum Grassy Woodland Community* was identified at a single location within the McFarlane Road, road reserve (KP 79.7). This community is proposed to be avoided through design refinement and implementation of appropriate construction controls. The very high sensitivity of this values means the actual significance of impacts are more likely to be 'low'.

1. Introduction

The proposed Marinus Link (the project) comprises a high voltage direct current (HVDC) electricity interconnector between Tasmania and Victoria, to allow for the continued trading and distribution of electricity within the National Energy Market (NEM).

The project was referred to the Australian Minister for the Environment on 5 October 2021. On 4 November 2021, a delegate of the Minister for the Environment determined that the proposed action is a controlled action as it has the potential to have a significant impact on the environment and requires assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) before it can proceed. The delegate determined that the appropriate level of assessment under the EPBC Act is an environmental impact statement (EIS).

On 12 December 2021, the former Victorian Minister for Planning under the *Environment Effects Act 1978* (Vic) (EE Act) determined that the project requires an environment effects statement (EES) under the EE Act, to describe the project's effects on the environment to inform statutory decision making.

In July 2022, a delegate of the Director of the Environment Protection Authority Tasmania determined that the project be subject to environmental impact assessment by the Board of the Environment Protection Authority (the Board) under the *Environmental Management and Pollution Control Act 1994* (Tas) (EMPCA).

As the project is proposed to be located within three jurisdictions, the Victorian Department of Transport and Planning (DTP), Tasmanian Environment Protection Authority (Tasmanian EPA) and Australian Department of Climate Change, Energy, Environment and Water (DCCEEW) have agreed to coordinate the administration and documentation of the three assessment processes. One EIS/EES is being prepared to address the requirements of DTP and DCCEEW. Two EISs are being prepared to address the Tasmanian EPA requirements for the Heybridge converter station and shore crossing.

This technical study has been prepared by Ecological Australia (ELA) to assess impacts to ecological values associated with the onshore component of the project in Victoria. This report will inform the EIS/EES being prepared for the project.

1.1 Purpose of this report

The purpose of this report is to present the findings of the detailed baseline ecology study, and associated impact assessment, for the Victorian section of the proposed project (Figure 1).

Based on the desktop review and field surveys conducted to date, the report considers potential direct and indirect impacts to ecological values within the survey area, including potential cumulative effects, in accordance with both state and federal legislative requirements.

1.2 Project overview

The project is a proposed 1500 megawatt (MW) HVDC electricity interconnector between Heybridge in northwest Tasmania and the Latrobe Valley in Victoria (Figure 1). Marinus Link is proposed to provide a second link between the Tasmanian renewable energy resources and the Victorian electricity grids

enabling efficient energy trade, transmission and distribution from a diverse range of generation sources to where it is most needed, and will increase energy capacity and security across the NEM.

Marinus Link Pty Ltd (MLPL) is the proponent for the project and is a wholly owned subsidiary of Tasmanian Networks Pty Ltd (TasNetworks). TasNetworks is owned by the State of Tasmania and owns, operates and maintains the electricity transmission and distribution network in Tasmania.

Tasmania has significant renewable energy resource potential, particularly hydroelectric power and wind energy. The potential size of the resource exceeds both the Tasmanian demand and the capacity of the existing Basslink interconnector between Tasmania and Victoria. The growth in renewable energy generation in mainland states and territories participating in the NEM, coupled with the retiring of baseload coal-fired generators, is reducing the availability of dispatchable generation that is available on demand.

Tasmania's existing and potential renewable resources are a valuable source of dispatchable generation that could benefit electricity supply in the NEM. Marinus Link will allow for the continued trading, transmission and distribution of electricity within the NEM. It will also manage the risk to Tasmania of a single interconnector across Bass Strait and complement existing and future interconnectors on mainland Australia. Marinus Link is expected to facilitate the reduction in greenhouse gas emissions at a state and national level.

Interconnectors are a key feature of the future energy landscape. They allow power to flow between different regions to enable the efficient transfer of electricity from renewable energy zones to where the electricity is needed. Interconnectors can increase the resilience of the NEM and make energy more secure, affordable and sustainable for customers. Interconnectors are common around the world including in Australia. They play a critical role in supporting Australia's transition to a clean energy future.

1.3 Regional context

The onshore component of the project in Victoria falls within the Gippsland Plain and Strzelecki Ranges bioregions, and the South Gippsland Shire and Latrobe City Council local government areas.

Over the past 200 years, the region has seen widespread and extensive clearing of the native woodlands and forest that would have once persisted across much of the alignment. The landscape is now dominated by agricultural industries (primarily pastoral however some horticulture, notably potato, is prominent in parts) and exotic softwood plantations (particularly between Mirboo North and Latrobe Valley).

As a result, native vegetation and associated habitats are largely restricted to small, fragmented patches of remnant and planted woodlands and scattered trees remaining along road reserves, property boundaries and creek lines. Within the entire alignment, only a small number of locations have extensive areas of native vegetation within and adjoining the survey area, including where the route traverses the foothills of the Strzelecki Ranges, woody vegetation cover increases, particularly along roadsides, creeks and gullies. Dense native and exotic plantations feature more prominently in the ranges north of Mirboo North, interspersed with larger patches and narrow corridors of native vegetation along creek lines and harvesting buffers.

1.4 Assessment context

Assessment of impacts to terrestrial ecological values is a key consideration at all levels of government in Australia. The purpose of such assessments is to understand the ecological values present in a project area and ways to avoid and minimise impacts to the natural environment, and in particular values which are considered significant at a local, state and/or national level.

In general, key terrestrial ecological values that are considered in this context include:

- Native vegetation and associated habitats representing ecological communities which are indigenous to the region.
- Threatened species that are recognised under state and/or national legislation.
- Threatened ecological communities (TECs) that are recognised under state and/or national legislation.

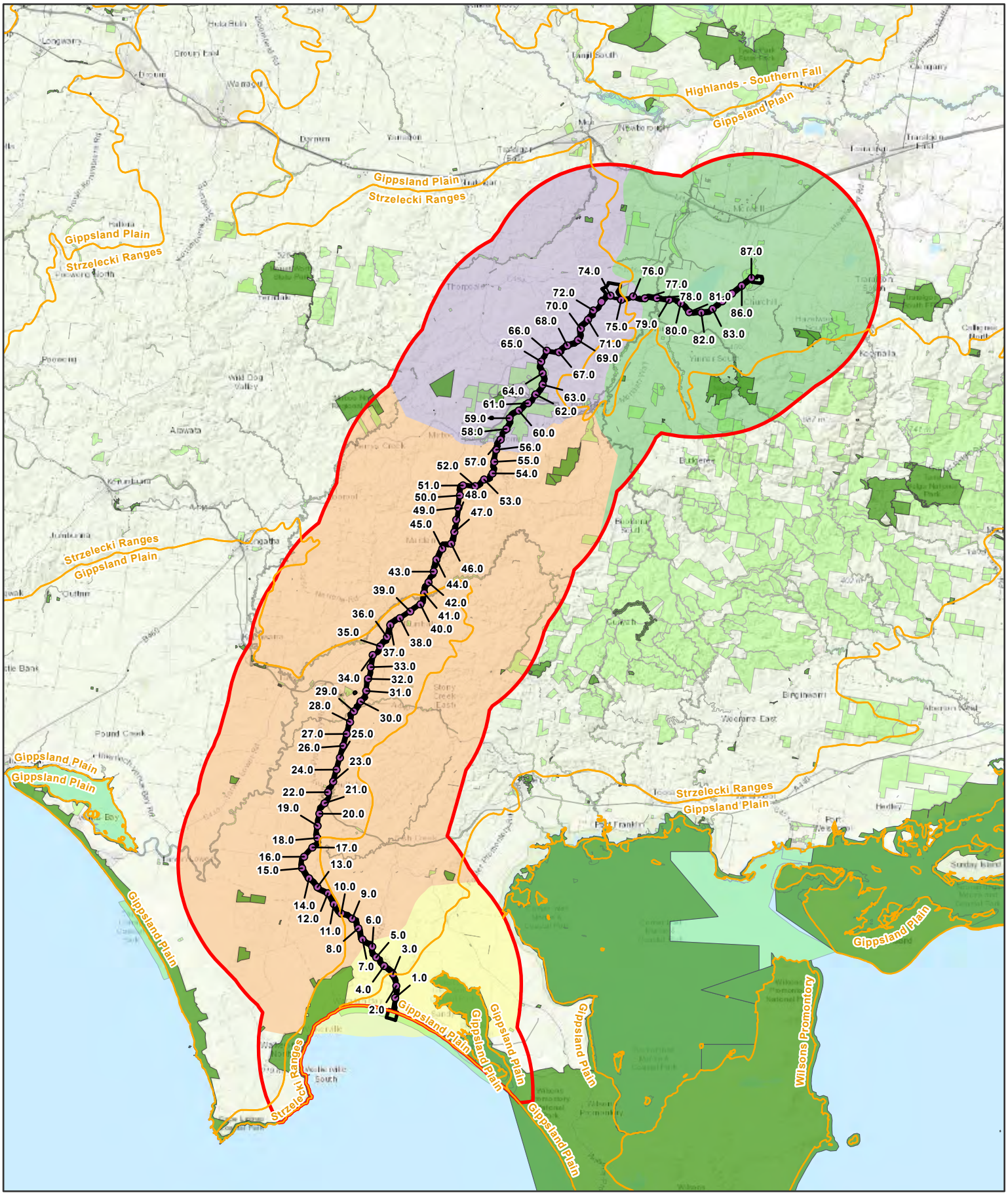

Figure 1. Regional context and projects areas

- Study area
- Survey areas
- Bioregion
- Parcels
- Major Watercourse
- Kilometre points

- Public Land
- Parks and Reserves

Landscape region

- LaTrobe Valley
- Strzelecki Ranges
- Tarwin Valley
- Waratah Bay

0 5 10 20
Kilometers

Datum/Projection:
GDA 1994 MGA Zone 55

Project: 14807 Date: 13/07/2023

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2. Assessment Guidelines

This section outlines the assessment guidelines relevant to terrestrial ecology and the linkages to other EIS/EES technical studies. A single consolidated EIS/EES is being prepared to address the requirements of all the Commonwealth and Victorian jurisdictions including the requirement for an EES. This report will use the term EIS/EES going forward.

2.1 Commonwealth

DCCEEW have published the following guidelines for the EIS: '*Guidelines for the Content of a Draft Environmental Impact Statement – Environment Protection and Biodiversity Conservation Act 1999* – Marinus Link underground and subsea electricity interconnector cable (EPBC 2021/9053)'. It specifically addresses sections 4.3.1, 5.1, 5.5, 5.9, 5.11, 6 and 7 of the guidelines and presents:

- A description of the environment of the proposed site and the surrounding areas that may be impacted by the action.
- A description of listed species, which includes listed threatened species and ecological communities (EPBC Act sections 18 and 18A) and listed migratory species (EPBC Act sections 20 and 20A) at the proposed development site and in areas that may be impacted by the action.
- A description of all the relevant impacts of the action on Matters of National Environmental Significance (MNES), including:
    - direct and indirect impacts.
    - consequential and facilitated impacts.
    - cumulative impacts.
- Information on proposed environmental performance requirements (EPRs), and any specific avoidance, management, and mitigation measures to deal with the relevant impacts of the proposed action on MNES.

2.2 Victoria

The EES Scoping Requirements issued by the Minister for Planning (February, 2023) outline the specific matters to be assessed across a number of environmental and social disciplines relevant to the project, and to be documented in the EES for the project.

The EES Scoping Requirements inform the scope of the EES technical studies and define the EES evaluation objectives. The EES evaluation objectives identify the desired outcomes to be achieved and provide a framework for an integrated assessment of the environmental effects of a proposed project.

The EES evaluation objective contained in Section 4.1 of the EES scoping requirements that is relevant to this terrestrial ecology assessment is:

> *Avoid, and where avoidance is not possible, minimise adverse effects on terrestrial, aquatic and marine biodiversity and ecology, including native vegetation, listed threatened species and ecological communities, other protected species and habitat for these species, and to address offset requirements consistent with state policies.*

In accordance with the EES Scoping Requirements for the project, this report presents:

- The existing environment, including the type, distribution, and condition of biodiversity values.
- Likely direct and indirect effects of the project on native vegetation, listed ecological communities, and listed threatened and other protected flora species.
- Identify and describe potential alternatives, proposed design options and mitigation measures, and their expected effectiveness in avoiding or reducing significant effects on native vegetation, listed ecological communities, and listed threatened and other protected flora species.

3. Legislation, policy and guidelines

3.1 Commonwealth

The *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) is Commonwealth legislation that protects species, habitats, and places of national and international significance. These matters are referred to collectively as Matters of National Environmental Significance (MNES). There are nine MNES recognised under the Act. These are;

- World Heritage properties.
- National Heritage places.
- Great Barrier Reef marine park.
- Nationally listed threatened species and ecological communities.
- Migratory species as listed under the Japan-Australian Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA), Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), Bonn Convention and Agreement on the Conservation of Albatrosses and Petrels (ACAP).
- Ramsar wetlands of international importance.
- Commonwealth marine areas.
- Nuclear actions (including uranium mining).
- A water resource, in relation to coal seam gas development and large coal mining development.

For the MNES of migratory species and Ramsar sites values are also considered in the context of internationally significant habitat for migratory shorebirds. A total of 37 species of migratory shorebird species migrate to and from Australia each year. Of these species 36 form part of the East Asian-Australasian Flyway (EAAF). Australia is one of 23 member countries of *The Partnership for the Conservation of Migratory Waterbirds and the Sustainable Use of their Habitats in the EAAF*.

Where a development or activity (action) has the potential to have a significant impact on a MNES, a referral is required to the Department of Climate Change, Energy, the Environment and Water (DCCEEW). The DCCEEW provides guidelines on assessing whether a proposed action is likely to have a significant impact on an MNES and therefore whether a referral is likely to be required.

Actions referred under the EPBC Act are assessed by the Minister or delegate who first determines if an action is a controlled action, not a controlled action or clearly unacceptable. For controlled actions the minister then determines how impacts will be further assessed. Finally, the minister decides whether to approve the controlled action, and what if any, approval conditions apply.

3.2 Victoria

Environment Effects Act 1978

The *Environment Effects Act 1978* (Vic) (EE Act) requires the preparation of an EES for activities considered to have, or to be capable of having, a significant effect on the environment. Triggers for an EES are set out as referral criteria in the *Ministerial Guidelines for Assessment of Environmental Effects under the EE Act* (DTP 2023).

Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act 1988* (Vic) (FFG Act) regulates the protection and management of biodiversity including the conservation of threatened species and communities and the management of threatening processes.

Permits are required to take, remove, or disturb listed and/or protected flora species, listed communities and fish on public land. Listed fauna species are also protected under the *Wildlife Act 1975* (Vic).

Native vegetation removal (NVR) guidelines

The Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017; the 'Guidelines') describes Victoria's state-wide policies in relation to assessing and compensating for the removal of native vegetation. This includes the assessment of impacts from removing native vegetation, and how offsets are calculated to compensate for the loss of biodiversity values. The Guidelines are incorporated into the Victorian Planning Provisions and all planning schemes in Victoria including local council planning schemes.

Planning and Environment Act 1987

The *Planning and Environment Act 1987* (Vic) (P&E Act) governs the use, development, and protection of land in Victoria. The P&E Act provides an integrated framework for planning policies and considerations across local, regional and state levels of governance and land use. These are incorporated through the Victorian Planning Provisions and enacted under the municipal planning scheme through legal instruments such as planning permits and precinct plans.

Wildlife Act 1975

The *Wildlife Act 1975* (Vic) (Wildlife Act) protects and provides for management of wildlife (fauna) in Victoria. The purpose of the Wildlife Act is to provide procedures for the protection and conservation of wildlife, the prevention of wildlife extinction, sustainable use and access to wildlife, and prohibit and regulate interactions with wildlife.

The Wildlife Act regulates interactions with wildlife including both native and non-native terrestrial species, and is the main legislation determining licensing relating to wildlife along with the FFG Act for threatened and protected taxa.

The *Wildlife Regulations 2013* provides for changes in licensing for the possession, use and trade of wildlife and further instruments for protecting wildlife under Part 2 – Protection of Wildlife including that a 'Person not to damage, disturb or destroy any wildlife habitat' under Section 42 of the regulations.

Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (Vic) (CaLP Act) is the legislative instrument for preventing land degradation and defining catchment planning and land management responsibilities.

The CaLP act has provisions for pest animals and noxious weeds and sets out requirements for landowners (including the Crown) in relation to these matters and land management practices. Under the CaLP Act, landowners have responsibilities set out for different categories of weeds which are listed by species in a 'declared list of noxious weeds'. These categories include State Prohibited Weeds, Regionally Prohibited Weeds, Regionally Controlled Weeds, and Restricted Weeds.

Crown Land (Reserves) Act 1978

Crown Land or State Land are public lands without a specific tenure and may be reserved for particular public uses. Most of the land held by the Victorian Government is Crown land reserved for national parks and state forests but also includes government roads and road reserves.

In Victoria Crown land is managed under the *Crown Land (Reserves) Act 1978* (Vic), which provides for the reservation of Crown Land for various public purposes including preserving areas of ecological significance and the development of public utilities. It also provides for the management of such reserved lands through powers, licences, offences, and penalties.

Marine and Coastal Act 2018

The *Marine and Coastal Act 2018* (Vic) governs the planning and management of the marine and coastal environments in Victoria. The act aims to provide an integrated and coordinated approach in order to protect the coastline and address long-term challenges such as climate change, population growth and ageing coastal structures. The Act outlines particular objectives and guiding principles, and contains offences for unauthorised development on coastal land.

4. Project description

4.1 Overview

Marinus Link is proposed to be implemented as two 750 MW circuits to meet transmission network operation requirements in Tasmania and Victoria. Each 750 MW circuit will comprise two power cables and a fibre-optic communications cable bundled together in Bass Strait and laid in a horizontal arrangement on land. The two 750 MW circuits would be installed in two stages with the western circuit being laid first as part of stage one, and the eastern cable in stage two.

The key project components for each 750 MW circuit, from south to north are:

- High voltage alternating current (HVAC) switching station and HVAC- HVDC converter station at Heybridge in Tasmania. This is where the project will connect to the North West Tasmania transmission network being augmented and upgraded by the North West Transmission Developments.
- Shore crossing in Tasmania adjacent to the converter station.
- Subsea cable across Bass Strait from Heybridge in Tasmania to Waratah Bay in Victoria.
- Shore crossing at Waratah Bay approximately 3 km west of Sandy Point.
- Land-sea cable joint where the subsea cables would connect to the land cables in Victoria.
- Land cables in Victoria from the land-sea joint to the converter station site in the Driffield or Hazelwood areas.
- HVAC switching station and HVAC-HVDC converter station at Driffield or at Hazelwood, where the project would connect to the existing Victorian transmission network.

A Transition Station at Waratah Bay may also be required if there are different cable manufactures or substantially different cable technologies adopted for the land and subsea cables. The location of the transition station will also house the fibre optic terminal station in Victoria. However, regardless of whether a transition station is needed, a fibre optic terminal station will still be required in the same location. The key project components are shown in Diagram 1.

Approximately 255 kilometres (km) of subsea HVDC cable will be laid across Bass Strait. The preferred technology for Marinus Link is two 750 megawatt symmetrical monopoles using ±320 kV, cross-linked polyethylene insulated cables and voltage source converter technology. Each symmetrical monopole is proposed to comprise two identical size power cables and a fibre-optic communications cable bundled together. The cable bundles for each circuit will transition from approximately 300 m apart at the HDD (offshore) exit to 2 km apart in offshore waters.

In Victoria, the shore crossing is proposed to be located at Waratah Bay with the alignment crossing at the Waratah Bay–Shallow Inlet Coastal Reserve. From Waratah Bay the cable will run northwest to the Tarwin River Valley and then travel to the north to the Strzelecki Ranges. The route crosses the ranges between Dumbalk and Mirboo North before descending to the Latrobe Valley where it turns northeast to Hazelwood. The Victorian converter station will be at either a site south of Driffield or Hazelwood adjacent to the existing terminal station (Figure 1).

The land cables will be directly laid in trenches or installed in conduits in the trenches. A construction area of 20 to 36 m wide will be required for laying the land cables and construction of joint bays. Temporary roads for accessing the construction area and temporary laydown areas will also be required to support construction. Where possible, existing roads and tracks will be used for access, for example, farm access tracks or plantation forestry tracks.

Land cables will be installed in ducts under major roads, railways, major watercourses and substantial patches of native vegetation using trenchless construction methods (e.g., HDD), where geotechnical conditions permit. A larger area than the 36 m construction area will be required for the HDD crossings.

The ecological assessment is focused on the Victorian section of the project. This report will inform the EIS/EES being prepared to assess the project's potential environmental effects in accordance with the legislative requirements of the Commonwealth and Victorian governments (Diagram 1).

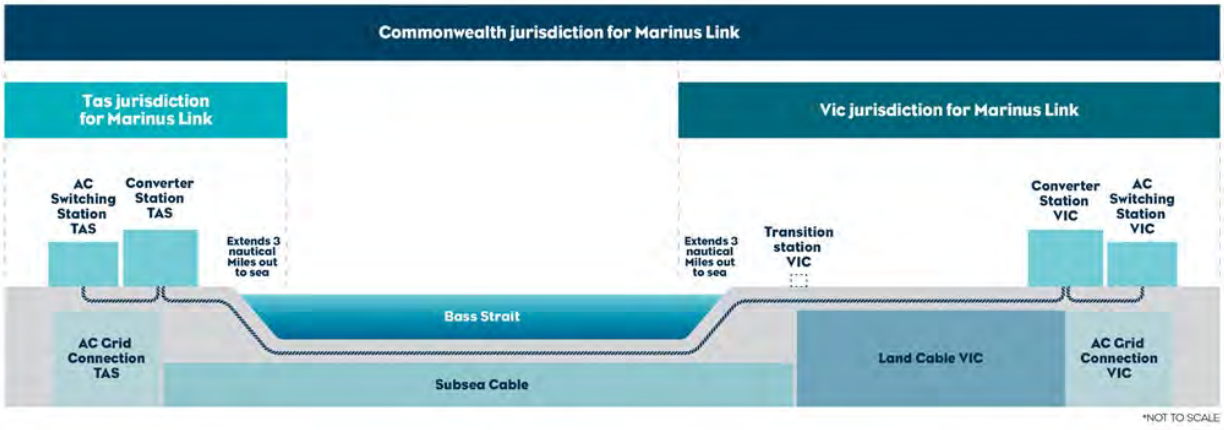

Diagram 1. Project components considered under applicable jurisdictions (Marinus Link Pty. Ltd. 2022).

If approved, the project will be constructed over a four-to-seven-year period. Cabling activities for the first 750 MW stage are anticipated to be completed by 2030, with Stage 2 to follow, with final timing to be determined by market demand. The project will be designed for an operational life of at least 40 years.

4.2 Construction

Marinus Link will be constructed in two 750 MW stages, each stage will have three cables bundled together in Bass Strait and laid in a single trench on land. For the land cables, the trench conduits and HDD ducts for both 750 MW links will be installed as part of stage one to reduce disturbance to properties, land use and farming activities.

Stage one will involve site establishment and hardstand areas constructed for the HVDC converter station, HVAC switching station and transition station sites. It will also involve all site establishment, civil works, trenching and installation of conduits, and installation of cable joint pits for Marinus Link 1 and Marinus Link 2. The land and subsea cables will be laid in each stage. This is to ensure that the cable barge is available for any rehabilitation activities that are required throughout the cable testing phase in Stage two.

The works in stage two will primarily be construction of the second HVDC Converter, laying of the land based and subsea Marinus Link 2 cables, completing the testing and commissioning, and any remaining site rehabilitation.

The key construction activities for land cables are:

- Establishing laydown areas, site offices and amenities.
- Site establishment e.g., constructing site entries and gates, access roads and tracks to the construction corridor, weed and pathogen wash-down facilities, and stock proof fencing, where required and agreed with landowner / land manager.
- Topsoil stripping and stockpiling.
- Constructing haul roads along the construction working corridor.
- HDD and duct installation at road, watercourse and third-party infrastructure crossings.
- Excavation of trenches and stockpiling of subsoil separate from topsoil.
- Installation of conduits and thermal backfill. Imported thermal backfill will be required where the native soil does not have the required heat dissipating properties.
- Backfilling trenches with subsoil and topsoil to reinstate soil horizons and reinstatement of the construction corridor except at cable joint pits and where equipment (e.g., caterpillar) required to assist cable installation, e.g., at bends and HDD crossings.
- Construction (in-situ) or installation (pre-cast modules) of cable joint pits.
- Pulling of land cables through the conduits between adjacent cable joint pits.
- Cable jointing.
- Backfilling and reinstatement of cable joint pit workspaces.

Where technically feasible, HDD may be used to drill beneath suitable features such as waterways, utilities or infrastructure and/or vegetated areas. HDD requires the excavation of an exit pit on the opposite side to where the drilling rig is set up to contain drilling fluids used to assist in the drilling process. A smaller entry pit approximately half the size of the exit pit is excavated on the drilling rig side for the same reason as described above. A curved bore hole is then drilled so it passes at a minimum of two metres below the hard invert of the drains/creeks, or at least 0.6 metres below any vegetation (i.e., outside the TPZ). The transmission cable is then pulled through the duct installed in the bore hole. The drilling fluids that are used to assist the process are monitored through the logging of fluid inputs and returns.

Alternatively, directional boring may be used to cross shorter distances requiring greater structural support. This will involve excavation of two pits on either side of the feature down to the depth required. A hole will be bored between the two pits with an encasing pipe pulled into the hole immediately behind the bore head to ensure full ground support at all times. The pits holes will be backfilled and ground surface reinstated.

It is intended that the Victorian shore crossing will be constructed using HDD to approximately 10 m water depth. The subsea cables will be installed in ducts inserted into the HDD boreholes. Up to 1 ha is required for the HDD drill pad, which will be located as close to the coastal reserve as possible (without being within the coastal reserve). The HDDs are expected to be between 800 m and 1,200 m long. Three boreholes will be required for each circuit, one for each power cable and one for the fibre-optic cable.

HDD from farmland adjacent to the coastal reserve is expected to be feasible for the Victorian shore crossing at Waratah Bay. The Waratah Bay foreshore will not be closed during construction, unless required to manage public safety concerns at the time, in which case disruption will be short term and temporary.

Approximately 12 months of drilling will be required to construct both circuits.

Where required or practicable, in response to conditions or values on-ground, the project alignment may be mircro-sited or realigned to avoid or mitigate impacts. Where micro-siting of the project alignment occurs, EPRs will be reapplied to confirm that impacts are no greater than those assessed in this report or the EIS/EES.

4.3 Operation

Marinus Link will operate 24 hours per day, 365 days per year over an anticipated minimum 40-year operational lifespan.

Operation and maintenance activities include:

- Routine inspections of the land cable easement for potential operational and maintenance issues, including:
    - Unauthorised activities and structures.
    - Land stability.
    - Rehabilitation issues.
    - Weed infestations resulting from construction activities.
    - Cover at watercourse crossings.
- Periodic inspection of the subsea project alignment by remotely operated vehicles.
- Remote monitoring of shipping activity near the subsea cables for potential anchoring issues.
- Servicing, testing and repair of the subsea and land cables, transition station and converter stations equipment and infrastructure including scheduled minor and major outages.
- Maintenance of access tracks.

4.4 Decommissioning

The operational lifespan of the project is a minimum of 40 years. At this time the project will be either decommissioned or upgraded to extend its operational lifespan.

Decommissioning will be planned and carried out in accordance with regulatory and landowner or land manager requirements at the time. A decommissioning plan in accordance with approvals conditions will be prepared prior to planned end of service and decommissioning of the project.

Requirements at the time will determine the scope of decommissioning activities and impacts. The key objective of decommissioning is to leave a safe, stable and non-polluting environment, and minimise impacts during the removal of infrastructure.

In the event that Marinus Link the project is decommissioned, all above-ground infrastructure will be removed, and associated land returned to the previous land use or as agreed with the landowner or land manager.

Decommissioning activities required to meet the objective will include, as a minimum, removal of above ground buildings and structures. Remediation of any contamination and reinstatement and rehabilitation of the site will be undertaken to provide a self-supporting landform suitable for the end land use.

Decommissioning and demolition of project infrastructure will implement the waste management hierarchy principles being avoid, minimise, reuse, recycle and appropriately dispose. Waste management will accord with applicable legislation at the time.

Decommissioning activities may include recovery of land cables and removal of land cable joint pits. Recovery of land cables would involve opening the cable joint pits and pulling the land cables out of the conduits, spoiling them onto cable drums and transporting them to metal recyclers for recovery of component materials. The conduits would be left in-situ as removal would cause significant environmental impact.

The concrete cable joint pits would be broken down to at least one metre below ground level and buried in-situ or excavated and removed.

A decommissioning plan will be prepared to outline how activities will be undertaken and potential impacts managed.

5. Assessment Method

5.1 Study area

The nominated assessment areas are based on the Victorian terrestrial project alignment and infrastructure locations provided by Tetra Tech Coffey Pty Ltd (and endorsed by MLPL). Based on these designs (Revision J), the following areas have been established for the purpose of informing the terrestrial ecology assessments in Victoria:

- Area of Disturbance (AoD) – the area in which construction and operation works will occur and therefore result in direct impacts to ecological values, consisting of:
    - A 20 m to 36 m wide works corridor based on the project alignment.
    - The building footprints associated with the proposed converter stations at Driffield and Hazelwood, and transition station at Waratah Bay.
    - Footprints associated with cable trenches including joint pits.
    - Laydown and work areas, including entry and exit points of proposed HDD sites to accommodate drilling equipment.
    - Access tracks, assuming a maximum 10 m wide corridor.
    - Roadsides where road upgrade works are proposed to facilitate heavy vehicle traffic movements on local roads.
    - Excludes marine and intertidal environments due to the proposed use of HDD to avoid the beach and dune system in Waratah Bay.
    - Excludes underground sections of HDD or other trenchless construction methods where they are currently proposed, such as waterways, sealed roads, native vegetation or habitat, and the foreshore crossing at Waratah Bay.
    - Excludes any pre-construction activities including geotechnical investigations.
- Survey area – an approximately 220 m wide corridor encompassing the AoD in which the final project alignment and associated infrastructure will occur. This area extends from the beach crossing on the shore of Waratah Bay to the greater Hazelwood area.
- Study area – an area sufficient to inform desktop review of the likely occurrence of ecological values within the survey area. This equates to a roughly 10 km search radius either side of the survey area depending on the nature of the landscape and the values in question.

5.2 Landscape regions

To assist with determining the likely presence and distribution of values, and subsequent presentation of results, the study area has been split into four regions based on similar landforms and associated vegetation and habitats (Figure 1). This includes:

- Waratah Bay – extending from the coastline (Kilometre Point [KP] 0) to Fish Creek-Walkerville Road (KP 6.4), this region encapsulates the beach and coastal dune system, low-lying coastal plains and foothills surrounding the plains and bay. This environment is heavily influenced by coastal processes and geomorphology.
- Tarwin Valley – this region is broadly classified by undulating farmland consisting of low hills and river flats associated with the Tarwin River catchment. Whilst relief in the south (KP 6.4) is relatively

low, this rises north of the Tarwin River East Branch as elevation increases through to Mirboo North (KP 56.3).

- Strzelecki Ranges – encapsulating the highest elevations within the survey area, this region extends from Mirboo North (KP 56.3) through a mixture of plantation and native forests to the upper river terraces of the Latrobe Valley (KP 76.6).
- Latrobe Valley – extending from Yinnar-Driffield Road (KP 76.6) through to the AusNet Terminal station on Tramway Road, this region covers farmlands on the river terraces and floodplains of the Morwell River.

5.3 Assumptions and limitations

Given the scale of the assessment, the following assumptions and limitations are recognised (Table 1).

Table 1. Assumptions and limitations

Matter	Response
Land access	Not all land parcels were accessible during the field surveys, preventing field teams from validating and assessing vegetation and habitat that may be present within these areas, or conducting targeted species surveys. Further detail on how this is addressed for each matter is provided below. Further surveys of sensitive locations considered to be at risk of impact are expected to be completed in 2023 as land access becomes available.
Unassessed native vegetation	Where access was unavailable, Eco Logical Australia (ELA) has mapped vegetation based on aerial imagery and field observations from adjoining land, and used modelled condition scores to attribute a relative value to the vegetation for use in the impact analysis. Some of this vegetation is likely exempt from requiring offsets, due to either being exotic or a planted native species, however as access was not available ELA has taken a conservative approach and assumed all impacted, non-validated vegetation is native (for further information see Section 6.2). Given the predominantly agricultural landscape through which the alignment passes, and the prevalence of planted exotic and non-indigenous native species along fence lines and properties boundaries, the impacts to native vegetation has likely been over-estimated. Confirmation of the nature and extent of unassessed vegetation will be done prior to construction commencing and used in the final offset analysis.
Unassessed habitat for threatened species	Where access was unavailable, threatened species habitat and the occurrence of threatened species has been determined based on a review of all information currently available (e.g. aerial imagery, observations from a distance, desktop assessments and the results of surveys in adjoining parcels/properties). Where this information cannot be used to conclusively rule out the presence of threatened species, the species in question has been assumed present for the purpose of the impact assessment, with avoidance and mitigation recommended accordingly. Further surveys will be completed prior to construction commencing to confirm the presence of suitable habitat and threatened species, and controls reviewed accordingly. Detailed information on threatened species, including potential, unassessed habitats, is provided in Section 6.3.
Threatened ecological communities	Whilst there remain sections of the survey area which were not assessed due to access constraints, these do not coincide with land considered likely to support threatened ecological communities. As a result, the survey effort is considered adequate to determine the extent and presence of TECs within the survey area and no further investigations are required. See section 6.4 for further information.

Matter	Response
Impacts within unassessed land	As discussed above, where there is considered to be a reasonable likelihood a value will occur within land that has not been surveyed, it will be assumed present and the impacts assessed accordingly based on the likely extent of habitat and construction approach proposed. Appropriate measures to avoid or minimise impacts will also be proposed based on all available information, and the post-mitigation impacts determined accordingly. This will ensure the impact assessment adopts a precautionary approach where information is insufficient, which will be reviewed once accessed has be obtained and surveys completed.

5.4 Database and literature review

A desktop review was completed on 26 May 2023 to identify ecological values which may occur within the survey area and gather associated supporting information. The review built on the *Terrestrial Ecology Baseline Study – Marinus Link* (ELA 2021), and considered::

- Commonwealth and state biological databases including EPBC Act Protected Matters Search Tool, Victorian Biodiversity Atlas, Nature Kit, the Native Vegetation Information Management system and Visualising Victoria's Biodiversity.
- The Department of the Environment, Land, Water, and Planning (DELWP) 2017 Native Vegetation spatial layers, including Location Risk and Strategic Biodiversity Value maps, and habitat importance and vegetation extent/condition models.
- Publicly available aerial imagery, including current and historical images from Google Earth, DELWP and ESRI.
- Relevant scientific literature.
- Policy documents, including listing advice and recovery plans for threatened species and communities.
- Previous relevant ecology assessment reports, including those relating to the proposed Delburn Wind farm.
- Relevant state environmental legislation and regulations (Section 3).

Species that are listed Marine species under the EPBC Act were not considered as part of the terrestrial assessment even though they appeared in the PMST searches. Separate marine ecology assessments have been completed to determine potential impacts to listed marine species, including those that appear within the PMST searches.

5.5 Preliminary site survey

A preliminary survey of the proposed project alignment was conducted by ELA between 12 and 14 September 2018. The aim of this survey was to identify environmental values within the landscape to inform route selection and provide input into the baseline characterisation study. The survey involved:

- Documenting the general nature and extent of native vegetation and landscape characteristics along the project alignment.
- Identifying potential habitat for threatened flora and fauna species where possible.

Surveys were conducted from public land where access could be obtained by vehicle. As a result, parts of the alignment were not inspected or only observable at a distance. In such instances, aerial imagery and desktop review was used to determine the likely presence of ecological values.

5.6 Vegetation quality assessments

Detailed vegetation quality assessments were conducted between June 2021 and December 2022 to determine the extent, condition and significance of native vegetation within the study area (Table 2). Assessments were undertaken in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) and will be used to inform avoidance, minimisation and offset measures.

As a minimum, the following information was recorded:

- The location and nature of remnant vegetation, including its origin, ecological vegetation class (EVC) and vegetation condition score in accordance with the Vegetation Quality Assessment (VQA) method (DSE, 2004).
- The location and nature of all scattered trees and large trees within patches. This included the species, origin, size class and where applicable, the diameter at breast height of trees, for the purpose of calculating tree protection zones (TPZs). Small trees within patches adjacent to the AoD were also recorded for the purpose of calculating indirect impacts to adjacent vegetation.

Further surveys are expected to be completed as land access becomes available for sensitive locations considered to be at risk of impact.

5.7 Groundwater Dependant Ecosystems

The Groundwater Dependant Ecosystem (GDE) section of this assessment was informed by the groundwater impact assessment prepared for the project (Tetra Tech Coffey 2023).

The findings of the groundwater impact assessment (Section 5.5.6 and Figure 5.5) were compared against the findings of the vegetation quality assessments undertaken by ELA. The comparison of data aims to determine what impacts to the terrestrial component of these GDEs may arise as a result of the project (i.e. the vegetation and associated habitats).

Potential impacts to the modelled GDEs were then assessed in conjunction with those already outlined in Section 7.2.2 of the groundwater impact assessment report.

5.8 Habitat condition surveys

Habitat surveys were undertaken between June 2021 and December 2022 (Table 2). The purpose of these surveys was to assess the extent and quality of habitat for flora and fauna across the study area, including identifying priority habitats for all threatened species identified during the database and literature review (Appendix 2). Priority habitats are those considered to meet the preferred habitat requirements for a given species and are further defined in the context of the impact assessment framework in section 5.12. Surveys to identify priority habitats were done in conjunction with the VQA assessments.

This information was used to inform the likelihood of occurrence assessment, parameters for targeted surveys and assess the significance of impacts on species in accordance with relevant referral criteria under the EPBC Act and EE Act.

As a minimum, the following information was recorded:

- The extent and quality of habitat across the study area.
- Mapping and assessment of priority habitats for threatened species such as hollow-bearing trees and other micro-habitat features.

Further surveys of sensitive locations considered to be at risk of impact are expected to be completed in 2023 as land access becomes available.

Table 2. Vegetation quality assessments and habitat condition surveys

Survey period	Locations
28 June – 2 July 2021	Waratah Bay, Tarwin Valley
12 – 16 July 2021	Waratah Bay, Tarwin Valley, Strzelecki Ranges, Latrobe Valley
9 – 13 August 2021	Tarwin Valley, Strzelecki Ranges, Latrobe Valley
15 – 26 November 2021	Tarwin Valley, Strzelecki Ranges, Latrobe Valley
6 – 10 December 2021	Waratah Bay, Tarwin Valley, Strzelecki Ranges, Latrobe Valley
22 – 23 December 2021	Strzelecki Ranges
14 – 17 June 2022	Strzelecki Ranges
16 – 18 August 2022	Waratah Bay, Tarwin Valley
19 – 23 December 2022	Tarwin Valley

5.9 Threatened fauna surveys

Threatened fauna surveys were undertaken between November 2018 and December 2022. The purpose of these surveys was to confirm the presence or absence of threatened fauna species that were deemed likely to occur within the study area based on the preliminary ecology baseline assessment, desktop review and habitat condition assessments. Targeted surveys were undertaken in accordance with State and Commonwealth guidelines, with survey techniques, survey effort and timing, described below, and a summary of target species shown in Table 3. Targeted surveys were not undertaken for *Antechinus minimus maritimus* (swamp antechinus) due to access constraints. Targeted surveys were also not undertaken for the aquatic species *Galaxiella pusilla* (dwarf galaxias), *Nannoperca* sp. 1 (flinders pygmy perch), *Prototroctes maraena* (Australian grayling) and *Ornithorhynchus anatinus* (platypus) due to land access constraints and proposed avoidance of major waterways.

Table 3. Summary of threatened fauna species targeted surveys.

Scientific Name	Common Name	FFG Act listing*	EPBC Act listing*	Targeted survey technique
Accipiter novaehollandiae	Grey Goshawk	EN		Diurnal bird surveys (section 5.9.4)
Ardea alba modesta	Eastern Great Egret	VU	Ma	Diurnal bird surveys (section 5.9.4)
Aythya australis	Hardhead	VU		Diurnal bird surveys (section 5.9.4)
Biziura lobata	Musk Duck	VU	Ma	Diurnal bird surveys (section 5.9.4)
Botaurus poiciloptilus	Australasian Bittern	CE	EN	Diurnal bird surveys (section 5.9.4)
Bubulcus ibis	Cattle Egret		Ma	Diurnal bird surveys (section 5.9.4)
Calidris alba	Sanderling		Ma, Mi	Shorebird surveys (section 5.9.9)

Scientific Name	Common Name	FFG Act listing*	EPBC Act listing*	Targeted survey technique
Calidris canutus	Red Knot	EN	EN, Ma, Mi	Shorebird surveys (section 5.9.9)
Calidris ruficollis	Red-necked Stint		Ma, Mi	Shorebird surveys (section 5.9.9)
Callocephalon fimbriatum	Gang-gang Cockatoo		EN	Diurnal bird surveys (section 5.9.4)
Charadrius bicinctus	Double-banded Plover		Ma, Mi	Shorebird surveys (section 5.9.9)
Charadrius leschenaultii	Greater Sand Plover	VU	VU, Ma, Mi	Shorebird surveys (section 5.9.9)
Charadrius mongolus	Lesser Sand Plover	EN	EN, Ma, Mi	Shorebird surveys (section 5.9.9)
Charadrius ruficapillus	Red-capped Plover		Ma	Shorebird surveys (section 5.9.9)
Egretta garzetta	Little Egret	EN	Ma	Diurnal bird surveys (section 5.9.4)
Engaeus phyllocercus	Narracan Burrowing Crayfish	EN		Norrocky traps (section 5.9.3)
Euastacus neodiversus	South Gippsland Spiny Crayfish	EN		Norrocky traps (section 5.9.3)
Falco subniger	Black Falcon	CE		Diurnal bird surveys (section 5.9.4)
Gallinago hardwickii	Latham's Snipe		Ma, Mi	Diurnal bird surveys (section 5.9.4)
Haliaeetus leucogaster	White-bellied Sea-Eagle	EN	Ma	Diurnal bird surveys (section 5.9.4)
Hieraaetus morphnoides	Little Eagle	VU		Diurnal bird surveys (section 5.9.4)
Hirundapus caudacutus	White-throated Needletail	VU	VU, Ma, Mi	Diurnal bird surveys (section 5.9.4)
Hydroprogne caspia	Caspian Tern	VU	Ma, Mi	Shorebird surveys (section 5.9.9)
Ixobrychus dubius	Australian Little Bittern	EN		Diurnal bird surveys (section 5.9.4)
Lewinia pectoralis	Lewin's Rail	VU		Diurnal bird surveys (section 5.9.4)
Lissolepsis coventyri	Swamp skink	EN	EN	Artificial refuges (tiles) Box (Elliot) trapping
Litoria raniformis	Growling Grass Frog	VU	VU	Call playback and spotlighting, dip netting (section 5.9.6)
Myiagra cyanoleuca	Satin Flycatcher		Ma, Mi	Diurnal bird surveys (section 5.9.4)
Neophema chrysostoma	Blue-winged Parrot		VU, Ma	Diurnal bird surveys (section 5.9.4)
Ninox connivens	Barking Owl	CE		Spotlighting and call playback (section 5.9.7), acoustic recorders (section 5.9.10)
Ninox strenua	Powerful Owl	VU		Spotlighting and call playback (section 5.9.7), acoustic recorders (section 5.9.10)

Scientific Name	Common Name	FFG Act listing*	EPBC Act listing*	Targeted survey technique
Numenius madagascariensis	Eastern Curlew	CE	CE, Ma, Mi	Shorebird surveys (section 5.9.9)
Oxyura australis	Blue-billed Duck	VU		Diurnal bird surveys (section 5.9.4)
Petauroides volans	Southern Greater Glider	VU	EN	Drone surveys (section 5.9.5)
Pseudemoia rawlinsoni	Glossy grass skink	EN		Artificial refuges (tiles) Box (Elliot) trapping
Pteropus poliocephalus	Grey-headed Flying-fox	VU	VU	Acoustic recorders (section 5.9.10)
Rhipidura rufifrons	Rufous Fantail		Ma, Mi	Diurnal bird surveys (section 5.9.4)
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	VY		Ultrasonic recorders (section 5.9.10)
Sminthopsis leucopus	White-footed dunnart	VU		Box (Elliot) trapping
Spatula rhynchotis	Australasian Shoveler	VU		Diurnal bird surveys (section 5.9.4)
Sternula albifrons	Little Tern	CE	Ma, Mi	Shorebird surveys (section 5.9.9)
Sternula nereis	Fairy Tern	CE	Ma, Mi	Shorebird surveys (section 5.9.9)
Stictonetta naevosa	Freckled Duck	EN		Diurnal bird surveys (section 5.9.4)
Thalasseus bergii	Crested Tern		Ma, Mi	Shorebird surveys (section 5.9.9)
Thinornis cucullatus cucullatus	Hooded Plover	VU	VU, Ma	Shorebird surveys (section 5.9.9)
Tyto novaehollandiae	Masked Owl	CE		Spotlighting and call playback (section 5.9.7), acoustic recorders (section 5.9.10)
Varanus varius	Lace Monitor	EN		Remote cameras (section 5.9.8)

*VU = Vulnerable, EN = Endangered, CE = Critically Endangered, Ma = Marine, Mi = Migratory

5.9.1 Artificial Refuges (Tiles)

Tiles were deployed on 10 November 2022 for detecting the threatened reptiles swamp skink (*Lissolepsis coventyri*) and glossy grass skink (*Pseudemoia rawlinsoni*). A total of 98 tiles were deployed and micro-sited in areas of suitable habitat near drainage lines and damp areas within the Great Southern Rail Trail (Table 4). Tiles were checked four times between 22 November 2022 and 23 December, resulting in a total of 392 tile checks. Weather conditions during the first tile check on 22 November were not ideal due to it being partly cloudy which reduces the likelihood that reptiles will utilise the tile for basking and therefore, detection rates. However, weather conditions during subsequent tile checks were suitable for the detection of the target species. Surveys were undertaken in accordance with best practice and the interim findings of Urlus, de Angelis and Humphrey (2018).

Tiles were inspected at least three times as per *the Forest Protection Survey Program Survey Guideline – Reptile Survey (V4.1)* (DELWP 2020). The survey guidelines state that there should be an interval of at least one week between inspections, however due to time constraints, checks were taken twice within

one week, with at least two days between checks. It is acknowledged this is not in line with the guidelines however, given surveys were undertaken approximately one month apart it is deemed suitable for the purpose of this study.

- 22 November – 13.2°C, partly cloudy
- 25 November – 17.4°C, partly sunny
- 20 December – 16.4 °C, sunny
- 23 December – 16.9 °C, partly cloudy

Table 4. Summary of artificial refuge locations for threatened skinks

KPs / location	Date	Details
KP 23.0 – 23.3	Deployed on 10 November 2022	36 tiles deployed along western side of Great Southern Rail Trail Reserve within Swampy Riparian Woodland.
KP 23.5 – 24.0	Deployed on 10 November 2022	62 tiles deployed along eastern side of Great Southern Rail Trail Reserve within Swampy Riparian Woodland.

5.9.2 Box (Elliott) Trapping

A total of 50 box traps were deployed across areas of suitable habitat as an additional survey technique for swamp skink, glossy grass skink, and white-footed dunnart between 21 and 25 November 2022 (Table 5). Due to poor weather conditions on 21 November 2022 (including heavy rain and hail), only 18 of the 50 traps were deployed, with the remaining 32 traps deployed the morning of the 22 November, equating to a total of 168 trap nights. Box trapping is the recommended method for capture of white-footed dunnart (DSEWPC 2011). Surveys were conducted in accordance with standard practice and animal ethics approval requirements and were generally in accordance with those established for small mammals in the '*Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act*' (DSEWPC 2011) and the interim findings of Urlus, de Angelis and Humphrey (2018).

Traps were deployed a minimum of 10 m apart and micro-sited in optimal habitat. Habitat structure comprised of heathy woodland dominated by swamp paperbark (*Melaleuca ericifolia*) and bracken (*Pteridium esculentum*). Each box trap was baited with rolled oats, peanut butter and sardines. All captured fauna were identified, with the location recorded using GPS.

There was no trapping undertaken for Swamp Antechinus (*Antechinus minimus maritimus*). Suitable habitat for this species is located within the Waratah Bay area, specifically KP3.5-KP6.4, with this area unable to be surveyed due to access constraints. Due to this, a precautionary approach has been taken and this species has been assumed present within this area.

Table 5. Summary of box trap locations

KPs / location	Date	Details
KP 22.6 – 23.4	21 – 25 November 2022	Traps were checked twice daily, once in the morning and once in the evening just before dusk.

5.9.3 Crayfish surveys

Targeted surveys for the threatened Narracan burrowing crayfish (*Engaeus phyllocercus*) and South Gippsland spiny crayfish (*Euastacus neodiversus*) were undertaken at several locations within the

Strzelecki Ranges (Table 6), across a range of habitats that showed signs of recent burrowing activity, including waterways and associated riparian corridors, along drainage lines and roadside swale, and at the discharge points of water-bars. All identified burrow chimneys recorded and mapped using a hand-held GPS (accurate to +/- 3 m). Modified Norrocky traps (utilising flexible corrugated tubing rather than the original rigid smooth tubing) were placed over entrances of burrows which showed signs of apparent recent activity (fresh mud pellets). Norrocky traps consist of a length of tubing with an internal one-way trap-door, which are placed over the burrow in the late afternoon and left overnight to capture any emerging crayfish. Traps were checked daily. Any crayfish found were mapped to the GIS spatial layers, and additional observations were made about traps that had failed to capture crayfish but that showed signs of crayfish activity. Traps were returned within areas that showed crayfish activity and/or good habitat, while traps in less ideal areas that showed no activity were redeployed to more active and favourable habitats. The targeted survey methodology generally conformed with methods as set out in the following papers:

- Improving survey methods and understanding the effects of fire on burrowing and spiny crayfish in the Bunyip and South Gippsland catchments (Bryant et al 2012).
- *Engaeus Erichson* (Decapoda: Parastacidae) capture using two versions of a Norrocky trap (Bryant et al 2014).

Traps were initially deployed from 25 – 28 October 2022 with minimal success (1% capture rate, 10% activity rate), so a second round of surveying was conducted between 23 – 25 November 2022. Both rounds were conducted during wet spring weather, concurrent with likely peak activity related to breeding season and wet conditions.

Species were keyed out in the field using 'A Taxonomic Revision of Species in the Freshwater Crayfish Genus *Engaeus Erichson* (Decapoda:Parastacidae) (Horowitz 1990)', and representative samples were retained for further taxonomic confirmation. The representative samples were sent to species specialist Dr Tarmo Raadik at the Department of Energy, Environment, and Climate Action's (DEECA) Arthur Rylah Institute for identification confirmation. The targeted survey and sample collections were conducted in accordance with the relevant approvals and permits held by Aquatica Environmental.

Table 6. Summary of crayfish targeted surveys

KPs / location	Date and weather	Number of traps deployed
KP 62.4 – 68.0 Damp Forest and Forestry Plantations in Strzelecki Ranges	26 October 2022 14°C, overcast, still, light rain	20 traps
KP 62.4 – 68.0 Damp Forest and Forestry Plantations in Strzelecki Ranges	27 October 2022 14°C, overcast, still, occasional light rain	40 traps
KP 62.4 – 68.0 Damp Forest and Forestry Plantations in Strzelecki Ranges	28 October 2022 13°C, overcast, light breeze, occasional light rain	40 traps
KP 62.4 – 68.0 Damp Forest and Forestry Plantations in Strzelecki Ranges	24 November 2022 14°C, overcast, still, occasional light rain	68 traps

KPs / location	Date and weather	Number of traps deployed
KP 62.4 – 68.0 Damp Forest and Forestry Plantations in Strzelecki Ranges	25 November 2022 16°C, partly cloudy (20%), light breeze, occasional light rain	68 traps

5.9.4 Diurnal bird surveys

Targeted surveys were undertaken for threatened and/or migratory woodland and wetland and wader bird species over four days between 21 – 25 November 2022 within areas of suitable threatened avian habitat and during optimal timing for detection of these species (Table 7). For the purpose of this assessment all birds species predominately associated with inland wetland habitats have been grouped together under the collective terms of waterbirds and waders. This grouping includes ducks, grebes, herons and egrets and select migratory shorebird species such as Latham's Snipe.

A total of thirteen sites were surveyed, with three sites located within the Great Southern Rail Trail Reserve, nine sites located within damp forest within the Strzelecki Ranges, and one site located within a floodplain (targeting inland wetland birds). Visual and auditory surveys were conducted by experienced ecologists using a 15-minute point search sampling method between the hours of 10:30 a.m. and 2:30 p.m.

Weather conditions during each of the surveys were suitable for the detection of woodland bird species and all visual and auditory species identifications were recorded for each point. Patchy rain was recorded throughout the survey days, with temperatures between 13.2 and 16.5 degrees and moderate winds during most surveys (Bureau of Meteorology 2022).

Table 7. Summary of diurnal bird survey effort

Kilometre Points (KPs) / location	Date and time	Habitat	Weather
KP 21.8 Great Southern Rail Trail Reserve	22 November 2022 22 December 2022	Swampy Riparian Woodland	14.5 °C, cloudy, moderate breeze 16.9 °C, light breeze
KP 22.6 – 22.7 Great Southern Rail Trail Reserve	22 November 2022	Swampy Riparian Woodland	13.2°C, cloudy, moderate breeze
KP 23.9 – 24.0 Great Southern Rail Trail Reserve	22 November 2022	Swampy Riparian Woodland	13.2°C, light rain, fresh winds
KP 27.6 Woodland patch bordered by Great Southern Rail Trail Reserve and grazed paddocks	20 December 2022	Damp heathy woodland	16.4 °C, moderate breeze
KP 45.1 Farm dam	20 December 2022	Large farm dam within agricultural land	21.4 °C, gentle breeze

Kilometre Points (KPs) / location	Date and time	Habitat	Weather
KP 48.4 Creek channel within agricultural land	20 December 2022	Creek channel	21.4 °C, gentle breeze
KP 57.4 – 57.5 Strzelecki State Forest adjacent to Slaughteryard Road	24 November 2022 21 December 2022	Damp forest	16.5°C, cloudy, moderate breeze 16.8 °C, moderate breeze
KP 61.4 Pleasant Valley Road reserve	24 November 2022	Damp forest	16.5°C, cloudy, moderate breeze
KP 62.3 Ten Mile Creek Road reserve	21 December 2022	Lowland forest	16.8 °C, moderate breeze
KP 65.0 – 65.1 Ten Mile Creek Road reserve	23 November 2022 21 December 2022	Damp forest	15.7°C, cloudy, moderate breeze 23.3 °C, gentle breeze
KP 65.7 – 65.8 Ten Mile Creek Road reserve	23 November 2022	Damp forest	15.6°C, cloudy, moderate winds
KP 67.0 Internal plantation road reserve	21 December 2022	Damp forest with wetland	23.3 °C, gentle breeze
KP 67.9 – 68.0 Strzelecki Highway Road reserve on edge of plantation	23 November 2022	Damp forest	15.0°C, cloudy, moderate breeze
KP 68.4 – 68.5 Strzelecki Highway Road reserve on edge of plantation	23 -24 November 2022	Damp forest	15.0°C, partly sunny, moderate breeze 14.0°C, cloudy, moderate breeze
KP 69.4 Strzelecki Highway Road reserve on edge of plantation	23 -24 November 2022	Damp forest	15.2°C, cloudy, moderate breeze 15.6°C, sunny, moderate breeze
KP 70.2 Strzelecki Highway Road reserve on edge of plantation	23 -24 November 2022	Damp forest	15.7°C, cloudy, moderate breeze 15.7°C, cloudy, moderate breeze
KP 71.0 Strzelecki Highway Road reserve on edge of plantation	23 -24 November 2022	Damp forest	15.6°C, rain, moderate breeze 14.9°C, cloudy, moderate breeze

Kilometre Points (KPs) / location	Date and time	Habitat	Weather
KP 78.4 – 78.2	21 November 2022 23 November 2022	Floodplain within agricultural land (cattle grazing)	9.2°C, rain, strong breeze 14.9°C, windy, moderate breeze

5.9.5 Drone surveys

Nocturnal drone surveys were undertaken in remnant damp forest within the Strzelecki Ranges on 20 December and 21 December 2022 targeting the greater glider (*Petauroides volans*) and regionally significant koala (*Phascolarctos cinereus victor*) (Table 8). Drones were flown by Field Master Systems with a line of sight up to 1.5 km and a 45-degree camera angle for detection of greater glider within the woodland and forest habitat. Drone surveys were used as the primary method for detection of arboreal mammals for this study based on the large survey area and recent scientific literature which has shown drone surveys to have similar or improved detection rates and efficacy compared with ground-based systematic searches such as spotlighting, which is the standard method used for detection of greater glider and koalas (Witt et al.2020; Vinson et al. 2020; Hodgson et al. 2017).

Target species captured by the drone were marked to ensure that species are not double counted, and details recorded. All captured drone images were identified by Ecocentric Environmental Consulting during the survey to determine target species. Thermal images were used for spotting canopy fauna and for providing context on animal size, position, movement and foraging patterns. Following identification by thermal imagery, colour imagery was then further analyses in the field for confirmation of species identification.

Further analysis of all fauna records using the recoded video footage was undertaken post field survey by Ecocentric Environmental Consulting with confirmed species records transcribed and mapped.

Table 8. Summary of targeted survey effort for greater glider

KPs / location	Date	Habitat
KP 57.2 – 66.0	20 December 2022	Damp Forest in Strzelecki Ranges
KP 66.0 – 71.9	21 December 2022	Damp Forest in Strzelecki Ranges

5.9.6 Frog surveys

Targeted call playback and spotlight surveys for growling grass frog (*Litoria raniformis*) were undertaken on 8 – 9 December 2021 at a single location containing two waterbodies near Mirboo North that were identified as having low-moderate quality habitat for the species (Table 9). Pre-recorded growling grass frog calls were broadcast for 2 minutes followed by 5 minutes of quiet listening and repeated twice. Following call playback, waterbodies were searched for individuals using a handheld spotlight. No additional locations were surveyed during this period due to unsuitable weather for the detection of this species (i.e., an increase in rain and decrease in temperature). No known growling grass frog reference sites were nearby to this location.

Typically, optimal timing for detection of this species is between November and December, when males are actively calling following rain events, however, breeding can occur until March, though detection of

adults later in the breeding season becomes more difficult (DEWHA 2009). Therefore, additional methods of detection including dip netting and bait traps were undertaken on 14 – 15 February 2022 to search for evidence of breeding (tadpoles and metamorphs) at suitable waterbodies in the northern alignment that had not previously been surveyed (Table 9).

Dip netting consisted of 1 m sweeps and agitation of aquatic vegetation along the edges of the waterbodies at each waterbody and six bait traps with fluorescent lights inside were set overnight and checked again in the morning for any tadpoles or metamorphs. The contents of the dip nets and bait traps were emptied into a plastic tray for processing and species capture were recorded.

Based on the presence of moderate-high quality habitat at KP 78.1-78.2 identified during the February 2022 surveys, it was determined that additional surveys were required during peak breeding season to conclusively determine the presence/absence of this species at this location. Reference site checks were undertaken at a nearby location where a known population of growling grass frogs occur, to determine the suitability of the weather and detectability (i.e., calling males). Following the reference site checks, two spotlighting and call playback surveys were undertaken on 26 November and 3 December 2022 at this location. Surveys occurred within a large dam and low-lying depression that contained well-vegetated margins with emergent and submergent macrophytes and herbs; and areas of open water (Table 9).

Spotlighting and call playback surveys were also undertaken near Driffield on 3 December, 10 December and 22 December 2022 following a nearby reference site check. Weather during the surveys was suitable for the detection of growling grass frogs however, none were heard calling at the reference site on 10 and 22 December 2022 (Table 9). Habitat at the survey sites comprised of a large dam with well-vegetated margins with emergent and submergent macrophytes and herbs; and areas of open water. The secondary site was a smaller sediment pond dominated by macrophytes.

All surveys were undertaken in accordance with the EPBC Act *Survey Guidelines for Australia's Threatened Frogs* (DEWHA 2010) and *Significant Impact Guidelines for the Vulnerable Growling Grass Frog Litoria raniformis* (DEWHA 2009b). Spotlighting and call playback surveys were undertaken from dusk.

Table 9. Summary of survey effort for growling grass frog

KPs / location	Date	Type of survey and weather
KP 44.2	8 – 9 December 2021	Spotlighting and targeted call playback 12.4°C, light rain, light breeze; 11.4°C, light rain, moderate breeze
KP 32.0	14 February 2022	Dip netting 24.8 °C, sunny, fresh breeze
KP 34.5 – 35.0	14 February 2022	Dip netting 24.8 °C, sunny, fresh breeze
KP 40.4	14 February 2022	Dip netting 24.8 °C, sunny, fresh breeze
KP 62.4	15 February 2022	Dip netting 21.4 °C, sunny, fresh breeze
KP 78.1-78.2	15 February 2022	Dip netting

KPs / location	Date	Type of survey and weather
		21.4 °C, sunny, fresh breeze
KP 67.0, KP 67.2	3, 10 and 22 December 2022	Spotlighting and targeted call playback >13 °C, fresh breeze (both surveys)
KP 78.1 – 78.2	26 November 2022 and 3 December 2022	Spotlighting and targeted call playback >20 °C, moderate breeze; 14 °C, fresh breeze

5.9.7 Spotlighting and call playback surveys

Targeted call playback and spotlight surveys for barking owl (*Ninox connivens)*, powerful owl (*Ninox strenua*) and masked owl (*Tyto novaehollandiae)* were undertaken at dusk or after dark between 14 – 15 June 2022 and 23 – 24 November 2022, with the surveys undertaken in November also targeting greater glider (*Petauroides volans subsp. volans*). Surveys were undertaken within remnant vegetation along the Great Southern Rail Trail and the Strzelecki Ranges in the northern end of the proposed alignment (Table 10).

Surveys were undertaken in accordance with the '*Forest Protection Survey Program'* survey guidelines (DELWP 2020). A pre-recorded call playback sequence was broadcast as follows:

- Powerful owl – two minutes
- Silence/listening – two minutes
- Barking owl – two minutes
- Silence/listening – two minutes
- Masked owl – two minutes (territorial screams)
- Silence/listening – two minutes
- Masked owl – 1 minute (chattering)
- Silence/listening – two minutes

Spotlight searches in areas nearby for threatened owls (and greater glider in November) followed call playback for a period of approximately 15 minutes. Weather conditions during the first round of targeted surveys (June 2022) were suitable with daily temperatures ranging from 4.1 °C to 13.9 °C, and light winds between 6 and 7 kph (Bureau of Meteorology 2022). Weather conditions during the second round of targeted surveys (November 2022) were also suitable, with daily temperatures ranging between 10.2°C and 17.1 °C, and whilst moderate winds were recorded during the day, with the average wind speed being 29kph (Bureau of Meteorology 2022), during the survey there were only light winds.

Table 10. Summary of targeted survey effort for threatened owl species

KPs / location	Date and time	Weather
KP 64.6	14 June 2022	Daily temperatures between 5.7-13.4 °C, gentle breeze.
KP 76.5	15 June 2022	Daily temperatures between 4.1-13.9 °C, gentle breeze.
KP 21.1 – 25.6	23 November 2022	Daily temperatures between 10.2-16.2 °C, gentle breeze.
KP 26.5 – 26.9	23 November 2022	Daily temperatures between 10.2-16.2 °C, gentle breeze.
KP 61.4	24 November 2022	Daily temperatures between 11.3-17.1 °C, gentle breeze.
KP 62.8 – 63.2	24 November 2022	Daily temperatures between 11.3-17.1 °C, gentle breeze.
KP 64.8 – 65.1	24 November 2022	Daily temperatures between 11.3-17.1 °C, gentle breeze.

5.9.8 Remote cameras

Targeted surveys were undertaken between 7 – 21 December 2021 (14 deployment nights) for white-footed dunnart, eastern pygmy possum (*Cercartetus nanus*; now delisted as threatened) and lace monitor (*Varanus varius*) (Table 11). A total of 47 remote sensing baited cameras (Reconyx Hyperfire 2, White Pro and Covert camera models) were deployed across the Tarwin Valley and Strzelecki Ranges. Remote cameras were programmed to record day and night, triggered by motion to take three consecutive images. Each remote camera was micro-sited in optimal habitat and deployed in a horizontal position for detection of mammals and large reptiles, facing a bait station containing a universal bait (oats, peanut butter and golden syrup). Approximately half of the remote cameras were deployed at ground level and half on trees to capture arboreal fauna. As there are no published survey guidelines for these species, survey effort and timing were undertaken using best practise methods, which included a minimum of 14 days survey effort.

Following retrieval of the remote cameras, images were downloaded and analysed by an ecologist for evidence of the target species. All taxa recorded were identified to the lowest taxonomic level possible, which was recorded along with camera location.

Table 11. Summary of remote camera survey effort

KPs / location	Deployed and collection dates	Details
KP 23.3 – 27.3 Great Southern Rail Trail Reserve	8 – 21 December 2021	10 x cameras (6 x ground and 4 x arboreal)
KP 57.4 – 57.5 Strzelecki State Forest adjacent to Slaughteryard Road	7 – 21 December 2021	4 x cameras (3 x ground and 1 x arboreal)
KP 61.4 Pleasant Valley Road reserve	7 – 21 December 2021	4 x cameras (3 x ground and 1 x arboreal)
KP 62.4 – 63.6 Ten Mile Creek Road reserve	7 – 21 December 2021	12 x cameras (8 x ground and 4 x arboreal) 7/12/21 (10 cameras) and 9/12/21 (2 cameras) deployed
KP 64.8 – 65.1 Ten Mile Creek Road reserve	9 – 21 December 2021	8 x cameras (4 x ground and 4 x arboreal)
KP 67.9 – 68.3 Strzelecki Highway Road reserve on edge of plantation	9 – 21 December 2021	4 x cameras (2 x ground and 2 x arboreal)
KP 70.3 – 70.7 Strzelecki Highway Road reserve on edge of plantation	9 – 21 December 2021	5 x cameras (3 x ground and 1 x arboreal)

5.9.9 Shorebird surveys

For the purpose of this assessment birds species predominately associated with shoreline habitats have been grouped together under the collective terms of shorebirds. This grouping, used throughout the assessment includes migratory shorebirds, resident shorebirds and sea birds such as terns and gulls which regularly forage and roost in shoreline habitats.

A two-day survey for threatened shorebirds targeting the hooded plover (*Thinornis rubricollis rubricollis*) and its habitat was also undertaken on 17 and 18 November 2018 (Table 12). The field survey was conducted to assess habitat for threatened shorebirds at landfall locations and undertake one seasonal survey for the threatened hooded plover and potential nesting sites during the "Hooded Plover Biennial Count period". The field surveys to identify habitat were for migratory shorebirds species were also conducted in line with EPBC Act guidelines and policy statements (i.e., Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species).

When completing surveys an 8 km section of Sandy Point Beach was traversed on foot between the eastern extent of Sandy Point township to Moongana Street at Waratah Bay township to the west. Continuous visual scans (using binoculars and spotting scope) were undertaken for hooded plover, nests, and opportunistically for other shorebirds along the shore/beach and adjacent dunes.

Based on the construction method and avoidance of habitat (i.e. HDD) at Waratah Bay, no further shorebird surveys of the beach and dune area were determined to be required.

Table 12. Summary of targeted surveys for threatened shorebird species

KPs / location	Date	Details
KP 0 Sandy Point Beach between the eastern extent of Sandy Point township to Moongana Street at Waratah Bay township.	17 – 18 November 2018	Continuous visual scans (using binoculars and spotting scope) were undertaken for *Thinornis r. rubricollis*, nests, and other shorebirds along the shore/beach and adjacent dunes.

5.9.10 Ultrasonic detectors and acoustic recorders

Four ultrasonic detectors (Anabat Swifts, Titley Scientific) were deployed across three sites within the Strzelecki Ranges between 7 December 2021 and 10 December 2021 equating to 11 trap nights, targeting yellow-bellied sheathtail bat (*Saccolaimus flaviventris*) (Figure 2; Table 13). Ultrasonic detectors were set to record between sunset and sunrise at a frequency between 10 kHz to 250 kHz then mounted to canopy trees approximately 1.5 m from the ground in areas of open vegetation structure to avoid obstruction or interference from tree branches or foliage. Following retrieval of the ultrasonic detectors, recorded data files were analysed manually by an experienced ecologist using the software program Anabat Insight to determine the species likely present at the site.

One acoustic recorder (Anabat Swift with acoustic microphone) was deployed at a dam in the Strzelecki Forest to survey for growling grass frog. The dam was adjacent to plantation and approximately 800 m away from a known population at Luxford Pond to the north (Figure 2, Table 13). The dam was low-

moderate quality habitat with rushes at one end, gentle slopes and suitable over-wintering habitat, but no floating aquatic vegetation. Given the proximity to a known population and several other waterbodies within the area, deployment of an acoustic recorder was undertaken for two nights between 8 – 10 December 2021 and during the peak calling period for this species to confirm presence/absence of this species at this location, with additional surveys to be undertaken if required.

As a supplementary method of detection for threatened owl species barking owl, powerful owl and masked owl, Songmeters were deployed from 22 November 2022 to 22 December 2022 equating to 168 recording nights (Figure 2; Table 13). ELA deployed two Songmeters within the Great Southern Rail Trail reserve, and five Songmeters in damp forest within the Strzelecki Highway Road reserve adjacent to plantation. Songmeter™ parameters were set to 24,000 Hz and to record for 10 minutes every 30 minutes between dusk and pre-dawn. Following retrieval of the acoustic detectors, recorded calls were identified by listening to and viewing all 10-minute output song acoustic files using the software program Kaleidoscope™ Pro v5.5.6 (Kaleidoscope). Recordings from a call library were inserted into the dataset to enable cluster analysis around similar calls recorded from the field. Manual assessment was then conducted by an experienced ecologist on extracted calls.

Table 13. Summary of ultrasonic detectors and acoustic recorders survey effort

KPs / location	Deployed and collected dates	Type
KP 57.4	7 – 10 December 2021	Anabat Swift (3 x detectors)
Strzelecki Highway Road reserve adjacent to KP 67.4	9 – 11 December 2021	Anabat Swift (acoustic microphone)
KP 74.9	9 – 10 December 2021	Anabat Swift
7KP 6.5	9 – 10 December 2021	Anabat Swift
KP 21.9 Great Southern Rail Trail reserve	22 November 2022 – 20 December 2022	Song Meter Micro
KP 28.7 Great Southern Rail Trail reserve	22 November 2022 -20 December 2022	Song Meter Micro
KP 67.9 Strzelecki Highway Road reserve on edge of plantation	22 November 2022 – 21 December 2022	Song Meter Micro
KP 69.0 Strzelecki Highway Road reserve on edge of plantation	22 November 2022 – 21 December 2022	Song Meter Micro
KP 69.9 Strzelecki Highway Road reserve on edge of plantation	22 November 2022 – 21 December 2022	Song Meter Micro
KP 70.7	22 November 2022 – 21 December 2022	Song Meter Micro

KPs / location	Deployed and collected dates	Type
Strzelecki Highway Road reserve on edge of plantation		
KP 71.7 Strzelecki Highway Road reserve on edge of plantation	22 November 2022 – 21 December 2022	Song Meter Micro

5.10 Threatened flora surveys

Targeted surveys for threatened flora were undertaken by ELA ecologists between August 2021 and December 2022 as outlined in Table 14. The purpose of these surveys was to confirm the presence or absence of threatened flora species that were deemed likely to occur within the study area based on the desktop analysis and habitat condition surveys. Surveys were undertaken in accordance with the Department of Environment and Energy *Survey Guidelines for Australia's Threatened Orchids*, and involved:

- Identification of optimal and micro-habitat during the habitat assessment (see Section 5.6).
- A pre-survey walkthrough ('random meander') of the study area to confirm habitat suitability and extent and locate any known populations.
- A systematic search using parallel transects approx. 5-20 metres apart across areas of optimal habitat. If a target species was identified, perpendicular transects across the immediately surrounding areas (up to 50 metres) was undertaken.

Information documented during the surveys for each species population identified included: diagnostic measurements and features, population numbers, location coordinates, habitat characteristics and photos of plant features and associated habitat.

Table 14. Targeted flora surveys completed within the survey area

Target group	Target species	Survey period and limitations
Winter-flowering species occurring in heathy woodlands and lowland forest habitats in Waratah Bay and southern extent of Tarwin Valley.	Lizard orchid Spurred helmet-orchid Fringed helmet-orchid Green-striped greenhood Leafy greenhood Cobra greenhood Rush lily Slender fork-fern Small fork-fern	16 – 18 August 2022
Spring/summer-flowering species occurring in heathy woodlands and lowland forest habitats in Waratah Bay and southern extent of Tarwin Valley.	Silver everlasting Orange-tip finger-orchid Eastern spider-orchid Thick-lipped spider orchid Slender pink-fingers Currant-wood	15 – 26 November 2021

Target group	Target species	Survey period and limitations
	Dense leek-orchid Leafy greenhood Rush lily Slender fork-fern Small fork-fern	
River swamp wallaby-grass in wetland habitats in Tarwin Valley, Strzelecki Ranges and Latrobe Valley.	River swamp-wallaby grass	19 – 23 December 2022
Matted flax-lily in roadsides supporting grassland and woodland communities in Latrobe Valley.	Matted flax-lily	19 – 23 December 2022
Spring/summer flowering species in forest and woodland communities along roadsides on northern aspects of Strzelecki Ranges.	Bear's-ear Austral crane's-bill Cobra greenhood	6 – 10 December 2021 19 – 23 December 2022
Summer flowering and non-flowering species in damp or wet forests and/or drainage lines in Strzelecki Ranges.	Mountain bird-orchid Two-tone vibrissea Slender tree-fern Netted brake Alpine sun-orchid Slender fork-fern Oval fork-fern	6 – 10 December 2021 19 – 23 December 2022
Eucalyptus species throughout survey area.	Green scentbark Southern blue-gum Bog gum Strzelecki gum Yarra gum	28 June – 2 July 2021 12 – 16 July 2021 9 – 13 August 2021 15 – 26 November 2021 6 – 10 December 2021 22 – 23 December 2021 14 – 17 June 2022 16 – 18 August 2022 19 – 23 December 2022
Species occupying coastal dunes in Waratah Bay.	Coast wirilda Coast bitter-bush Coast colobanth Dune wood-sorrel Coast fescue	Surveys not required as habitat to be avoided via HDD.

5.11 Likelihood of occurrence assessment

The likelihood of occurrence is a determination of the potential for threatened flora, fauna or ecological communities to be present and make significant use of the survey area. The ranking of a species or ecological communities' likelihood of occurrence is determined by:

- Reviewing information contained in public biological datasets (e.g. past records and species distribution/habitat importance models), scientific literature, previous studies and reports and expert advice.
- Assessing species habitat requirements (including surrounding connectivity) and comparing against habitat condition surveys completed across the survey area, and
- The results of targeted surveys for threatened species within the survey area.

Species were first ranked as having either no, low, medium, or high likelihood of occurrence, or as being present, based on the baseline ecology assessment, and further desktop review and habitat condition surveys completed as part of the detailed ecology assessments. Targeted surveys were then undertaken for species ranked as medium, high or present where access allowed and impacts considered possible, as described in Section 5.9. Following completion of targeted surveys, a final likelihood of occurrence value was assigned based on all information collected over the course of the project. The consideration of impact to ecological values is based on the final likelihood of occurrence score for species listed as medium, high or present. Species with a likelihood of no or low have not been considered any further as part of this project. The likelihood of occurrence table including rational is included in Appendix 2.

The criteria utilised to assign the likelihood of occurrence is described in Table 15.

Table 15. Likelihood of occurrence criteria for threatened species

Likelihood of occurrence	Criteria
Present	The species/ecological community has been recorded in the survey area.
High	The species/ecological community has been recently recorded (<10 years) in the study area and suitable high quality habitat exists, or could exist, in the areas where no targeted surveys have been currently undertaken due to lack of access.
Moderate	The species/ecological community has been recorded in the study area and suitable moderate quality habitat exists, or could exist, in the areas where no targeted surveys have been currently undertaken due to lack of access.
Low	The species/ecological community has not been recorded in the study area and/or suitable species habitat does not exist in or adjacent to the survey area.
No	The species/community predicted distribution includes the study area but has never been recorded in or adjacent to the study area.

5.12 Impact assessment

5.12.1 Impact assessment framework

A 'significance of impact' approach has been used to assess impacts to ecological values within the survey area, which considers the sensitivity of the value and magnitude of the impact. This approach assumes the identified impacts will occur, as this conservative method enables a more comprehensive understanding and assessment of the likely impacts of a project. It focuses attention on the mitigation

and management of potential impacts through the identification and development of effective design responses and environmental controls.

Using this approach, the sensitivity of a value is determined with respect to its protection status, intactness, uniqueness or rarity, resilience to change and replacement potential. The magnitude of impacts on a value is assessment of the geographical extent, duration and severity of the impact.

A discussion of the application of this approach, and associated sensitivity and magnitude criteria, is provided below for the three key categories of ecological values considered in this report.

Based on the sensitivity and magnitude of impact values assigned to the ecological values identified within the survey area, a final significance of assessment rating was assigned based on the matrix in Table 16.

Table 16. Assessment of significance of impacts

Magnitude of impact	Sensitivity of value				
	Very high	High	Moderate	Low	Very low
Severe	Major	Major	Major	High	Moderate
Major	Major	Major	High	Moderate	Low
Moderate	High	High	Moderate	Low	Low
Minor	Moderate	Moderate	Low	Low	Very low
Negligible	Moderate	Low	Low	Very low	Very low

Table 17. Sensitivity criteria for impacts to ecological values with the survey area

Sensitivity level	Criteria
Very high	EPBC Act listed threatened community (critically endangered or endangered) EPBC Act listed species (critically endangered)
High	EPBC Act listed threatened community (vulnerable) FFG Act listed threatened community EPBC Act listed species (endangered) FFG Act listed species (critically endangered)
Moderate	EPBC Act listed species (vulnerable) FFG Act listed species (endangered) Native vegetation with an EVC bioregional conservation status of endangered or vulnerable
Low	EPBC Act migratory/marine species FFG Act listed species (vulnerable) Native vegetation with an EVC bioregional conservation status of depleted
Very low	Native vegetation with an EVC bioregional conservation status of least concern Regionally significant species

Table 18. Magnitude criteria for impacts to ecological values within the survey area

Magnitude level	Criteria
Severe	• Significant impacts* to a threatened species or ecological community, that is sensitive (e.g. important population or priority habitat) and where impacts are likely to be long-term and irreversible. • Removal of more than 20ha of native vegetation and/or habitat for native species, or more than 150 large trees. • Consequential losses of more than 40ha of native vegetation and/or habitat for native species, or more than 300 large trees.
Major	• Significant impacts* to a threatened species or ecological community, that is sensitive (e.g. important population or priority habitat) and where impacts are likely to be medium to long-term and potentially irreversible (> 10 years to recover). • Removal of more than 10ha of native vegetation and/or habitat for native species, or more than 100 large trees. • Consequential losses of more than 20ha of native vegetation and/or habitat for native species, or more than 200 large trees.
Moderate	• Significant impacts* to a threatened species or ecological community, where impacts are likely to be medium-term and reversible (5–10 years for recovery). • Removal of more than 5ha of native vegetation and/or habitat for native species, or more than 50 large trees. • Consequential losses of more than 10ha of native vegetation and/or habitat for native species, or more than 100 large trees.
Minor	• Non-significant impacts to a threatened species or ecological community, where impacts are likely to be readily reversible (within 5 years for recovery). • Removal of more than 1ha of native vegetation and/or habitat for native species, or more than 10 large trees. • Consequential losses of more than 2ha of native vegetation and/or habitat for native species, or more than 20 large trees.
Negligible	• Direct or indirect impacts that are unlikely to have a material effect on a threatened species or ecological community. • Clearing of less than 1ha of native vegetation and/or habitat for native species, or less than 10 large trees. • Consequential losses of less than 2ha of native vegetation and/or habitat for native species, or less than 20 large trees.

* As defined in *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (DoE 2013)

5.12.2 Native vegetation and Threatened Ecological Communities

Impacts to native vegetation and associated TECs (listed under EPBC Act or FFG Act) were assessed in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) (and associated policies and guidelines), *Ministerial guidelines for assessment of environmental effects* (DSE 2006) and *Matters of National Environmental Significance – Significant impact guidelines 1.1* (DoE 2013). Sensitivity criteria uses the current bioregional conservation status (for native vegetation) and/or listing status under the FFG Act and EPBC Act (for threatened communities). Both frameworks consider intactness, uniqueness, resilience and replacement potential in determining the

protection status. The magnitude criteria draws on thresholds contained in the documents listed above to establish a relative scale of impact for use in this study.

Sensitivity and magnitude criteria have been prepared based on these documents and are presented in Table 17 and Table 18.

Where access to land to complete on-ground VQA assessments was not available, native vegetation has been remotely mapped using aerial photography informed by photographs and data gathered during the field survey. Mapping identified patches and scattered trees where possible, with the DEECA (formerly DELWP) EVC dataset used to classify vegetation type and conservation status for each patch and tree, with condition scores assigned based on the modelled NVR2017 Condition dataset (DELWP 2017).

Direct impacts to native vegetation have been determined by directly overlaying the AoD on the mapped extent of native vegetation and associated TPZs (as per guidance in Native Vegetation Regulations Newsletter 1, DELWP 2018). Where vegetation was remotely mapped, a buffer of 9.6 m (based on an average diameter at breast height of 80 cm) has been used to account for potential encroachment of TPZs and indirect loss of the associated vegetation. The diameter at breast height of 80 cm was derived by calculating the average of all the trees which were subject to field assessment during the vegetation surveys. Given the type of EVCs which form the remotely mapped vegetation i.e. Lowland Forest, this estimate is considered appropriate for the purpose of informing the impact assessment. Once detailed design occurs, on-ground surveys will confirm the TPZ of trees to be impacted.

The resulting area of native vegetation removed, based on on-ground assessments using the VQA method and remotely mapped vegetation, was used to generate two scenario test Native Vegetation Removal (NVR) reports using the EnSYM Native Vegetation Regulations Tool (DELWP 2022). The first of these reports is based on a calculation of vegetation losses using a conservative approach or 'worst case' scenario referred to as 'pre-mitigation'. The second report is on the basis of vegetation removal post-mitigation. These reports (Appendix 3) present the extent and value of native vegetation proposed to be removed under each scenario and provide offset requirements for the proposed removal should a permit be granted. Offset requirements are expressed in 'General Habitat Units' and/or 'Species-specific Habitat Units' (DELWP 2017).

Ultimate vegetation losses, and therefore offset requirements associated with the project can only be confirmed on final project design and following the assessment of effectiveness of proposed mitigation measure by a qualified arborist. Only once this has been done will a final NVR be requested for the project. An offset strategy has been developed for the project. This strategy is presented in attachment 5 of the EIS / EES. Further context to the offset strategy is provided in section 8.3.1.

In addition to impacts to remnant native vegetation this assessment also considers the loss of planted vegetation. Planted native vegetation within this report has been considered in a manner which reflects the intent and guidance within the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) and exemptions under clause 52.17 of the Victorian Planning Provisions. Where planted vegetation was identified (or considered to have the potential) to be *planted or managed with public funding for the purpose of land protection or enhancing biodiversity* this vegetation, where encountered, was assigned an appropriate EVC and classed as planted for conservation. Where impacts to this vegetation are proposed losses have been determined in a manner identical to that for native

remnant vegetation. Where, however, vegetation appears to have been either planted, or grown as a result of direct seeding by private individuals in the absence of public finding this vegetation has been classified by the assessment as Native (exempt). Examples of such vegetation include the planting of native and primarily non-indigenous vegetation in private property for the purposes of screening, windbreak, amenity and providing shade to livestock. Another example includes native species planted for the purposes of timber harvesting (forestry). The most prevalent example of which within the study area was *Eucalyptus globulus* (Blue Gum) plantations. Whilst not subject to 52.17 the totals of such vegetation to be lost is still considered to provide valuable context to the project and the magnitude of its impacts.

5.12.3 Threatened species

Impacts to Native Vegetation and associated TECs (listed under the EPBC Act or FFG Act) were assessed using the *Ministerial guidelines for assessment of environmental effects* (DTP 2023) and *Matters of National Environmental Significance – Significant impact guidelines 1.1* (DoE 2013) (Appendix 5).

The sensitivity criteria are based on a species' listing status under either the EPBC Act (nationally significant) or FFG Act (state significant), which both use the International Union for Conservation of Nature standard for the assessment and listing of threatened species (Table 17). This standard includes consideration of intactness, uniqueness, resilience and replacement potential in determining the protection status. Where relevant, regionally significant species have also been considered. The magnitude criteria are based on the extent of impacts to populations of threatened species and associated habitat, as defined in the *Matters of National Environmental Significance – Significant impact guidelines 1.1* (Table 18). Where these impacts affect 'important populations' or 'critical habitat' the magnitude of the impact is heightened. It is noted that there are currently no defined critical habitats listed for FFG Act listed species under the Act, and in lieu of these guidelines, 'critical' or priority habitat has been defined using the EPBC Act criteria as a guide, in conjunction with documented habitat preferences (i.e. journals, DELWP 2020 threatened species assessments, distribution models and the results of the field surveys).

5.12.4 Cumulative impacts

The EIS guidelines and EES scoping requirements both include requirements for the assessment of cumulative impacts. Cumulative impacts result from incremental impacts caused by multiple projects occurring at similar times and within proximity to each other.

To identify possible projects that could result in cumulative impacts, the International Finance Corporation (IFC) guidelines on cumulative impacts have been adopted. The IFC guidelines (IFC, 2013) define cumulative impacts as those that 'result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones.'

The approach for identifying projects for assessment of cumulative impacts considers:

- Temporal boundary: the timing of the relative construction, operation and decommissioning of other existing developments and/or approved developments that coincides (partially or entirely) with Marinus Link.

- Spatial boundary: the location, scale and nature of the other approved or committed projects expected to occur in the same area of influence as Marinus Link. The area of influence is defined as the spatial extent of the impacts a project is expected to have.
- Proposed and reasonably foreseeable projects were identified based on their potential to credibly contribute to cumulative impacts due to their temporal and spatial boundaries. Projects were identified based on publicly available information at the time of assessment. The projects considered for cumulative impact assessment in Victoria are:
    - Delburn Wind farm
    - Star of the South Offshore Wind farm
    - Offshore wind development zone in Gippsland including Greater Gippsland Offshore Wind Project (BlueFloat Energy), Seadragon Project (Floatation Energy), Greater Eastern Offshore Wind (Corio Generation).
    - Hazelwood Rehabilitation Project
    - Wooreen Energy Storage System.

6. Existing conditions

6.1 Overview

The Victorian project alignment falls within the Gippsland Plain and Strzelecki Ranges bioregions, and the South Gippsland Shire and Latrobe City Council local government areas.

The region through which the Victorian section of the align runs is dominated by productive agricultural landscapes, comprised primarily of intensive pastoral or horticultural operations, with higher elevation sections in the Strzelecki Ranges supporting dense pine plantations. As a result, the vast majority of native vegetation (scrubs, woodlands and forests) and associated habitat that would have once covered South Gippsland has been cleared, leaving small, fragmented patches remaining along road reserves, property boundaries and creek lines and scattered trees in paddocks. In some sections, such as the hills around Waratah Bay, the Great Southern Rail Reserve and the Strzelecki Ranges, larger patches of native vegetation persist in the landscape on private and public land, representing important areas of priority habitat for flora and fauna species. The project alignment avoids protected areas such as National and State parks and conservation areas.

6.2 Vegetation and habitat

6.2.1 Overview

Native vegetation varied across the survey area in quality and extent, influenced heavily by changes in land tenure, use and landscape context (Appendix 1: Figure 6). Given the large expanses of modified land within the Tarwin Valley and Latrobe Valley, native vegetation within these areas was often fragmented and of low quality. This improved within the Strzelecki Ranges and Waratah Bay sections of the survey area, where larger, more interconnected patches of woodlands and forest were present, however these areas were still dominated by agricultural and forestry land uses with high levels of fragmentation.

The DEECA pre-1750 EVC model dataset indicates the survey area and local vicinity may have once supported at least 13 EVCs (Table 19).

Table 19. Pre-1750 EVCs that were likely to occur within the survey area

Bioregional conservation status	Ecological vegetation classes
Endangered	• Damp Forest (EVC 29) • Herb-rich Foothill Forest (EVC 23) • Swamp Scrub (EVC 53) • Swampy Riparian Woodland (EVC 83) • Plains Grassy Woodland (EVC 55) • Plains Grassy Forest (EVC 151, Strzelecki Ranges bioregion) • Shrubby Foothill Forest (EVC 45)
Vulnerable	• Damp Heathy Woodland/Lowland Forest Mosaic (EVC 1106) • Lowland Forest (EVC 16) • Plains Grassy Forest (EVC 151, Gippsland Plain bioregion)
Depleted	• Wet Forest (EVC 30) • Coastal Dune Scrub/Coastal Dune Grassland Mosaic (EVC 1)
Least concern	• Estuarine Wetland (EVC 10)

Habitat types common within the survey area included:

- Open farmlands, comprised of introduced pastures, planted native and exotic trees along boundaries and in-frequent scattered trees, which provided foraging habitat for fauna adapted to modified landscapes.
- Dense plantations, consisting primarily of introduced *Pinus radiata* and providing limited habitat value for native flora and fauna.
- Dune systems, along Waratah Bay beach.
- Wetlands (including dams) and watercourses, scattered throughout the survey area.
- Scrubs and swampy woodlands, primarily in low-lying sections in the southern half of the alignment, often associated with drainage lines.
- Heathy woodland and lowland forests, common in small patches between Waratah Bay and the Strzelecki Ranges.
- Tall forests, common in the Strzelecki Ranges and varying in nature from wet or damp forests to drier equivalents on ridges or north/west facing slopes.
- Riparian and floodplain woodlands, associated with major drainage lines such as the Morwell River and the Tarwin River East Branch.

These habitats often contained important features or resources which are considered priority locations for supporting populations of flora and fauna. Key resources identified in the survey area include:

- Hollow-bearing trees, which provide breeding and refuge habitat for arboreal mammals, birds, reptiles and micro-bats.
- Fresh-water streams and pools, containing breeding and foraging habitat for amphibians, crustaceans, fish and waterfowl.
- Large-woody debris, important refuge and breeding habitat for small mammals and reptiles.
- Flowering trees and shrubs, providing important food resources for a wide range of fauna species.

- Interconnected scrubs, woodlands and forests, providing for the movement and dispersal of fauna through the landscape.

High-quality habitats containing features and resources which are consistent with threatened species preferred habitat requirements and also support a wide range of flora and fauna species have been termed 'priority habitats' and are shown on Figure 5 (Appendix 1).

Further detail on the nature and extent of vegetation and habitat within each of the landscape regions is provided below. Categories as they relate to planted vegetation are described in section 5.12.2.

6.2.2 Waratah Bay

The Waratah Bay area is characterised by vegetation assemblages of coastal dunes, lowland forests/heathy woodlands and swampy scrubs and woodlands (Table 20; Appendix 1: Figure 6). The coastal sand dunes occupy the foreshore area of Waratah Bay. As the alignment begins to extend north into the surrounding farmland, swamp scrubs and riparian woodland, transition into heathy and lowland forests as the alignment extends into the hills surrounding the coastal plains. Native vegetation consists of the following dominant groupings:

- Coastal scrub and grassland vegetation was restricted to the foreshore and dunes of Waratah Bay (Plate 1). The vegetation was characterised by a dense cover of shrub species, including coast tea-tree (*Leptospermum laevigatum*), white correa (*Correa alba*) and coast daisy-bush (*Olearia axillaris*). Coastal tussock grass (*Poa poiformis*) and pigface (*Carpobrotus* spp.) dominated the ground stratum near the interface with the beach, with kidney weed (*Dichondra repens*), spear grass (*Austrostipa* spp.) and New Zealand spinach (*Tetragonia tetragonoides*) being identified less frequently. This vegetation assemblage best represents Coastal Dune Scrub (EVC 160) (Appendix 1: Figure 6).
- Swamp scrubs and woodland patches were characterised by a low canopy (< 15 m) dominated by either swamp gum (*Eucalyptus ovata*) or swamp paperbark. Where swamp paperbark was most dominant, very little was observed within the mid or ground stratum, likely due to the increased shading from the presence of this species. Where swamp gum was more prevalent, an increase in native species diversity within the mid and ground stratums was observed. In these patches swamp paperbark was still present however occurred as a medium shrub (< 5 m high). Other species identified within these patches included New Zealand spinach, bracken fern, variable sword-sedge (*Lepidosperma laterale*) and spiny-headed mat-rush (*Lomandra longifolia*). These patches were predominantly mapped as Swamp Scrub (EVC 53) in the survey area where access was available (Appendix 1: Figure 6).
- Lowland forest communities had an open structure with clear distinctions between each stratum (Plate 2). Messmate stringybark (*Eucalyptus obliqua*) and narrow-leaved peppermint (*Eucalyptus radiata* subsp. *radiata*) dominated the canopy layer, with acacia species such as Blackwood (*Acacia melanoxylon*) and silver wattle (*Acacia delbata*) common in the mid-layer, along with hop wattle (*Acacia stricta*) and juniper wattle (*Acacia ulicifolia*) less frequently. Other species identified within the mid-storey of these patches include snowy daisy-bush (*Olearia lirata*) and dolly bush (*Cassinia aculeata* subsp. *aculeata*). In many situations the ground-layer was comprised primarily of introduced grasses, such as Yorkshire fog (*Holcus lanatus*). Where native species were present, weeping grass (*Microlaena stipoides* var. *stipoides*), bracken and common tussock grass (*Poa labilardierei* var. *labilardierei*) were most common along with a variety of herbs and ericoides. Communities within this section of the alignment include Lowland Forest (EVC 16) (Plate 2).

The Waratah Bay section of the alignment harbours two priority habitat types: the foreshore and dunes (KP0-0.2; Plate 4) and interconnected woodlands (KP 2.3-6.4; Plate 1) (Appendix 1: Figure 5). Several farm dams and minor drainage lines were also present, primarily within cleared pastures (KPs 0.3, 0.7, 1.6, 2.4 and 6.15; Plate 3).

The foreshore and dunes provide habitat for a range of shorebirds and migratory species and is not located anywhere else within the survey area. The woodlands likely act as an important wildlife corridor as there are so few sections of interconnecting woodland within the surrounding landscape. The nature of habitat with the woodland sections could not be assessed due to access constraints.

Table 20. Native vegetation recorded in the study area in Waratah Bay section

Vegetation type and EVC	Bioregional conservation status	Area (ha)/number of vegetation/trees in survey area
Trees		
Scattered – Large	NA	8
Scattered – Small	NA	2
Patch – Large	NA	37
Native – remnant		**6.94**
GipP0053 : Swamp Scrub	Endangered	0.36
GipP0160 : Coastal Dune Scrub	Depleted	4.59
Strz0016 : Lowland Forest	Vulnerable	1.99
Native – remnant (desktop/no access)		**27.14**
GipP0053 : Swamp Scrub	Endangered	3.87
GipP0793 : Damp Heathy Woodland	Vulnerable	22.04
Strz0793 : Damp Heathy Woodland	Depleted	1.23
NATIVE TOTAL (ha)		**34.08**
Introduced		0.32
Native (exempt)		0.06

Plate 1. EVC 160 – Coastal Dune Scrub vegetation

Plate 2. EVC 16 – Lowland Forest vegetation

Plate 3. Wetland habitat within the Waratah Bay section of the proposed alignment

Plate 4. Foreshore dune habitat within the Waratah Bay section of the proposed alignment

6.2.3 Tarwin Valley

Between Waratah Bay and Mirboo North, the land is largely cleared with small patches of remnant vegetation persisting across the landscape. This vegetation occurs as a mosaic of swampy/riparian scrubs and heathy/lowland forests to the south of the Tarwin River East Branch, before transitioning into taller forests to the north as elevation increases towards Mirboo North. Scattered trees, small areas of regrowth and planted native vegetation occur sporadically within cleared farmland. Native vegetation consists of the following dominant groupings:

- South of the Tarwin River, swampy/riparian forests and heathy/lowland forests were prominent (Appendix 1: Figure 6). These communities had canopy cover consisting of a few emergent eucalypts, including swamp gum, messmate stringybark and Strzelecki gum (*Eucaluptus strzeleckii*), in combination with a high abundance of other species occurring as understorey trees or large shrubs within the mid-storey. Blackwood, swamp paperbark, scented paperbark (*Melaleuca squarrosa*), swamp gum and blackwood are examples of species identified within this growth form. Prickly tea-tree (*Leptospermum continentale*), snowy daisy-bush, burgan (*Kunzea ericoidies* s.l.) and elderberry (*Polyscias sambucifolia*) were common across the mid-storey stratum. The groundcover stratum exhibited a high amount of diversity, with a substantial proportion of the overall total cover being contributed by exotic species. In higher-quality remnants, native species within the ground layer included red-fruit saw-sedge (*Gahnia sieberiana*), thatch saw-sedge (*Gahnia radula*), bidgee-widgee (*Acaena novae-zelandiae*), weeping grass, bracken and forest wire-grass (*Tetrarrhena juncea*). EVCs that occurred within this vegetation type included Swamp Scrub (EVC 53), Swampy Riparian Woodland (EVC 83) (Plate 5), Damp Heathy Woodland (EVC 793), Lowland Forest (EVC 16) (Plate 6), Riparian Forest (EVC 18) and Floodplain Riparian Woodland (EVC 56).
- North of the Tarwin River, native vegetation is limited with wet or damp forest types persisting as highly modified, small remnants or groups of scattered trees with exotic understorey (often pastures). Canopy species within these patches included messmate stringybark, blue gum (*Eucalyptus globulus*) and mountain grey-gum (*Eucalyptus cypellocarpa*). The mid-storey stratum was often absent, likely due to past removal. However, where mid-storey species were present, blackwoods were dominant.

Key habitats within the Tarwin Valley section of the alignment include:

- a large patch of heathy woodlands/lowland forest within private land (KP 8.1 – 8.9) and moderate to high-quality scrub and woodland remnants along the Great Southern Rail Trail reserve and adjacent private land (KP 21.4 – 28.7; Plate 8), along with other smaller remnants associated with private land between these areas (Appendix 1: Figure 5). This vegetation provides foraging habitat for fauna (including providing a variety of flowering species and habitat for prey species), refuge for fauna and flora species (supporting numerous large trees with hollows, woody debris and dense scrubs/understorey vegetation), as well as providing wildlife connectivity through the landscape.
- numerous vegetated waterways (KPs 17.6, 19.1, 21.5, 23.9, 28.5, 29.4, 34.9, 40.6, 49.3, 50.5, 52, 52.3, 53.3 and 54.8; Plate 7) providing habitat for birds, fish, crustaceans and amphibians (Appendix 1: Figure 5).
- Scattered, old large trees in paddocks providing roasting for predatory species and connectivity where in close proximity to remnant patches.

Table 21. Native vegetation recorded in the study area in Tarwin Valley section

Vegetation type and EVC	Bioregional conservation status	Area (ha)/number of vegetation/trees in survey area
Trees		
Scattered – Large	NA	151
Scattered – Small	NA	28
Patch – Large	NA	292
Native – planted for conservation		**0.22**
GipP0083 : Swampy Riparian Woodland	Endangered	0.11
Strz0029 : Damp Forest	Endangered	0.07
Strz0793 : Damp Heathy Woodland	Depleted	0.03
Native – regrowth		**5.44**
GipP0083 : Swampy Riparian Woodland	Endangered	5.44
Native – remnant		**32.93**
GipP0016 : Lowland Forest	Vulnerable	5.01
GipP0018 : Riparian Forest	Vulnerable	3.13
GipP0029 : Damp Forest	Endangered	0.15
GipP0053 : Swamp Scrub	Endangered	1.91
GipP0056 : Floodplain Riparian Woodland	Endangered	2.03
GipP0136 : Sedge Wetland	Vulnerable	0.08
GipP0083 : Swampy Riparian Woodland	Endangered	15.40
GipP0793 : Damp Heathy Woodland	Vulnerable	0.32
GipP0937 : Swampy Woodland	Endangered	1.17
Strz0016 : Lowland Forest	Vulnerable	0.43
Strz0023 : Herb-rich Foothill Forest	Endangered	0.15
Strz0029 : Damp Forest	Endangered	2.70
Strz0053 : Swamp Scrub	Endangered	0.45
Native – remnant (desktop/no access)		**33.85**
GipP0053 : Swamp Scrub	Endangered	1.90
GipP0083 : Swampy Riparian Woodland	Endangered	0.73
GipP0793 : Damp Heathy Woodland	Vulnerable	9.98
Strz0023 : Herb-rich Foothill Forest	Endangered	0.25
Strz0029 : Damp Forest	Endangered	14.26
Strz0030 : Wet Forest	Depleted	4.73
Strz0045 : Shrubby Foothill Forest	Endangered	0.81
Strz0793 : Damp Heathy Woodland	Depleted	1.18
NATIVE TOTAL		**72.43**

Vegetation type and EVC	Bioregional conservation status	Area (ha)/number of vegetation/trees in survey area
Introduced		5.43
Native (exempt)		4.85

Plate 5. EVC 83 -Swampy Riparian Woodland vegetation

Plate 6. EVC 16 – Lowland Forest vegetation

Plate 7. Vegetated waterway within the Tarwin Valley section of the proposed alignment

Plate 8. Burrow located along the Great Southern Rail Trail

6.2.4 Strzelecki Ranges

Continuing north from Mirboo North across to Yinnar in the north-east, the alignment passes through the highest part of the Strzelecki Ranges where exotic (pine) plantations are the dominant land use. Scattered among these plantations are several large patches of remnant woodlands and tall forests (Table 22). These patches largely occur adjacent to the alignment in crown reserves and road reserves (e.g. the Strzelecki Highway) or intersect the alignment at creeklines, with smaller patches and scattered remnant trees are scattered infrequently throughout the various plantations.

Native vegetation consists of the following dominant groupings:

- Lowland forests dominated by Messmate stringybark, primarily on flat or low gradients between Mirboo North and Stony Creek. Understorey structure varied with shrubs, such as snowy daisy-bush, prickly tea-tree and dolly bush present in parts, whilst other sections the ground layer was dominant with thatch saw-sedge, spiny-headed mat-rush, and *Tetratheca juncea* prevalent. This vegetation primarily aligned with Lowland Forest (EVC 16) (Appendix 1: Figure 6, KP 64.5, KP 76.1-76.6)).
- Tall damp or wet forest supporting mountain grey gum and silvertop ash (Eucalyptus sieberi) in the canopy layer. *Acacia* species were very prominent within the mid-storey, with Varnish wattle (*Acacia verniciflua*), burgan, prickly tea tree, shiny cassinia (*Cassinia longifolia*), snowy daisy bush and hop goodenia (*Goodenia ovata*) prevalent. Native groundcover species within this vegetation were diverse with no single species being overly dominant. Common species included bracken fern, weeping grass, fireweed groundsel (*Senecio linearifolius*), mountain clematis (*Clematis aristata*), thatch saw-sedge, spiny-headed mat-rush, *Tetratheca juncea* and small-leaf bramble (*Rubus parvifolius*). Vegetation within this section of the alignment was assigned to either Herb-rich Foothill Forest (EVC 23), Damp Forest (EVC 29) and Wet Forest (EVC 30) (Appendix 1: Figure 6; Plate 9).
- On the ridgelines and north-facing aspects where the alignment descends into the Latrobe Valley, drier tall forest types were prevalent. These were categorised by the absence of species preferring damp environments, such as tree ferns, and in the driest locations had a sparse shrub layer with low understorey consisting of bracken and grasses such as veined spear-grass (*Austrostipa rudis* subsp. *nervosa*) and weeping grass. This vegetation primarily aligned with Herb-rich Foothill Forest (EVC 23) (KP 67.0-76.5) and Shrubby Foothill Forest (EVC 45) (Appendix 1: Figure 6, KP 41.0, KP 41.9-42.1, KP 67.9-71.9.).

The Strzelecki Ranges section of the proposed alignment is unique in that it is the only section that has large areas of interconnecting remnant vegetation. All vegetation within this area plays an important role in providing habitat for flora and fauna species. Key habitats within the Strzelecki Ranges section of the alignment include:

- Two large patches of lowland forest between KPs 58.5-59.8 and KPs 60.5-60.8 (Appendix 1: Figure 5). These patches likely provide important foraging and refuge habitat for a wide range of fauna and flora species, along with providing connectivity in the wider landscape.
- The aquatic and riparian environs of Little Morwell River (KP 61.5; Plate 11), Stony Creek (KPs 62.5-63.7) and the unnamed drainage lines at KP 66.6 and 66.9 (Appendix 1: Figure 5). These waterways provide important habitat for birds, fish, crustaceans and amphibians (Appendix 1: Figure 5). Riparian vegetation located along the waterways also contained suitable habitat for a range of fauna, including burrowing crayfish, arboreal mammals and birds.

- Tall forests along Ten Mile Creek Road (KPs 64.6-), the Strzelecki Highway (KPs 71.9-73.8; Plate 12) and Kings Road (KPs 74.9-76.6) (Appendix 1: Figure 5). This vegetation contained large, hollow-bearing trees a diversity of flora species which could provide foraging and breeding habitat for predatory birds, such as owls, arboreal mammals and a variety of woodland and forest bird species.

Table 22. Native vegetation recorded in the study area in Strzelecki ranges section

Vegetation type and EVC	Bioregional conservation status	Area (ha) of vegetation in survey area	Number of trees in survey area
Trees			
Scattered – Large	NA		78
Scattered – Small	NA		36
Patch – Large	NA		448
Native – planted for conservation		**0.69**	
Strz0030 : Wet Forest	Depleted	0.69	
Native – regrowth		**4.97**	
Strz0023 : Herb-rich Foothill Forest	Endangered	4.97	
Native – remnant		**48.10**	
GipP0016 : Lowland Forest	Vulnerable	0.24	
Strz0016 : Lowland Forest	Vulnerable	14.80	
Strz0018 : Riparian Forest	Vulnerable	0.30	
Strz0023 : Herb-rich Foothill Forest	Endangered	9.16	
Strz0029 : Damp Forest	Endangered	12.19	
Strz0030 : Wet Forest	Depleted	0.20	
Strz0045 : Shrubby Foothill Forest	Endangered	11.20	
Native – remnant (desktop/no access)		**30.41**	
Strz0016 : Lowland Forest	Vulnerable	20.15	
Strz0023 : Herb-rich Foothill Forest	Endangered	5.46	
Strz0029 : Damp Forest	Endangered	2.94	
Strz0030 : Wet Forest	Depleted	0.87	
Strz0151 : Plains Grassy Forest	Endangered	0.98	
NATIVE TOTAL		**84.16**	
Introduced		5.03	
Introduced – pine plantation		320.88	
Native (exempt)		9.21	

Plate 9. EVC 45 – Shrubby Foothill Forest vegetation

Plate 10. EVC 18 – Riparian Forest

Plate 11. Little Morwell River located at approximately KP 61.5

Plate 12. Interconnected woodland located adjacent to the Strzelecki Highway

6.2.5 Latrobe Valley

Along the final stretch of the proposed alignment, from Yinnar to Hazelwood, the landscape again transitions to cleared agricultural land with scattered, highly modified, remnants of grassy forests and woodlands, with floodplain woodlands along the Morwell River. The majority of this vegetation occurs as small, isolated patches and scattered trees.

Where native vegetation does exist, the vegetation composition forms various types of grassy woodland. Strzelecki gum, Gippsland red-gum (*Eucalyptus tereticornis* subsp. *median*), and manna gum (*Eucalyptus viminalis* subsp. *viminalis*) were all common canopy species. Given the cleared nature of the landscape, mid-storey species were mostly absent with the occasional occurrence of varnish wattle. The ground stratum species included veined spear-grass, bracken fern, red-fruit saw-sedge and weeping grass. EVCs that best fit the patches within this section of the proposed alignment include Riparian Forest (EVC 18), Plains Grassy Woodland (EVC 55), Floodplain Riparian Woodland (EVC 56), Plains Grassy Forest (EVC 151) and Grassy Woodland (EVC 175) (Table 23; Appendix 1: Figure 6 KP78.4, KP 78.8,79.6-79.9, KP 83.3-83.5, and KP 84.9).

Key habitats within the Latrobe Valley include:

- Small woodland patches and scattered trees, particularly within farmland between KP 76.5 and 79.7, including riparian vegetation along the Morwell River (Appendix 1: Figure 5). This vegetation consisted of large, old trees containing a variety of hollows. Despite this, connectivity was poor and vegetation was likely only able to be utilised by mobile species tolerant of disturbed landscapes.
- The terraces immediately adjacent to the Morwell River supported a number of small wetlands, capable of providing habitat for inland waterbirds, waders, amphibians and aquatic flora (KP 78.2; Appendix 1: Figure 5). Toward the eastern extent of the proposed alignment lies the Hazelwood Cooling Pond. A small section of this pond resides near the proposed alignment (KP 83.4). This aquatic habitat may provide foraging habitat for waterfowl, crustaceans, fish and amphibian species.

Table 23. Native vegetation recorded in the study area in Latrobe Valley section

Vegetation type and EVC	Bioregional conservation status	Area (ha)/number of vegetation/trees in survey area
Trees		
Scattered – Large	NA	53
Scattered – Small	NA	8
Patch – Large	NA	17
Native – planted for conservation		**1.35**
GipP0056 : Floodplain Riparian Woodland	Endangered	1.35
Native – remnant		**3.14**
GipP0016 : Lowland Forest	Vulnerable	0.04
GipP0018 : Riparian Forest	Vulnerable	1.71
GipP0151 : Plains Grassy Forest	Vulnerable	0.81
GipP0175 : Grassy Woodland	Endangered	0.58
Native – remnant (desktop/no access)		**1.82**

Vegetation type and EVC	Bioregional conservation status	Area (ha)/number of vegetation/trees in survey area
GipP0053 : Swamp Scrub	Endangered	0.75
GipP0055 : Plains Grassy Woodland	Endangered	1.07
NATIVE TOTAL		**6.30**
Introduced		**0.63**
Native (exempt)		**0.70**

Plate 13. Plains Grassy Forest (EVC 175) vegetation located at KP 79.7

Plate 14. Large Strzelecki gum located within the remnant patches of vegetation at KP 77.9

Plate 15. Hollow-bearing tree within the Latrobe Valley

Plate 16. Watercourse within the Latrobe Valley section

6.3 Threatened species

6.3.1 Fauna species

The desktop assessment identified 133 significant fauna species as previously occurring within the 10 km study area (Appendix 2)). This includes 104 species listed on the EPBC Act (of which 64 are threatened and 56 are migratory) and 90 species listed on the FFG Act.

Considering the presence of existing records, habitat requirements and known information about the survey area and surrounding landscape, 55 significant species were identified as potentially occurring within the survey area based on the desktop assessment (Table 24). Where land access permitted, targeted surveys were undertaken for these species with the findings, and a discussion of the ecology, distribution and habitat within the survey area, provided below by faunal group.

All fauna species recorded during the targeted surveys are provided in Appendix 4.

Table 24. Significant fauna species which may occur within the survey area based on the desktop assessment

Common name	FFG	EPBC	Location of potential habitat within the survey area	Use of the study area
Grey goshawk	EN		Woodlands and farmland near the Strzelecki Ranges and wooded farmland near Waratah Bay (KP 2.3 – 8.9, 57 – 76.5).	Foraging
Common sandpiper	VU	Ma, Mi	Waratah Bay coastline (KP 0). and Hazelwood Cooling Pond (KP 83.4).	Foraging
Swamp antechinus	VU	VU	Dunes and heathy woodlands in Waratah Bay (KP 0, 2.3 - 6.4, 8.1 - 8.9).	Breeding and foraging
Eastern great egret	VU	Ma	Margins of waterbodies and well vegetated drainage lines, including Waratah Bay coastline (KP 0)., Morwell River (KP 78) and Hazelwood Cooling Pond (KP 83.4). .	Foraging
Hardhead	VU		Waterbodies with deep water and dense reed beds throughout the study area (KPs 45.1, 67, 83.4).	Foraging
Musk duck	VU	Ma	Waterbodies with deep water and dense reed beds throughout the study area (KPs 45.1, 67, 83.4).	Foraging
Australasian bittern	CE	EN	Tall aquatic vegetation at Hazelwood Cooling Pond (KP 67, 83.4).	Foraging
Cattle egret		Ma	Farmland and wetlands throughout the study area (KP 0.3-56.6, 76.6-87.2).	Foraging
Sharp-tailed sandpiper		Ma, Mi	Drainage line in property behind Waratah Bay foreshore (KP 0.3).	Foraging
Sanderling		Ma, Mi	Waratah Bay coastline (KP0).	Foraging
Red knot	EN	EN Ma, Mi	Waratah Bay coastline (KP0).	Foraging
Red-necked stint		Ma, Mi	Waratah Bay coastline (KP0).	Foraging
Gang-gang cockatoo		EN	Wet sclerophyll forest in the Strzelecki Ranges and large woodland patches and roadsides with a high tree cover in the south near Waratah Bay (KP 2.3 – 12.8, 56.5 – 79.7).	Foraging

Common name	FFG	EPBC	Location of potential habitat within the survey area	Use of the study area
Double-banded plover		Ma, Mi	Waratah Bay coastline (KP0).	Foraging
Greater sand plover	VU	VU Ma, Mi	Waratah Bay coastline (KP0).	Foraging
Lesser sand plover	EN	EN Ma, Mi	Waratah Bay coastline (KP0).	Foraging
Red-capped plover		Ma	Waratah Bay coastline (KP0).	Breeding and foraging
Little egret	EN	Ma	Vegetated wetlands within the study area (KP 67, 78.1-78.2, 83.4).	Foraging
Narracan burrowing crayfish	EN		Wet sclerophyll forest and ferny gullies in the Strzelecki Ranges (KP 63.6, 66.6, 67).	Breeding and foraging
South Gippsland spiny crayfish	EN		Narrow streams in Strzelecki Ranges (KP 61.6, 63.6, 66.6, 67).	Breeding and foraging
Black falcon	CE		Woodland and wooded farmland throughout the alignment (KP 2.3- 6.4, 8.1- 8.9, 12.3, 21.5 – 28.7, 29.4, 57 – 79.8).	Foraging
Dwarf galaxias	EN	VU	Rivers and creeks within the study area (KP 17.7, 21.5, 28.5, 29.4, 40.6, 54.3, 61.6, 78, 83.4, 85- 85.2).	Breeding and foraging
Latham's snipe		Ma, Mi	Wetlands and inundated pastures/woodlands in Waratah Bay, Tarwin Valley and Latrobe Valley (KP 0 – 57.2, 76.6 – 87.1).	Foraging
White-bellied sea-eagle	EN	Ma	Woodland and forest associated with Waratah Bay coastline and Morwell River (KP0 - 6.4, 76.6 - 87.1).	Foraging
Little eagle	VU		Open woodland and farmland within the survey area (KP 2.3 – 6.4, 8.1- 8.9, 12.3, 21.5 – 28.7, 57 – 79.8).	Foraging and breeding
White-throated needletail	VU	VU Ma, Mi	Remnant woodland and forest throughout the survey area (KP2.3 - 84.9)	Foraging
Caspian tern	VU	Ma, Mi	Waratah Bay coastline (KP0).	Foraging
Australian little bittern	EN		Vegetated wetlands and waterways (KP67, 83.4)	Foraging
Lewin's rail	VU		Vegetated wetlands and waterways (KP 22.6 - 28.7, 67, 83.4)	Breeding and foraging
Swamp skink	EN	EN	Creeklines, swamp scrubs and swampy woodlands around Waratah Bay and rail trail (2.3 - 6.4, 8.1 - 8.9, 22.6-23.4)	Breeding and foraging
Growling grass frog	VU	VU	Well vegetated wetlands and dams throughout survey area (KP32.0, 34.5-35.0, 40.4, 44.2, 62.4, 67.0, 67.2, 67.4, 78.1, 78.2, 78.1-78.2).	Breeding and foraging
Satin flycatcher		Ma, Mi	Woodlands in Waratah Bay and Latrobe Valley (KP 2.3 – 6.4, 8.1- 8.9, 57 – 76.5).	Breeding and foraging

Common name	FFG	EPBC	Location of potential habitat within the survey area	Use of the study area
Flinders Pygmy Perch *1*	VU		Morwell River and other suitable rivers and creeks within the alignment (KP 17.7, 21.5, 28.5, 29.4, 40.6, 54.3, 61.6, 78, 83.4, 85, 85.1).	Breeding and foraging
Blue-winged parrot		VU, Ma	Grassy areas within the Strzelecki Forest and large woodland patches in the south (KP 2.3 – 6.4, 8.1- 8.9, 57 – 76.5).	Foraging
Barking owl	CE		Eucalypt-dominated woodland and open forest within the alignment (KP 21.5 – 28.7, 57 – 76.5).	Breeding and foraging
Powerful owl	VU		Primarily forest and open woodlands in the Strzelecki Ranges and larger woodland patches near Waratah Bay. May occasionally forage in wooded farmland (KP 2.3 – 6.4, 8.1- 8.9, 12.3, 21.5 – 28.7, 57 – 76.5).	Breeding and foraging
Eastern curlew	CE	CE, Ma, Mi	Waratah Bay coastline (KP0).	Foraging
Platypus	VU		Slow-moving rivers, lakes, and farm dams at Fish Creek, Stony Creek, Tarwin River, Berrys Creek, Mirboo North and Morwell River (KP 17.7, 29.4, 40.6, 54.3, 61.6, 78).	Breeding and foraging
Blue-billed duck	VU		Well vegetated wetlands and waterways (KP67, 83.4)	Foraging
Greater glider	VU	EN	Tall eucalyptus forests in the Strzelecki Ranges (KP57-76.5).	Breeding and foraging
Glossy grass skink	EN		Creeklines, swamp scrubs and swampy woodlands around Waratah Bay (KP2.3 - 6.4, 8.1 - 8.9, 22.6-23.4)	Breeding and foraging
Grey-headed flying-fox	VU	VU	Forests and woodlands throughout the survey area (KP2.3-6.4, 8.1- 8.9, 12.3, 21.5 - 28.7, 57 - 76.5). May occasionally utilise farmland trees and feed trees within townships.	Foraging
Rufous fantail		Ma, Mi	Forests in Strzelecki Ranges and woodland patches in the Tarwin Valley and Waratah Bay (2.3 - 6.4, 8.1- 8.9, 57 - 76.5). (KP 2.3 – 6.4, 8.1- 8.9, 57 – 76.5)	Breeding and foraging
Yellow-bellied sheathtail bat	VU		Forests and woodlands in the Strzelecki Ranges (KP 57 – 76.6)	Breeding and foraging
White-footed dunnart	VU		Large woodland patches in Waratah Bay and Tarwin Valley (KP0, 2.3 - 6.4, 8.1- 8.9, 21.5 - 28.7).	Breeding and foraging
Australasian shoveler	VU		Large farm dams, wetlands and waterways throughout the study area (KP 34.6, 54.8, 67, 83.4).	Breeding and foraging
Little tern	CE	Ma, Mi	Waratah Bay coastline (KP 0).	Foraging
Fairy tern	CE	VU, Ma	Waratah Bay coastline (KP 0).	Foraging
Freckled duck	EN		Vegetated wetlands and waterways (KP67, 83.4)	Foraging
Crested tern		Ma, Mi	Waratah Bay foreshore (KP 0).	Foraging
Hooded Plover	VU	VU, Ma	Waratah Bay foreshore (KP 0).	Foraging
Marsh sandpiper	EN	Ma, Mi	Inundated pasture immediately north of Waratah Bay coastal dunes (KP 0.3).	Foraging

Common name	FFG	EPBC	Location of potential habitat within the survey area	Use of the study area
Masked Owl	CE		Forest and open woodlands in the Strzelecki Ranges and larger woodland patches near Waratah Bay. May occasionally forage in wooded farmland (KP 2.3 – 6.4, 8.1-8.9, 12.3, 21.5 – 28.7, 57 – 76.5).	Breeding and foraging
Lace monitor	EN		Woodland and forest throughout the survey area (KP 2.3-6.4, 8.1- 8.9, 12.3, 21.5 – 28.7, 29.4, 57 – 76.5).	Breeding and foraging
Southern Toadlet	EN		Potential habitat in woodlands around Waratah Bay (KP2.3-6.4, 8.1-8.9).	Breeding and foraging

Priority habitat for threatened species is summarised (area extent) in Appendix 6.

Aquatic fauna

Two threatened fish species and one threatened semi-aquatic mammal species were identified as potentially occurring within the waterways intersecting the survey area based on the desktop review (Appendix 2). These include the FFG Act listed Flinders pygmy perch and platypus and the FFG Act and EPBC Act listed dwarf galaxias and Australian grayling.

Dwarf galaxias is a small freshwater fish endemic to south-eastern Australia and is listed as endangered under the FFG Act and vulnerable under the EPBC Act. On mainland Australia, the species' range extends from the Mitchell River Basin in Central Gippsland in Victoria to the Cortina Lakes, near the Coorong in South Australia (Saddlier et. Al. 2010). Typically, habitat includes well vegetated, slow flowing, still, shallow temporary or permanent freshwater habitats including swamps, drains and backwaters of streams and creeks. Some wetlands may be partially or completely dry during summer. Populations are fragmented and patchy across the landscape and the species has suffered declines in abundance due to habitat loss and modification.

Australian grayling is a small to medium size diadromous fish which inhabits estuarine waters and coastal seas as larvae/juveniles and freshwater rivers and streams as adults (Backhouse G, O'Connor, J and Jackson, J. 2008). Adult Australian grayling mostly occur in cool clear freshwater, with a gravel substrate and alternating rifle and pool zones (Backhouse G, O'Connor, J and Jackson, J. 2008).

Flinders pygmy perch occurs from eastern Victoria as far west as the Latrobe River (Bray 2022). This species occurs in slow or still waters with abundant aquatic vegetation, including in lakes, ponds and slow-flowing rivers and creeks, as well as in pools in moderately flowing streams.

Platypus is a semi-aquatic mammal species, which is widespread in Victoria, being found in all areas except for the Mallee where there are no permanent streams (DELWP 2018b). It is found in a range of freshwater bodies and is mostly found where the banks are suitable for building stable burrows and where the water is shallow enough for them to dive down and feed on bottom-dwelling creatures. This species prefers well-vegetated freshwater creeks, slow-moving rivers, lakes joined by rivers, and built water storages such as farm dams.

The potential distribution for each species within the survey area is as follows:

- Australian grayling, dwarf galaxias and Flinders pygmy perch – potential to occur in a number of waterways south of Buffalo to Morwell, including Morwell River, Eel Hole Creek, Stony Creek, Little

Morwell River, Berrys Creek, Tarwin River East Branch, and Fish Creek. These species have been recorded at several locations along the Tarwin River East Branch although not within the immediate vicinity of the survey area.

- Platypus – has the potential to occur within creeks and rivers along the entire alignment. There are recent records within the following creeks and rivers which intersect the survey area:
    - Fish Creek approximately 1.7 km west of the survey area, with Fish Creek intersecting the survey area at KP 17.7.
    - Amber Creek, which branches off Fish Creek, approximately 6 km east of the survey area.
    - Stony Creek approximately 2 km west of the survey area. Stony Creek intersects the survey area at KP 28.5.
    - Tarwin River east branch approximately 700 m west of the survey area. Tarwin River east branch intersects the survey area at KP 40.6.
    - Berrys Creek both east (approximately 850 m) and west (approximately 500 m) of the survey area. Berrys Creek intersects the survey area at KP 54.3.
    - Morwell River approximately 2.5 km south of the survey area. Morwell River intersects the survey area at KP 78.0.

No targeted surveys have been undertaken within the survey area as construction treatment of waterways has not been determined. If direct impacts to waterways are likely e.g., open trenching, then aquatic surveys are recommended to determine presence/absence of these values. Currently, a precautionary approach has been taken and presence has been assumed for the above species. This is based on the desktop review and habitat assessments where applicable.

Based on the findings of the desktop review and field surveys, locations which support priority habitat for Australian grayling, Flinders pygmy perch and platypus and dwarf galaxias are shown on Figure 5 as Aquatic 1 (Tarwin Valley), Aquatic 2 (Tarwin Valley) and Aquatic 3 (Strzelecki Ranges).

Crayfish

Two threatened freshwater crustacean species were identified as potentially occurring within the survey area based on the desktop review (Appendix 2). These include the FFG listed South Gippsland spiny crayfish and Narracan burrowing crayfish.

South Gippsland spiny crayfish occurs within Wilsons Promontory and the Strzelecki Ranges in southern Victoria (DSE 2003a). This species occurs in streams in sclerophyll forest where the streamside vegetation is dominated by mountain ash (*Eucalyptus regnans*), tree ferns (*Cyathea* sp.) and lilly pilly (*Acmena smithii*). It is more common in streams with pool habitat and little to no aquatic vegetation cover.

Narracan burrowing crayfish is predominantly a burrower, spending most of its life underground (DSE 2001). Its burrows, which consist of two or more openings, are typically found in the flood bed region of fern gullies in wet sclerophyll forest. This species may sometimes be found in the banks of flowing creeks where the burrows have several openings, ultimately descending to the deepest level of the water table.

Tall, pelleted crayfish chimneys, some with multiple openings were observed throughout much of the survey area. Most of the burrows were found near water or along roadside drainage lines, with some

burrows occurring within patches of damp forest. Potential habitat for these species was identified within the riparian corridor of Stony Creek and tributaries that intersect the survey area near Mirboo North (KP 63.5 – KP 67.3).

No Narracan burrowing crayfish were captured during targeted surveys. A total of seven burrowing crayfish were captured, all were identified as the common species lowland burrowing crayfish (*Engaeus quadrimanus*). This common species is not known to be sympatric with the threatened Narracan burrowing crayfish based on a literature review, however, they have overlapping distributions and historical records of Narracan burrowing crayfish are present within 10 km of the survey area. Given this and the low capture rate, this species may still be present within the survey area.

No surveys have been undertaken to date for South Gippsland spiny crayfish within the survey area due to access limitations and the construction treatment of waterways has not been finalised. If direct impacts to waterways are likely e.g., open trenching, then aquatic surveys are recommended to determine presence/absence of these values.

Currently, a precautionary approach has been taken and presence has been assumed for the above species.

Based on the findings of the desktop review and field survey, locations which support priority habitat for South Gippsland spiny crayfish and Narracan burrowing crayfish are shown on Figure 5 as Wetland 3 (Strzelecki Ranges) and Aquatic 3 (Strzelecki Ranges).

Frogs

Two threatened frogs were identified as potentially occurring within the survey area based on the desktop review (Appendix 2). These include the FFG Act and EPBC Act listed growling grass frog and FFG Act listed southern toadlet.

Growling grass frog potentially occurs within permanent and ephemeral waterbodies within the survey area, based on the desktop review (Appendix 2). Growling grass frog is a large native frog dependent on a combination (matrix) of aquatic and terrestrial habitat for foraging, breeding, and shelter (DEWHA 2009c). It occurs in permanent or seasonally inundated waterbodies including swamps, lakes, ponds, farm dams, and irrigation channels, and is mostly associated with waterbodies supporting surrounding, fringing, and dense emergent vegetation. Submerged and floating vegetation is important for breeding while rocks and/or logs surrounding waterbodies provide shelter, basking, and hibernating opportunities during winter months. Fringing and surrounding terrestrial vegetation provide for foraging and dispersal events.

This species has the potential to occur in the survey area in permanent and ephemeral waterbodies such as farm dams, rivers, creeks and lakes between Waratah Bay and Hazelwood. Specific locations include Fish Creek, Stony Creek, Tarwin River East Branch, Berrys Creek, Little Morwell River, Morwell River and Eel Hole Creek, dams near Buffalo, Dumbalk-Stony Creek Road, South Gippsland Highway and Waratah Road and within wetlands along Clarkes Road in Luxford Pond. There are 29 records of the species within 10 km of the survey area.

Southern toadlet is a small frog which occurs within open forest, woodland, grassland and heathland and can be found underneath damp leaf litter, logs or rocks (DELWP 2020, SWIFFT, 2023). Breeding

habitat includes swamps and seasonally flooded low-lying areas and watercourses (DELWP 2020). This species has sharply declined since the early 1980's due to habitat loss, degradation and fragmentation (DELWP 2020). Within the survey area this species has the potential to occur in woodland near Waratah Bay (KPs 2.3 - 6.4 and 8.1 - 8.9).

No growling grass frog were recorded during targeted surveys undertaken for the project assessment during 2021 and 2022. Growling grass frogs have been previously recorded during targeted surveys for the proposed Delburn Wind Farm within the wetland at KP 67 (Ecology and Heritage Partners 2020). This wetland provides good quality habitat and connectivity to other areas of suitable habitat within the broader area for growling grass frog. During the targeted surveys for the proposed Delburn Wind Farm, this species was heard calling in high numbers at the site, and the wetland is considered to support a breeding population of 20 – 30 individuals. Whilst no growling grass frog were recorded during the targeted surveys undertaken for the project assessment at this same location, this species is assumed to still be present within this section of the alignment.

Given the survey results, all other habitat for growling grass frog which intersect the alignment, including habitat at KPs 32.0, 34.5-35.0, 40.4, 44.2 and 78.1-78.2, are considered unlikely to support the species, which may be attributed to a combination of poor water quality, with sediment visible in the water column, and pugging at dam margins caused by stock access. Mosquito fish (*Gambusia Proposed*), which are known to predate growling grass frog tadpoles, were also recorded at most survey locations during targeted surveys.

No targeted surveys were undertaken for southern toadlet. Potential habitat for southern toadlet occurs within areas not yet accessed (KPs 2.3 - 6.4 and 8.1 - 8.9) and presence is therefore assumed for this species at these locations.

Based on the findings of the desktop review and field surveys, a single location is considered to support priority habitat for growling grass frog, which is shown on Figure 5 as Wetland 4 (Strzelecki Ranges) (KP67). Priority habitat for southern toadlet is shown on Figure 5 as Woodlands 1 (Waratah Bay).

Mammals

Four threatened mammals were identified as potentially occurring within the survey area, at various locations, based on the desktop review (Appendix 2). These include the FFG Act and EPBC Act listed greater glider, grey-headed flying-fox and swamp antechinus, and the FFG Act listed white-footed dunnart.

Greater glider is an arboreal nocturnal marsupial restricted to Eastern Australia and eucalypt forests and woodland (DCCEEW 2022). During diurnal hours it shelters in large hollow-bearing trees and typically are higher in abundance in tall montane wet forests where large old trees and hollows are plentiful. Home ranges are relatively small (1-4 ha) and have poor dispersal ability, largely limited by their gliding distance as animals rarely venture to the ground or disperse across non-native forest, which makes the species sensitive to habitat clearing and fragmentation, and logging and wildfire. Current population size is estimated to be 100,000 distributed across Eastern Australia. Populations of greater glider are known from approximately 1 km to the west of the alignment in Mirboo North Regional Park and adjacent forest and woodland, and further to the east near Ashfords Road between Stony Creek and Morwell River. The survey area supports similar vegetation types and some sections are contiguous with those supporting known greater glider populations.

Grey-headed flying-fox is Australia's only endemic flying-fox and occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria, although only a small proportion of this range is used at any one time, as the species is a selective forager (DAWE 2021). This species is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, with the primary food source being blossom from Eucalyptus and related genera. There is a nationally important camp located in Bairnsdale, as well as other camps which have been identified and monitored during the national flying-fox monitoring program located in Woodside, Traralgon, Sale and Maffra.

Swamp antechinus is a small carnivorous marsupial, which has a highly fragmented distribution in costal Victoria (TSSC 2016). It mainly occurs in damp areas, particularly at sites with dense vegetation, and its habitat includes dense wet heathlands, tussock grasslands, sedgelands, damp gullies, swamps and some shrubby woodlands. It shelters in a short burrow in the topsoil or beneath thick leaf litter. Breeding occurs between June and August.

White-footed dunnart is a nocturnal marsupial which occurs in a range of sclerophyll and coastal habitats in Victoria, including forest, woodland, heathland and coastal shrublands on a range of geologies, from infertile sandy soils to deeper richer soils (Wilson and Aberton 2006). This species prefers dense shrub and ground layers and feed on insects and small skinks (Wilson and Aberton 2006, Menkhorst and Knight 2011). Nests are constructed in tree hollows from bark, under fallen timber or dense leaf litter, burrows in the ground, piles of logging debris, in the 'skirts' of Grass Trees *Xanthorrhoea* sp. and Cycads *Macrozamia* sp. and rock crevices (Menkhorst and Knight 2011, OEHb 2020). Breeding occurs in Victoria between late July and August.

The potential distribution for each species within the survey area is as follows:

- Greater glider – tall, moist eucalypt forests between Mirboo North and Hazelwood (KP 56.7 – KP 75.2)
- Grey-headed flying-fox – in woodlands and forest throughout the survey area.
- Swamp antechinus – dunes, swamp scrub and damp heathy woodland within Waratah Bay and southern parts of the Tarwin Valley (KPs 0, 2.3 - 6.4 and 8.1 - 8.9).
- White-footed dunnart – swamp scrub and damp heathy woodland within Waratah Bay and southern parts of the Tarwin Valley (KPs 2.3 - 6.4 and 8.1 - 8.9) and within swampy riparian woodland along the Great Southern Rail Trail (KP 22.6 – KP 26.5).

Grey-headed flying-fox were recorded on the acoustic recorded located at KP 67.9. The recording included a minimum of two individuals involved in a scuffle, indicating that this species utilises this section of the study area for foraging. There are no known camps located within the survey area, therefore, the survey area is considered to contain foraging habitat only.

No greater glider were recorded during targeted surveys (Ecocentric Environmental Consulting 2023). Surveys to date have covered five out of six areas of suitable habitat for this species within the Strzelecki Ranges, with an area of suitable habitat along Kings Road in the northern end of the survey area not surveyed due to time constraints. Other small arboreal mammals, including sugar glider (*Petaurus breviceps*), common ringtail possum (*Pseudocheirus peregrinus*) and common brushtail possum (*Trichosurus vulpecula*) were identified during the targeted surveys, which indicates that had greater glider been present within the survey area, this species would have been positively identified during the

drone surveys. Given the results of the surveys, there is a low likelihood of this species occurring within the areas surveyed. This is consistent with the targeted surveys undertaken for the proposed Delburn Wind Farm (Ecology and Heritage Partners 2019). Spotlighting detected common arboreal mammals, including sugar glider and common brushtail possum, however no greater glider were detected.

No white-footed dunnart were recorded during targeted surveys within the Great Southern Rail Trail and, given the habitat is considered to be of low to moderate habitat quality for this species, the likelihood of this species occurring at this location is low.

Potential habitat for white-footed dunnart and swamp antechinus occurs within areas not yet accessed (KPs 2.3 - 6.4 and 8.1 - 8.9) and presence is therefore assumed for these species at these locations.

Southern brown bandicoot is not considered likely to occur due to a lack of recent records (Appendix 2) and limited suitable habitat within the survey area. This was confirmed by lack of detection on remote cameras deployed in potential habitat for this species and is consistent with the results of targeted surveys undertaken for the proposed Delburn Wind Farm (Ecology and Heritage Partners 2019).

Based on the findings of the desktop review and field surveys, a single location is considered to support priority habitat for growling grass frog, which is shown on Figure 5 as Wetland 4 (Strzelecki Ranges) (KP67).

Raptors and owls

Four threatened raptors and two threatened owl species were identified as potentially occurring within the survey area based on the desktop review (Appendix 2). These includes the FFG Act listed species grey goshawk (*Accipiter novaehollandiae*), black falcon (*Falco subniger*), white-bellied sea-eagle (*Haliaeetus leucogaster*), little eagle (*Hieraaetus morphnoides*), barking owl and powerful owl.

Grey goshawk is mainly found in wet forests in the Otway Ranges, with low densities of individuals in woodlands, dry forests and farmland in the Strzelecki Ranges, Gippsland Plains, Glenelg Plain and Otway Plains (SWIFFT 2022a). Black falcon is sparsely spread across most of Victoria. It inhabits woodland, shrubland and grassland, especially riparian woodland and agricultural land, and is often associated with streams or wetlands. White-bellied sea-eagle is distributed along the coastline of mainland Australia and Tasmania and in eastern Australia it also extends inland along some of the larger waterways (DSE 2003b). This species occurs near freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters, with terrestrial habitats including coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas. Little eagle is a widespread species which occurs primarily in wooded farmland and dry woodlands.

Barking owl has been recorded from scattered localities throughout Victoria, although it is largely absent from unforested areas such as the volcanic plains and the semi-arid north-west (DE 2003c). It inhabits woodland and open forest, including fragmented remnants and partly cleared farmland, wetland and riverine forest. Powerful owl occurs mainly on the eastern side of the Great Dividing Range, and inhabits open forests and woodlands, as well as sheltered gullies in wet forests with dense understoreys, especially along watercourses (DSE 2004). This species requires old growth trees for nesting.

The potential distribution for each species within the survey area varies as follows:

- Grey goshawk – woodlands and forests in Waratah Bay and Strzelecki Ranges.

- Black falcon – woodlands associated with streams and wetlands throughout the survey area.
- White-bellied sea-eagle – woodlands associated with the Morwell River and Waratah Bay.
- Little eagle – open woodland and farmland throughout the survey area.
- Barking owl – woodland and open forests throughout the survey area.
- Powerful owl –interconnected forest and woodlands throughout the survey area.

One species, grey goshawk, was opportunistically recorded during field surveys adjacent to KP 67.3.

Targeted surveys for threatened owls recorded powerful owl fledglings on the acoustic recorder located at KP 21.9. This species was recorded multiple times across the recording period at this location.

Targeted surveys did not record any other species from within this group. This is consistent with targeted surveys, including call playback and spotlighting, undertaken for the proposed Delburn Wind Farm, within and adjacent to the study area (Ecology and Heritage Partners 2019). Whilst powerful owl was not recorded in other sections of the survey area, it is still considered to have a moderate to high likelihood of occurrence, particularly given the prevalence of historical records near or within the survey area and detection at KP21.9.

Based on the findings of the desktop review and field surveys, priority habitat is shown on Figure 5 as follows:

- Powerful Owl - Woodland 1 (Waratah Bay), Woodland 2 (Waratah Bay), Woodland 4 (Tarwin Valley), Wetland 3 (Strzelecki Ranges), Damp Forest (Strzelecki Ranges) and Damp Forest (Tarwin Valley).
- White-bellied Sea-Eagle - Dunes (Waratah Bay), Woodland 1 (Waratah Bay), Morwell River (Latrobe Valley) and Aquatic 4 (Latrobe Valley).
- Grey Goshawk - Woodland 1 (Waratah Bay), Damp Forest (Strzelecki Ranges).

Priority habitat for little eagle has not been defined due to its potential to make (limited) use of small, modified and degraded habitats throughout the study area.

Reptiles

Three threatened reptile species were identified as potentially occurring within the survey area based on the desktop review (Appendix 2). These include the FFG Act listed swamp skink, glossy grass skink and lace monitor.

Swamp skink and glossy grass skink are diurnal reptiles which prefer swampy and damp heath habitat, including dense vegetation along the margins of swamps and watercourses, wet heathlands and salt marshes (SWIFFT 2022b). Lace monitor is a large carnivorous reptile that lives in wooded habitats with a wide distribution across Victoria and South-eastern Australia. It is an agile climber, which lays its eggs in arboreal and terrestrial termite mounds, and feeds on a range of vertebrate and non-vertebrate species such as insects, birds, eggs, small reptiles and possums.

The potential distribution for each species within the survey area varies as follows:

- Swamp skink and glossy grass skink –remnant swamp scrub from Waratah Bay north to the base of the Strzelecki Ranges. In particular, within swampy riparian woodland along the Great Southern Rail Trail (KP 22.6-26.5) and within swamp scrub and damp heathy woodland in the south of the

proposed alignment (KP 2.3 - 6.4, 8.1 - 8.9). There was no suitable habitat for this species where Morwell River intersects the alignment in the north (KP79). The escarpment at Morwell River was steep and adjacent ephemeral wetlands were both accessible by stock and subject to cropping up to the banks of the wetland as recently as 2021 (Google Earth). Therefore, it is unlikely that any Swamp Skink would persist with these disturbances if present and the likelihood of occurrence at this location is low.

- Lace monitor – suitable habitat is present in larger patches of woodland and forest between Mirboo North and Hazelwood in the northern section, and southern parts of Tarwin Valley and Waratah Bay in the south.

No swamp skink or glossy grass skink were recorded during targeted surveys within the Great Southern Rail Trail. Based on the results of the targeted surveys and the highly modified nature of the adjacent habitat, including the presence of stock, there is a low likelihood of these species occurring within the survey area. Potential habitat still occurs within areas not yet accessed (KPs 2.3 - 6.4 and 8.1 - 8.9), and presence is therefore assumed for these species at these locations.

Lace monitor was recorded on a remote camera during targeted field surveys within the survey area at KP 68.0 and has been historically recorded within and around the survey area, particularly within the Strzelecki Ranges and Great Southern Rail Trail. This species is highly mobile and based on the results of the targeted surveys and historical records, is likely to occur in all areas of suitable habitat within the survey area.

Based on the findings of the desktop review and field survey, locations which support priority habitat for swamp skink, glossy grass skink and lace monitor are shown on Figure 5 as Woodland 1 (Waratah Bay); and Woodland 4 (Tarwin Valley) and Damp Forest (Strzelecki Ranges) for lace monitor only.

Shorebirds

Fourteen (14) threatened bird species were identified as potentially occurring within the foreshore and dunes at Waratah Bay, based on the desktop review (Appendix 2). These included the FFG Act and EPBC Act listed common sandpiper (*Actitis hypoleucos*), red knot (*Calidris canutus*), greater sand plover (*Charadrius leschenaultii*), lesser sand plover (*Charadrius mongolus*), Caspian tern (*Hydroprogne caspia*), eastern curlew (*Numenius madagascariensis*), little tern (*Sternula albifrons*) , fairy tern (*Sternula nereis*) and hooded plover and the EPBC Act only listed sanderling (*Calidris alba*), red-necked stint (*Calidris ruficollis*), double-banded plover (*Charadrius bicinctus*), red-capped plover (*Charadrius ruficapillus*) and crested tern (*Thalasseus bergii*).

There is a single record from 1999 of hooded plover in the survey area at Sandy Point Beach (Waratah Bay) and three more recent observations have been made within 200 m of the survey area boundary. Numerous records of hooded plover have been made along Sandy Point Beach and Waratah Bay although most are located approximately 3 km to the east and west of the survey area. Suitable (but not optimal) habitat exists within the survey area for foraging and nesting, although high levels of human and domestic pet (dog) activity and less optimal habitat (sparse seaweed and flotsam and limiting backing dune) reduce the significance of the site.

The survey area likely provides foraging, and occasional nesting opportunities for species in this group, and also functions as a movement corridor between more significant areas of habitat along this section of coastline.

Targeted surveys undertaken at Waratah Bay at Sandy Point Beach identified three crested terns, as well as one large flock of sanderlings (approx. 200 birds). Whilst other species were not recorded during the surveys, Sandy Point Beach is likely to be used by a number of the species (including hooded plover), however the significance of this habitat may be reduced by high levels of human and animal disturbance (including off-leash dogs) and more limited protective seaweed/flotsam/dune sites for nesting and foraging.

Based on the findings of the desktop review and field survey, locations which support priority habitat for shorebirds are shown on Figure 5 as Foreshore (Waratah Bay) and Dunes (Waratah Bay).

Waterbirds and waders (inland)

Fourteen (14) threatened bird species were identified as potentially occurring within watercourses, well vegetated wetlands and dams and areas/pastures prone to inundation located within the survey area, based on the desktop review (Appendix 2). These included the FFG Act listed hardhead (*Aythya australis*), Australasian bittern (*Botaurus poiciloptilus*), Australian little bittern (*Ixobrychus dubius*), Lewin's rail (*Lewinia pectoralis*), blue-billed duck (*Oxyura australis*), Australasian shoveler (*Spatula rhynchotis*) and freckled duck (*Stictonetta naevosa*), the FFG Act and EPBC Act listed eastern great egret (*Ardea modesta*), musk duck (*Biziura lobata*), little egret (*Egretta garzetta*), and the EPBC Act only listed cattle egret (*Bubulcus ibis*), sharp-tailed sandpiper (*Calidris acuminata*) and Latham's snipe (*Gallinago hardwickii*).

Cattle egret was recorded opportunistically during field surveys in a wetland adjacent to KP 52.3 and within paddocks at KP 55.1. Latham's snipe was recorded opportunistically utilising a waterbody near KP 78.8. Hardhead was recorded during diurnal bird surveys within a large farm dam at KP 45.1. Despite not being identified during targeted surveys, Australasian bittern is considered likely to occur within with the survey area due to suitable habitat for these species, particular within the Hazelwood Cooling Pond (KP 83.4). All other species are considered unlikely to occur within the survey area based on the results of the targeted surveys and suitability of habitat.

Based on the findings of the desktop review and field survey, locations which support priority habitat for waterbirds and waders are shown on Figure 5 as Aquatic 2 (Tarwin Valley), Wetland 1 (Tarwin Valley), Wetland 4 (Strzelecki Ranges) and Aquatic 4 (Latrobe Valley).

Woodland and forest birds

Four woodland and forest bird species were identified as potentially occurring within woodland patches in the north and south of the survey area, based on the desktop review (Appendix 2). These include the EPBC Act listed gang-gang cockatoo (*Callocephalon fimbriatum*) and the EPBC Act listed blue-winged parrot (*Neophema chrysostoma*), and the EPBC Act listed satin flycatcher (*Myiagra cyanoleuca*) and rufous fantail (*Rhipidura rufifrons*).

Gang-gang cockatoo are endemic to south-eastern Australia, and in Victoria is widespread through north-east and southern regions, with records in east Melbourne, Mornington Peninsula and south-western Gippsland (DAWE 2022). This species primarily occurs within the temperate eucalypt forests and woodlands of mainland south-east Australia and is an altitudinal migrant. During summer months, they primarily inhabit mature, wet sclerophyll forests, typically dominated by eucalypts, whilst during winter months, this species tends to range beyond montane forests to inhabit woodland assemblages at lower, drier altitudes.

The blue-winged parrot occurs within south Victoria and the midlands and eastern areas of Tasmania, and inhabits a range of habitats from coastal, sub-coastal and inland area, favouring grasslands and grassy woodlands. The satin flycatcher is widespread in the south and east of Victoria, and inhabits eucalypt-dominated forests, especially near wetlands, watercourses and heavily vegetated gullies (DoE 2022). The rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalyptus with a dense shrubby understorey including ferns. They are also found in drier sclerophyll forests and woodlands often with a shrubby or heathy understorey.

The potential distribution for each species within the survey area is as follows:

- Gang-gang cockatoo –wet sclerophyll forests, primarily within the Strzelecki Ranges.
- Satin flycatcher – tall forests within the survey area.
- Blue-winged parrot –grassy woodlands across the survey area and may occasionally utilise farmlands.
- Rufous fantail –wet sclerophyll forests in Strzelecki Ranges and woodland patches in Waratah and southern sections of Tarwin Valley.

Targeted surveys undertaken within the survey area identified one rufous fantail, within the Strzelecki Highway Road reserve on edge of plantation (near KP 70.2). This species was identified by its distinctive reddish-brown rump and fanned tail.

The remaining species within this group were not identified during targeted surveys however recent records in close proximity to the survey area means these species cannot be ruled out in high-quality habitats, particular in sections of the Strzelecki Ranges, Tarwin Valley and Waratah Bay supporting large, interconnected patches of woodlands or forest.

Based on the findings of the desktop review and field survey, locations which support priority habitat for woodland birds are shown on Figure 5 as Woodland 1 (Waratah Bay) and Damp Forest (Strzelecki Ranges).

Regionally significant species

Whilst not listed as threatened in Victoria, koalas are considered a regionally significant species. This species is a marsupial which is widely distributed across eastern Australia, and due to their specific dietary niche of Eucalyptus foliage and their broader aesthetic appeal, they have cultural, environmental and economic importance. This has led to concern about the conservation status of koalas, both in Australia and internationally. There are three regions across the state, which includes the Gippsland region, which support approximately 80% of Victoria's koala population in native vegetation, with these regions also supporting 99% of the population inhabiting eucalypt plantations (Heard and Ramsey 2020).

There are numerous historical records of this species within the survey area, as well as being observed during field surveys. In particular, this species was recorded on multiple occasions during field surveys along the Great Southern Rail Trail (KP 21.7 – KP 28.6), as well as through the Strzelecki Ranges between KP 61.4 73.1.

6.3.2 Flora species

The desktop assessment identified 79 significant flora species as previously occurring within the 10 km wide study area (Appendix 2). This includes 54 species listed on the EPBC Act and 75 species listed on the FFG Act.

Considering the presence of existing records, habitat requirements and known information about the survey area and surrounding landscape, 37 significant species were identified as potentially occurring within the survey area based on the desktop assessment (Table 25). Where land access permitted, targeted surveys were undertaken for these species with the findings, and a discussion of the ecology, distribution and habitat within the survey area, provided below by habitat grouping.

Table 25. Significant flora species which may occur within the survey area based on the desktop assessment

Common name	FFG	EPBC	Location of potential habitat within the survey area	Use of the study area
Coast wirilda	EN		Coastal dunes in Waratah Bay (KP 0)	Growth and reproduction
Coast bitter-bush	EN		Coastal dunes in Waratah Bay (KP 0)	Growth and reproduction
River swamp wallaby-grass		VU	Waterways and wetlands in Tarwin Valley, Strzelecki Ranges and Latrobe Valley (KP 45.0, 46.1, 48.4, 49.3, 50.3, 50.5, 52.0, 53.4, 54.8, 78.2).	Growth and reproduction
Silver everlasting	EN		Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9)	Growth and reproduction
Lizard orchid	EN		Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9)	Growth and reproduction
Orange-tip finger-orchid	EN		Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9)	Growth and reproduction
Eastern spider orchid	EN	EN	Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9, 22.6 – 28.7)	Growth and reproduction
Thick-lipped spider-orchid		VU	Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	Growth and reproduction
Slender pink-fingers	VU		Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	Growth and reproduction
Mountain bird-orchid	VU		Damp and wet forest communities in low-lying areas/gullies through Strzelecki Ranges (KP61.4, 63.6, 66.9, 71.7).	Growth and reproduction
Two-tone vibrissea	EN		Major creeks and waterways in Strzelecki Ranges, namely Little Morwell River and Stony Creek (KP61.4, 63.6, 66.6, 66.9).	Growth and reproduction
Coast colobanth	EN		Coastal dunes in Waratah Bay (KP 0)	Growth and reproduction
Spurred helmet-orchid	EN		Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9).	Growth and reproduction
Fringed helmet-orchid	EN		Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9).	Growth and reproduction

Common name	FFG	EPBC	Location of potential habitat within the survey area	Use of the study area
Slender tree-fern	CE		Wet forest communities in low-lying areas/gullies through Strzelecki Ranges (KP 61.4, 63.6, 66.6, 66.9, 71.7).	Growth and reproduction
Bear's-ear	EN		Dry forest and woodland communities along roadsides on the northern half of the Strzelecki Ranges (KP 67.9, 68.9, 69.6, 70.2, 71.9 – 73.8, 74.9 – 76.5).	Growth and reproduction
Matted flax-lily	CE	EN	Roadsides supporting grassland and woodland communities in Latrobe Valley with limited disturbance/modification. In particular, McFarlane Road (KP 76.5, 79.7, 79.8).	Growth and reproduction
Green scentbark	EN		Between Yinnar-Driffield Road and Morwell River, in the Latrobe Valley (KP 76.5 – 77.4).	Growth and reproduction
Southern blue-gum	EN		Roadsides and farmland between Tarwin River East Branch and Mirboo North (KP 40.6 – 57.4).	Growth and reproduction
Bog gum	CE		Low-lying/wet areas in the Tarwin Valley, primarily associated with roadsides and remnant bushland (KP 6.5, 15.3, 22.6 – 28.7, 31.6 – 33.7).	Growth and reproduction
Strzelecki gum	CE	VU	Roadsides, waterways, farmland and remnant bushlands in Tarwin Valley and Latrobe Valley (KP29.4, 31.5, 34.9, 40.7, 63.6, 78.0, 78.2).	Growth and reproduction
Yarra gum	CE		Farmlands and woodlands in Latrobe Valley (KP76.5 – 79.8).	Growth and reproduction
Austral Crane's-bill	EN		Dry forest and woodland communities along roadsides on the northern half of the Strzelecki Ranges (KP 67.9, 68.9, 69.6, 70.2, 71.9 – 73.8, 74.9 – 76.5)	Growth and reproduction
Currant-wood	EN		Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9)	Growth and reproduction
Dune wood-sorrel	EN		Coastal dunes in Waratah Bay (KP 0)	Growth and reproduction
Coast fescue	EN		Coastal dunes in Waratah Bay (KP 0)	Growth and reproduction
Dense leek-orchid		VU	Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9)	Growth and reproduction
Netted brake	EN		Damp and wet forest communities in low-lying areas/gullies through Strzelecki Ranges (KP 61.4, 63.6, 66.9, 71.7)	Growth and reproduction
Green-striped greenhood		VU	Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9).	Growth and reproduction
Leafy greenhood		VU	Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9)	Growth and reproduction
Cobra greenhood	EN		Drier forests on northern slopes of Strzelecki Range. May also occur in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9, 67.9 – 76.5).	Growth and reproduction

Common name	FFG	EPBC	Location of potential habitat within the survey area	Use of the study area
Small sickle greenhood	EN		Swampy areas in southern section of Great Southern Rail Trail (KP22.6-26.5).	Growth and reproduction
Rush lily	VU		Woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9).	Growth and reproduction
Alpine sun-orchid	CE		Damp or wet forests in Strzelecki Ranges (57.4, 58.5 – 59.8, 61.4, 61.6, 60.6, 61.9, 62.3 – 63.6, 64.6 – 66.0, 66.6, 66.9 – 67.0, 68.7, 69.6, 70.2).	Growth and reproduction
Slender fork-fern	CE		Wet areas supporting *Dicksonia antarctica* in woodlands in Waratah Bay and damp/wet forests in Strzelecki Ranges (KP 3.5 – 6.3, 57.4, 58.5 – 59.8, 61.4, 61.6, 60.6, 61.9, 62.3 – 63.6, 64.6 – 66.0, 66.6, 66.9 – 67.0, 68.7, 69.6, 70.2).	Growth and reproduction
Oval fork-fern	EN		Wet areas supporting tree ferns in damp/wet forests in Strzelecki Ranges (KP 57.4, 58.5 – 59.8, 61.4, 61.6, 60.6, 61.9, 62.3 – 63.6, 64.6 – 66.0, 66.6, 66.9 – 67.0, 68.7, 69.6, 70.2).	Growth and reproduction
Small fork-fern	EN		Wet areas supporting *Dicksonia antarctica* in woodlands in Waratah Bay (KP 3.5-6.3).	Growth and reproduction

Coastal dune flora

Five threatened flora species were identified as potentially occurring within the coastal dunes system bordering Waratah Bay, based on the desktop review (Appendix 2). These include the FFG Act listed common tussock-grass (*Poa billardierei*), coast wirilda (*Acacia uncifolia*), coast bitter-bush (*Adriana quadripartita*), coast colobanth (*Colobanthus apetalus* var. *apetalus*) and dune wood-sorrel (*Oxalis rubens*). All species have similar coastal dunes habitat requirements and have been recorded along the South Gippsland coastline from Venus Bay through to Wilson's Promontory.

Within the survey area habitat for these species is restricted to the narrow band of coastal dunes surrounding Waratah Bay (KP 0; Figure 5). Whilst distribution of individual species within the dune system may vary (e.g. either foredune or hind dunes), habitat is limited by the narrow nature of the dunes at the point of crossing and limited hind dunes supporting taller coastal scrubs and Banksia woodlands.

Given avoidance of the dune system via HDD was established early in the project design process, no targeted surveys for these species have been completed. As a result, they have been assumed present (and avoided) for the purpose of this assessment.

Based on the findings of the desktop review and field survey, locations which support priority habitat for coastal dune flora are shown on Figure 5 as Dunes (Waratah Bay).

Waratah Bay woodland flora

Sixteen flora species were identified as potentially occurring within lowland forest and heathy woodland remnants surrounding Waratah Bay, and in particular parcels and roadsides immediately south and north of Fish Creek-Waratah Bay Road, based on the desktop review (KP 3.5 - 6.3, 8.7 - 8.9) (Appendix

2). These include the EPBC Act and FFG Act listed eastern spider orchid (*Caladenia orientalis*), and currant-wood (*Monotoca glauca*), the FFG Act only listed silver everlasting (*Argentipallium dealbatum*), lizard orchid (*Burnettia cuneata*), orange-tip finger orchid (*Caladenia aurantiaca*), slender pink fingers (*Caladenia vulgaris*), spurred helmet-orchid (*Corybas aconitiflorus*), fringed helmet-orchid (*Corybas fimbriatus*), cobra greenhood (*Pterostylis grandiflora*), rush lily (*Sowerbaea juncea*), slender fork-fern (*Tmesipteris elongata*) and small fork-fern (*Tmesipteris parva*), and EPBC Act only listed thick-lipped spider orchid (*Caladenia tessellata*), dense leek-orchid (*Prasophyllum spicatum*), green-striped greenhood (*Pterostylis chlorogramma*), leafy greenhood (*Pterostylis cucullata* subsp. *cucullata*).

With the exception of currant-wood, which is recorded frequently in the local area (including just outside the survey area on Fish Creek-Waratah Bay Road; KP 6.4; Figure 4), records for these species are sporadic in the Waratah Bay region, or based on species habitat modelling (e.g. PMST). This should however be considered in the context of limited past survey effort in the region, including the likelihood that habitat within private land may not have been surveyed in detail at any stage. In addition, extensive coastal woodlands and lowland forest habitat persists in Cape Liptrap Coastal Park less than 2 km to the south-east of the survey area (KP 5.1; Figure 4), which in turn is relatively well connected to a large patch of remnant woodland and forest within and adjacent to the survey area in private land (KP 4.5 – 6.4). Given numerous threatened species have been recorded in Cape Liptrap Coastal Park previously, remnant vegetation in this section is considered to have a high likelihood of supporting threatened flora species.

Targeted flora surveys undertaken in Fish Creek-Waratah Bay Road and Waratah Bay Road did not identify any threatened species from this group (Figure 4). The aforementioned habitat within the adjoining private land has not been surveyed, and whilst these species may occur within the broader patch, vegetation/habitat immediately adjacent to the alignment (i.e. the edge of the patch) is of a lesser quality due to edge effects (weed encroachment from pastures and access from cattle). Sections of the habitat closest to the AoD is therefore considered likely to be sub-optimal and, like the roadsides, may not support threatened flora species. This however cannot be confirmed without access to the vegetation/habitat in question and, for the purpose of this assessment, we have assumed presence of these species in potential habitats between KPs 3.5 – 6.3 and 8.7 – 8.9.

Based on the findings of the desktop review and field survey, locations which support priority habitat for Waratah Bay woodland flora are shown on Figure 5 as Woodlands 1 (Waratah Bay).

River swamp wallaby-grass

River swamp wallaby-grass (*Amphibromus fluitans*) was identified as potentially occurring along minor drainage lines and associated wetlands, based on the desktop review (Appendix 2). Whilst recorded sporadically, with only seven records across the study area, limited past survey effort in the region and the inconspicuous nature of this species suggests it may be more widespread.

Whilst habitat could occur in discrete locations across most of the survey area, the desktop and on-ground habitat assessments have identified a high likelihood of the species occupying waterways intersecting the survey area in the Latrobe Valley and Strzelecki Ranges, as well as small dams and lakes in hills south of Mirboo North in the Tarwin Valley (KPs 45.0, 46.1, 48.4, 49.3, 50.3, 50.5, 52.0, 53.4, 54.8, 78.2).

To date surveys have been completed at KPs 45.0, 46.1, 48.4 and 78.2. A large population (100+ individuals) was found in a small wetland adjacent to the Morwell River at KP 78.2. It was not detected in any other location surveyed.

Based on the findings of the desktop review and field survey, locations which support priority habitat for Waratah Bay woodland flora are shown on Figure 5 as Aquatic 2 (Tarwin Valley) and Wetland 2 (Tarwin Valley).

Strzelecki Ranges dry forest flora

Three flora species were identified as potentially occurring within drier forest communities in the Strzelecki Ranges, primarily associated with north and west facing slopes between KP 67.9 and 76.5, based on the desktop review (Appendix 2). These include the FFG Act listed cobra greenhood, bear's-ear (*Cymbonotus lawsonianus*), and austral crane's-bill (*Geranium solanderi* var. *solanderi*).

Records of austral crane's-bill within the study area are limited to a single occurrence in Morwell National Park, however this species is inconspicuous and often overlooked or mistaken for common species within the genus. The other species, cobra greenhood and bear's-ear, have been recorded in numerous locations in similar habitats to the north and south of the survey area.

None of the target species were detected during surveys. Given the inconspicuous nature of these species, their presence within the survey area cannot be completely ruled out. However, it is considered unlikely the survey area would support a large or significant population and the associated habitat can be considered 'sub-optimal' for the purpose of this assessment. These species are therefore considered unlikely to occur within the survey area based on the results of the desktop review and field surveys.

Strzelecki Ranges damp forest flora

Six threatened flora species and one threatened fungus species were identified as potentially occurring within damp or wet forests in the Strzelecki Ranges between KP 58.5 and 70.2 based on the desktop review (Appendix 2. These include FFG Act listed mountain bird-orchid (*Chiloglottis jeanesii*), slender tree-fern (*Cyathea cunninghamii*), alpine sun-orchid (*Thelymitra alpicola*), slender fork-fern, oval fork-fern (*Tmesipteris ovata*) and two-tone vibrissae (*Chlorovibrissea bicolor*), and netted brake (*Pteris epaleata*).

Past records of all species within the study area are limited, with many occurring in areas not directly connected to the habitats in question (Figure 4). However, with the exception of slender tree-fern, all species are relatively inconspicuous and likely under-surveyed throughout the region and may have persisted in small pockets of remnant forest within relatively undisturbed waterways, gullies or shaded roadsides.

None of the target species were detected during surveys, however potential habitat for alpine sun-orchid, slender fork-fern and oval fork-fern between KP58.4 and 61.1 remains unsurveyed due to land access constraints (the other species were primarily associated with drainage lines and wet gullies which are not present in these locations). These species are therefore assumed to be present within the survey area, whilst all others considered unlikely to occur.

Based on the findings of the desktop review and field survey, locations which support priority habitat for alpine sun-orchid, slender fork-fern and oval fork-fern are shown on Figure 5 as Damp Forest (Strzelecki Ranges).

Matted flax-lily in Latrobe Valley

The EPBC Act and FFG Act listed matted flax-lily was identified was potentially occurring in roadsides and remnant woodland patches within the Latrobe Valley and northern foothills of the Strzelecki Ranges, based on the desktop review (Appendix 2). Matted flax-lily has a broad range across Victoria and is associated with native grasslands and woodlands of the Victorian Volcanic Plains and Gippsland Plains, often being restricted to small linear remnants along roadsides, public land, and less disturbed grassland and woodland remnants in private land.

Suitable habitat was identified at KPs 76.5, 79.7 and 79.8 within grassy woodland or grassland remnants in roadsides. One area considered particularly likely to support this species is McFarlanes Road, from which numerous individuals have previously been recorded and is known to support an important population (Carter, 2010).

Targeted surveys have been undertaken in all areas of suitable habitat. This species was not detected within the survey area and is considered unlikely to occur.

Threatened Eucalyptus species

Five threatened Eucalyptus species were identified as potentially occurring within the survey area based on the desktop review (Appendix 2). These include the EPBC Act and FFG Act listed Strzelecki gum, and FFG Act listed green scentbark (*Eucalyptus fulgens*), southern blue-gum (*Eucalyptus globulus* subsp. *globulus*), bog gum (*Eucalyptus kitsoniana*) and Yarra gum.

These species may persist in the landscape within remnant patches of forest, or as scattered trees in otherwise cleared settings (such as paddocks). The potential distribution for each species within the survey area is as follows:

- Strzelecki gum – may persist across much of the survey area from Buffalo (KP 22.5) through into the Latrobe Valley (KP 87.2), on ridges, slopes and along stream banks.
- Green scentbark and Yarra gum – restricted to heavy soils on the plains and lower slopes of the Latrobe Valley, from KP 76.5 through to 87.2.
- Southern blue-gum – recorded infrequently across the study area from the hills around Waratah Bay (KP 8.1) through to the Latrobe Valley (KP 87.2), however northern populations may represent an intergrade between southern blue-gum (subsp. *globulus*) and eurabbie (subsp. *pseudoglobulus*).
- Bog gum – recorded frequently within the survey area from Waratah Bay (KP 2.2) through to the Tarwin River East Branch (KP 40.6), the species occurs in low-lying areas prone to waterlogging or infrequent inundation.

With the exception of southern blue-gum and green scentbark, all other threatened eucalyptus species have been recorded within the survey area during the preliminary vegetation and habitat assessments (Section 6.2) as follows:

- Strzelecki gum – 104 individual trees recorded within the survey area, with major populations at Stony Creek (KP 29.4), unnamed creekline at KP 34.9, Tarwin River East Branch (KP 40.6) and Morwell River and associated terraces (KP 76.5 – 78.6).
- Yarra gum – 18 individual trees recorded within the survey area from a single population in an unused rail reserve at KP 78.9.
- Bog gum – over 500 individual trees recorded within the survey area, with major populations within the Great Southern Rail Trail reserve (KP 23.0 – 28.4), and the Dumbalk-Stony Creek Road reserve (KP 31.5 – 33.5).

Given the conspicuous nature of these species and the extensive recording of trees, southern blue-gum and green scentbark are not considered likely to occur within the survey area.

Based on the findings of the desktop review and field surveys, priority habitat is shown on Figure 5 as follows:

- Strzelecki Gum - Damp Forest (Tarwin Valley), Morwell River (Latrobe Valley) and Grassy Woodland 1 (Latrobe Valley).
- Bog Gum - Woodland 2 (Waratah Bay), Woodland 3 (Tarwin Valley) and Woodland 4 (Tarwin Valley).
- Yarra Gum - Grassy Woodland 2 (Latrobe Valley).

6.4 Threatened ecological communities

The desktop review identified the following TECs with a natural or modelled distribution covering the survey area:

- EPBC Act listed *Natural Damp Grassland of the Victorian Coastal Plain and Subtropical and Temperate Coastal Saltmarsh* within Waratah Bay.
- EPBC Act listed *Gippsland Red Gum (Eucalyptus tereticornis* subsp*. mediana) Grassy Woodland and Associated Native Grassland* and equivalent FFG Act listed *Forest Red Gum Grassy Woodland Community* and/or *Central Gippsland Plains Grassland*, within the Latrobe Valley.
- EPBC Act listed *Subtropical and Temperate Coastal Saltmarsh* within Waratah Bay.
- FFG Act listed *Warm Temperate Rainforest (East Gippsland Alluvial Terraces) Community* within the Strzelecki Ranges.

The only TEC recorded within the survey area was the EPBC Act listed critically endangered *Gippsland Red Gum (Eucalyptus tereticornis* subsp. *mediana) Grassy Woodland and Associated Native Grassland* community and equivalent FFG Act listed *Forest Red Gum Grassy Woodland Community.* These synonymous communities were identified within the McFarlane Road, road reserve at KP 79.7; Appendix 1: Figure 5.

6.5 Groundwater Dependant Ecosystems

As discussed in section 5.5.6. of the groundwater impact assessment (Tetra Tech Coffey 2023), potential GDEs are located across most sections of the alignment. Terrestrial and aquatic GDEs are most likely to occur, whereas subterranean GDEs are considered unlikely.

No terrestrial GDEs are considered likely to occur within the Waratah Bay section of the proposed alignment. As the alignment heads north across the Tarwin Valley, several largely isolated patches of

mapped native vegetation have been modelled as potential terrestrial GDEs. These patches largely align with vegetation identified as Swamp Scrub (EVC 53), Damp Heathy Woodland (EVC 793), Swampy Riparian Woodland (EVC 83) and Floodplain Riparian Woodland (EVC 56). As the proposed alignment heads through Mirboo North and into forestry plantations, the modelled abundance of terrestrial GDEs diminishes. The specific location of mapped native vegetation patches that have the potential to be GDE vegetation include (Appendix 1: Figure 6):

- KP 2.2 to 2.9: Swamp Scrub – (EVC 53) – potential terrestrial GDE.
- KP 19.1: Swampy Riparian Woodland (EVC 83) – potential terrestrial GDE.
- KP 22.5 to 28.7: Floodplain Riparian Woodland (EVC 56), Swampy Riparian Woodland (EVC 83), Damp Heathy Woodland (EVC 793) – likely terrestrial GDEs.
- KP 34.5 to KP 35: Riparian Forest (EVC 18), Swampy Riparian Woodland (EVC 83), Swamp Scrub (EVC 53) – likely terrestrial GDE.
- KP 40.6: Floodplain Riparian Woodland (EVC 56), Swampy Riparian Woodland (EVC 83) – potential terrestrial GDE.

Vegetation patches identified at the above locations are comprised of species that are capable of utilising groundwater. These patches also align with the modelled data presented in the groundwater impact assessment (Tetra Tech Coffey 2023).

7. Summary of key ecological values

After consideration of all data and information collected and reviewed as part of the detailed assessment (as presented in Section 6) the key ecological values that are considered to be present or likely to occur within the survey area are summarised below. These values, and their relative abundance distribution and significance, will be used to inform the impact assessment for the project.

7.1 Vegetation and habitat

The survey area is highly modified with the vast majority of it having previously been cleared for agricultural and forestry operations. In most instances, remnant native vegetation is limited to small (<1ha) patches along roadsides, property boundaries or creeklines, or scattered trees in paddocks. Despite this, several larger, higher-quality patches persist in the landscape and provide important habitat for a range of common species. In total, the survey area contained 201.9 ha of native vegetation (Table 26).

Key locations supporting high-quality native remnants include (Appendix 1: Figure 6):

- Coastal scrub vegetation restricted to the foreshore and coastal dunes of Waratah Bay (KP 0).
- Lowland forests between Waratah Road and Fish-Creek Walkerville Road (KP 2.3 – 6.4) and within private land north of Fish-Creek Walkerville Road (KP 8.0 – 8.9).
- Swamp scrubs, swampy woodlands and lowland forest in the Great Southern Rail Trail reserve and intersecting waterways, including stony creek and adjoining private land (KP 21.4-30.1).
- Lowland forests between Mirboo North and Stony Creek (KP57-57.5, 58.5-59.8, 60.5-61.1, 61.3-62.0, 62.2-63.7).
- Tall forests along Ten Mile Creek Road and Strzelecki Highway (KP64.6-71.8).
- Floodplain and grassy woodlands associated with Morwell River and nearby terraces (KP77.9-78.4).

Table 26. Summary of native vegetation within the survey area

Native vegetation category	Extent in survey area
PATCHES	
Endangered EVCs	102.85
Vulnerable EVCs	85.66
Depleted EVCs	13.39
TOTAL VEGETATION	**201.90**
LARGE TREES	**1084**

7.2 Threatened species

The detailed assessment, including extensive habitat mapping and targeted surveys, revealed that much of the habitat within the survey area is considered 'sub-optimal' for threatened species (i.e. lacking in key structural or functional characteristics required to sustain a population), with targeted surveys failing to identify the presence of threatened species in many of the locations surveyed. Taking this into account, the species considered present, or likely to occur within the survey area have been summarised in Table 27 and Table 28 below, with the associated 'priority habitats' mapped in Figure 5. Further

information on each species ecology, habitat requirements and likely presence and distribution within the survey area is provided in Appendix 2 and discussed in Section 6.3.

Table 27. Threatened fauna species considered present within the survey area for the purpose of the impact assessment

Scientific name	Common name	EPBC	FFG	Priority habitat	Figure reference
Nationally significant species					
Numenius madagascariensis	Eastern Curlew	CR, Ma, Mi	CE	Foreshore (Waratah Bay) Dunes (Waratah Bay)	5.1
Botaurus poiciloptilus	Australasian Bittern	EN	CE	Aquatic 4 (Latrobe Valley)	5.43
Callocephalon fimbriatum	Gang-gang Cockatoo	EN		Woodland 1 (Waratah Bay) Damp Forest (Strzelecki Ranges)	5.2 – 5.5 5.28 – 5.39
Lissolepis coventryi	Swamp Skink	EN	EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Antechinus minimus maritimus	Swamp Antechinus	VU	VU	Dunes (Waratah Bay) Woodland 1 (Waratah Bay)	5.1 - 5.5
Galaxiella pusilla	Dwarf Galaxias	VU	EN	Aquatic 1 (Tarwin Valley) Aquatic 2 (Tarwin Valley) Aquatic 3 (Strzelecki Ranges)	5.10, 5.21, 5.23, 5.30 – 5.31
Hirundapus caudacutus	White-throated Needletail	VU, Ma, Mi	VU	NA - wooded farmland and roadside vegetation throughout the survey area	
Litoria raniformis	Growling Grass Frog	VU	VU	Wetland 4 (Strzelecki Ranges)	5.35
Neophema chrysostoma	Blue-winged Parrot	VU, Ma		Woodland 1 (Waratah Bay) Damp Forest (Strzelecki Ranges)	5.2 – 5.5 5.28 – 5.39
Pteropus poliocephalus	Grey-headed Flying-fox	VU	VU	Woodland 1 (Waratah Bay) Woodland 4 (Tarwin Valley) Damp Forest (Strzelecki Ranges)	5.2 – 5.5 5.8 – 5.17 5.28 – 5.39
Thinornis cucullatus cucullatus	Hooded Plover	VU, Ma	VU	Foreshore (Waratah Bay) Dunes (Waratah Bay)	5.1
Bubulcus ibis	Cattle Egret	Ma		Aquatic 2 (Tarwin Valley) Wetland 1 (Tarwin Valley) Wetland 4 (Strzelecki Ranges)	5.31 5.35
Calidris alba	Sanderling	Ma, Mi		Foreshore (Waratah Bay) Dunes (Waratah Bay)	5.1
Calidris ruficollis	Red-necked Stint	Ma, Mi		Foreshore (Waratah Bay) Dunes (Waratah Bay)	5.1
Charadrius bicinctus	Double-banded Plover	Ma, Mi		Foreshore (Waratah Bay) Dunes (Waratah Bay)	5.1
Charadrius ruficapillus	Red-capped Plover	Ma		Foreshore (Waratah Bay) Dunes (Waratah Bay)	5.1
Gallinago hardwickii	Latham's Snipe	Ma, Mi		NA - wooded farmland and roadside vegetation throughout the survey area	

Scientific name	Common name	EPBC	FFG	Priority habitat	Figure reference
Haliaeetus leucogaster	White-bellied Sea-Eagle	Ma	EN	Dunes (Waratah Bay) Woodland 1 (Waratah Bay) Morwell River (Latrobe Valley) Aquatic 4 (Latrobe Valley)	5.1 5.2 – 5.5 5.40, 5.43
Hydroprogne caspia	Caspian Tern	Ma, Mi	VU	Foreshore (Waratah Bay) Dunes (Waratah Bay)	5.1
Myiagra cyanoleuca	Satin Flycatcher	Ma, Mi		Woodland 1 (Waratah Bay) Damp Forest (Strzelecki Ranges)	5.2 – 5.5 5.28 – 5.39
Prototroctes maraena	Australian grayling	VU	EN	Aquatic 1 (Tarwin Valley) Aquatic 2 (Tarwin Valley) Aquatic 3 (Strzelecki Ranges)	5.10, 5.21, 5.23, 5.30 – 5.31
Rhipidura rufifrons	Rufous Fantail	Ma, Mi		Woodland 1 (Waratah Bay) Damp Forest (Strzelecki Ranges)	5.2 – 5.5 5.28 – 5.39
Thalasseus bergii	Crested Tern	Ma, Mi		Foreshore (Waratah Bay) Dunes (Waratah Bay)	5.1
State significant species					
Accipiter novaehollandiae	Grey Goshawk		EN	Woodland 1 (Waratah Bay) Damp Forest (Strzelecki Ranges)	5.2 – 5.5 5.28 – 5.39
Engaeus phyllocercus	Narracan Burrowing Crayfish		EN	Wetland 3 (Strzelecki Ranges) Aquatic 3 (Strzelecki Ranges)	5.31, 5.32, 5.35
Euastacus neodiversus	South Gippsland Spiny Crayfish		EN	Wetland 3 (Strzelecki Ranges) Aquatic 3 (Strzelecki Ranges)	5.31, 5.32, 5.35
Pseudemoia rawlinsoni	Glossy Grass Skink		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Pseudophryne semimarmorata	Southern Toadlet		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Varanus varius	Lace Monitor		EN	Woodland 1 (Waratah Bay) Woodland 4 (Tarwin Valley) Damp Forest (Strzelecki Ranges)	5.2 – 5.5 5.8 – 5.17 5.28 – 5.39
Aythya australis	Hardhead		VU	Aquatic 2 (Tarwin Valley) Wetland 1 (Tarwin Valley) Wetland 4 (Strzelecki Ranges) Aquatic 4 (Latrobe Valley)	5.22 - 5.23, 5.35, 5.43
Hieraaetus morphnoides	Little Eagle		VU	NA - Open woodland and farmland throughout survey area	
Nannoperca sp. 1	Flinders Pygmy Perch		VU	Aquatic 1 (Tarwin Valley) Aquatic 2 (Tarwin Valley) Aquatic 3 (Strzelecki Ranges) Aquatic 4 (Latrobe Valley)	5.10, 5.21, 5.23, 5.30 – 5.31

Scientific name	Common name	EPBC	FFG	Priority habitat	Figure reference
Ninox strenua	Powerful Owl		VU	Woodland 1 (Waratah Bay) Woodland 2 (Waratah Bay) Woodland 4 (Tarwin Valley) Damp Forest (Tarwin Valley) Wetland 3 (Strzelecki Ranges) Damp Forest (Strzelecki Ranges)	5.2 – 5.5 5.8 - 5.17 5.20 – 5.21, 5.23, 5.35 5.28 – 5.39
Ornithorhynchus anatinus	Platypus		VU	Aquatic 1 (Tarwin Valley) Aquatic 2 (Tarwin Valley) Aquatic 3 (Strzelecki Ranges)	5.10, 5.21, 5.30 – 5.31
Sminthopsis leucopus	White-footed Dunnart		VU	Woodland 1 (Waratah Bay)	5.2 – 5.5

Table 28. Threatened flora species considered present within the survey area for the purpose of the impact assessment

Scientific name	Common name	EPBC	FFG	Priority habitat	Figure reference
Nationally significant species					
Caladenia orientalis	Eastern Spider Orchid	EN	EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Amphibromus fluitans	River Swamp Wallaby-grass	VU		Aquatic 2 (Tarwin Valley) Wetland 2 (Tarwin Valley)	5.23 – 5.27
Caladenia tessellata	Thick-lipped Spider-orchid	VU		Woodland 1 (Waratah Bay)	5.2 – 5.5
Eucalyptus strzeleckii	Strzelecki Gum	VU	CE	Damp Forest (Tarwin Valley) Morwell River (Latrobe Valley) Grassy Woodland 1 (Latrobe Valley)	5.16, 5.18, 5.20, 5.21, 5.32, 5.41, 5.42
Prasophyllum spicatum	Dense Leek-orchid	VU	CE	Woodland 1 (Waratah Bay)	5.2 – 5.5
Pterostylis chlorogramma	Green-striped Greenhood	VU	EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Pterostylis cucullata subsp. cucullata	Leafy Greenhood	VU	EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
State significant species					
Acacia uncifolia	Coast Wirilda		EN	Dunes (Waratah Bay)	5.1
Adriana quadripartita	Coast Bitter-bush		EN	Dunes (Waratah Bay)	5.1
Argentipallium dealbatum	Silver Everlasting		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Burnettia cuneata	Lizard Orchid		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Caladenia aurantiaca	Orange-tip Finger-orchid		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Caladenia vulgaris	Slender Pink-fingers		VU	Woodland 1 (Waratah Bay)	5.2 – 5.5

Scientific name	Common name	EPBC	FFG	Priority habitat	Figure reference
Colobanthus apetalus var. apetalus	Coast Colobanth		EN	Dunes (Waratah Bay)	5.1
Corybas aconitiflorus	Spurred Helmet-orchid		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Corybas fimbriatus	Fringed Helmet-orchid		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Eucalyptus kitsoniana	Bog Gum		CE	Woodland 2 (Waratah Bay) Woodland 3 (Tarwin Valley) Woodland 4 (Tarwin Valley)	5.4 – 5.20
Eucalyptus yarraensis	Yarra Gum		CE	Grassy Woodland 2 (Latrobe Valley)	5.41 - 5.42
Monotoca glauca	Currant-wood		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Oxalis rubens	Dune Wood-sorrel		EN	Dunes (Waratah Bay)	5.1
Poa billardierei	Coast Fescue		EN	Dunes (Waratah Bay)	5.1
Pterostylis grandiflora	Cobra Greenhood		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5
Sowerbaea juncea	Rush Lily		VU	Woodland 1 (Waratah Bay)	5.2 – 5.5
Thelymitra alpicola	Alpine Sun-orchid		CE	Damp Forest (Strzelecki Ranges)	5.28 – 5.39
Tmesipteris elongata	Slender Fork-fern		CE	Damp Forest (Strzelecki Ranges)	5.28 – 5.39
Tmesipteris ovata	Oval Fork-fern		EN	Damp Forest (Strzelecki Ranges)	5.28 – 5.39
Tmesipteris parva	Small Fork-fern		EN	Woodland 1 (Waratah Bay)	5.2 – 5.5

7.3 Threatened ecological communities

The EPBC Act listed *Gippsland Red Gum (Eucalyptus tereticornis subsp. mediana) Grassy Woodland and Associated Native Grassland community* and equivalent FFG Act listed *Forest Red Gum Grassy Woodland Community* was identified at a single location within the McFarlane Road, road reserve (KP 79.7).

Given the lack of suitable vegetation communities, and the highly modified nature of the survey area, no additional TECs are considered likely to occur within the survey area.

8. Impact assessment

This section presents the results of the assessment of impacts due to the AoD on native vegetation and TECs and species within the survey area. Consideration of the type and nature of impacts relevant to the project are discussed in section 8.1. Given the highly modified nature of the landscape, and existing use and activities, impacts associated with fire are considered negligible and are not considered a potential impact pathway for this project. Therefore, they have not been considered further.

8.1 Nature of impacts

Major infrastructure projects have the potential to impact on ecological values in a variety of different ways. Impacts may occur during or after construction, and may be 'direct' in nature, such as the removal of a tree, or 'indirect', such as the release of sediment into waterways and the associated impacts to habitat downstream. In assessing impacts and developing management measures, it is therefore important to consider all potential sources of impacts a project of this nature may have. Potential sources of impacts are discussed in further detail below.

8.1.1 Removal or degradation of native vegetation and habitat

Direct impacts to native vegetation involves the physical removal or degradation of vegetation as a result of clearing, trimming or other direct physical disturbances (e.g. crushing by machinery). This includes:

- The physical removal of all trees, shrubs and groundcover to allow for construction activities.
- The partial removal of major branches and/or sections of canopy, or slashing of scrub, to facilitate movement of large machinery (within the AoD) or heavy vehicles (along public roads and access tracks).

Direct impacts to native vegetation are limited for this project, and primarily associated with sections of the alignment which directly intersect trees or patches of vegetation, or where the alignment is constrained on either side and therefore removal or direct disturbance of vegetation cannot be avoided (e.g. pinch points).

Indirect impacts to native vegetation and habitat are more common, and include 'consequential losses' associated with soil excavation or compaction which may adversely impact the roots of trees and shrubs resulting in the potential decline in health or even death over medium to long timeframes (one to ten years). Consequential losses are an important consideration in linear projects such as this, where ground disturbance activities such as trenching often run parallel to patches of native vegetation. Consideration of consequential losses is required where works encroach on 10% or greater of the vegetation's tree protection zone, as outlined in the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) and *Australian Standard for Protection of Trees on Development Sites* (AS4970 2009).

In addition, important habitat resources may also be removed or degraded by the proposed works, further magnifying the severity of the impacts. These are considered indirect, as they do not result in harm or death to individuals directly, but have the potential to result in the long-term decline or loss of populations at any given location. Potential indirect impacts to habitat include:

- Loss of hollow bearing trees representing critical, and limiting, habitat for a range of arboreal mammals, lace monitor, and bird species.

- Removal of large trees which provide roosting habitats for predatory birds.
- Removal of feed species, critical for seasonal requirements.
- Removal of habitat reducing the ability for species to move through the landscape and access key resources (i.e. reduction in physical or functional habitat connectivity).

Direct impacts to native vegetation are considered to be a significant risk for the project, due to the permanent nature of the impacts. Indirect (consequential) impacts are considered to have a lower risk profile, as the vegetation, and associated habitat resources (such as hollows) is likely to persist for some time post-works. As the physical extent of the vegetation will not change consequential impacts also allow for future recruitment to replace individuals that may decline and die, further minimising the severity of impacts in the long-term.

8.1.2 Collision, noise, vibration and light impacts

Construction activities, including operation of heavy machinery, excavations, drilling, and the movement of vehicles, supplies and people, can result in a range of direct and indirect impacts to fauna and flora species. These impacts tend to be short-term, lasting only for the duration of the activities, but have the potential to cause harm to individuals if not controlled appropriately. Potential direct impacts include:

- Fauna injury and/or mortality through collisions with vehicles and machinery, entrapment in trenches and pits, or crushing during the removal of vegetation or movement of constructions materials wildlife may have taken harbour within.
- Noise, vibration or light pollution immediate adjacent to nesting and roosting habitat, which may adversely impact the natural behaviour of certain species, leading to a decline in health and/or reproductive success.

In the context of the project, these impacts are considered to be a low to moderate risk, particularly given construction in any one location is not expected to last for longer than two weeks. Furthermore, EIS/EES Technical appendix T: Noise and vibration (Marshall Day Acoustics 2023) indicated that impacts as a result of sound and vibrations were moderate to low and primarily of concern at where HDD will be conducted. Appropriate controls to further minimise these impacts have been recommended in the technical study.

8.1.3 Pollution, sedimentation and dust

Releases of pollutants, such as chemicals, contaminated water, and fine sediments in water or as dust, can directly impact fauna and flora species or indirectly through the decline of ecosystem processes and deterioration of habitat. Potential impacts due to the release of pollutants include:

- Pollution or sedimentation of waterways which may adversely impact the physiology of aquatic species, leading to a decline of health or mortality.
- Release of pollutants or sedimentation into soil or water which may be absorbed by plants and adversely impact the physiological processes of vegetation and overall health of the community.
- Heavy dust loads which may cover plants reducing respiration and/or photosynthesis, leading to a reduction in health.

Significant releases of sediment into waterways as a result of storm events, either during construction or immediately after whilst vegetation is re-establishing on exposed soils, is a significant risk for the project. In particular, sections of the alignment associated with steep gradients that are prone to erosion north of the Tarwin River East Branch should be managed carefully.

8.1.4 Pests, weeds and diseases

The introduction of noxious and environmental weeds or diseases can impact the health of ecosystems through competition and reduced health outcomes of associated populations. In addition, certain activities (such as vegetation removal and fragmentation) may also promote the prevalence of pest animal species within a landscape which in turn may compete or predate on native species.

Impacts associated with the introduction of pests and diseases is considered to be moderate to low, primarily due the already modified and industrialised nature of the landscape and presence of numerous invasive pests, weeds and diseases already within the survey area (e.g. cats, foxes and blackberry).

8.2 Environmental performance requirements

The following EPRs have been informed by the example mitigation measures discussed further below (Table 29). These mitigation measures are discussed to provide an example of how the EPRs could be implemented. The EPRs have also been developed with consideration of industry standards and relevant legislation, guidelines and policies.

Table 29. Environmental Performance Requirements for avoiding and minimising impacts to ecological values

EPR ID	Environmental Performance Requirement	Project Stage
EC01	**Avoid or minimise native vegetation and habitat loss and degradation** Prior to commencement of project works and to inform the design: • Complete vegetation quality assessments at locations that could be impacted by the areas of disturbance of the final design and require further assessment to confirm vegetation type and extent. Areas to be surveyed, if impacted, include those shown in Figure 6 of Technical Appendix V: Terrestrial Ecology Assessment. • Complete habitat assessments and targeted surveys at locations that could be impacted by the areas of disturbance of the final design and required further assessment to determine habitat suitability and/or presence/absence of threatened species. Areas to be surveyed, if impacted, include those shown in Figure 5 of EIS/EES Technical Appendix V. • Complete fauna utilisation surveys of all impacted hollow-bearing trees within areas of priority habitats shown in Figure 5 of EIS/EES Technical Appendix V, to identify nesting sites and minimise removal of hollow bearing trees. • Develop and implement measures to avoid or otherwise minimise impacts on native vegetation and priority habitats, so far as reasonably practicable, through detailed design and appropriate construction methods, at locations shown in Figure 6 of EIS/EES Technical Appendix V. Where feasible, measures will include: o Minor realignment of the Area of Disturbance. o Reducing the width of the Area of Disturbance. o Use of trenchless technologies such as HDD. • Develop and implement construction methods that avoid impacts to the Gippsland Red Gum (Eucalyptus tereticornis subsp. mediana) Grassy Woodland and Associated Native Grassland Threatened Ecological Community including the related FFG Act listed Threatened Ecological Community located along McFarlane Road, Hazelwood as shown in Figure 5.42 of EIS/EES Technical Appendix V. • Prior to construction and to inform detailed design, complete an arboriculture assessment of trees impacted due to consequential losses and encroachment of tree protection zones, as shown in Figure 6 of EIS/EES Technical Appendix V. Inspections by qualified arborists must be undertaken to inform measures which may minimise the likelihood of trees being lost.	Design and construction

EPR ID	Environmental Performance Requirement	Project Stage
	• Obtain native vegetation offsets in accordance with the *Guidelines for removal, destruction or lopping of native vegetation* (DELWP 2017) for the native vegetation to be removed based on the detailed design.t.	

EC02	**Develop and implement a biodiversity management plan**
	Prior to commencement of project works develop a biodiversity management plan to avoid or otherwise minimise impacts to flora and fauna values.
	The vegetation and habitat management measures must cover, but not be limited to:
	• Identification and protection of native vegetation and priority habitats to be retained as shown in Figures 5 and 6 of EIS/EES Technical Appendix V. This must include pre-construction assessment to flag vegetation to be removed and retained and establishment of no-go zones to a standard suitable to prevent access during construction.
	• Implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds and diseases during construction in areas supporting native vegetation, priority habitats and threatened ecological communities, as shown in Figures 5 and 6 of EIS/EES Technical Appendix V including relevant approved EPBC Act threat abatement plans.
	• Manage all work areas to maintain landform stability and avoid or minimise erosion and sedimentation, and avoid storage of excess soil or fill material upslope or adjacent to native vegetation and priority habitats (to the extent not already addressed under EPR GM02, GM03, GM06, GM07, GM08).
	• Use of sedimentation and pollution controls to prevent uncontrolled releases into retained native vegetation and priority habitats, as shown in Figures 5 and 6 of EIS/EES Technical Appendix V (to the extent not already addressed under EPR GM08 and SW01).
	• Use of locally indigenous species in revegetation or plantings, particularly in areas where habitat is removed that is suited to the landscape context and associated native species requirements.
	• Where possible, avoid removal or disturbance of root systems associated with native vegetation in areas of priority habitat, to prevent impacts to ground-dwelling fauna (e.g. crayfish).
	• Incident management protocols for addressing accidental clearing of vegetation or habitat through assisted regeneration or additional offsets.
	The flora and fauna species management measures must cover, but not be limited to:
	• Undertaking pre-clearing inspections by a suitably qualified ecologist to confirm the on-site location of fauna immediately prior to habitat removal.
	• Salvage and re-location of fauna, if required prior to construction, in accordance with the *Wildlife Act 1975* (Vic) and *EPBC Act* (Cwlth) where required.
	• Daily inspections of open trenches or pits for trapped animals, such as reptiles and small-ground dwelling mammals.
	• Utilising night lighting to a minimum amount required to safely operate the site and to reduce light pollution and adverse effects to nocturnal species in accordance with Night Light Pollution Guidelines for Wildlife (DCCEEW 2023). This must include using:
	  • light shields to direct light and reduce light spill.
	  • low beam vehicle lights except where safety is compromised.
	• Work restrictions during sensitive life-stages (e.g. breeding, nesting, etc.) within 100m of priority habitats, as shown in Figure 5 of EIS/EES Technical Appendix V, to avoid and minimise disturbance to native fauna (with a particular focus on noise and light pollution). This may include restrictions on work activities during a season (e.g., spring), species life stage (e.g., breeding or nesting) or time of day (e.g., night-time), based on the ecology of the species and proximity to habitats. Where work restrictions are not feasible, develop and implement alternative control measures (e.g. light shields).
		Construction

EPR ID	Environmental Performance Requirement	Project Stage
	• Installation of temporary wildlife barriers near priority habitats to prevent the movements of ground-dwelling fauna into high-risk areas, such as access tracks. • Ensuring speed limits within works areas are restricted to appropriate levels, and enforced, to minimise the risk of faunal strikes. • Managing native fauna that may be displaced due to habitat removal, in compliance with the *Wildlife Act 1975* (Vic). • Procedures if unexpected threatened species are identified during construction. The biodiversity management plan must be a sub plan of the CEMP and must be implemented during construction.	
EC03	**Implement aquatic habitat protection measures** Avoid and minimise impacts to aquatic habitat, so far as reasonably practicable, through adopting trenchless construction methods (such as HDD) or project alignment changes at the following waterway crossing locations: Morwell River, Tarwin River East Branch, tributaries of the Tarwin River East Branch, Stony Creek, Buffalo Creek and Fish Creek, as shown in Figure 6 of EIS/EES Technical Appendix V. If any flowing or ephemeral waterways that are deemed to be potential habitat for threatened species are proposed to be open-cut or directly impacted, conduct aquatic surveys prior to commencement of project works to inform design and construction methods. Where direct impacts to waterways are likely to occur, prepare a site environmental management plan with reference to the plan prepared to manage erosion and surface water in accordance with EPR SW01 and in consultation with the West Gippsland Catchment Management Authority covering: • Details for retention and protection of riparian and instream vegetation, dead and alive standing trees and fallen timber and other habitat values. • Requirements for salvage and translocation of aquatic fauna prior to construction, in accordance with the *Wildlife Act 1975* (Vic). • Approach for the implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds and diseases during construction in aquatic habitats. • Document the locations of where measures must be applied. The plan must be a sup plan of the CEMP and be implemented in construction.	Construction

For the purpose of the above EPR's fauna utilisation surveys will comprise the identification and where possible inspection of hollows by suitably experienced and qualified zoologists. Methods that may be employed include inspection of hollows by pole mounted camaras and diurnal and nocturnal visual surveys as appropriate. These inspections should be timed in late spring to minimize potential impacts to breeding fauna. Outcomes of the fauna utilisation survey will be provided to the arborist ahead of their assessment so as that impacts to trees identified as supporting hollow dependant fauna can be further avoided were possible. Where sufficient information cannot be obtained during the fauna utilisation survey or where impacts to trees cannot be avoided hollow bearing trees would also be flagged for assessment as part of the arboriculture assessment.

8.3 Impacts analysis

Impacts to values considered to be present or likely to occur within the survey area (as presented in Section 7) are discussed in detail below. The assessment considered both pre- and post-mitigation impacts based on implementation of the EPRs and associated mitigation measures. Where required,

8.3 Impacts analysis

Impacts to values considered to be present or likely to occur within the survey area (as presented in Section 7) are discussed in detail below. The assessment considered both pre- and post-mitigation impacts based on implementation of the EPRs and associated mitigation measures. Where required, further detail on specific mitigation measures are provided for particular values (e.g. arboreal mammals) and will be considered for incorporation in the detailed design and construction management plans. Priority locations for implementation of EPRs taking into consideration the extent, quality and proximity of native vegetation and priority habitats is presented in Figures 5 and 6.

8.3.1 Native vegetation and habitat

Direct impacts to native vegetation and associated habitat were determined by overlaying the mapped native vegetation (including both patches and trees) with the AoD. Where the project had the potential to result in the removal of vegetation, the extent of removal was calculated by EVC and bioregional conservation status for each landscape region (Table 21; Figure 6). As discussed in Section 5.6, this analysis includes native vegetation assessed on-ground (where access was available) and remotely using aerial imagery, modelled datasets and field observations. As not all properties have been accessed, the tree numbers discussed below are a best-estimate and may changing marginally once assessment of un-accessed land has been completed.

The extent of native vegetation and associated habitat impacted by the project includes all direct impacts, where vegetation will be removed permanently during construction, assumed losses and consequential losses including indirect impacts, where vegetation loss may occur over the medium to long-term (e.g., impacts through encroachment of tree protection zones or trimming of branches, which may lead to the decline and/or death of the tree) in accordance with the Guidelines.

Mitigation measures to further reduce and minimise impacts to native vegetation and habitat will be implemented to comply with EPR EC01 and EC02, with a particular focus on key locations identified in Figure 6. Specifically, these will include:

- EPR EC01: Minor realignment and/or reducing the width of AOD to avoid direct removal and consequential losses to native vegetation and habitat. In numerous instances the AoD overlaps with the TPZs of large trees parallel to the alignment, resulting in these trees being considered 'lost' in accordance with the *Protection of Trees on Development Sites (AS4970 2009)* and the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017). Small adjustments to the alignment or reducing the width will minimise encroachment of TPZs and ensure trees and vegetation is retained.
- EPR EC01: Use of trenchless technologies such as HDD to avoid impacts by boring under vegetation or habitat.
- EPR EC01: Where encroachment of works within TPZs cannot be avoided, inspections by qualified arborists should be undertaken to advise additional measures which may minimise the likelihood of trees being lost through a decline in health. Such measures may include non-destructive hydro-excavation to minimise damage to roots.
- EPR EC01: Minimise the removal of large trees which are a proxy for hollow bearing trees.
- EPR EC01: Offsets must be obtained for all native vegetation identified as impacted in accordance with the DELWP Guidelines based on the detailed design.

- EPR EC02: Implement procedures to ensure retained native vegetation and habitat is protected during construction (e.g. no-go zones).
- EPREC02: Ensure any accidental / excessive clearing will be remediated through assisted regeneration or additional offsets.
- EPR EC02: Use of sedimentation and pollution controls to prevent releases into adjacent vegetation and habitats.
- EPR EC02: Implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds and diseases.

The pre-mitigation impact analysis determined a total of 10.56 ha of native vegetation, containing 49 large trees, will be directly impacted (removed) as a result of the proposed construction works. In addition, a further 10.69 ha of native vegetation will be consequentially lost over time, including 135 large trees if mitigation measures are not applied.

Taking the mitigation measures outlined in the EPRs and above into account, it is expected that the impact on native vegetation and habitats could be significantly reduced in the final design. Post-mitigation impacts are estimated to be as little as:

- Direct impacts involving 6.20 ha of native vegetation removed, including 39 large trees, representing approximately 3.1% of the native vegetation within the survey area (Table 30).
- Indirect impacts in the form of consequential losses of 0.55 ha of native vegetation, including 12 large trees, representing approximately 0.27% of the native vegetation within the survey area (Table 31).

A summary of the impact assessment for native vegetation, against the relevant sensitivity and magnitude criteria, is presented in Table 32.

Table 30. Direct impacts to native vegetation within the survey area

Vegetation	Extent in survey area	Impacts (pre-mitigation)	Impacts (post-mitigation)	Percentage of vegetation impacted (post-mit)
Latrobe Valley				
Vegetation (ha)	6.86	0.57	0.46	6.7%
Large trees (no.)	70	8	8	11.4%
Strzelecki Ranges				
Vegetation (ha)	85.78	2.53	1.87	2.2%
Large trees (no.)	526	14	14	2.7%
Tarwin Valley				
Vegetation (ha)	74.91	6.13	3.50	4.7%
Large trees (no.)	443	24	15	5.4%
Waratah Bay				
Vegetation (ha)	34.35	1.33	0.37	1.1%
Large trees (no.)	45	3	2	4.4%

TOTALS				
Patches (ha)	201.98	10.56	6.20	3.1%
Large trees (no.)	1084	49	39	3.6%

Table 31. Indirect impacts (consequential losses) to native vegetation within the survey area

Vegetation	Extent in survey area	Impacts (pre-mitigation)	Impacts (post-mitigation)	Percentage of vegetation impacted (post-mit)
Latrobe Valley				
Vegetation (ha)	6.86	0.04	0.00	0.0%
Large trees (no.)	70	0	0	0.0%
Strzelecki Ranges				
Vegetation (ha)	85.78	9.14	0.41	0.5%
Large trees (no.)	526	121	9	1.7%
Tarwin Valley				
Vegetation (ha)	74.91	1.04	0	0.0%
Large trees (no.)	443	11	0	0.0%
Waratah Bay				
Vegetation (ha)	34.35	0.47	0.15	0.4%
Large trees (no.)	45	3	3	6.7%
TOTALS				
Patches (ha)	201.98	10.69	0.55	0.27%
Large trees (no.)	1084	135	12	1.1%

Based on the approach described in section 5.12.2, two Ensym scenario test - NVR reports have been produced for the project and are provided in Appendix 3. These reports provide a calculation of project offset requirements in accordance with the guidelines for vegetation losses based on pre-mitigation and post mitigation impact extents. It is noted that some variance exists between totals summarised in table 30 and table 31 and the Ensym scenario test - NVR reports. This is a result of differences between the project standards and the ENYSM tool's projection/coordinate systems (differences in area decimal rounding).

Final offset requirements will be incorporated into the project offset strategy (Victoria) based on the detailed project design and construction approach in accordance with the Guidelines. This will be informed by the final project design and assessment of project impacts by a qualified arborist who will determine the effectiveness of proposed mitigation measures (to reduce vegetation losses). The offset strategy is for the project is presented in attachment 5 of the EIS / EES.

Table 32. Assessment of significance of impact on native vegetation and habitat

Sensitivity	Pre-mitigated magnitude	Pre-mit. impact	Post-mit. magnitude	Post-mit. Impact
MODERATE Includes vegetation with a bioregional conservation status of 'Endangered'.	**MODERATE** Direct impacts (removal) of 10.56 ha of native vegetation and 49 large trees. Indirect impacts (consequential losses) of 10.69 ha of native vegetation and 135 large trees.	**MODERATE**	**MINOR** Direct impacts (removal) of 6.20 ha of native vegetation and 39 large trees. Indirect impacts (consequential losses) of 0.55 ha of native vegetation and 12 trees.	**LOW**

8.3.2 Threatened species

Impacts to threatened species that are considered to be present or likely to occur within the survey area (27 flora and 33 fauna) are discussed by functional groupings below. This discussion includes the nature of the potential impacts (which are primarily focused on the areas of priority habitat shown in Figures 5 and 6), specific mitigation measures and an assessment of pre- and post-mitigation impacts against the framework.

A summary of pre and post mitigation impacts to species priority habitat is presented in Appendix 6. These areas of priority habitat loss are further referenced, as appropriate, in species significant impact tests presented in Appendix 5.

As a count of tree hollows within areas of unassessed areas was not possible. As a precautionary approach, the number of large trees has been used as a proxy for the number of hollow-bearing trees (Table 30). The loss of hollow-bearing trees is considered to be relevant to cavity dependent fauna that fall within the below groupings.

Owls, raptors and other fauna with large ranges

The threatened powerful owl, white-bellied sea-eagle, grey goshawk, little eagle, grey-headed flying fox and lace monitor are considered likely to occur within the survey area in high-quality woodland and forest habitats (priority habitats as per Section 7, Figure 6). Habitat elements such as large old trees with hollows for roosting and breeding, and open understorey vegetation and adjacent cleared farmland that support prey are important for these species. Flowering tree species producing nectar, including *Eucalyptus* and *Banksia*, are an important food source for grey-headed flying fox.

Potential impacts include the removal of habitat, disturbance due to construction noise and light (particularly during nesting periods where works occur in close proximity) and, for lace monitor, vehicle strikes.

Key mitigation measures to avoid and minimise impacts to these species include:

- EPR EC01: Minimising vegetation and habitat loss (see Section 8.3.1).
- EPR EC01: Complete fauna utilisation surveys of all impacted hollow-bearing trees within areas of priority habitat to identify nesting sites and minimise removal of hollow bearing trees.

- EPR EC02: Implement work restrictions and controls during sensitive life-stages (e.g. breeding, nesting, etc.) within 100m of priority habitats for the relevant species (Section 7; Figure 6), to avoid disturbance (with a particular focus on noise and light pollution). Key (nesting) periods for species include:
  - Winter (powerful owl)
  - June to January (white-bellied sea-eagle)
  - July to December (grey goshawk)
  - spring to early summer (little eagle)
  - September to December (lace monitor)
- EPR EC02: Undertake pre-clearing inspections by a suitably qualified zoologist or wildlife handler to confirm the on-site location of fauna immediately prior to habitat removal.
- EPR EC02: Ensuring speed limits within works areas are restricted to appropriate levels, and enforced, to minimise the risk of faunal strikes (particularly lace monitor).

Considering the extent of habitat proposed for removal, and implementation of the EPR measures listed above, these species are unlikely to be significantly impacted by the project due to their extensive range and the availability of similar foraging habitat throughout the region. This is particularly the case when considering post-mitigation vegetation losses in areas of priority habitat will be reduced to negligible levels and potential disturbance from noise or light, if mitigated accordingly, will be minimal and of a short duration. Based on this, the pre and post-mitigation significance of impact is provided in Table 33.

Table 33. Impact assessment of threatened owls, raptors and other fauna with large ranges within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Powerful owl, grey goshawk, little eagle, white-bellied sea eagle, grey-headed flying fox and lace monitor	**HIGH** Includes species listed as CE (FFG Act) and VU (EPBC Act)	**MODERATE** Significant impacts, where impacts are likely to be medium-term and reversible (5–10 years for recovery).	**HIGH**	• EPR EC01 • EPR EC02	**NEGLIGIBLE** Direct or indirect impacts that are unlikely to have a material.	**LOW**

Ground-dwelling fauna

Several threatened, small mammals, reptiles and frogs were identified as likely to occur within scrub and woodland habitats around Waratah Bay (Figure 6). These species include swamp skink, glossy grass skink, swamp antechinus, white-footed dunnart and southern toadlet. Key habitat resources for these species include dense understorey vegetation, in particular tussocks and sedges in damp areas which provide refuge from predators and high-quality foraging habitat.

In addition to the removal of vegetation, impacts may include fragmentation or degradation of habitat which reduces connectivity, increased prevalence of pest animals (which may compete with, or predate on, the threatened species) and increased edge-effects. Disturbance from noise, light or vibrations may also alter species behaviour, however some of these species, including swamp antechinus and white-

footed dunnart, are largely inactive during daylight hours when the majority of the work activity will take place.

Key mitigation measures to avoid and minimise impacts to threatened ground-dwelling species include:

- EPR EC01: Minimising vegetation and habitat loss (see Section 8.3.1)
- EPR EC02: Implement work restrictions and controls within 100m of priority habitats to minimise disturbance (with a particular focus on noise and vibration).
- EPR EC02: Implementation of appropriate measures to manage the risk of the introduction and spread of environmental diseases, include chytrid fungus for southern toadlet.
- EPR EC02: Conduct daily inspections of open trenches or pits for trapped animals.
- EPR EC02: Installation of temporary wildlife barriers near priority habitats to prevent the movements into high-risk areas, such as access tracks.

Considering implementation of the EPR measures listed above, these species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats (impacts to vegetation limited to consequential losses and/or removal of small amounts of vegetation on the edge of patches currently impacted by stock access). Furthermore, given the extent of habitat and connectivity that extends beyond the survey area for these species, it is unlikely disturbance as a result of light or noise will have a material effect on populations (if present). Likewise, it is not anticipated that the project will result in a significant increase in pest species which may reduce populations through predation, given the limited impacts on habitat and the existing land use (cattle grazing). Based on this, the pre and post-mitigation significance of impact is provided in Table 34.

Table 34. Impact assessment of threatened ground-dwelling fauna species within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Swamp skink, glossy grass skink, swamp antechinus, white-footed dunnart and southern toadlet	**HIGH** Includes species listed as EN (EPBC Act)	**MODERATE** Significant impacts, where impacts are likely to be medium-term and reversible (5–10 years for recovery).	**HIGH**	• EPR EC01 • EPR EC02	**MINOR** Direct or indirect impacts that are unlikely to have a material effect.	**MODERATE**

Aquatic fauna

The survey area supports a range of aquatic habitats in the form of small creeks, larger streams and rivers, ephemeral or semi-permanent wetlands and small dams. Where key resources are present (including fringing and emergent vegetation, good water-quality with limited pollution and sedimentation, and connectivity to habitat up and down-stream) these habitats are known, or considered likely, to support aquatic and semi-aquatic threatened fauna including dwarf galaxias, Flinders pygmy perch, growling grass frog, Narracan burrowing crayfish, South Gippsland spiny crayfish and platypus.

Removal of aquatic habitat has largely been avoided (several low-quality ephemeral streams may still be trenched), with indirect impacts to priority habitat for threatened species the primary concern. This

includes the potential release of pollution and/or sediment into waterways and the immediate and downstream effects on the ecosystem this may have. Introduction of diseases, such as chytrid fungus, or aquatic weeds is also a concern where equipment may be interacting and moving between aquatic environments. In some instance, light pollution may alter behaviours or diurnal cycles of aquatic fauna and, if it were to persist, lead to changes in faunal assemblages.

Key mitigation measures to avoid and minimise impacts to threatened aquatic species include:

- EPR EC03: Avoid or minimise impacts to aquatic habitat through HDD or alignment changes.
- EPR EC03: Prior to construction and to inform detailed design, conduct aquatic surveys for flowing waterways proposed to be open-cut or directly impacted.
- EPR EC03: Salvage and translocation of aquatic fauna prior to construction.
- EPR EC03: Implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds and diseases during construction in aquatic habitats.
- EPR EC03: Manage all work areas to maintain landform stability and avoid / minimise erosion and sedimentation, including avoiding storage of excess soil or fill material upslope or adjacent to aquatic habitats.
- EPR EC03: Use of sedimentation and pollution controls to prevent uncontrolled releases into aquatic habitats.
- EPR EC02: Installation of temporary wildlife barriers near priority habitats for Growling Grass Frog to prevent movements into high-risk construction areas.
- EPR EC02: Where possible, avoid removal or disturbance of root systems associated with native vegetation in areas of priority habitat to prevent impacts to crayfish.

Post-mitigation impacts to aquatic fauna species are considered low to negligible due to avoidance of priority habitats and management of indirect impacts through proven construction controls listed in the EPRs above. Based on this, the pre and post-mitigation significance of impact is provided in Table 35.

Table 35. Impact assessment of threatened aquatic fauna species within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Dwarf galaxias, flinders pygmy perch, Australian grayling, growling grass frog, Narracan burrowing crayfish, South Gippsland spiny crayfish and platypus	**MODERATE** Includes species listed as VU (EPBC Act) and EN (FFG Act)	**MAJOR** Significant impacts, where impacts are likely to be medium to long-term and potentially irreversible (> 10 years to recover).	**HIGH**	• EPR EC02 • EPR EC03	**MINOR** Non-significant impacts, where impacts are likely to be readily reversible (within 5 years for recovery).	**LOW**

Shorebirds

The coastal environs of Waratah Bay are considered high-quality habitat for a large number of shorebirds, which may utilise the beach and associated dunes for nesting, refuge and foraging. Threatened species considered likely to occur within the survey area where it intersects the foreshore and dunes of Waratah Bay include eastern curlew, hooded plover, sanderling, red-necked stint, double-banded plover, red-capped plover, caspian tern, and crested tern.

The removal or degradation of habitat will be avoided through HDD of the dunes and beach from the adjoining farmland out past the low water-mark in the bay. Impacts associated with noise and light pollution may disturb nesting or foraging activities, however the elevated nature of the dunes means this is only likely to impact individuals using habitat on the inland side of the dunes closest to the HDD works area in the adjoining paddock (Figure 6).

Key mitigation measures to avoid and minimise impacts to threatened shorebird species include:

- EPR EC02: Identification and protection of native vegetation and priority habitat to be retained.
- EPR EC02: Implement work restrictions and controls during sensitive life-stages within 100m of priority habitats to avoid disturbance (with a particular focus on noise and light pollution). Key (nesting) periods for include August to March.

Considering implementation of the EPR measures listed above, and avoidance of habitat removal under the current design, impacts to shorebird species as a result of the project is considered to be negligible. Based on this, the pre and post-mitigation significance of impact is provided in Table 36.

Table 36. Impact assessment of threatened shorebird species within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Eastern curlew, hooded plover, sanderling, red-necked stint, double-banded plover, red-capped plover, caspian tern, and crested tern	**VERY HIGH** Includes species listed as Critically endangered (EPBC Act) and Migratory / Marine (EPBC Act)	**MINOR** Non-significant impacts, where impacts are likely to be readily reversible (within 5 years for recovery).	**MODERATE**	• EPR EC02	**NEGLIGIBLE** Direct or indirect impacts that are unlikely to have a material effect.	**MODERATE**

Waterbirds and waders

The survey area supports a range of aquatic habitat in the form of ephemeral or semi-permanent wetlands and small dams. Where key resources are present (including fringing and emergent vegetation and good water-quality with limited pollution and sedimentation), these habitats are known, or

considered likely to support threatened waterbirds and waders, including Australasian bittern, cattle egret, Latham's snipe and hardhead.

Removal of wetland habitat has largely been avoided (several low-quality ephemeral streams may still be trenched). Disturbance due to construction noise and light (particularly during nesting periods may impact breeding or nesting if in close proximity.

Key mitigation measures to avoid and minimise impacts to threatened waterbirds and wader species include:

- EPR EC01: Minimising vegetation and habitat loss (see Section 8.3.1).
- EPR EC03: Avoid or minimise impacts to aquatic habitat through HDD or alignment changes.
- EPR EC02: Identification and protection of native vegetation and priority habitat to be retained.
- EPR EC02: Implement work restrictions and controls during sensitive life-stages within 100m of priority habitats to avoid disturbance (with a particular focus on noise and light pollution). Key (nesting) periods include August to March.
- EPR EC03: Use of sedimentation and pollution controls to prevent uncontrolled releases into aquatic habitats.

Considering the extent of habitat proposed for removal, and implementation of the EPR measures listed above, these species are unlikely to be significantly impacted by the project due to their extensive range and the availability of similar foraging habitat throughout the region. This is particularly the case when considering priority habitat will be avoided and potential disturbance from noise or light, if mitigated accordingly, will be minimal and of a short duration. Based on this, the pre and post-mitigation significance of impact is provided in Table 37.

Table 37. Impact assessment of threatened waterbirds and waders within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Australasian bittern, cattle egret, Latham's snipe and hardhead	**HIGH** Includes species listed as Critically endangered (FFG Act) and endangered (EPBC Act)	**MODERATE** Significant impacts, where impacts are likely to be medium-term and reversible (5–10 years for recovery).	**HIGH**	• EPR EC01 • EPR EC02 • EPR EC03	**NEGLIGIBLE** Direct or indirect impacts that are unlikely to have a material effect.	**LOW**

Woodland birds

The threatened gang-gang cockatoo, blue-winged parrot, satin flycatcher and rufous fantail are considered likely to occur within the survey area in high-quality woodland and forest habitats (Figure 6). Habitat elements such as large woodland areas for foraging, including those with high tree cover and open understorey vegetation are important for these species. Important habitat for the Blue-winged Parrot also includes grassy areas adjacent to woodland patches.

In addition to the removal of habitat, impacts may include fragmentation or degradation of habitat which reduces connectivity, and increases the prevalence of pest animals (which may compete with, the threatened species) or risk of predation (including from native predators). Disturbance from noise, light or vibrations may also alter species behaviour.

Key mitigation measures to avoid and minimise impacts to these species include:

- EPR EC01: Minimising vegetation and habitat loss (see Section 8.3.1).
- EPR EC01: Complete fauna utilisation surveys of all impacted hollow-bearing trees within areas of priority habitat to identify nesting sites and minimise removal of hollow bearing trees.
- EPR EC02: Implement work restrictions and controls during sensitive life-stages within 100m of priority habitats for the relevant species.

Considering the extent of habitat proposed for removal, and implementation of the EPR measures listed above, these species are unlikely to be significantly impacted by the project due to their extensive range and the availability of similar foraging habitat throughout the region. This is particularly the case when considering post-mitigation vegetation losses in areas of priority habitat will be reduced to negligible levels and potential disturbance from noise or light, if mitigated accordingly, will be minimal and of a short duration. Based on this, the pre and post-mitigation significance of impact is provided in Table 38.

Table 38. Impact assessment of threatened woodland birds within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Gang-gang cockatoo, blue-winged parrot, satin flycatcher, rufous fantail	**HIGH** Includes species listed as Endangered (EPBC Act).	**MODERATE** Significant impacts, where impacts are likely to be medium-term and reversible (5–10 years for recovery).	**HIGH**	• EPR EC01 • EPR EC02	**NEGLIGIBLE** Direct or indirect impacts that are unlikely to have a material effect.	**LOW**

Coastal flora

Coast wirilda, coast bitter-bush, coast colobanth, dune wood-sorrel and coast fescue are all threatened species considered likely to occur within the coastal dunes of Waratah Bay (Figure 6). Habitat is restricted to a narrow strip of vegetation between the farmland and beach, consisting of a mixture of low scrubs and tussock grasslands.

The removal or degradation of habitat will be avoided through HDD of the dunes and beach from the adjoining farmland out past the low water-mark in the bay. The elevated nature of the dunes means impacts as a result of the release of pollutants or sediment is considered unlikely (Figure 6). No additional measures other than avoiding vegetation and habitat removal, as outlined in Section 8.3.1, is recommended. Based on this, the pre and post-mitigation significance of impact is provided in Table 39.

Table 39. Impact assessment of threatened coastal flora within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Coast wirilda, coast bitter-bush, coast colobanth, dune wood-sorrel, coast fescue	**MODERATE** Includes species listed as endangered (FFG Act)	**NEGLIGIBLE** Direct or indirect impacts that are unlikely to have a material effect.	**LOW**	NA	**NEGLIGIBLE** Direct or indirect impacts that are unlikely to have a material effect.	**LOW**

Waratah Bay woodland flora

Fifteen threatened flora species are considered likely to occur within the relatively extensive woodlands around Waratah Bay (Table 40; KPs 3.5 - 6.3, 8.7 - 8.9, Figure 6). Whilst this area is largely unsurveyed due to access constraints, review of interconnected habitats in roadsides and field observations indicates that habitat quality varies throughout this area and is heavily influenced by stock access and edge effects, with particularly high covers of introduced pasture grasses in the understorey. This means that despite species being considered likely to occur within the survey area, which covers some of the larger/higher-quality patches of habitat, the likelihood threatened flora species will be present along the margins of patches, which intersects the AoD, is less likely.

Removal of habitat is limited to degraded edges, fragmented patches along boundaries or scattered trees. Impacts associated with the release of pollutants or sediment into adjoining understorey habitat is a risk in steeper sections south of Waratah Bay-Fish Creek Road, as well as the potential for dust impacts and introduction of weeds species.

Key mitigation measures to avoid and minimise impacts to threatened woodland flora include:

- EPR EC01: Minimising vegetation and habitat loss (see Section 8.3.1).
- EPR EC02: Identification and protection of native vegetation and priority habitat to be retained.
- EPR EC02: Implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds.
- EPR EC02: Use of sedimentation and pollution controls to prevent uncontrolled releases into retained native vegetation and priority habitats.

Considering the minimal habitat proposed for removal, and implementation of the EPR measures listed above, these species are unlikely to be significantly impacted by the project (if present). Based on this, the pre and post-mitigation significance of impact is provided in Table 40.

Table 40. Impact assessment of threatened Waratah Bay woodland flora within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Eastern spider orchid thick-lipped spider-orchid dense leek-orchid green-striped greenhood leafy greenhood silver everlasting lizard orchid orange-tip finger-orchid slender pink-fingers spurred helmet-orchid fringed helmet-orchid currant-wood cobra greenhood rush lily small fork-fern	**HIGH** Includes species listed as endangered (EBPC Act)	**MAJOR** Significant impacts, where impacts are likely to be medium to long-term and potentially irreversible (> 10 years to recover).	**MAJOR**	• EPR EC01 • EPR EC02	**MINOR** Non-significant impacts, where impacts are likely to be readily reversible (within 5 years for recovery).	**MODERATE**

Strzelecki Ranges damp forest flora species

Three threatened flora species, alpine sun-orchid, slender fork-fern and oval fork-fern, are considered likely to occur within unsurveyed forest habitats within the Strzelecki Ranges (Figure 6, Table 28).

Direct impacts to these species will be limited to the removal of habitat along the edge of patches (which is considered less likely to support the species if they are present) and potential release of dust, pollutants or sediment into the adjoining understorey habitat. Introduction of weed species which may compete with threatened flora is also a risk in higher-quality remnants.

Key mitigation measures to avoid and minimise impacts to threatened woodland flora include:

- EPR EC01: Minimising vegetation and habitat loss (see Section 8.3.1).
- EPR EC02: Identification and protection of native vegetation and priority habitat to be retained.
- EPR EC02: Implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds.
- EPR EC02: Use of sedimentation and pollution controls to prevent uncontrolled releases into retained native vegetation and priority habitats.

Considering the minimal habitat proposed for removal, and implementation of the EPR measures listed above, these species are unlikely to be significantly impacted by the project (if present). Based on this, the pre and post-mitigation significance of impact is provided in

Table 41.

Table 41. Impact assessment of threatened Strzelecki Ranges damp forest flora species within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Alpine sun-orchid slender fork-fern oval fork-fern	**HIGH** Includes species listed as CE (FFG Act)	**MODERATE** Significant impacts where impacts are likely to be medium-term and reversible (5–10 years for recovery).	**HIGH**	• EPR EC01 • EPR EC02	**NEGLIGIBLE** Direct or indirect impacts that are unlikely to have a material effect.	**LOW**

Threatened Eucalyptus species

Strzelecki gum, Yarra gum and bog gum are present within the survey area as discussed in Section 6.3.2 (Figure 5, Table 28). Yarra gum occurs in a single patch in the Latrobe Valley, bog gum in numerous patches in the southern parts of the Tarwin Valley and Waratah Bay, and Strzelecki gum in both patches and as scattered trees throughout the alignment (commonly along drainage lines).

Impacts to threatened eucalyptus species are primarily associated with removal of trees, or consequential impacts associated with works within TPZs or trimming of branches resulting in the introduction of pest or disease into the tree. Impacts associated with the release of pollutants or dust may impact trees where releases are significant and trees are susceptible (e.g. in poor health).

The key mitigation measures to avoid and minimise impacts to threatened eucalyptus include:

- EPR EC01: Minimising vegetation and habitat loss (see Section 8.3.1).
- EPR EC02: Identification and protection of native vegetation and priority habitat to be retained.
- EPR EC02: Use of sedimentation and pollution controls to prevent uncontrolled releases into retained native vegetation and priority habitats.

Pre-mitigation impacts to threatened eucalyptus species include (Figure 5 and Figure 6):

- Strzelecki gum – removal of one tree at KP40.5.
- Bog gum – removal of numerous trees from multiple, large populations at KP 27.1, 27.6 and 28.1, a single tree at KP 40.5, and potential for further losses in habitat not yet surveyed (KP 2.1-6.4, 8.1-8.9, 17.6, 19.1, 23.1 and 23.9). Yarra gum - impacts to three trees within a small, but locally important population at KP 78.9.

Assuming implementation of the EPR measures listed above, post-mitigation impacts to Strzelecki gum and Yarra gum can be avoided due to the limited number of trees being impacted. This may also be the case for bog gum however the uncertainty regarding the extent of the population and feasibility of avoidance through design means the extent to which impacts to this species can be mitigated is unable to be determined at this stage. Further on-ground assessments and refinement of the project design is required before a final impact assessment can be made. Based on this, the pre and post-mitigation significance of impact is provided in Table 42.

Table 42. Impact assessment of threatened eucalyptus flora within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
Strzelecki gum and Yarra gum	**HIGH** Listed as critically endangered (FFG Act) and Vu (EPBC Act)	**MINOR** Non-significant impacts, where impacts are likely to be readily reversible (within 5 years for recovery).	**MODERATE**	• EPR EC01 • EPR EC02	**NEGLIGIBLE** Direct or indirect impacts that are unlikely to have a material effect.	**LOW**
Bog gum	**HIGH** Listed as critically endangered (FFG Act)	**MAJOR** Significant impacts, where impacts are likely to be medium to long-term and potentially irreversible (> 10 years to recover).	**MAJOR**	• EPR EC01 • EPR EC02	**MODERATE** Significant impacts, where impacts are likely to be medium-term and reversible (5–10 years for recovery).	**HIGH**

River Swamp Wallaby-grass

A large population of river-swamp wallaby-grass was recorded within the survey area in a small wetland adjacent to the Morwell River at KP 78.2 (Figure 5). This species may also occur within minor drainage lines south of Mirboo north which are yet to be surveyed due to access constraints.

Potential impacts to river swamp wallaby-grass include the removal of wetland habitats or degradation through the release of pollutants or sediment. Changes in surface flows which may impact the level or duration of water in wetland habitats is also considered a risk.

Key mitigation measures to avoid and minimise impacts to river swamp wallaby-grass include:

- EPR EC02: Identification and protection of native vegetation and priority habitat to be retained, if the species is present.
- EPR EC02: Use of sedimentation and pollution controls to prevent uncontrolled releases into retained native vegetation and priority habitats.
- EPR EC03: Avoid or minimise impacts to aquatic habitat through HDD or alignment changes.
- EPR EC03: Implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds and diseases during construction in aquatic habitats.
- EPR EC03: Manage all work areas to maintain landform stability and avoid / minimise erosion and sedimentation, including avoiding storage of excess soil or fill material upslope or adjacent to aquatic habitats.

Uncertainty still remains regarding the presence of river swamp wallaby-grass within the survey area in priority habitat south of Mirboo North (Figure 5). In addition, the close proximity of the AoD (and associated HDD entry/exit pit) to a significant population at KP 78.2 means a high-level of uncertainty

regarding the nature of impacts remains. Taking this uncertainty into account, the pre and post-mitigation significance of impact is provided in Table 43.

Table 43. Impact assessment of River Swamp Wallaby-grass within the survey area

Species	Sensitivity	Magnitude	Pre-mit. Impact	EPRs	Post-mit. Magnitude	Post-mit. Impact
River swamp wallaby-grass	**MODERATE** Listed as vulnerable (EPBC Act)	**MAJOR** Significant impacts, where impacts are likely to be medium to long-term and potentially irreversible (> 10 years to recover).	**HIGH**	• EPR EC02 • EPR EC03	**MODERATE** Significant impacts, where impacts are likely to be medium-term and reversible (5–10 years for recovery).	**MODERATE**

8.3.3 Threatened ecological communities

The EPBC Act listed *Gippsland Red Gum (Eucalyptus tereticornis subsp. mediana) Grassy Woodland and Associated Native Grassland* community and equivalent FFG Act listed *Forest Red Gum Grassy Woodland Community* was identified at a single location within the McFarlane Road, road reserve (KP 79.7).

Based on the current design, pre-mitigation works would result in the direct removal of 0.11 ha of this community (Figure 5). Key mitigation measures to avoid and minimise impacts to the community include:

- EPR ECO1: Develop and implement construction methods that avoid impacts to the Gippsland Red Gum (*Eucalyptus tereticornis* subsp. *mediana*) Grassy Woodland and associated native grassland EPBC Act Threatened Ecological Community located along McFarlane Road, Hazelwood (KP 79.7).
- EPR EC02: Identification and protection of native vegetation and priority habitat to be retained.
- EPR EC02: Implementation of appropriate measures to manage the risk of the introduction and spread of environmental weeds and diseases during construction in areas supporting native vegetation and priority habitats and threatened ecological communities.

Considering implementation of the EPR measures listed above pre and post-mitigation significance of impact is provided in . Assessment of significance of impact on threatened ecological communities

Sensitivity	Pre-mitigated magnitude	Pre-mit. impact	Post-mit. magnitude	Post-mit. Impact
VERY HIGH Includes community listed as Critically Endangered (EPBC Act)	**SEVERE** Significant impacts to a threatened species or ecological community, that is sensitive (e.g. important population or priority habitat) and where impacts are likely to be long-term and irreversible.	**MAJOR**	**NEGLIGBLE** Direct or indirect impacts that are unlikely to have a material effect on a threatened species or ecological community.	**MODERATE**

Note that the avoidance to the community (in accordance with ECO1) is a commitment of the project. The significant impact test and project approval therefore assume successful avoidance of all impacts to the community. Retention of this vegetation is also reflected in the 'worst case' scenario NVR (Section 8.3.1; Appendix 3).

8.4 Cumulative impacts

The *Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets* (IFC 2013) has been used as the basis for guiding the cumulative impact assessment for ecological matters.

IFC (2013) defines cumulative impacts as those that "result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones."

The Delburn Windfarm EES was approved in March 2022. For the purpose of assessing the cumulative impact of the project within the region, the following potential impacts associated with the proposed Delburn Wind Farm, as identified in the Expert Witness Statement for Delburn Wind Farm, Strzelecki Ranges, Victoria (A. Organ 2021) have been considered:

- 12.34 ha of native vegetation.
- Loss of 49 large trees, including approximately 27 hollow-bearing trees.
- Temporary disturbance to habitat and fauna movement during construction works, temporary increase in risk of direct mortalities due to culvert upgrade and additional vehicle and machinery traffic.

An accurate picture of the true cumulative impacts of the two projects is difficult due to the proposal to share a common cable easement with wind farm infrastructure through much of the Strzelecki Ranges. Therefore, the following cumulative impacts (i.e. the sum of vegetation removal from both projects) are provided as a mitigated estimation of:

- 19.09 ha of native vegetation.
- Loss of 100 large trees.

For the remaining projects identified in section 5.12.4, no detailed information on the projects potential extent of impacts to ecological values such as native vegetation or threatened species habitat was available at the time of writing this report. The impact assessments for these projects are understood to still be in preparation and the and the equivalent detailed information as available for Delburn Wind Farm is yet to be released on public exhibition. Therefore, cumulative impacts for these projects cannot be accurately assessed at this time.

9. Conclusion

MLPL proposes to construct a high voltage direct current electricity interconnector (comprised of dual transmission lines) between Tasmania and Victoria, including a subsea cable and onshore cable and converter facilities. The purpose of this report is to present the findings of the detailed ecological investigations, and associated impact assessment, for the Victorian section of the proposed project.

Regional context

The region through which the Victorian section of the align runs is dominated by productive agricultural landscapes, comprised primarily of intensive pastoral or horticultural operations, with higher elevation sections in the Strzelecki Ranges supporting dense softwood plantations. As a result, the vast majority of native vegetation (scrubs, woodlands and forests) and associated habitat that would have once covered South Gippsland has been cleared, leaving small, fragmented patches remaining along road reserves, property boundaries and creek lines, and scattered trees in paddocks. In some sections, such as the hills around Waratah Bay, the Great Southern Rail Reserve and the Strzelecki Ranges, larger patches of native vegetation persist in the landscape in private and public land, representing important areas of priority habitat for flora and fauna species.

Key ecological values

Taking into account the desktop review, field surveys involving vegetation quality and habitat condition assessments, and the additional targeted surveys for threatened species in suitable habitats, key ecological values that are considered to be present within the survey area and used to inform the impact assessment, are summarised in .

Key locations supporting high-quality native remnants and habitats include (Appendix 1: Figure 5 and Figure 6):

- Coastal scrub vegetation restricted to the foreshore and coastal dunes of Waratah Bay (KP 0).
- Lowland forests between Waratah Road and Fish-Creek Walkerville Road (KP 2.3 – 6.4) and within private land north of Fish-Creek Walkerville Road (KP 8.0 – 8.9).
- Swamp scrubs, swampy woodlands and lowland forest in the Great Southern Rail Trail reserve and intersecting waterways, including stony creek and adjoining private land (KP 21.4-30.1).
- Lowland forests between Mirboo North and Stony Creek (KP57-57.5, 58.5-59.8, 60.5-61.1, 61.3-62.0, 62.2-63.7).
- Tall forests along Ten Mile Creek Road and Strzelecki Highway (KP64.6-71.8).
- Floodplain and grassy woodlands associated with Morwell River and nearby terraces (KP77.9-78.4).
- Grassy woodlands within McFarlane Road, road reserve at (KP 79.7).

Table 44. Ecological values considered present within the survey area for the purpose of the impact assessment

Value	Species and Communities
Native vegetation	A total of 201.90 ha of native vegetation was recorded within the survey area, including of 102.85 ha with a bioregional conservation status of endangered and 1084 large trees (scattered and in patches) (Appendix 1: Figure 6).

Value	Species and Communities
Nationally significant threatened species	**Fauna:** Australasian bittern, blue-winged parrot, caspian tern, cattle egret, crested tern, double-banded plover, dwarf galaxias, eastern curlew, gang-gang cockatoo, grey-headed flying-fox, growling grass frog, hooded plover, Latham's snipe, red-capped plover, red-necked stint, rufous fantail, sanderling, satin flycatcher, swamp antechinus, swamp skink, white-bellied sea-eagle, white-throated needletail. **Flora:** Eastern spider orchid, river swamp wallaby-grass, thick-lipped spider-orchid, Strzelecki gum, dense leek-orchid, green-striped greenhood, leafy greenhood. Priority habitats for these species are shown in Appendix 1: Figure 5.
State significant threatened species	**Fauna:** Grey goshawk, Narracan burrowing crayfish, South Gippsland spiny crayfish, glossy grass skink, southern toadlet, lace monitor, hardhead, little eagle, flinders pygmy perch, powerful owl, platypus, white-footed dunnart. **Flora:** Coast wirilda, coast bitter-bush, silver everlasting, lizard orchid, orange-tip finger-orchid, slender pink-fingers, coast colobanth, spurred helmet-orchid, fringed helmet-orchid, bog gum, Yarra gum, currant-wood, dune wood-sorrel, coast fescue, cobra greenhood, rush lily, alpine sun-orchid, slender fork-fern, oval fork-fern, small fork-fern. Priority habitats for these species are shown in Appendix 1: Figure 5.
Threatened ecological communities	A single patch of the EPBC Act listed *Gippsland Red Gum (Eucalyptus tereticornis subsp. mediana) Grassy Woodland and Associated Native Grassland community* and equivalent FFG Act listed *Forest Red Gum Grassy Woodland community* was identified within the McFarlane Road, road reserve at (KP 79.7; Appendix 1: Figure 5).

Impacts

A 'significance of impact' approach has been used to assess impacts to ecological values within the survey area, which considers the sensitivity of the value and magnitude of the impact. This approach takes into account pre-mitigation impacts, based on the current design and construction approach, along with post-mitigation impacts which assume implementation of the EPRs developed to avoid and minimise impacts to ecological values.

Based on successful implementation of the EPRs, including the revision of the existing design to further avoid vegetation and habitat impacts, and implementation of vegetation and habitat protection measures to minimise indirect impacts during construction, post-mitigation impacts to ecological values are summarised in Table 45. In some instances, the impacts to threatened species could not be mitigated fully due to uncertainty remaining with regards to their presence within the study area. In these instance, further on-ground assessments are required to inform the impact assessment, and a precautionary approach has been adopted for this report.

Table 45. Summary of the significance of impacts to ecological values within the survey area

Value	Post-mit. impact	Discussion
Native vegetation	**LOW**	Due to the significant ability to avoid and minimise indirect impacts associated consequential losses (e.g. encroachment of tree protection zones) through minor design revisions, post-mitigation impacts are estimated to be as little as: • Direct impacts involving 6.20 ha of native vegetation removed, including 39 large trees, representing approximately 3.1% of the native vegetation within the survey area.

Value	Post-mit. impact	Discussion
		• Indirect impacts in the form of consequential losses of 0.55 ha of native vegetation, including 12 large trees, representing approximately 0.27% of the native vegetation within the survey area. Consequential losses will occur over the medium to long-term and will not lead to a reduction in the extent of habitat.
Owls, raptors and other fauna with large ranges, including the threatened powerful owl, grey goshawk, little eagle, white-bellied sea eagle, grey-headed flying fox and lace monitor.	**LOW**	These species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).
Ground-dwelling fauna, including the threatened swamp skink, glossy grass skink, swamp antechinus, white-footed dunnart and southern toadlet.	**MODERATE**	Areas of potential habitat within the survey area for these species have not been assessed on-ground due to land access constraints. These species may not occur within the survey area, and particularly so within the disturbed edges of patches where impacts will occur. Despite this, a precautionary approach has been taken and these species are assumed to occur within habitat that may be impacted. Irrespective, direct and indirect impacts will likely be avoided through further refinement of the designs and construction controls. A post-mitigation magnitude of minor (rather than negligible) has been used for the impact assessment to account for the remaining uncertainty, with the overall significance of impact being determined as 'moderate'.
Aquatic fauna, including the threatened Australian grayling, dwarf galaxias, Flinders pygmy perch, growling grass frog, Narracan burrowing crayfish, South Gippsland spiny crayfish and platypus	**LOW**	These species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).
Shorebirds, including the threatened eastern curlew, hooded plover, sanderling, red-necked stint, double-banded plover, red-capped plover, caspian tern and crested tern	**MODERATE (Low)**	Direct impacts to foreshore and dune habitat in Waratah Bay will be avoided through HDD of these areas (Appendix 1: Figure 5) and construction controls to avoid disturbance during sensitive periods (e.g. nesting). The residual post-mitigation impact is moderate due the critically endangered EPBC Act listed eastern curlew being within this group, and is Very high sensitivity rating pushing up the significance of the post-mitigation impacts. However, materially impacts will be negligible to these species due to the temporary nature of works and avoidance of all areas of habitat. The significance of impacts to these species is therefore considered to be low.
Waterbirds and waders, including the threatened Australasian bittern, cattle egret, Latham's snipe and hardhead.	**LOW**	These species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).
Woodland birds, including the threatened gang-gang	**LOW**	These species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and

Value	Post-mit. impact	Discussion
cockatoo, blue-winged parrot, satin flycatcher, rufous fantail		implementation of appropriate construction controls (in accordance with the EPRs).
Coastal flora, including the threatened coast wirilda, coast bitter-bush, coast colobanth, dune wood-sorrel, coast fescue	**LOW**	The removal or degradation of habitat will be avoided through HDD of the dunes and beach. The elevated nature of the dunes means impacts due to the release of pollutants or sediment is considered unlikely.
Waratah Bay woodland flora, including eastern spider orchid, thick-lipped spider-orchid, dense leek-orchid, green-striped greenhood, leafy greenhood, silver everlasting, lizard orchid, orange-tip finger-orchid, slender pink-fingers, spurred helmet-orchid, fringed helmet-orchid, currant-wood, cobra greenhood, rush lily and small fork-fern	**MODERATE**	Areas of potential habitat within the survey area for these species have not been assessed on-ground due to land access constraints. These species may not occur within the survey area, and particularly so within the disturbed edges of patches where impacts will occur. Despite this, a precautionary approach has been taken and these species are assumed to occur within habitat that may be impacted. Irrespective, direct and indirect impacts will likely be avoided through further refinement of the designs and construction controls. A post-mitigation magnitude of minor (rather than negligible) has been used for the impact assessment to account for the remaining uncertainty, with the overall significance of impact being determined as 'moderate'.
Strzelecki Ranges damp forest flora, including the threatened alpine sun-orchid, slender fork-fern and, oval fork-fern	**LOW**	If present, these species are unlikely to be significantly impacted by the project due to the avoidance of priority habitats through design refinement and implementation of appropriate construction controls (in accordance with the EPRs).
Strzelecki gum and **Yarra gum**	**LOW**	Potential impacts include a single Strzelecki Gum and three Yarra Gum. These impacts can be avoided through design refinement and implementation of appropriate construction controls. Impacts to Yarra Gum are negligible to due avoidance of priority habitat.
Bog gum	**HIGH**	Potential impacts to Bog Gum include removal of numerous trees from multiple, large populations and potential for further losses in habitat not yet surveyed. Whilst it may be feasible to avoid impacts through refinement of project design and construction controls, the uncertainty regarding the extent of the population and feasibility of avoidance means the extent to which impacts to this species can be mitigated is unable to be determined at this stage. Further on-ground assessments and refinement of the project design is required before a final impact assessment can be made.
River swamp wallaby-grass	**MODERATE**	Uncertainty still remains regarding the presence of River Swamp Wallaby-grass within the survey area in priority habitat south of Mirboo North, due to access constraints. In addition, the close proximity of the AoD (and associated HDD entry/exit pit) to a significant population at KP 78.2 means a high-level of uncertainty regarding the nature of impacts remains. Taking this uncertainty into account, the post-mitigation significance of impact is considered to be moderate.

Value	Post-mit. impact	Discussion
Threatened ecological communities	**MODERATE (LOW)**	The *Gippsland Red Gum (Eucalyptus tereticornis subsp. mediana) Grassy Woodland and Associated Native Grassland community* and equivalent FFG Act listed *Forest Red Gum Grassy Woodland Community* was identified at a single location within the McFarlane Road, road reserve (KP 79.7). The project will develop and implement construction measures to avoid impacts to the community. The very high sensitivity of this values means the actual significance of impacts are more likely to be 'low'.

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Appendices

Appendix 1 Map Series

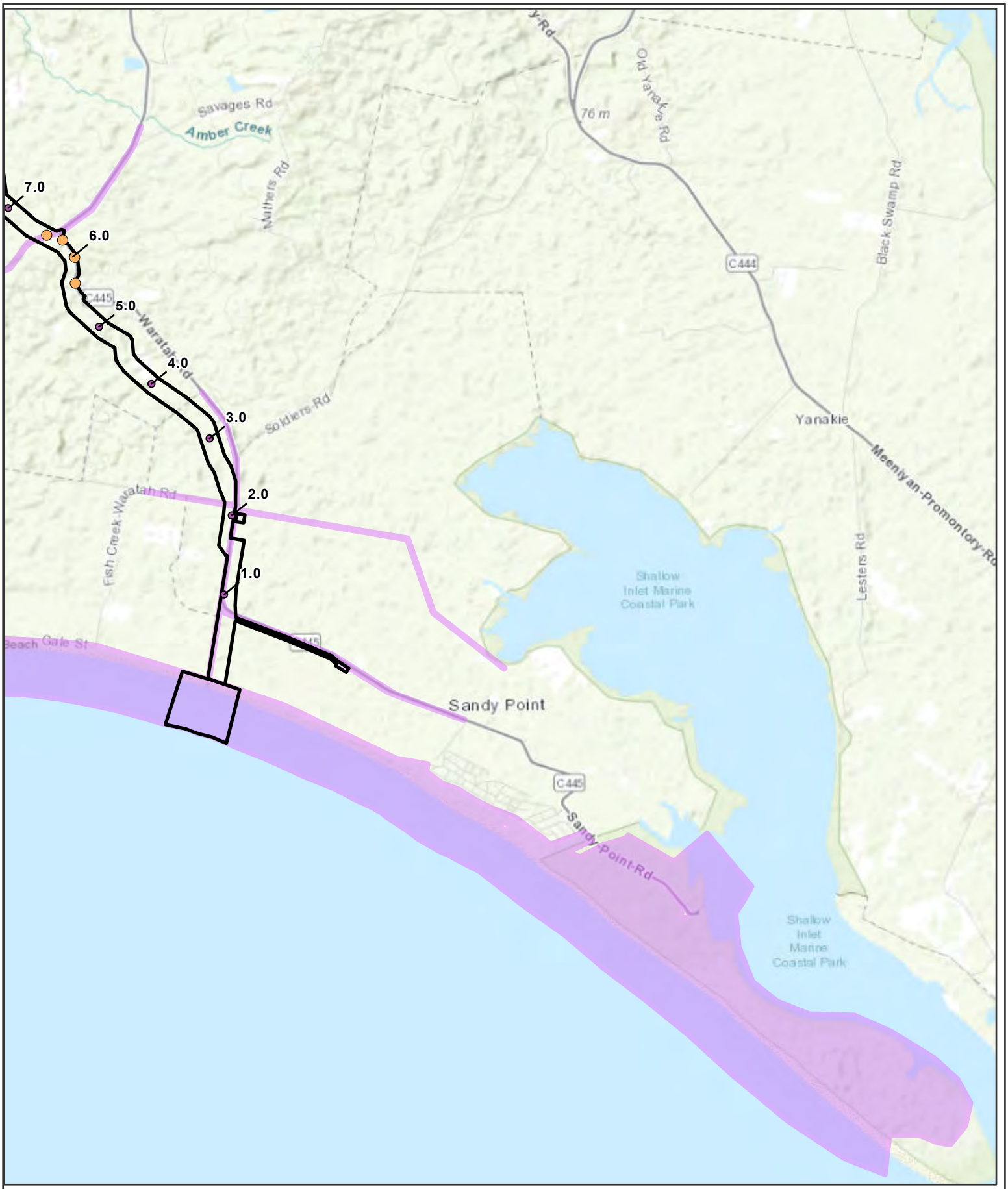

Figure 2.1 Survey effort

Survey areas
Bioregion
Parks and Reserves
Public Land
Major Watercourse
Kilometre points

Vegetation and habitat surveys (access permitted)
Public

Targeted survey locations
Flora transects

0 0.5 1 2
Kilometers

Datum/Projection:
GDA 1994 MGA Zone 55

Project: 14807 Date: 13/07/2023

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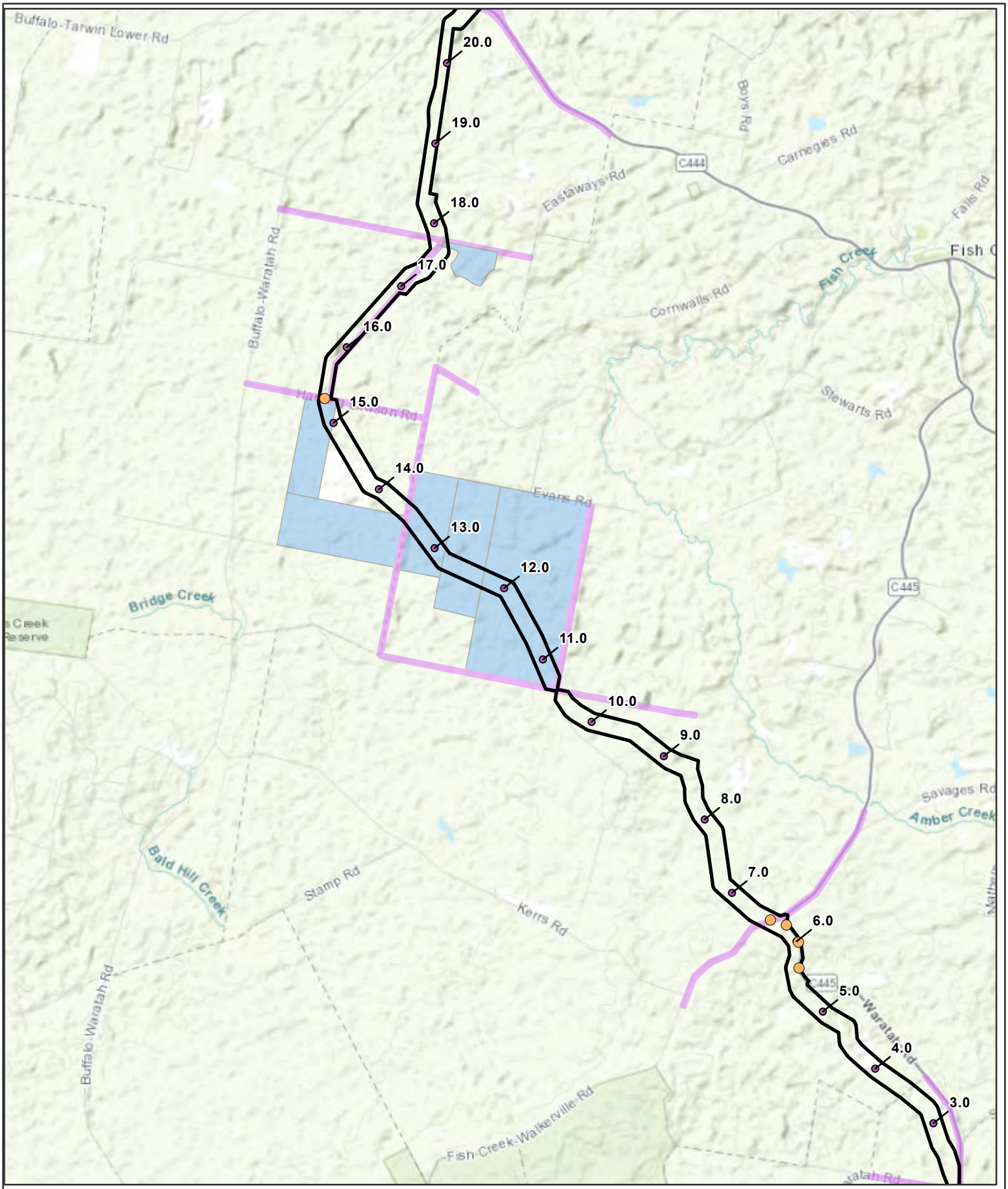

Figure 2.2 Survey effort

- Survey areas
- Bioregion
- Parks and Reserves
- Public Land
- Major Watercourse
- Kilometre points

Vegetation and habitat surveys (access permitted)

- Public
- Private

Targeted survey locations

- Flora transects

0 0.5 1 2
Kilometers

Datum/Projection:
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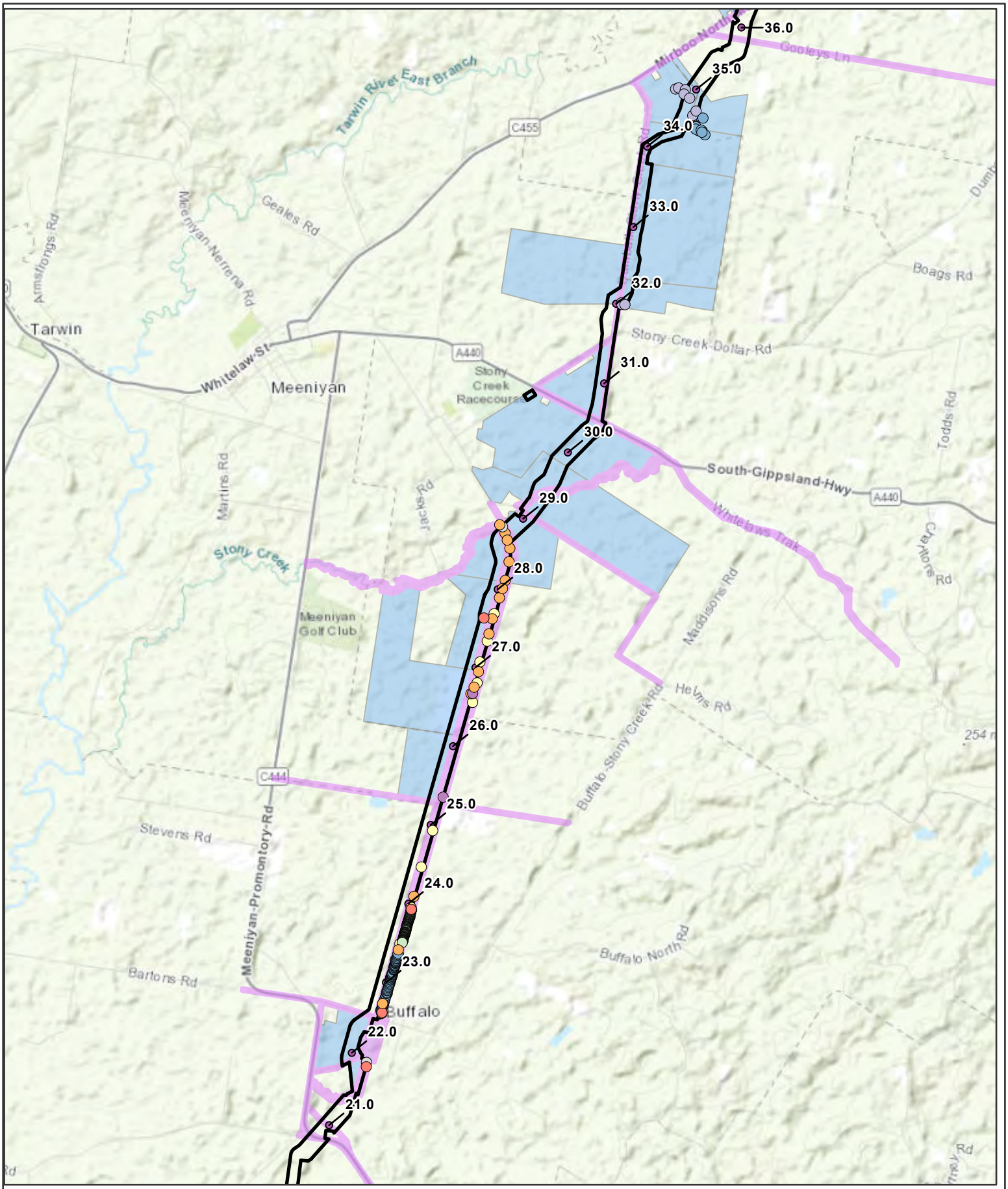

Figure 2.3 Survey effort

- Survey areas
- Bioregion
- Parks and Reserves
- Public Land
- Major Watercourse
- Kilometre points

Vegetation and habitat surveys (access permitted)

- Public
- Private

Targeted survey locations

- Camera
- Dip netting
- Diurnal bird survey
- Elliot
- Flora transects
- Songmeter
- Spotlighting

0 0.5 1 2
Kilometers

Datum/Projection:
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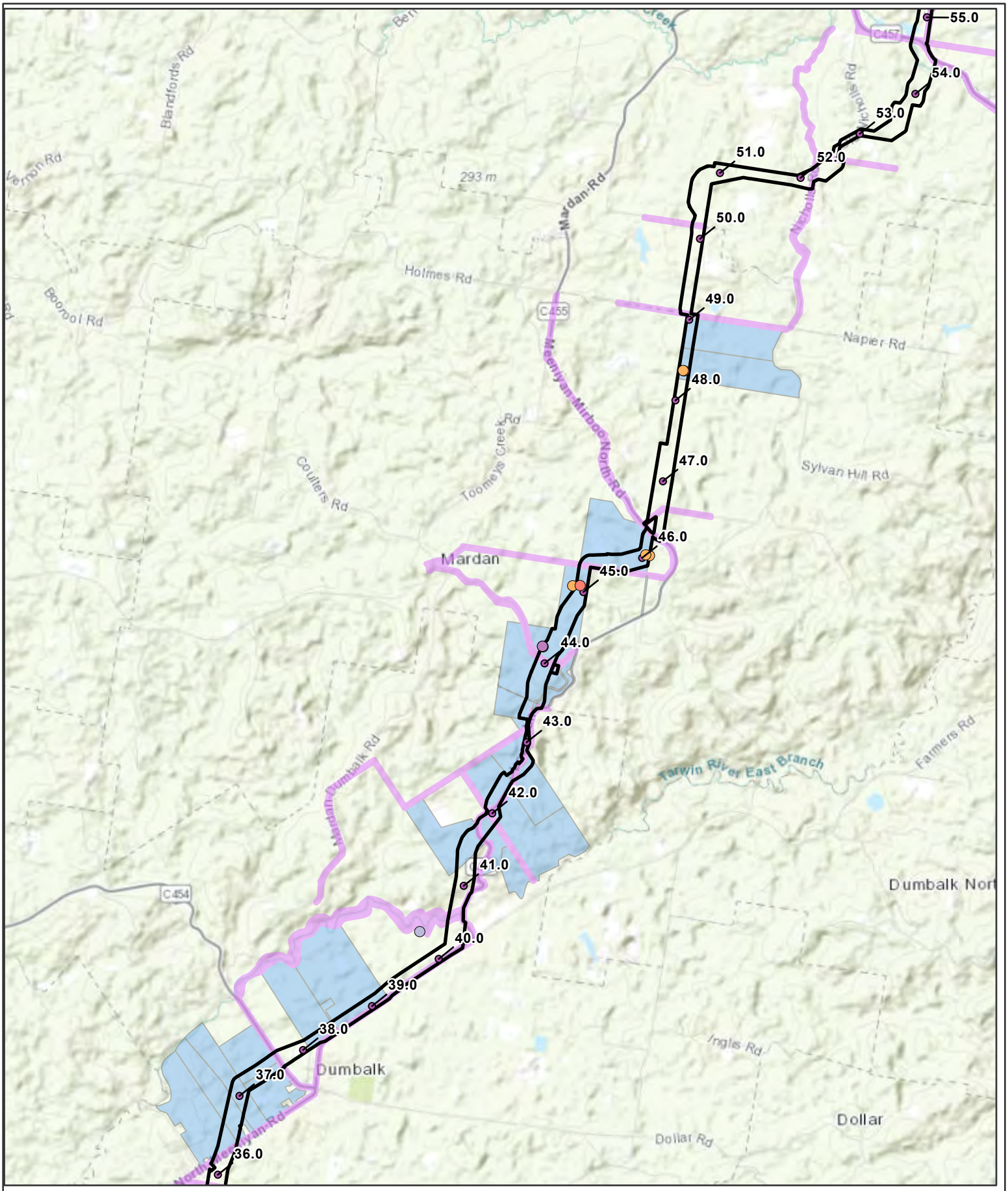

Figure 2.4 Survey effort

Survey areas
Bioregion
Parks and Reserves
Public Land
Major Watercourse
Kilometre points

Vegetation and habitat surveys (access permitted)

Public
Private

Targeted survey locations

Dip netting
Diurnal bird survey
Flora transects
Spotlighting

0 0.5 1 2
Kilometers

Datum/Projection:
GDA 1994 MGA Zone 55

Project: 14807 Date: 13/07/2023

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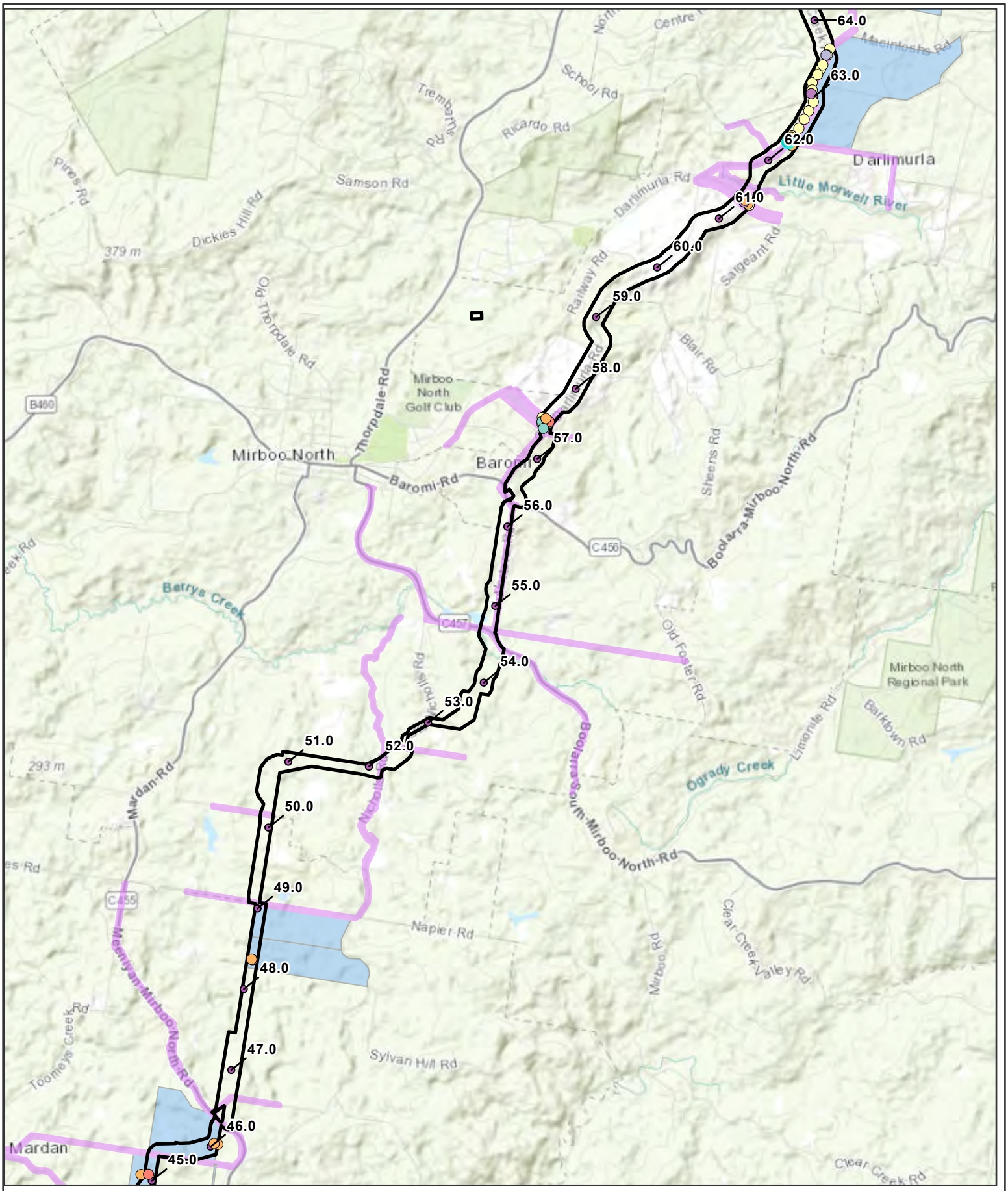

Figure 2.5 Survey effort

- Survey areas
- Bioregion
- Parks and Reserves
- Public Land
- Major Watercourse
- Kilometre points

Vegetation and habitat surveys (access permitted)

- Public
- Private

Targeted survey locations

- Anabat
- Camera
- Dip netting
- Diurnal bird survey
- Flora transects
- Spotlighting

0 0.5 1 2
Kilometers

Datum/Projection:
GDA 1994 MGA Zone 55

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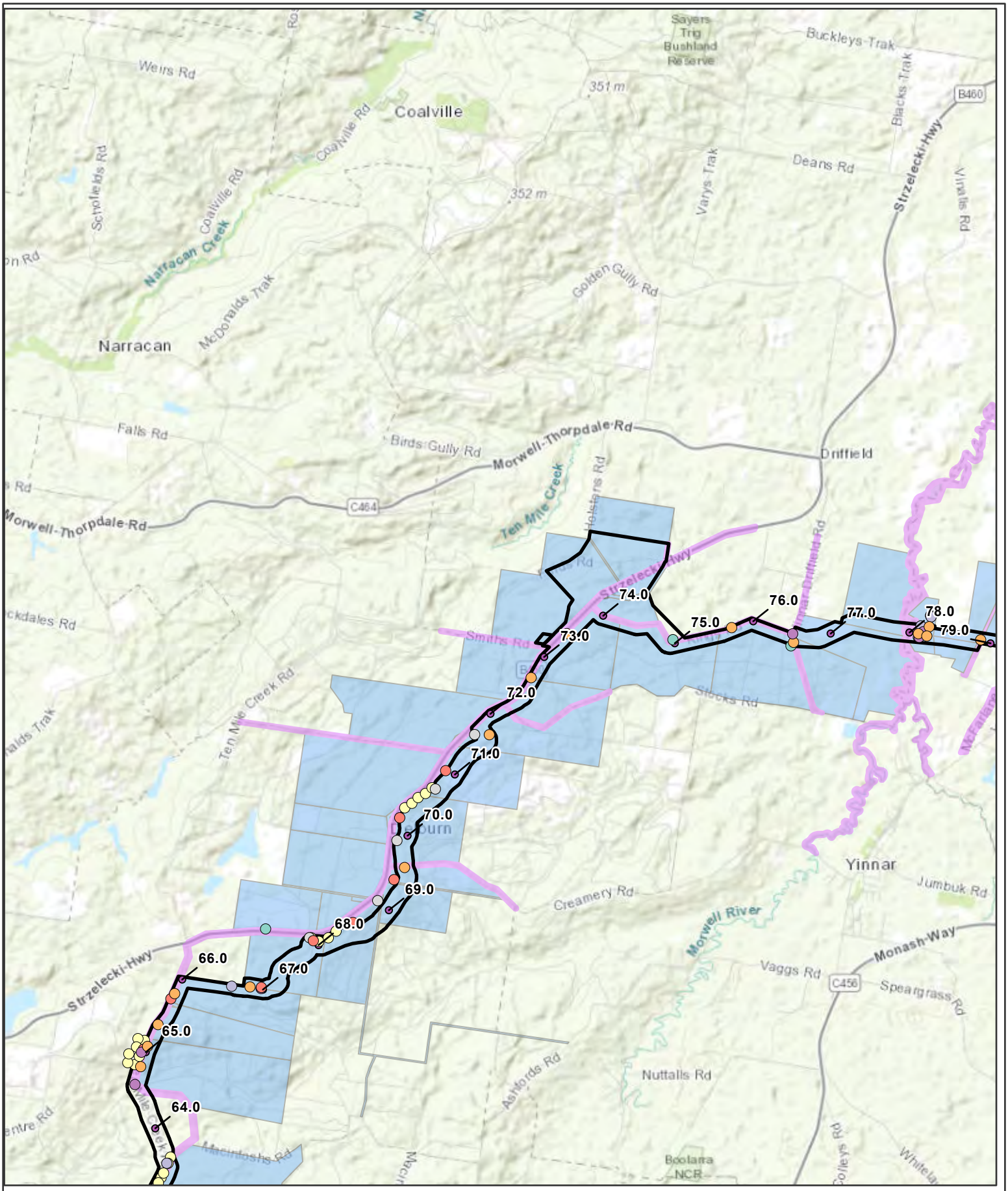

Figure 2.6 Survey effort

- Survey areas
- Bioregion
- Parks and Reserves
- Public Land
- Major Watercourse
- Kilometre points

Vegetation and habitat surveys (access permitted)

- Public
- Private

Targeted survey locations

- Anabat
- Camera
- Dip netting
- Diurnal bird survey
- Flora transects
- Songmeter
- Spotlighting

0 0.5 1 2
Kilometers

Datum/Projection:
GDA 1994 MGA Zone 55

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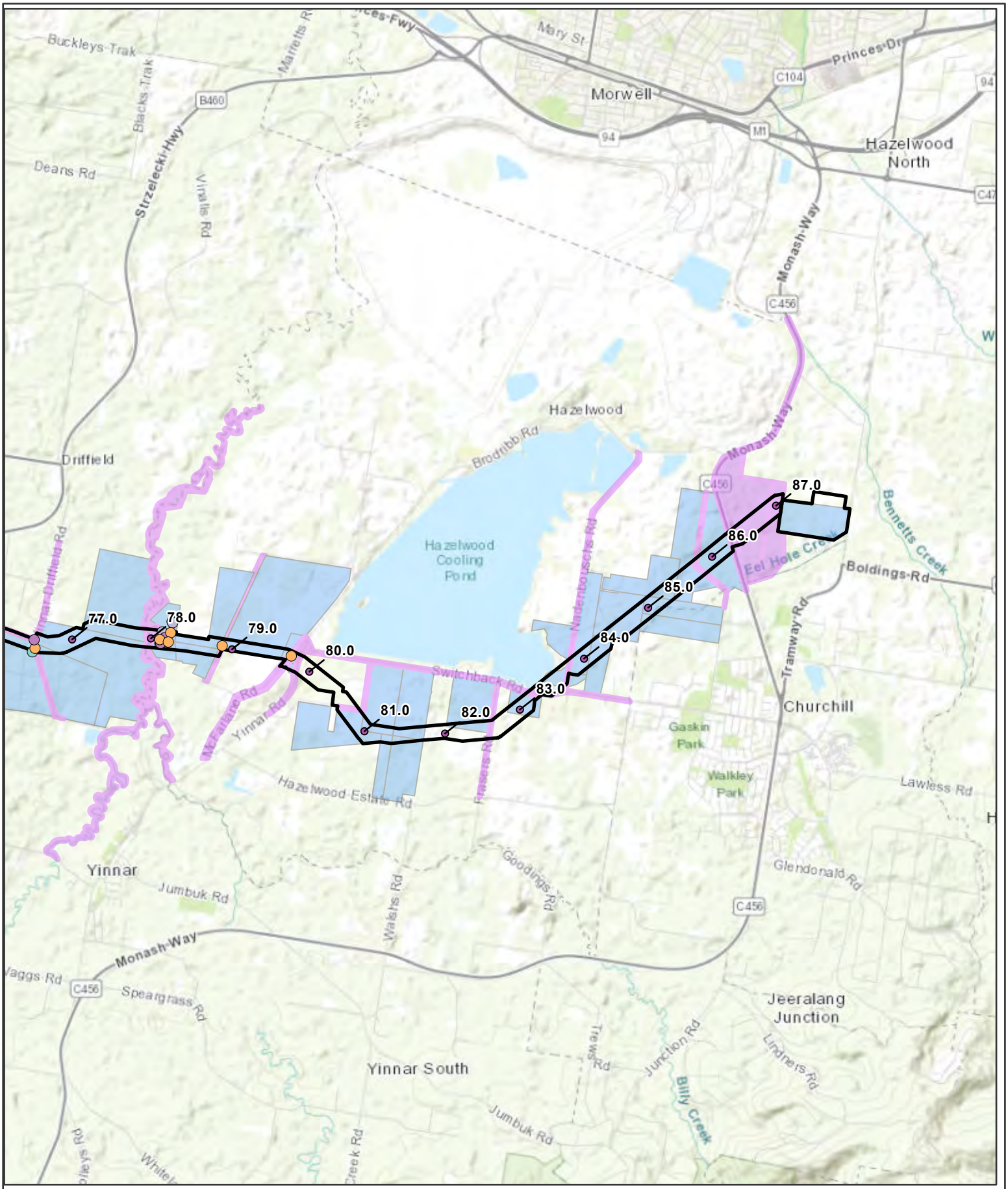

Figure 2.7 Survey effort

- Survey areas
- Bioregion
- Parks and Reserves
- Public Land
- Major Watercourse
- Kilometre points

Vegetation and habitat surveys (access permitted)

- Public
- Private

Targeted survey locations

- Anabat
- Dip netting
- Diurnal bird survey
- Flora transects
- Spotlighting

0 0.5 1 2
Kilometers

Datum/Projection:
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Project: 14807 Date: 13/07/2023

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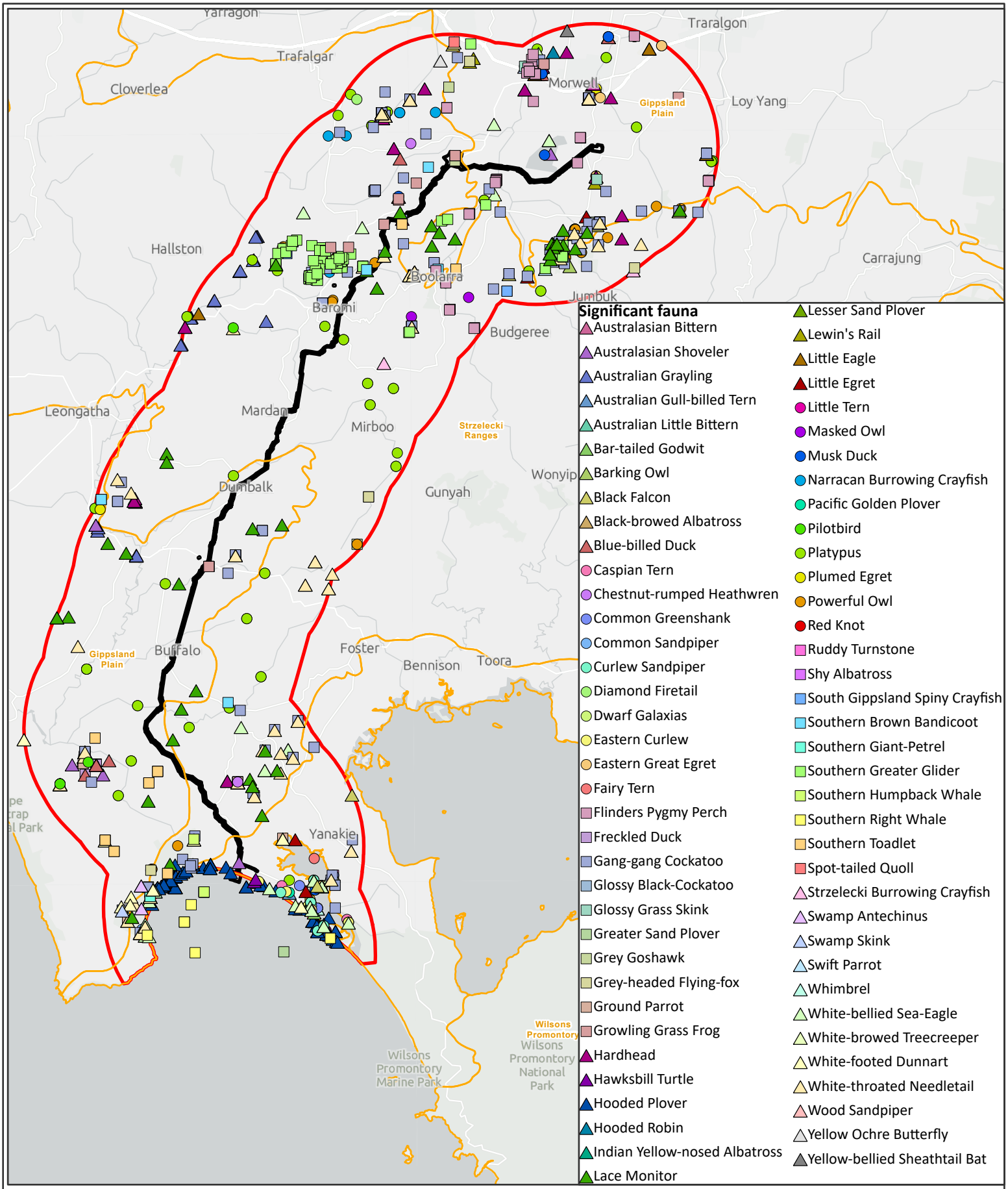

Figure 3. Threatened fauna species records

Study area

Survey areas

Bioregion

0 5 10 20

Kilometers

Datum/Projection:
GDA 1994 MGA Zone 55

Project: 14807 Date: 13/07/2023

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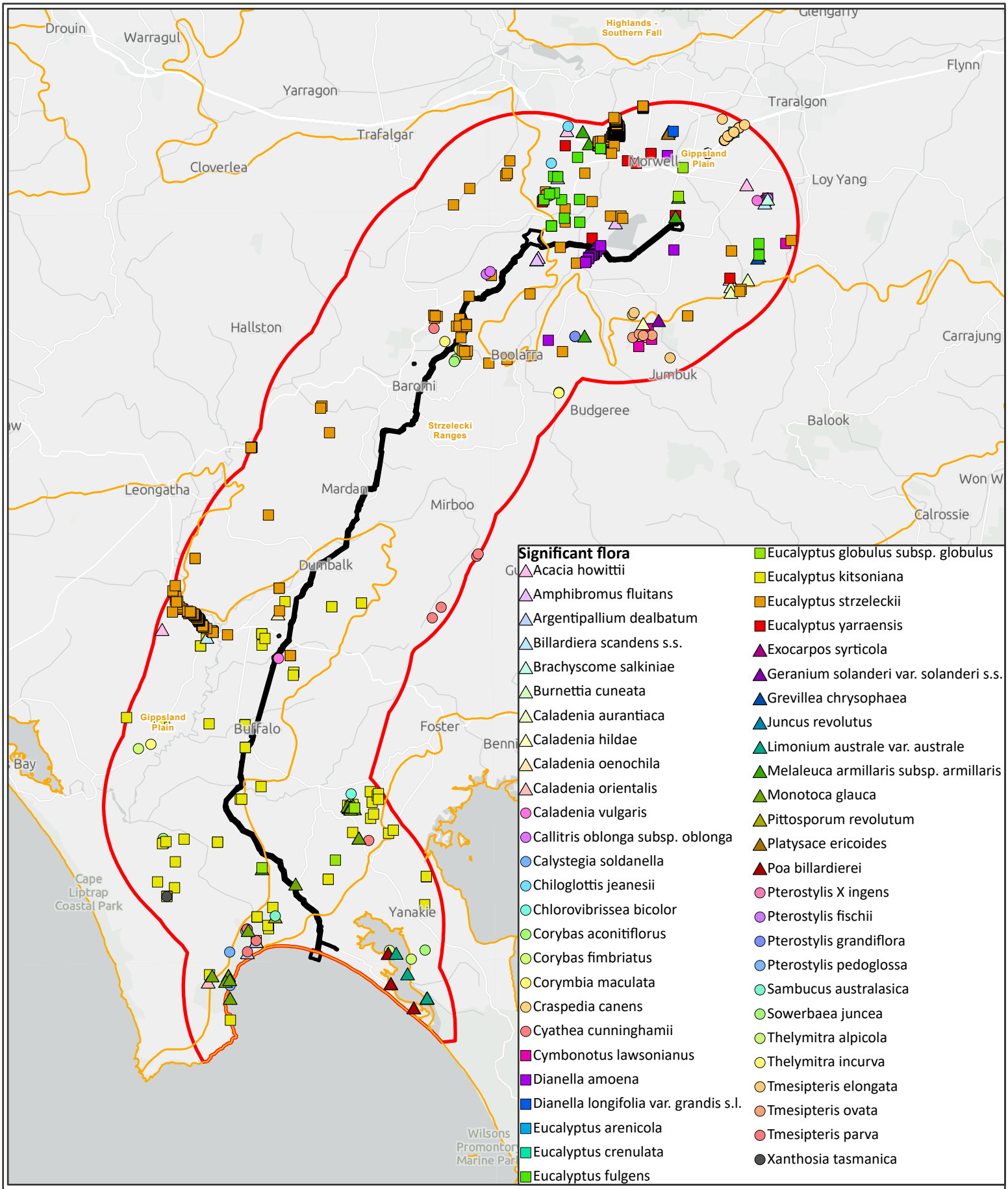

Figure 4. Threatened flora species records

Study area

Survey areas

Bioregion

0 5 10 20

Kilometers

Datum/Projection:
GDA 1994 MGA Zone 55

Project: 14807 Date: 13/07/2023

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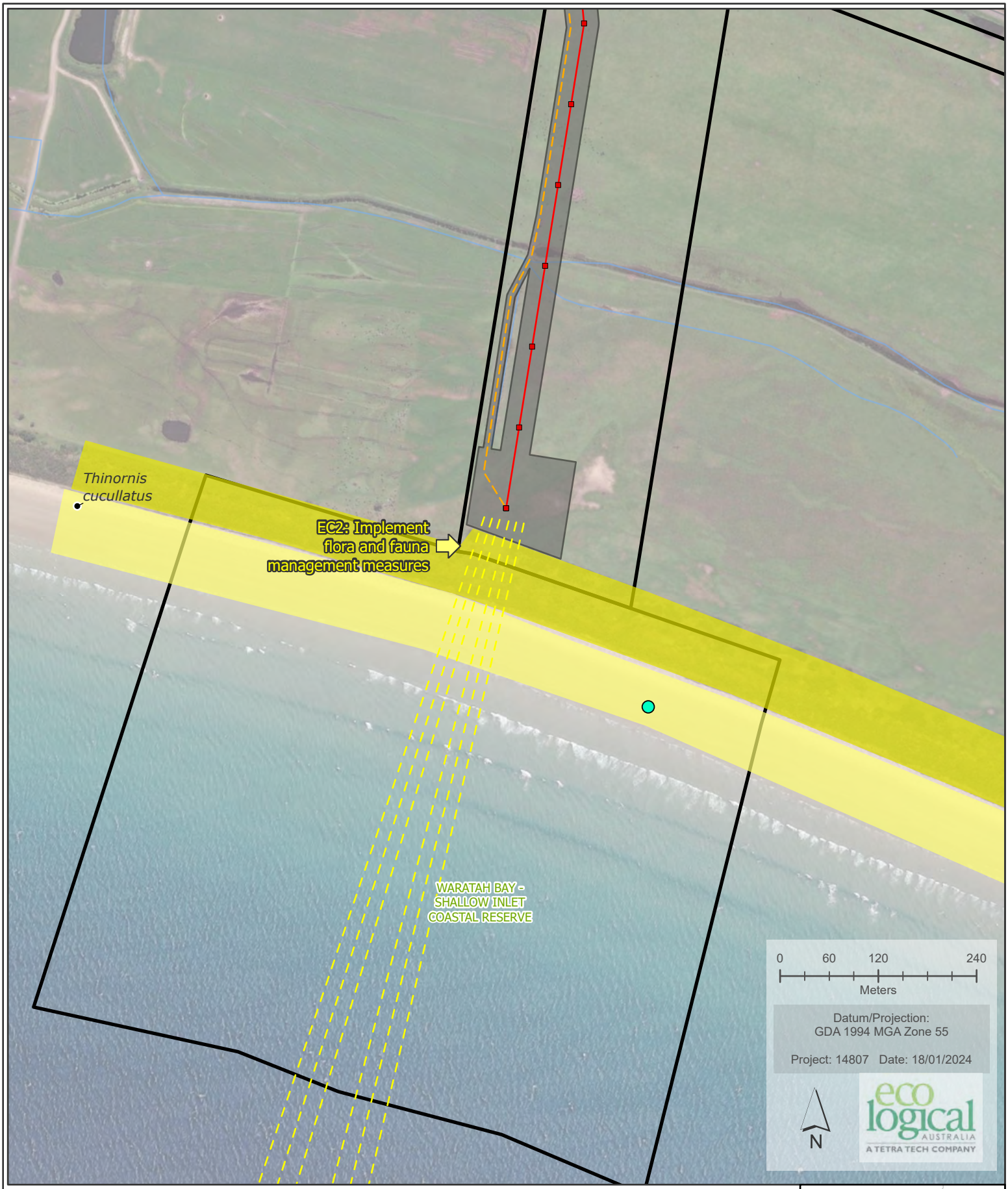


Figure 5.1 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- EPR priority locations

Species Records (VBA 2023)

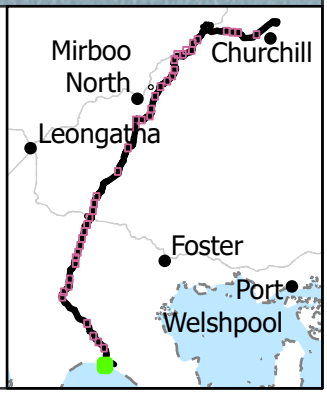
- Significant fauna

Targeted survey results (ELA 2020-2023)

- Crested Tern

Priority habitats

- Dunes (Waratah Bay)
- Foreshore (waratah bay)
- Kilometre points



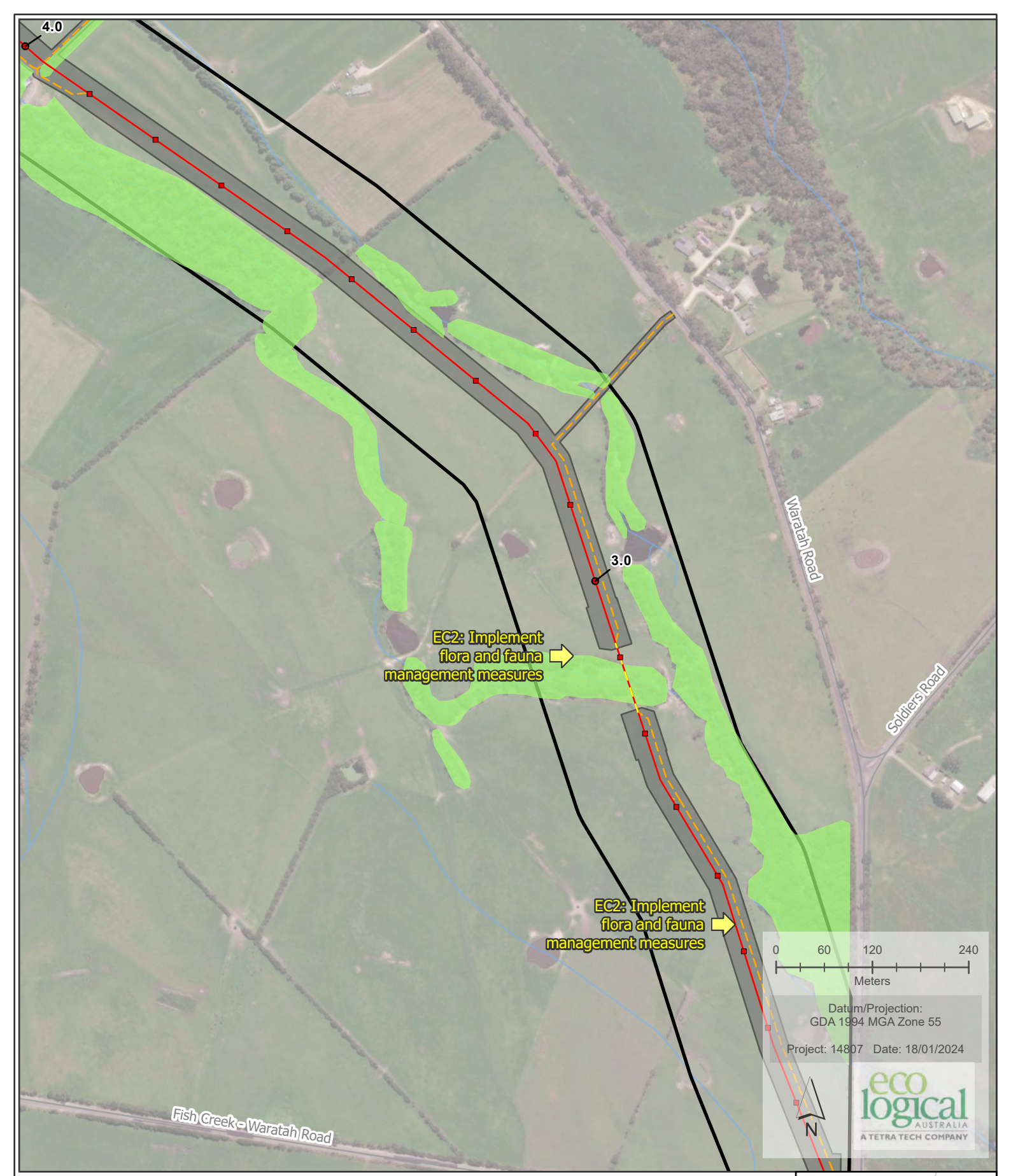
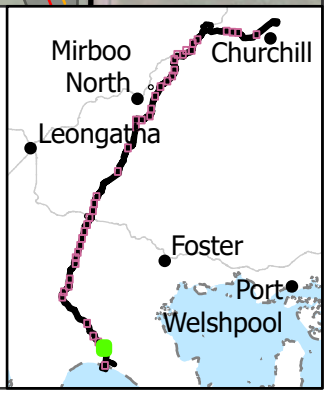


Figure 5.2 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Woodland 1 (Waratah Bay)
- Kilometre points



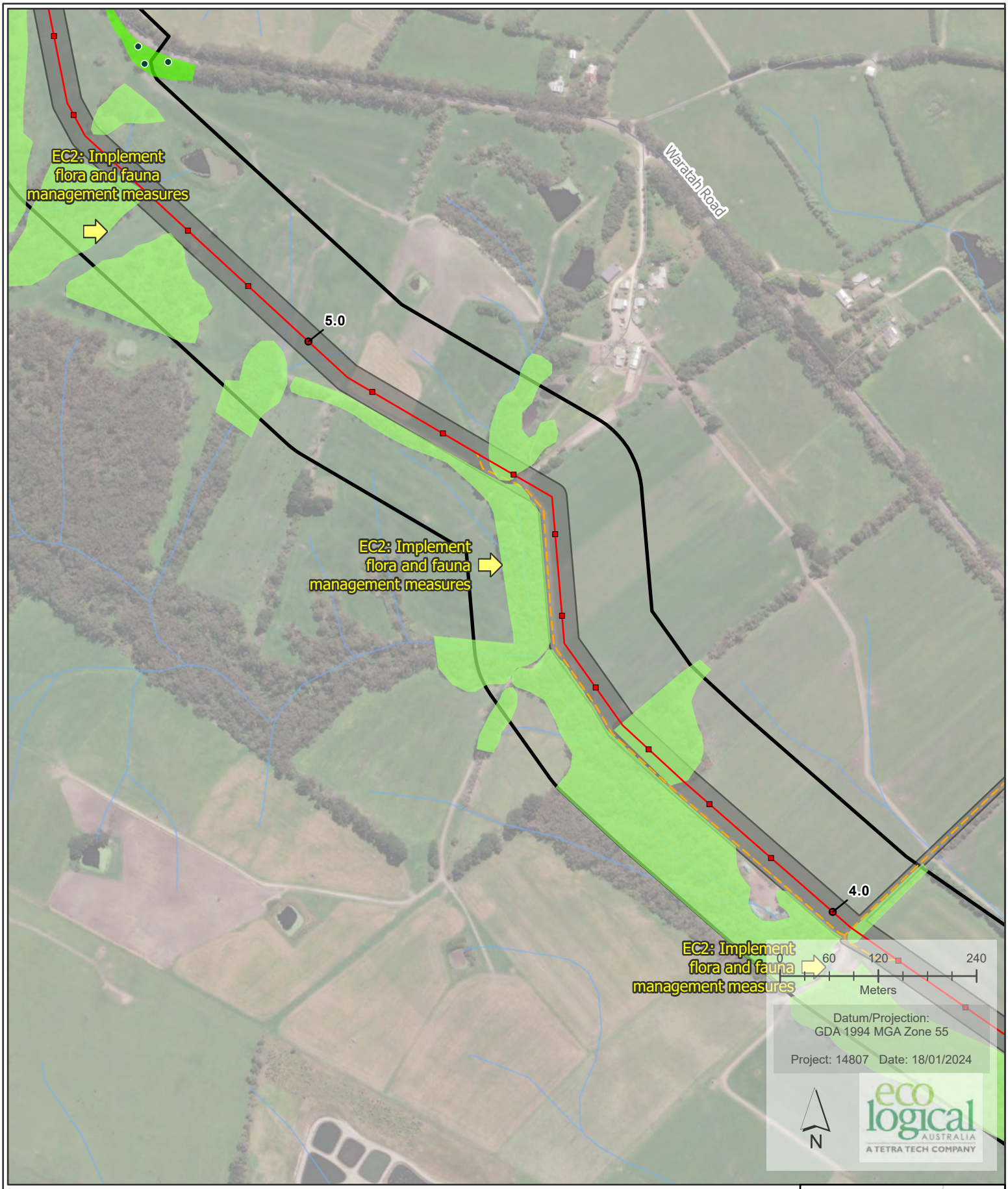
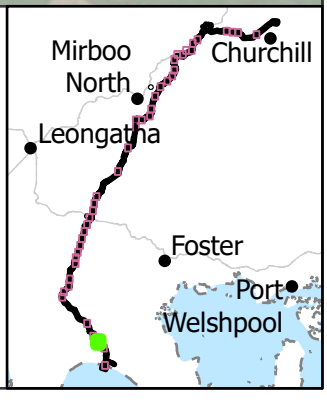


Figure 5.3 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Woodland 1 (Waratah Bay)
- Woodland 2 (Waratah Bay)
- Potential hollow-bearing trees
- Kilometre points



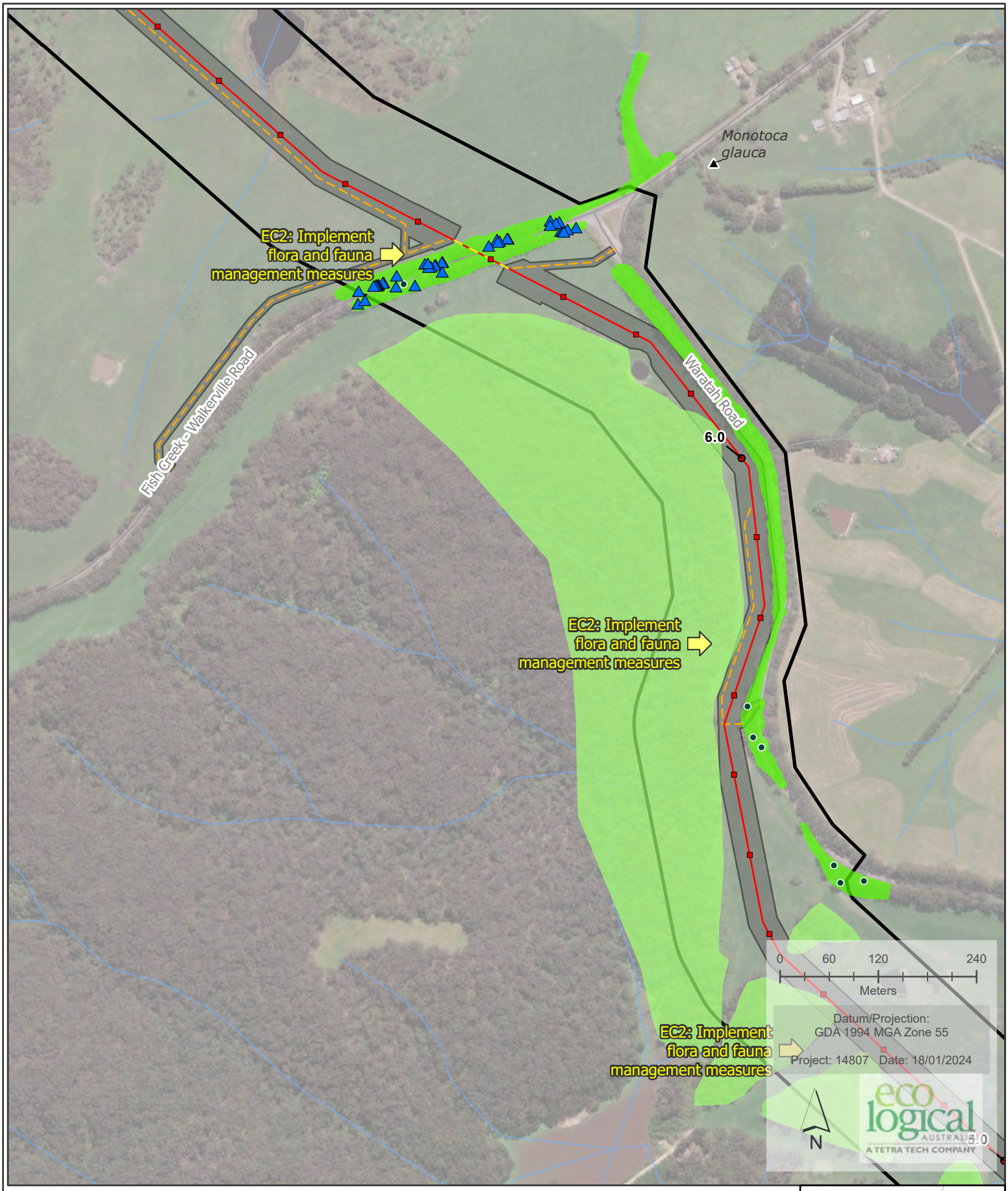


Figure 5.4 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

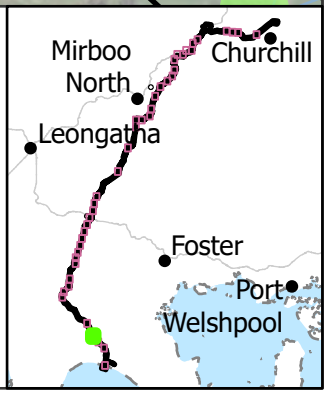
- Significant flora

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 1 (Waratah Bay)
- Woodland 2 (Waratah Bay)
- Potential hollow-bearing trees
- Kilometre points



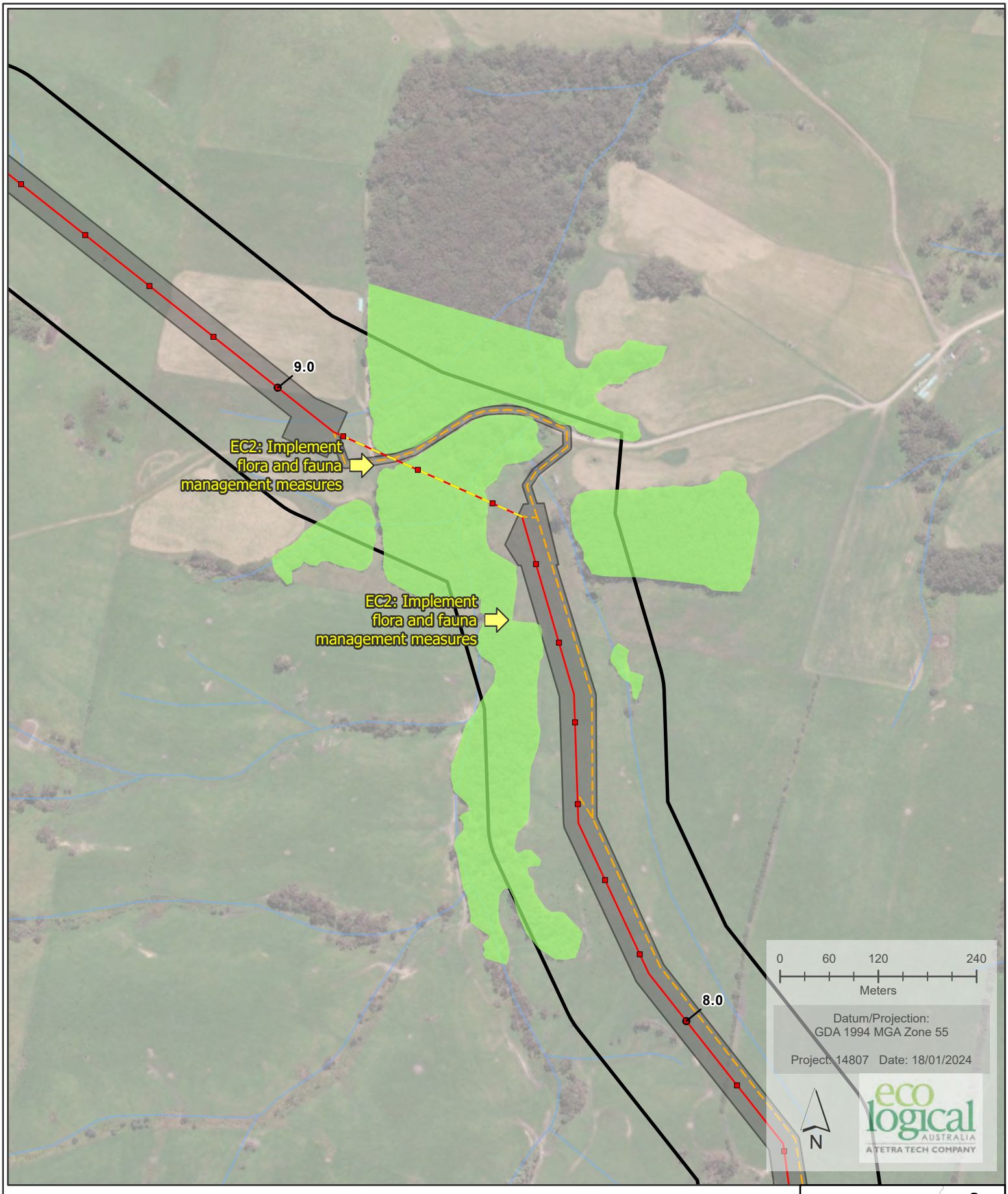
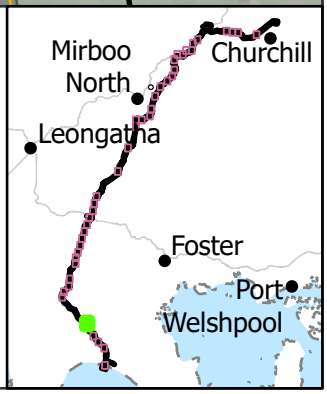


Figure 5.5 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Woodland 1 (Waratah Bay)
- Kilometre points



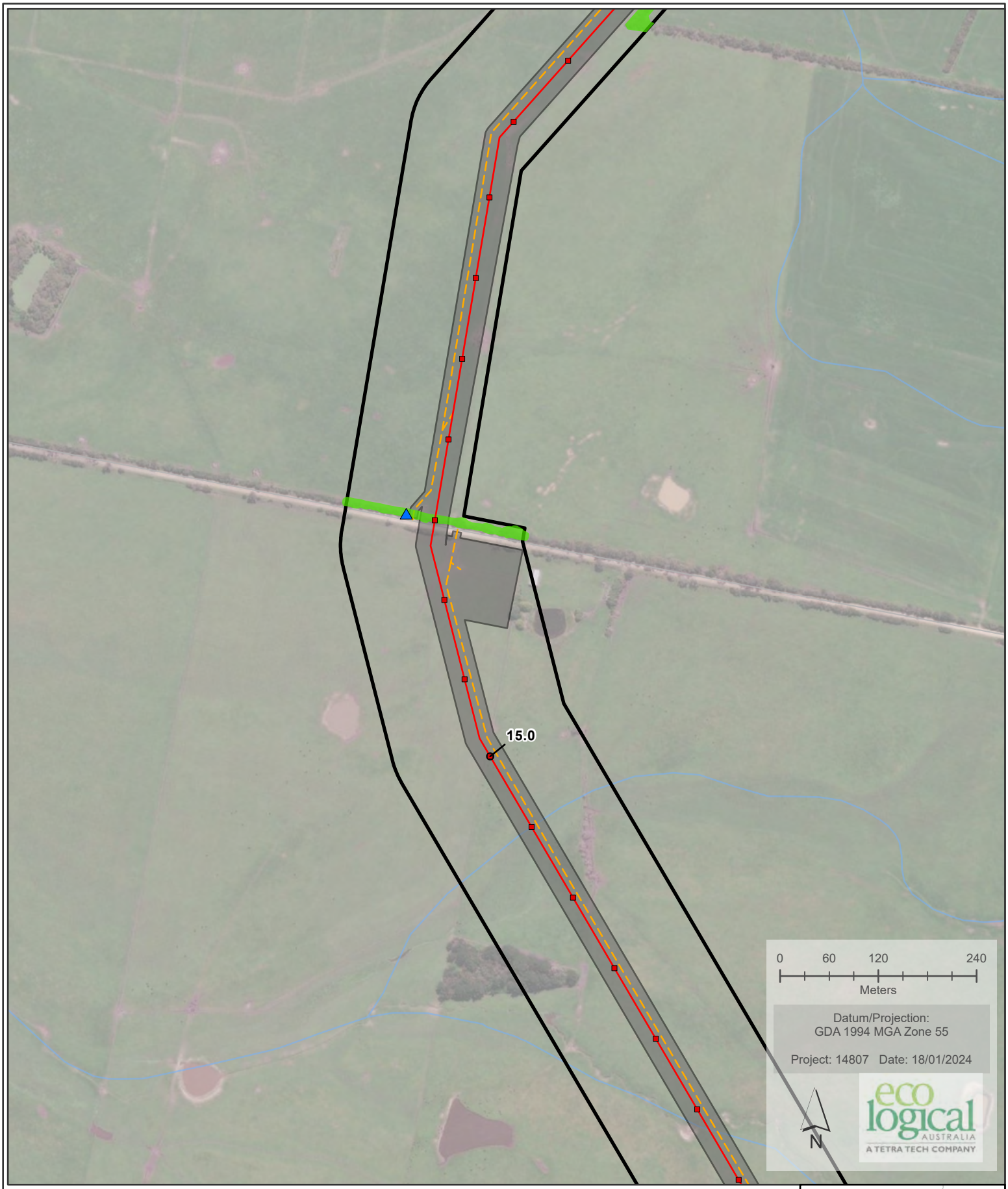


Figure 5.6 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 3 (Tarwin Valley)
- Kilometre points

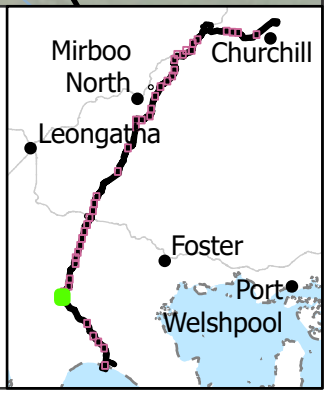
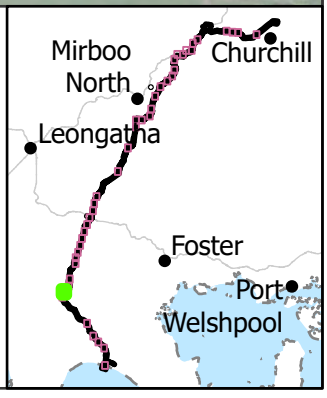


Figure 5.7 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points

Priority habitats

- Woodland 3 (Tarwin Valley)
- Kilometre points



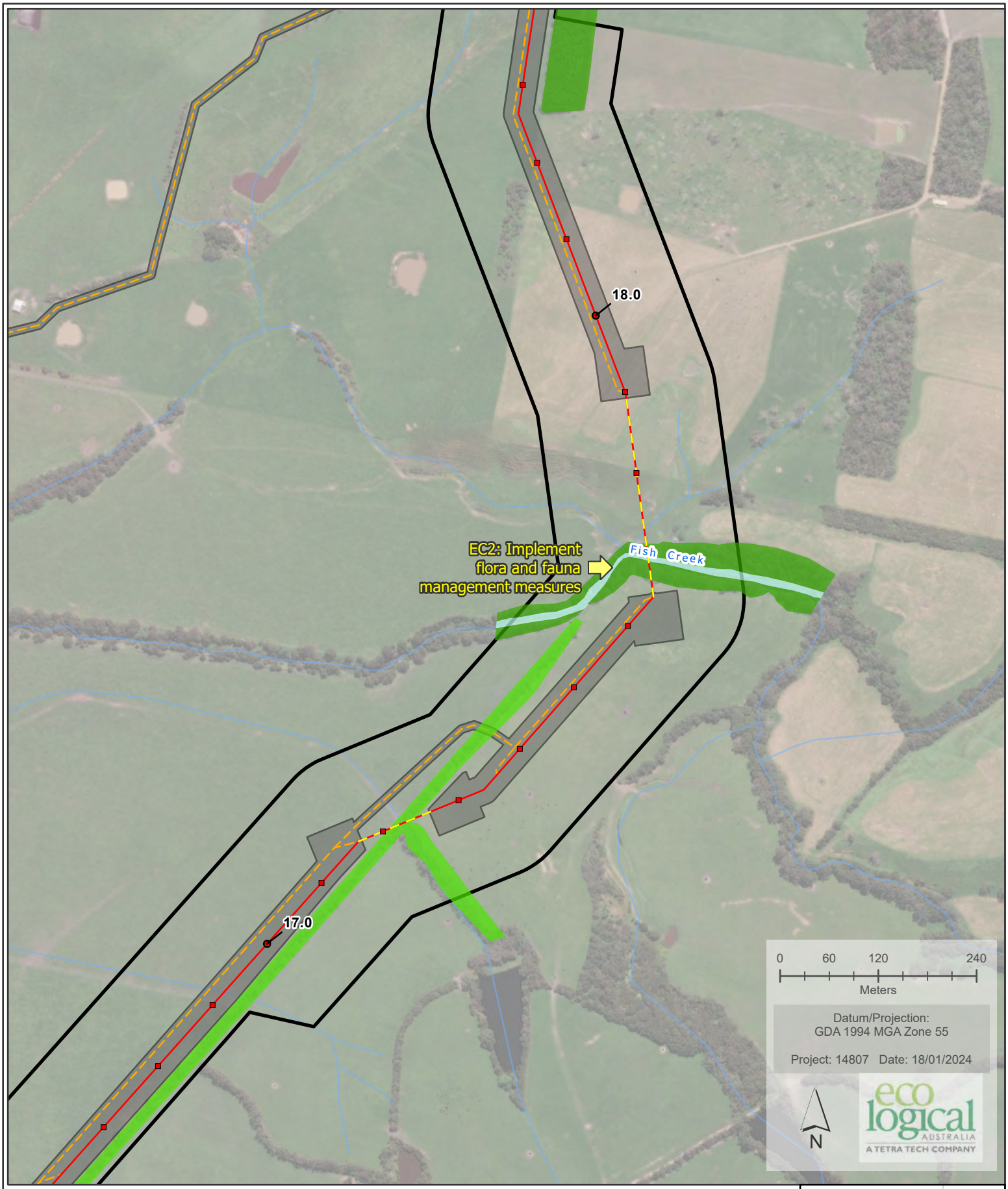


Figure 5.8 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Aquatic 1 (Tarwin Valley)
- Woodland 3 (Tarwin Valley)
- Woodland 4 (Tarwin Valley)
- Kilometre points

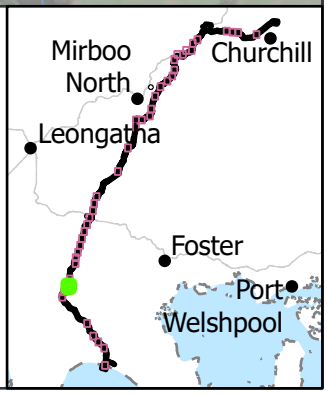
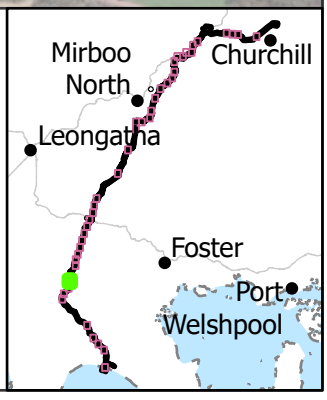


Figure 5.9 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Woodland 4 (Tarwin Valley)
- Kilometre points



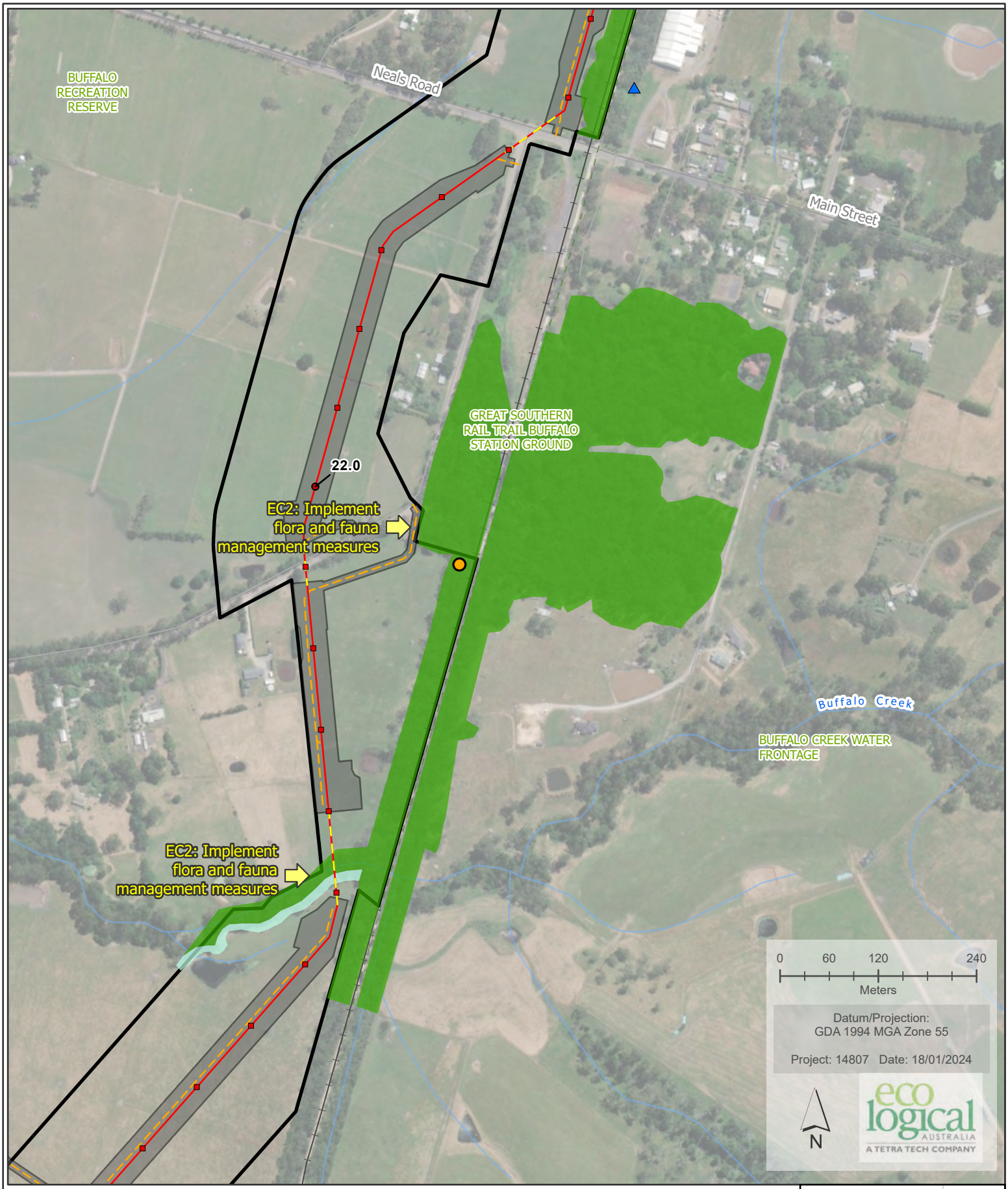


Figure 5.10 Threatened ecological communities, species and priority habitats

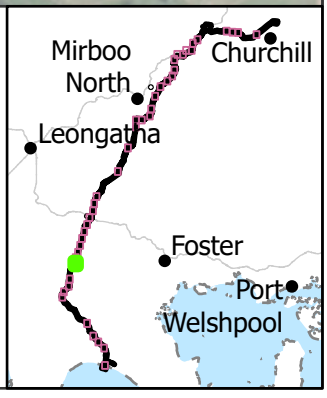
- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Powerful Owl
- Bog Gum

Priority habitats

- Aquatic 1 (Tarwin Valley)
- Woodland 4 (Tarwin Valley)
- Kilometre points



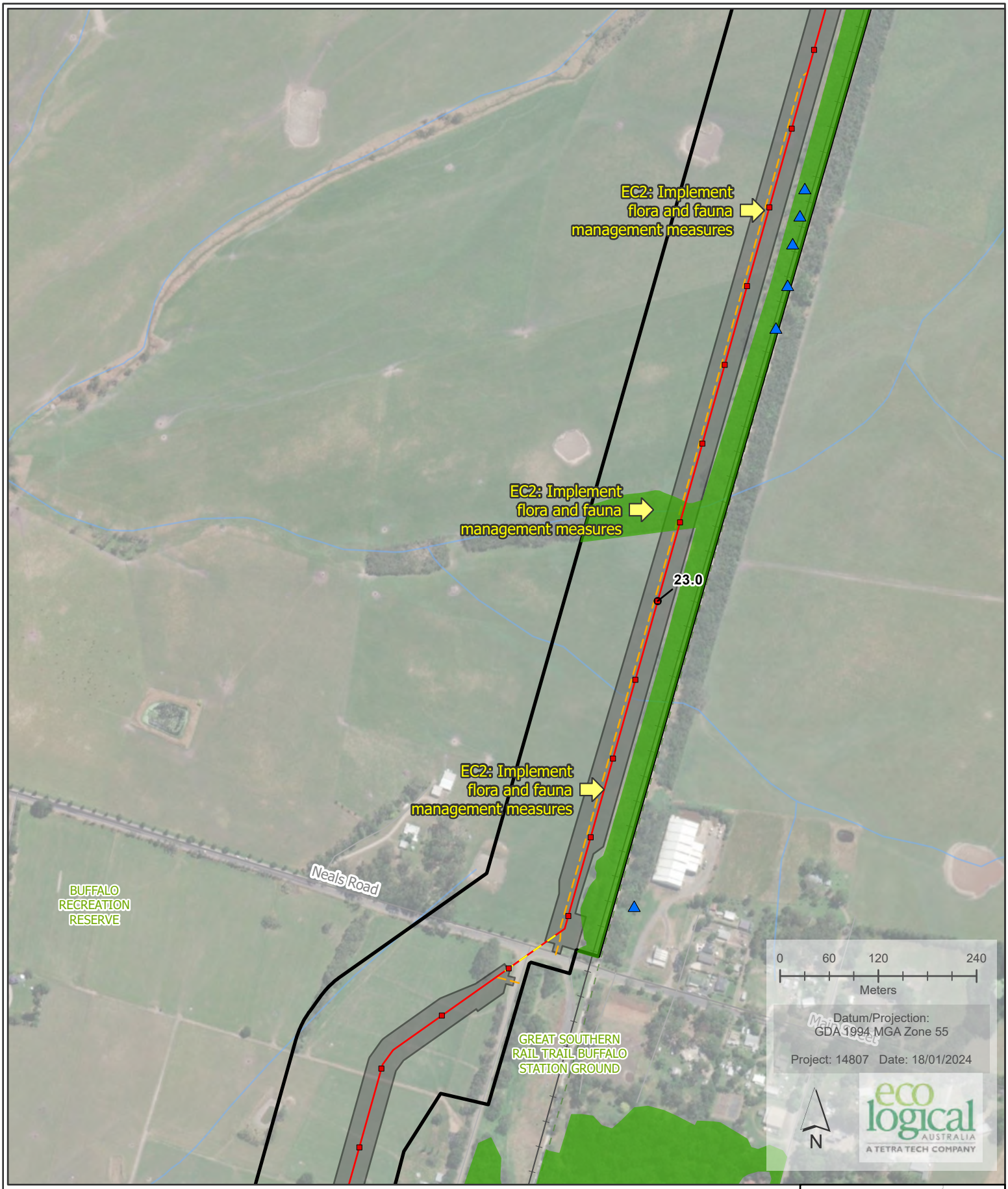


Figure 5.11 Threatened ecological communities, species and priority habitats

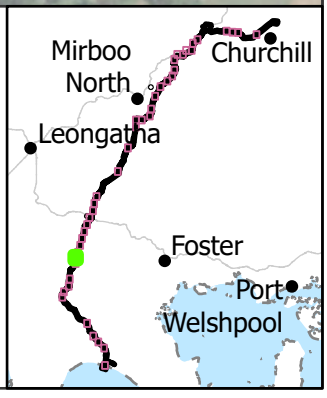
- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 4 (Tarwin Valley)
- Kilometre points



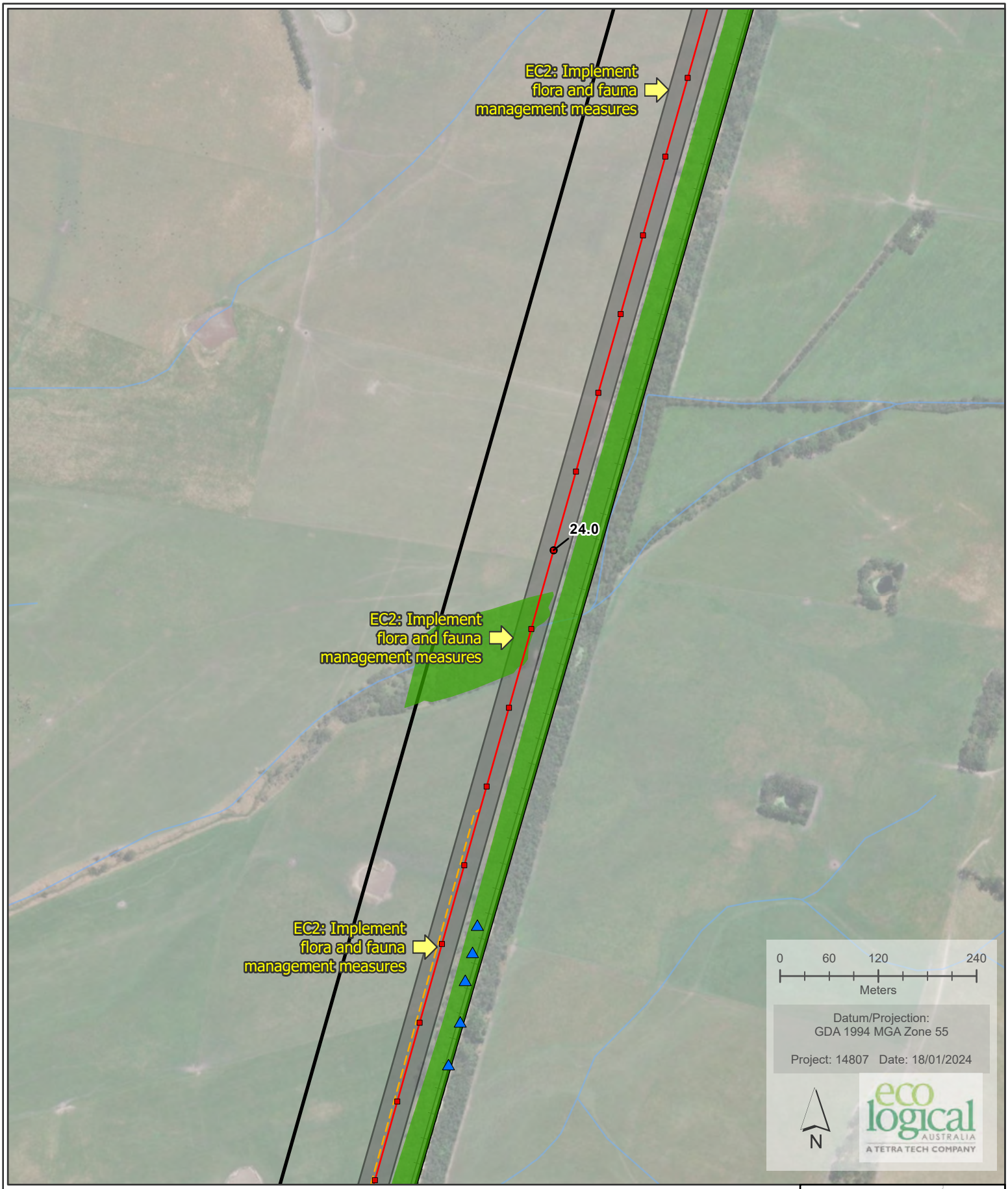


Figure 5.12 Threatened ecological communities, species and priority habitats

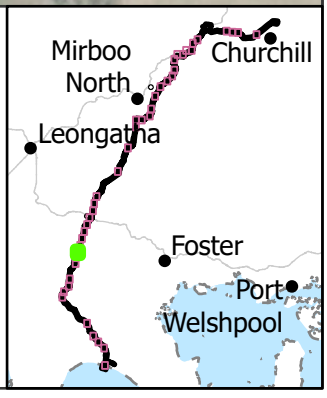
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 4 (Tarwin Valley)
- Kilometre points



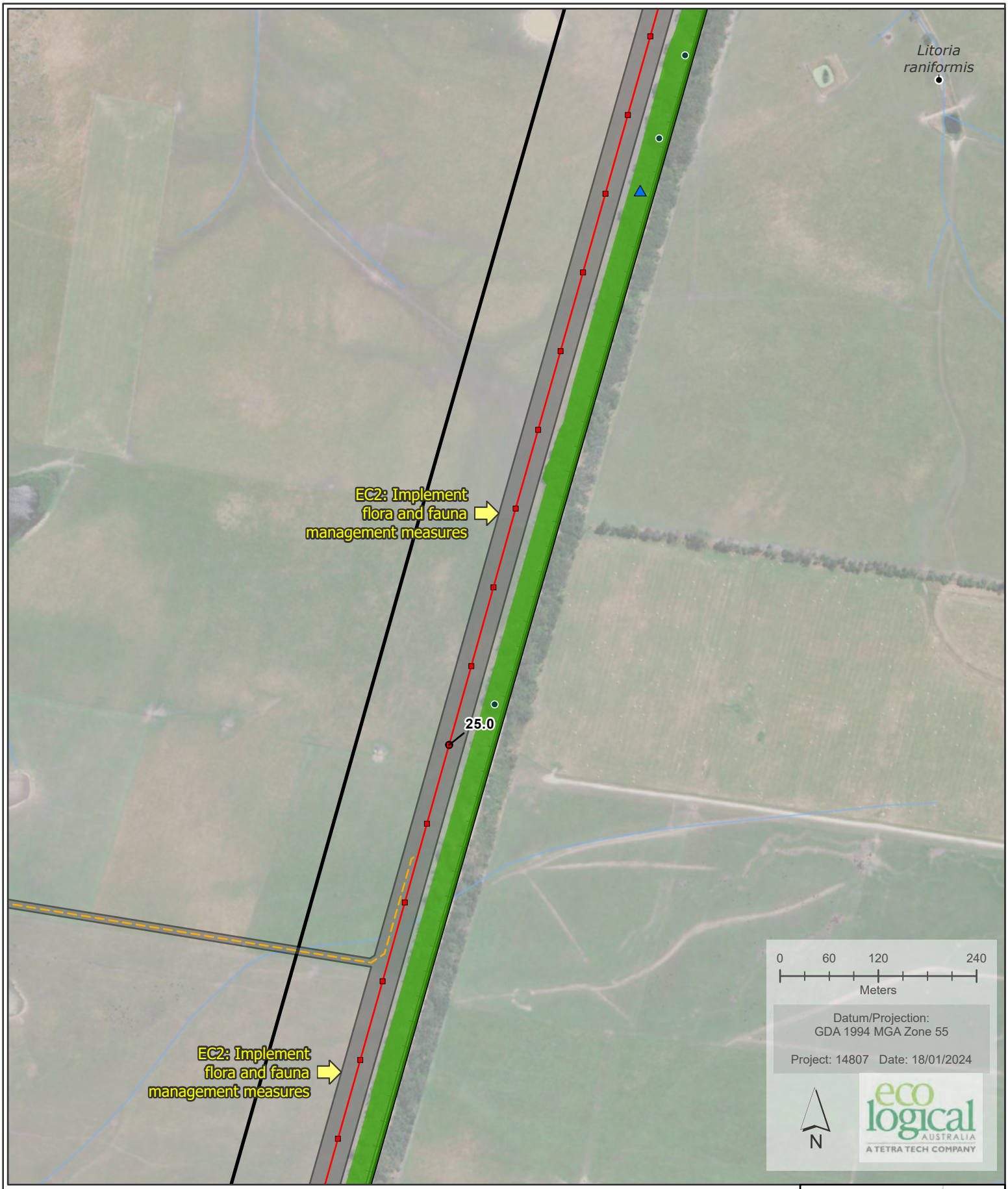


Figure 5.13 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

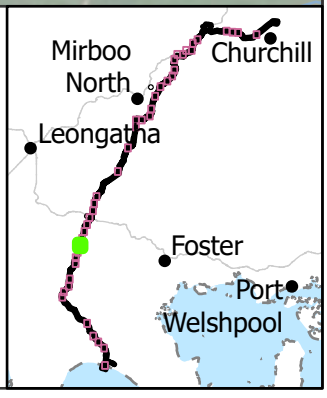
- Significant fauna

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 4 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



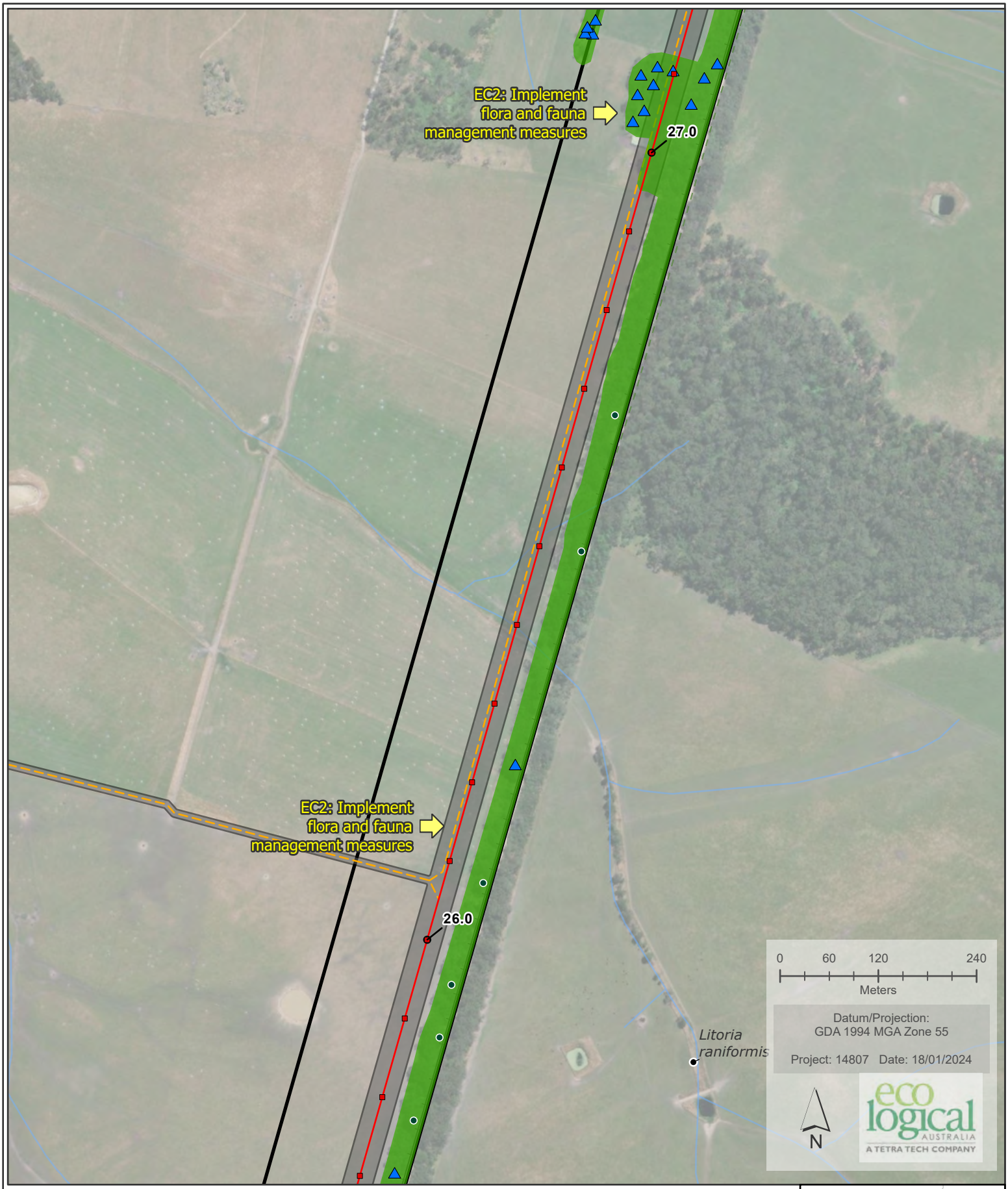


Figure 5.14 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

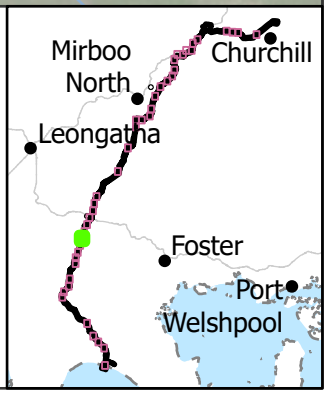
- Significant fauna

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 4 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



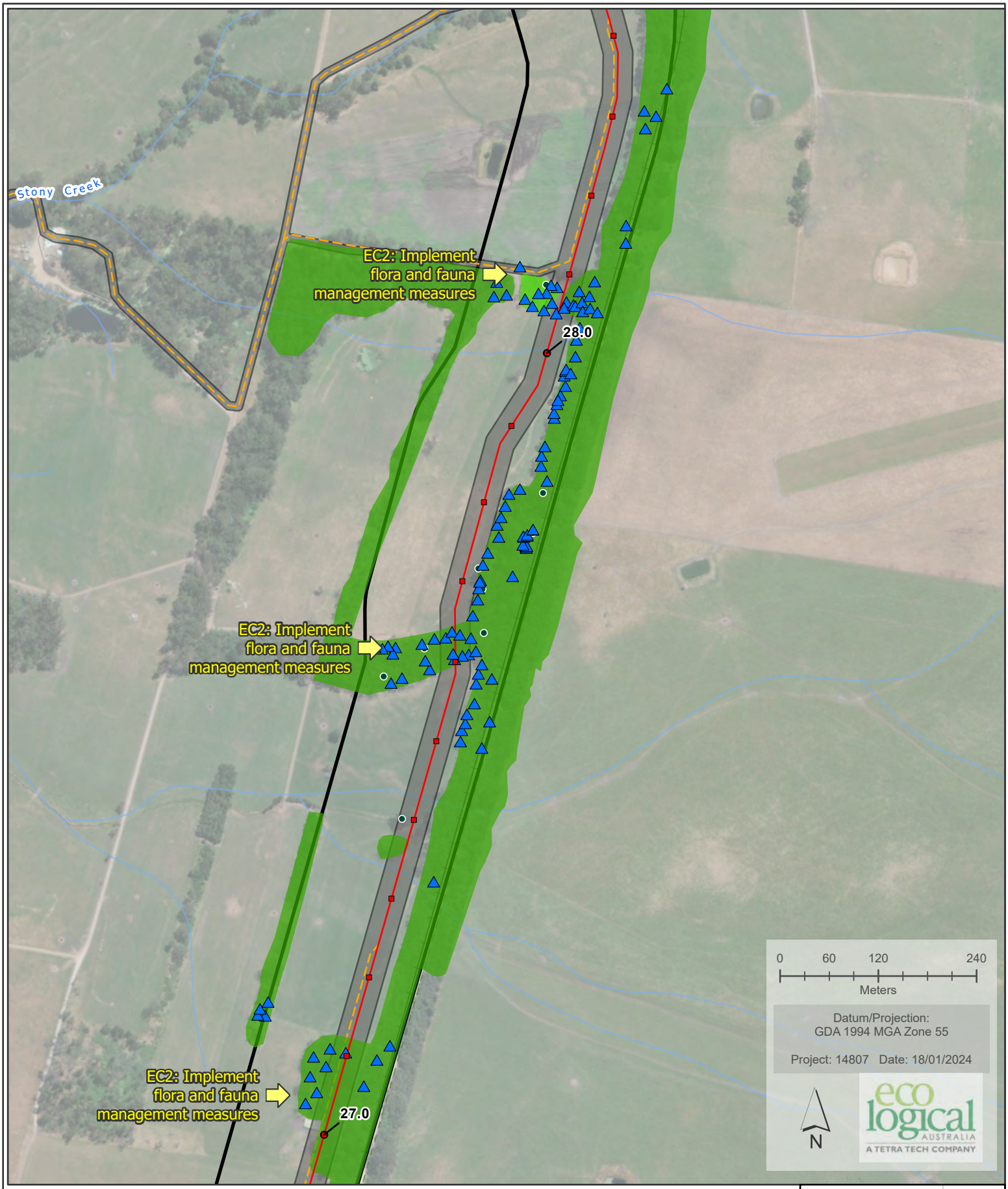


Figure 5.15 Threatened ecological communities, species and priority habitats

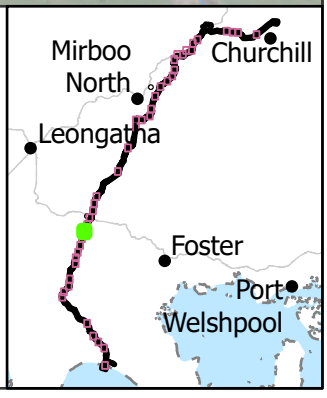
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 3 (Tarwin Valley)
- Woodland 4 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



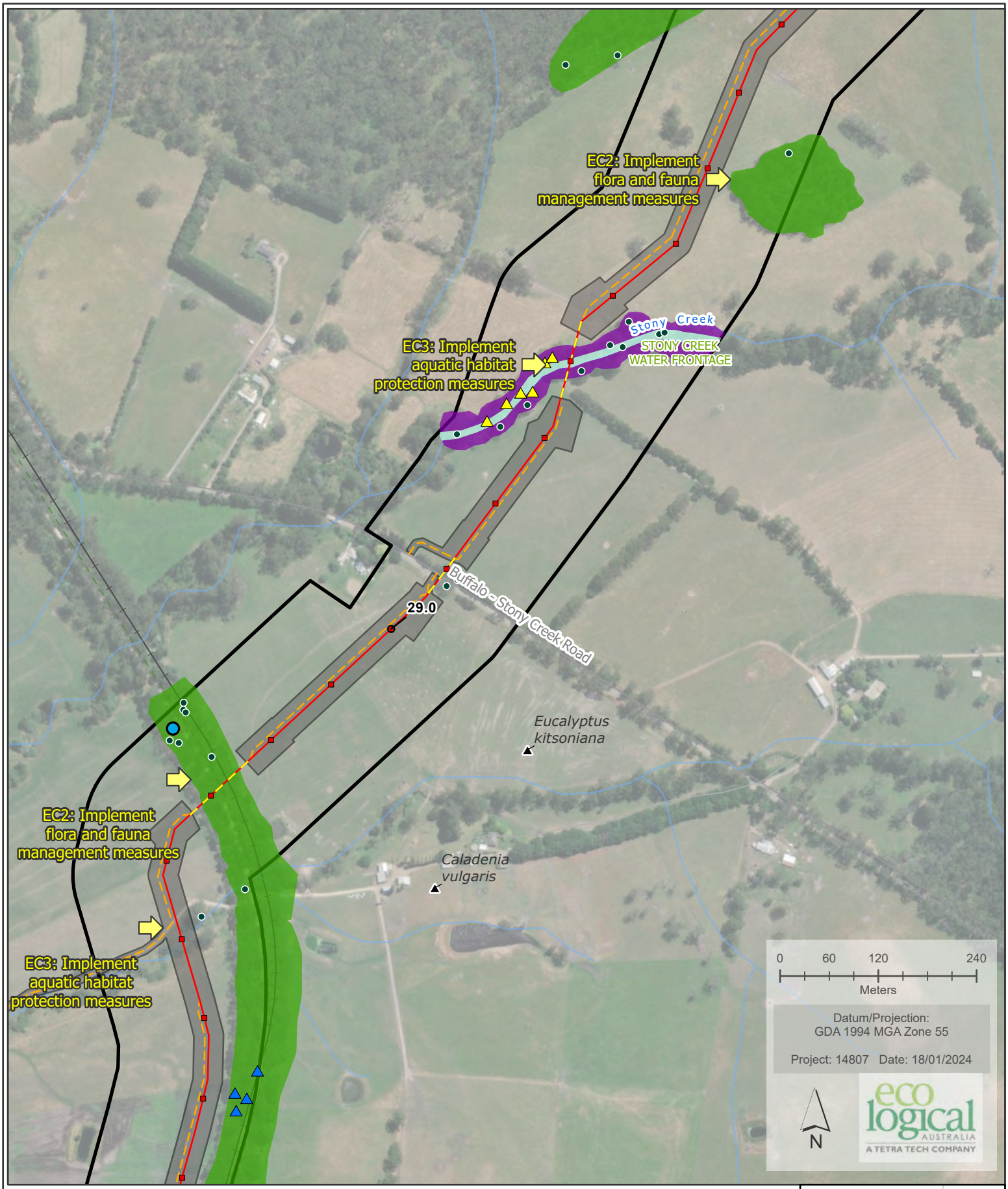


Figure 5.16 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

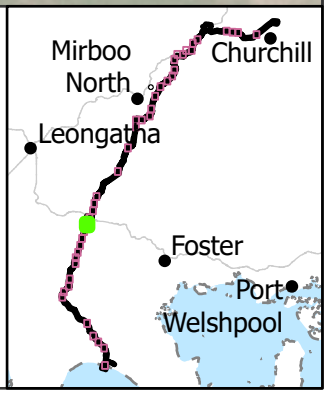
- Significant flora

Targeted survey results (ELA 2020-2023)

- Koala
- Strzeleckii Gum
- Bog Gum

Priority habitats

- Aquatic 1 (Tarwin Valley)
- Damp Forest (Tarwin Valley)
- Woodland 4 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



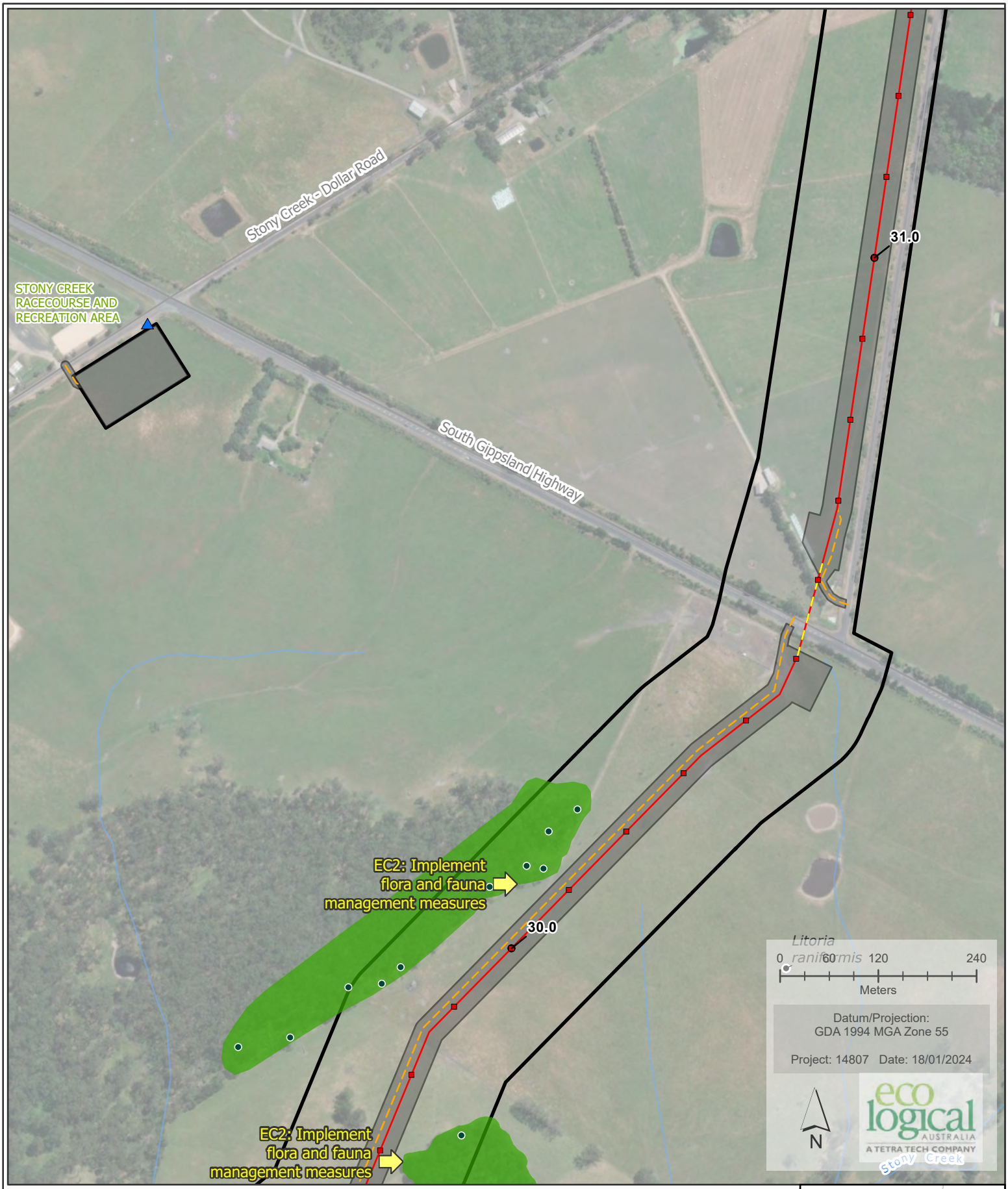


Figure 5.17 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

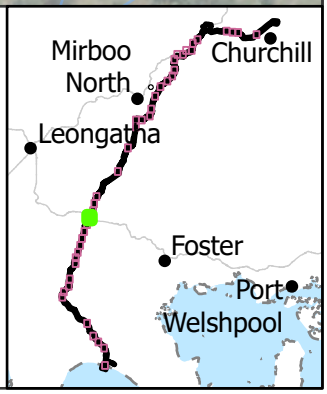
- Significant fauna

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 4 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



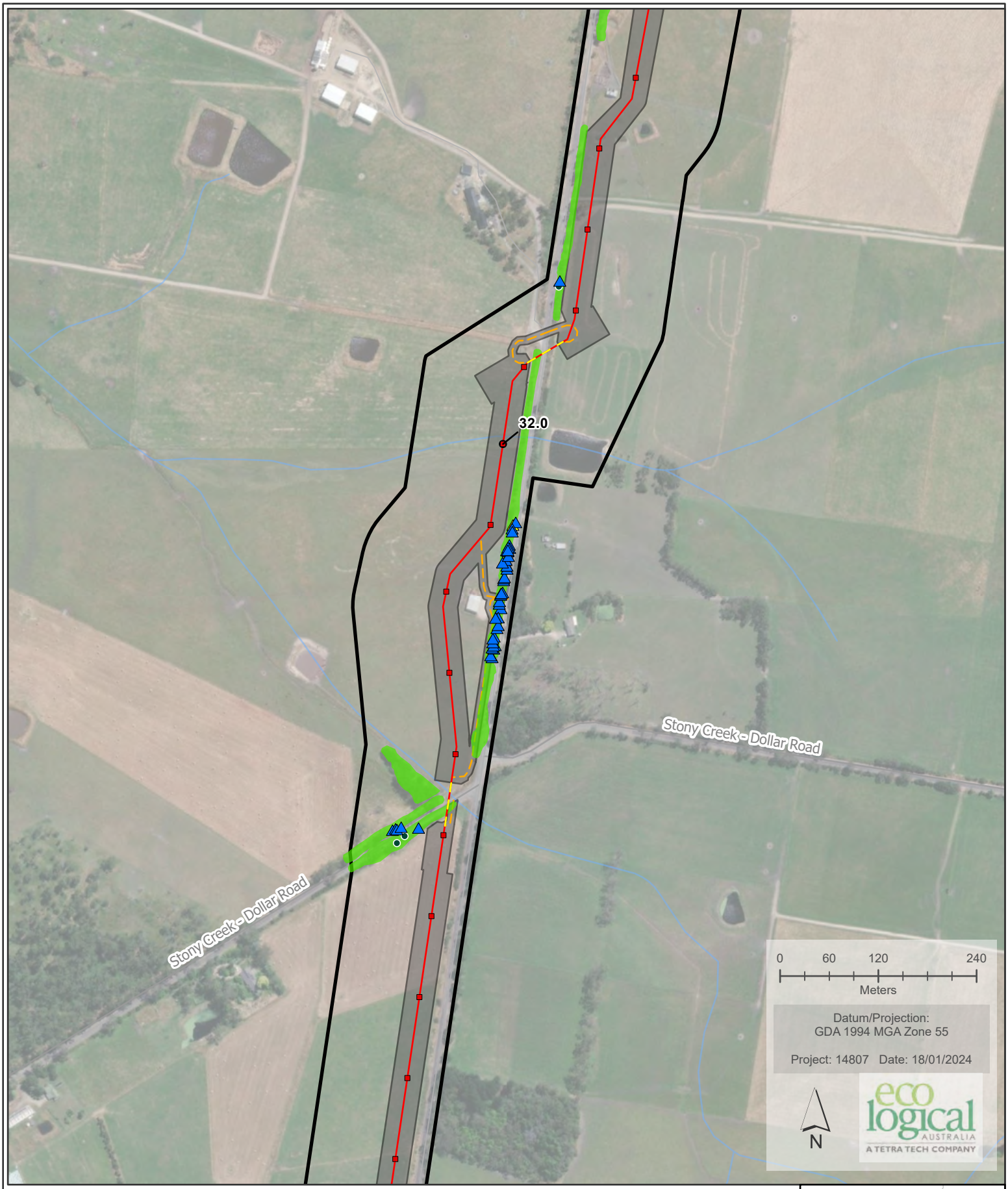


Figure 5.18 Threatened ecological communities, species and priority habitats

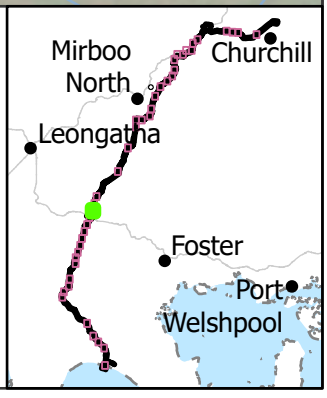
- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points

Targeted survey results (ELA 2020-2023)

- Strzeleckii Gum
- Bog Gum

Priority habitats

- Woodland 3 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



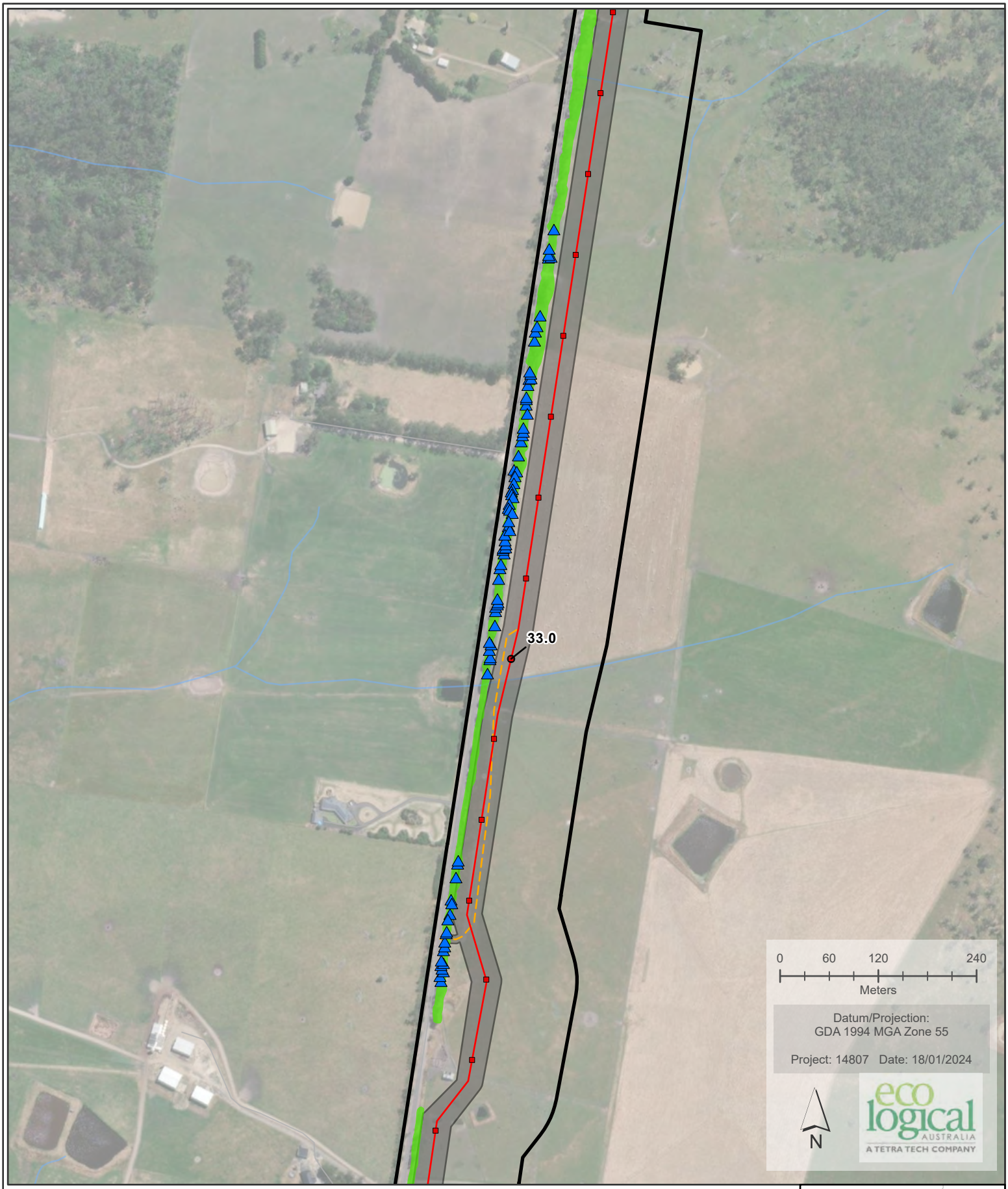


Figure 5.19 Threatened ecological communities, species and priority habitats

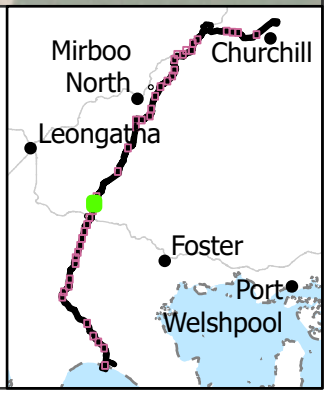
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points

Targeted survey results (ELA 2020-2023)

- Bog Gum

Priority habitats

- Woodland 3 (Tarwin Valley)
- Kilometre points



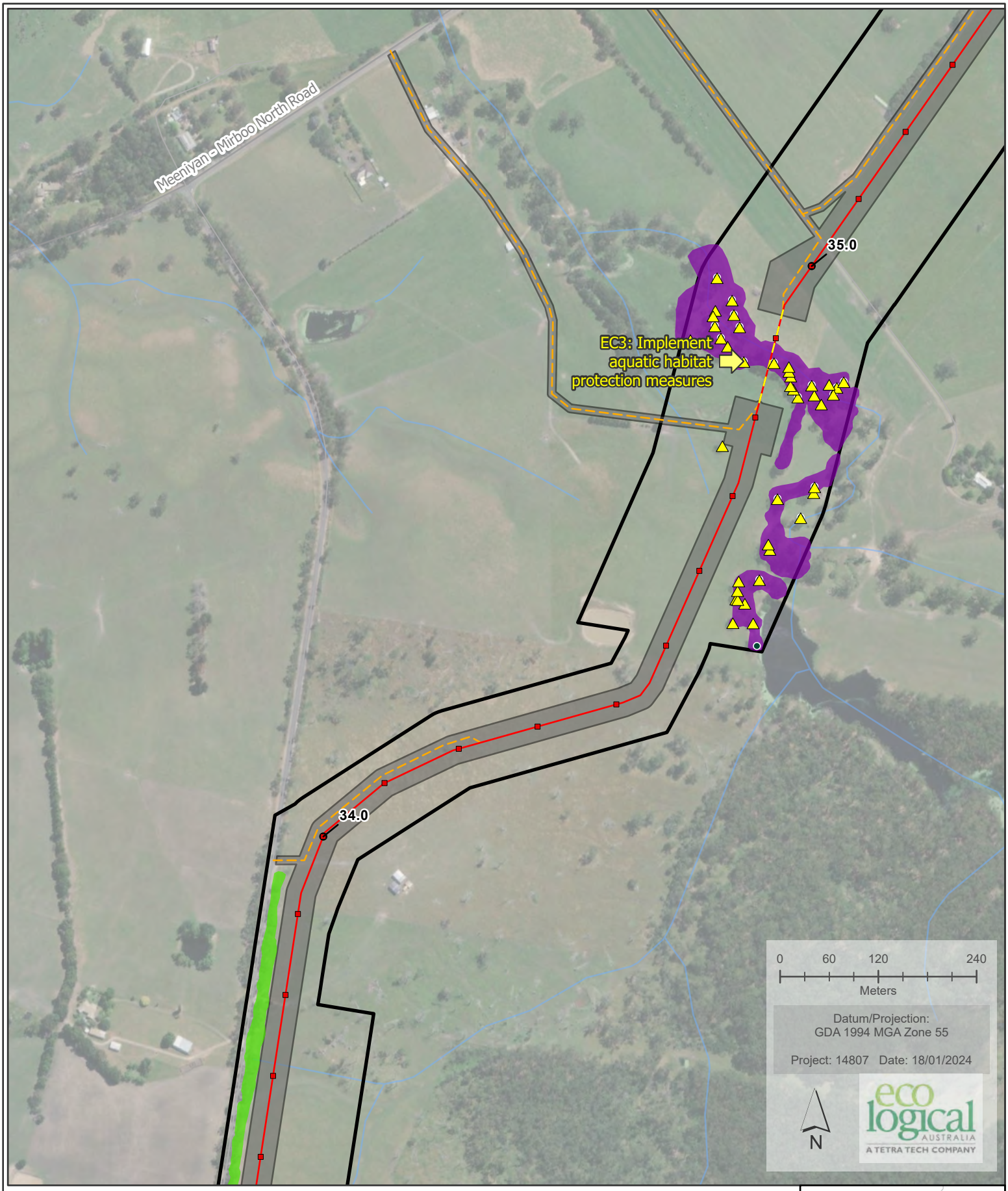


Figure 5.20 Threatened ecological communities, species and priority habitats

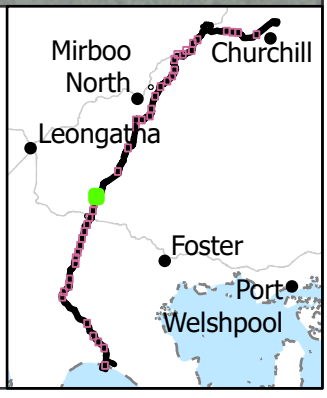
- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Strzeleckii Gum

Priority habitats

- Damp Forest (Tarwin Valley)
- Woodland 3 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



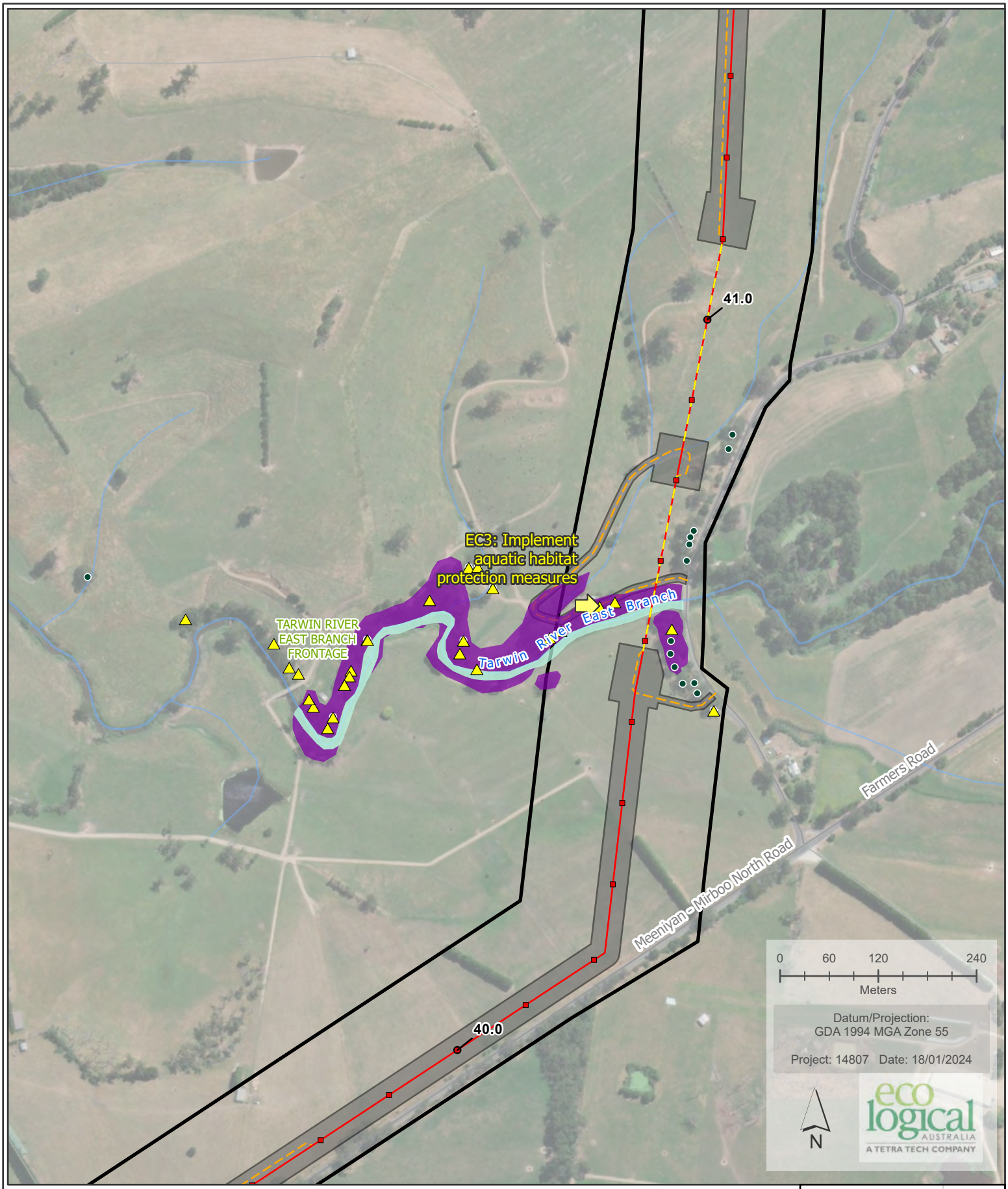


Figure 5.21 Threatened ecological communities, species and priority habitats

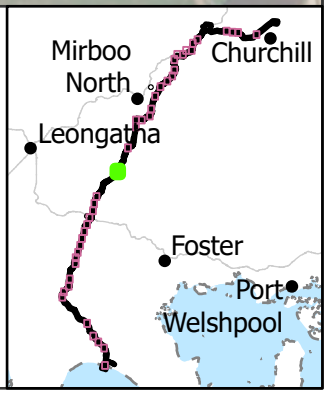
- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Strzeleckii Gum

Priority habitats

- Aquatic 1 (Tarwin Valley)
- Damp Forest (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



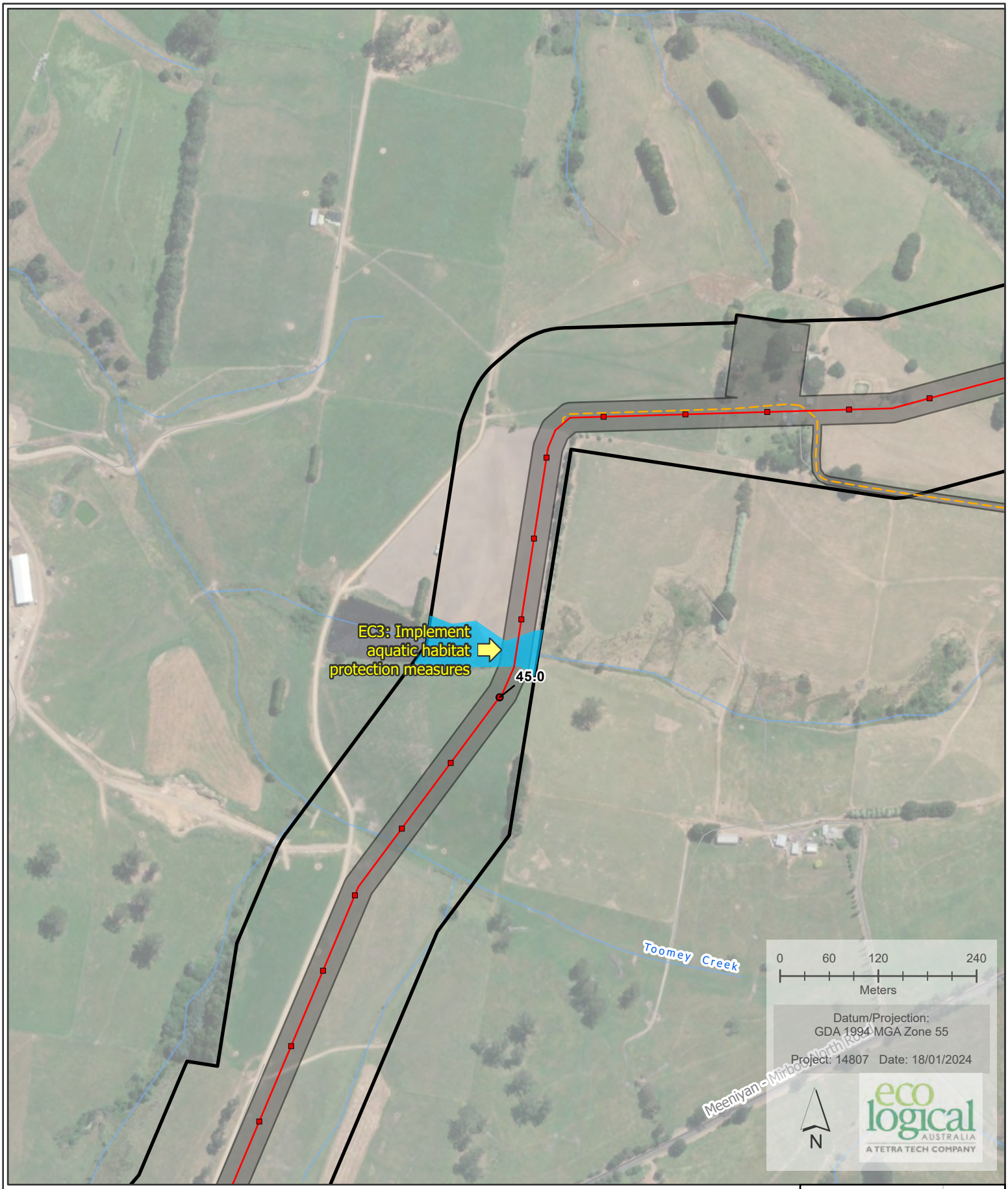
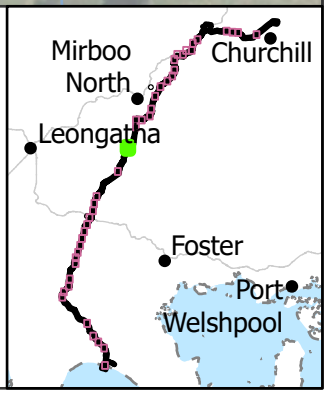


Figure 5.22 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Wetland 1 (Tarwin Valley)
- Kilometre points



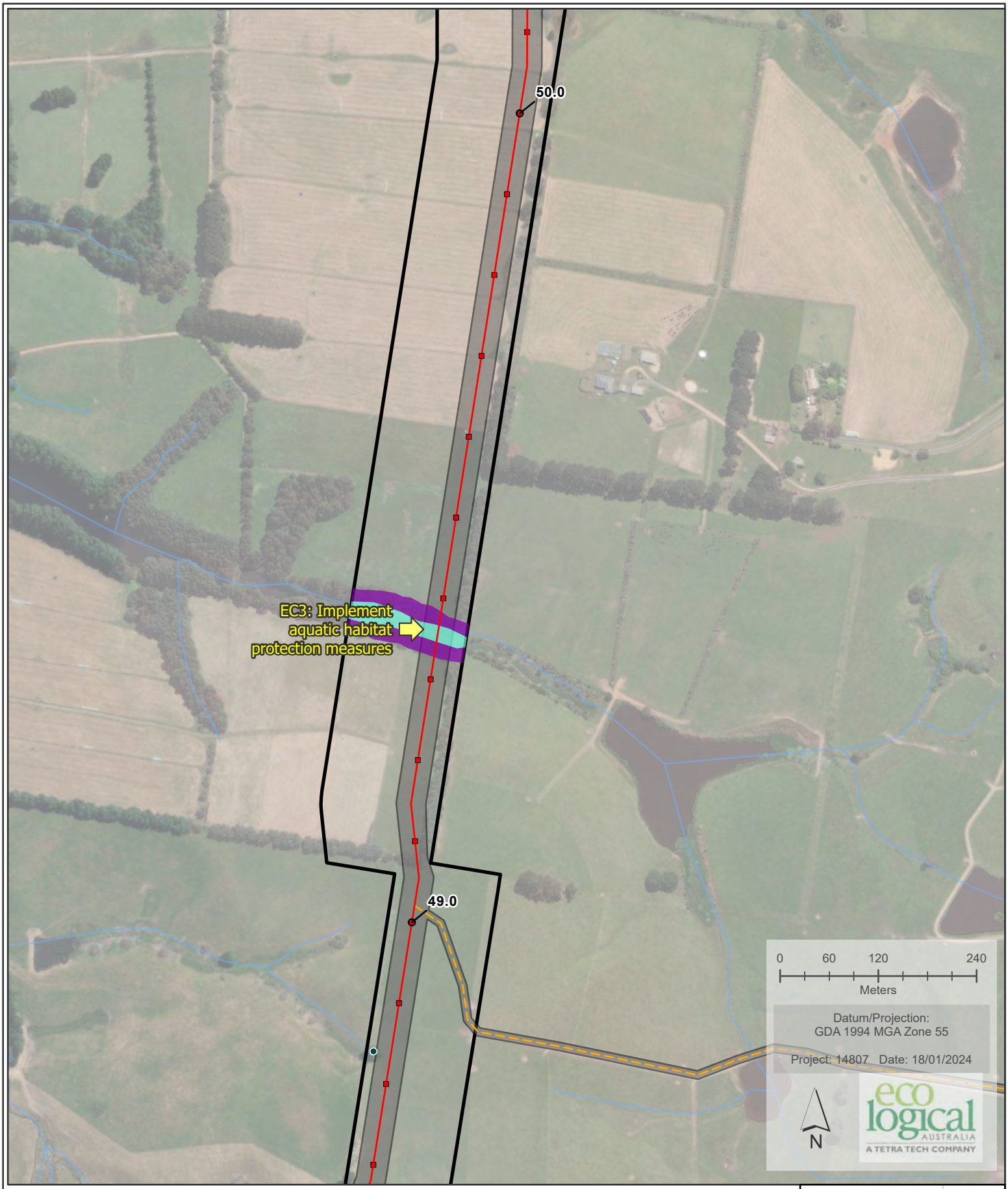
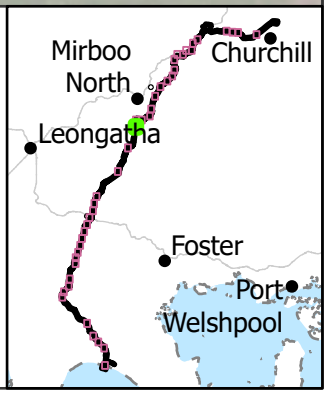


Figure 5.23 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Aquatic 2 (Tarwin Valley)
- Damp Forest (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



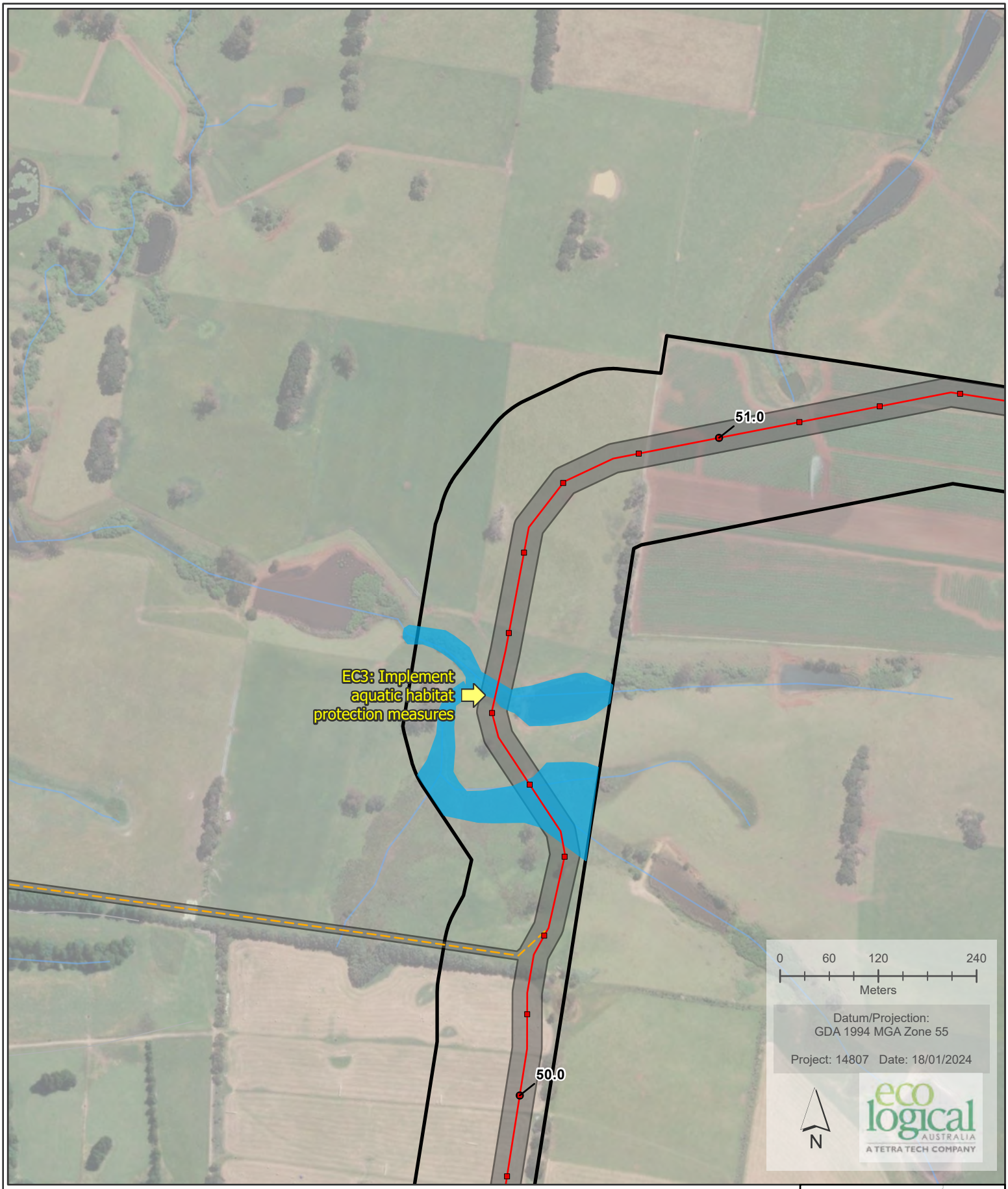
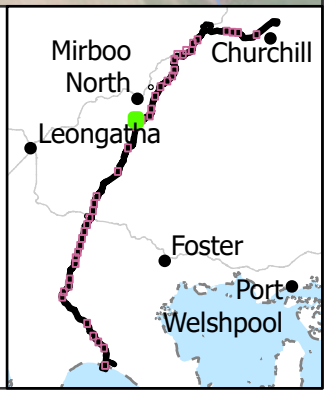


Figure 5.24 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Wetland 2 (Tarwin Valley)
- Kilometre points



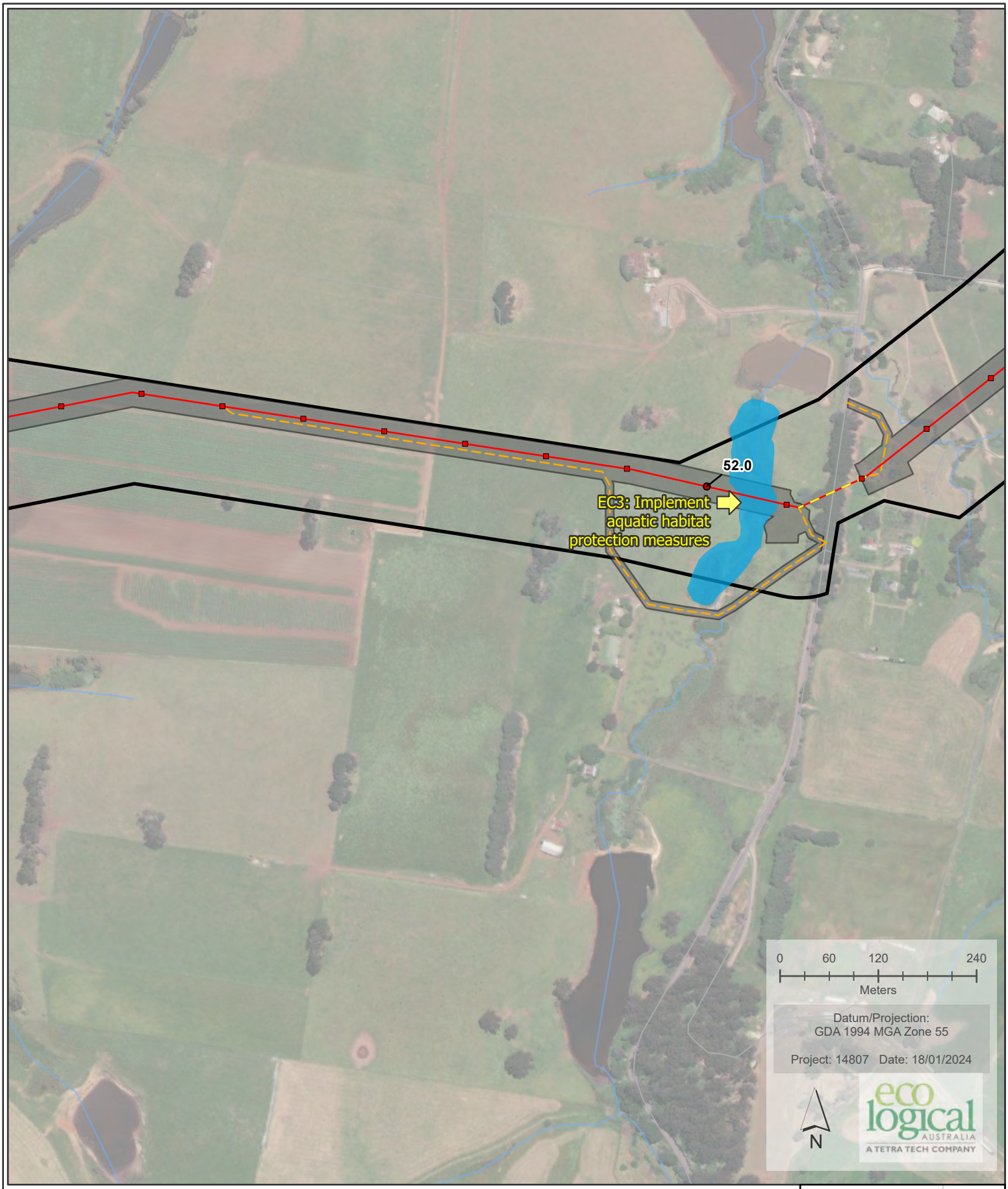
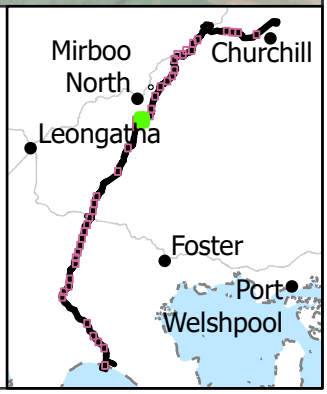


Figure 5.25 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Wetland 2 (Tarwin Valley)
- Kilometre points



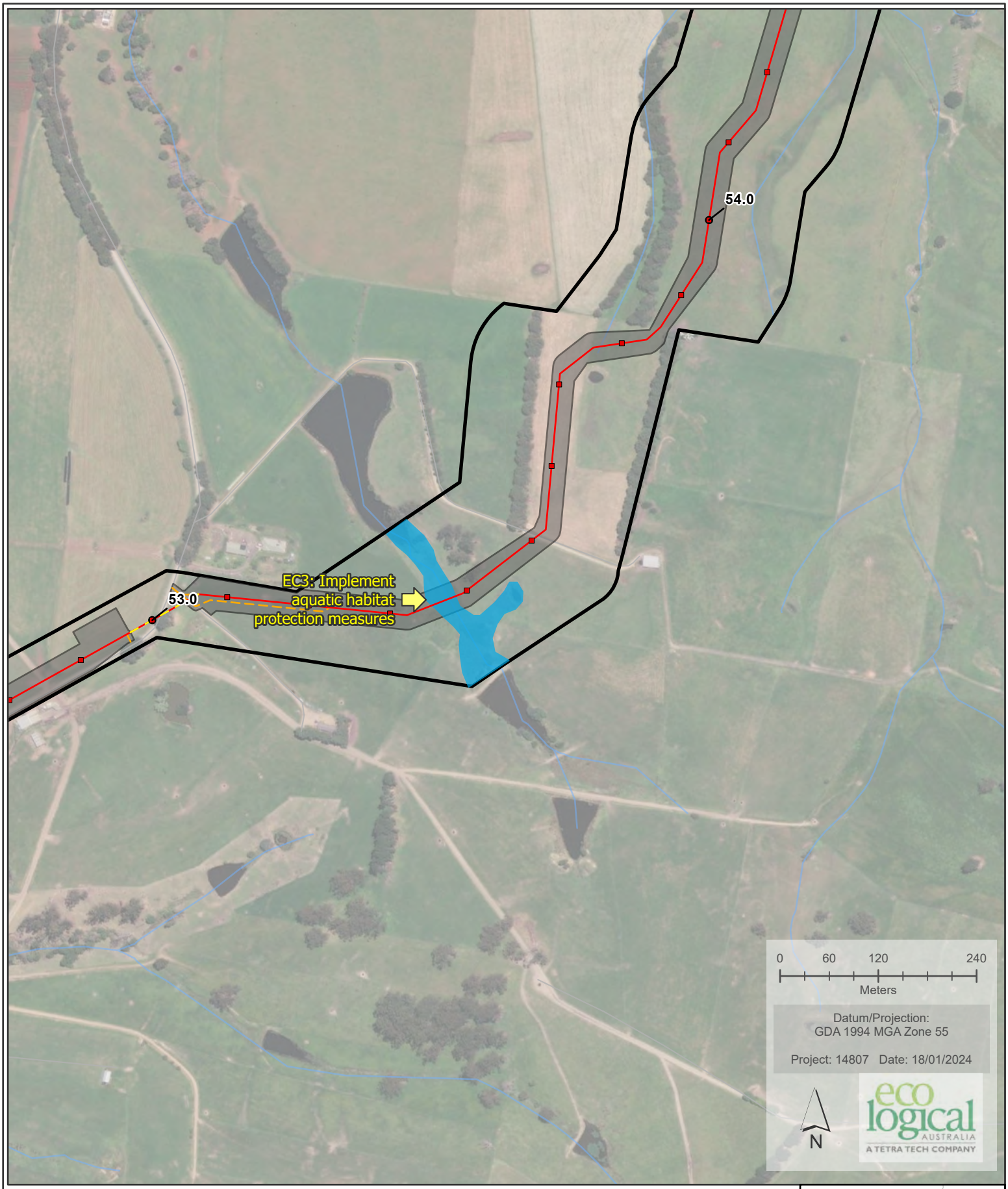
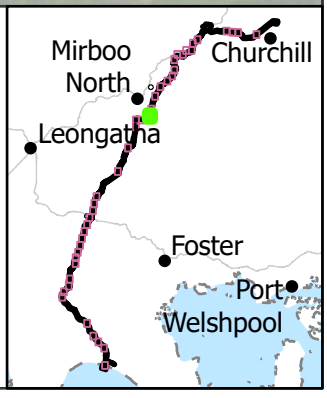


Figure 5.26 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Wetland 2 (Tarwin Valley)
- Kilometre points



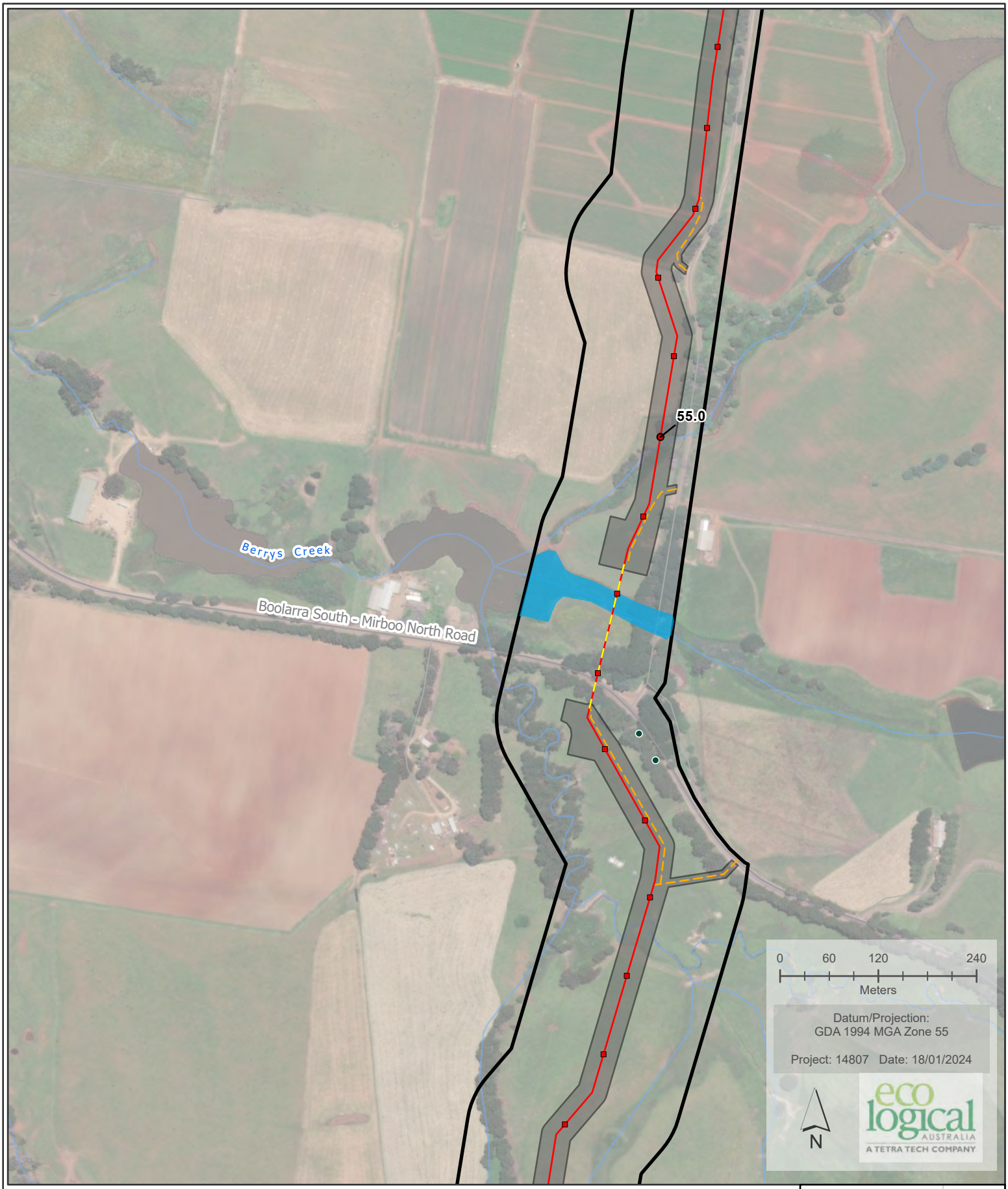
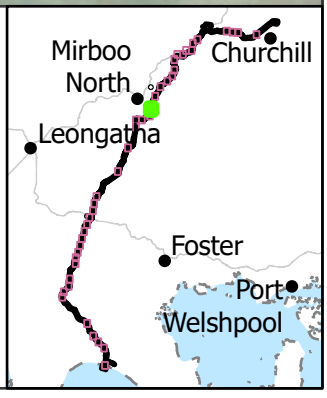


Figure 5.27 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points

Priority habitats

- Wetland 2 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



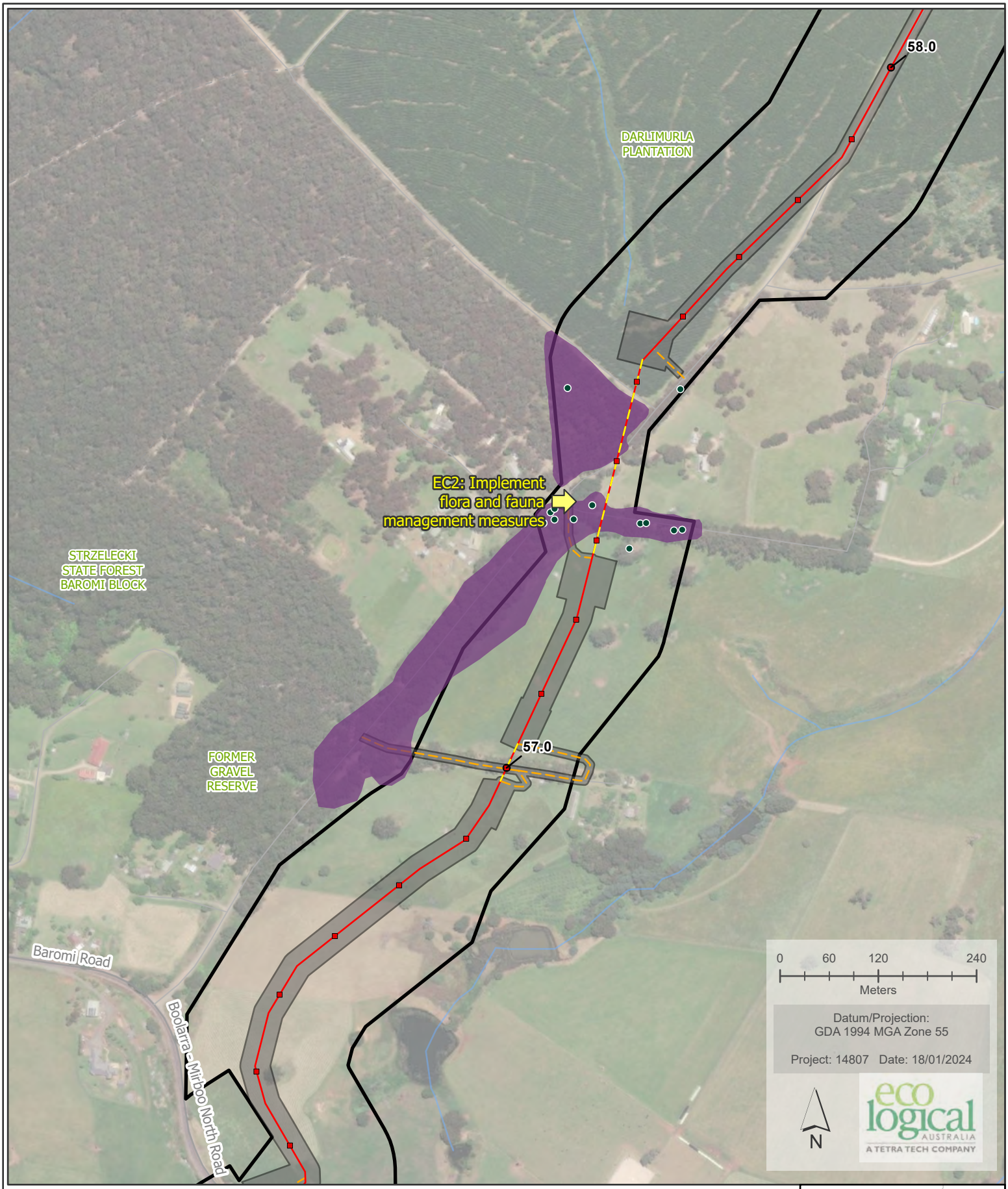
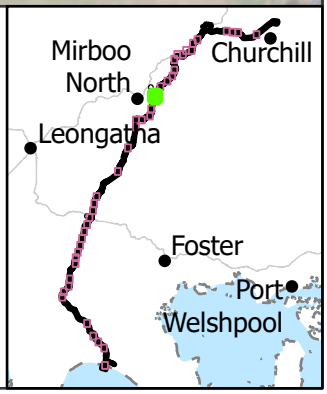


Figure 5.28 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



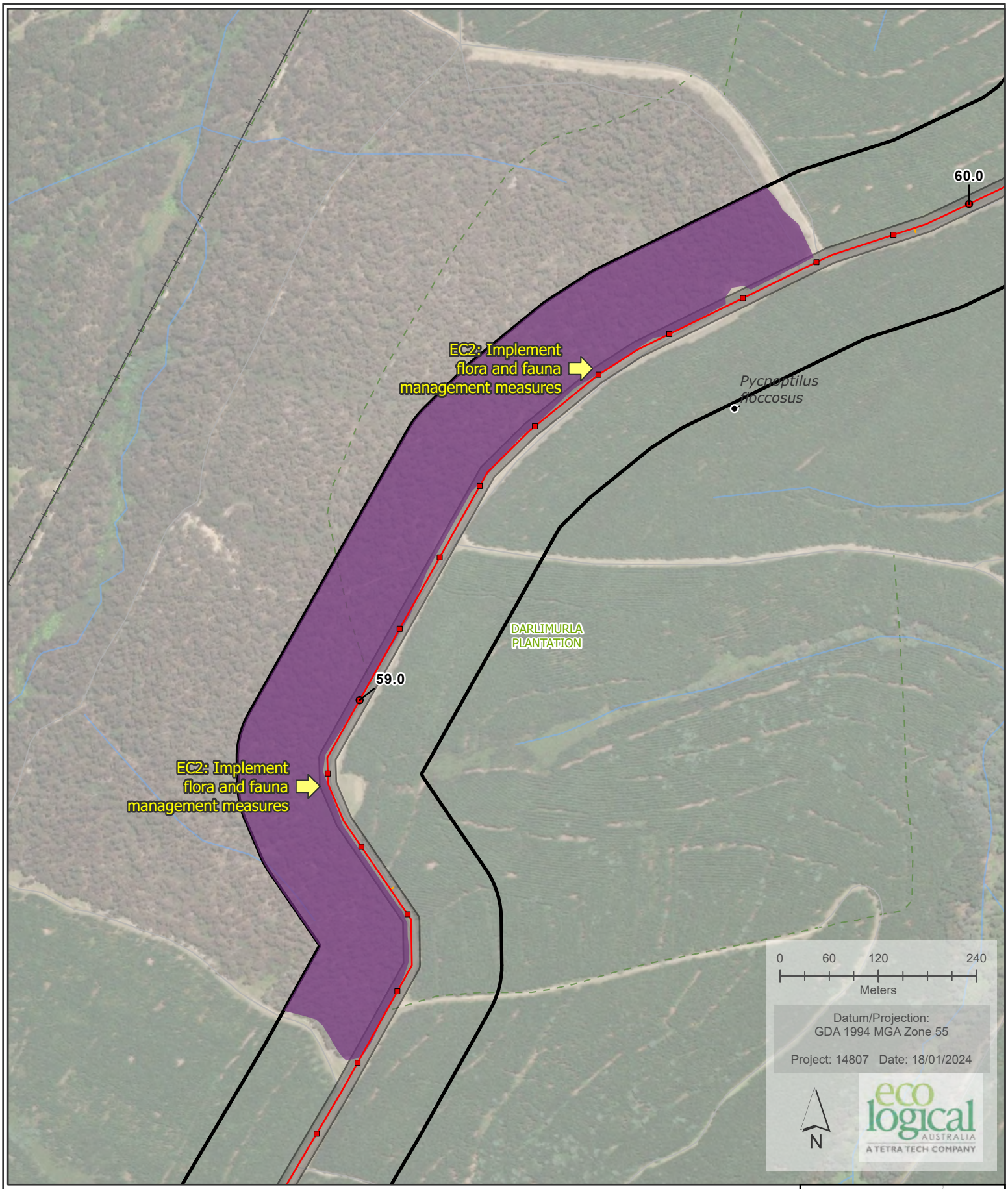


Figure 5.29 Threatened ecological communities, species and priority habitats

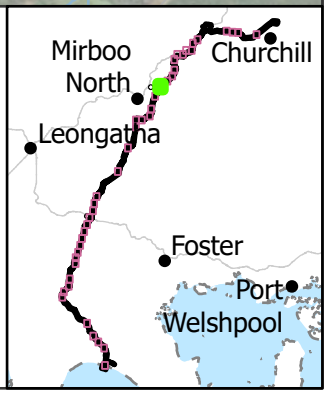
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

- Significant fauna

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Kilometre points



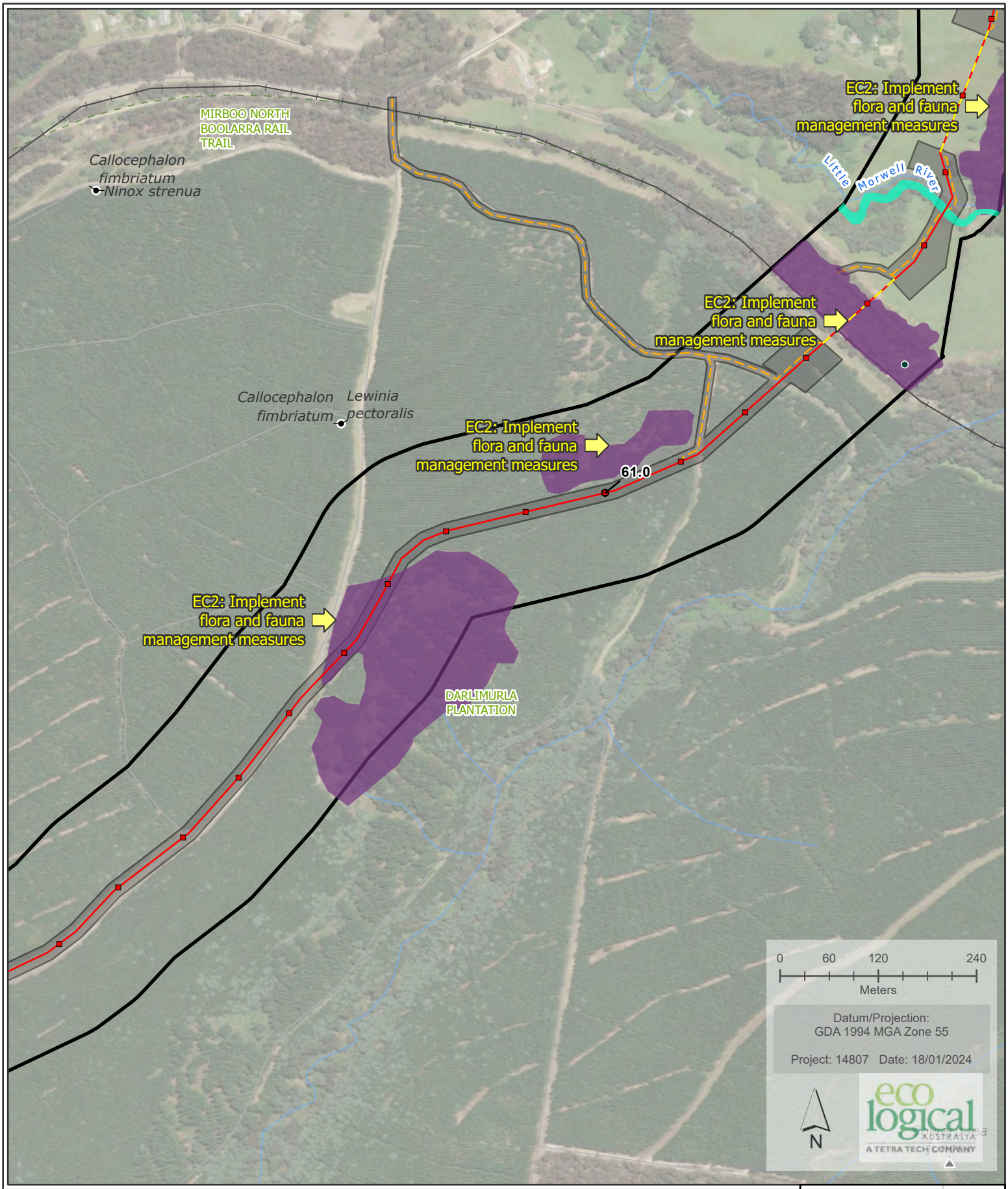


Figure 5.30 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

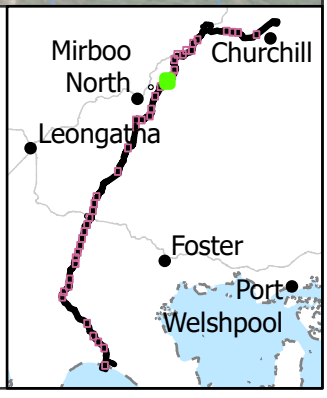
- Significant fauna

Species Records (VBA 2023)

- Significant flora

Priority habitats

- Aquatic 3 (Strzelecki Ranges)
- Damp Forest (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



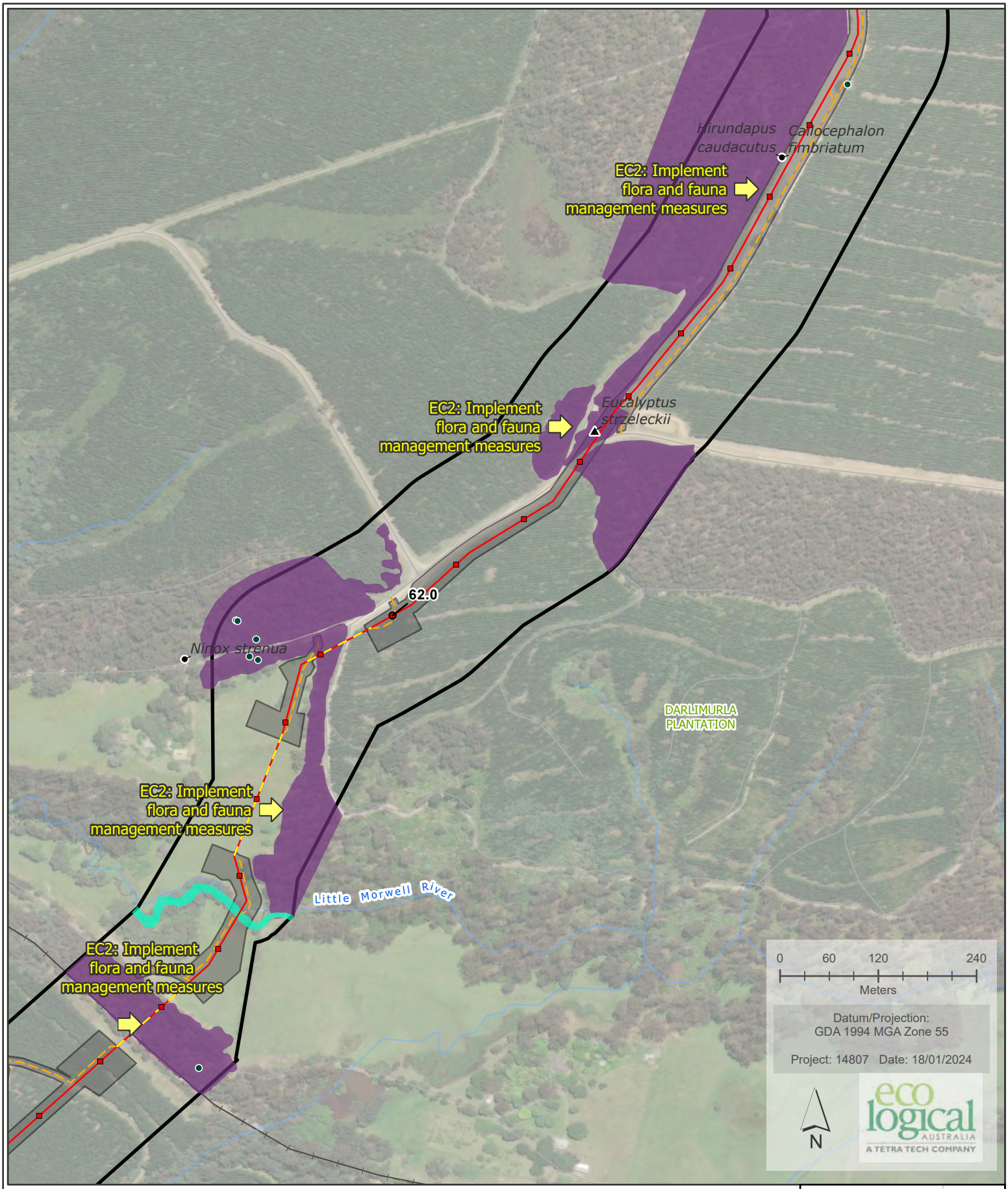


Figure 5.31 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

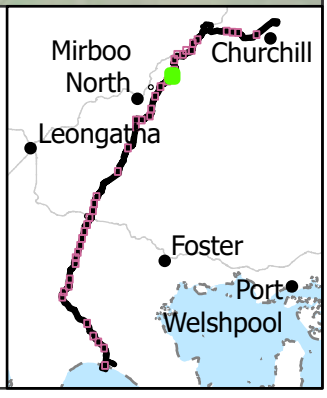
- Significant fauna

Species Records (VBA 2023)

- Significant flora

Priority habitats

- Aquatic 3 (Strzelecki Ranges)
- Damp Forest (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



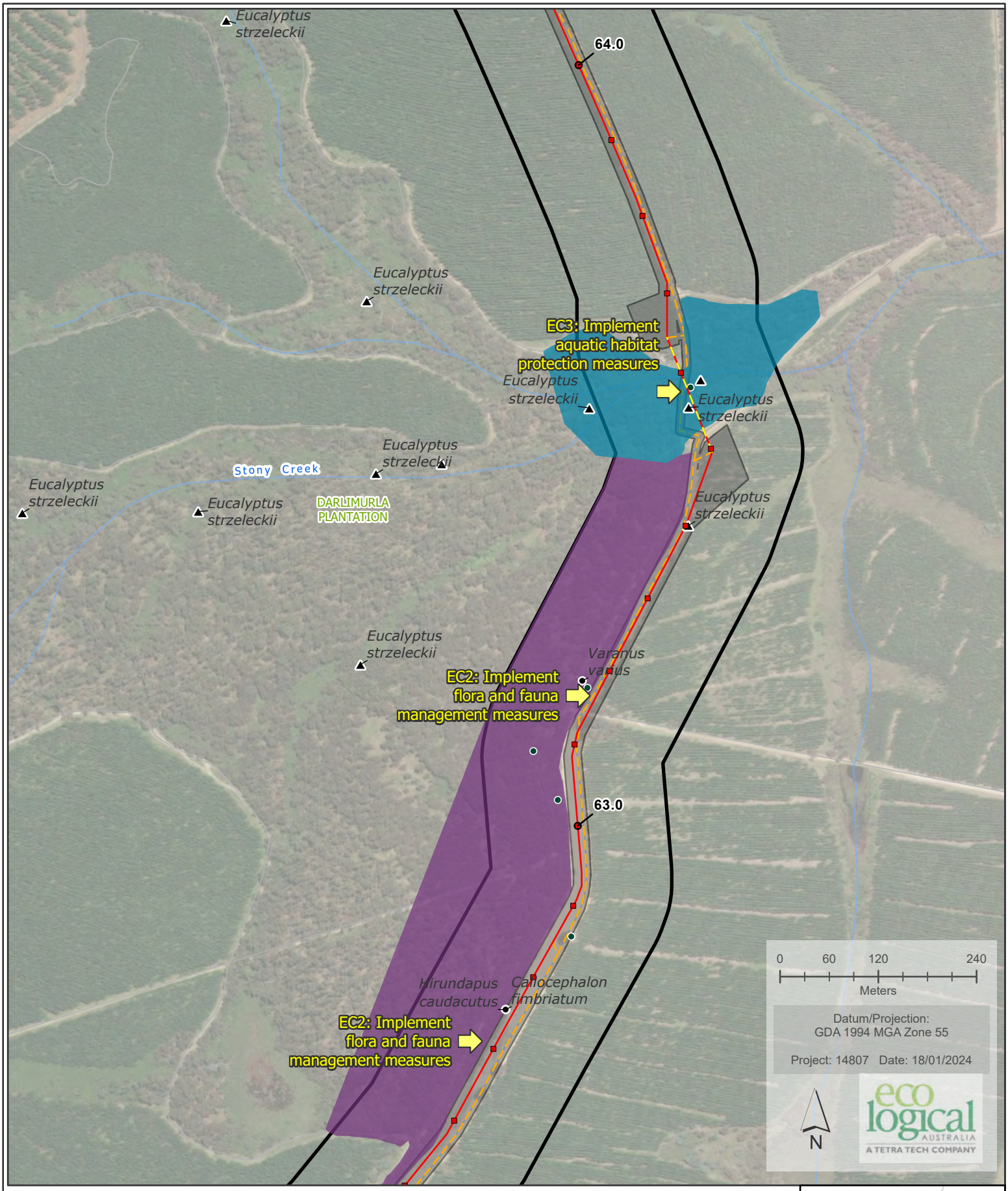


Figure 5.32 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

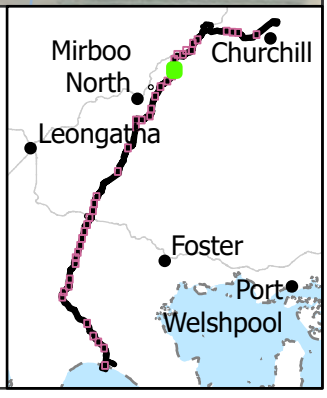
- Significant fauna

Species Records (VBA 2023)

- Significant flora

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Wetland 3 (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



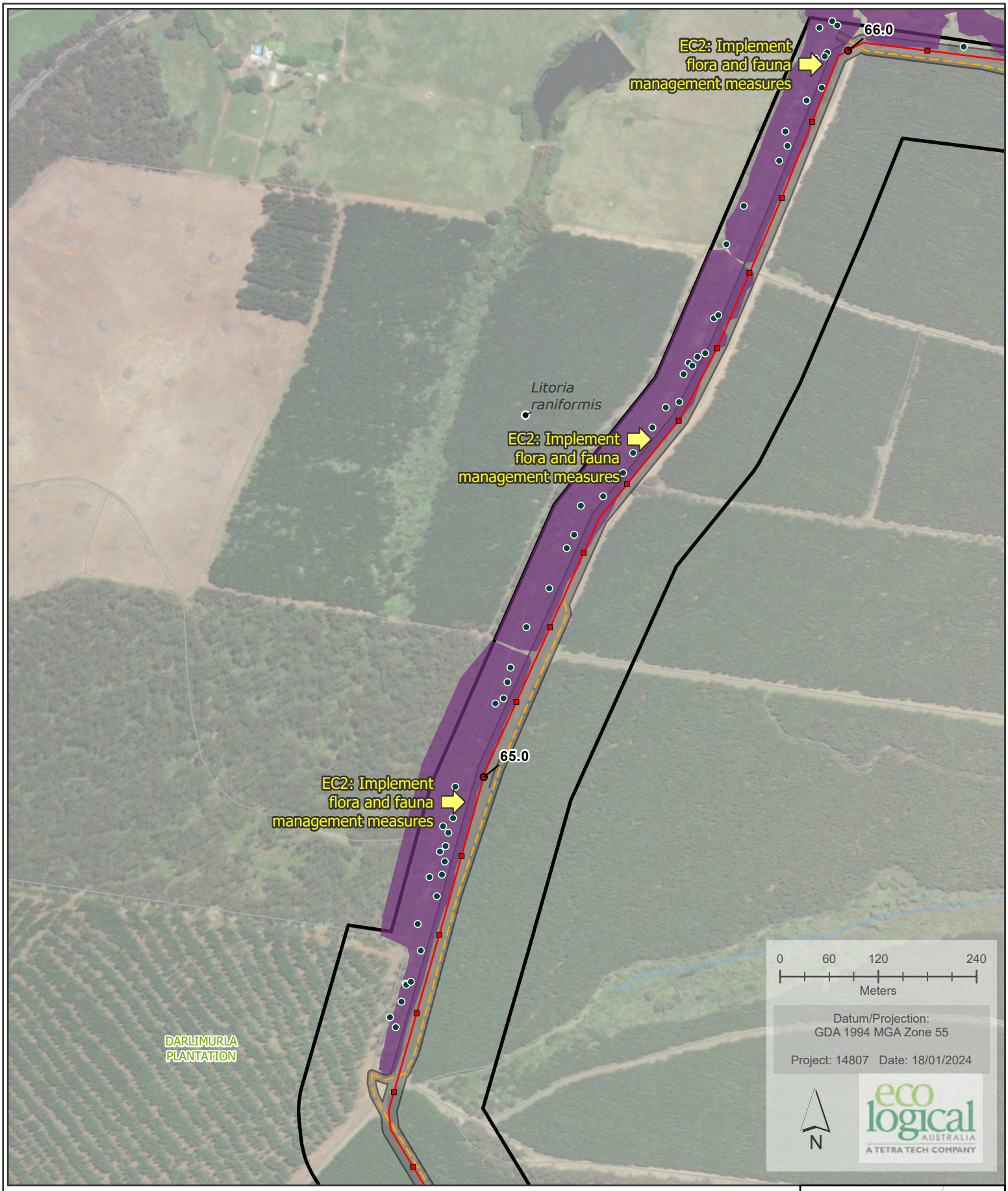


Figure 5.33 Threatened ecological communities, species and priority habitats

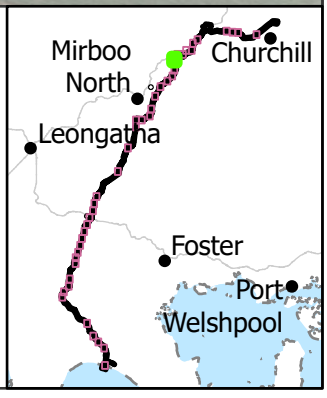
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

- Significant fauna

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



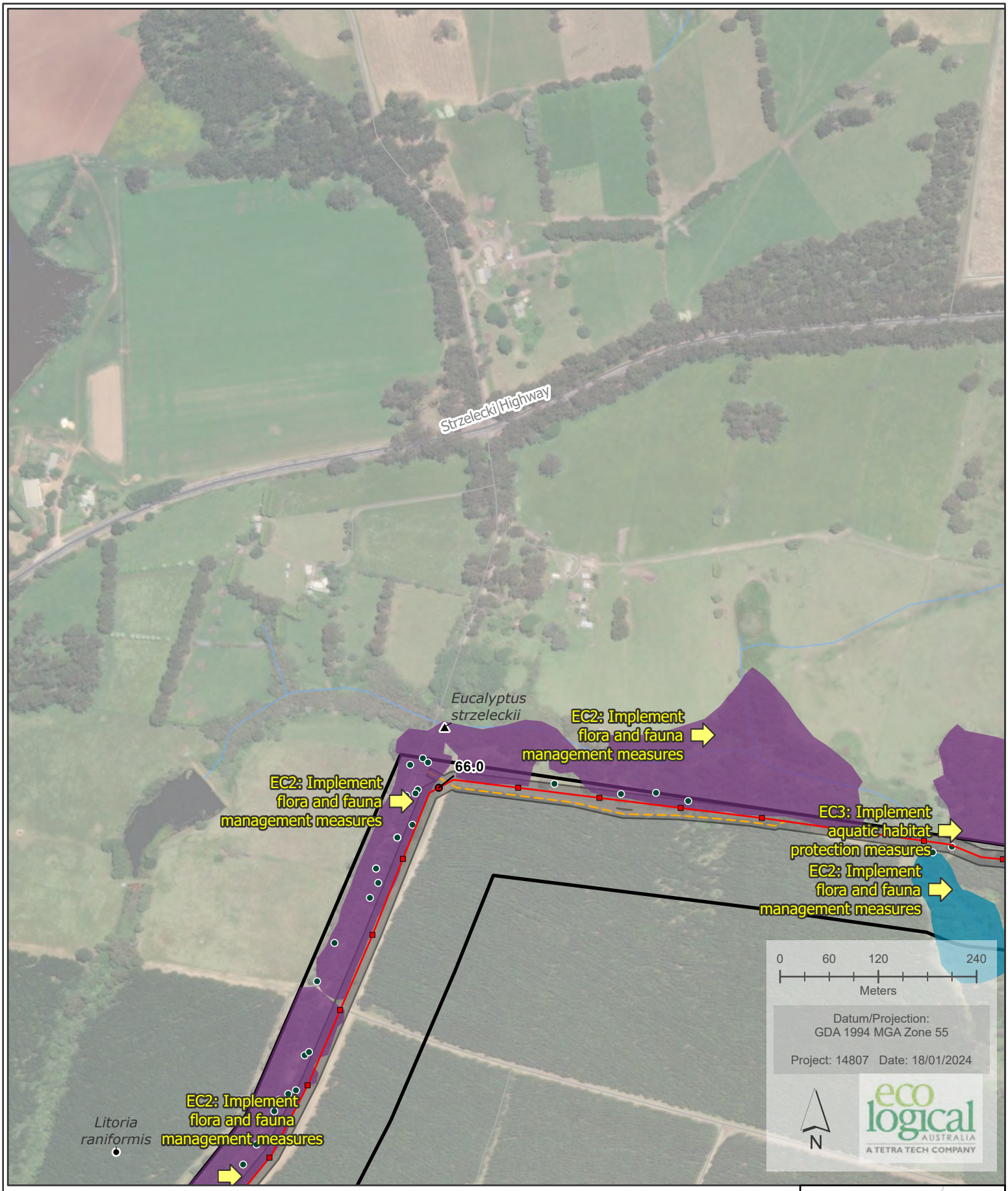


Figure 5.34 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

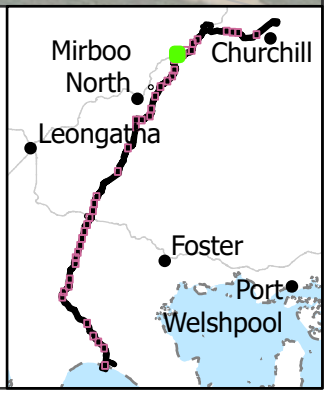
- Significant fauna

Species Records (VBA 2023)

- Significant flora

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Wetland 3 (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



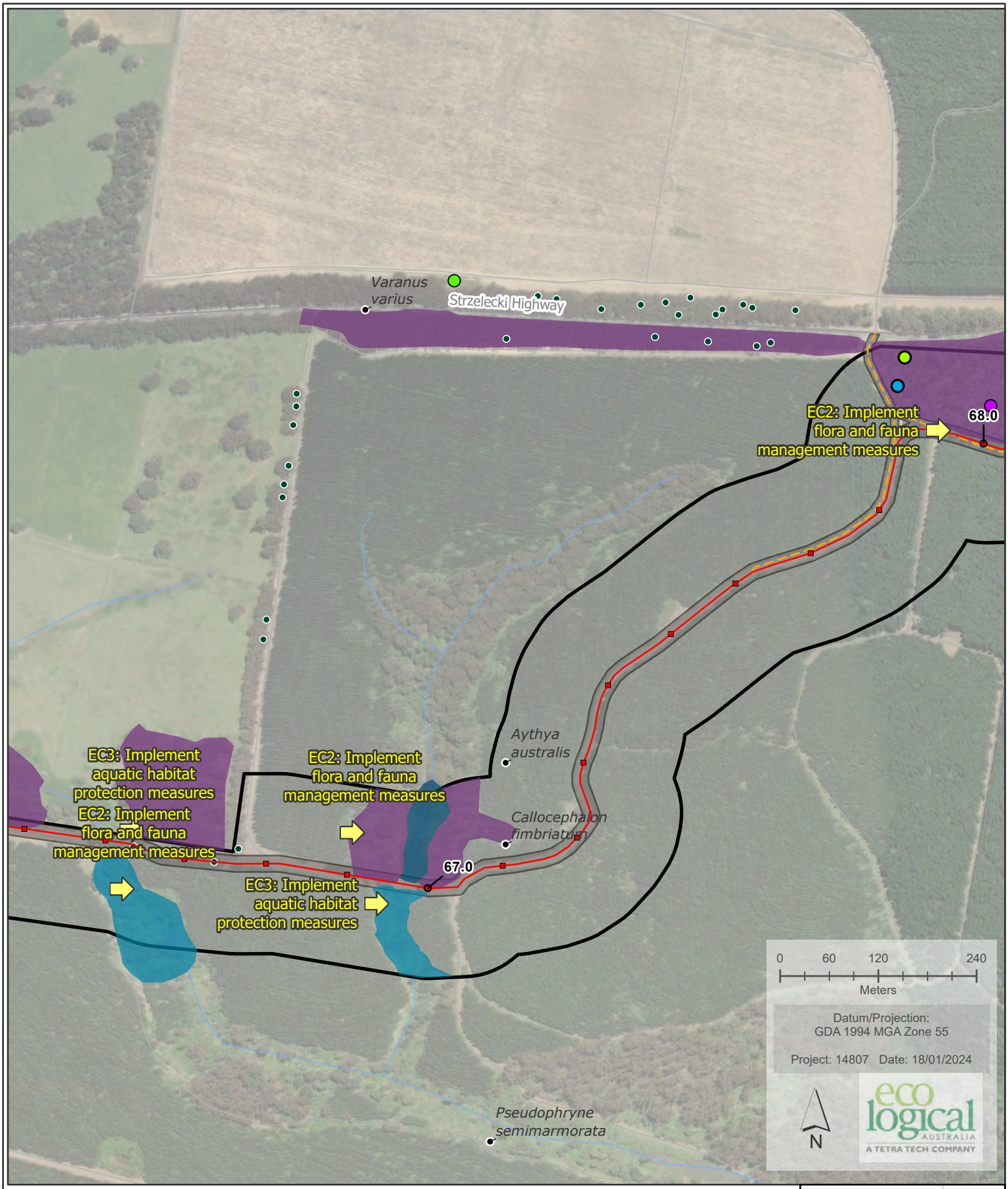


Figure 5.35 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

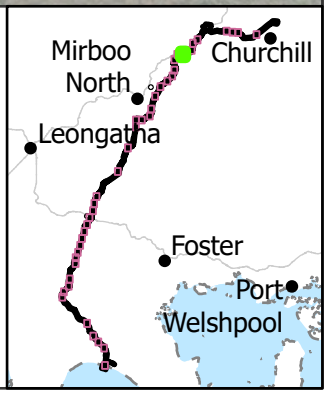
- Significant fauna

Targeted survey results (ELA 2020-2023)

- Grey Goshawk
- Lace Monitor
- Grey-headed flying-fox
- Koala

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Wetland 3 (Strzelecki Ranges)
- Wetland 4 (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



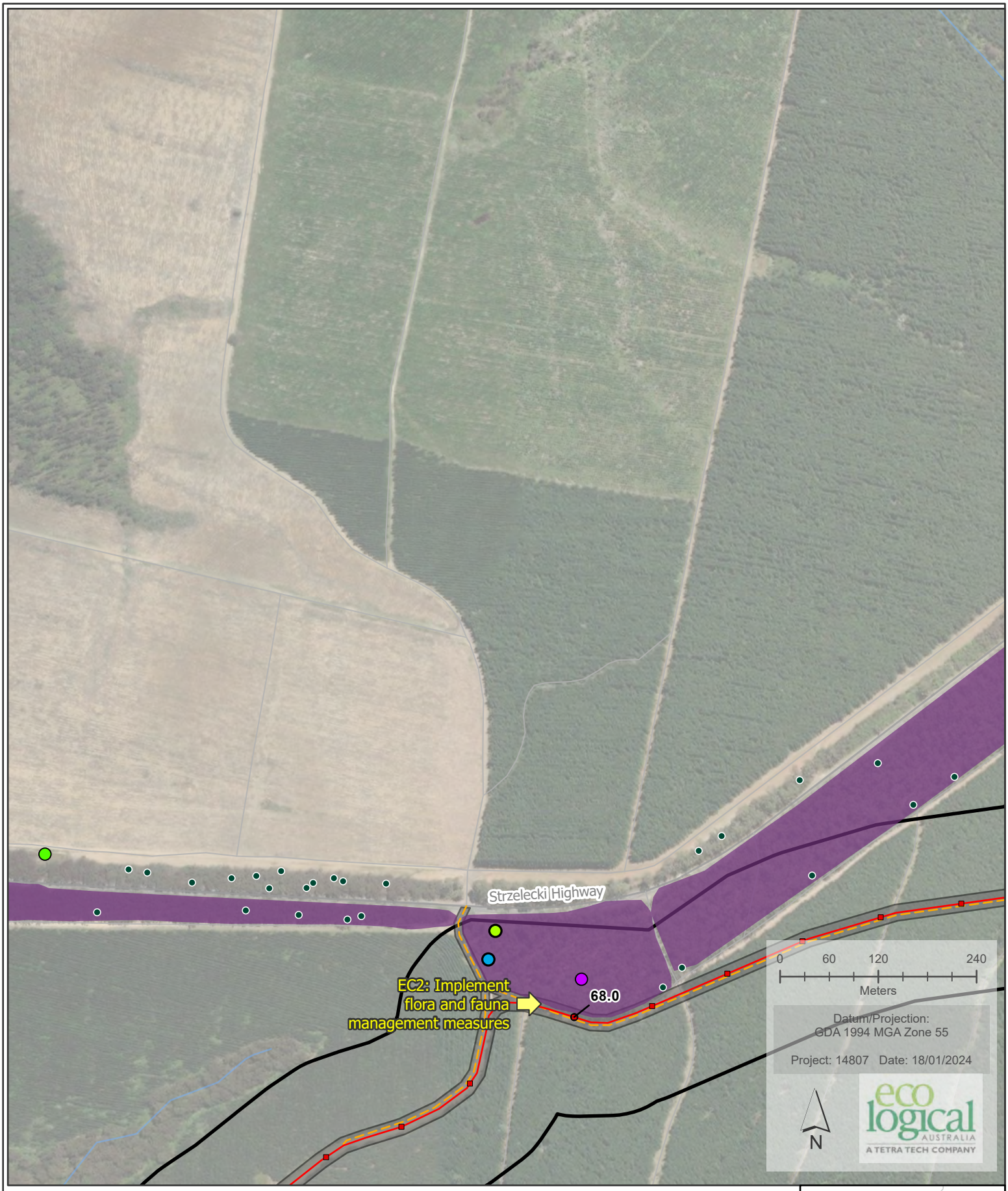


Figure 5.36 Threatened ecological communities, species and priority habitats

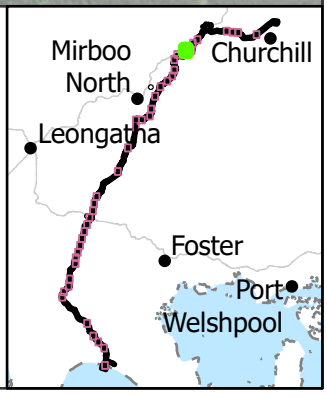
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Grey Goshawk
- Lace Monitor
- Grey-headed flying-fox
- Koala

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



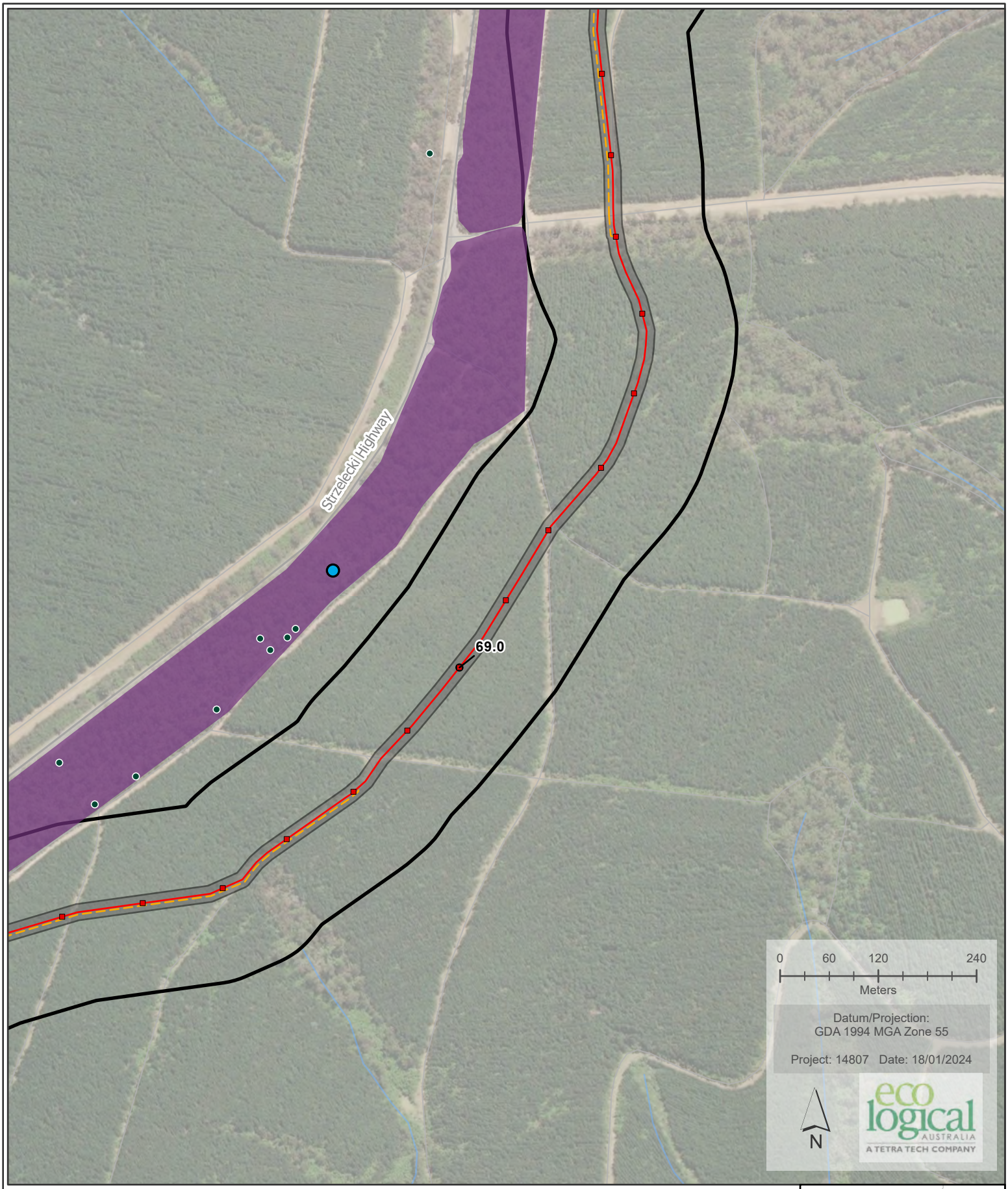


Figure 5.37 Threatened ecological communities, species and priority habitats

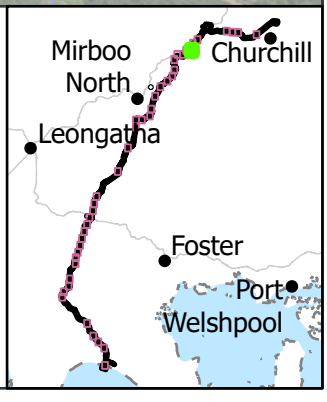
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points

Targeted survey results (ELA 2020-2023)

- Koala

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



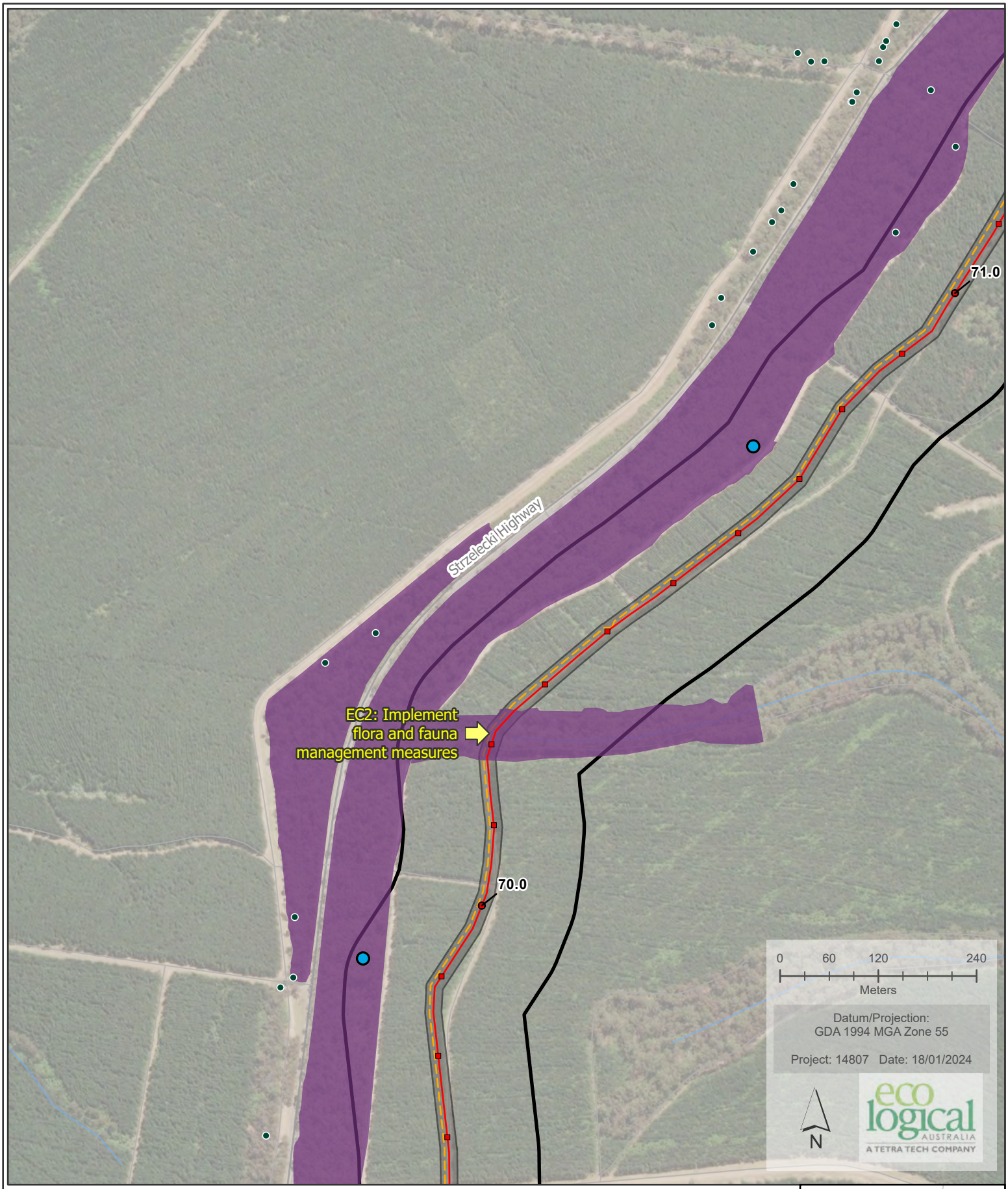


Figure 5.38 Threatened ecological communities, species and priority habitats

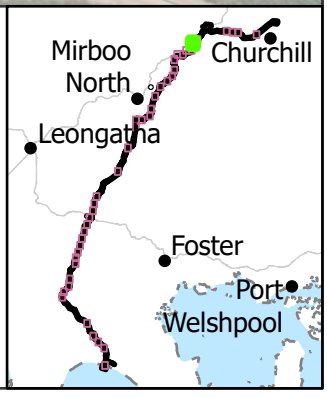
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Koala

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



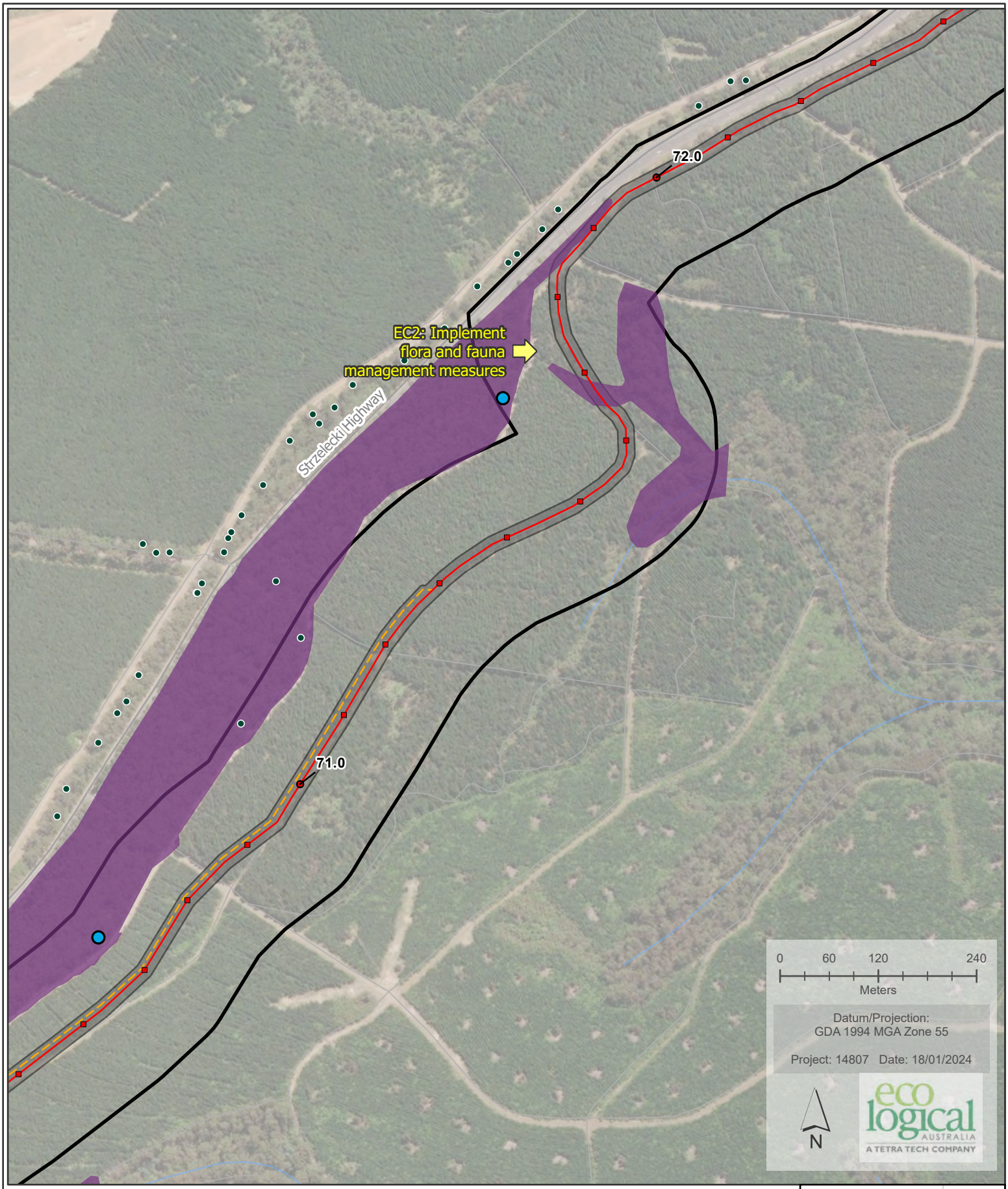


Figure 5.39 Threatened ecological communities, species and priority habitats

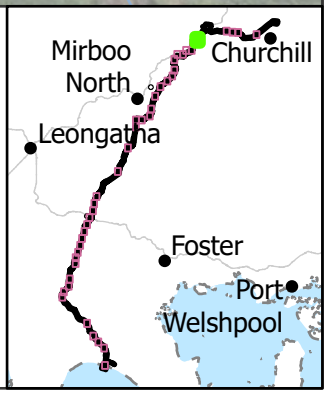
- Survey areas
- Alignment
- Area of disturbance
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- Koala

Priority habitats

- Damp Forest (Strzelecki Ranges)
- Potential hollow-bearing trees
- Kilometre points



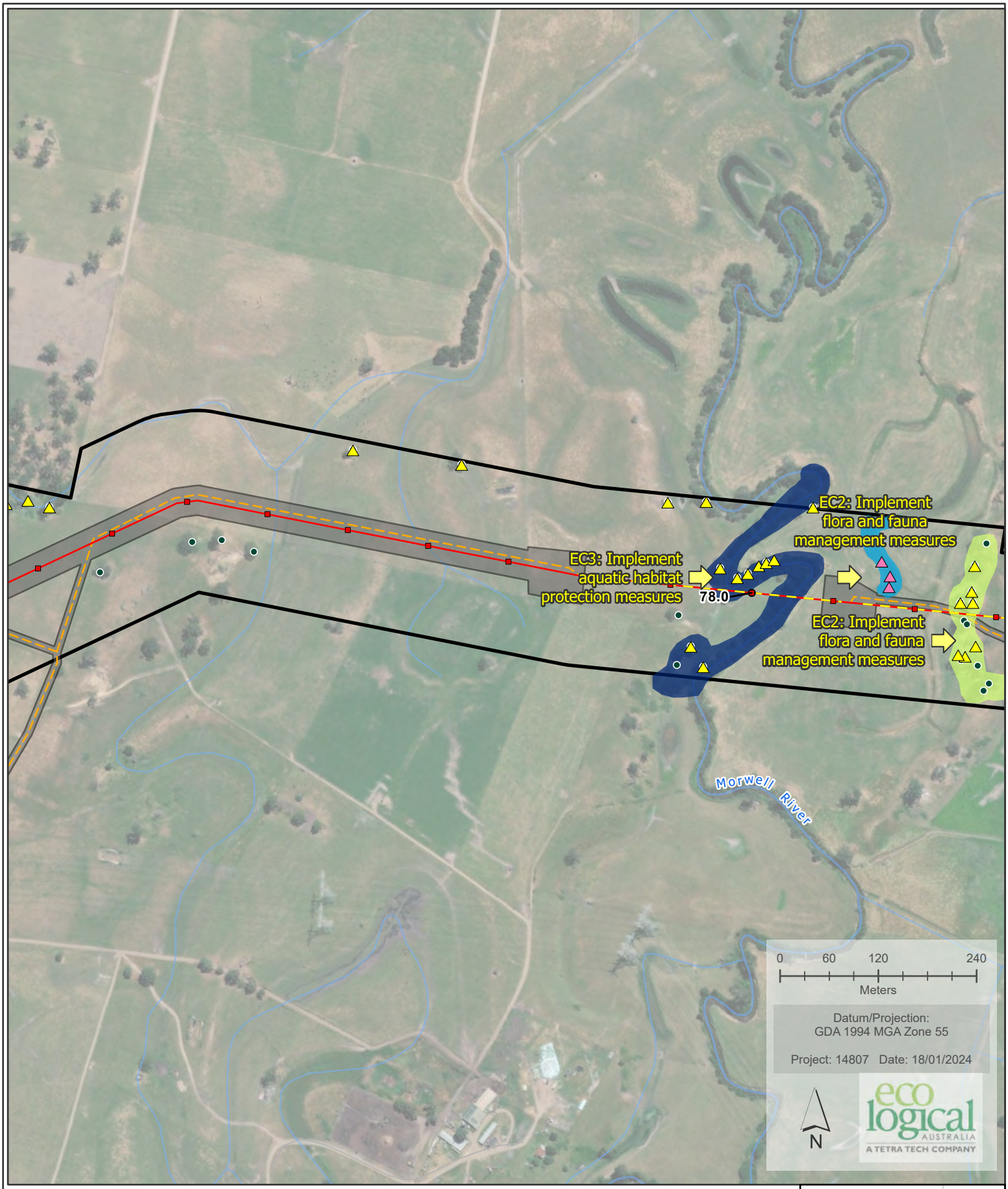


Figure 5.40 Threatened ecological communities, species and priority habitats

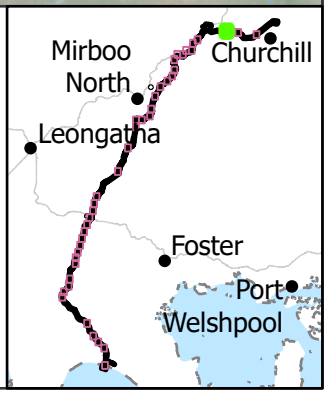
- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Targeted survey results (ELA 2020-2023)

- River Swamp Wallaby Grass
- Strzeleckii Gum

Priority habitats

- Grassy Woodland 1 (Latrobe Valley)
- Morwell River (Latrobe Valley)
- Wetland 2 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



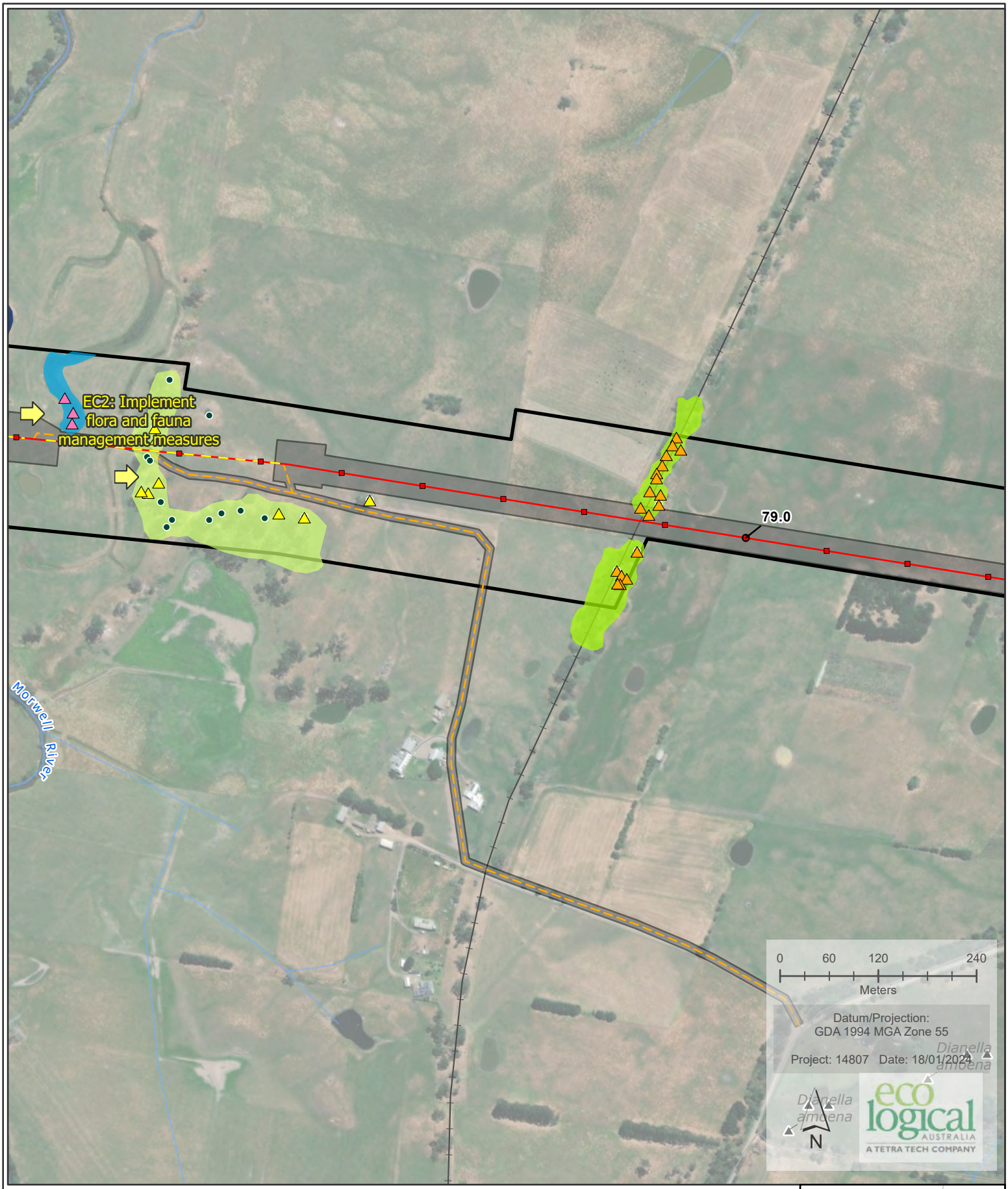


Figure 5.41 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Species Records (VBA 2023)

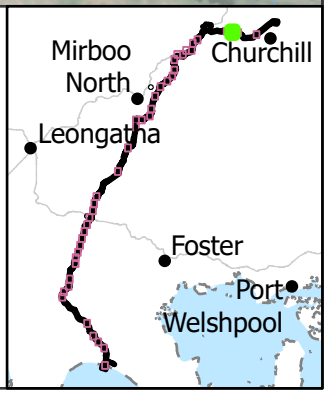
- Significant flora

Targeted survey results (ELA 2020-2023)

- River Swamp Wallaby Grass
- Strzeleckii Gum
- Yarra Gum

Priority habitats

- Grassy Woodland 1 (Latrobe Valley)
- Grassy Woodland 2 (Latrobe Valley)
- Morwell River (Latrobe Valley)
- Wetland 2 (Tarwin Valley)
- Potential hollow-bearing trees
- Kilometre points



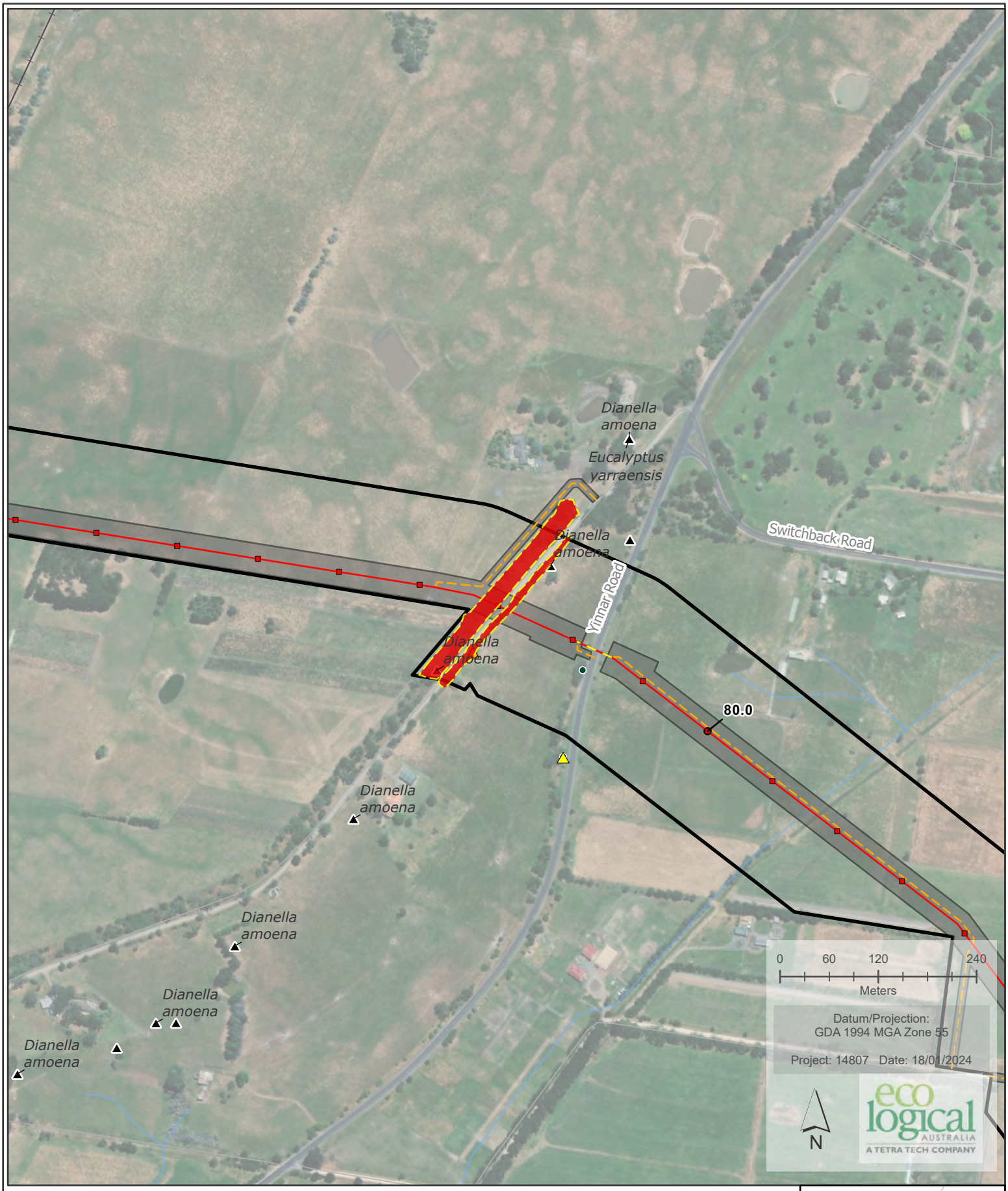


Figure 5.42 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points

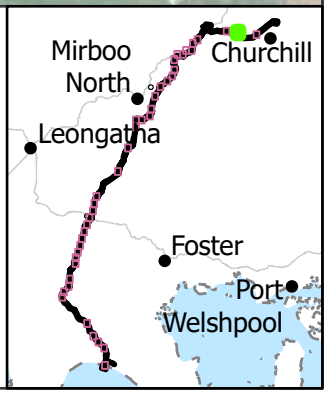
Species Records (VBA 2023)

- Significant flora

Targeted survey results (ELA 2020-2023)

- Strzeleckii Gum
- Yarra Gum

- Threatened ecological community
- Potential hollow-bearing trees
- Kilometre points



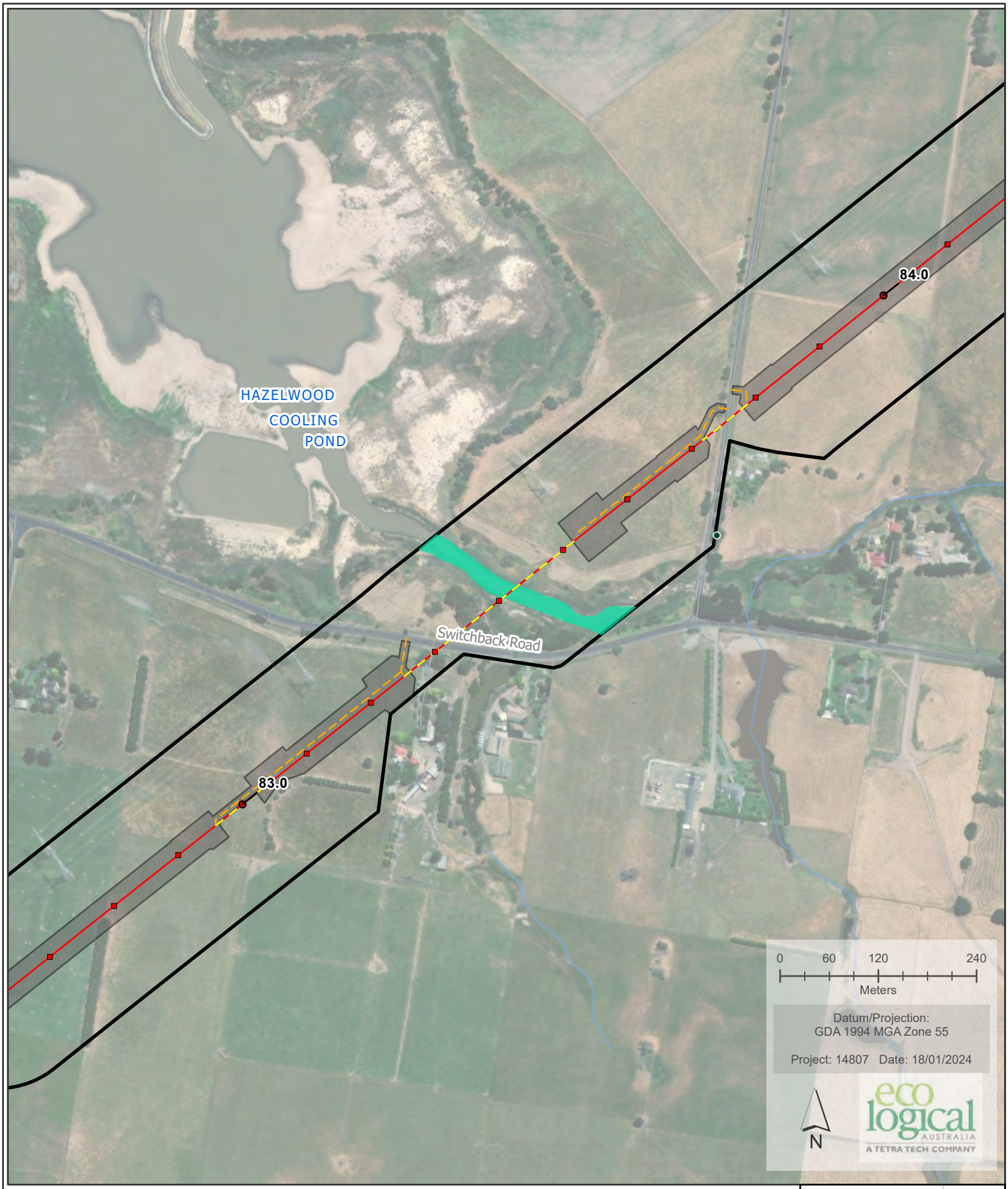
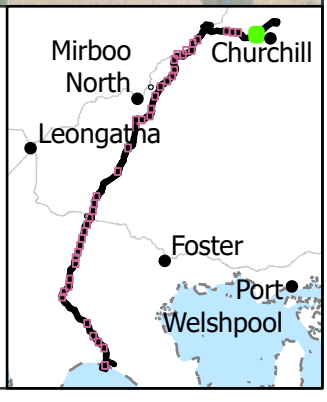


Figure 5.43 Threatened ecological communities, species and priority habitats

- Survey areas
- Alignment
- Area of disturbance
- HDD crossings
- Access tracks
- Kilometre points

Priority habitats

- Aquatic 4 (Latrobe Valley)
- Potential hollow-bearing trees
- Kilometre points



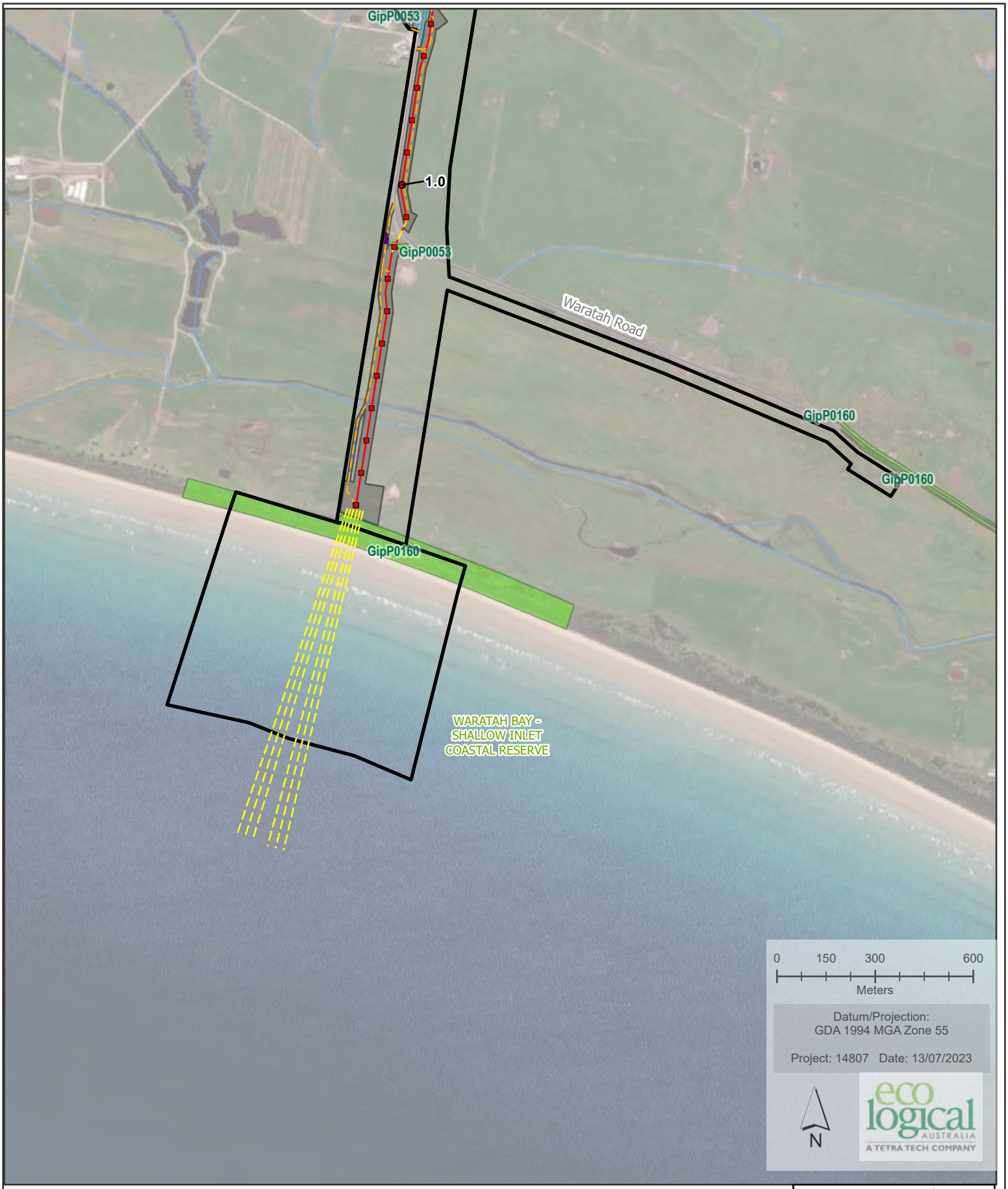


Figure 6.1 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

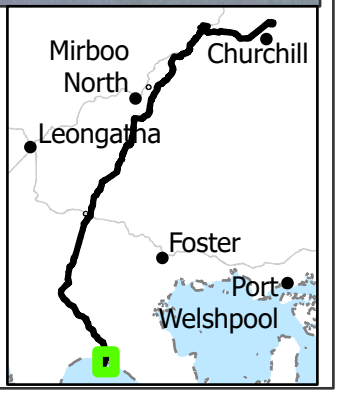


Figure 6.2 Native vegetation, habitats and potential impacts

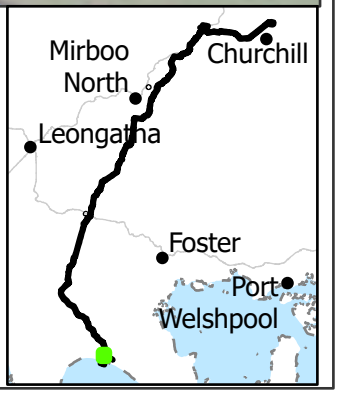
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)



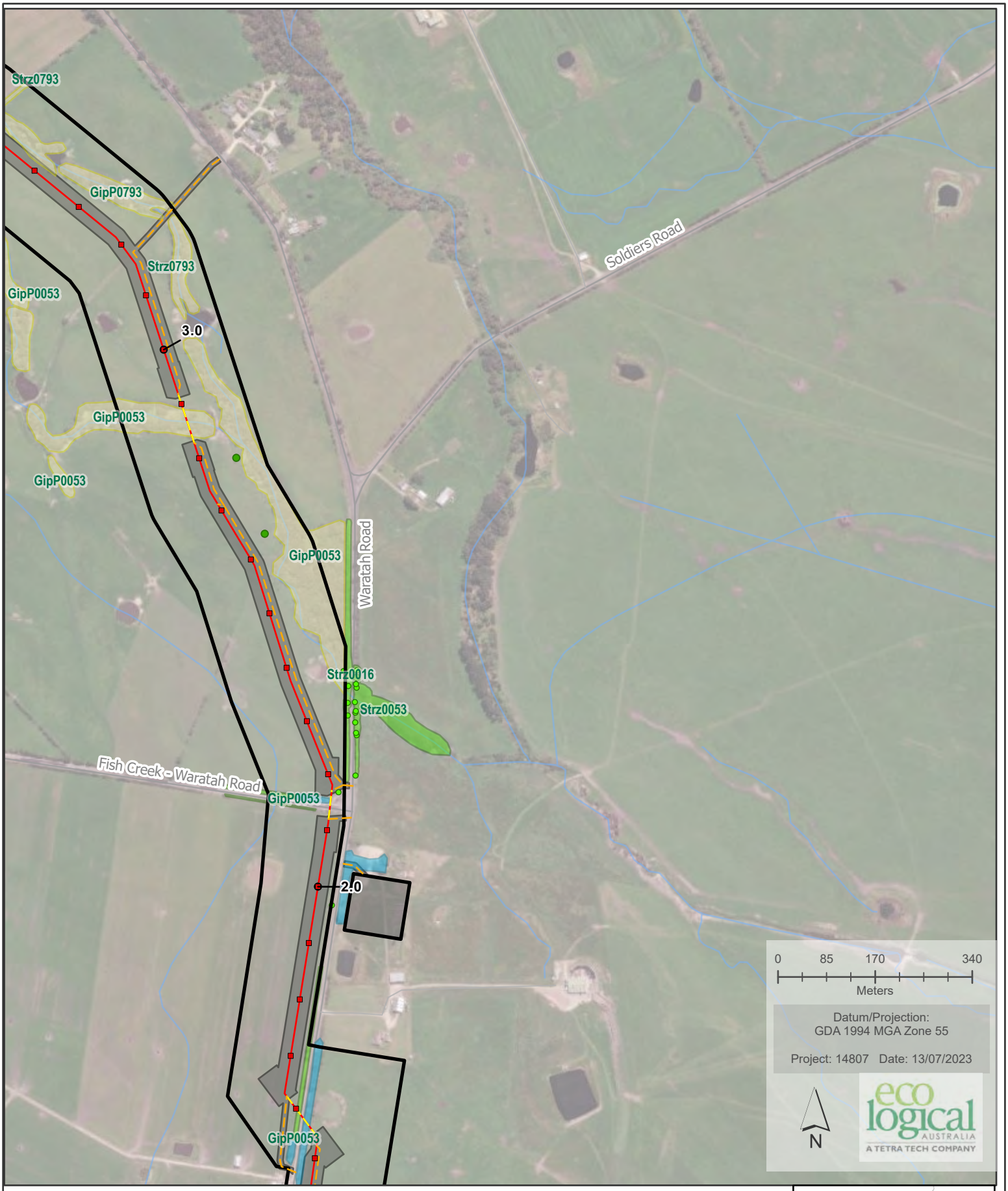
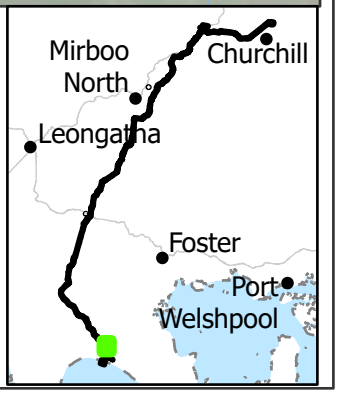


Figure 6.3 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large



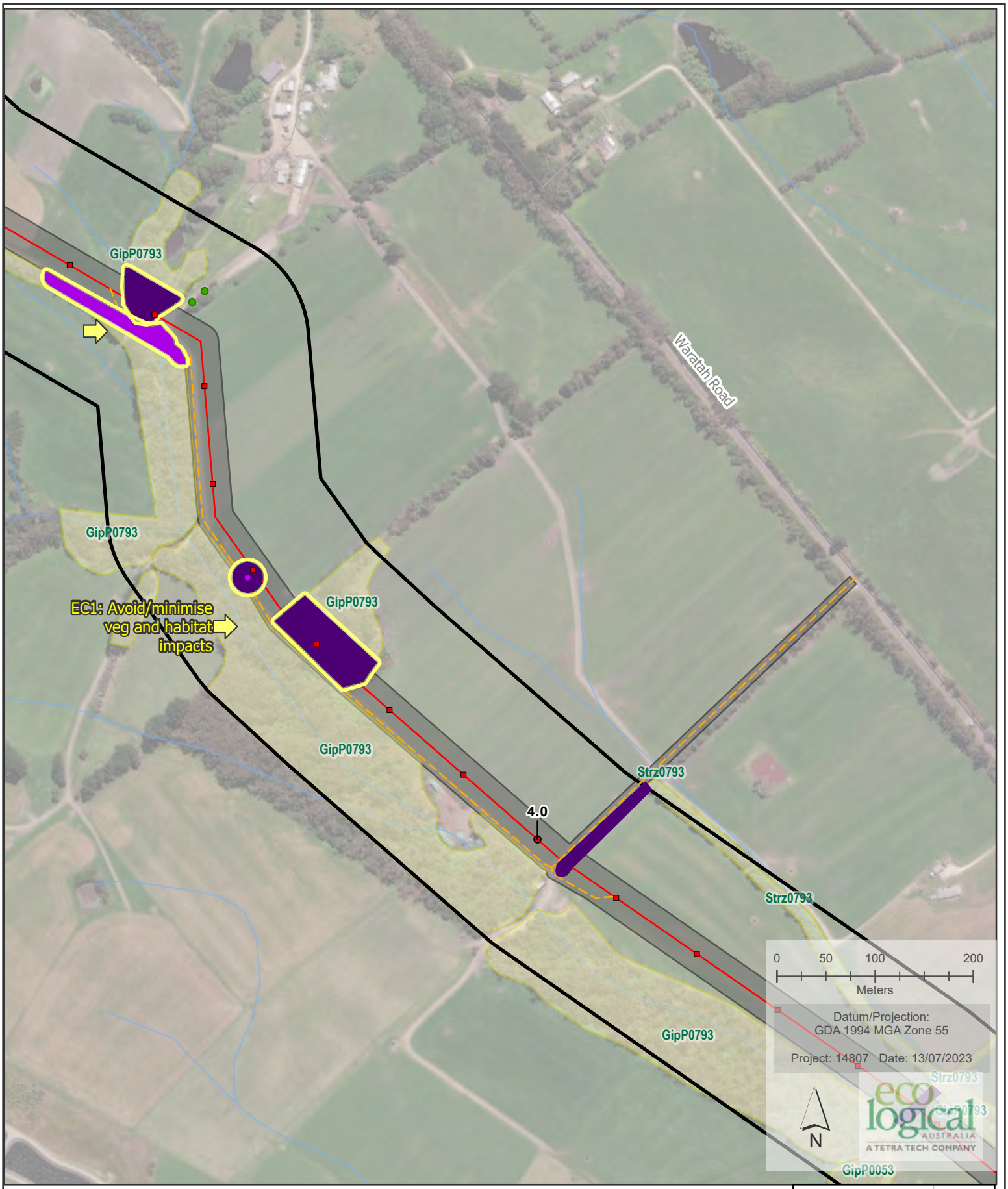


Figure 6.4 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

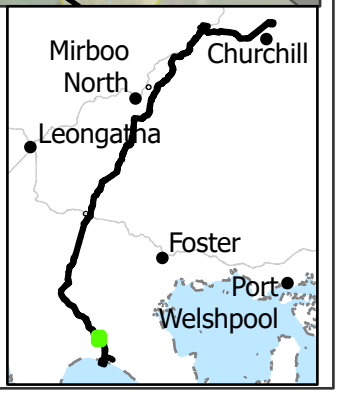
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



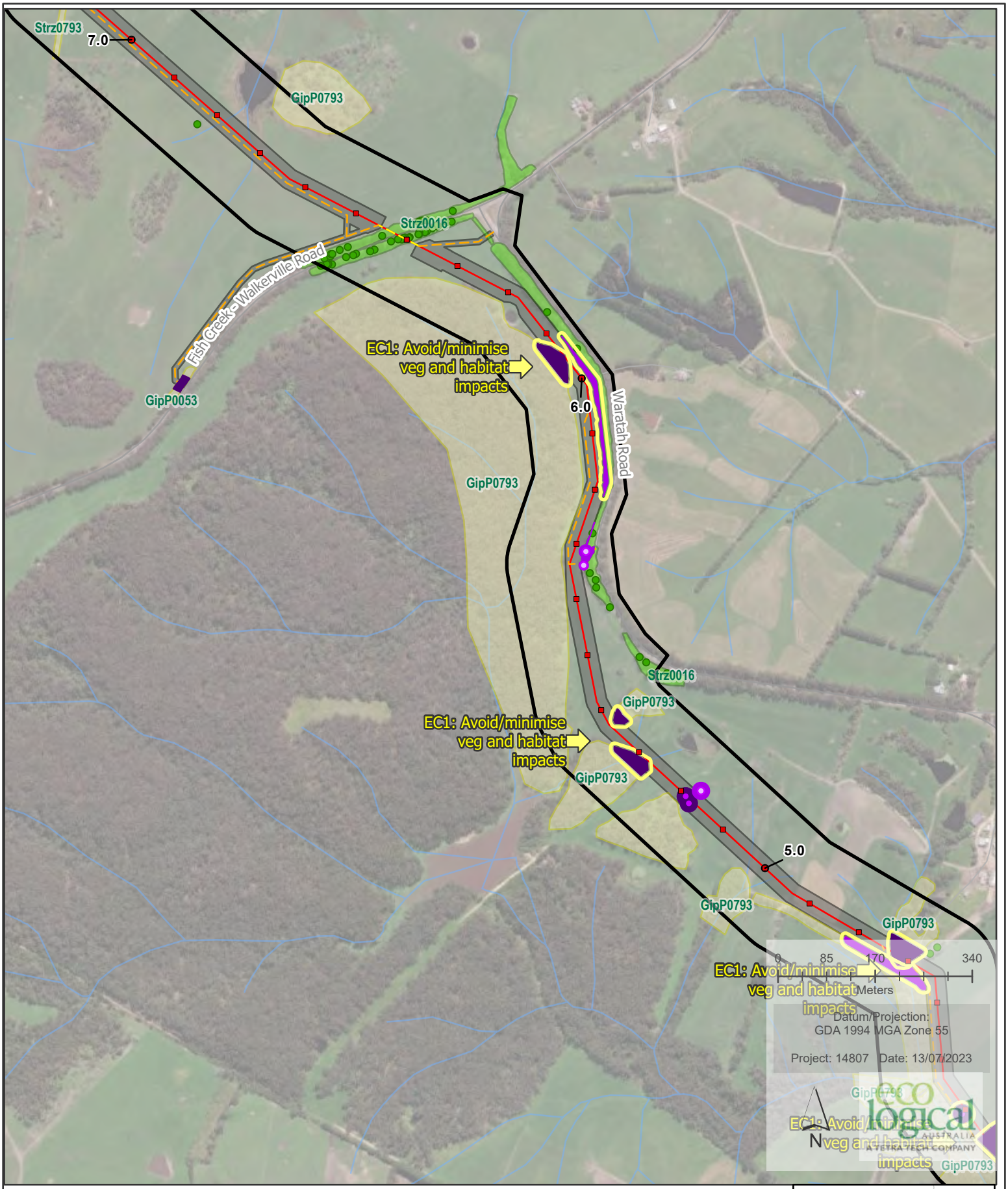


Figure 6.5 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

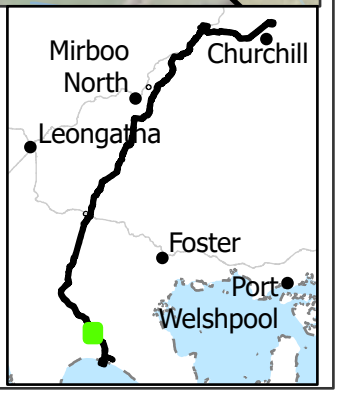
- Native vegetation
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



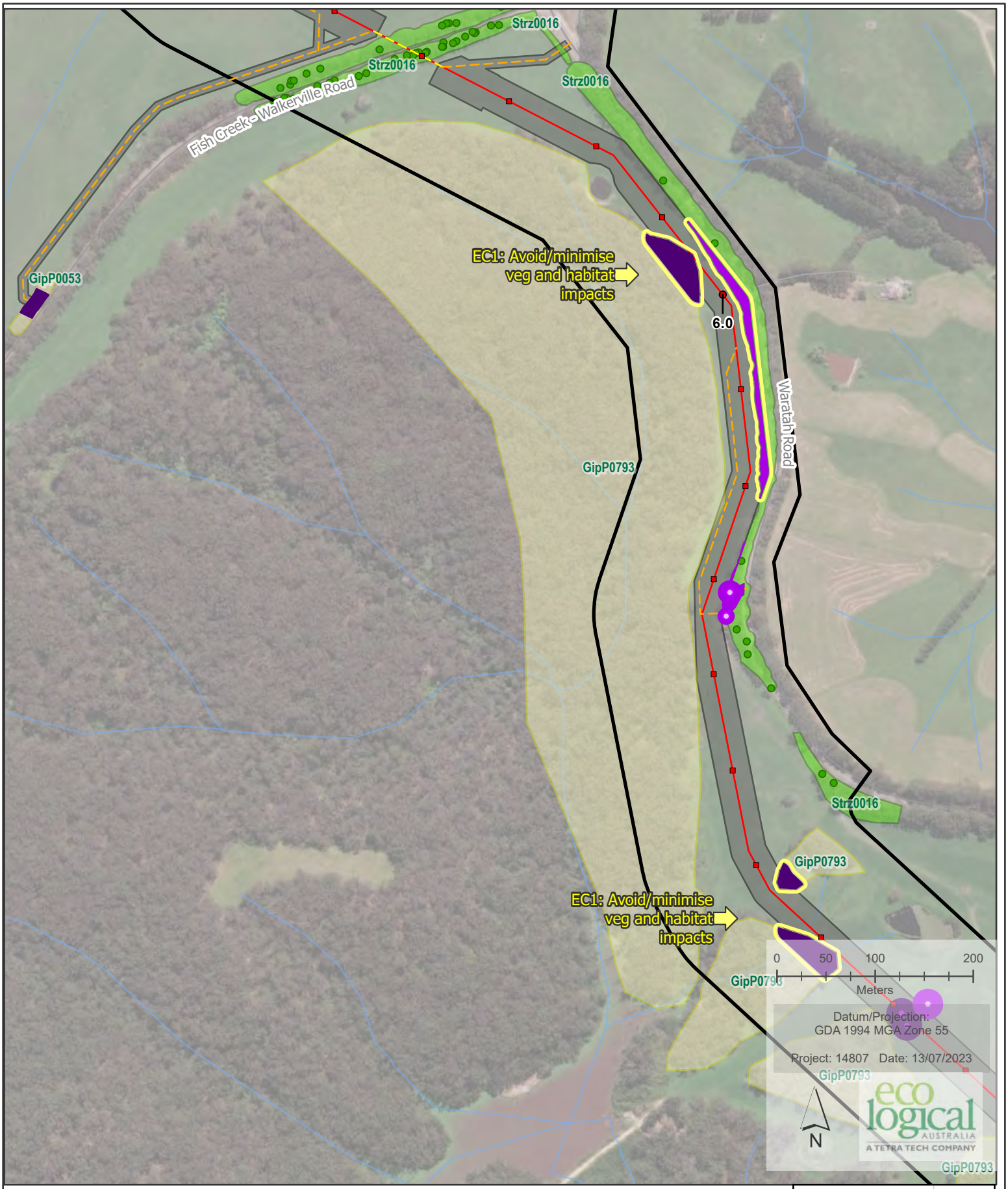


Figure 6.6 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

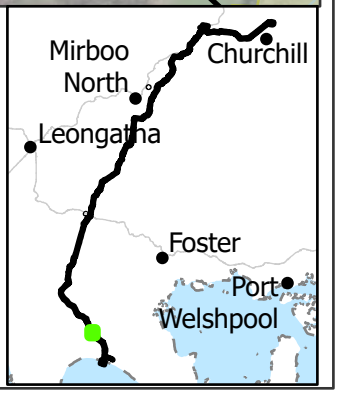
- Native vegetation
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



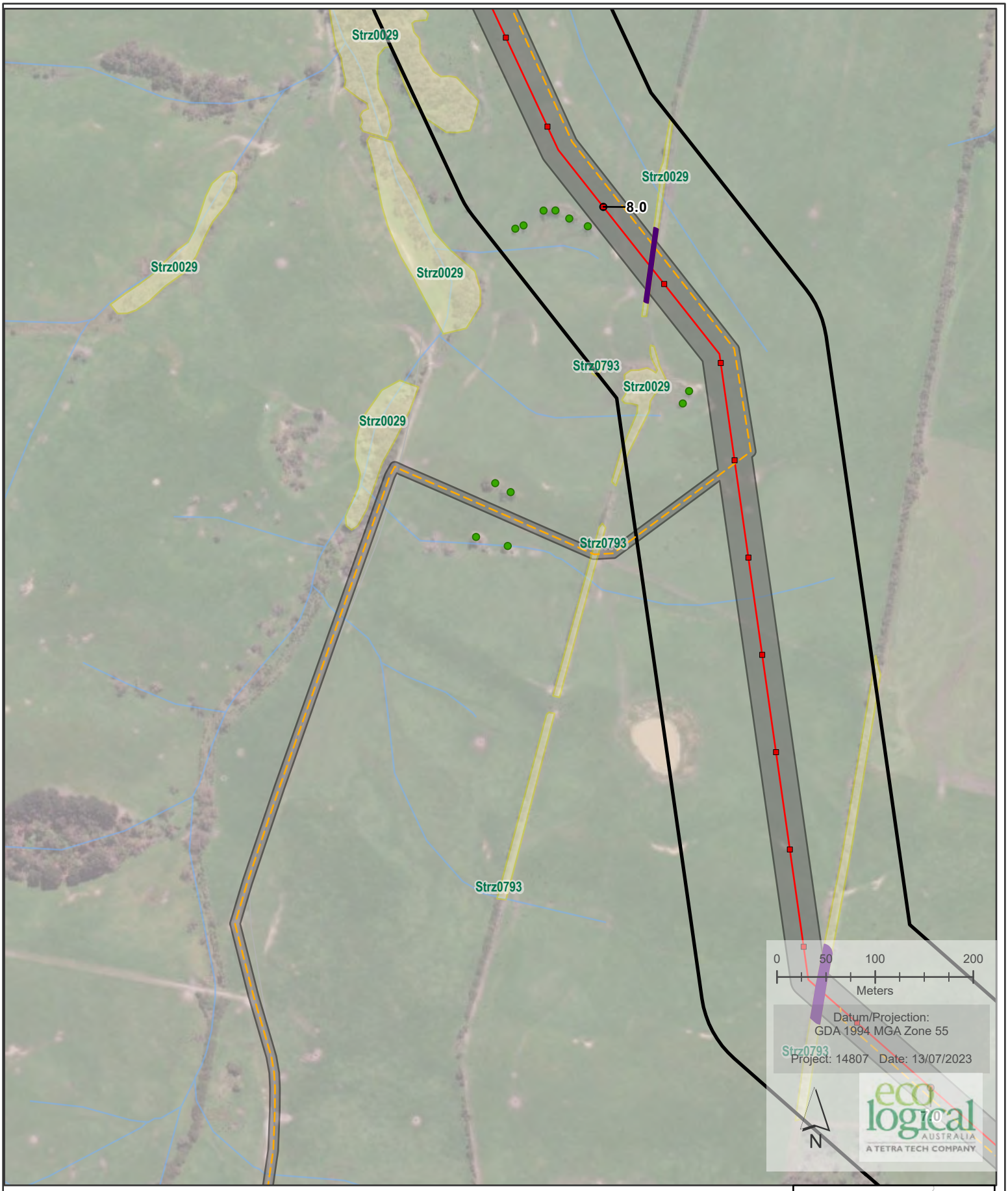


Figure 6.7 Native vegetation, habitats and potential impacts

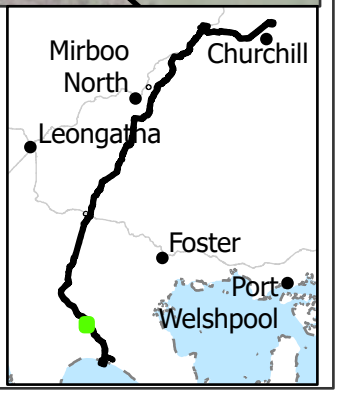
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points

Vegetation

- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)



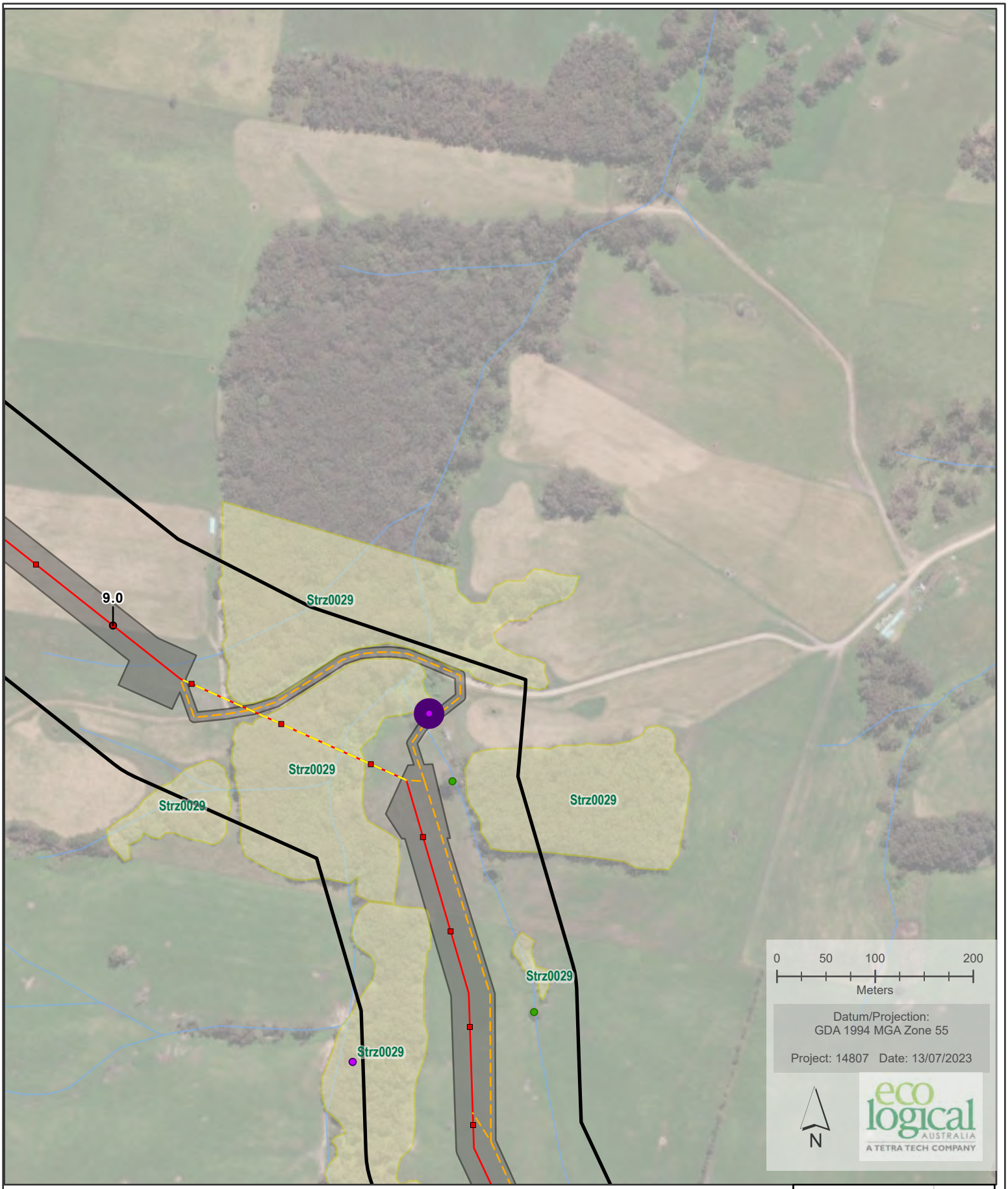


Figure 6.8 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

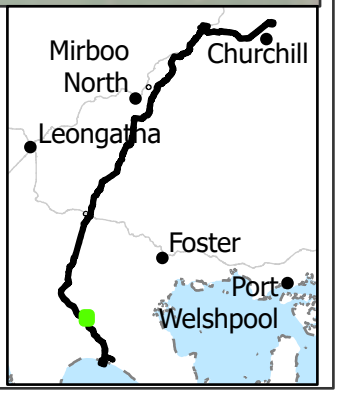
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

Impacted Large Native Trees

- Direct (vegetation removal)



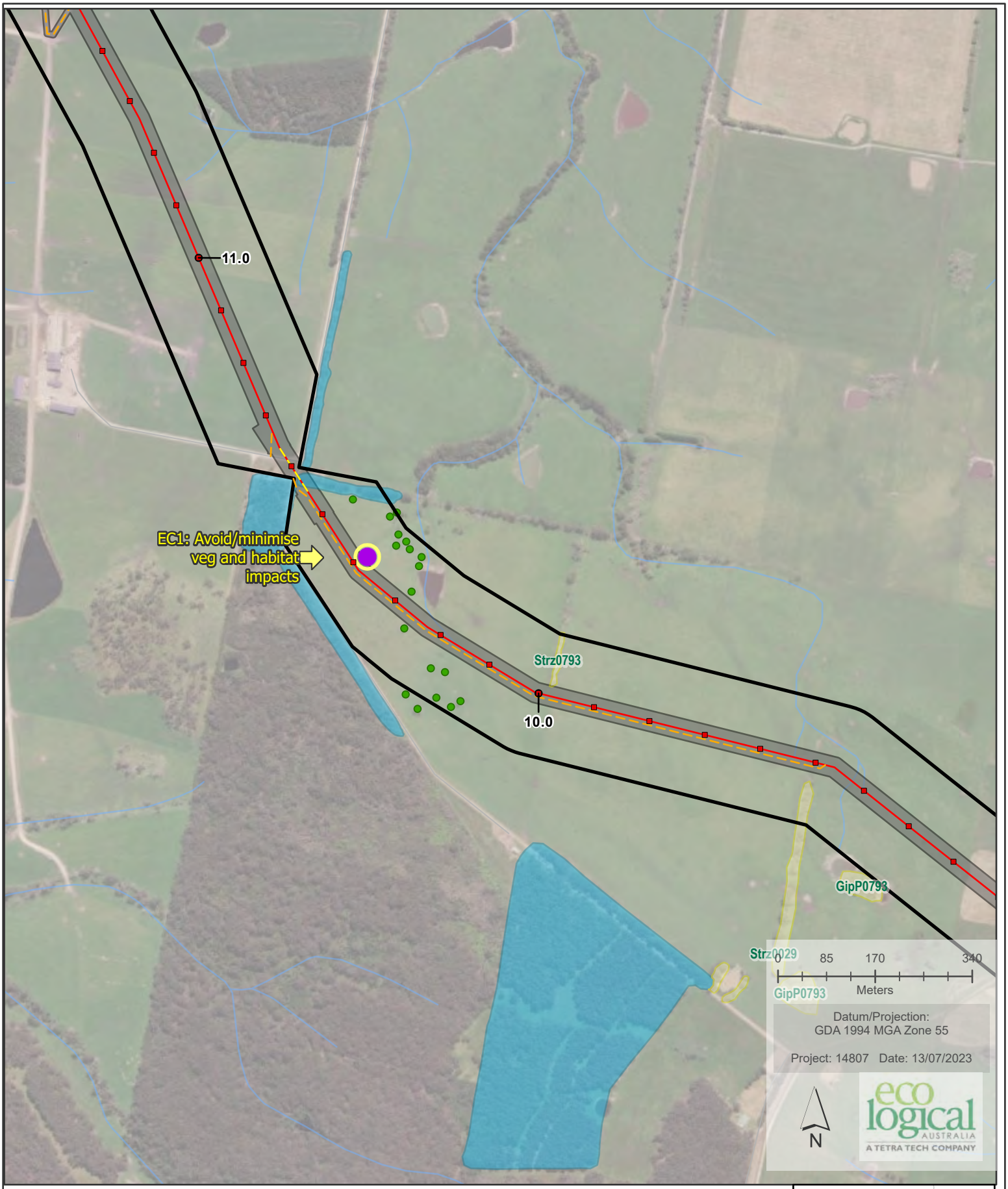


Figure 6.9 Native vegetation, habitats and potential impacts

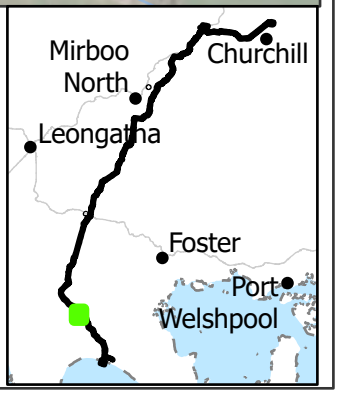
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**



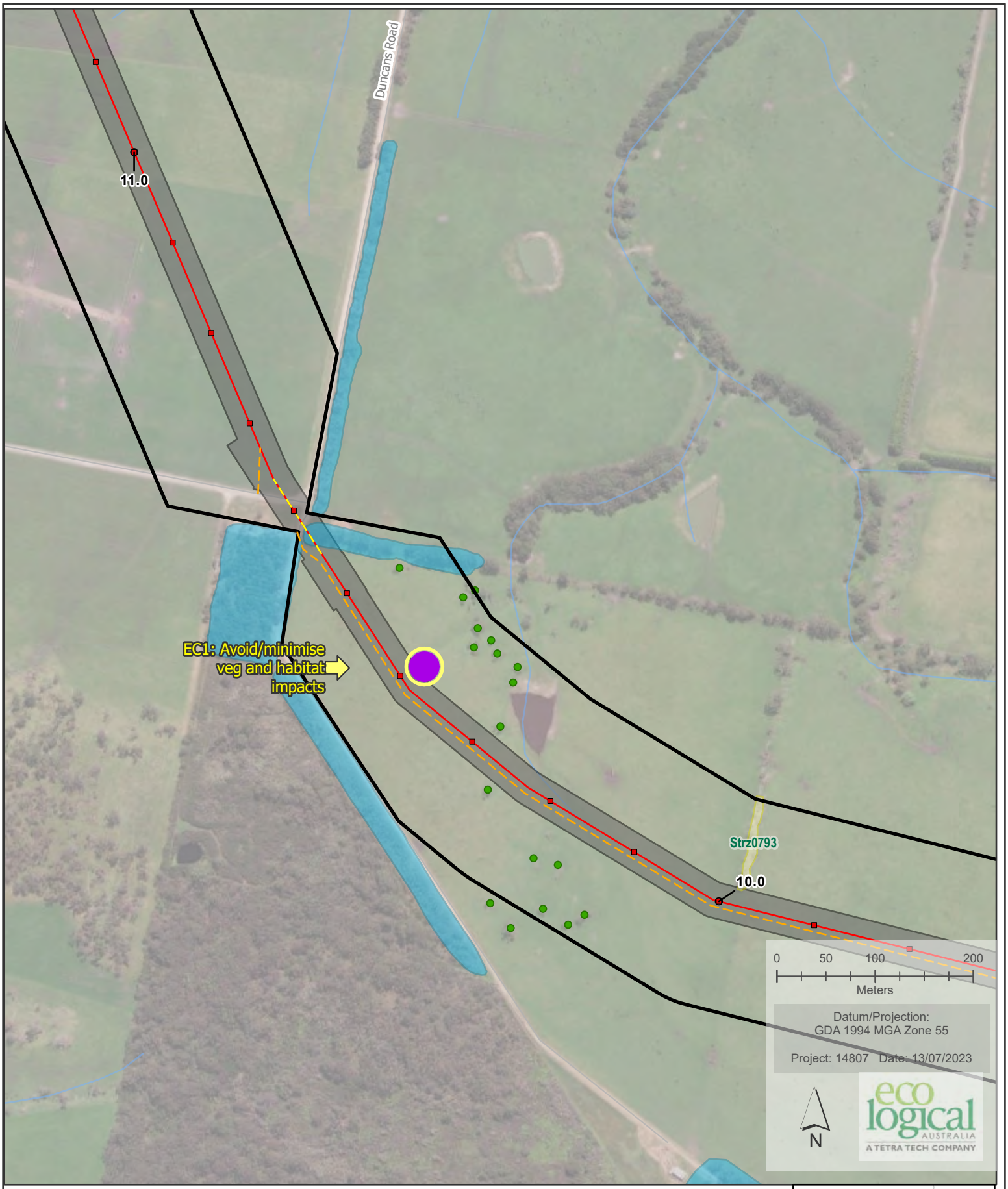


Figure 6.10 Native vegetation, habitats and potential impacts

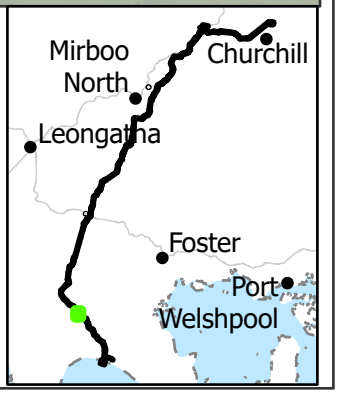
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**



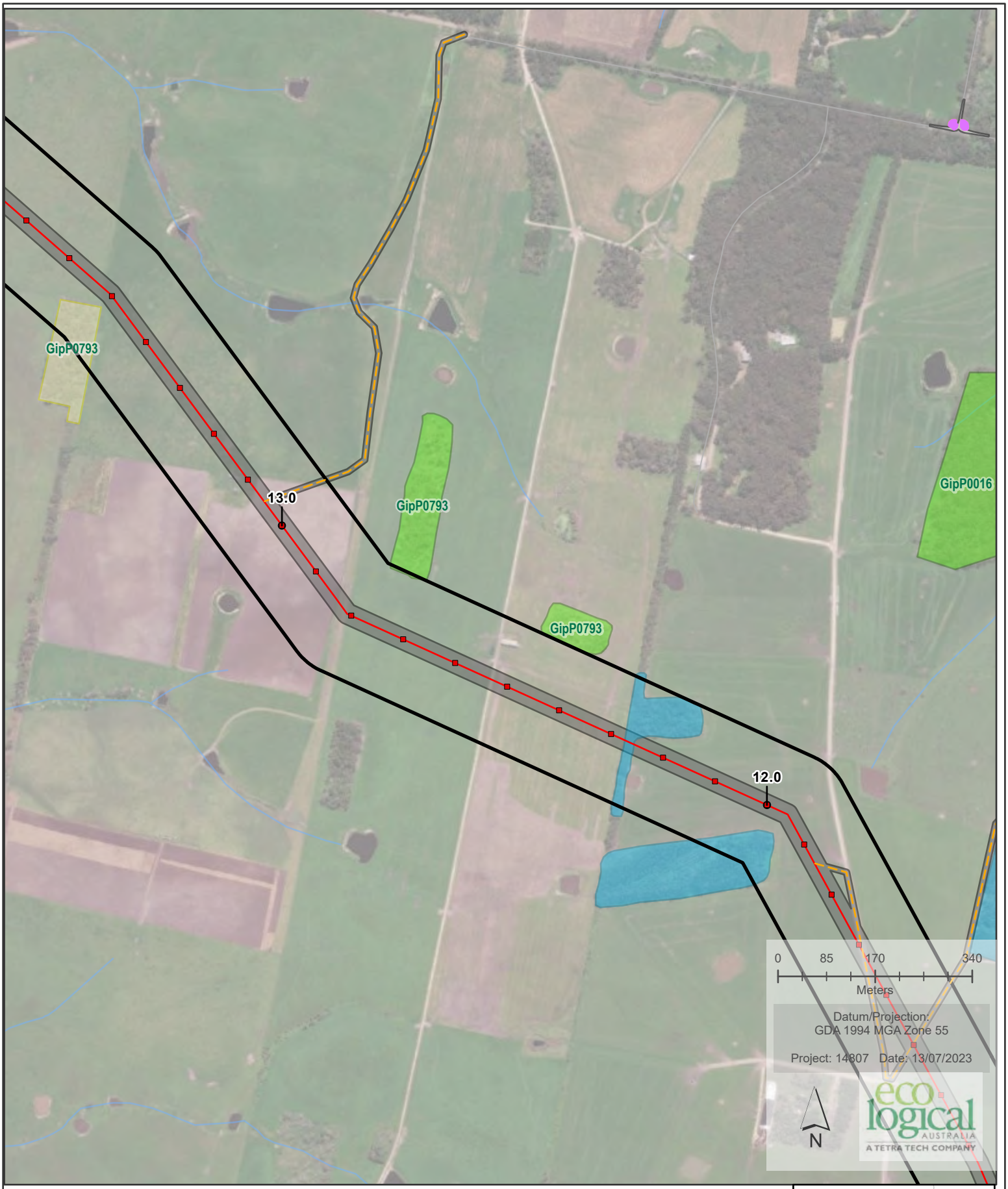


Figure 6.11 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- HV swept path
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impacts (trimming for access)

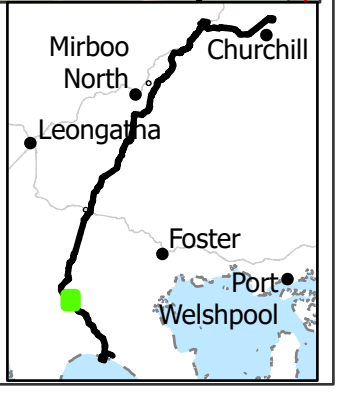


Figure 6.12 Native vegetation, habitats and potential impacts

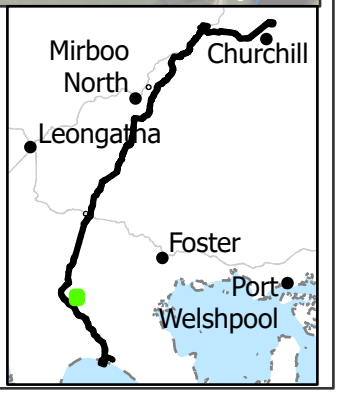
HV swept path

Vegetation

Native vegetation (unassessed)

Impacted Native Vegetation (pre-mitigation)

Direct impacts (trimming for access)



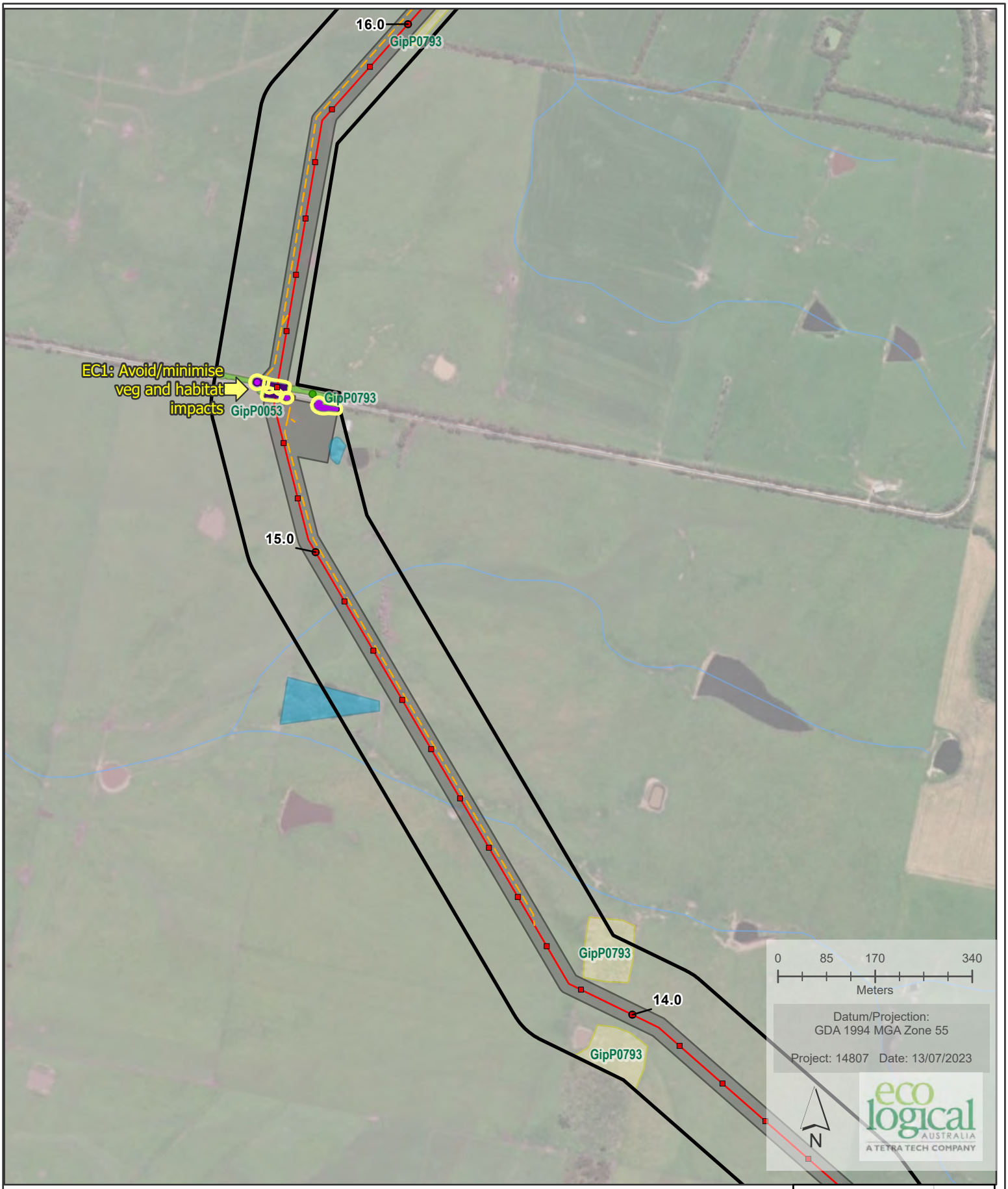


Figure 6.13 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

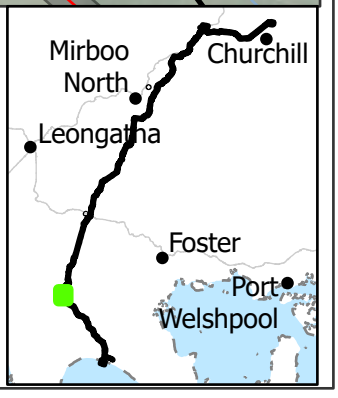
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



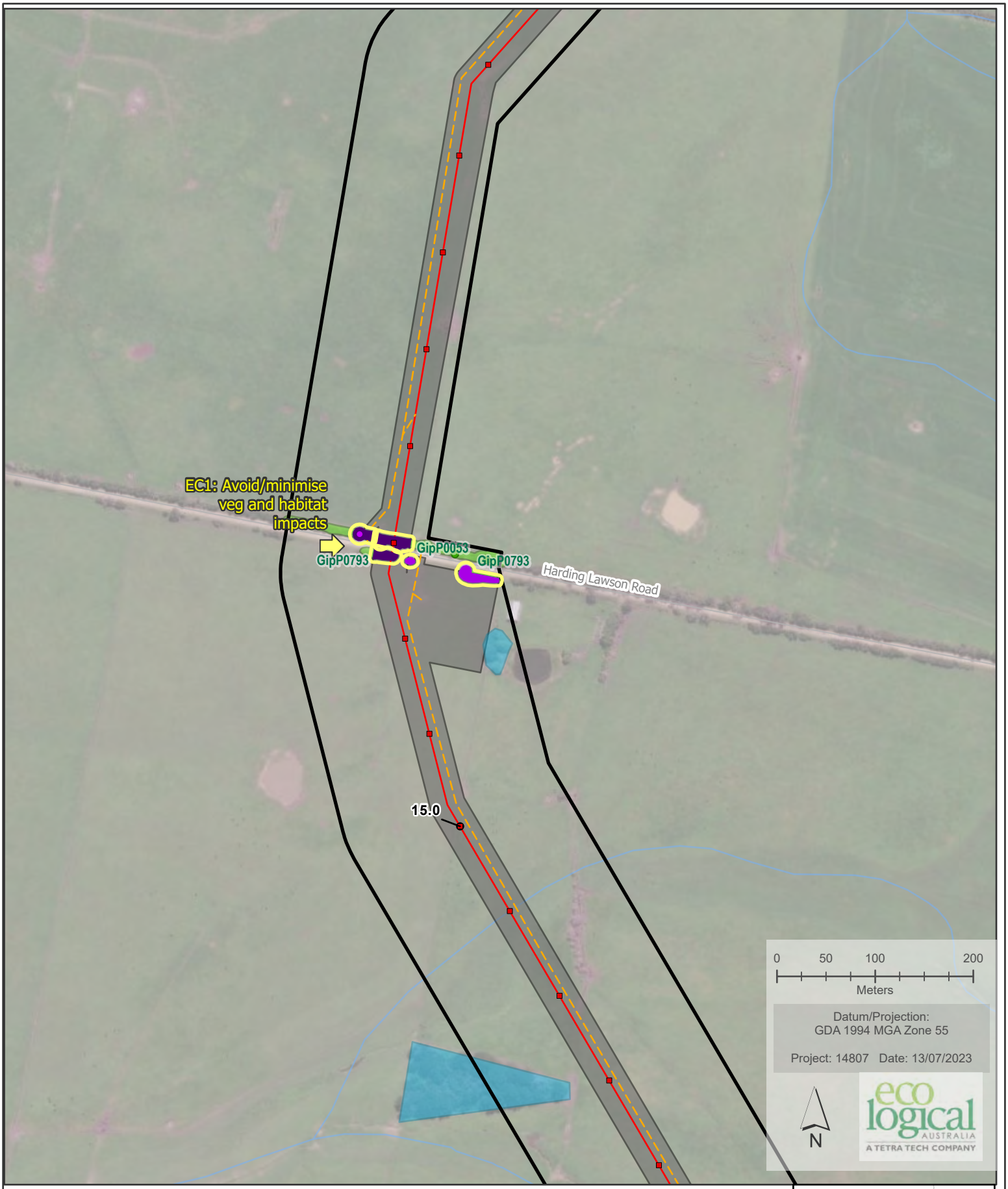


Figure 6.14 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Introduced vegetation
- Small native tree

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)

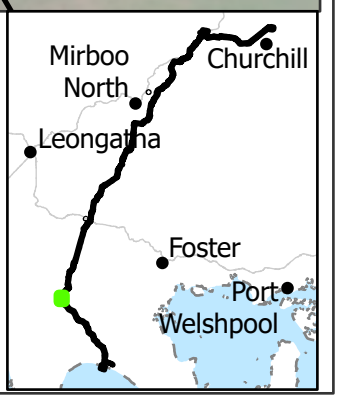


Figure 6.15 Native vegetation, habitats and potential impacts

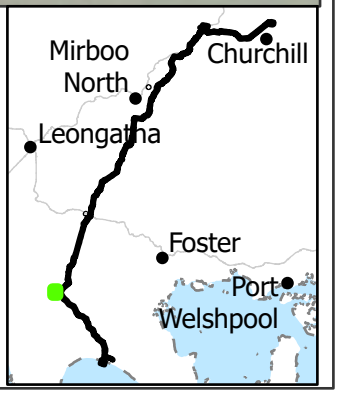
HV swept path

Vegetation

Native vegetation (unassessed)

Impacted Native Vegetation (pre-mitigation)

Direct impacts (trimming for access)



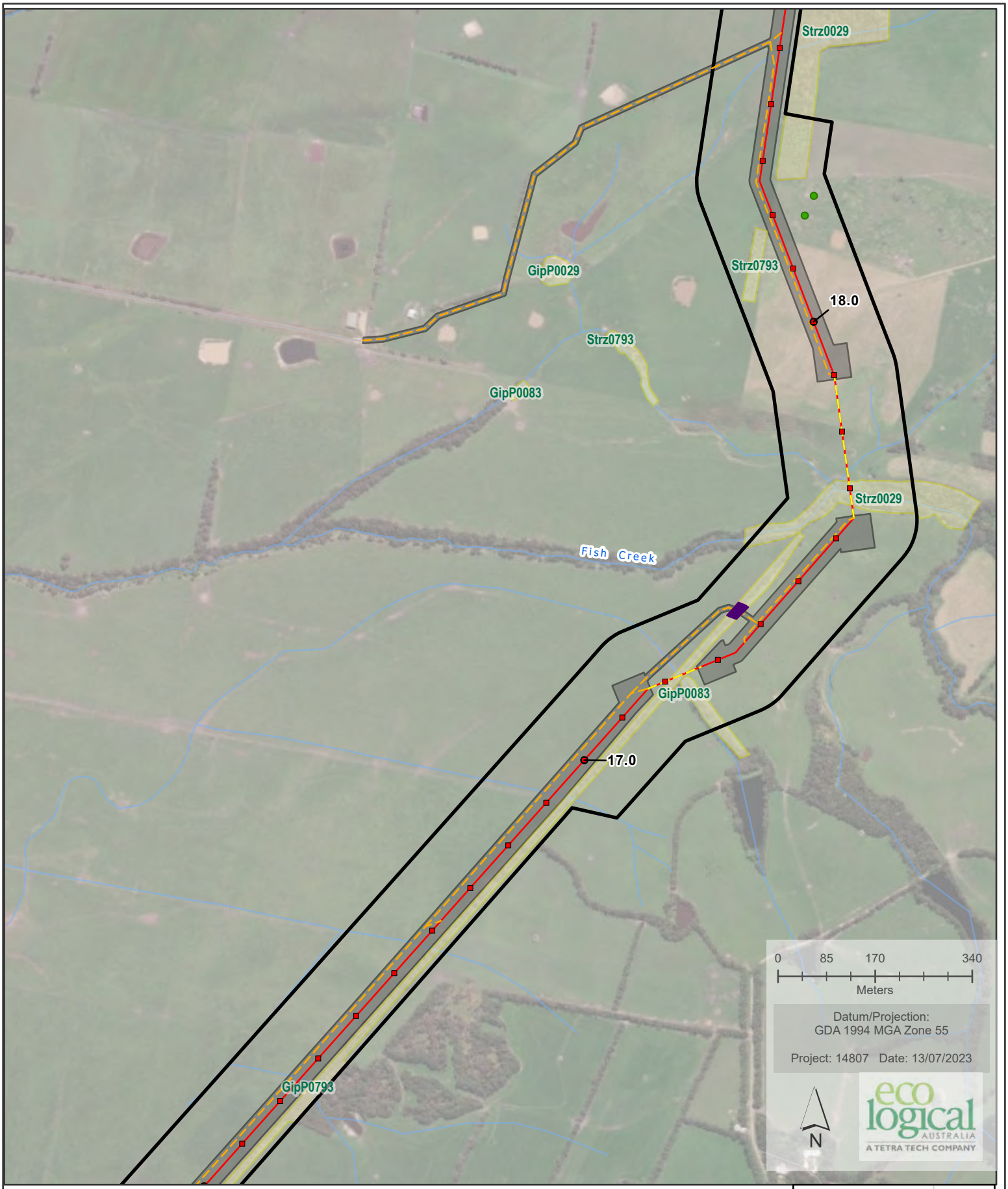


Figure 6.16 Native vegetation, habitats and potential impacts

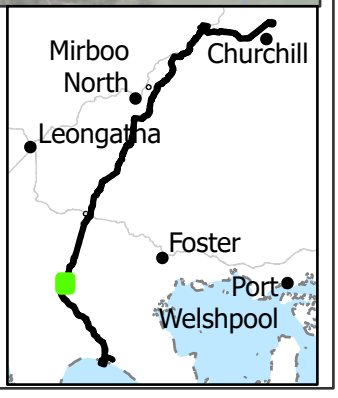
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)



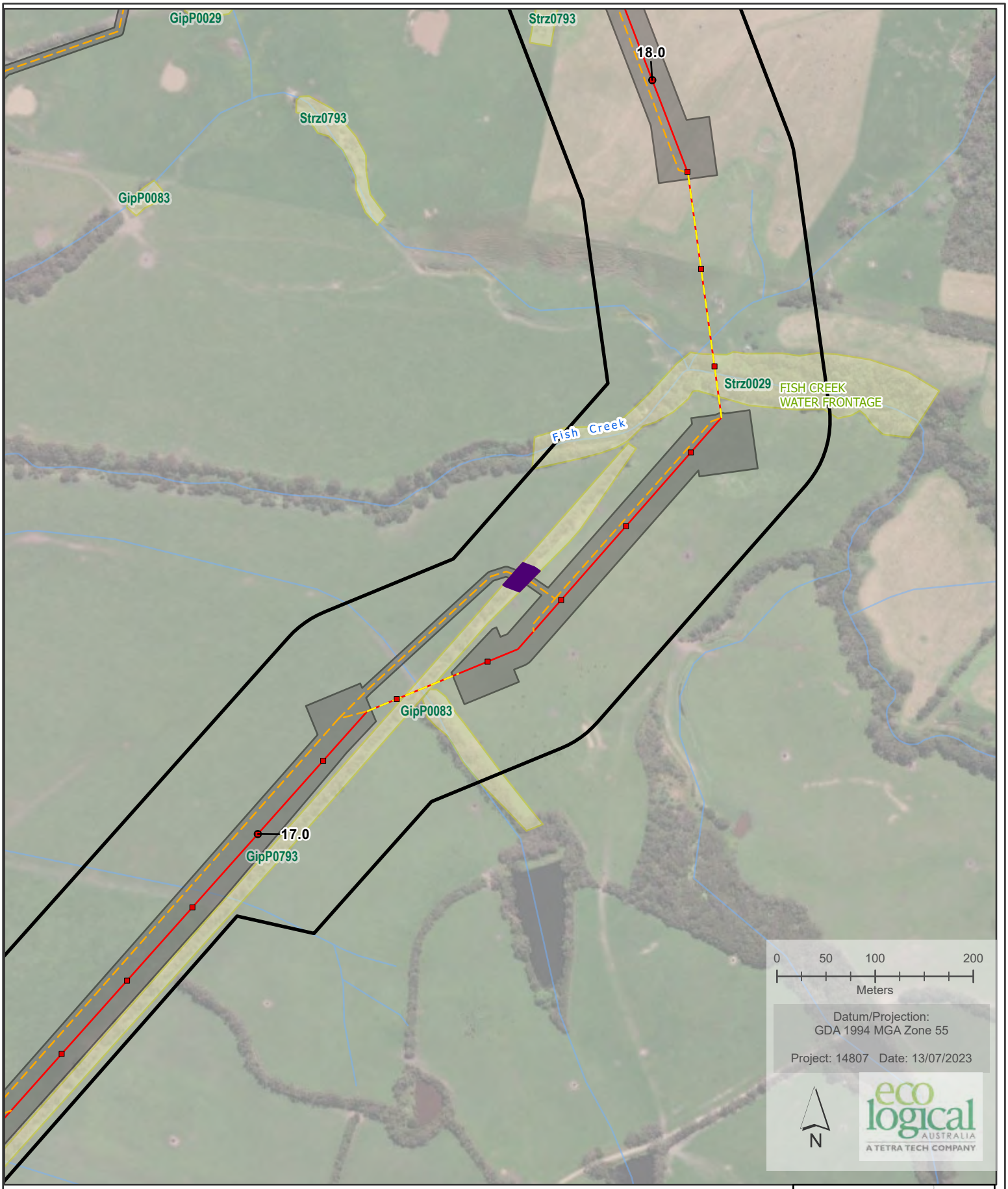


Figure 6.17 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation (unassessed)

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

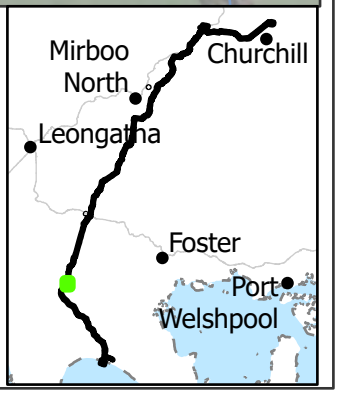


Figure 6.18 Native vegetation, habitats and potential impacts

HV swept path

Vegetation

Native vegetation (unassessed)

Impacted Native Vegetation (pre-mitigation)

Direct impacts (trimming for access)

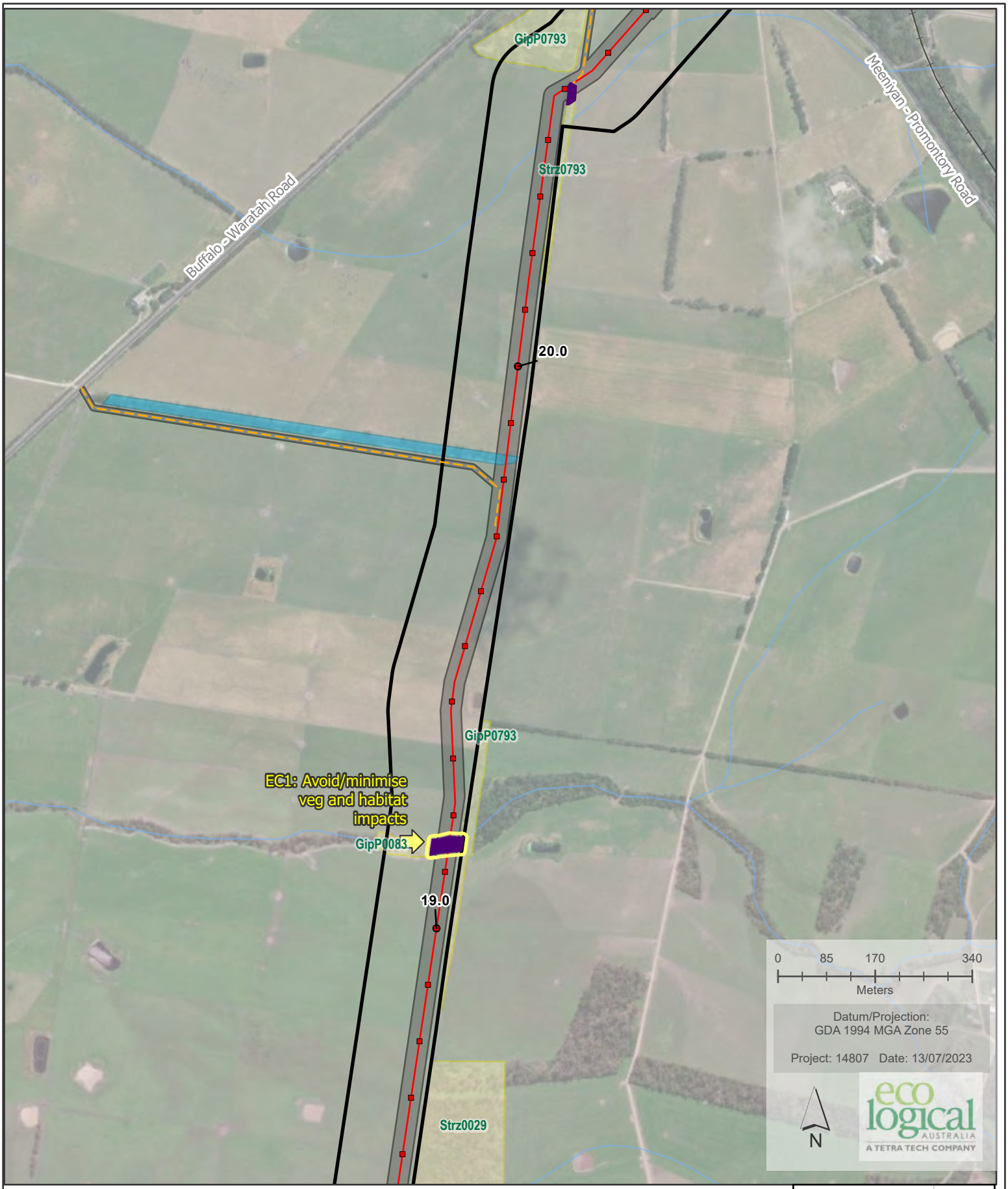


Figure 6.19 Native vegetation, habitats and potential impacts

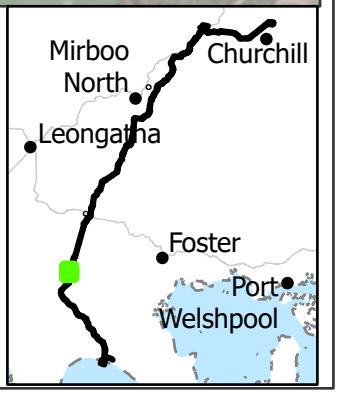
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation (unassessed)
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- **Proposed avoidance and minimisation**



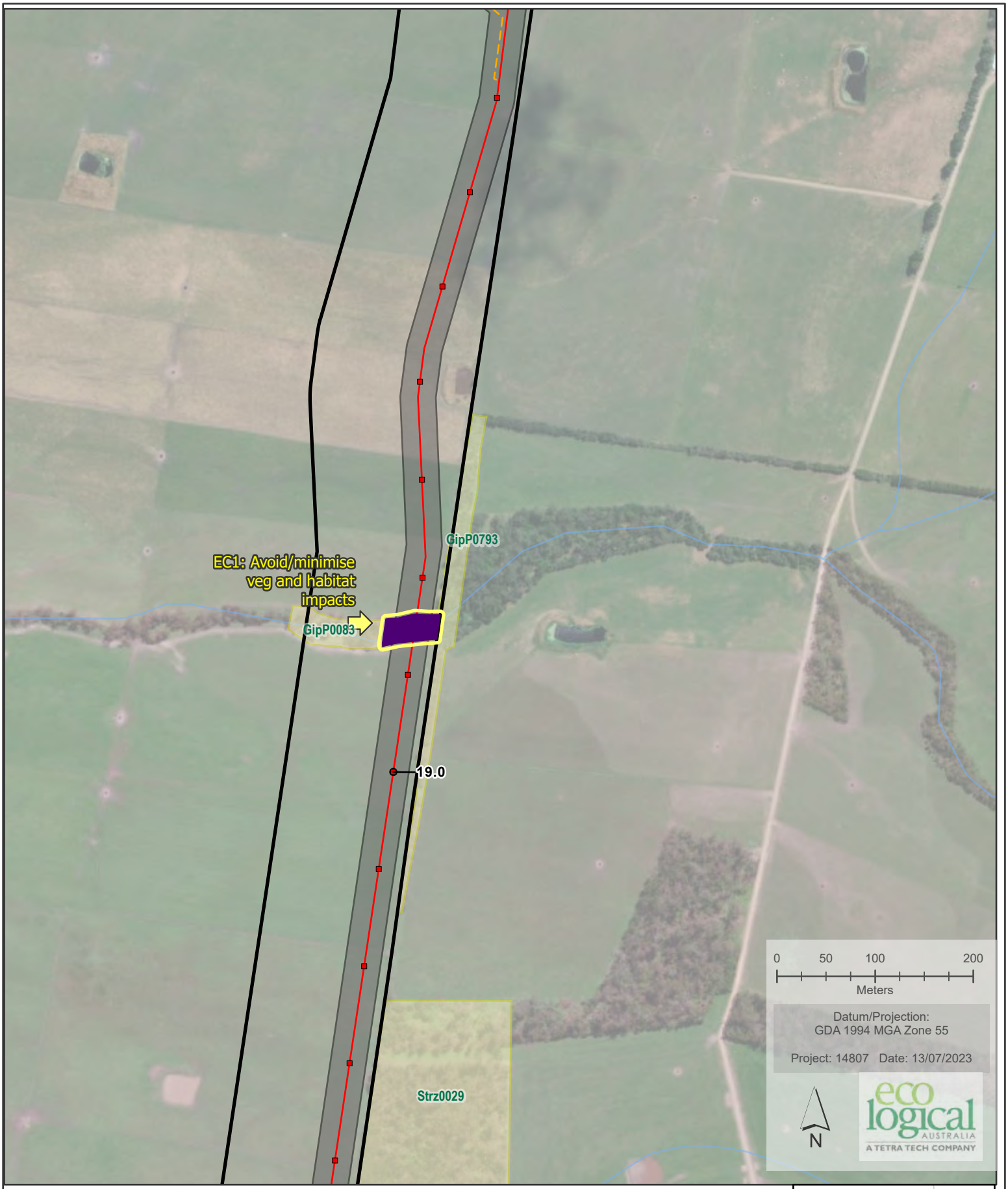


Figure 6.20 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation (unassessed)

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- **Proposed avoidance and minimisation**

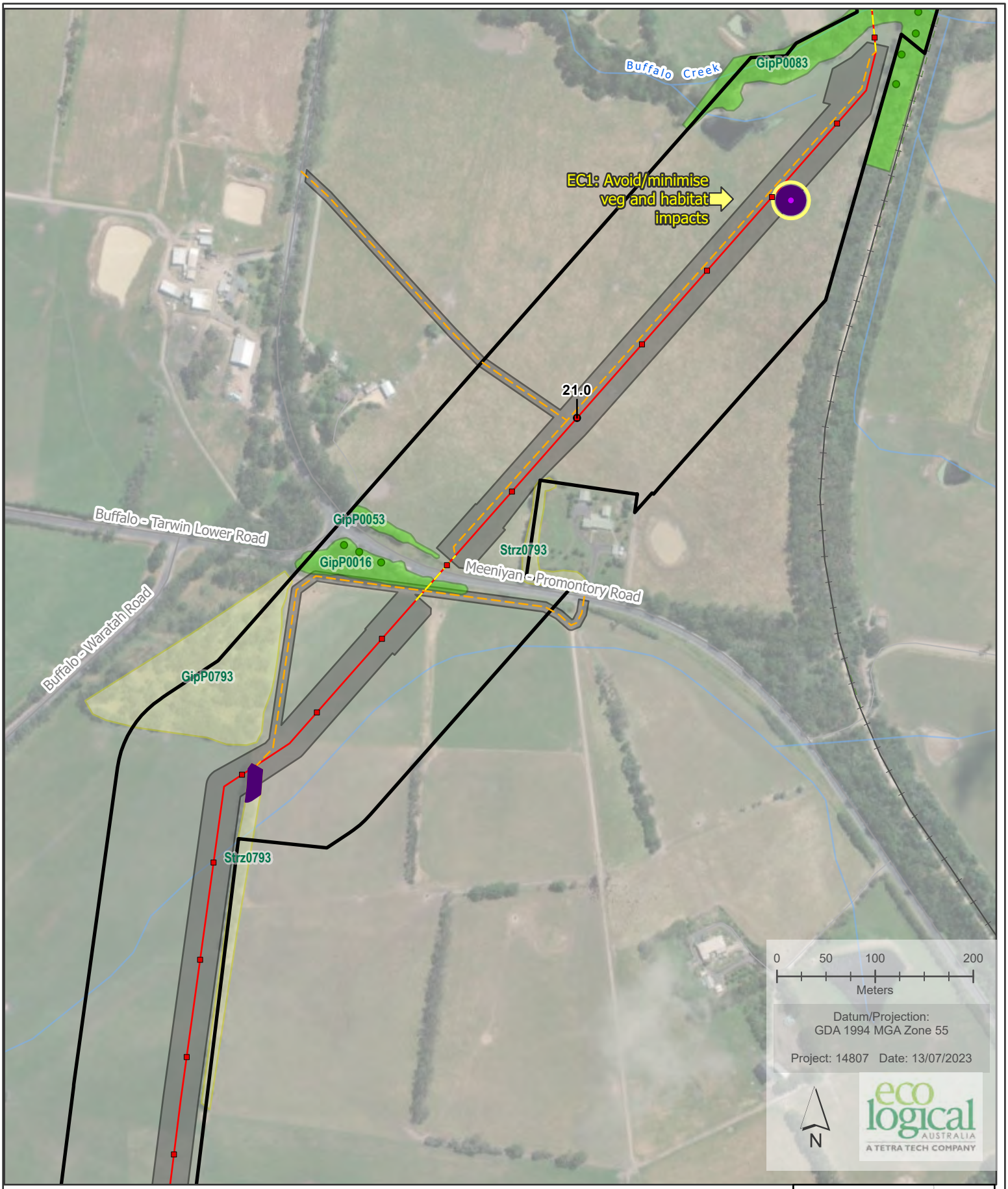


Figure 6.21 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)

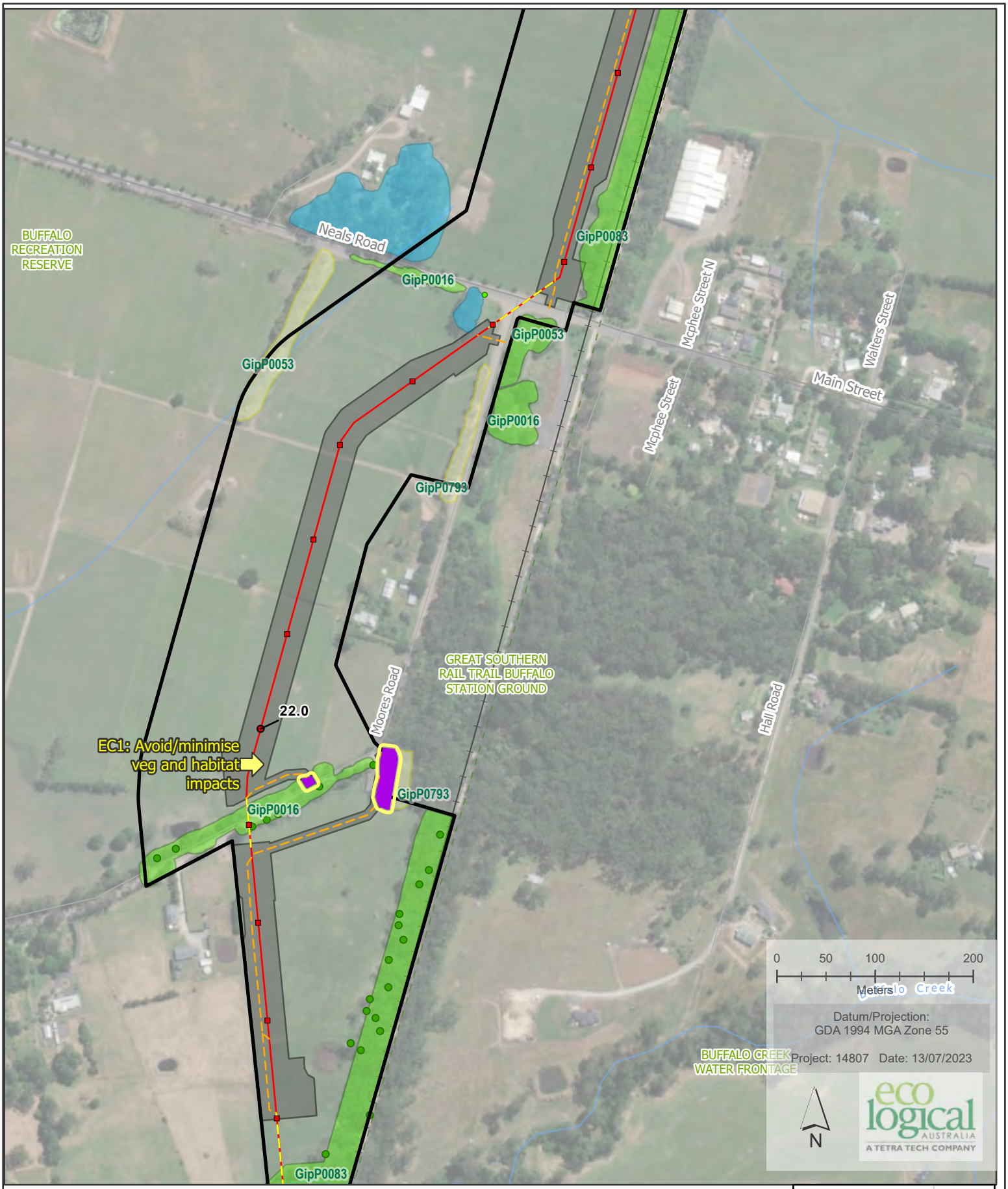


Figure 6.22 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)

Proposed avoidance and minimisation

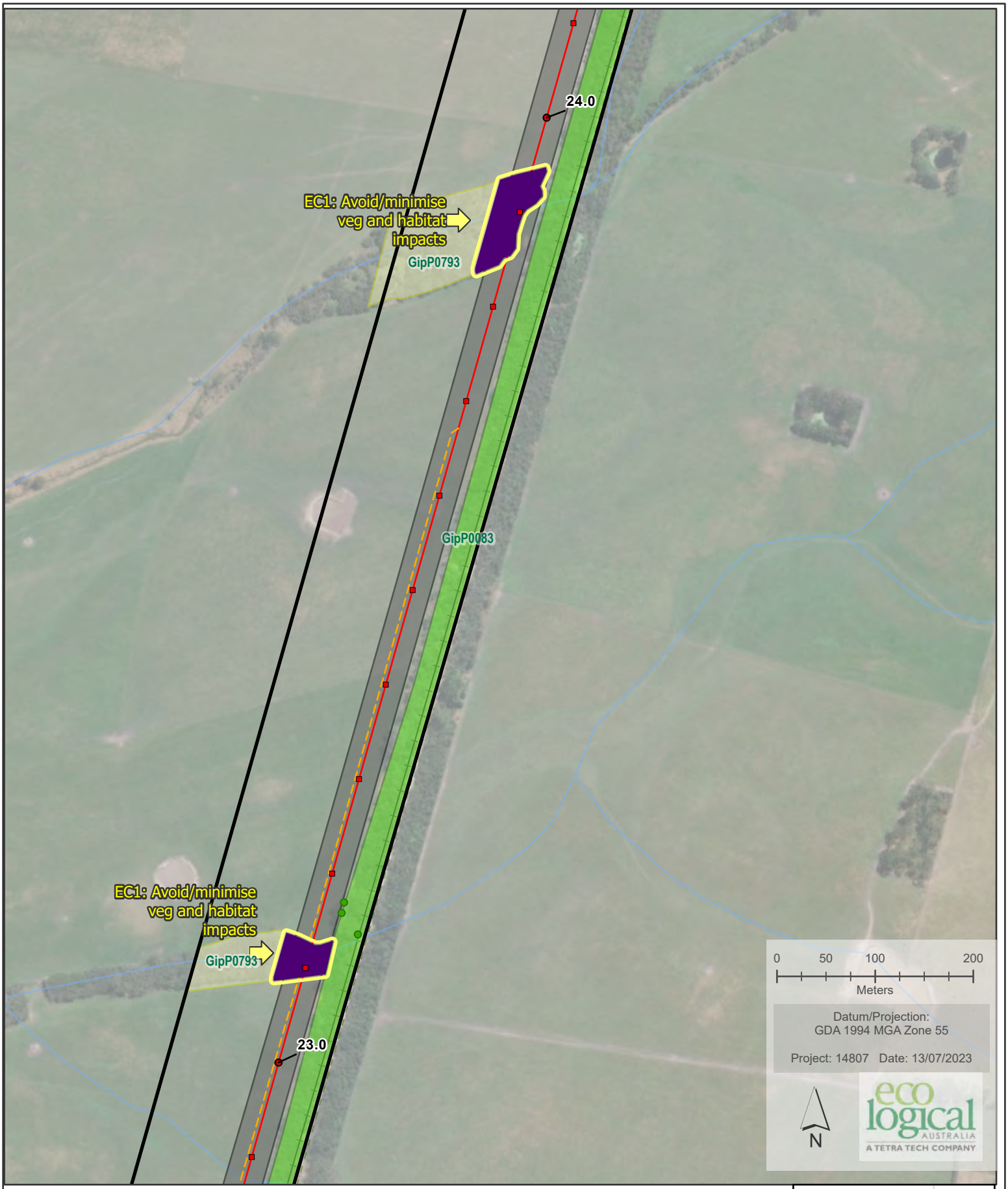


Figure 6.23 Native vegetation, habitats and potential impacts

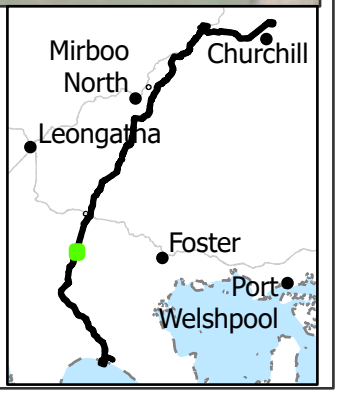
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- **Proposed avoidance and minimisation**



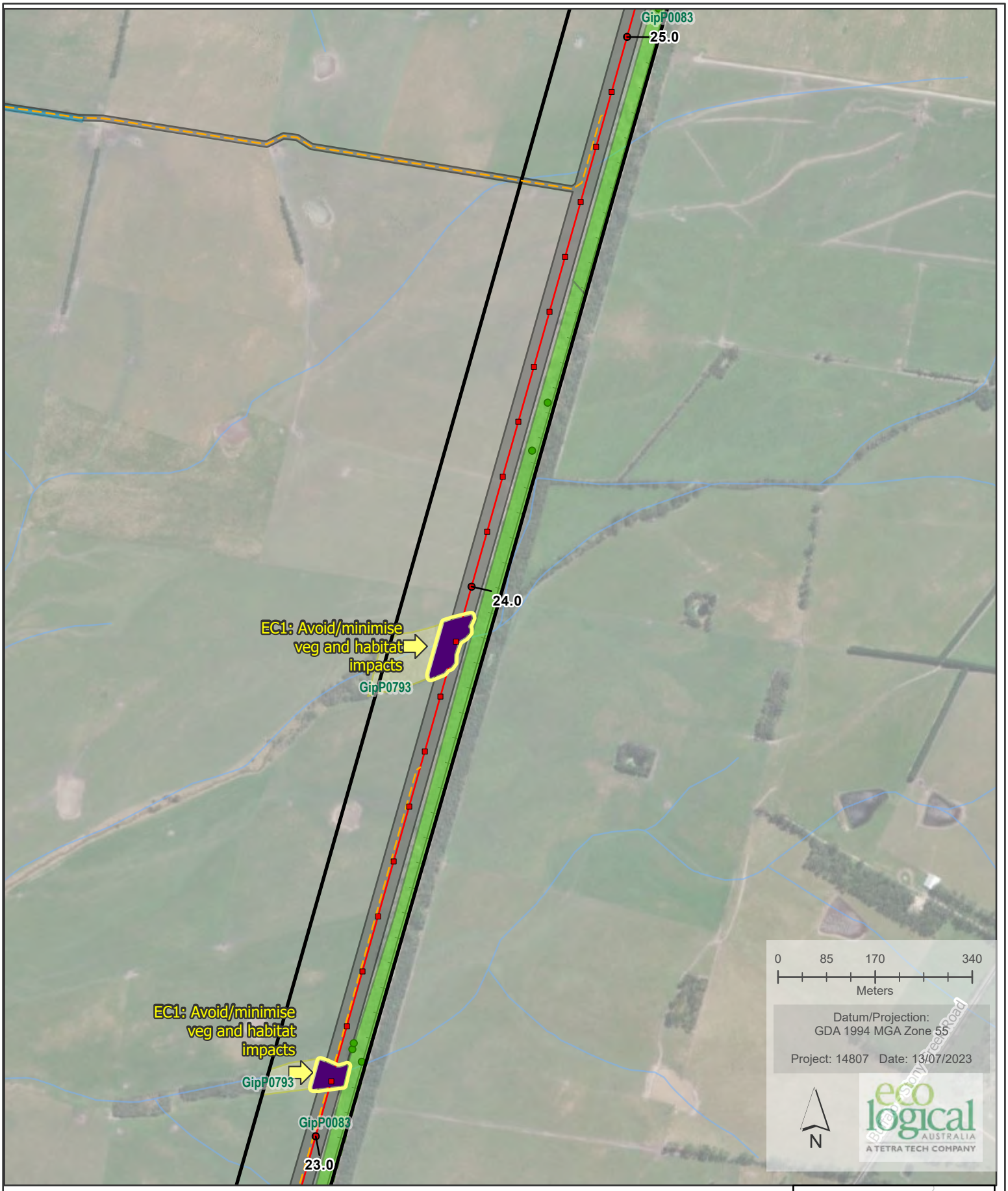


Figure 6.24 Native vegetation, habitats and potential impacts

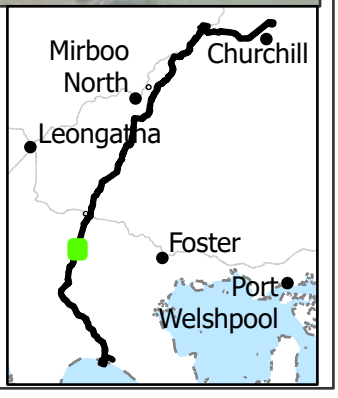
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- **Proposed avoidance and minimisation**



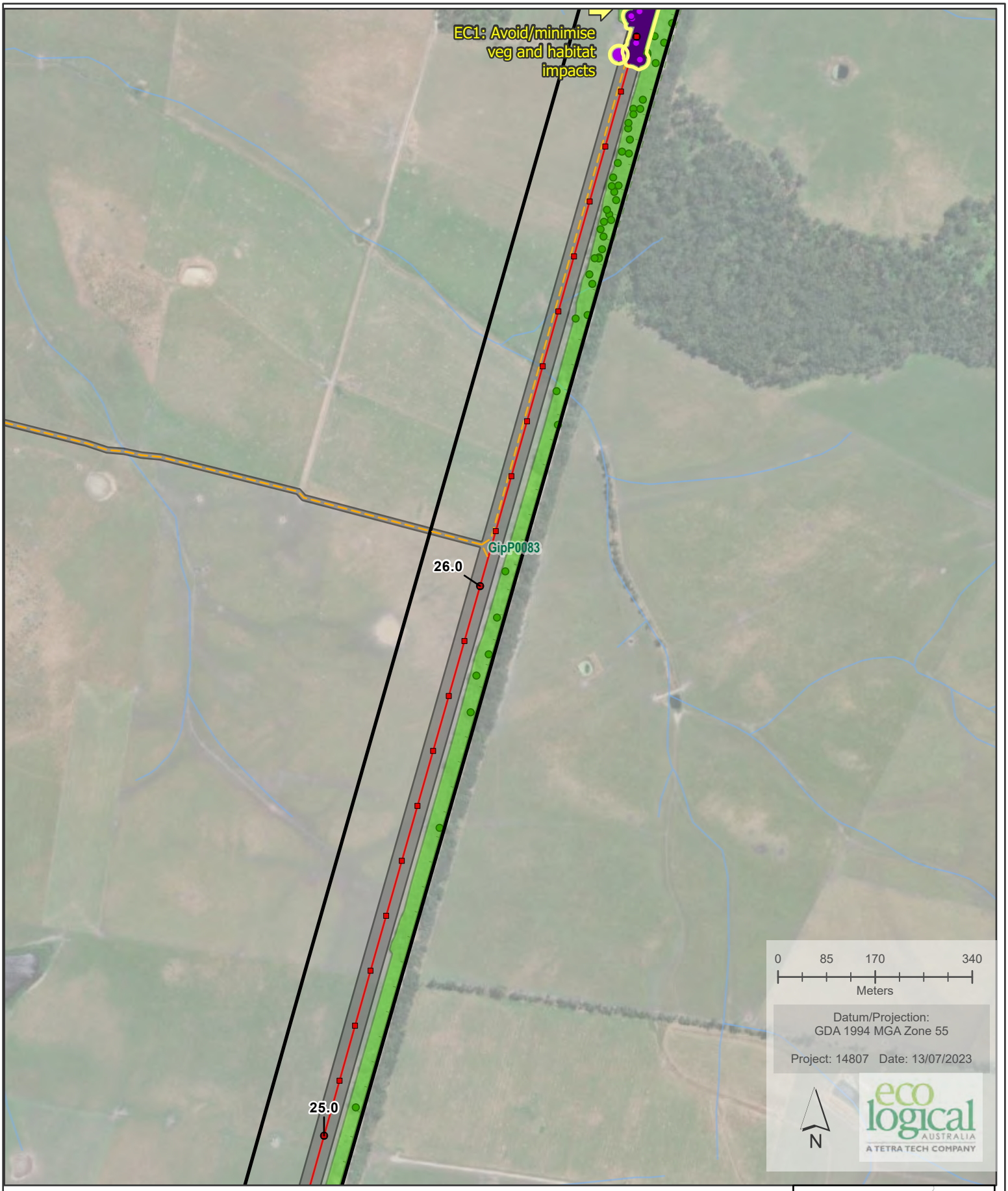


Figure 6.25 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

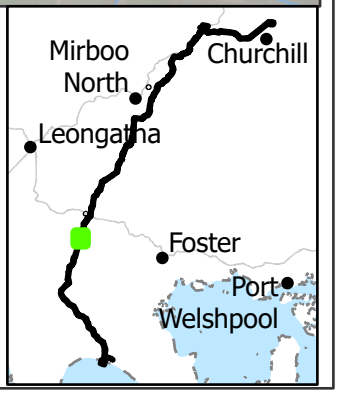
- Native vegetation
- Small native tree

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



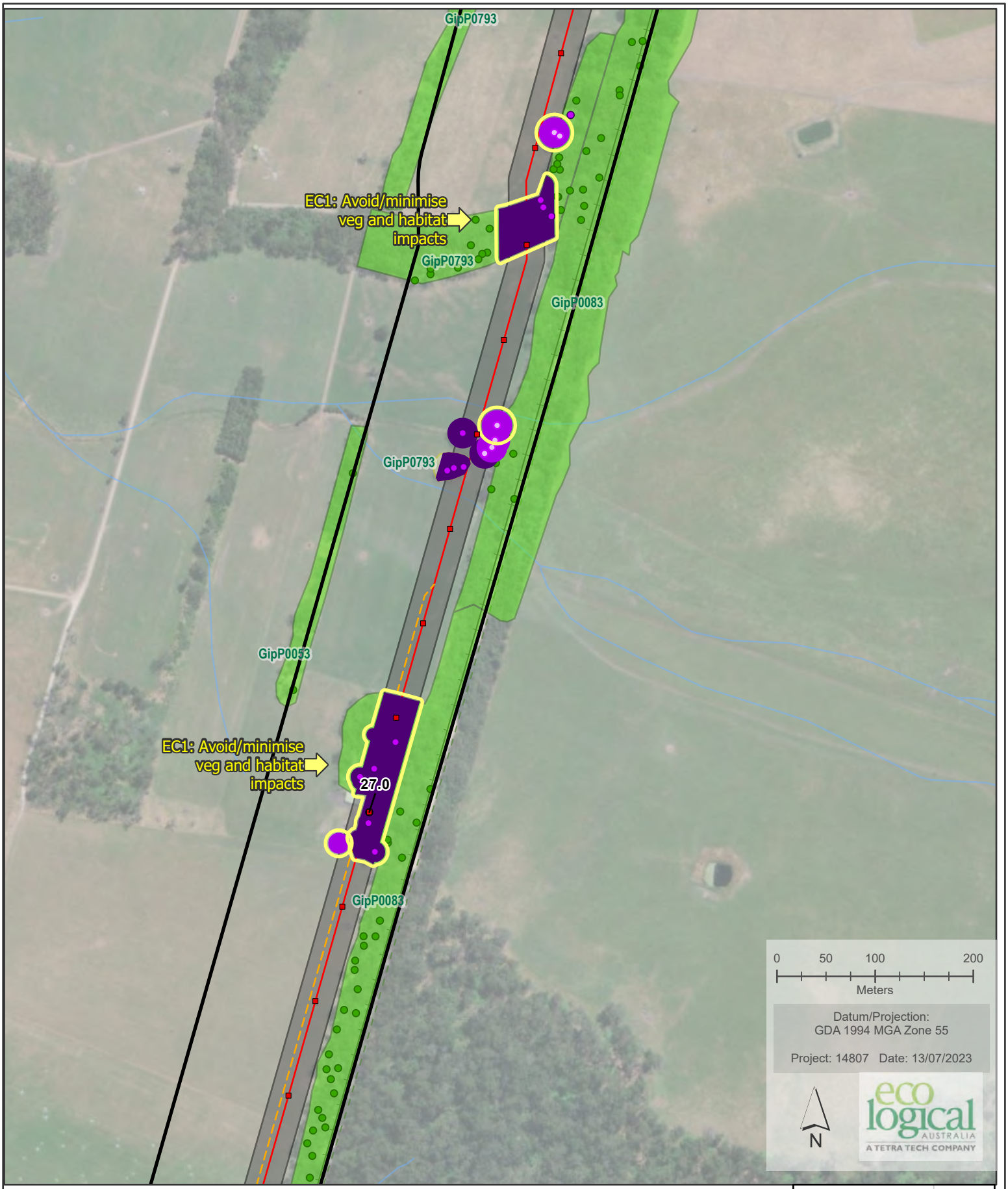


Figure 6.26 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)

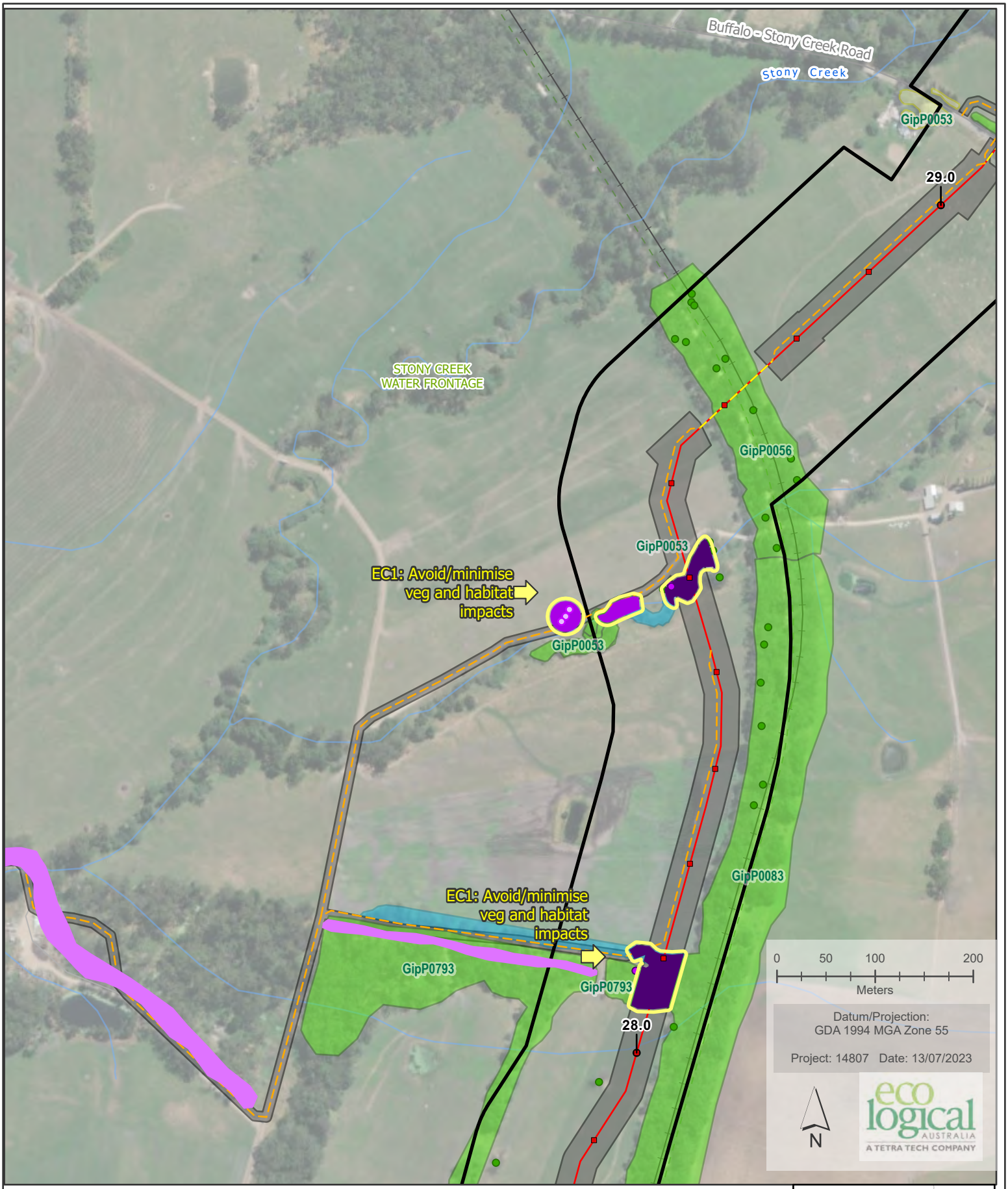


Figure 6.27 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- Direct impacts (trimming for access)
- **Proposed avoidance and minimisation**

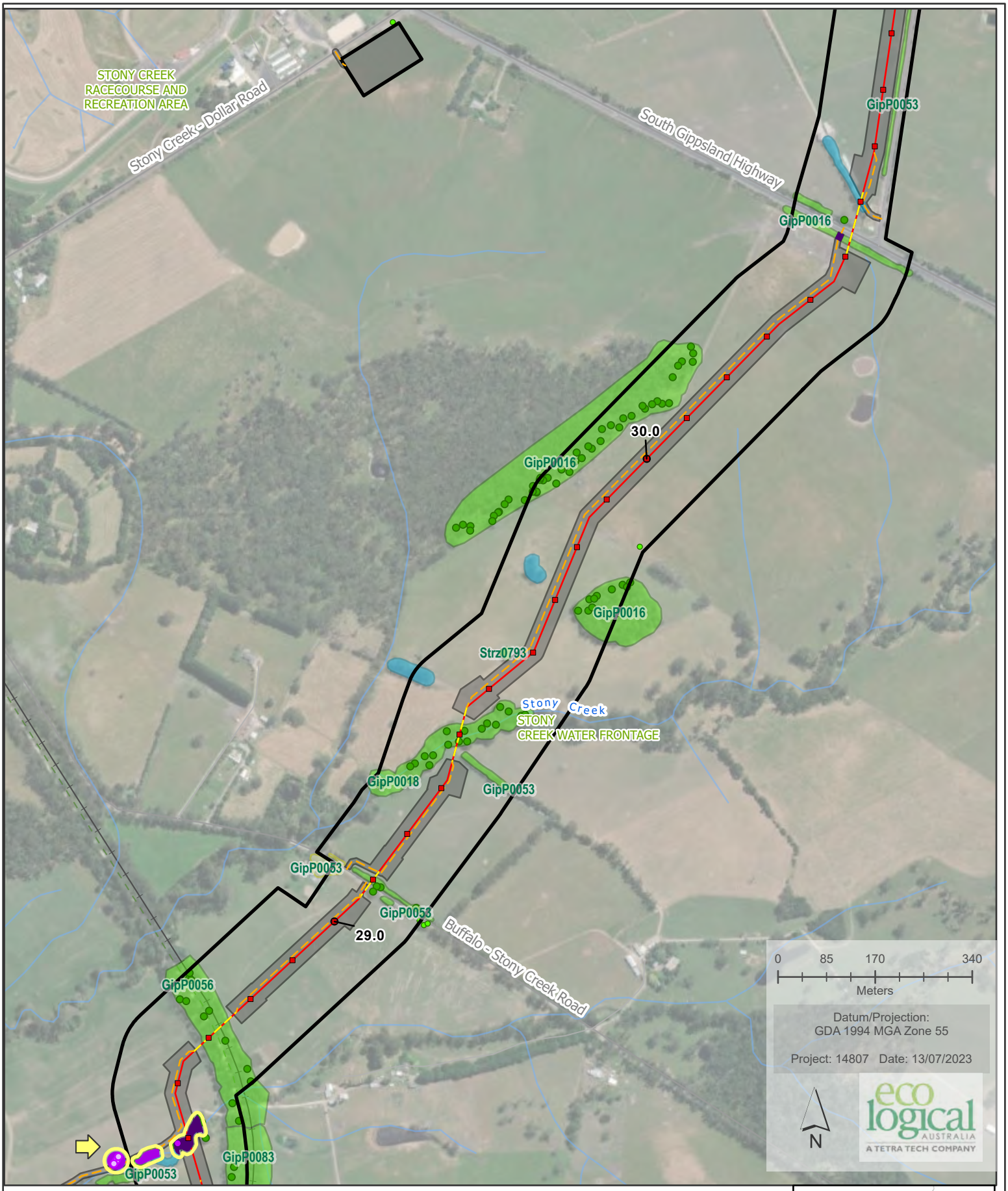


Figure 6.28 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

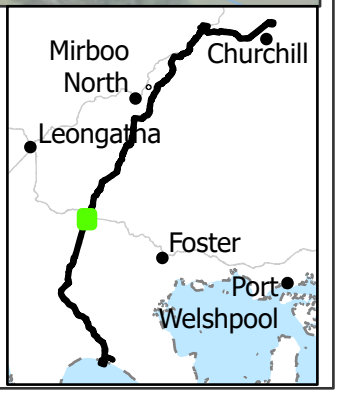
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



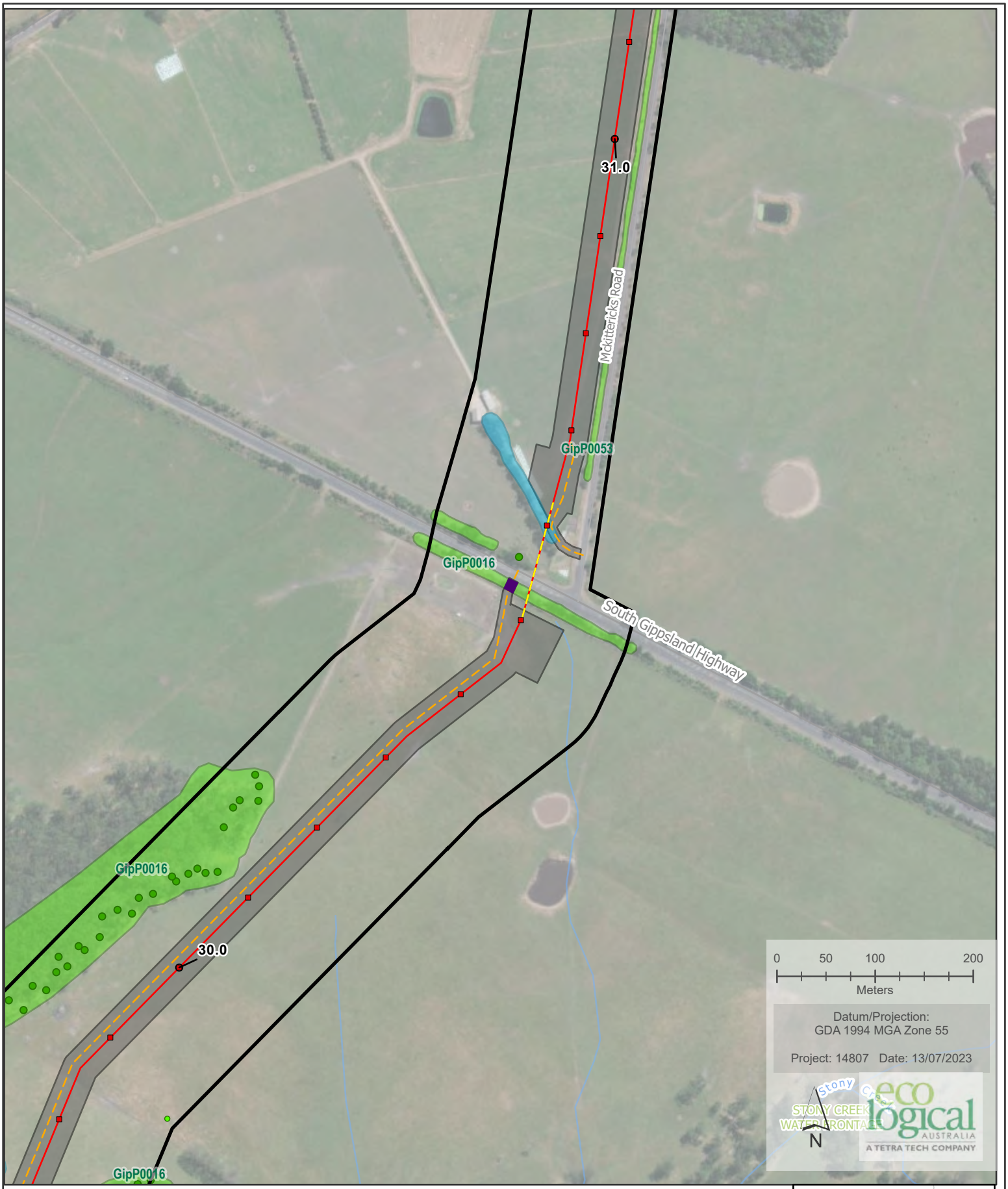


Figure 6.29 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

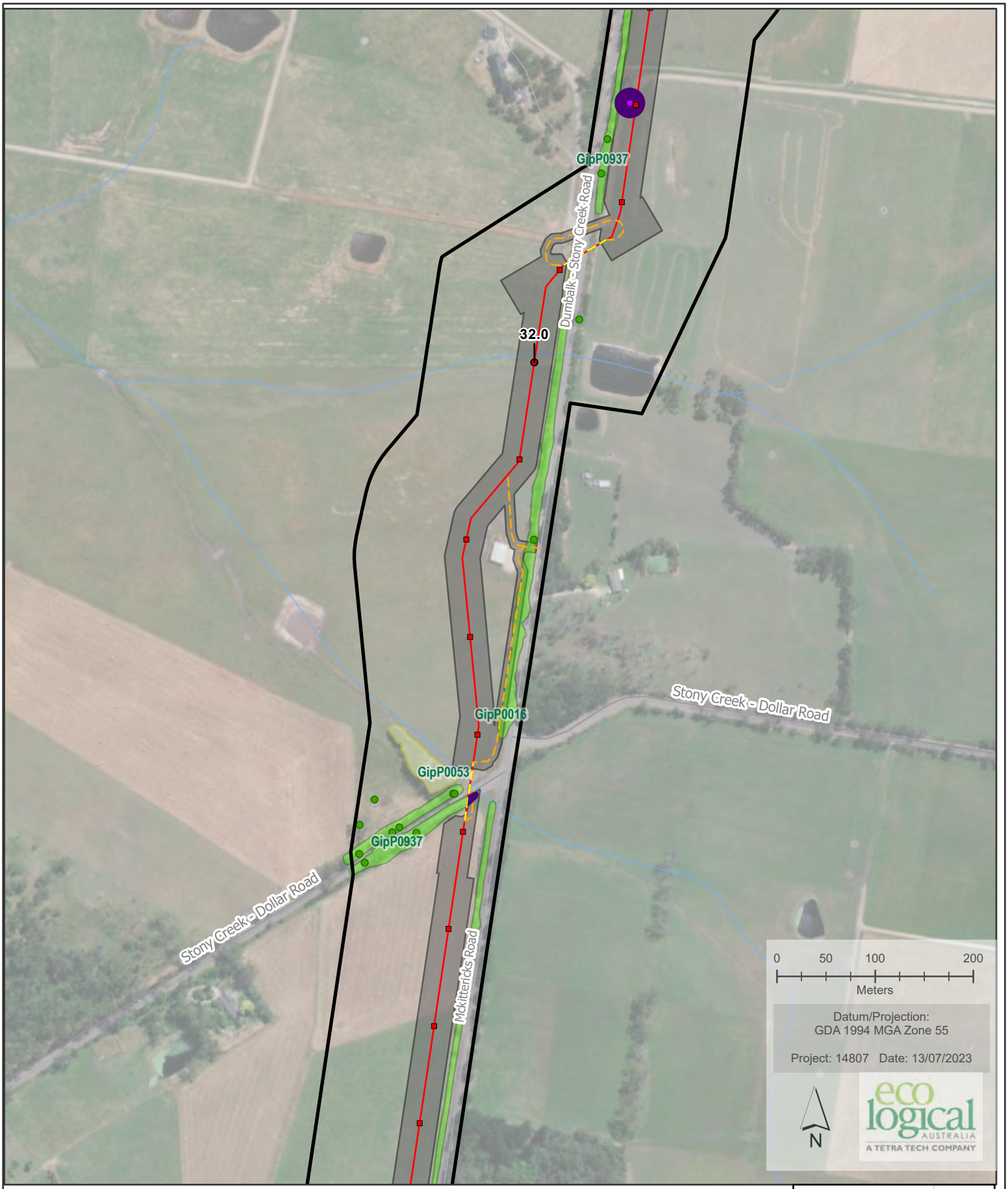


Figure 6.30 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

Impacted Large Native Trees

- Direct (vegetation removal)

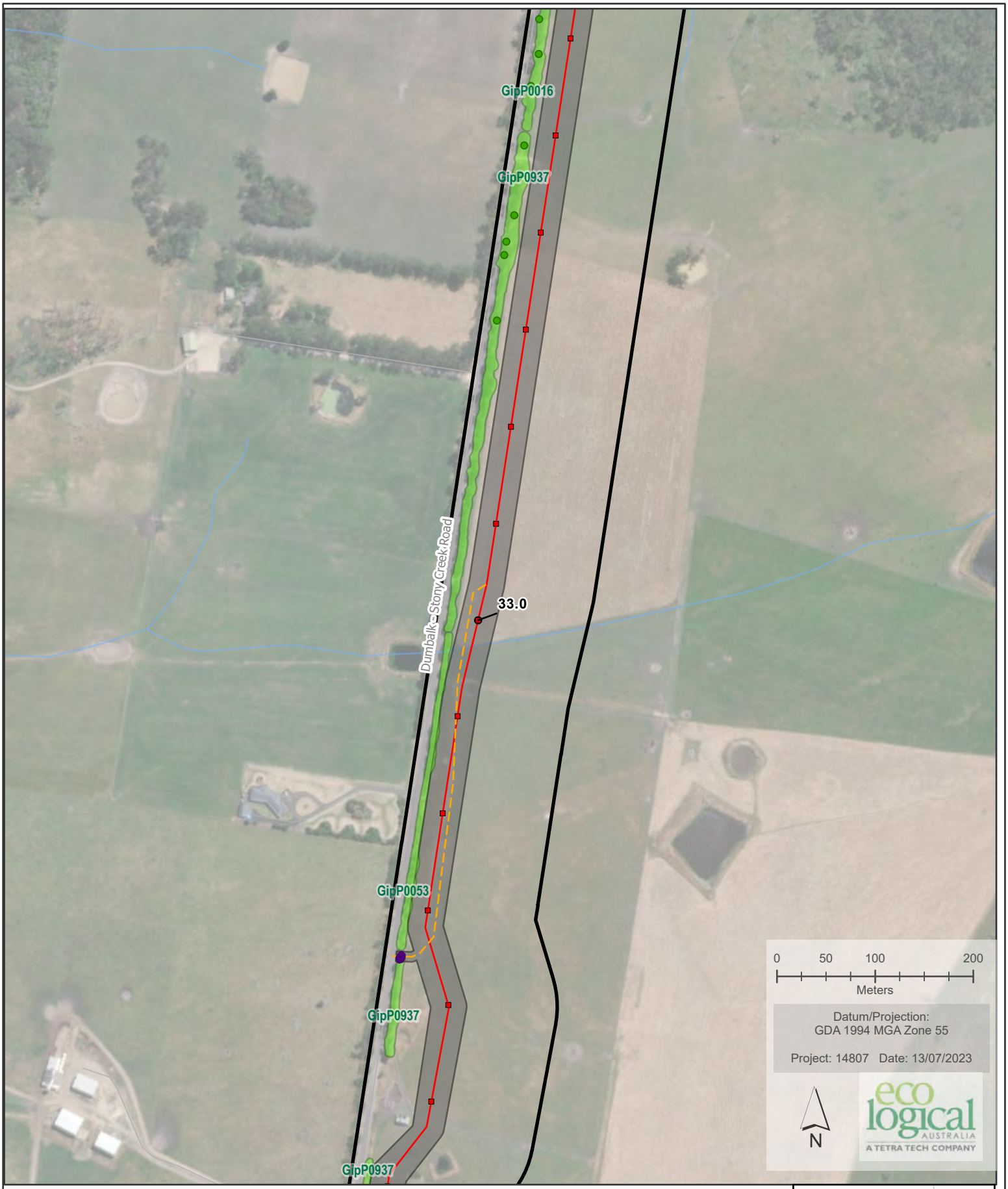


Figure 6.31 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points

Vegetation

- Native vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

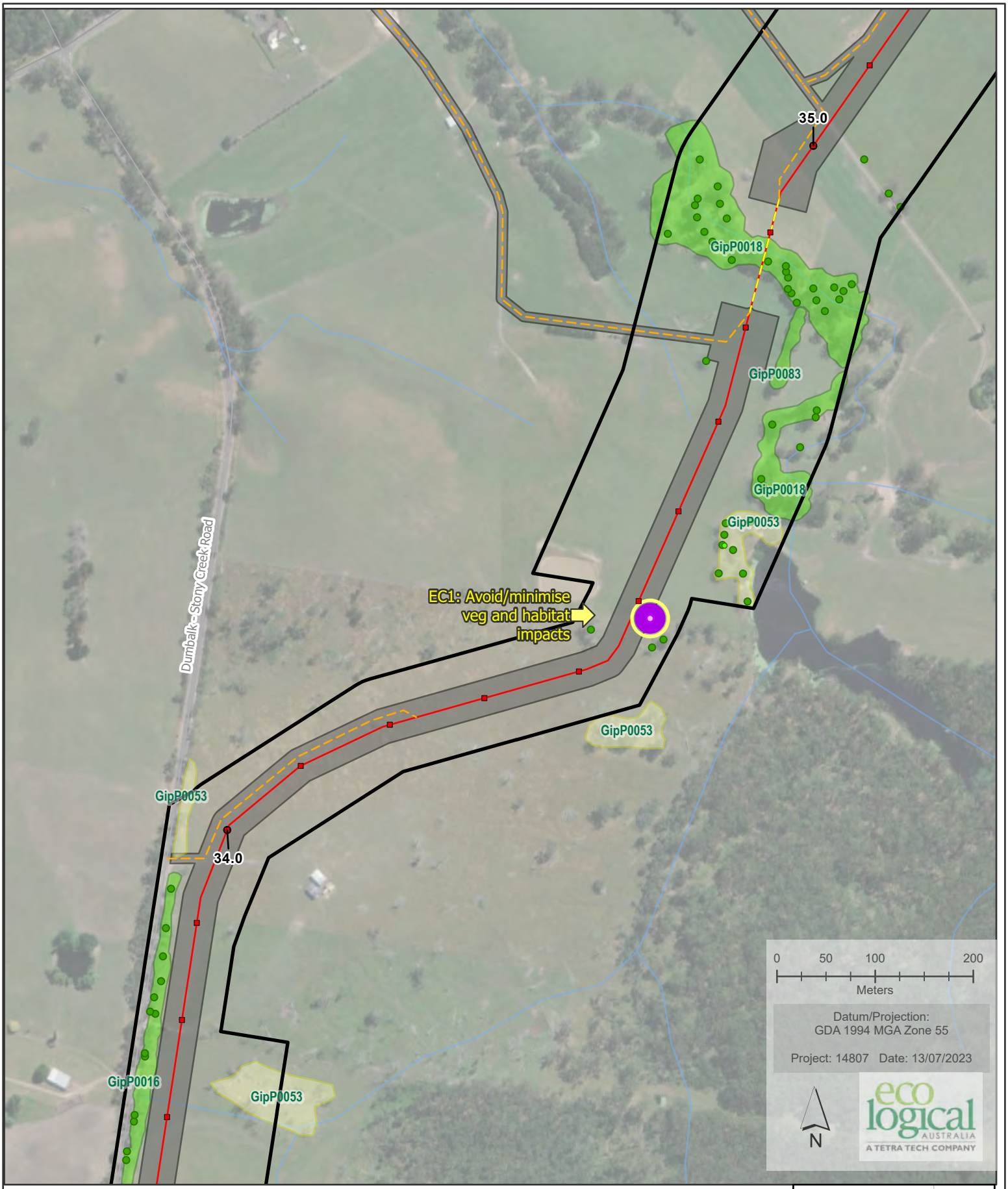


Figure 6.32 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Small native tree
- Large

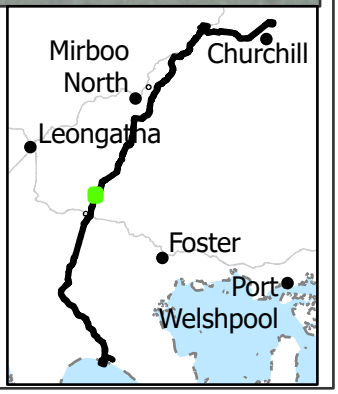
Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)

Proposed avoidance and minimisation

Impacted Large Native Trees

- Indirect (consequential loss)



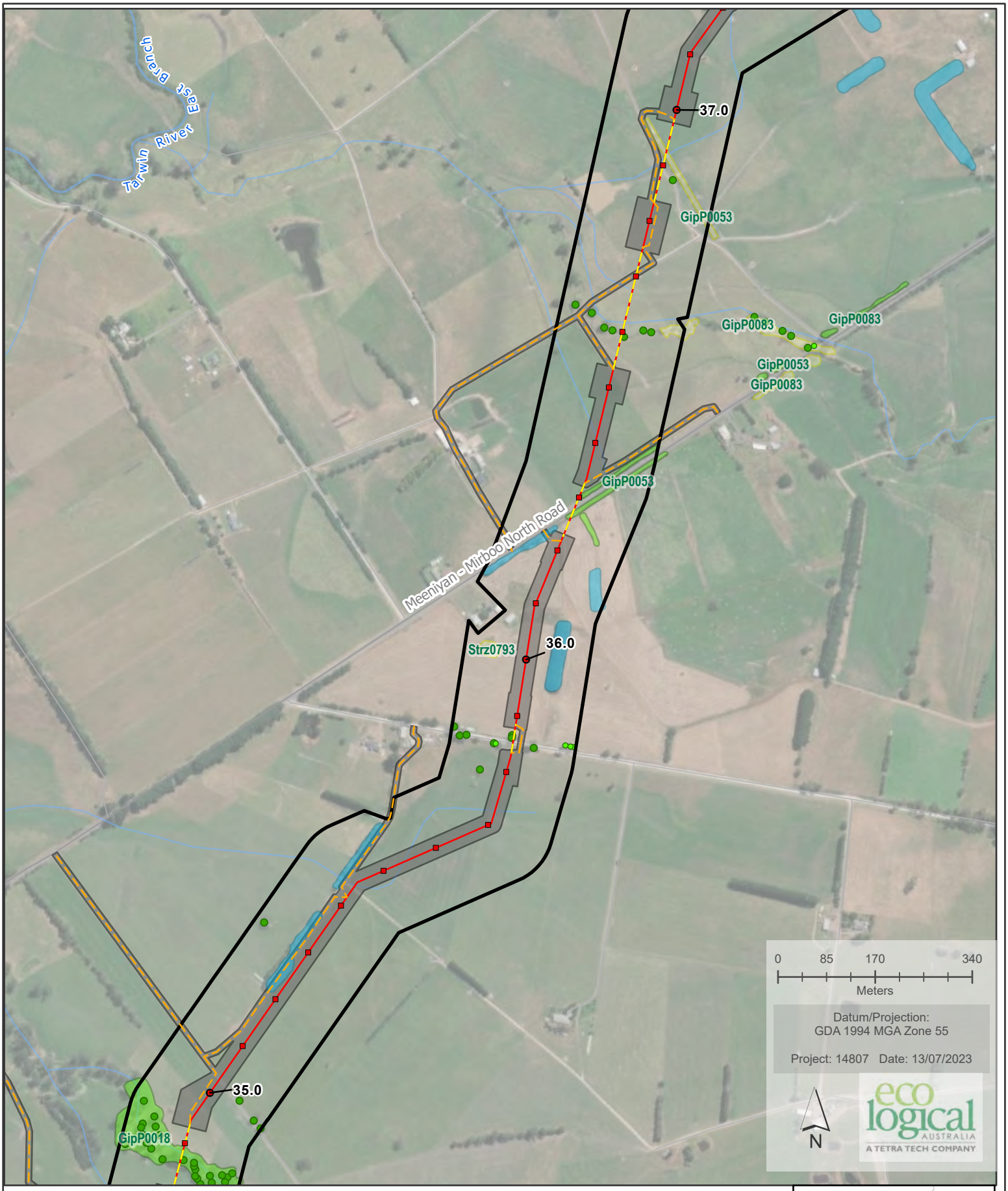


Figure 6.33 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

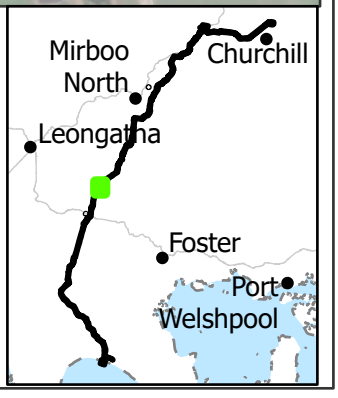


Figure 6.34 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

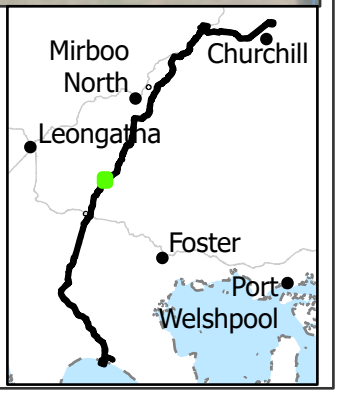
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

Impacted Large Native Trees

- Direct (vegetation removal)



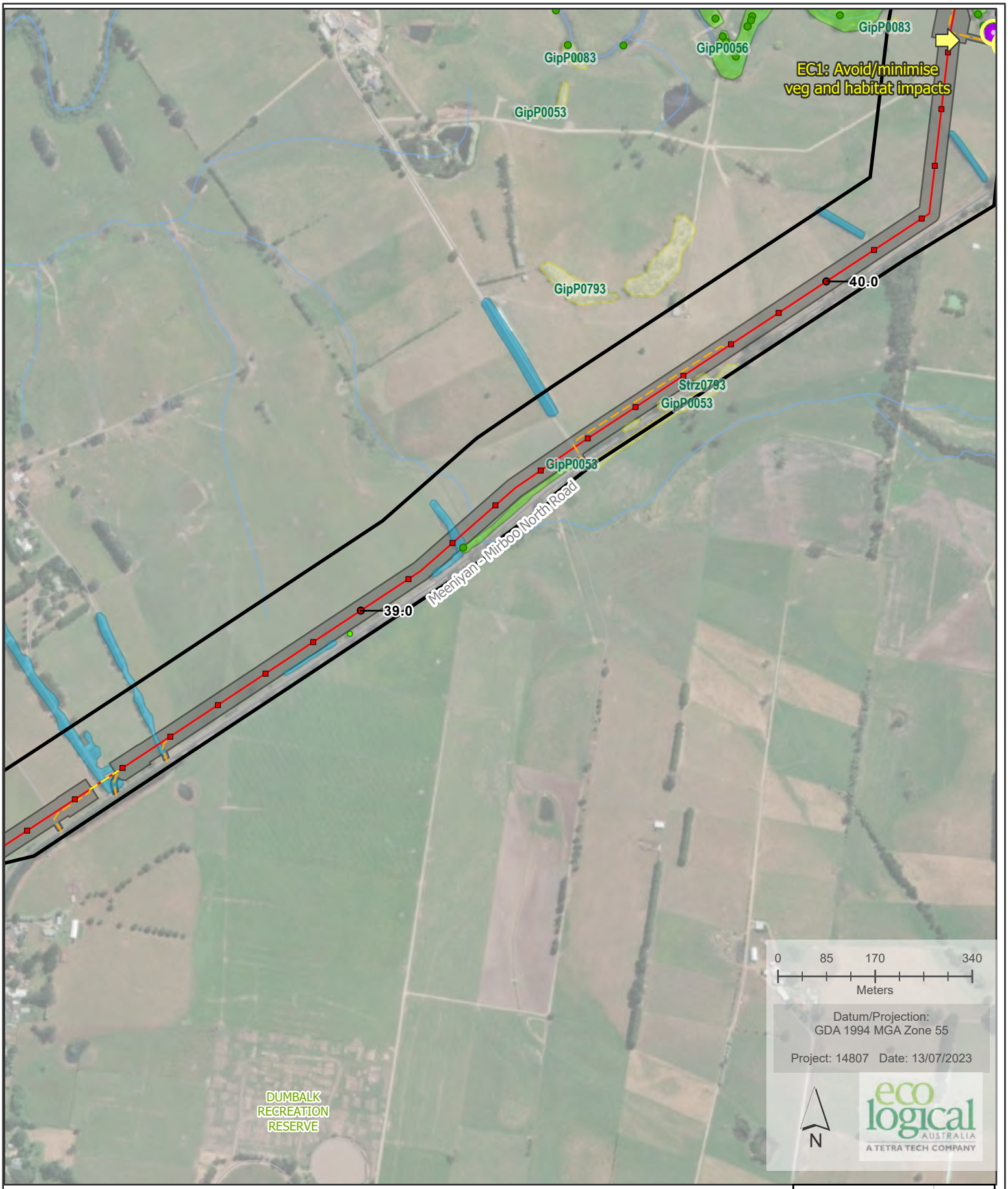


Figure 6.35 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Indirect (consequential loss)

Figure 6.36 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

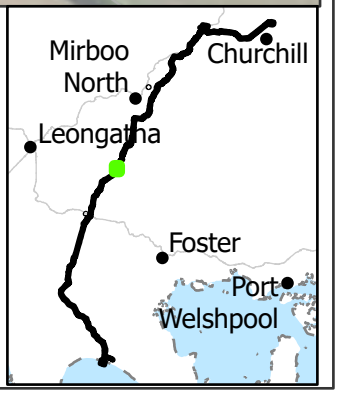
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



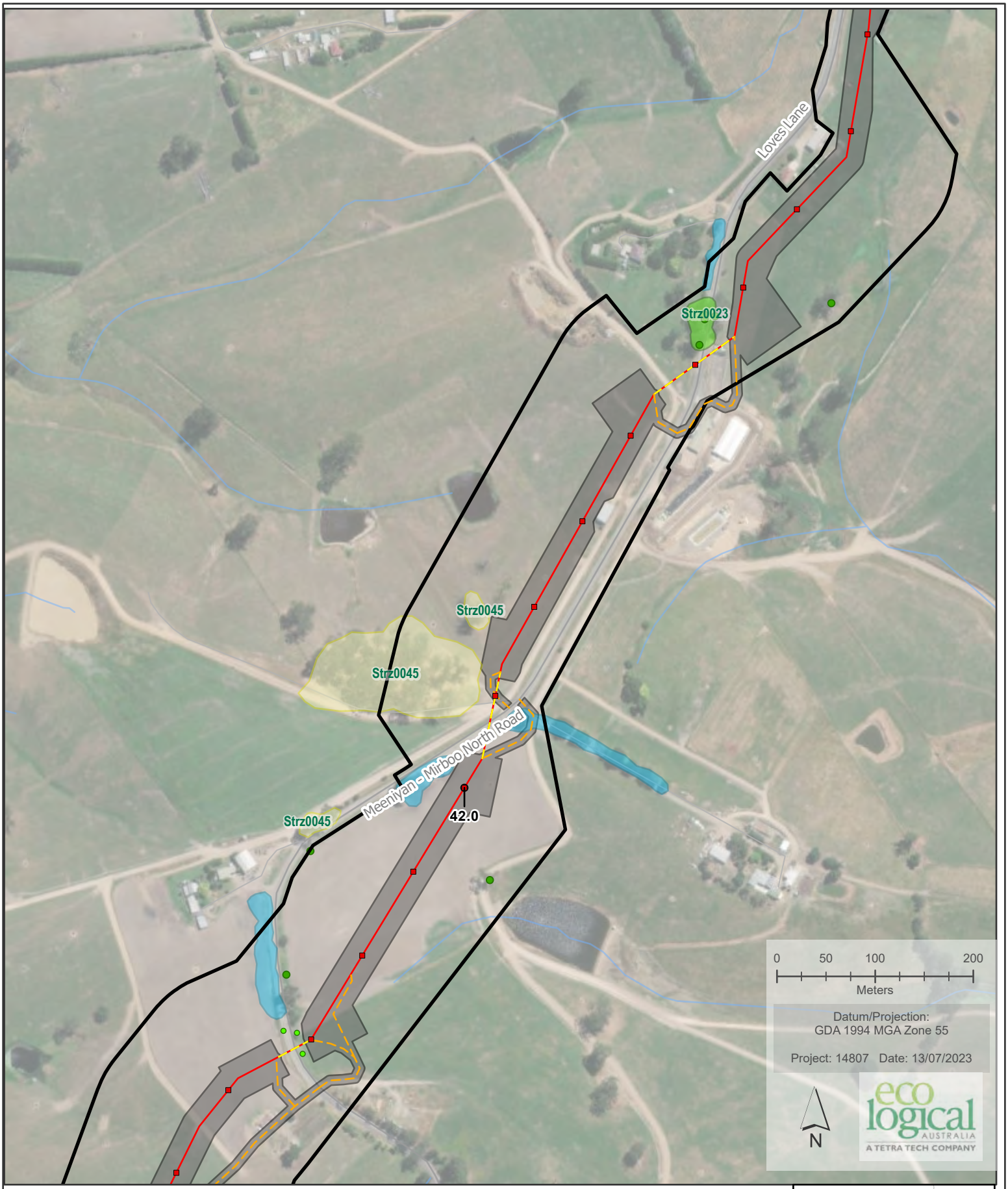
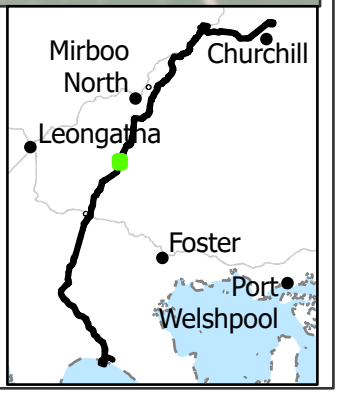


Figure 6.37 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large



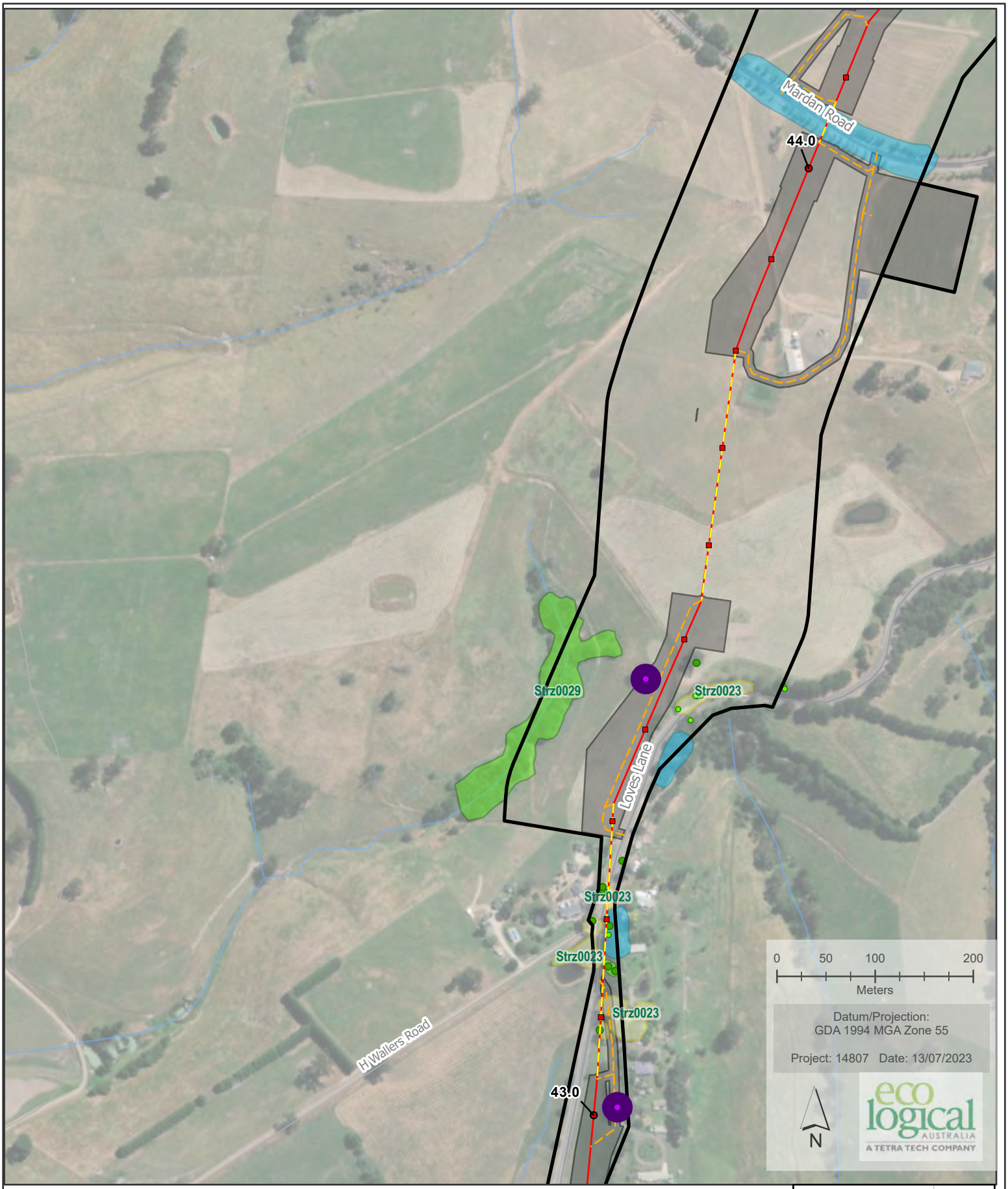


Figure 6.38 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

Impacted Large Native Trees

- Direct (vegetation removal)

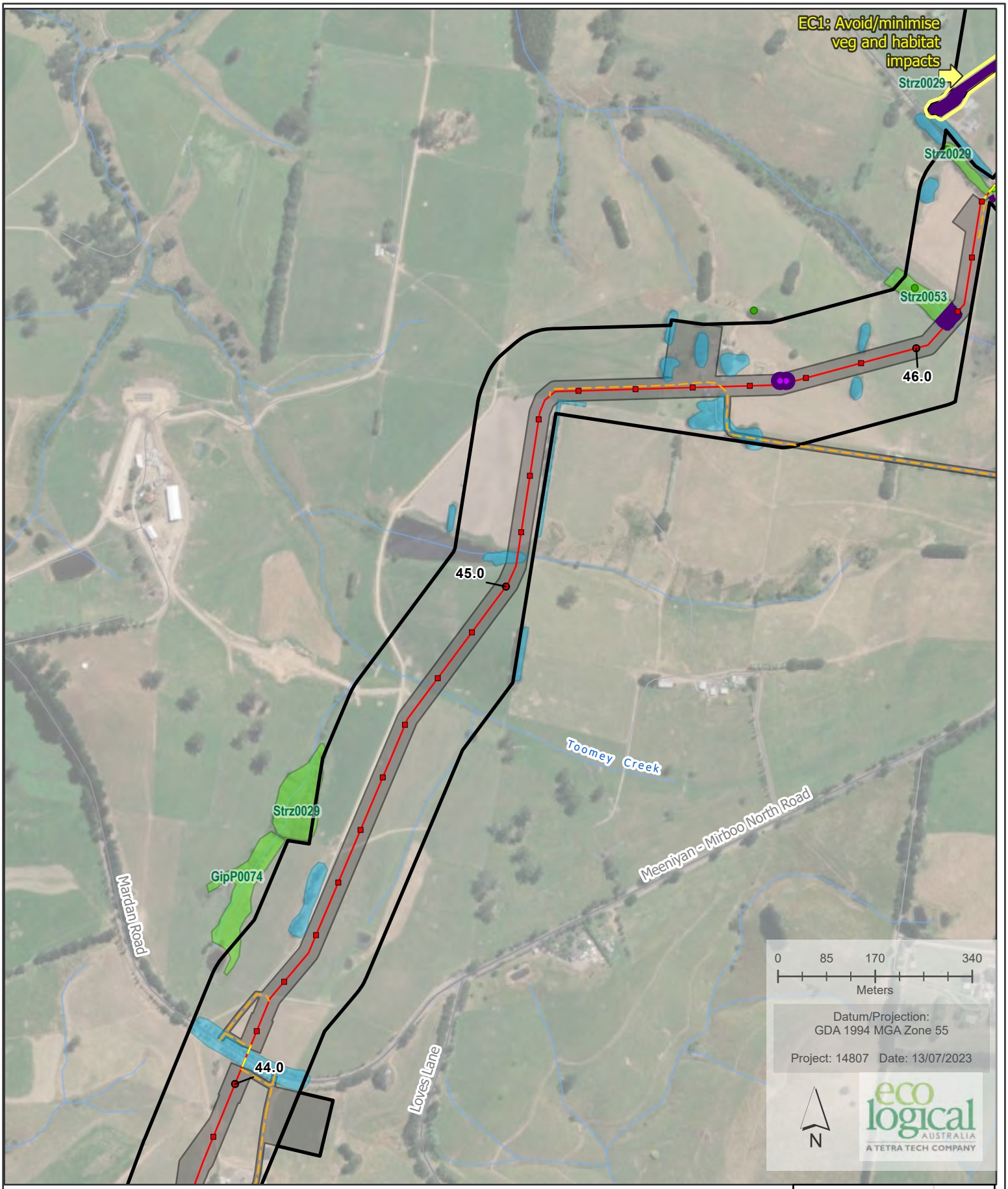


Figure 6.39 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)

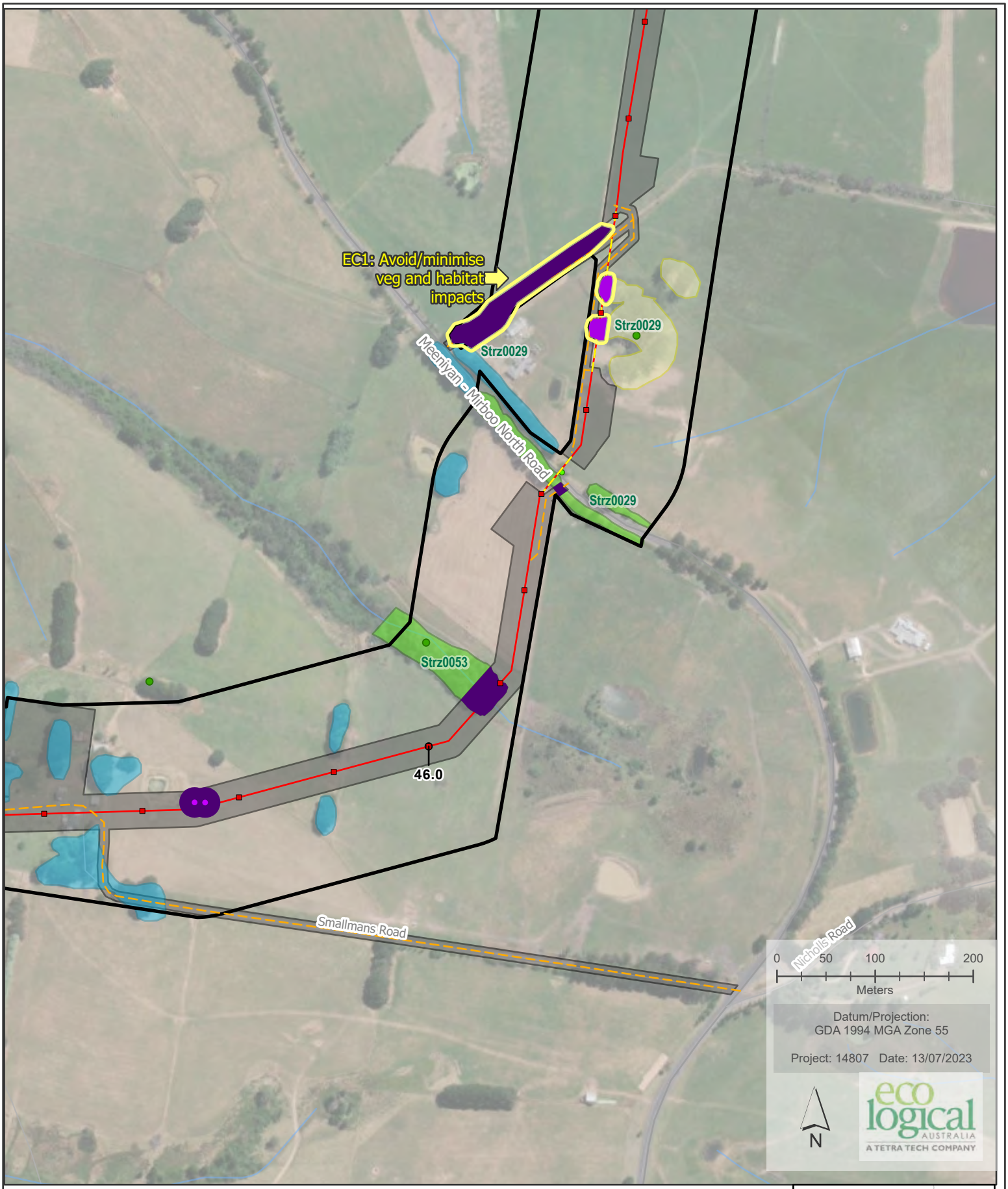


Figure 6.40 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)

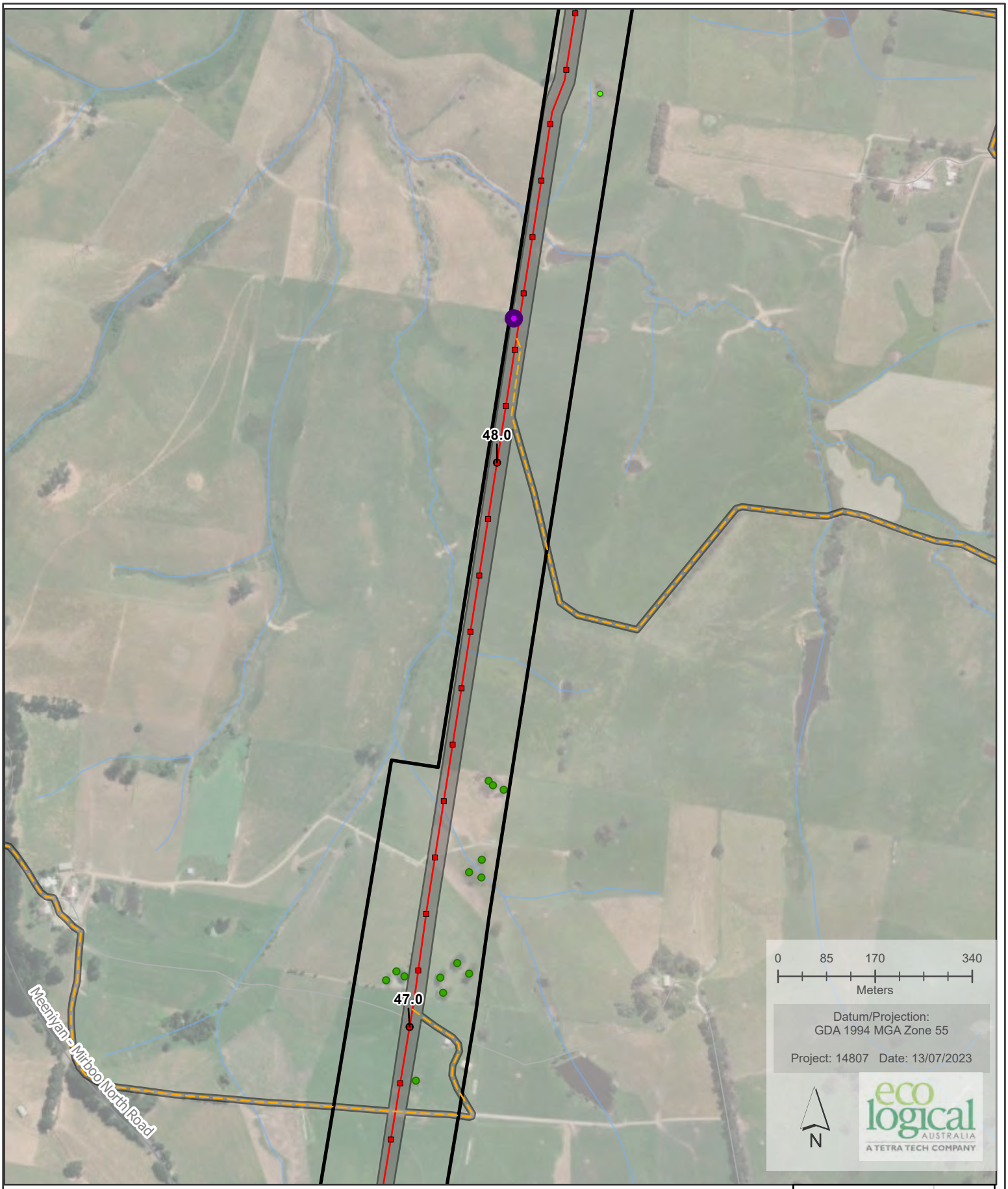


Figure 6.41 Native vegetation, habitats and potential impacts

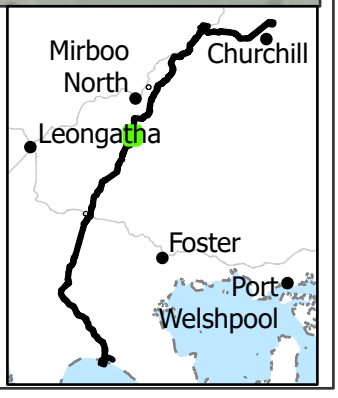
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

Impacted Large Native Trees

- Direct (vegetation removal)



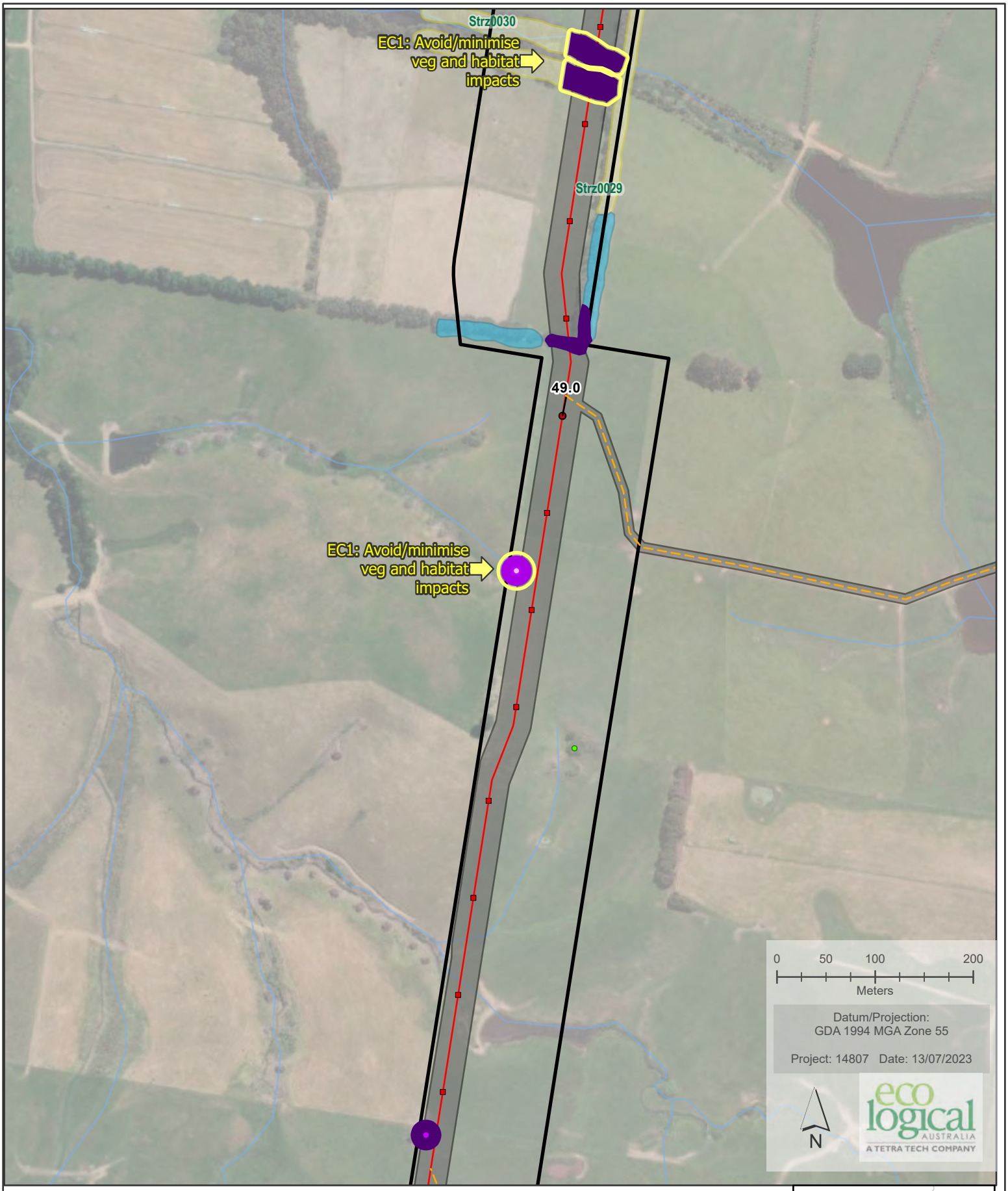


Figure 6.42 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

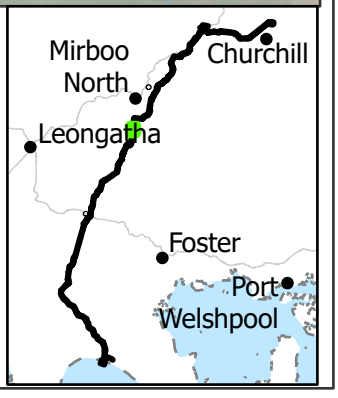
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



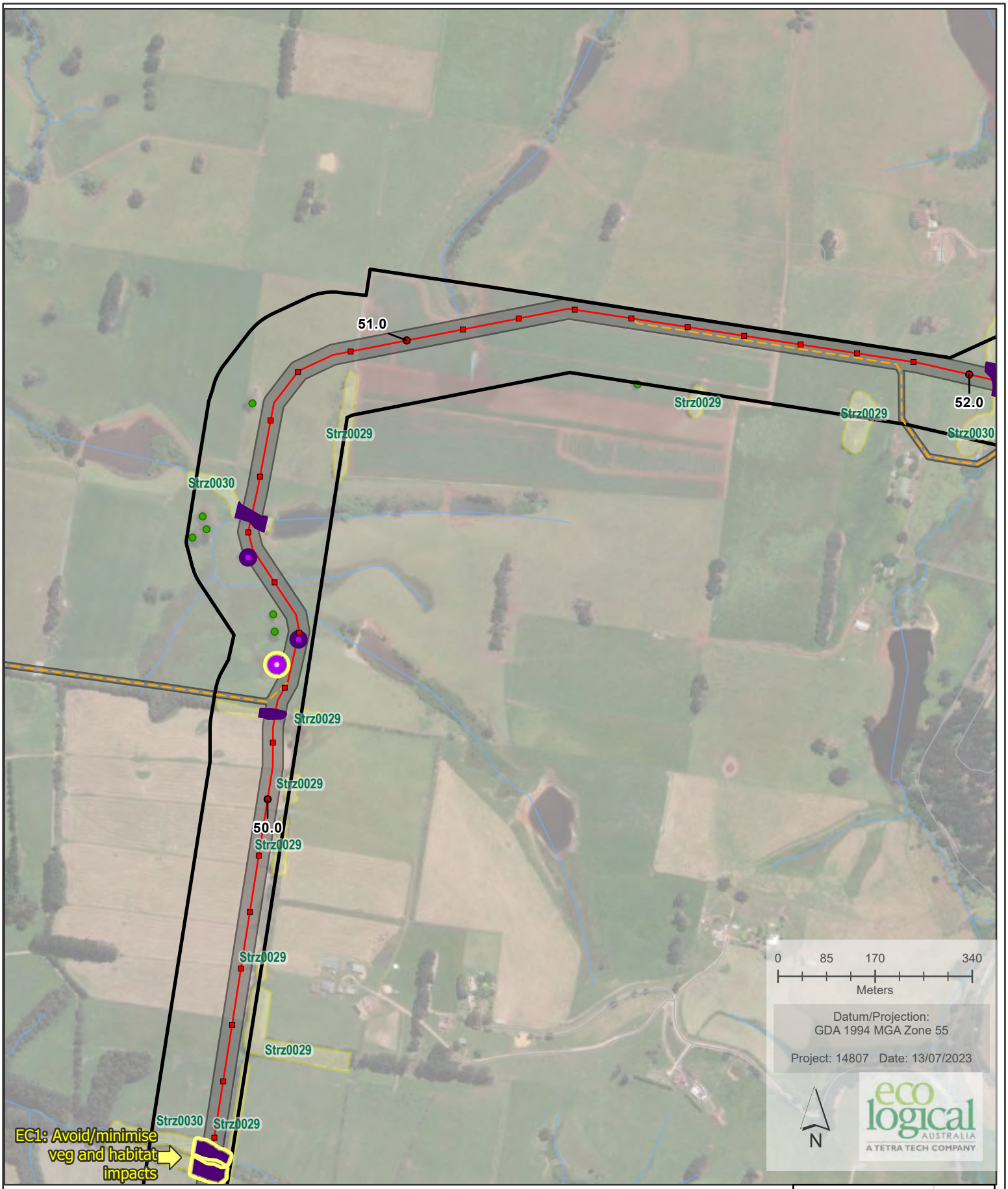


Figure 6.43 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

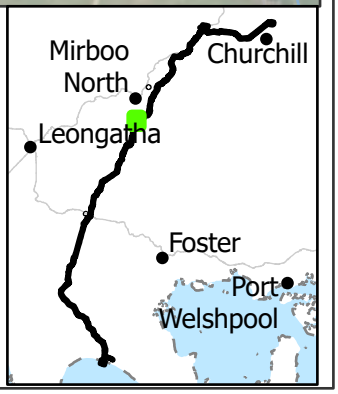
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



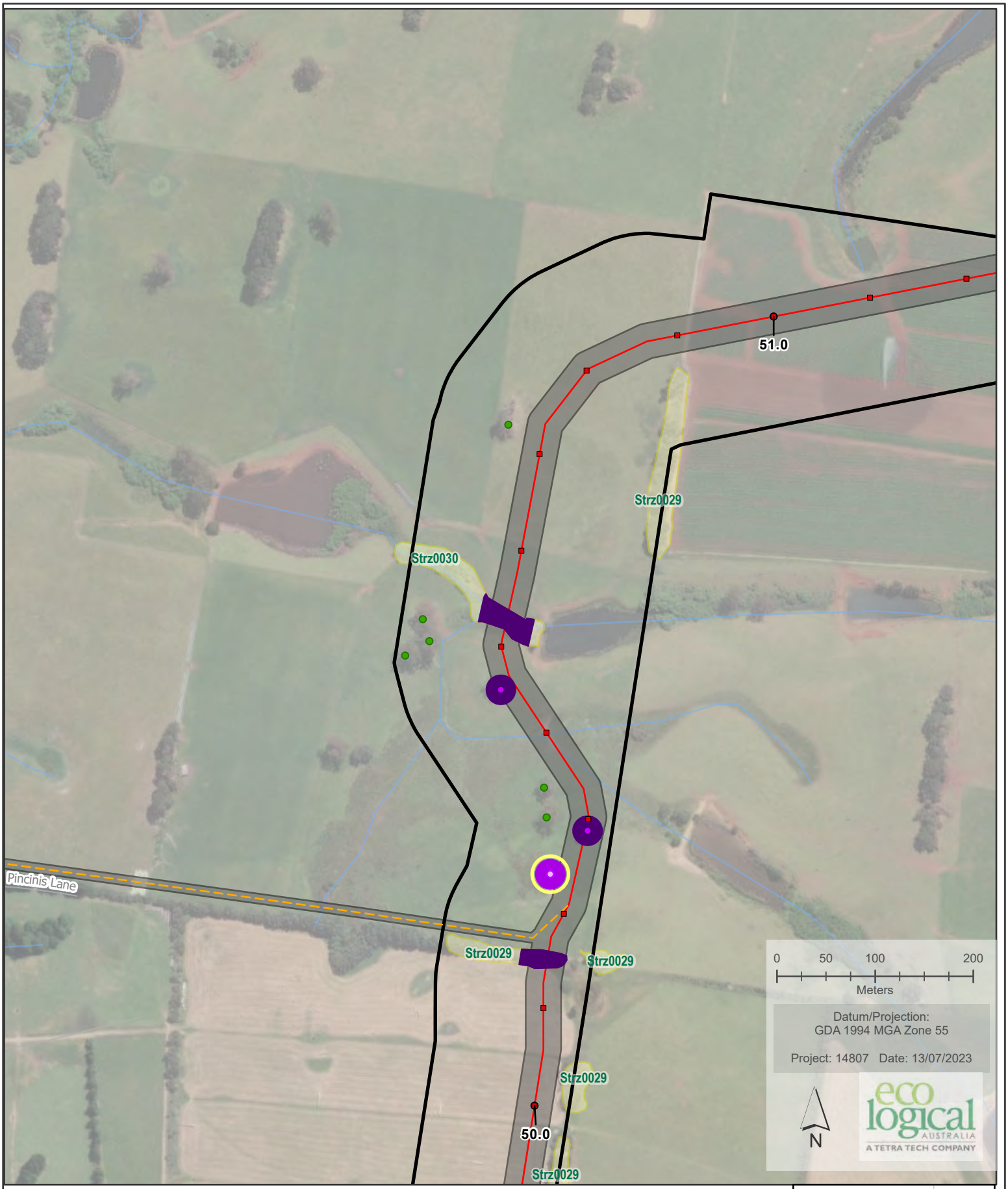


Figure 6.44 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points

Vegetation

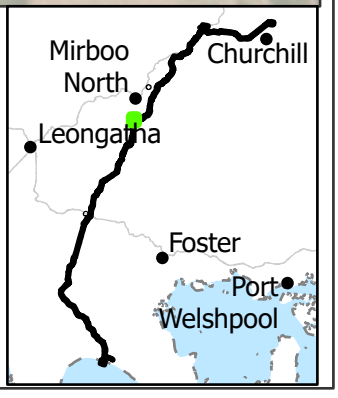
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



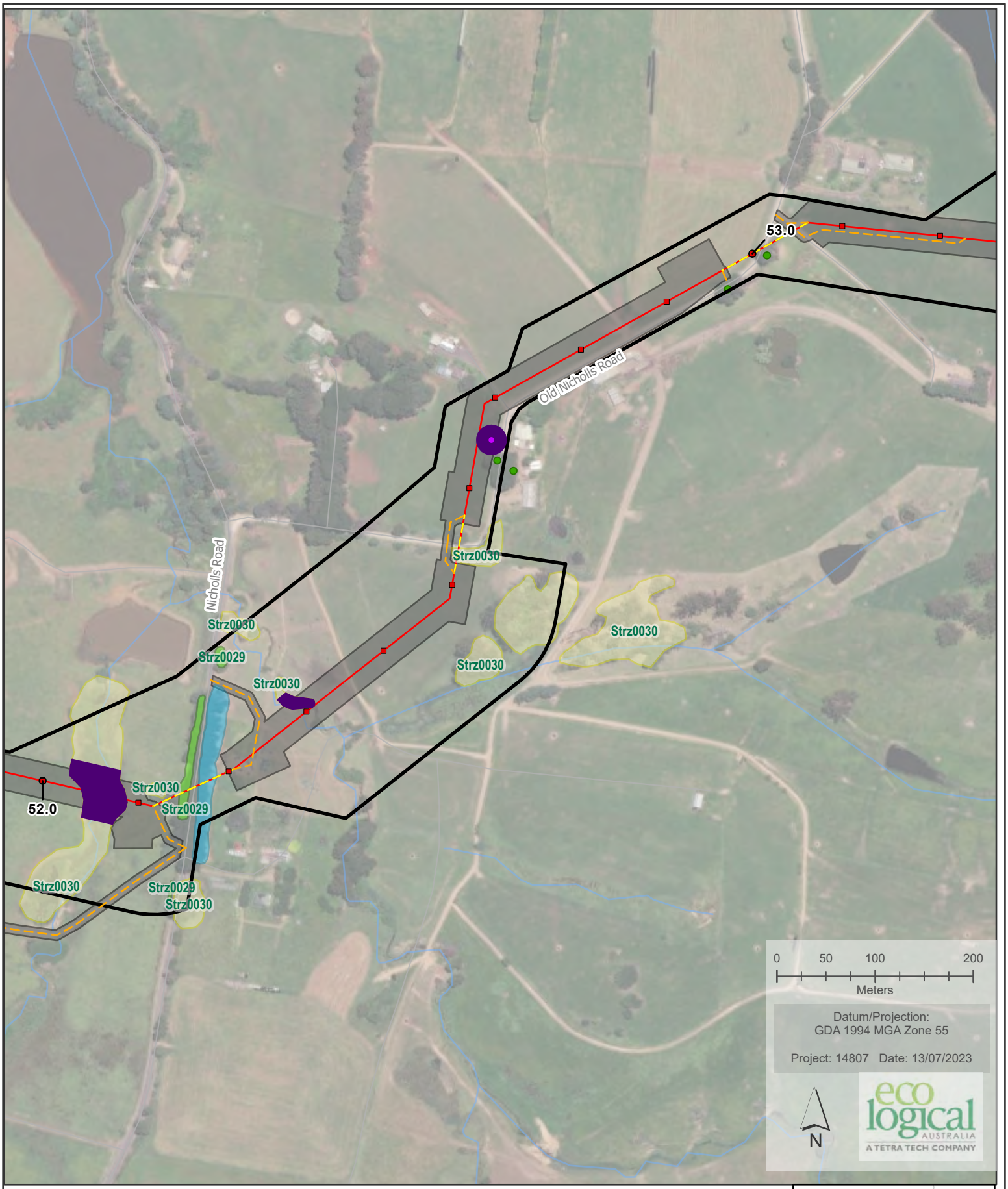


Figure 6.45 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

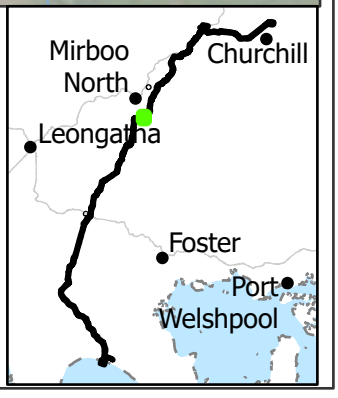
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

Impacted Large Native Trees

- Direct (vegetation removal)



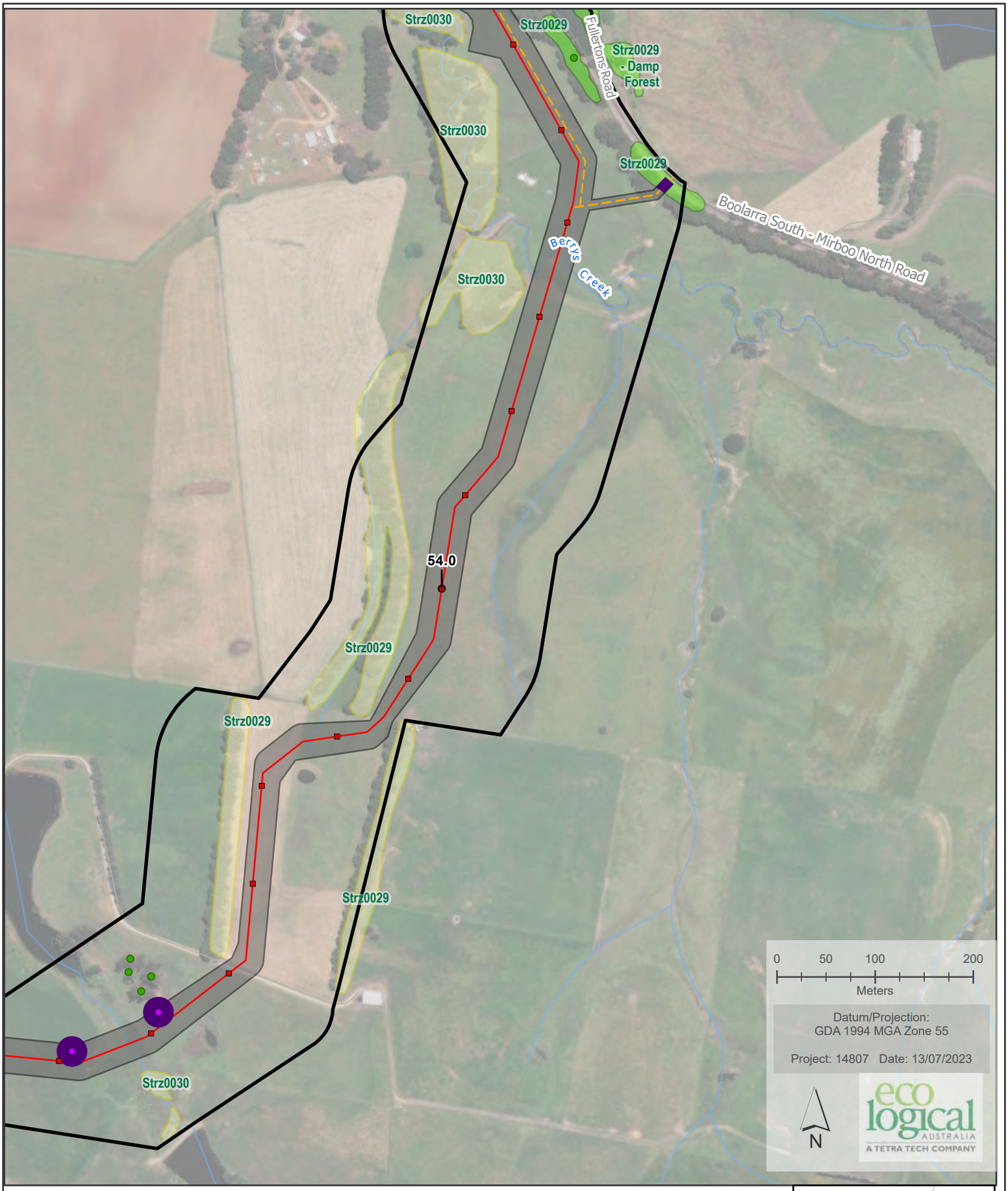


Figure 6.46 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points

Vegetation

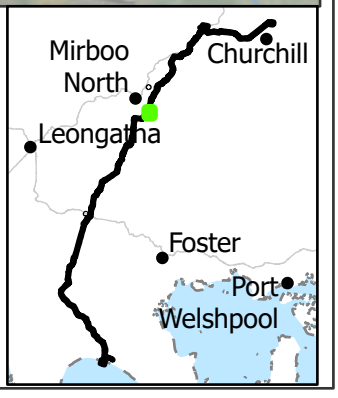
- Native vegetation
- Native vegetation (unassessed)
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

Impacted Large Native Trees

- Direct (vegetation removal)



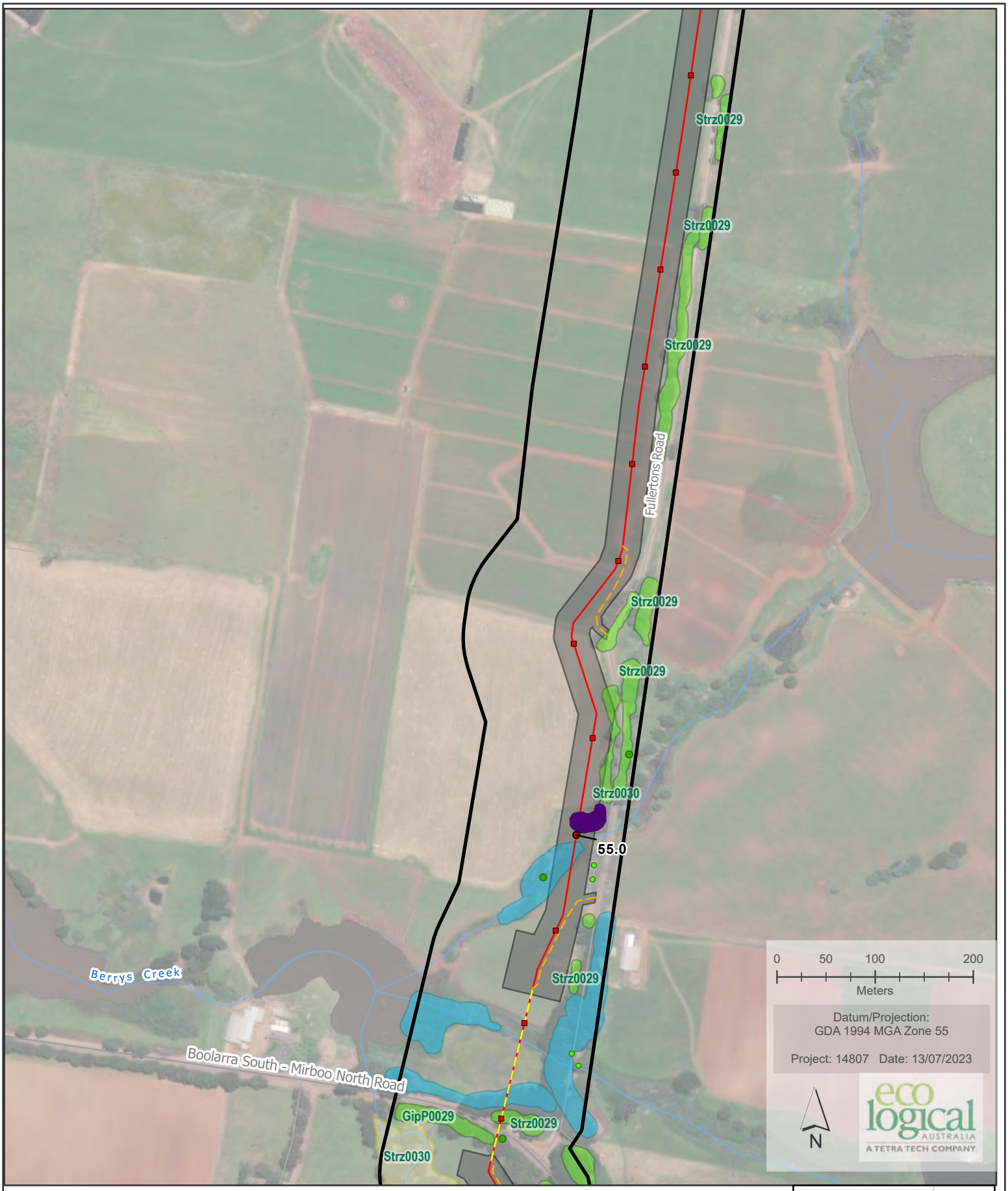


Figure 6.47 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)

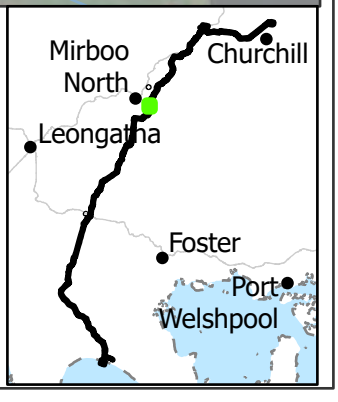


Figure 6.48 Native vegetation, habitats and potential impacts

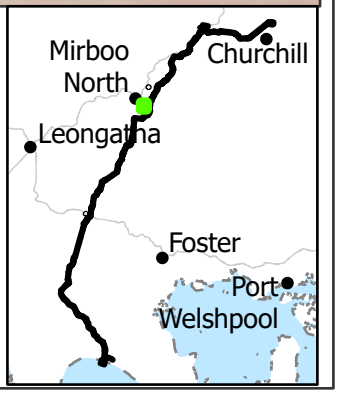
HV swept path

Vegetation

Native vegetation (unassessed)

Impacted Native Vegetation (pre-mitigation)

Direct impacts (trimming for access)



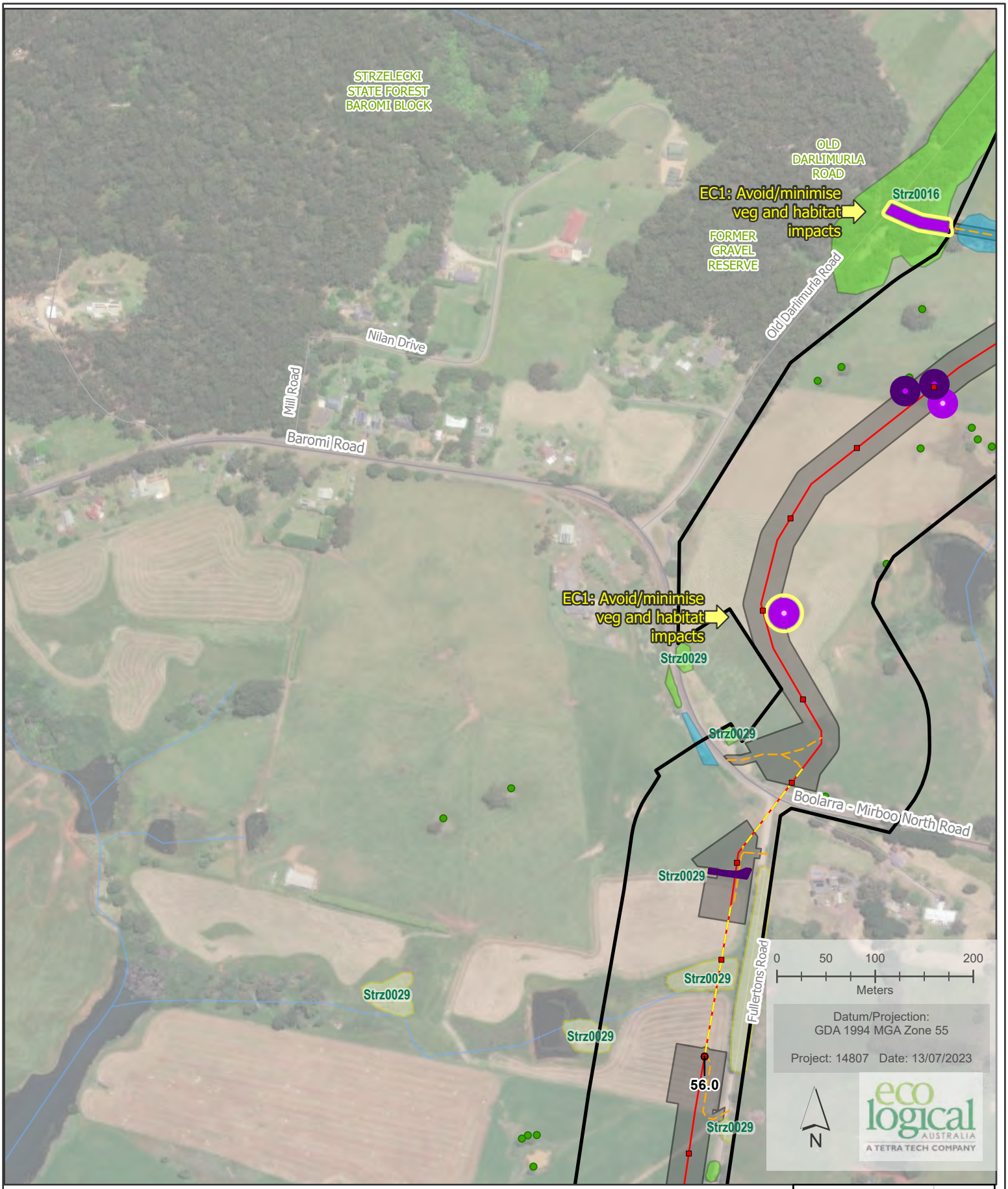


Figure 6.49 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

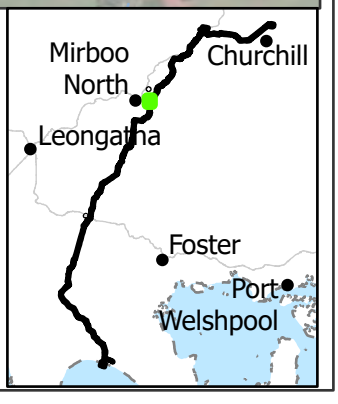
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



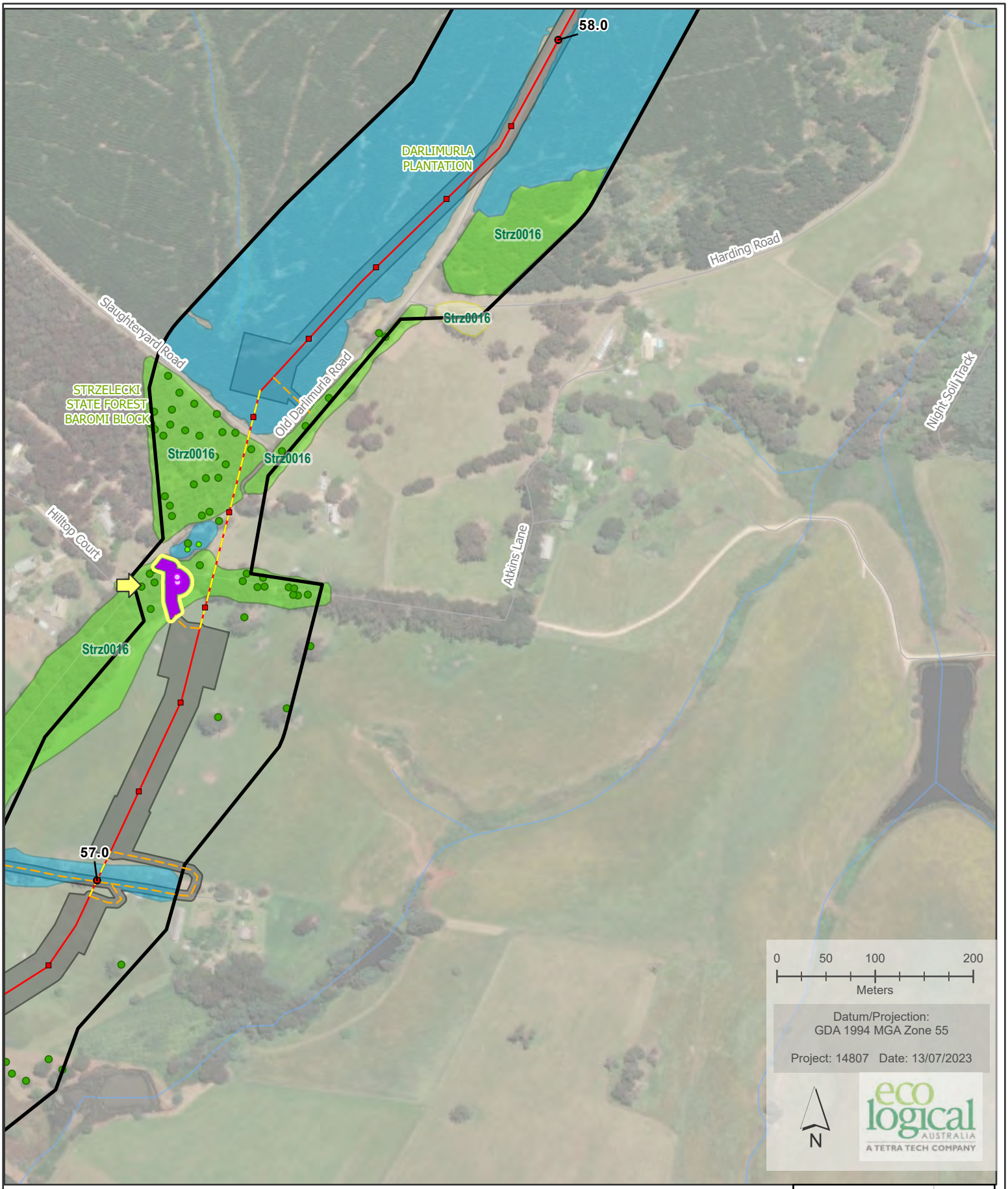


Figure 6.50 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Indirect (consequential loss)

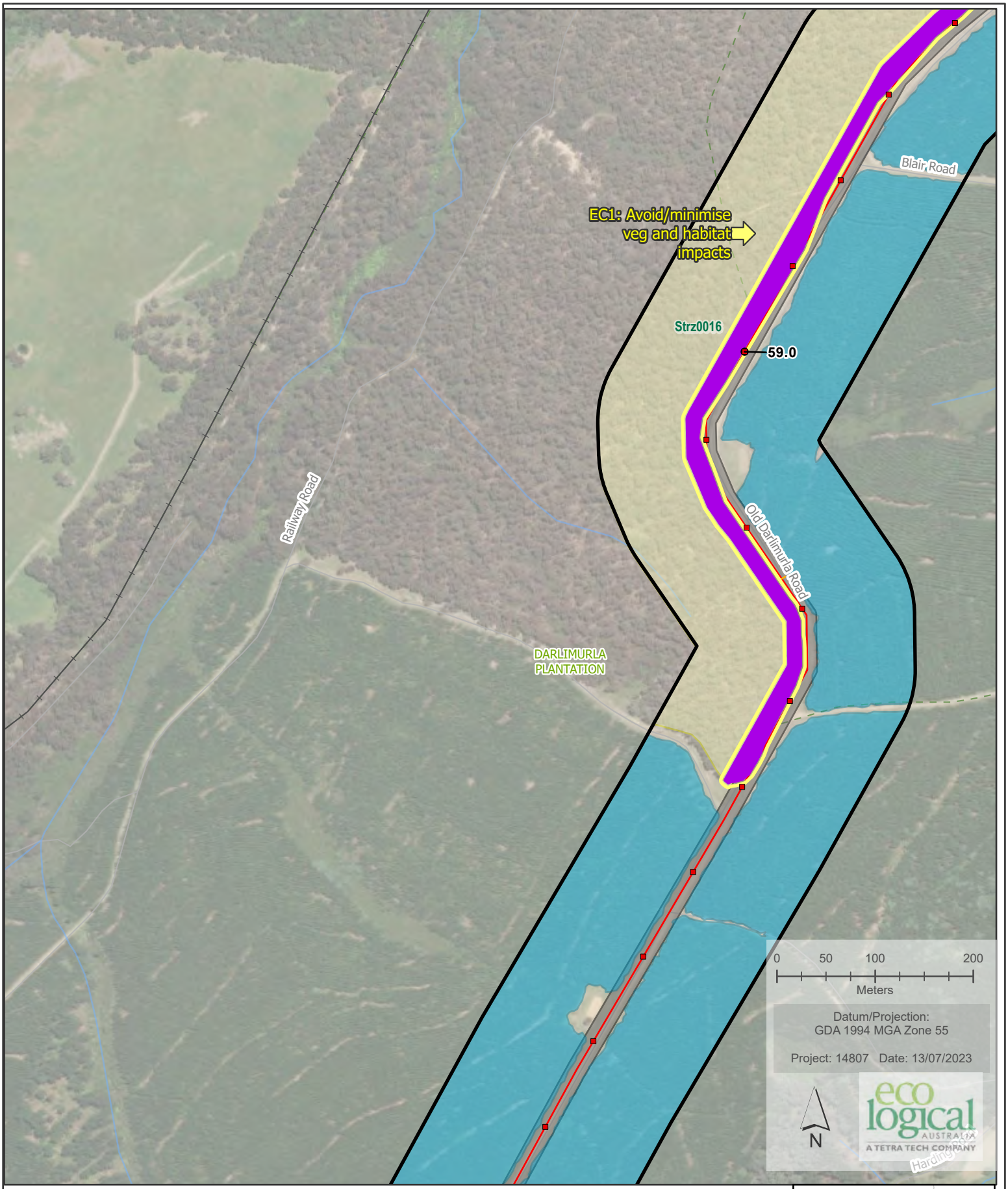


Figure 6.51 Native vegetation, habitats and potential impacts

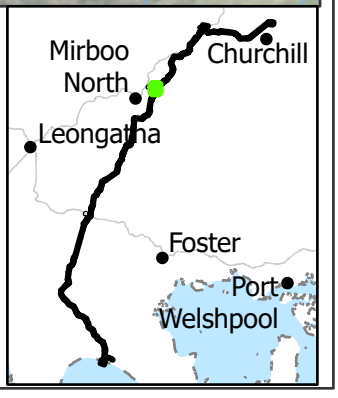
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation (unassessed)
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**



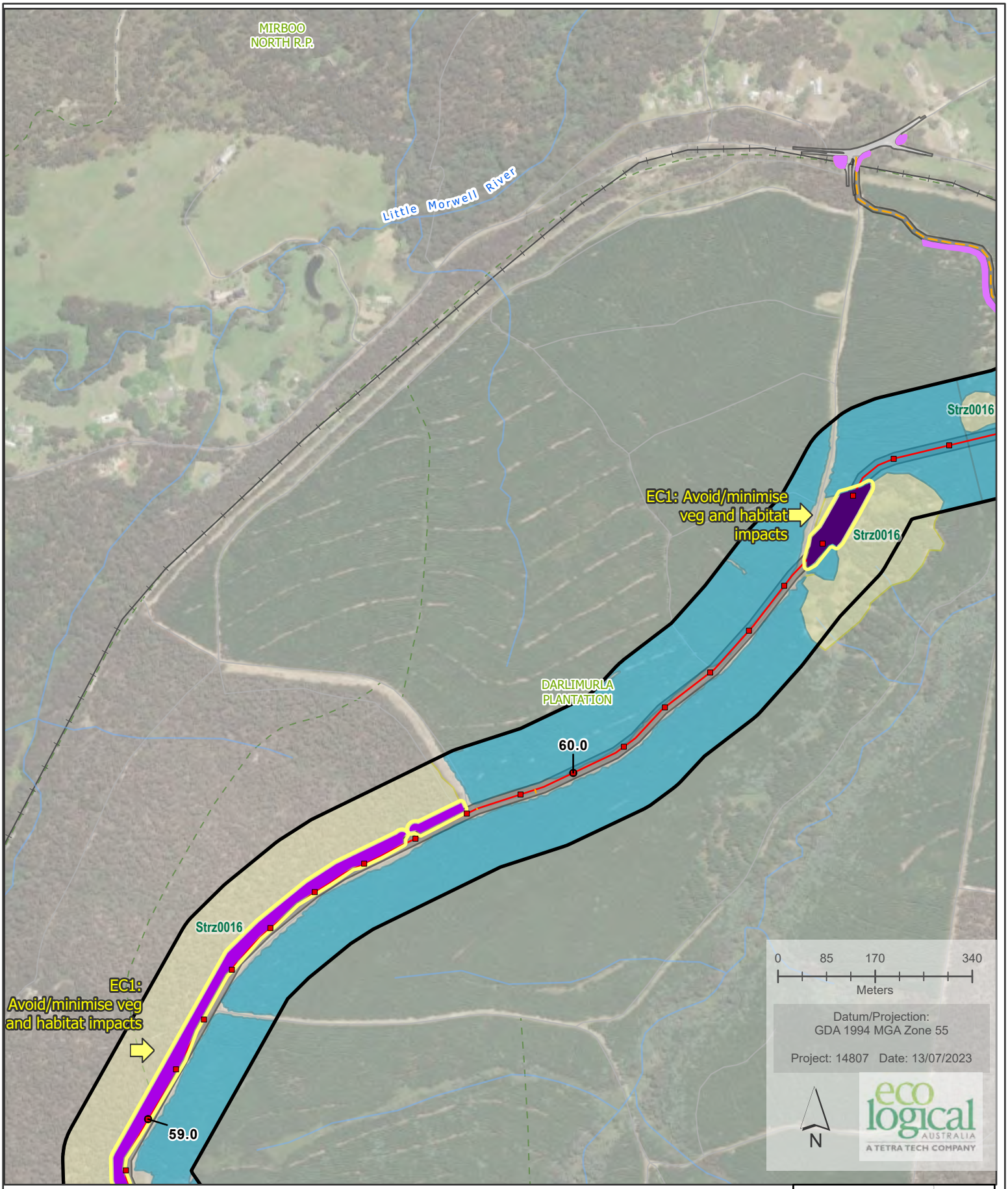


Figure 6.52 Native vegetation, habitats and potential impacts

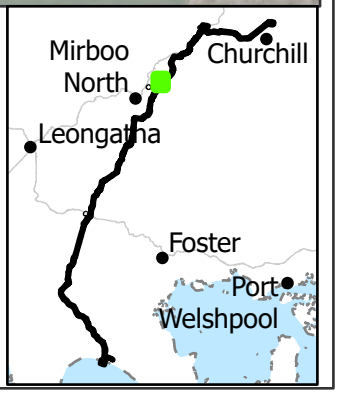
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- HV swept path
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation (unassessed)
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- Direct impacts (trimming for access)
- Direct impacts (trimming for access)



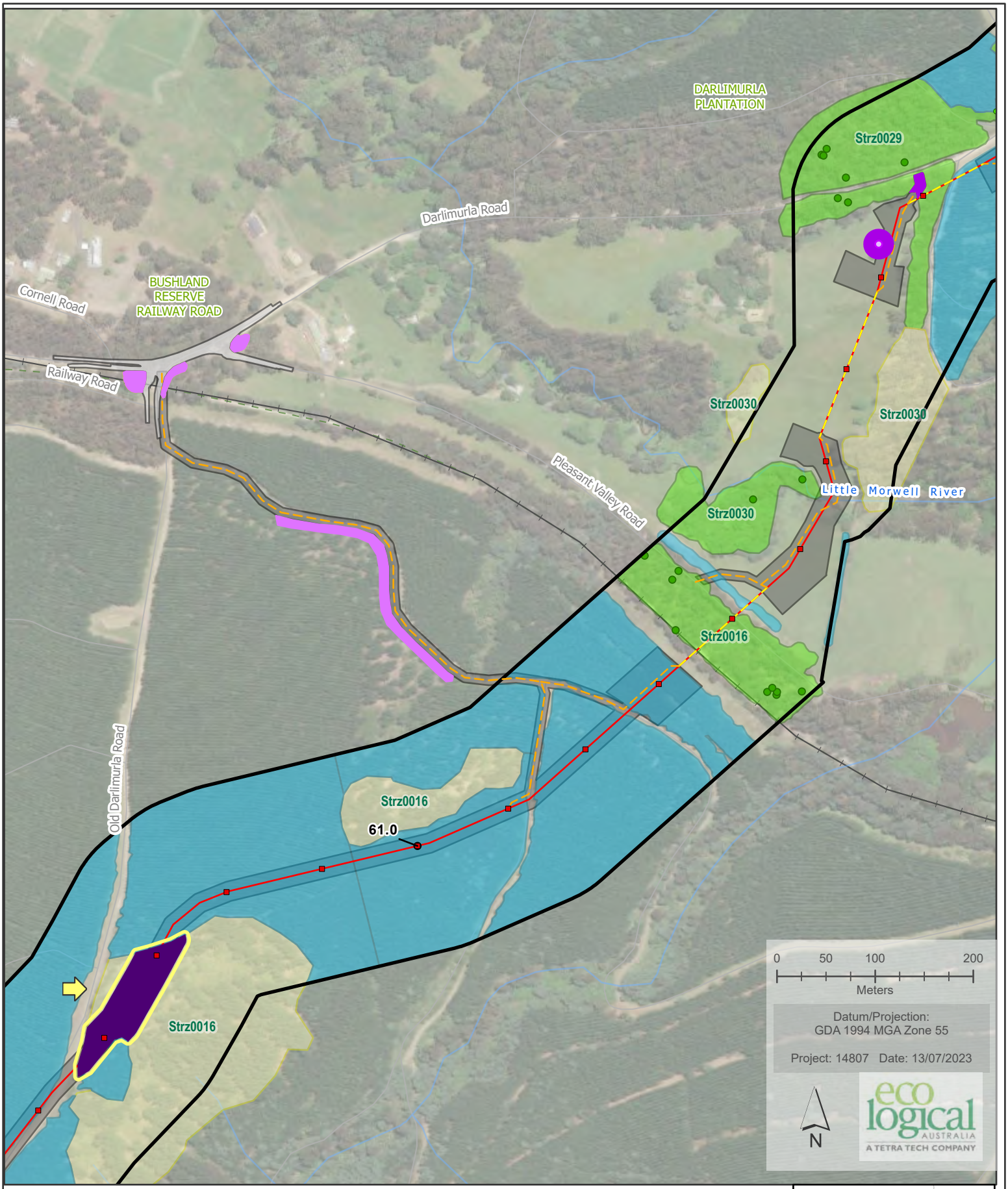


Figure 6.53 Native vegetation, habitats and potential impacts

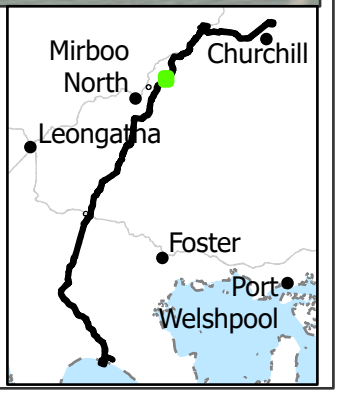
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- HV swept path
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- Direct impacts (trimming for access)
- Direct impacts (trimming for access)



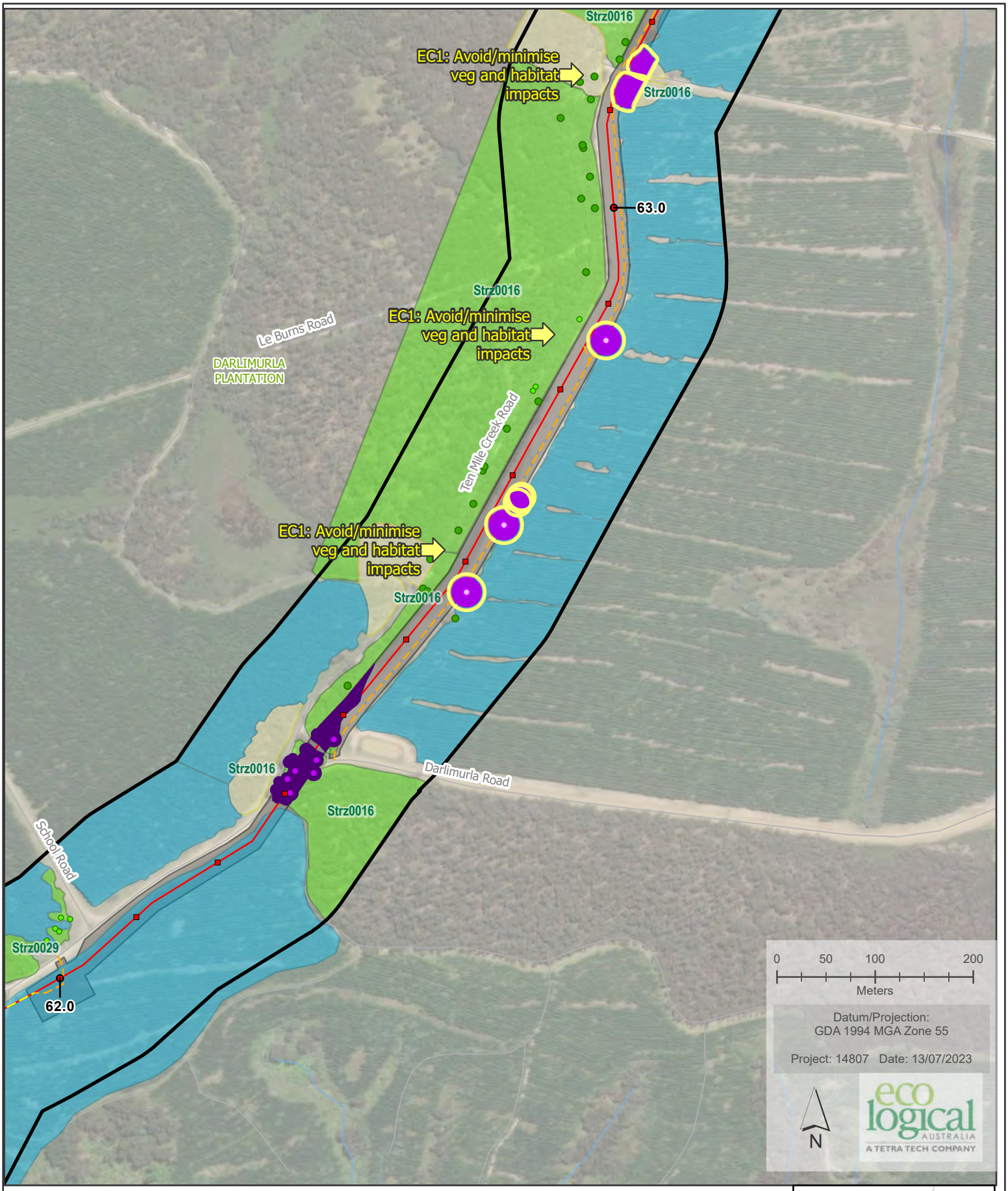


Figure 6.54 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

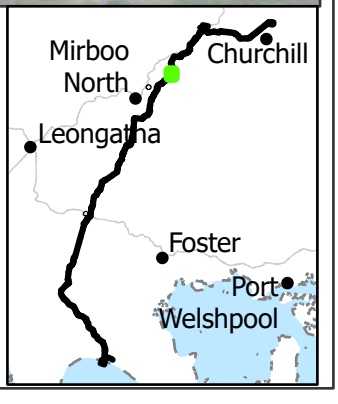
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



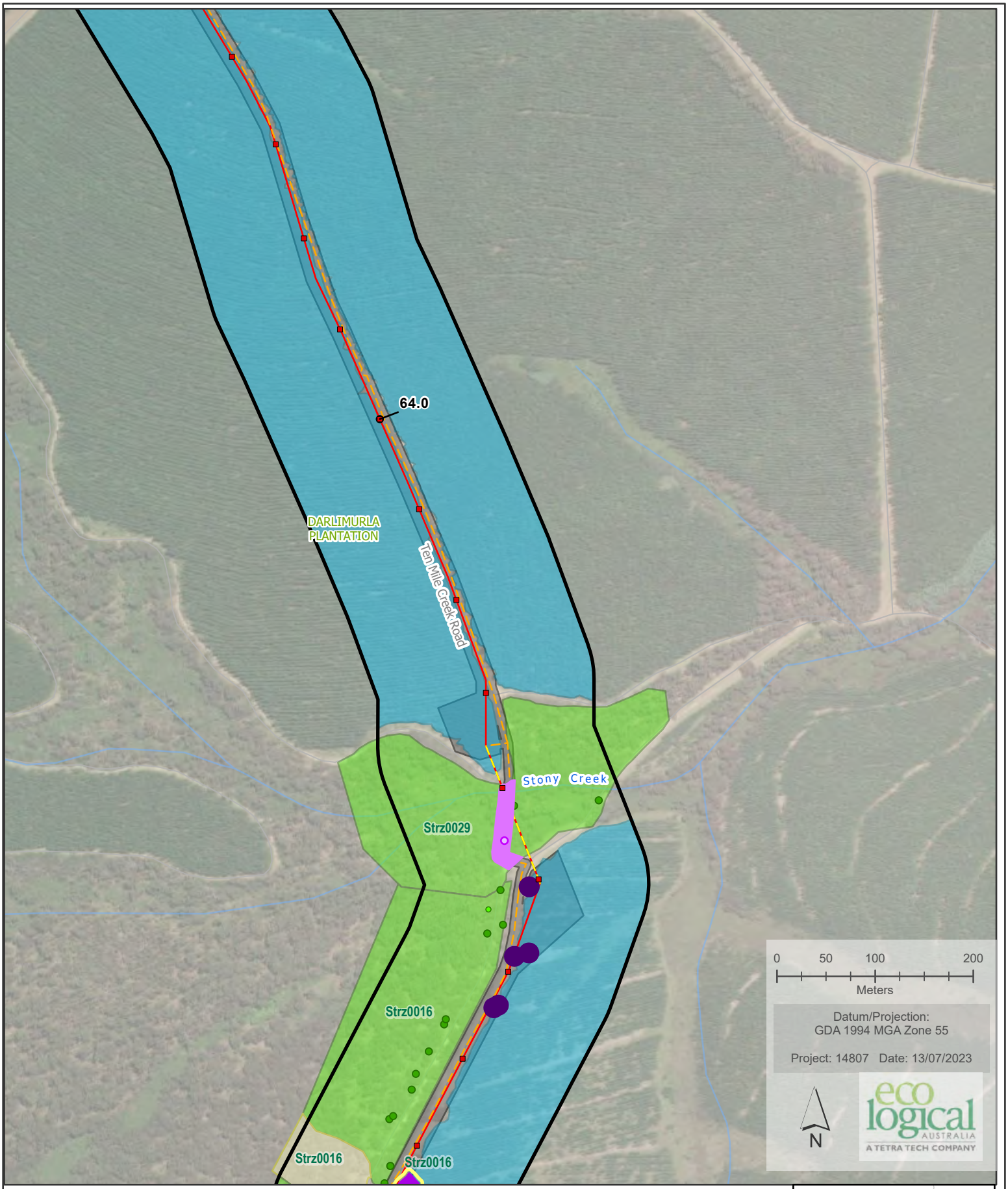


Figure 6.55 Native vegetation, habitats and potential impacts

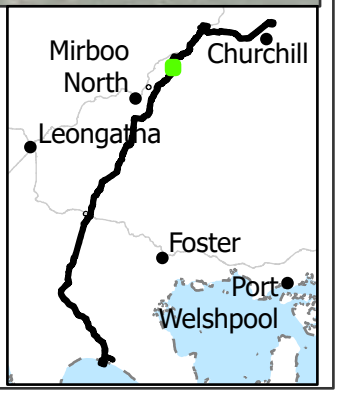
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- Direct impacts (trimming for access)
- **Proposed avoidance and minimisation**



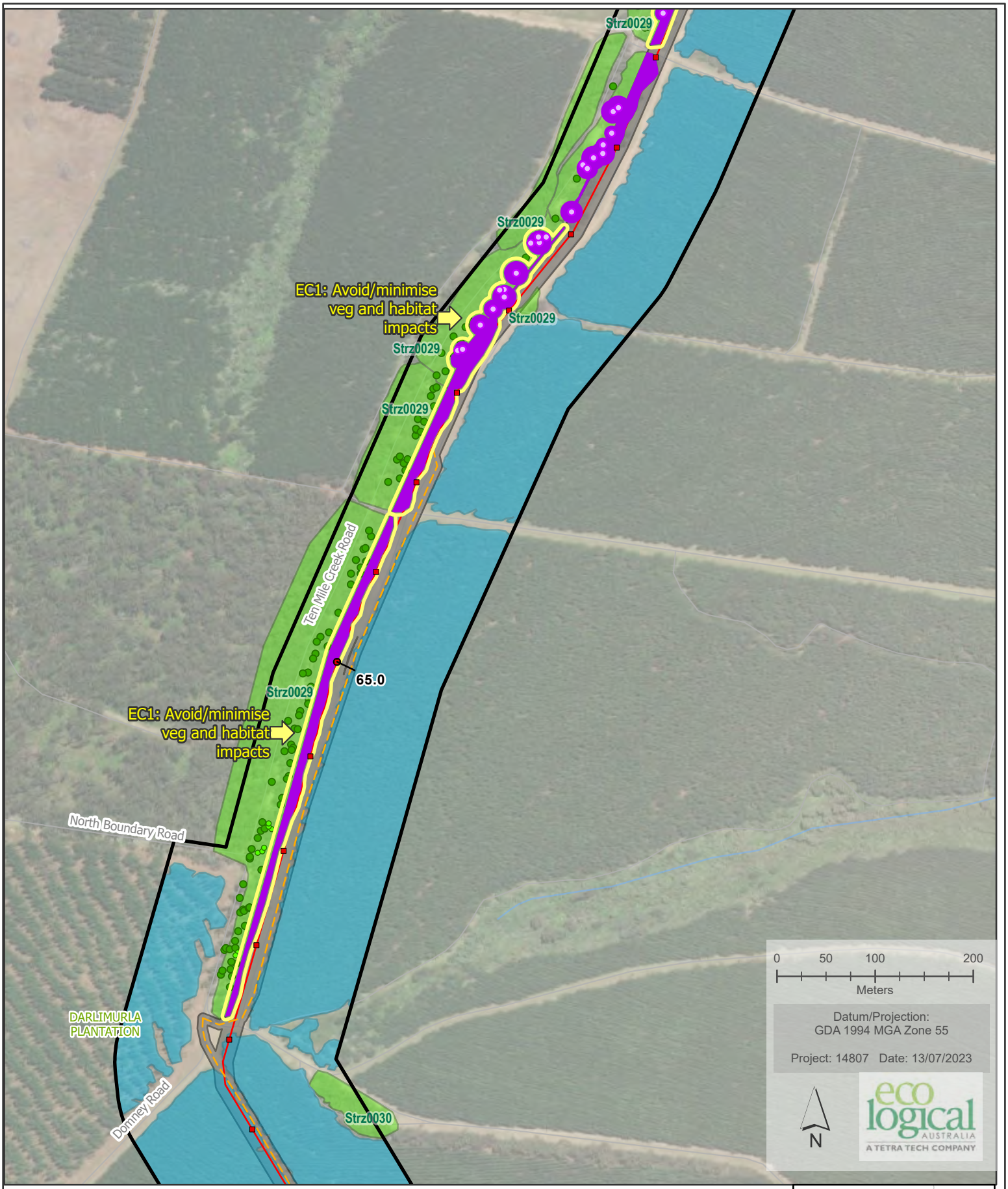


Figure 6.56 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Indirect (consequential loss)

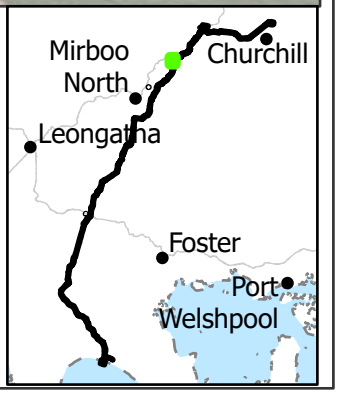


Figure 6.57 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- HV swept path
- Kilometre points
- EPR priority locations

Vegetation

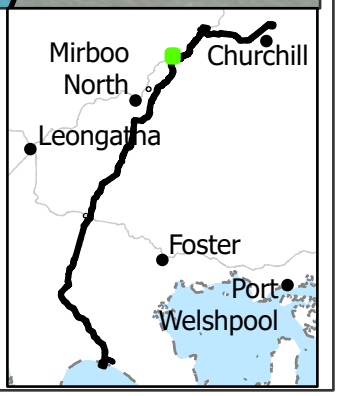
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- Direct impacts (trimming for access)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Indirect (consequential loss)



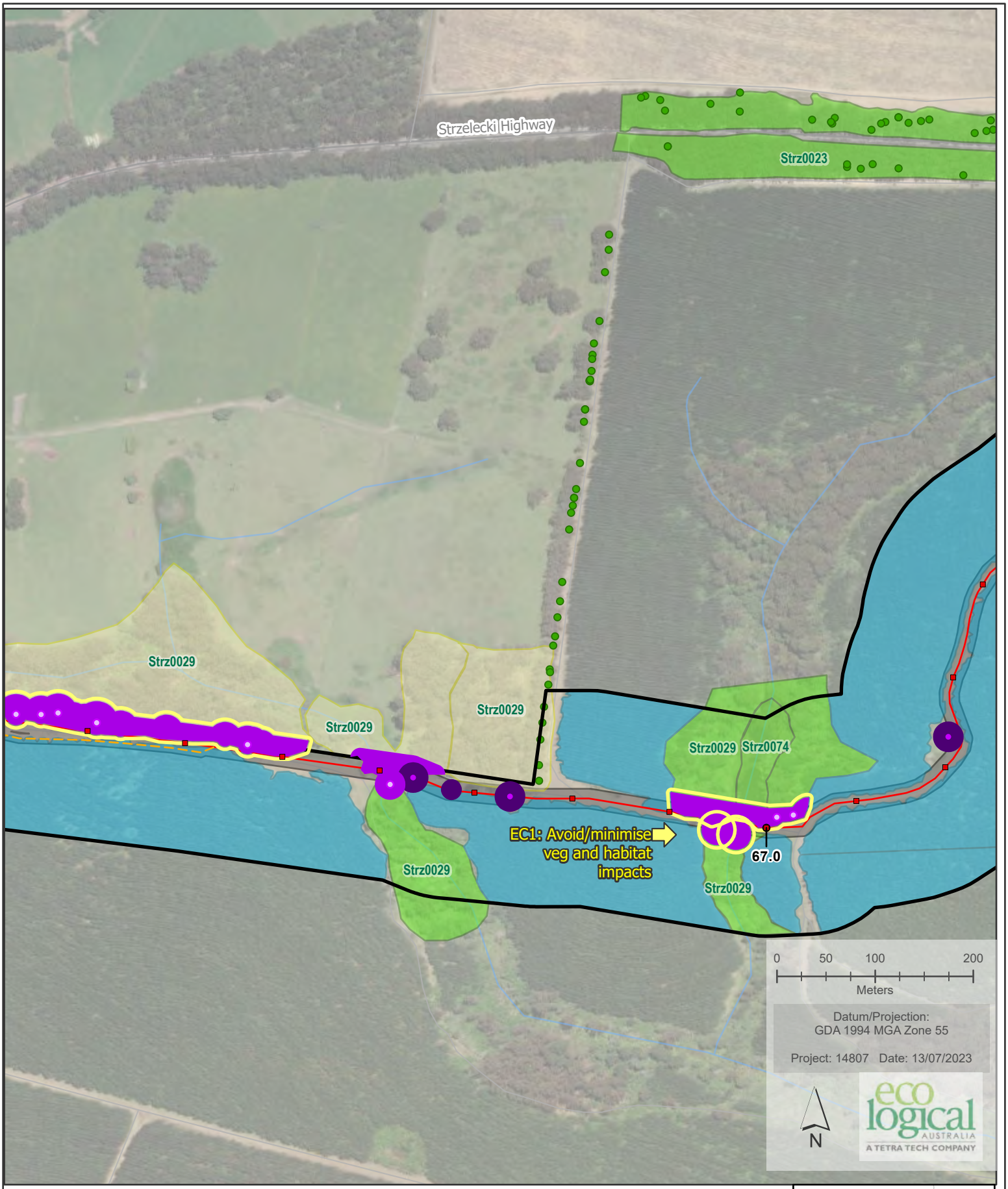


Figure 6.58 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

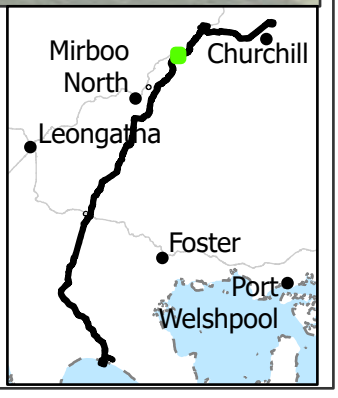
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Direct (vegetation removal)



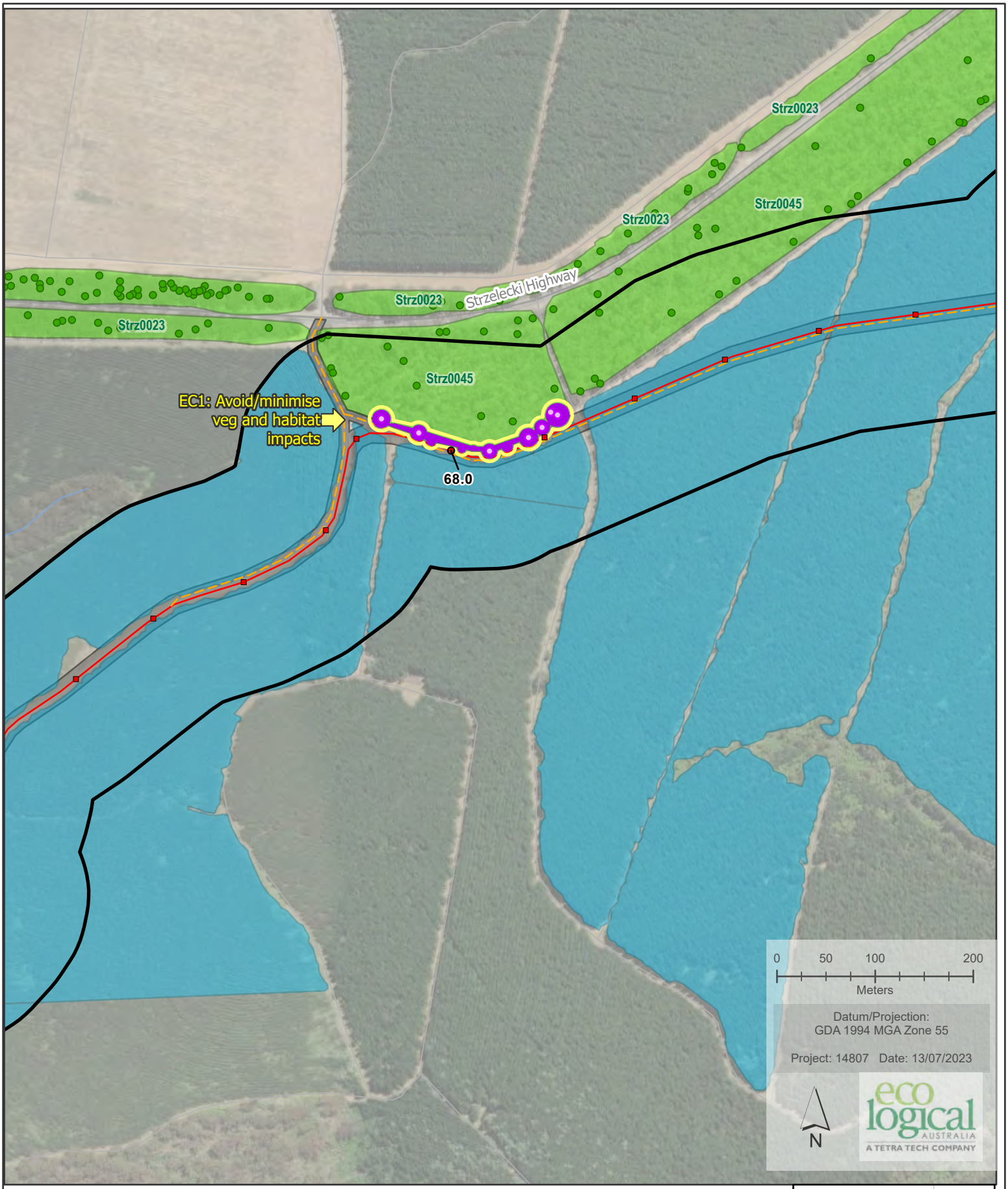


Figure 6.59 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

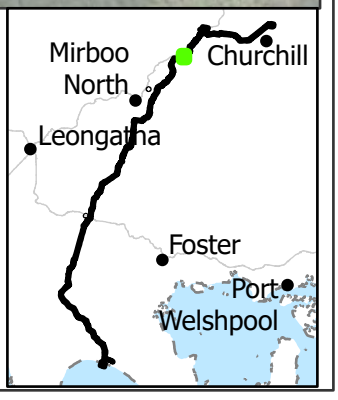
- Native vegetation
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Indirect (consequential loss)



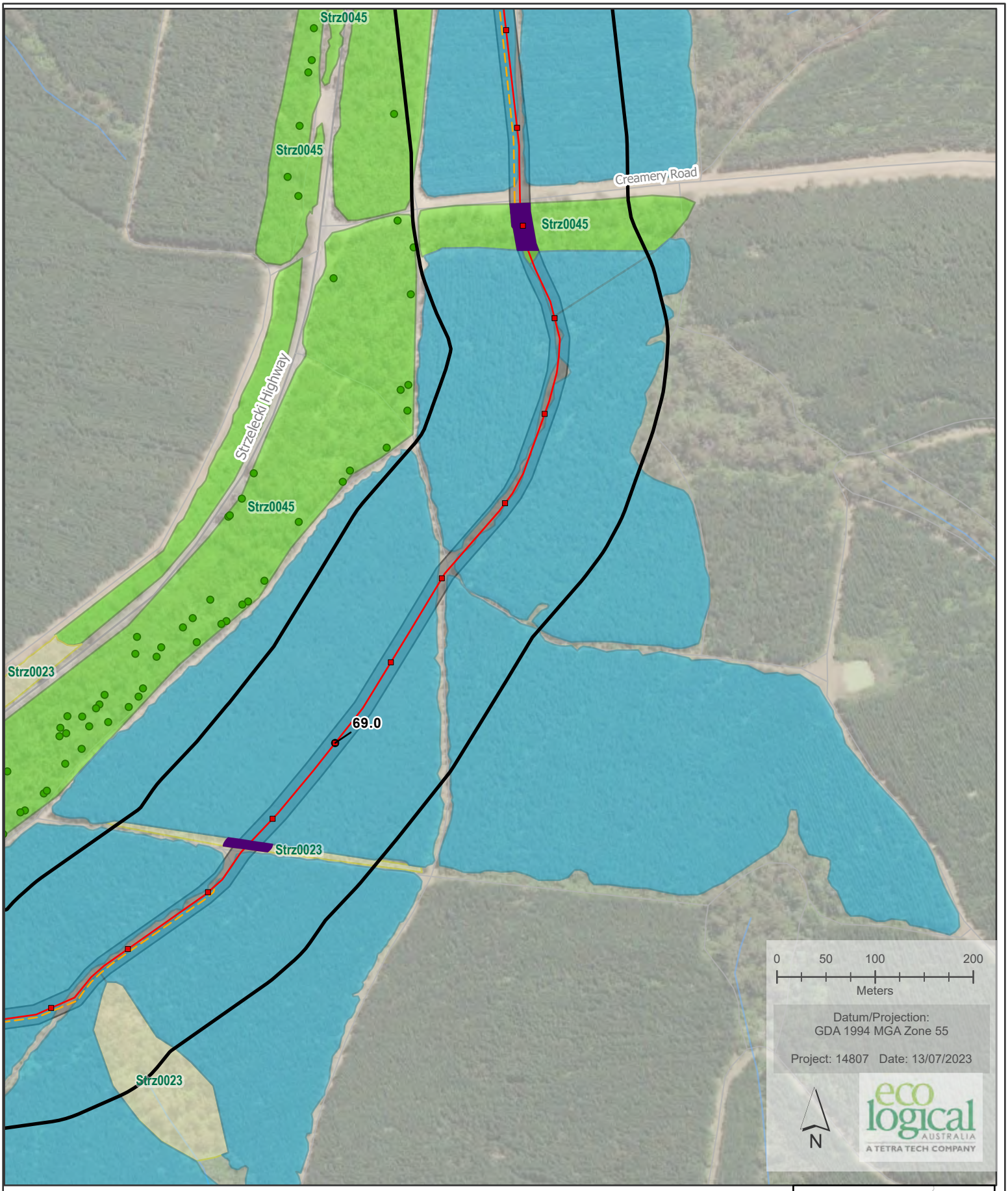


Figure 6.60 Native vegetation, habitats and potential impacts

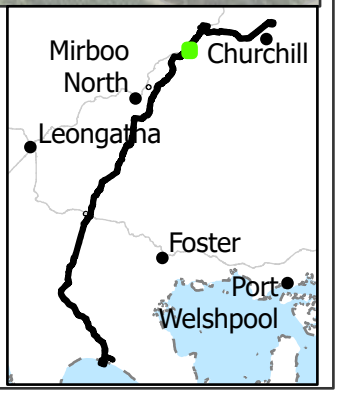
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)



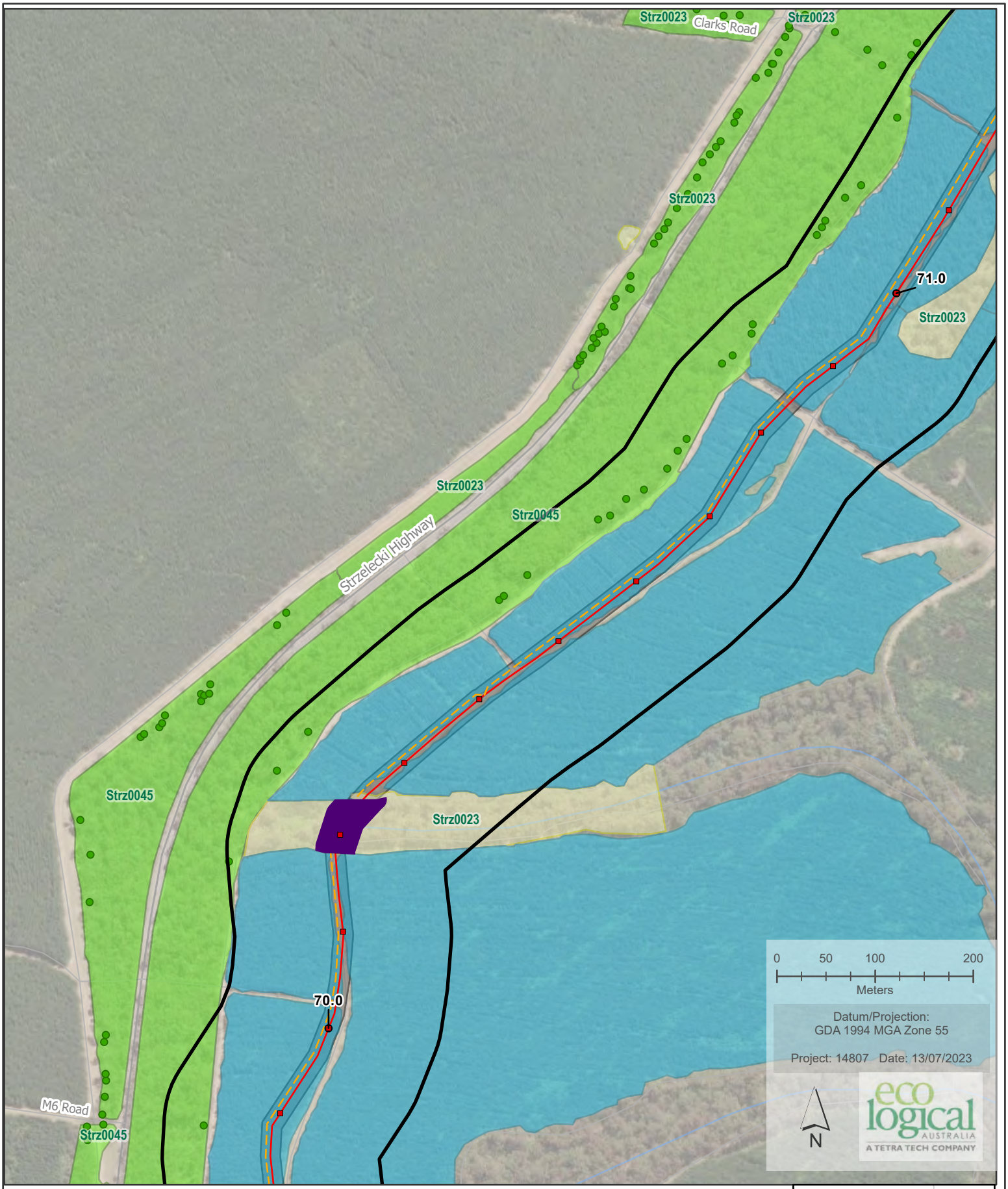


Figure 6.61 Native vegetation, habitats and potential impacts

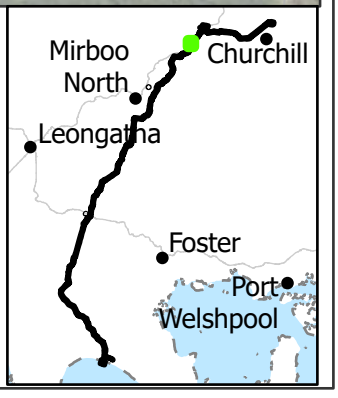
- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)



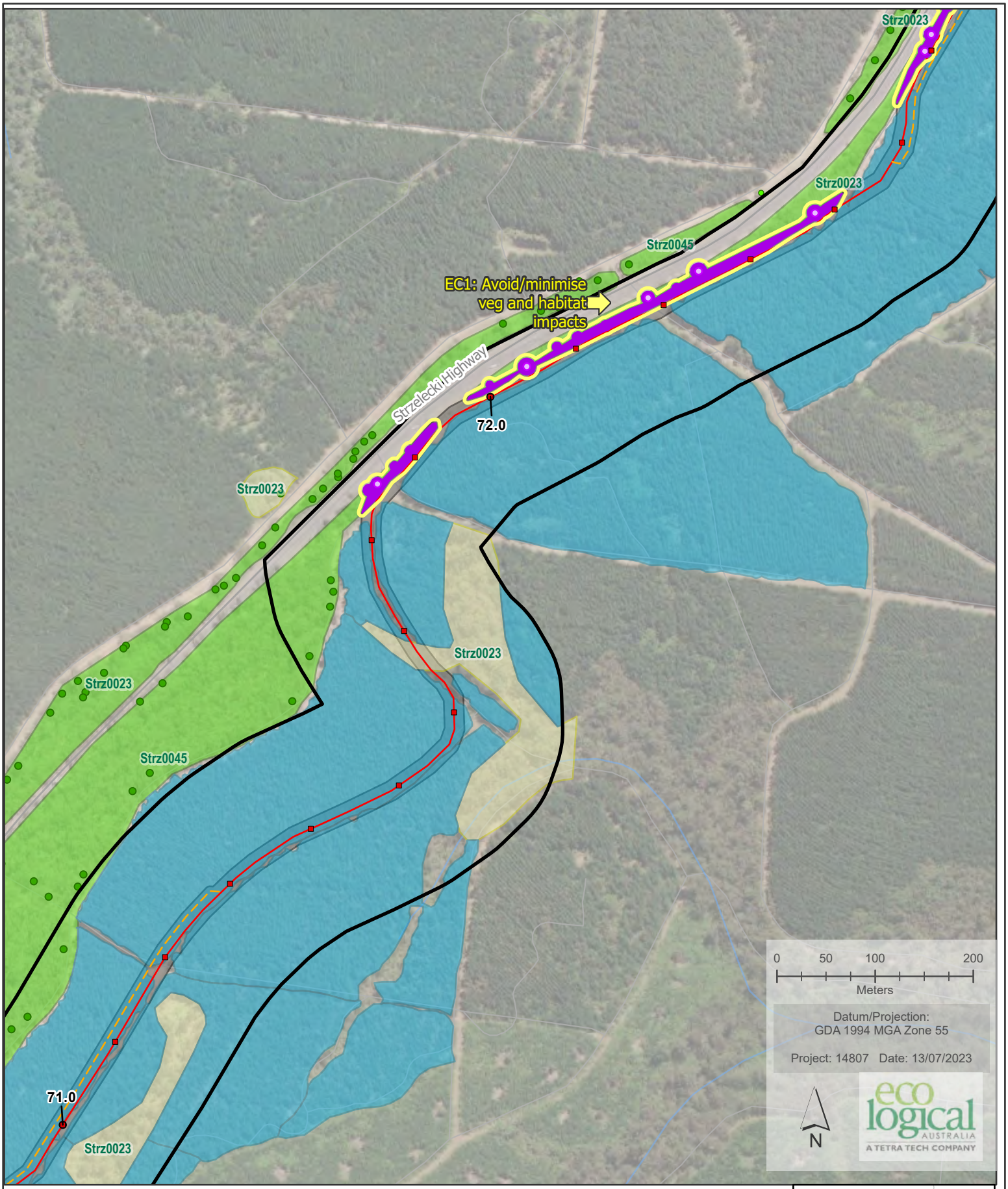


Figure 6.62 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

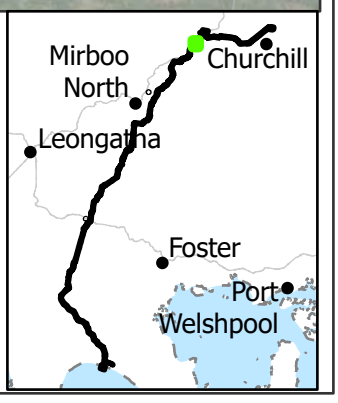
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Indirect (consequential loss)



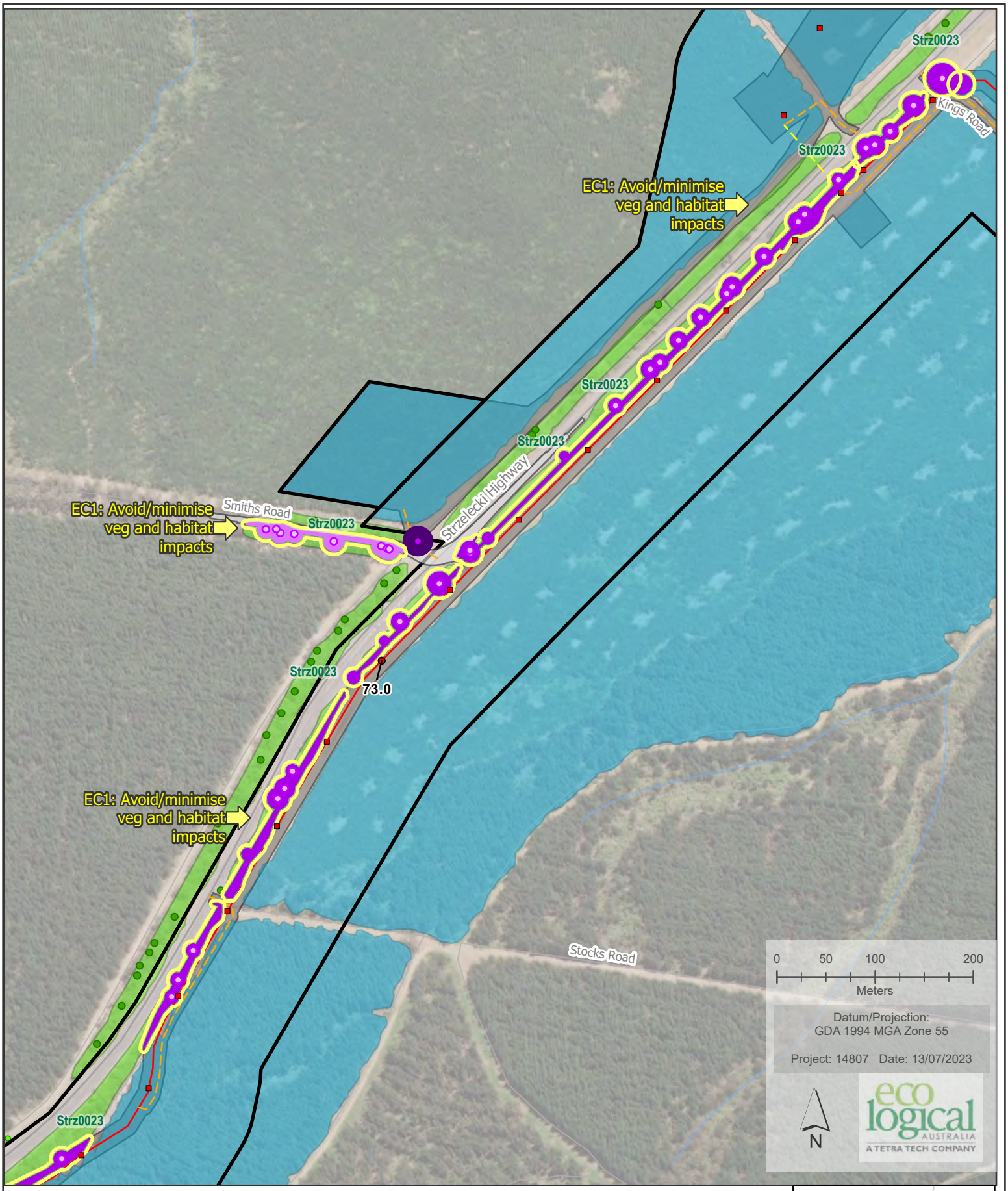


Figure 6.63 Native vegetation, habitats and potential impacts

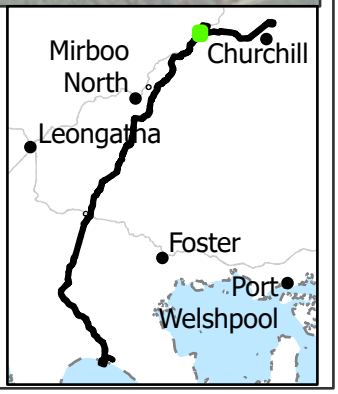
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- HV swept path
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- Direct impacts (trimming for access)
- **Proposed avoidance and minimisation**



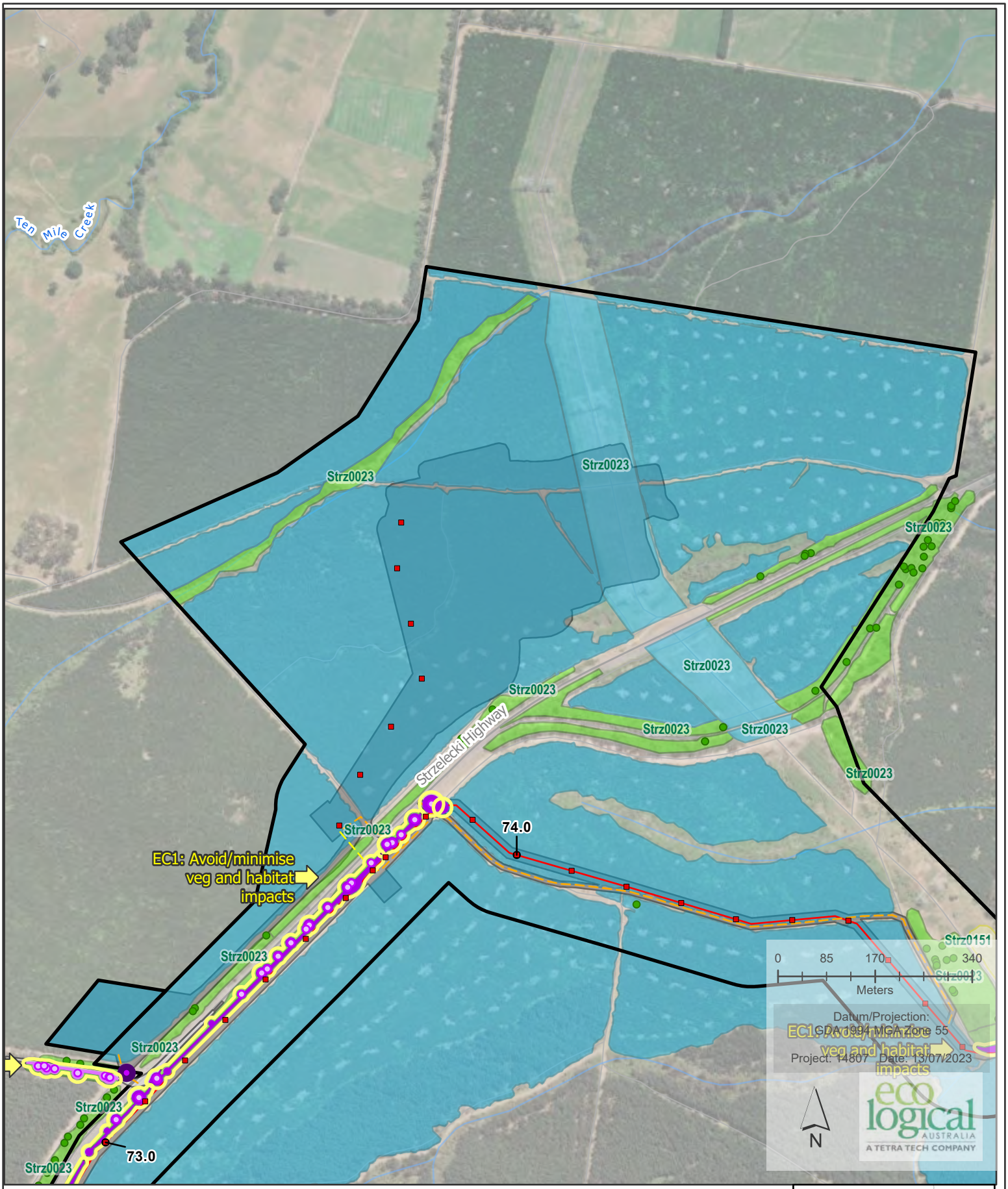


Figure 6.64 Native vegetation, habitats and potential impacts

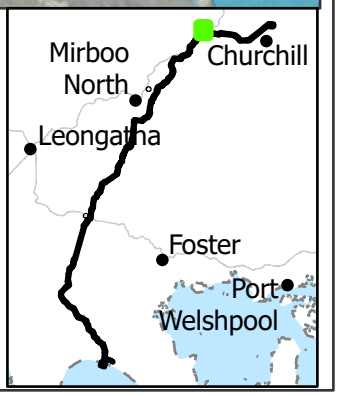
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- HV swept path
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Indirect impact (consequential losses)
- Direct impacts (trimming for access)
- **Proposed avoidance and minimisation**



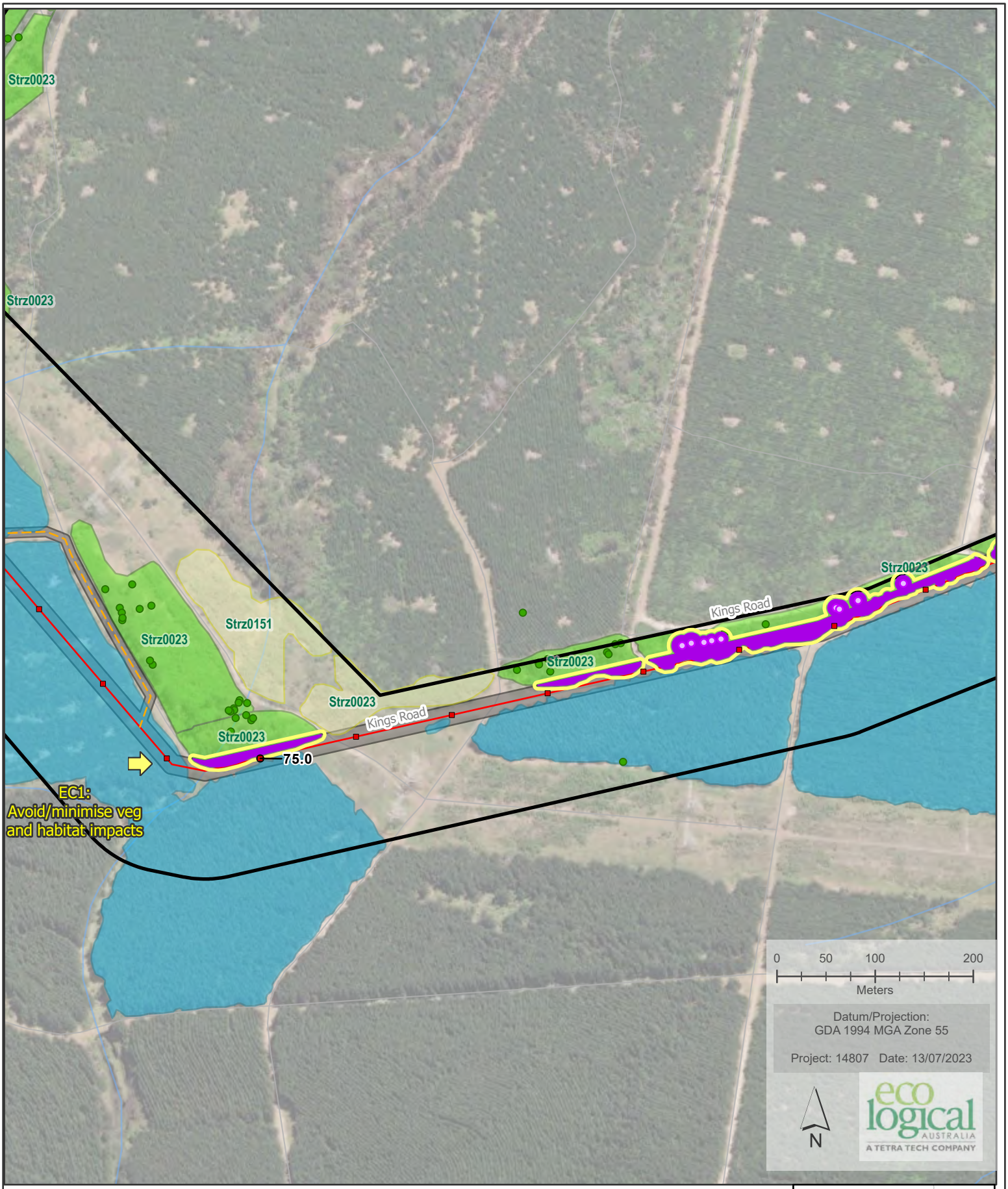


Figure 6.65 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

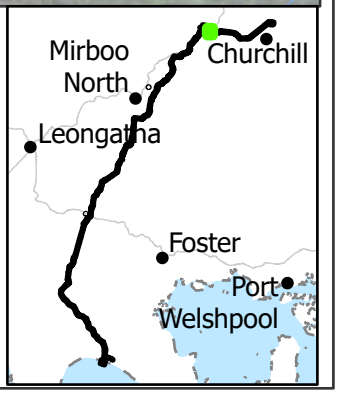
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Indirect (consequential loss)



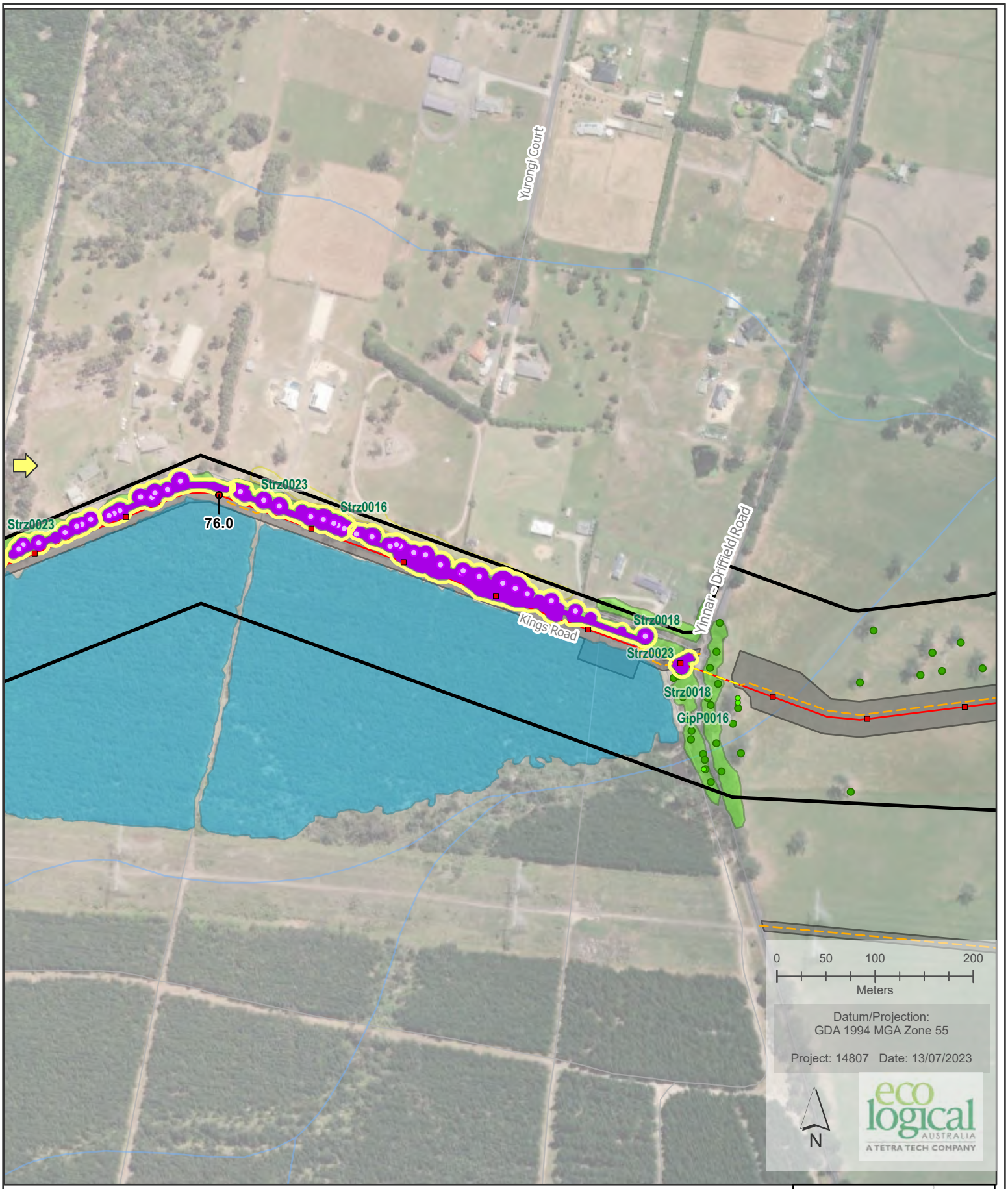


Figure 6.66 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

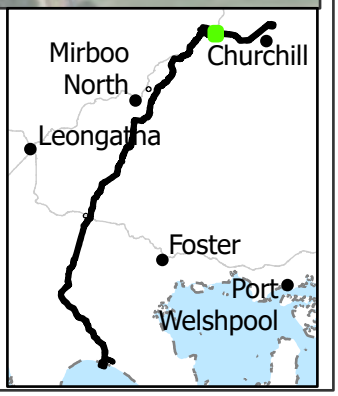
- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**

Impacted Large Native Trees

- Indirect (consequential loss)



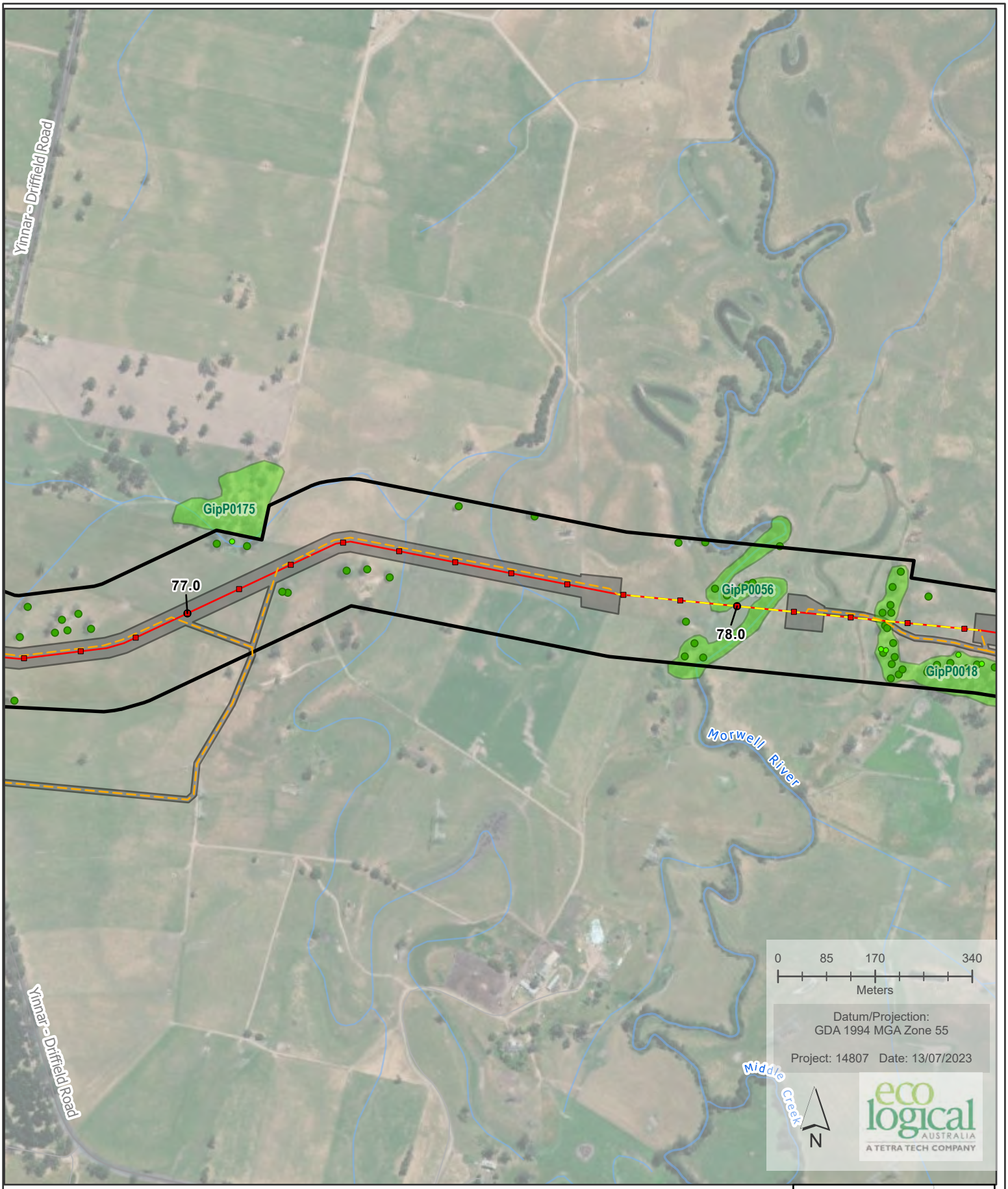


Figure 6.67 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Small native tree
- Large

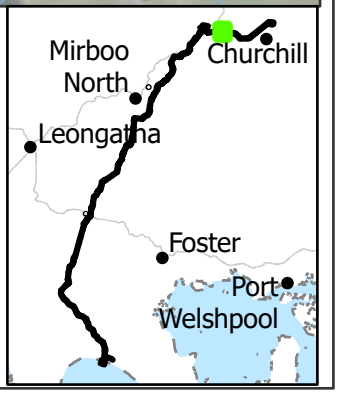
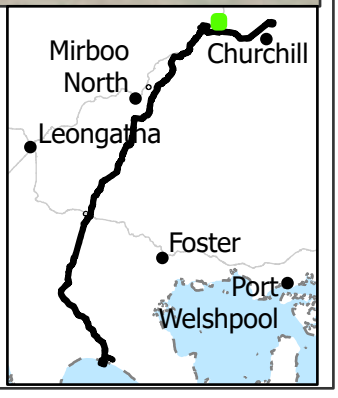


Figure 6.68 Native vegetation, habitats and potential impacts

HV swept path

Impacted Native Vegetation (pre-mitigation)

Direct impacts (trimming for access)



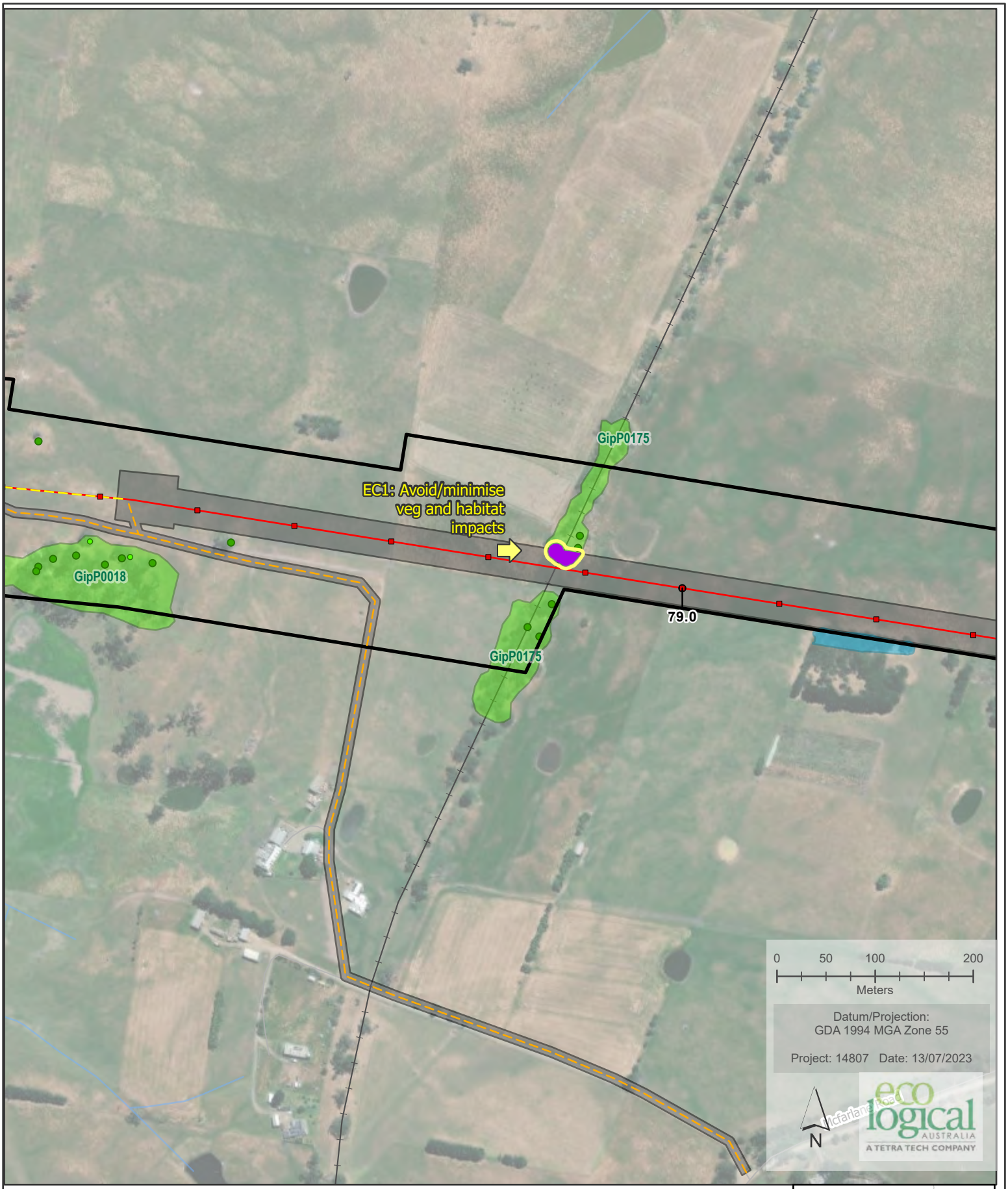


Figure 6.69 Native vegetation, habitats and potential impacts

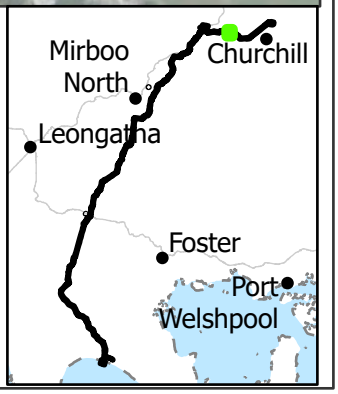
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Introduced vegetation
- Small native tree
- Large

Impacted Native Vegetation (pre-mitigation)

- Indirect impact (consequential losses)
- **Proposed avoidance and minimisation**



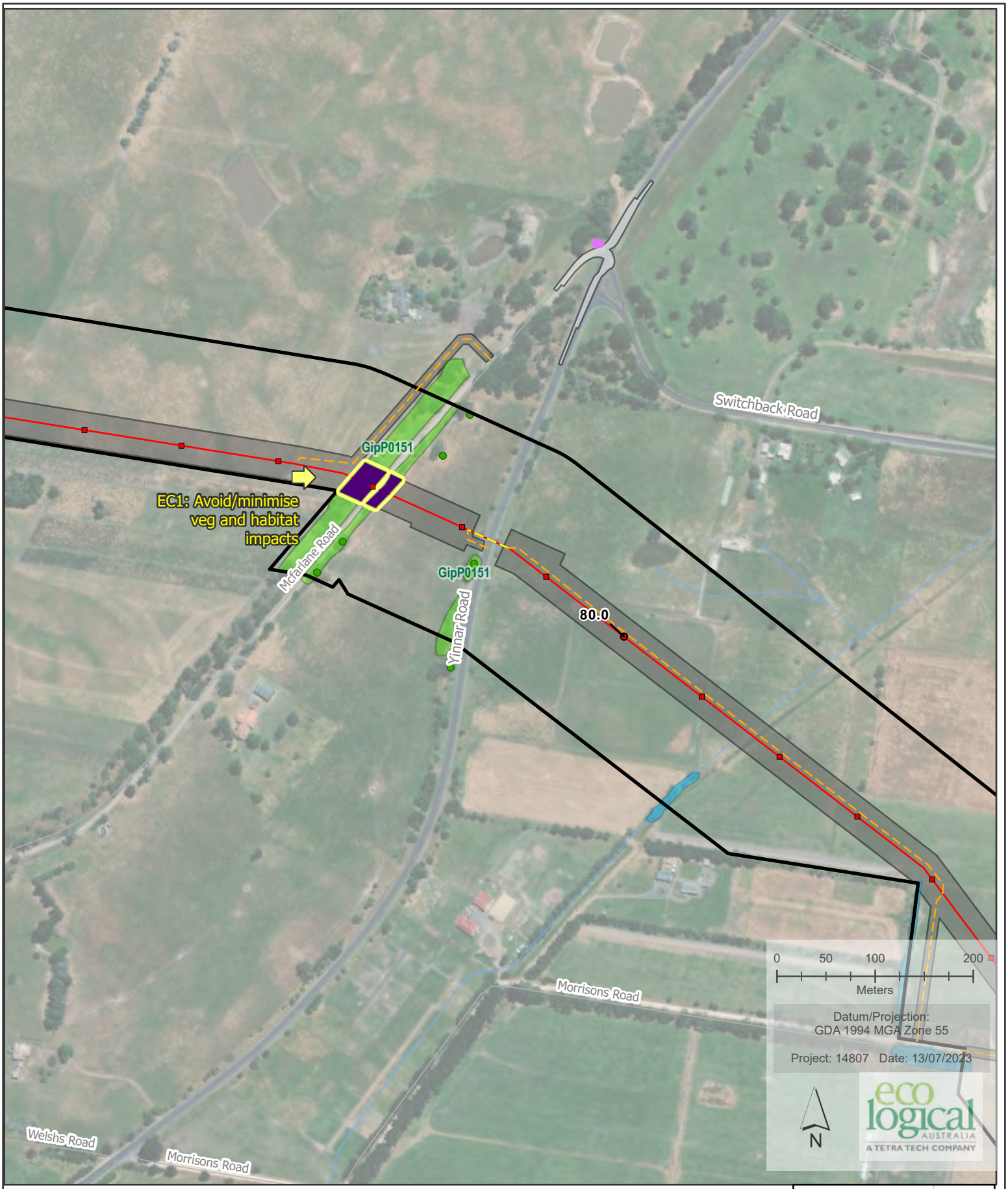


Figure 6.70 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- HV swept path
- Kilometre points
- EPR priority locations

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Large

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)
- Direct impacts (trimming for access)
- **Proposed avoidance and minimisation**

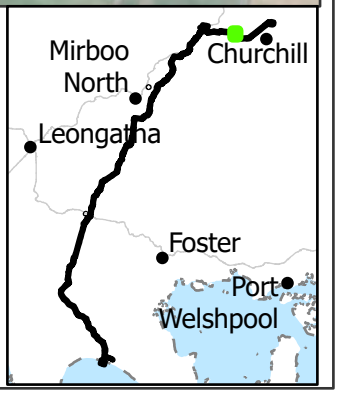
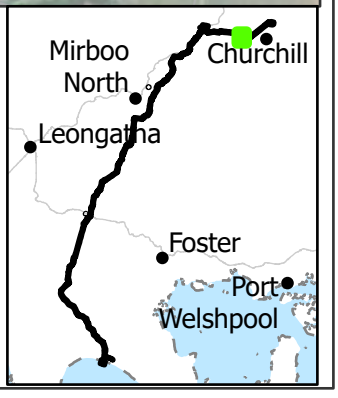


Figure 6.71 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- Access tracks
- Kilometre points

Vegetation

- Introduced vegetation



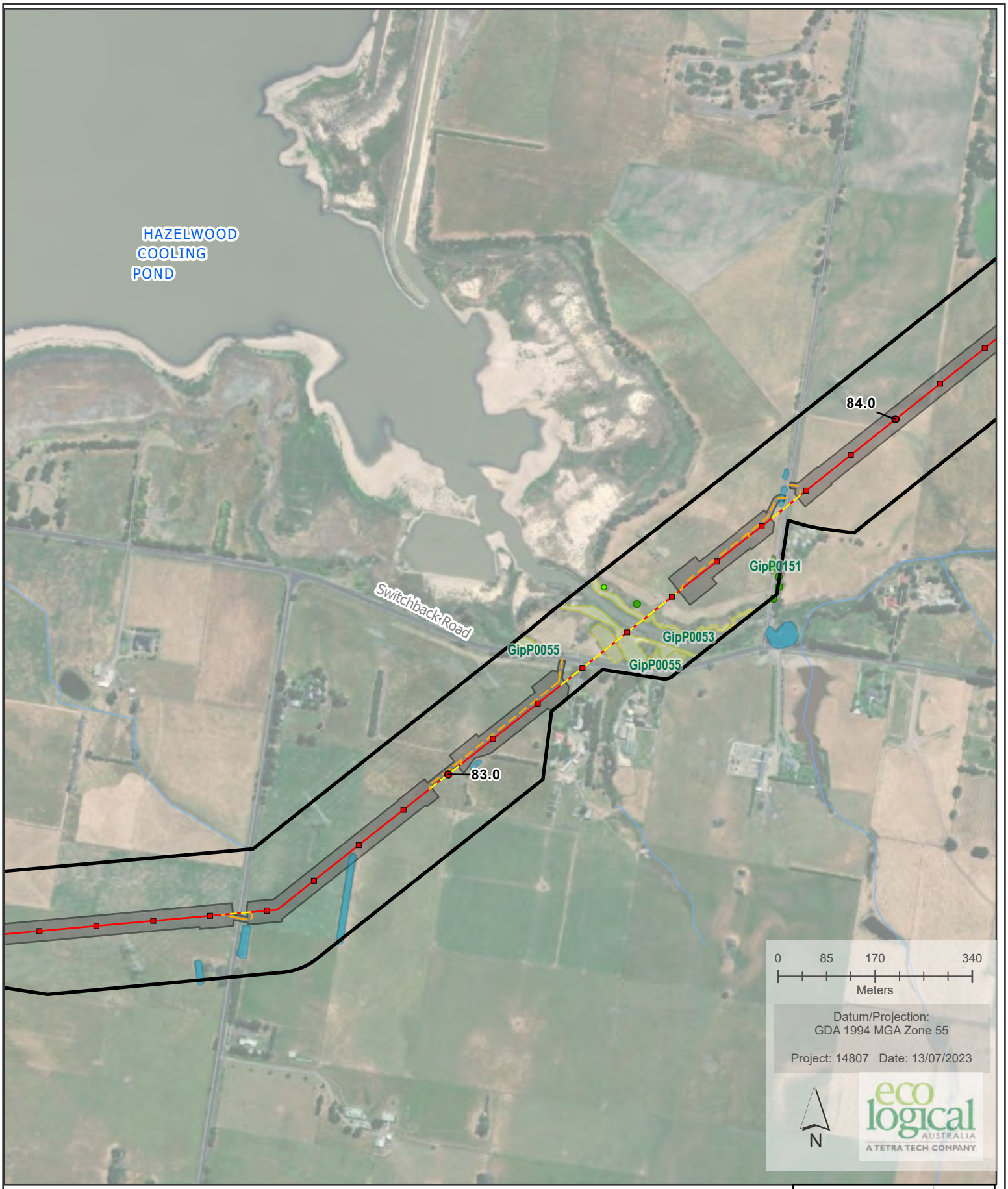
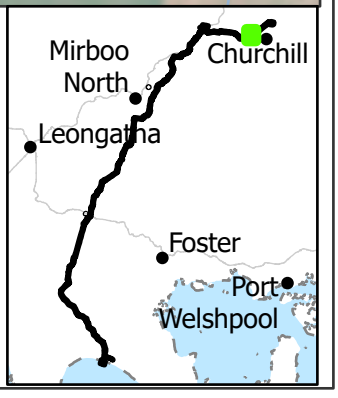


Figure 6.72 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation
- Native vegetation (unassessed)
- Introduced vegetation
- Small native tree
- Large



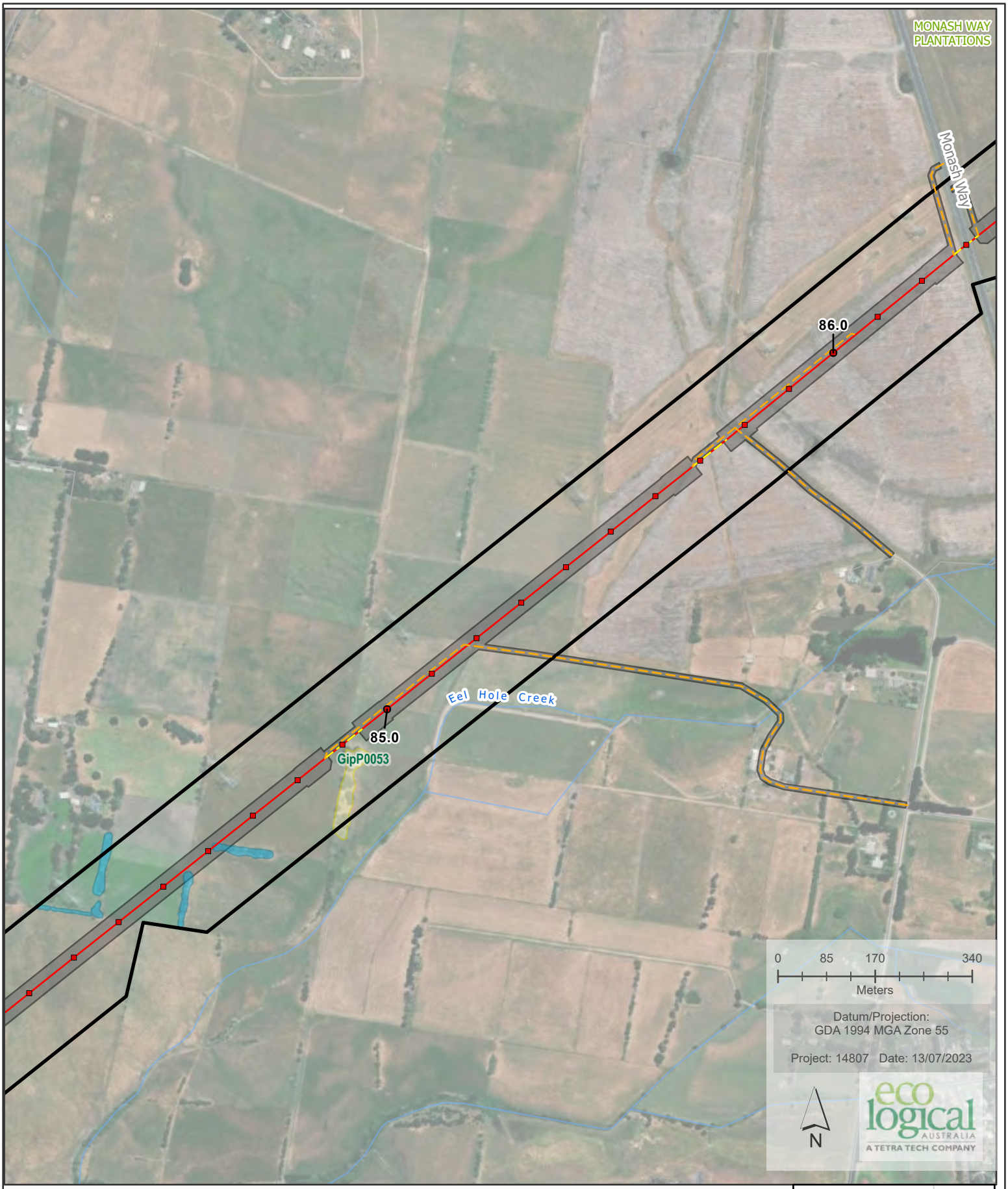
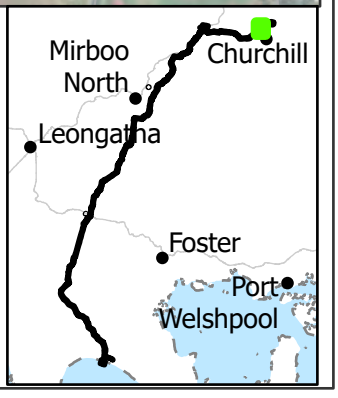


Figure 6.73 Native vegetation, habitats and potential impacts

- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- Kilometre points

Vegetation

- Native vegetation (unassessed)
- Introduced vegetation



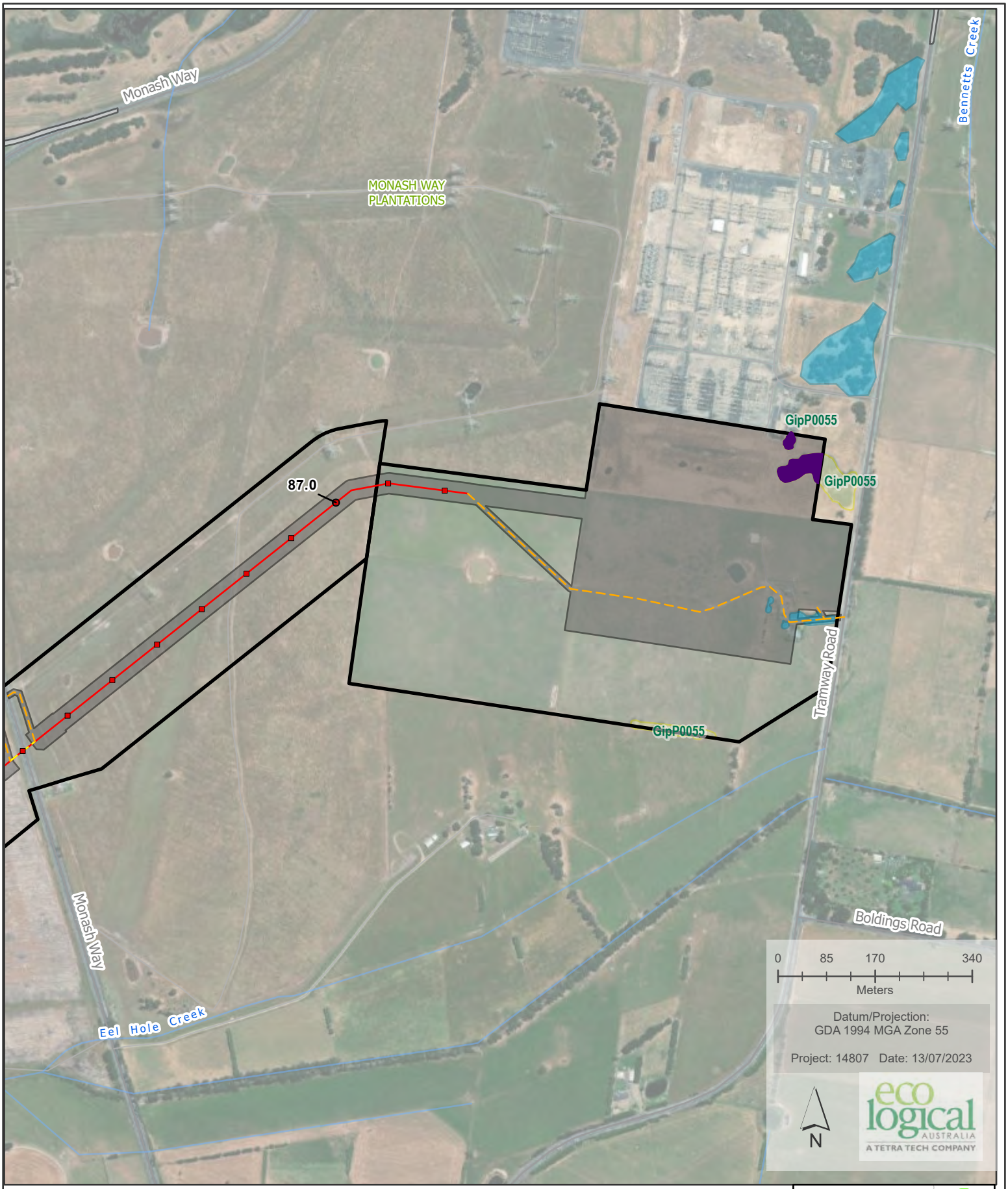


Figure 6.74 Native vegetation, habitats and potential impacts

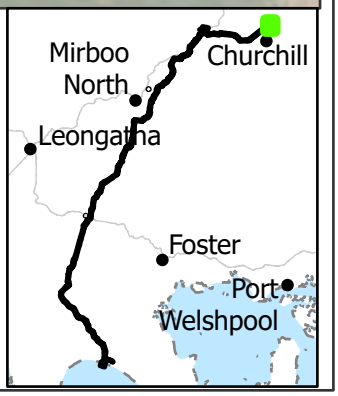
- Survey areas
- Area of disturbance
- Alignment
- HDD crossings
- Access tracks
- HV swept path
- Kilometre points

Vegetation

- Native vegetation (unassessed)
- Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

- Direct impact (vegetation removal)



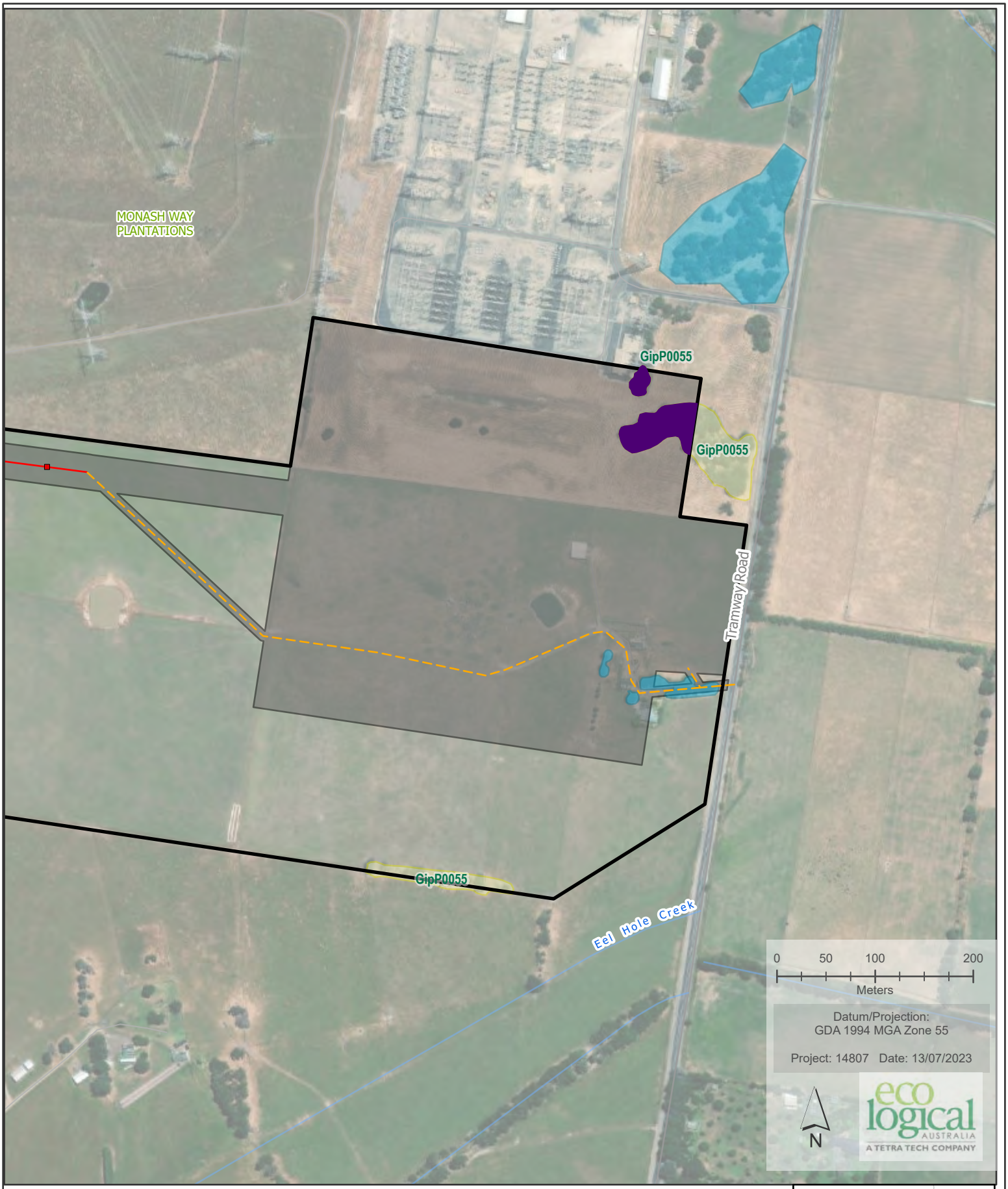


Figure 6.75 Native vegetation, habitats and potential impacts

Survey areas

Area of disturbance

Alignment

Access tracks

Vegetation

Native vegetation (unassessed)

Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

Direct impact (vegetation removal)

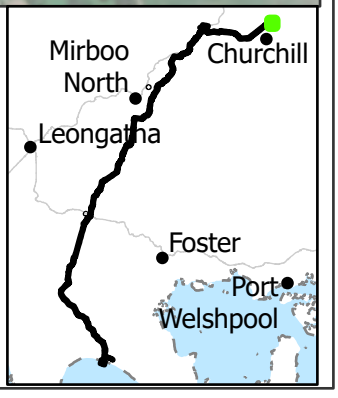


Figure 6.76 Native vegetation, habitats and potential impacts

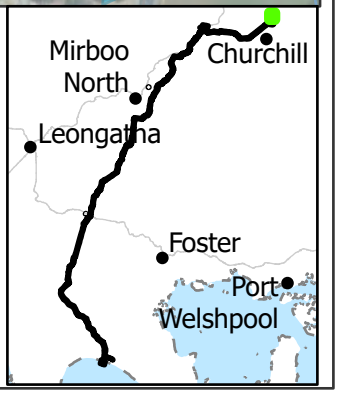
HV swept path

Vegetation

Introduced vegetation

Impacted Native Vegetation (pre-mitigation)

Direct impacts (trimming for access)



Appendix 2 Likelihood of occurrence tables

Likelihood of occurrence	FFG Act	EPBC Act	Protected Matters Search Tool
FLORA **Present**: Recorded within the study area in the last ten years. **High**: High likelihood of occurrence. Recent records of the species in the local vicinity (i.e. within the last 10 years); and/or, the study area contains high quality suitable habitat. **Moderate**: Moderate likelihood of occurrence. Previous records of the species in the local vicinity; and/or, the study area contains moderate quality suitable habitat. **Low**: Low likelihood of occurrence. Limited previous records of the species in the local vicinity; and/or, the study area contains poor or limited habitat. May also be considered low if other environmental factors, such as the fragmented or isolated nature of the habitat, are present. **None**: No suitable habitat and/or outside species range. **FAUNA** **Present**: Known resident of the study area based on site observations, recent database records (i.e. within last ten years) or expert advice. **High**: Recent records of the species in the local vicinity (i.e. within the last 10 years); and/or, the study area contains high quality or critical/ preferred habitat. **Moderate**: Previous records of the species in the local vicinity; and/or, the study area contains moderate quality or seasonal habitat. **Low:** Limited previous records of the species in the local vicinity; and/or, the study area contains habitat the species may use opportunistically or en-route to areas of preferred habitat. **None:** No suitable habitat and/or outside species range.	**EX**: Extinct **CR**: Critically endangered **EN**: Endangered **VU**: Vulnerable	**EX**: Extinct **CR**: Critically endangered **EN**: Endangered **VU**: Vulnerable **CD**: Conservation dependent	**PMST-K**: Species or species habitat known to occur within area **PMST-L**: Species or species habitat likely to occur within area **PMST-M:** Species or species habitat may occur within area **PMST-F:** Foraging, feeding or related behaviour likely to occur within area

Table 1A. Significant fauna

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Accipiter novaehollandiae	Grey Goshawk	EN		10	19/11/2019	VBA	**High**	Mainly wet forests in the Otway Ranges but also woodlands, dry forests, and farmland in the Strzelecki Ranges, Gippsland Plains and Otway Plains.	Potential foraging habitat within woodlands and farmland near the Strzelecki Ranges and wooded farmland near Waratah Bay.	Recorded near KP67.3. May occur in high-quality habitats at KP2.3 - 8.9, 57 - 76.5.	**Present**
Actitis hypoleucos	Common Sandpiper	VU	Ma, Mi	3	2/12/2006	VBA	**Moderate**	Occurs in a wide range of inland and coastal wetlands. Mainly associated with estuaries and large coastal mudflats.	Potential habitat associated with Waratah Bay foreshore (KP0) and Hazelwood Cooling Pond (KP83.4), however limited records means species unlikely to make frequent use of survey area.	Not recorded during targeted surveys. Given limited records in study area species considered unlikely to occur in survey area.	**Low**
Antechinus minimus maritimus	Swamp Antechinus	VU	VU	4	5/11/2017	VBA	**Moderate**	Mainly occurs in damp areas with dense vegetation at about 1–2 m above ground level, including dense wet heathlands, tussock grasslands, sedgelands, damp gullies, swamps and some shrubby woodlands. Found in Coastal Victoria as far east as Wilson's Promontory.	Potential habitat within dunes and heathy woodlands in Waratah Bay (KP0, 2.3 - 6.4, 8.1 - 8.9).	Habitat condition and targeted surveys not completed due to access constraints.	**Moderate**
Anthochaera phrygia	Regent Honeyeater	CE	CE	Modelled	N/A	PMST	**None**	Mainly occurs in box-ironbark forests and woodlands in northern Victoria.	Outside species primary range.		
Apus pacificus	Fork-tailed Swift		Ma, Mi	Modelled	N/A	PMST	**Low**	Primarily an aerial species which forages in flight and may occasionally land.	Modelled distribution. Primarily an aerial species which occasionally lands. Unlikely to significantly use the study area.		
Arctocephalus pusillus	Australian Fur-seal, Australo-African Fur-seal		Ma	Modelled	N/A	PMST	**Low**	Ten breeding locations restricted to islands in the Bass Strait. Prefers rocky parts of islands with flat, open terrain.	Primarily a marine species.		
Arctophoca australis forsteri	Long-nosed Fur Seal	VU	Ma	1	1/10/1925	VBA	**Low**	Coastal and continental shelf waters in southern Australia.	Primarily a marine species.		
Ardea intermedia plumifera	Plumed Egret	CE		7	2/07/2021	VBA	**Low**	Mostly an inhabitant of the shallows in terrestrial wetlands, and prefers freshwater swamps, billabongs, floodplains and wet grasslands with dense aquatic vegetation. It is only occasionally seen in estuarine or intertidal habitats.	Species mainly occurs in the west and north of the state in suitable wetlands. Study area outside its normal range, and unlikely to use limited suitable habitat within the survey area. FFG Act Action statement: in Victoria, they are infrequently recorded and occur mainly in the west and north of the state in suitable wetlands.		
Ardea alba modesta	Eastern Great Egret	VU	Ma	36	22/06/2019	VBA	**Moderate**	Widespread in Australia. Inhabits swamps and marshes, grasslands, margins of rivers and lakes, salt pans, estuarine mudflats and other wetland habitats.	Potential habitat associated with Waratah Bay foreshore (KP0), Morwell River (KP78) and Hazelwood Cooling Pond (KP83.4). Most records are associated with more heavily vegetated wetlands although one record is associated with the Hazelwood Cooling Pond. This species may infrequently use agricultural land, and vegetated margins of wetlands and waterways within survey area.	Not recorded within the survey area. Habitat within survey area considered sub-optimal for species.	**Low**
Ardenna carneipes	Flesh-footed Shearwater		Ma, Mi	Modelled	N/A	PMST	**None**	Is a locally common visitor to waters of the continental shelf and continental slope off southern Australia (south-western Western Australia to south-eastern Queensland) and around Lord Howe Island	Restricted to marine environment.		
Ardenna grisea	Sooty Shearwater		Ma, Mi	Modelled	N/A	PMST	**None**	In Australia, the Sooty Shearwater breeds on islands off New South Wales (NSW) and Tasmania. The species occurs off the coast of south-east Queensland in small numbers and is a moderately common migrant and visitor to Victoria and South Australia	Restricted to marine environment.		
Arenaria interpres	Ruddy Turnstone	EN	Ma, Mi	4	15/10/2018	VBA	**Low**	Widespread within Australia during its non-breeding period of the year. It is found in most coastal regions,	Only moderate levels of seaweed and no rocky platforms within survey area at Waratah Bay beach.		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
								with occasional records of inland populations. It strongly prefers rocky shores or beaches where there are large deposits of rotting seaweed.			
Aythya australis	Hardhead	VU		220	19/08/2021	VBA	**Present**	Found in freshwater swamps and wetlands and occasionally in sheltered estuaries. They are rarely seen on land and tend to roost on low branches and stumps near the water. They prefer deep, fresh open water and densely vegetated wetlands for breeding.	Potential habitat in waterbodies with deep water and dense reed beds in the survey area (KPs 45.1, 67, 83.4).	Recorded in habitat at KP45.1. Not recorded at KP67, however suitable habitat is present and there is a nearby VBA record so it may use this wetland on occasion.	**Present**
Biziura lobata	Musk Duck	VU	Ma	26	9/06/2017	VBA	**Moderate**	Found in south-western and south-eastern mainland Australia and Tasmania. Inhabits terrestrial wetlands, estuaries and sheltered inshore waters, preferring deep water with plenty of aquatic vegetation.	Potential habitat in waterbodies with deep water and dense reed beds in the survey area (KPs 45.1, 67, 83.4).	Not recorded during targeted surveys. Habitat within the study area is considered low-quality/sub-optimal.	**Low**
Botaurus poiciloptilus	Australasian Bittern	CE	EN	4	29/11/2020	VBA	**Moderate**	Coastal and sub-coastal areas in extreme south-western mainland Australia, south-eastern mainland Australia and Tasmania. Inhabits wetlands and swamps with tall aquatic vegetation. Occasionally occurs in rice fields and saltmarshes.	Potential habitat at KP67 and Hazelwood Cooling Pond (KP 83.4).	Not recorded during targeted surveys. Hazelwood cooling pond has not been surveyed, however contains a dense cover of Phragmites australis which may provide habitat for this species.	**Moderate**
Bubulcus ibis	Cattle Egret		Ma	Modelled	N/A	PMST	**High**	Widespread in south-eastern Australia. Found in grasslands, farmland, woodlands and wetlands. Often occurs with cattle and other stock.	Potential habitat within farmland and wetlands throughout the study area (KP 0.3-56.6, 76.6-87.2).	Recorded at KP's 52.3 and 55.1. Potential to occur elsewhere in high-quality habitats.	**Present**
Calamanthus pyrrhopygius	Chestnut-rumped Heathwren	VU	EN	2	24/12/1998	VBA	**Low**	The SouthEastern Australian subspecies (*Hylacola pyrrhopygia pyrrhopygia*) is found on the seaward and inland side of the Great Dividing Range. It inhabits heathlands and woodlands with dense shrub and ground-layer vegetation and is most commonly found in rocky areas.	No suitable habitat present.		
Calidris acuminata	Sharp-tailed Sandpiper		Ma, Mi	Modelled	N/A	PMST	**Moderate**	Widespread in most regions of Victoria, especially in coastal areas. Inhabits muddy edges of shallow fresh or brackish wetlands in coastal areas with emergent sedges, grass, saltmarsh or other low vegetation.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded during targeted surveys. Given absence of records in study area species considered unlikely to occur in survey area.	**Low**
Calidris alba	Sanderling		Ma, Mi	Modelled	N/A	PMST	**High**	Widespread records occur between Venus Bay and the Bellarine Peninsula. Inhabits coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and lagoons; rarely recorded in near-coastal wetlands.	Potential habitat along Waratah Bay coastline (KP0).	Observed at Waratah Bay outside of survey area during targeted shorebird survey. Given the continuity of habitat, this species is likely to occur within the survey area.	**Present**
Calidris canutus	Red Knot	EN	EN, Ma, Mi	2	12/10/2018	VBA, PMST	**Moderate**	Common in all the main suitable habitats around the coast of Australia. Intertidal mudflats, sandflats sheltered sandy beaches, estuaries, bays, inlets, lagoons, harbours, sandy ocean beaches, rock platforms, coral reefs, terrestrial saline wetlands near the coast, sewage ponds and saltworks. Rarely inland lakes or swamps.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded during targeted surveys. Given low number of records in sudy area species considered unlikely to occur in survey area.	**Low**
Calidris ferruginea	Curlew Sandpiper	CE	CR, Ma, Mi	18	2/03/2020	VBA, PMST	**Low**	In Victoria, they are widespread and common in coastal bays and inlets and are widespread in near-coastal wetlands, and inland in suitable habitats such as the Kerang area, Mildura, and western districts. They inhabit Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	No intertidal mudflats within the survey area.		

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Calidris melanotos	Pectoral Sandpiper		Ma, Mi	Modelled	N/A	PMST	**Low**	Non breeding migratory species that prefers shallow fresh to saline wetlands with open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. Also occurs in swamps, saltmarshes, lakes and inundated grasslands.	Modelled distribution. No records within the 10 km search area. Preferred wetland habitat type is not present within the survey area. Secondary habitat (inundated grassland) is present, however, this species is unlikely to make any significant use given that no records are present at Corner inlet which is well surveyed and the nearest record is near Phillip Island. Most records are associated with coast around Port Phillip Bay and inland wetlands to the west of Melbourne.		
Calidris ruficollis	Red-necked Stint		Ma, Mi	Modelled	N/A	PMST	**Moderate**	Coastal species which occurs in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores. Occasionally occur in saltworks, sewage farms, saltmarsh, shallow wetlands, lakes, swamps, riverbanks, dams, flooded paddocks or damp grasslands.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded, however has been recorded utilising shoreline, most recently in 2017, and considered likely to make occasional use of the survey area.	**Moderate**
Calidris tenuirostris	Great Knot	CE	CE, Ma, Mi	Modelled	N/A	PMST	**Low**	Nonbreeding migratory species that occurs in intertidal mudflats and sandflats in sheltered coasts, including bays harbours and estuaries.	Modelled distribution. No historical records within 50 km of the study area.		
Callocephalon fimbriatum	Gang-gang Cockatoo		EN	289	21/04/2021	VBA	**High**	Gang-gang Cockatoos primarily occur within the temperate eucalypt forests and woodlands of mainland south-east Australia. The species is an altitudinal migrant. During summer months, Gang-gang Cockatoos primarily inhabit mature, wet sclerophyll forests, typically dominated by eucalypts. During winter months, Gang-gang Cockatoos tend to range beyond montane forests to inhabit woodland assemblages at lower, drier altitudes	Potential habitat in wet sclerophyll forest in the Strzelecki Ranges and large woodland patches and roadsides with a high tree cover in the south near Waratah Bay (KP 2.3 – 12.8, 56.5 – 79.7). Recent VBA records occur within the Strzelecki Ranges.	Not recorded in targeted surveys, however still considered likely to utilise survey area based on recent records from adjoining, inter-connected habitats.	**High**
Calyptorhynchus lathami	Glossy Black-Cockatoo	CE	VU	2	31/08/1974	PMST	**Low**	Most Victoria records occur in East Gippsland. Open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur.	Historical records only. No significant areas of habitat within survey area.		
Caretta caretta	Loggerhead Turtle		EN, Ma, Mi	Modelled	N/A	PMST	**None**	In Australia, they occur in coral reefs, bays and estuaries in tropical and warm temperate waters off the coast of Queensland, Northern Territory, Western Australia and New South Wales.	Restricted to marine environment.		
Charadrius bicinctus	Double-banded Plover		Ma, Mi	Modelled	N/A	PMST	**Moderate**	Found in both coastal and inland areas on sandy or rocky beaches, mudflats, sewage farms, bays, inlets and saltmarsh. It also occurs in short pasture near the coast.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded, however regularly recorded at Sandy Point and considered to make occasional use of the survey area.	**Moderate**
Charadrius leschenaultii	Greater Sand Plover	VU	VU Ma, Mi	1	28/03/1984	VBA	**Moderate**	In Southern Australia it is mostly recorded in Corner Inlet, Western Port and Port Phillip Bay in Victoria. The species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons, and inshore reefs, rock platforms, small rocky islands or sand cays on coral reef.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded during targeted surveys. Given limited records in study area species considered unlikely to occur in survey area.	**Low**
Charadrius mongolus	Lesser Sand Plover	EN	EN, Ma, Mi	1	27/09/2018	VBA	**Moderate**	Widespread in coastal regions within Australia. This species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and	Potential habitat along Waratah Bay coastline (KP0).	Not recorded during targeted surveys. Given limited records in study area species considered unlikely to occur in survey area.	**Low**

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								occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves.			
Charadrius ruficapillus	Red-capped Plover		Ma	Modelled	N/A	PMST	**Moderate**	Widespread throughout Australia. Inhabits sandy beaches, saltmarshes, and large inland saline wetlands.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded during targeted surveys. Recent records near survey area at KP0 (birdata).	**Moderate**
Chelonia mydas	Green Turtle		VU, Ma, Mi	Modelled	N/A	PMST	**None**	Occurs in seaweed-rich coral reefs and inshore seagrass pastures in tropical and subtropical areas of the Indo-Pacific region. In Australia, there are seven regional populations of green turtles that nest in different areas; the southern Great Barrier Reef, the northern Great Barrier Reef, the Coral Sea, the Gulf of Carpentaria, Western Australia's north-west shelf, the Ashmore and Cartier Reefs and Scott Reef.	Restricted to marine environment.		
Climacteris affinis	White-browed Treecreeper	EN		1	19/10/2004	VBA	**Low**	Habitat includes grassy open woodland, inland riparian woodland, grassland, shrub steppe, agricultural land and edges of inland wetlands. In Victoria, White-browed Treecreepers are restricted to localised populations in regenerating native pine (Callitris spp.) and/or Buloke (*Allocasuarina luehmannii*) and Belah (Casuarina pauper) woodlands, or in fairly dense thickets of smaller shrubs, including Sugarwood (*Myoporum platycarpum*), Weeping Pittosporum (*Pittosporum phillyraeoides*), Small Cooba (*Acacia ligulata*), Umbrella Wattle (*A. osswaldii*) and Slender Hopbush (*Dodonaea viscosa*) spp.	No suitable habitat present.		
Climacteris picumnus	Brown Treecreeper		VU	Modelled	N/A	PMST	**Low**	Endemic to couth-eastern Australia from the Grampians in western Victoria, through central NSW to the Bunya Mountains in Queensland. Less commonly found on coastal plains and ranges. Occur dry open eucalypt forests and woodlands, mainly inhabiting woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey.	Limited records within the locality, and is outside its normal range.		
Dasyurus maculatus maculatus	Spot-tailed Quoll	EN	EN	2	1/08/1962	VBA, PMST	**Low**	In Victoria, locations include East Gippsland, the Strzelecki Range, and Wilson's Promontory NP. In inhabits rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	Limited historical records and marginal habitat within the AoD.		
Dasyurus viverrinus	Eastern Quoll	EN	EN		31/03/1999	VBA	**Low**	The species now survives in several discrete areas of Victoria, including eastern Victoria (including north-eastern Victoria and lowland East Gippsland) and South Gippsland, in the Strzelecki Ranges. It inhabits Dry sclerophyll forest, scrub, heathland and cultivated land.	Historical records only. Likely to be locally extinct.		
Delma impar	Striped Legless Lizard	EN	VU	Modelled	N/A	PMST	**Low**	Occurs in grassland with complex grass structure, including native and exotic tussock grasses with high biomass, surface rocks, arthropod burrows or cracking soils. Occurs on roadsides and can persist in disturbed areas with low-moderate intensity grazing but not in cropped or ploughed land.	No suitable habitat within the survey area.		

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Dermochelys coriacea	Leatherback Turtle	CE	EN, Ma, Mi	Modelled	N/A	PMST	**None**	In Australia, leatherback turtles occur in tropical and temperate waters. Leatherback turtles are most commonly reported feeding in coastal waters in central eastern Australia (from the Sunshine Coast in southern Queensland to central New South Wales); south-east Australia (from Tasmania, Victoria and eastern South Australia) and in south-western Western Australia. They are also regularly seen in southern Australia.	Restricted to marine environment.		
Diomedea antipodensis	Antipodean Albatross		VU, Ma, Mi	Modelled	N/A	PMST	**None**	The Antipodean Albatross is endemic to New Zealand, but forages widely in open water in the south-west Pacific Ocean, Southern Ocean and the Tasman Sea. It is marine, pelagic and aerial.	Oceanic species, no suitable habitat.		
Diomedea antipodensis gibsoni	Gibson's Albatross		VU, Ma	Modelled	N/A	PMST	**None**	Gibson's Albatross is marine, pelagic and aerial. In the Antarctic, it occurs in open water, and rarely enters the belt of icebergs region. In late summer, it may approach the edge of the pack-ice. On breeding islands, the Gibson's Albatross nests on coastal or inland ridges, slopes, plateaux and plains, often on marshy ground.	Oceanic species, no suitable habitat.		
Diomedea epomophora	Southern Royal Albatross	CE	VU, Ma, Mi	Modelled	N/A	PMST	**None**	Southern royal albatrosses nest almost exclusively on the Chatham Islands, located hundreds of miles east of New Zealand. After breeding, the species may circumnavigate the Southern Ocean, though it is most commonly sighted in New Zealand and South American waters.	Oceanic species, no suitable habitat.		
Diomedea exulans	Wandering Albatross	CE	VU, Ma, Mi	Modelled	N/A	PMST	**None**	The Wandering Albatross breeds on Macquarie Island . A single breeding pair has also been recorded on Heard Island. It feeds in Australian portions of the Southern Ocean.	Oceanic species, no suitable habitat.		
Diomedea sanfordi	Northern Royal Albatross		EN, Ma, Mi	Modelled	N/A	PMST	**None**	The Northern Royal Albatross ranges widely over the Southern Ocean, with individuals seen in Australian waters off south-eastern Australia. The Northern Royal Albatross feeds regularly in Tasmanian and South Australian waters, and less frequently in NSW waters	Oceanic species, no suitable habitat.		
Egretta garzetta	Little Egret	EN	Ma	21	28/04/2019	VBA	**Moderate**	Found mainly in coastal and inland areas of northern, eastern and south-eastern Australia. It frequents tidal mudflats, saltwater and freshwater wetlands, and mangroves.	Potential habitat associated with vegetated wetlands within the study area (KP 67,78.1-78.2, 83.4)	Not recorded during targeted surveys. Habitat within the study area is considered low-quality/sub-optimal.	**Low**
Engaeus phyllocercus	Narracan Burrowing Crayfish	EN		12	4/02/2011	VBA	**High**	Occurs in the Warragul and Narracan districts. Typically found in the flood-bed regions of ferny gullies in wet sclerophyll forest and on creek banks.	Potential habitat in wet sclerophyll forest and ferny gullies in the Strzelecki Ranges (KP 63.6, 66.6, 67).	No individuals were recorded during targeted surveys. However, limited access. Low detection rates and high-quality habitat means species still considered likely to occur.	**Moderate**
Engaeus rostrogaleatus	Strzelecki Burrowing Crayfish	EN		3	8/06/1999	VBA	**Low**	Has a very restricted distribution along a 30 km section of the Eastern Strzelecki Ranges in South Gippsland at high altitudes generally above 400 m. Typically found in the flood-bed regions of ferny gullies in wet sclerophyll forest and on creek banks.	Study area outside known distribution. No streams with suitable vegetation e.g., mountain ash and tree ferns in study area.		

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Eretmochelys imbricata	Hawksbill Turtle		VU, Ma, Mi	2	21/6/2006	VBA	**Low**	In Victoria, likely to occur as far west as Bemm River. Marine, pelagic for first the 5 - 10 years, then found in tropical tidal and sub-tidal coral and rocky reef habitat.	Primarily a marine species.		
Euastacus neodiversus	South Gippsland Spiny Crayfish	EN		2	19/04/2018	VBA	**High**	Occurs at Wilsons Promontory and the southern side of the Strzelecki Ranges. The species occurs near streams in sclerophyll forest where the streamside vegetation is dominated by Mountain Ash (*Eucalyptus regnans*), tree ferns (Cyathea spp) and Lilly Pilly (*Acmena smithii*).	Narrow streams in Strzelecki Ranges (KP 61.6, 63.6, 66.6, 67)	No individuals were recorded during targeted surveys. However, limited access. Low detection rates and high-quality habitat means species still considered likely to occur.	**Moderate**
Falco hypoleucos	Grey Falcon	VU	VU	Modelled	N/A	PMST	**Low**	Primarily occurs inland in arid areas but can occur elsewhere in Australia. Prefers lightly timbered woodland and Acacia scrub.	Modelled distribution. Wide ranging but rare species. Limited historical records near the study area.		
Falco subniger	Black Falcon	CE		8	30/01/2007	VBA	**Moderate**	Sparsely spread across most of Victoria. Inhabits woodland, shrubland and grassland, especially riparian woodland and agricultural land. It is often associated with streams or wetlands.	Potential foraging habitat in woodland and wooded farmland throughout the survey area (2.3- 6.4, 8.1- 8.9, 12.3, 21.5 - 28.7, 29.4, 57 - 79.8).	Not recorded during targeted surveys and is sparsely recorded within the broader area.	**Low**
Fregetta grallaria grallaria	White-bellied Storm-Petrel		VU	Modelled	N/A	PMST	**None**	Occurs across sub-tropical and tropical waters in the Tasman Sea, Coral Sea and, possibly, the central Pacific Ocean. In the non-breeding season, it reaches and forages over near-shore waters along the continental shelf of mainland Australia. It breeds, in Australian territory, on offshore islets and rocks in the Lord Howe Island group.	Primarily a marine species.		
Galaxiella pusilla	Dwarf Galaxis	EN	VU	7	16/07/2020	VBA	**Moderate**	Occurs from the Mitchell River Basin in Central Gippsland, Victoria, to the Cortina Lakes, near the Coorong in South Australia. Typically occurs in well vegetated slow flowing, still, shallow temporary or permanent freshwater habitats including swamps, drains and backwaters of streams and creeks. Some wetlands be may partially or completely dry during summer.	Potential habitat associated with rivers and creeks within the study area (KP 17.7, 21.5, 28.5, 29.4, 40.6, 54.3, 61.6, 78, 83.4, 85- 85.2).	Aquatic surveys not completed due to access constraints at numerous waterways.	**Moderate**
Gallinago hardwickii	Latham's Snipe		Ma, Mi	N/A	N/A	PMST	**High**	Found in all regions of Victoria except for the north-west. Occupies a range of habitats, though usually found in open freshwater wetlands with low, dense vegetation; including freshwater swamps, flooded grasslands or heathlands. Also occurs in modified habitats such as pasture, irrigation channels, drainage ditches and near human activity e.g. roadsides and railways.	Potential habitat in wetlands and inundated pastures/woodlands in Waratah Bay, Tarwin Valley and Latrobe Valley (KP 0 – 57.2, 76.6 – 87.1).	Recorded at KP78.1 within drainage line within paddock.	**Present**
Gallinago megala	Swinhoe's Snipe		Ma, Mi	Modelled	N/A	PMST	**Low**	Few definite records occur in Australia, but potential habitat occurs along much of the coast of Victoria. In Australia the species is found around edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains.	No recent records and suboptimal habitat present.		
Gallinago stenura	Pin-tailed snipe		Ma, Mi	Modelled	N/A	PMST	**Low**	Cryptic shorebird of wetlands, wet meadows, and both flooded and dry agricultural fields. Looks very similar to other snipe species.	Modelled distribution. Uncommon species in Victoria. Unlikely to use the study area.		
Gelochelidon nilotica macrotarsa	Australian Gull-billed Tern	EN	Ma, Mi	3	26/07/1987	VBA	**Low**	Found in marshier habitats than most other tenrs, usually near the coast, but not on the ocean, though also occasionally seen on beaches and mudflats.	Suboptimal habitat, no recent records		

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Grantiella picta	Painted Honeyeater	VU	VU	Modelled	N/A	PMST	**Low**	Prefers forest/woodland, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands with mistletoe a high number of mature trees. Also occurs in acacia-dominated woodlands, paperbarks, casuarinas, *callitris*, and trees on farmland or gardens.	Modelled habitat. Strong holds for this species are in north-east and central Victoria. Very low number of historical records near the study area.		
Haliaeetus leucogaster	White-bellied Sea-Eagle	EN	Ma	50	19/07/2021	VBA	**Moderate**	Distributed along the coastline of mainland Australia and Tasmania. In eastern Australia it also extends inland along some of the larger waterways. Occurs near freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	Potential habitat in woodland and forest associated with Waratah Bay coastline and Morwell River (KP0 - 6.4, 76.6 - 87.1).	Not recorded within survey area. VBA records at Hazelwood Cooling Pond and Sandy Point. Given wide range, and lack of habitat surveys in woodlands around Waratah Bay, species considered likely to occur in survey area.	**Moderate**
Halobaena caerulea	Blue Petrel		VU, Ma	Modelled	N/A	PMST	**Low**	Has a global distribution throughout the southern oceans from the pack ice edge up to about 30 degrees south. Individuals are rarely encountered inshore and offshore over the continental shelf and in pelagic waters off the shelf break. It forages in Antarctic and subantarctic waters mainly on pelagic crustaceans, fish, cephalopods and insects.	Has a global distribution throughout the southern oceans from the pack ice edge up to about 30 degrees south. Individuals are rarely encountered inshore and offshore over the continental shelf and in pelagic waters off the shelf break. It forages in Antarctic and subantarctic waters mainly on pelagic crustaceans, fish, cephalopods and insects.		
Hieraaetus morphnoides	Little Eagle	VU		21	10/08/2014	VBA	**Moderate**	Widespread species. Occurs primarily in wooded farmland and dry woodlands.	Potential habitat in open woodland and farmland within the study survey area (KP 2.3 – 6.4, 8.1- 8.9, 12.3, 21.5 – 28.7, 57 – 79.8).	Not recorded, however, this species is widespread and utilises a variety of habitat within the survey area and has been recorded recently within the study area (VBA). Given wide range, and lack of habitat surveys in woodlands around Waratah Bay, species considered likely to occur in survey area.	**Moderate**
Hirundapus caudacutus	White-throated Needletail	VU	VU, Ma, Mi	123	22/03/2019	VBA	**Moderate**	Widespread in Victoria. Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	An aerial species that may make use of the study area for foraging. Potential habitat associated with remnant woodland and forest throughout the survey area (KP2.3 - 84.9)	Not recorded, however species is unlikely to make use of terrestrial habitats impacted by project.	**Low**
Hydroprogne caspia	Caspian Tern	VU	Ma, Mi	13	16/02/2019	VBA	**Moderate**	Occurs in most coastal regions of Victoria. Three significant regular breeding colonies are known in Victoria: Corner Inlet, Mud Island in Port Philip Bay and Mallacoota. Found near coastal offshore waters, beaches, mudflats, estuaries, rivers and lakes.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded, however regularly recorded at Sandy Point and considered to make occasional use of the survey area.	**Moderate**
Hyridella narracanensis	Narracan Corrugated Mussel	EN		1	01/01/1889	VBA	**Low**	Relatively few occurrence records for the species are report in online databases, however these records indicate the general distribution is restricted to certain rivers and streams in Victoria. First recorded and described from the Narracan River in Gippsland. Found in areas well-shaded by overhanging vegetation, in shallow water with moderate currents over sandy, compacted substrata with low organic content.	No recent records, and has not been recorded in river systems intersecting the study area.		
Isoodon obesulus obesulus	Southern Brown Bandicoot	EN	EN	1	30/03/1978	VBA	**Low**	Primarily distributed in coastal regions in Victoria. Distribution of this subspecies includes the East Gippsland Lowlands, Gippsland Plain (Western section) and Wilson's Promontory. Inhabits heath or open forest	No recent records nearby and unlikely to be suitable habitat present.		

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								with a heathy understorey on sandy or friable soils with dense ground cover and adjacent open areas for foraging.			
Ixobrychus dubius	Australian Little Bittern	EN		2	19/11/2018	VBA	**Moderate**	East of Melbourne, isolated records occur near Marthavale and the Lake Curlip Wildlife Reserve. Mainly found in dense emergent vegetation in freshwater wetlands, especially in reedbanks and Typha, as well as in inundated shrub thickets; can occur in small wetlands.	Potential habitat includes vegetated wetlands and waterways (KP67, 83.4)	Not recorded during targeted surveys. Habitat within the study area is considered low-quality/sub-optimal.	**Low**
Lathamus discolor	Swift Parrot	CE	CE, Ma	2	19/11/2018	VBA	**Low**	A non-breeding winter migrant to the mainland from Tasmania. In Victoria, the over-wintering habitat of the Swift Parrot is eucalypt forests and woodlands consisting primarily of the winter-flowering Grey Box (*Eucalyptus microcarpa*), Red Ironbark (*Eucalyptus tricarpa*)	Low number of recent records and limited preferred foraging trees within the alignment.		
Lewinia pectoralis	Lewin's Rail	VU		11	8/04/2019	VBA	**Moderate**	Found along the south east and eastern seaboard west to Kangaroo Island. Occupies dense cover (reeds, saltmarsh, tussocks) of coastal and near coastal wetlands; also wetlands in rainforests, woodlands and heathlands.	Potential habitat includes vegetated wetlands and waterways (KP 22.6 - 28.7, 67, 83.4)	Not recorded during targeted surveys. Habitat within the study area is considered low-quality/sub-optimal.	**Low**
Limosa lapponica	Bar-tailed Godwit	VU	Ma, Mi	4	25/01/2020	VBA	**Low**	Widespread along the coast of Victoria; a few records inland. Inhabits intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, salt lakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	Suitable habitat at Waratah Beach.		
Lissolepis coventryi	Swamp Skink	EN	EN	2	13/11/2007	VBA	**Moderate**	Inhabits densely vegetated, wet environments throughout south-east Australia, including swamp margins, tea-tree thickets and tidal salt marshes.	Potential habitat includes creeklines, swamp scrubs and swampy woodlands around Waratah Bay and rail trail (2.3 - 6.4, 8.1 - 8.9)	Not recorded during targeted surveys in rail trail (KP22.6-23.4). Surveys not completed in Waratah Bay woodlands due to land access.	**Moderate**
Litoria aurea	Green and Golden Bell Frog		VU	Modelled	N/A	PMST	**Low**	Occurs in isolated coastal lowland areas in Gippsland, Victoria. Its southern most point is near Lake Wellington, west of Lakes Entrance. Prefers undisturbed habitats in the coastal plains and low foothills including lowland forest, Banksia woodland, wet heathland, riparian scrub complex, riparian forest, damp forest, shrubby forest, limestone box woodland but can also occur in cleared farmland (DEWHA, 2009). Breeding occurs in permanent and ephemeral ponds.	Modelled habitat. Species distribution is concentrated north of Sale in Victoria. No records near the study area.		
Litoria raniformis	Growling Grass Frog	VU	VU	28	15/11/2010	VBA	**Moderate**	Distributed across Victoria and absent from the north-west corner of the state and alpine areas. Previously widespread, the species persists in isolated populations including in the greater Melbourne area, south-west of Victoria, central Victoria and Gippsland. Inhabits still or slow-moving wetland systems such as lagoons, swamps, lakes and ponds with grassland habitat and emergent vegetation. Also found in farm dams, irrigation channels and disused quarries.	Potential habitat includes well vegetated wetlands and dams throughout survey area (KP32.0, 34.5-35.0, 40.4, 44.2, 62.4, 67.0, 67.2, 67.4, 78.1, 78.2, 78.1-78.2).	Not recorded during targeted surveys, however recorded within wetland at KP 67 during targeted surveys for Delburn Wind Farm. Population of approximately 20-30 individuals	**High**
Macronectes giganteus	Southern Giant-Petrel	EN	EN, Ma, Mi	Modelled	N/A	PMST	**None**	The Southern Giant-Petrel is a marine species. Over summer, the species nests in small colonies amongst open vegetation on Antarctic and subantarctic islands. It	Oceanic species. No suitable habitat present.		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
								can be seen off the coast of Victoria during the non-breeding season.			
Macronectes halli	Northern Giant-Petrel	EN	VU, Ma, Mi	Modelled	N/A	PMST	**None**	The Northern Giant Petrel breeds in the sub-Antarctic, and visits areas off the Australian mainland mainly during the winter months (May-October). Immature and some adult birds are commonly seen during this period in offshore and inshore waters from around Fremantle (WA) to around Sydney (NSW).	Oceanic species. No suitable habitat present.		
Mastacomys fuscus mordicus	Broad-toothed Rat	VU	VU	3	30/06/2019	VBA	**None**	Found in the alpine and subalpine heathlands of Victoria and southern NSW. In southern Victoria, the species occupies dense undergrowth in wet sedgelands.	No suitable vegetation types in study area.		
Melanodryas cucullata	Hooded Robin	VU	EN	1	12/06/1999	VBA	**Low**	Found all over mainland Australia. Inhabits lightly timbered woodland usually dominated by acacia and/or eucalypts.	No large native woodlands in study area.		
Merops ornatus	Rainbow Bee-eater		Ma	Modelled	N/A	PMST	**Low**	Widespread within Australia, although southern populations migrate north from February and return in September. Often occurs in open forest, woodlands and shrublands near water. May also occur in wooded farmland, quarries and orchards.	Modelled distribution. Limited records nearby. Unlikely to make use of the survey area.		
Monarcha melanopsis	Black-faced Monarch		Ma, Mi	Modelled	N/A	PMST	**Low**	In Victoria, it is largely confined to east Gippsland, where it is widespread south of 37 °S, and west to around the Mitchell River National Park. Mainly associated with rainforest habitats but may also occur in open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	Survey area is outside of this species preferred location and suboptimal habitat is present.		
Motacilla flava	Yellow Wagtail		Ma, Mi	Modelled	N/A	PMST	**Low**	Nonbreeding migratory species. Occurs in grassland habitat subject to inundation.	Modelled distribution. Migratory species within limited records across Victoria. Species is wide ranging but rare.		
Myiagra cyanoleuca	Satin Flycatcher		Ma, Mi	Modelled	N/A	PMST	**Moderate**	In Victoria, the species is widespread in the south and east. Inhabits eucalypt-dominated forests, especially near wetlands, watercourses, and heavily vegetated gullies.	Potential habitat in woodlands in Waratah Bay and Latrobe Valley (KP 2.3 – 6.4, 8.1- 8.9, 57 – 76.5).	Not recorded during targeted surveys, however Waratah Bay woodlands not surveyed due to land access.	**Moderate**
Nannoperca sp. 1	Flinders Pygmy Perch	VU		38	19/10/2020	VBA	**High**	Records occur from eastern Victoria as far west as the Latrobe River. Typically occurs in lakes, ponds and slow-flowing rivers.	Potential habitat includes Morwell River and other suitable rivers and creeks within the alignment (KP 17.7, 21.5, 28.5, 29.4, 40.6, 54.3, 61.6, 78, 83.4, 85, 85.1).	No Flinders Pygmy Perch were recorded at KP 34.9 during targeted surveys for frogs (dip netting). Aquatic surveys not completed due to access constraints at numerous waterways. Many records associated with Morwell River and potential for suitable habitat within rivers and creeks within the AoD.	**High**
Neophema chrysogaster	Orange-bellied Parrot	CE	CR, Ma	Modelled	N/A	PMST	**Low**	Breeds in Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern SA and southern Victoria. Winter habitat is mostly within 3 km of the coast in sheltered bays, lagoons, estuaries, coastal dunes and saltmarshes. Also occurs on small islands and peninsulas, saltworks, golf courses, low samphire herbland and taller coastal shrubland.	Narrow band of suboptimal habitat present at Waratah Bay.		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Neophema chrysostoma	Blue-winged Parrot		VU, Ma	Modelled	N/A	PMST	**Moderate**	Occurs in range of habitats from coastal, sub-coastal, and inland areas, through to semi-arid zones. Throughout their range they favour grasslands and grassy woodlands, and are found near wetlands both by the coast and in semi-arid zones. Can also be found in altered environments like airfields, golf courses, and paddocks. Prefers to forage in grasslands and grassy woodlands containing *Rytidosperma* and *Poa* sp.	Potential habitat includes grassy areas within the Strzelecki Forest and large woodland patches in the south (KP 2.3 – 6.4, 8.1- 8.9, 57 – 76.5).	Not recorded, however, recent records in 2020 in the survey area (Ten Mile Creek road).	**Moderate**
Ninox connivens	Barking Owl	CE		4	27/06/2005	VBA	**Moderate**	It is estimated that there are only 50 pairs left in Victoria. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland, wetland and riverine forest.	Eucalypt-dominated woodland and open forest within the alignment (KP 21.5 – 28.7, 57 – 76.5).	Not recorded during target surveys. Given that this species is rare in Victoria, it is unlikely that this species is present within the survey area.	**Low**
Ninox strenua	Powerful Owl	VU		40	10/11/2020	VBA	**High**	Occurs mainly on the eastern side of the Great Dividing Range. Inhabits open forests and woodlands, as well as sheltered gullies in wet forests with dense understoreys, especially along watercourses. Occasionally found in open areas near forests such as farmland, parks and suburban areas and remnant bushland patches. Needs old growth trees to nest.	Potential habitat in forest and open woodlands in the Strzelecki Ranges and larger woodland patches near Waratah Bay. May occasionally forage in wooded farmland (KP 2.3 – 6.4, 8.1- 8.9, 12.3, 21.5 – 28.7, 57 – 76.5).	Recorded along rail trail, near KP21.8. Fledglings were recorded on the acoustic recorder, which shows there is at least one breeding pair close to the alignment. Suitable foraging habitat associated with larger areas of native forests and woodlands throughout.	**Present**
Numenius madagascariensis	Eastern Curlew	CE	CR, Ma, Mi	47	25/02/2021	VBA	**Moderate**	A summer migrant to Australia. Inhabit Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded, however regularly recorded in local vicinity and considered to make occasional use of the survey area.	**Moderate**
Numenius minutus	Little Curlew		Ma, Mi	Modelled	N/A	PMST	**Low**	Migratory species which is widespread in northern Australia and scattered elsewhere. Occurs in wetlands and inundated grassy areas such as farmland and airfields.	Modelled distribution. Uncommon in Victoria. No historical records near the study area.		
Numenius phaeopus	Whimbrel	EN	Ma, Mi	10	7/04/2019	VBA	**Low**	In Victoria it is commonly found at Corner Inlet, Westernport and Port Phillip Bays. Inhabits estuaries, mangroves, tidal flats, coral cays, exposed reefs, flooded paddocks, sewage ponds, grasslands, sports fields and lawns.	Marginal habitat within the survey area. Species is unlikely to occur.		
Ornithorhynchus anatinus	Platypus	VU		22	10/08/2022	VBA	**Moderate**	Prefers well vegetated freshwater creeks, slow-moving rivers, lakes joined by rivers, and built water storages such as farm dams. Builds burrows into riverbanks among tree roots.	Potential habitat in low-moving rivers, lakes, and farm dams at Fish Creek, Stony Creek, Tarwin River, Berrys Creek, Mirboo North and Morwell River (KP 17.7, 29.4, 40.6, 54.3, 61.6, 78).	Aquatic surveys not completed due to access constraints at numerous waterways.	**Moderate**
Oxyura australis	Blue-billed Duck	VU		43	19/08/2021	VBA	**Moderate**	Widely distributed in Victoria; most large populations occur in northern and western Victoria. The species inhabits stable, deep, fresh well-vegetated wetlands for much of the year. These swamps often contain rushes or sedges, but lignum *Meuhlenbeckia* spp. or *Melaleuca* swamps are also used. In winter, flocks congregate on large, open, fresh to saline wetlands, including artificial areas such as sewage ponds.	Potential habitat includes vegetated wetlands and waterways (KP67, 83.4)	Not recorded during targeted surveys. Habitat within the study area is considered low-quality/sub-optimal.	**Low**
Pachyptila turtur	Fairy Prion		Ma	Modelled	N/A	PMST	**None**	A marine species. Often beachcast on the south-eastern coast of Australia and are commonly seen offshore over the continental shelf and over pelagic waters. Found in temperate and subantarctic seas. It sometimes forages	Restricted to marine environment		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
								over continental shelves and the continental slope but can come close inshore in rough weather.			
Pandion haliaetus	Osprey		Ma, Mi	Modelled	N/A	PMST	**Low**	Marine bird. The species is a rare vagrant in Victoria. It inhabits rocky shorelines, islands, reefs, mouths of large rivers, lagoons and lakes.	Marginal suitable habitat at Morwell River and Waratah Bay, however this species is a rare and infrequent species and is unlikely to occur within the survey area.		
Petauroides volans	Southern Greater Glider	VU	EN	88	23/03/2020	VBA	**Moderate**	Restricted to eastern Australia; in Victoria, occurs as far west as the Wombat State Forest. Typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.	Potential habitat in tall eucalyptus forests in the Strzelecki Ranges (KP57-76.5).	Not recorded during targeted surveys. Unlikely to occur within the survey area.	**Low**
Petaurus australis	Yellow-bellied Glider		VU	Modelled	N/A	PMST	**Low**	IN Vic, 75% of all yellow-bellied glider records are in the eastern portion of the state, extending from the east coast to Melbourne and Port Philip Bay. Occurs in eucalypt-dominated woodlands and forests, including both wet and ry sclerophyll forests. The species shows a preference for large patches of mature old growth forest that provide suitable trees for foraging and shelter.	No historical records within the study area and locality		
Pezoporus wallicus	Ground Parrot	EN		3	18/04/2017	VBA	**None**	In south-central Victoria, it is found in Wilsons Promontory National Park. Further east, it occurs in Gippsland Lakes Coastal Park and, in the far east, in Croajingalong National Park. In Victoria, it inhabits closed coastal heathland and sedgeland. Heathlands are either dominated by graminoids or support a diversity of shrubs.	No suitable habitat present.		
Phoebetria fusca	Sooty Albatross	CE	VU, Ma, Mi	Modelled	N/A	PMST	**None**	Is marine and pelagic. During both the breeding and non-breeding seasons, the species occurs widely over pelagic waters, exploiting dispersed sources of food. The species breeds on subtropical and subantarctic islands in the Indian and Atlantic Oceans, on vegetated cliffs and steep slopes that are sheltered from prevailing winds, often amongst tussock grass	Restricted to marine environment.		
Pluvialis fulva	Pacific Golden Plover	VU	Ma, Mi	15	25/02/2021	VBA	**Low**	Recorded at scattered sites in the south-east of Australia. Inhabits estuaries, mudflats, saltmarshes, mangroves, rocky reefs, inland swamps, ocean shores, paddocks, sewage ponds, ploughed land, airfields, playing fields.	Suitable habitat at Waratah Beach.		
Potorous tridactylus	Long-nosed Potoroo	VU	VU	Modelled	N/A	PMST	**Low**	In Victoria, the Long-nosed Potoroo (SE Mainland) occurs in six discrete regions (Seebeck 1981), including the South-western region, Grampians, Otways, Western Port, Wilsons Promontory and east Gippsland. Most commonly inhabits heath-woodland grading into heath dominated by *Eucalyptus obliqua* and *E. baxteri*, and sometimes *E. radiata*.	No records in local area and restricted occurrences across the state. No suitable habitat present.		
Prototroctes maraena	Australian Grayling	EN	VU	19	25/04/2018	VBA	**Present**	Currently occurs in streams and rivers on the eastern and southern flanks of the Great Dividing Range. The species spends part of its lifecycle in freshwater and at least part of the larval and/or juvenile stages in coastal seas. Adults inhabit cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones.	Tarwin River is an important river (population) for this species. Potential habitat associated with rivers and creeks within the study area (KP 17.7, 21.5, 28.5, 29.4, 40.6, 54.3, 61.6, 78, 83.4, 85- 85.2).	Aquatic surveys not undertaken due to avoidance through HDD of major waterways.	**Moderate**

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Pseudemoia rawlinsoni	Glossy Grass Skink	EN		2	13/05/2008	VBA	**Moderate**	Found in the alpine regions of north-eastern Victoria and lowland areas in southern Victoria. Inhabits humid and densely vegetated swampy areas such as marshland and the margins of creeks, swamps and lakes.	Potential habitat in creeklines, swamp scrubs and swampy woodlands around Waratah Bay (KP2.3-6.4, 8.1-8.9, 22.6-23.4)	Species not recorded within survey area however, however suitable habitat may occur in areas not yet accessed (KP 2.3 - 6.4, 8.1 - 8.9).	**Moderate**
Pseudomys novaehollandiae	New Holland Mouse	EN	VU	Modelled	N/A	PMST	**Low**	Occurs in isolated sites within coastal plains east of Melbourne and Otway Plains near Anglesea (DSE, 2006). Occurs in heathlands, heathy woodlands, open forests and vegetated sand dunes (DSE, 2006).	Modelled habitat Disjunct species distribution. Nearest isolated historical records are 50 km away from the study area.		
Pseudophryne semimarmorata	Southern Toadlet	EN		8	27/05/1977	VBA	**Moderate**	Occurs in South-Eastern Australia. It can be found in sclerophyll forest, woodland, heaths and grasslands. It is usually found under litter, logs and rocks in damp areas.	Potential habitat in woodlands around Waratah Bay (KP2.3-6.4, 8.1-8.9).	Species not recorded within survey area however, however suitable habitat may occur in areas not yet accessed (KP 2.3 - 6.4, 8.1 - 8.9).	**Moderate**
Pterodroma leucoptera leucoptera	Gould's Petrel		EN	Modelled	N/A	PMST	**None**	Is a pelagic marine species, spending much of its time foraging at sea and coming ashore only to breed. The Australian subspecies breeds and roosts on two islands off NSW, Cabbage Tree and Boondelbah Islands, and the at-sea distribution is poorly known.	Primarily a marine species.		
Pteropus poliocephalus	Grey-headed Flying-fox	VU	VU	5	8/04/2019	VBA	**Moderate**	Found throughout eastern Mainland Australia in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Forage over extensive areas and have been known to fly as far as 40 km to feed before returning to their roost the same night (DAWE 2021). Known camps present in locality. Bairnsdale is a nationally important camp. Other camps identified and monitored through the national flying-fox monitoring program occur at woodside, Traralgon, sale and Maffra.	Potential foraging habitat in forests and woodlands throughout the survey area (KP2.3- 6.4, 8.1- 8.9, 12.3, 21.5 - 28.7, 57 - 76.5). May occasionally utilise farmland trees and feed trees within townships.	Recorded at KP 67.9, most likely foraging.	**Present**
Pycnoptilus floccosus	Pilotbird		VU	6	22/05/2012	PMST, VBA	**Low**	Are endemic to south-east Australia. Are strictly terrestrial, living on the ground in dense forests with heavy undergrowth.). Largely sedentary, they are typically seen hopping briskly over the forest floor and foraging on damp ground or among leaf-litter	Prefers wet gullies with dense understory vegetation of Bracken and tree ferns. No suitable habitat is present within the survey area.		
Rhipidura rufifrons	Rufous Fantail		Ma, Mi	Modelled	N/A	PMST	**Present**	Found in south and central Victoria in wet sclerophyll forests, subtropical and temperate rainforests. It sometimes inhabits drier sclerophyll forests and woodlands.	Potential habitat in forests in Strzelecki Ranges and woodland patches in the Tarwin Valley and Waratah Bay (2.3 - 6.4, 8.1- 8.9, 57 - 76.5).	Recorded at KP 70.2. Considered likely to occur in high-quality habitats throughout survey area.	**Present**
Rostratula australis	Australian Painted-snipe	CE	EN, Ma	Modelled	N/A	PMST	**Low**	Occurs in shallow fresh or brackish wetlands with permanent or semi-permanent water, cover of adjacent grasses and muddy edges. Also occurs in waterlogged grassland, sewage ponds and dams.	Modelled distribution. Limited historical records within 50 km of alignment.		
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	VU		1	21/05/2000	VBA	**Moderate**	Occurs in a variety of habitats. Forages above the canopy but can also forage in treeless areas. Requires tree hollows for roosting and nesting.	Potential habitat in forests and woodlands in the Strzelecki Ranges (KP57-76.5).	Not recorded during targeted surveys. Unlikely to occur within the survey area.	**Low**

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Sminthopsis leucopus	White-footed Dunnart	VU		7	11/05/2017	VBA	**Moderate**	Found throughout south-eastern Australia in coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest.	Potential habitat in large woodland patches in Waratah Bay and Tarwin Valley (KP0, 2.3 - 6.4, 8.1- 8.9, 21.5 - 28.7).	Not recorded during targeted surveys of the Great Southern Rail Trail, however suitable habitat may occur in areas not yet accessed (KP 2.3 - 6.4, 8.1 - 8.9).	**Moderate**
Spatula rhynchotis	Australasian Shoveler	VU		72	19/08/2021	VBA	**Moderate**	Found throughout much of Victoria. Prefers permanent, well-vegetated wetlands but will use most freshwater habitats.	Potential habitat includes large farm dams, wetlands and waterways throughout the survey area (KP34.6, 54.8, 67, 83.4).	Not recorded during targeted surveys. Habitat within the study area is considered low-quality/sub-optimal.	**Low**
Stagonopleura guttata	Diamond Firetail	VU	VU	1	17/12/1998	VBA	**Low**	Found throughout south-eastern mainland Australia. Inhabits grassy eucalypt woodlands, open forest, Mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.	Limited preferred habitat present and low number of historical records.		
Sternula albifrons	Little Tern	CE	Ma, Mi	3	8/07/2000	VBA	**Moderate**	Breeds in spring and summer along the entire east coast of Australia. Inhabits sheltered coastal environments, harbours, inlets and rivers.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded during targeted surveys. Given limited records in study area species considered unlikely to occur in survey area.	**Low**
Sternula nereis nereis	Fairy Tern	CE	Vu, Ma	4	3/07/2000	VBA	**Moderate**	Occurs along the coast of Victoria. Inhabits a variety of habitats including offshore, estuarine or lake islands, wetlands and mainland coastline. It nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation.	Potential habitat along Waratah Bay coastline (KP0).	Not recorded during targeted surveys. Given limited records in study area species considered unlikely to occur in survey area.	**Low**
Stictonetta naevosa	Freckled Duck	EN		14	10/02/2020	VBA	**Moderate**	Prefers large freshwater inland wetlands, generally with dense vegetation. Occasionally recorded in coastal wetlands.	Potential habitat includes vegetated wetlands and waterways (KP67, 83.4)	Not recorded during targeted surveys. Habitat within the study area is considered low-quality/sub-optimal.	**Low**
Synoicus chinensis	King Quail	EN		1	15/05/1901	VBA	**None**	Patchy distribution; most records from southern Australia, especially near major towns and cities, are probably escaped birds. Found in tropical and temperate shrublands and grasslands, towards coastal areas. They occur in very dense ground vegetation, such as grass, shrubs, ferns, herbs, at damp or swampy sites.	Historical records only.		
Thalassarche bulleri	Buller's Albatross	EN	VU, Ma, Mi	Modelled	N/A	PMST	**None**	The Pacific Albatross is a non-breeding visitor to Australian waters. Foraging birds are mostly limited to the Pacific Ocean and the Tasman Sea, although birds do reach the east coast of the Australian mainland. Occurrence within the Australian Fishing Zone is likely, however, the threat from longline injury is considered low.	Restricted to marine environment.		
Thallassarche bulleri platei	Northern Buller's Albatross		VU, Ma	Modelled	N/A	PMST	**None**	Northern Buller's Albatross is a non-breeding visitor to Australian waters. Foraging birds are mostly limited to the Pacific Ocean and the Tasman Sea, although birds do reach the east coast of the Australian mainland.	Restricted to marine environment		
Thalassarche carteri	Indian Yellow-nosed Albatross	EN	VU, Ma, Mi	8	30/06/2019	VBA	**None**	A marine bird. Forages mostly in the southern Indian Ocean but records also occur off the coast of Victoria. Mostly inhabits subtropical and warmer subantarctic waters.	Restricted to marine environment.		
Thalassarche cauta	Shy Albatross	EN	EN, Ma, Mi	2	23/01/2020	VBA	**None**	The Shy Albatross is the only albatross species endemic to Australia. The species has breeding colonies on three small islands off Tasmania: Albatross Island in western	Restricted to marine environment.		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
								Bass Strait, the Mewstone and Pedra Branca n southern Tasmanian waters			
Thalassarche chrysostoma	Grey-headed Albatross	EN	EN, Ma, Mi	Modelled	N/A	PMST	**None**	The Grey-headed Albatross has a circum-global distribution in the southern hemisphere. The only place that the species breeds within Australian territory is on the southern and western slopes of Petrel Peak in the south-western corner of Macquarie Island.	Restricted to marine environment.		
Thalassarche impavida	Campbell Albatross, Campbell Black-browed Albatross		Vu, Ma, Mi	Modelled	N/A	PMST	**None**	The Campbell Albatross is a marine sea bird inhabiting sub-Antarctic and subtropical waters from pelagic to shelf-break water habitats. In the Antarctic, it occurs through the belt of icebergs to the edge of the consolidated pack-ice. The Campbell Albatross breed on Campbell Island. They make their nests on tussock-covered ledges and terraces of cliffs, slopes and hills, overlooking the sea or valleys, and on the summits of rocky islets.	Restricted to marine environment.		
Thalassarche melanophris	Black-browed Albatross		VU, Ma, Mi	2	16/10/1977	VBA	**None**	A marine bird. The species is common in the non-breeding period at the continental shelf and shelf-break of Victoria. It can tolerate a broad range of sea-surface temperatures, from 0–24º C. It forages around the breaks of continental and island shelves and across nearby underwater banks.	Restricted to marine environment.		
Thalassarche salvini	Salvin's Albatross		VU, Ma, Mi	Modelled	N/A	PMST	**None**	Salvin's Albatross is a non-breeding visitor to Australian waters. Salvin's Albatross breeds on Bounty, Snares and Chatham Islands, south of New Zealand, as well as on Crozet Island in the Indian Ocean. The species forages over most of the southern Pacific Ocean, where it is particularly common in the Humboldt Current, off South America.	Restricted to marine environment.		
Thalassarche steadi	White-capped Albatross		VU, Ma, Mi	Modelled	N/A	PMST	**None**	The White-capped Albatross is probably common off the coast of south-east Australia throughout the year. Whilst there has been no specific study, the species has been caught on longline hooks off Tasmania.	Restricted to marine environment.		
Thalasseus bergii	Crested Tern		Ma, Mi	Modelled	N/A	PMST	**Moderate**	Widespread along the coastlines. Often occurs in estuaries and near-coastal environments. Also occasionally occurs inland in rivers and lakes.	Potential habitat along Waratah Bay coastline (KP0).	Recorded at shoreline during shorebird surveys.	**Present**
Thinornis cucullatus cucullatus	Hooded Plover	VU	VU, Ma	172	24/01/2021	VBA	**High**	Usually restricted to wide ocean beaches but have also been recorded near tidal bays and estuaries, rock platforms, rocky or sand-covered reefs, and small beaches in lines of cliffs. The species also uses near-coastal saline and freshwater lakes and lagoons.	Potential habitat along Waratah Bay coastline (KP0).	Whilst not recorded during targeted surveys, has been recorded at the beach recently in 2022. Has a high likelihood of utilising the study area.	**High**
Thylogale billardierii	Rufous-bellied Pademelon	T		1	01/01/1830	VBA	**None**	Extirpated from Victoria. Inhabits dense vegetation adjacent to open patches, including paddocks and gardens, rainforest, wet sclerophyll forest, coastal heath and shrub, gullies and drier forest.	Regionally extinct.		
Trapezites luteus luteus	Yellow Ochre Butterfly	EN		3	12/10/1959	VBA	**Low**	Located all across South-eastern Australia in eucalypt woodlands and grasslands, subalpine woodlands and open woodlands.	Historical records. Limited habitat within the survey area.		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Tringa brevipes	Grey-tailed Tattler	CR	Ma, Mi	Modelled	N/A	PMST	**Low**	Prefers large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	No suitable habitat present.		
Tringa glareola	Wood Sandpiper	EN	Ma, Mi	1	10/01/1981	VBA	**Low**	Scattered records near Corner Inlet. Prefers shallow freshwater wetlands, ponds and pools with emergent reeds and grass. Also uses wetlands, such as swamps, billabongs, lakes, pools and waterholes; inundated grasslands; floodplains; irrigated crops; sewage ponds; reservoirs; large farm dams; bore drains; rarely brackish wetlands and saltmarsh.	Limited preferred habitat within study area and no recent records.		
Tringa nebularia	Common Greenshank	EN	Ma, Mi	9	5/04/2019	VBA	**Low**	Widespread in coastal regions, mainly between Gippsland Lakes and Port Phillip Bay. Inhabits terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, salt flats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayment's, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	Limited suitable habitat near the coast within the survey area. More common in estuaries.		
Tringa stagnatilis	Marsh Sandpiper	EN	Ma, Mi	Modelled	N/A	PMST	**Moderate**	In Victoria, most records are found in Port Phillip Bay, but also in Gippsland. Inhabits swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, intertidal mudflats, sewage farms and saltworks, reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes.	Potential seasonal habitat in inundated pasture immediately north of Waratah Bay coastal dunes (KP 0.3).	Not recorded during targeted surveys. Given limited records in study area species considered unlikely to occur in survey area.	**Low**
Tyto novaehollandiae	Masked Owl	CE		1	6/06/2006	VBA	**Moderate**	In Victoria, the strongholds of the Masked Owl appear to be in East Gippsland and the Otway Ranges, and to a lesser extent in the Central Highlands, Midlands and Portland areas. Can be found in areas of tall grass, including grass tussocks, swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. Victorian Masked Owls occur along partially forested river flats near the coast, and may require open areas, such as clearings or forest edges, for foraging, as well as hollows, dense vegetation or caves for roosting.	Potential habitat in forest and open woodlands in the Strzelecki Ranges and larger woodland patches near Waratah Bay. May occasionally forage in wooded farmland (KP 2.3 – 6.4, 8.1- 8.9, 12.3, 21.5 – 28.7, 57 – 76.5).	No Masked Owl were recorded during the targeted surveys. Survey area likely provides suboptimal habitat for this species.	**Low**
Varanus varius	Lace Monitor	EN		46	13/05/2019	VBA	**Present**	Occur in well-timbered areas, from dry woodlands to cool temperate southern forests.	Potential habitat in woodland and forest throughout the survey area (KP 2.3- 6.4, 8.1- 8.9, 12.3, 21.5 – 28.7, 29.4, 57 – 76.5).	Recorded at KP 68.0 and is known to occur within the Great Southern Rail Trail. Suitable habitat present in larger patches of woodland and forest between Mirboo North and Hazelwood in northern section and Waratah North in the south.	**Present**

Table 1B. Significant flora

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Acacia howittii	Sticky Wattle	VU		3	14/05/2019	VBA	**Low**	Endemic to Victoria. Confined to the east, Macalister River near Mt Howitt, to Yarram and Tabberabbera in moist forests.	Limited records and suitable habitat unlikely to occur within survey area.		**Low**
Acacia uncifolia	Coast Wirilda	EN		2	15/04/2011	VBA	**Moderate**	On coastal dunes and near saltmarsh, on calcareous sand and sandy loam soils. Geelong and Wilsons Promontory (Vicflora). Species largely confined to Wilsons Promontory in this region.	Potential habitat along Waratah Bay coastline (KP0).	Targeted surveys not completed due to avoidance of dunes via HDD.	**Moderate**
Acacia verticillata subsp. ruscifolia	Broad-leaf Prickly Moses	EN		2	6/01/1997	VBA	**Low**	Wilsons Promontory and Sunday Island (Vicflora)	Restricted to Wilsons Promontory, last nearby record was made in 1997, no suitable habitat in the study area.		
Adriana quadripartita	Coast Bitter-bush	EN		5	12/02/2011	VBA	**Moderate**	Apart from disjunct inland occurrences at Mt Arapiles and near Ouyen, apparently confined to coastal and near-coastal areas west from Wilsons Promontory. Numerous recent records in similar dune habitats in Cape Liptrap Coastal Park, around Venus Bay.	Potential habitat along Waratah Bay coastline (KP0).	Targeted surveys not completed due to avoidance of dunes via HDD.	**Moderate**
Amphibromus fluitans	River Swamp Wallaby-grass		VU	6	26/08/2003	VBA	**Moderate**	Uncommon in the south of Victoria. Confined to permanent swamps. Known to occur in waterways which cross the project alignment in the north between Morwell River and Boolarra-Darlimurla area.	Potential habitat includes waterways and wetlands in Tarwin Valley, Strzelecki Ranges and Latrobe Valley (KP45.0, 46.1, 48.4, 49.3, 50.3, 50.5, 52.0, 53.4, 54.8, 78.2).	A large population (100+ individuals) was found in a small wetland adjacent to the Morwell River at KP 78.2. Assumed presence at KPs 49.3, 50.3, 50.5, 52.0, 53.4, 54.8 (have not been surveyed due to access constraints).	**Present**
Argentipallium dealbatum	Silver Everlasting	EN		4	11/12/1983	VBA	**Moderate**	Near-coastal heathlands of the south-west.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Atriplex paludosa subsp. paludosa	Marsh Saltbush	EN		8	18/11/2019	VBA	**Low**	Found on the fringes of coastal salt marsh, west from Wilsons Promontory. Locally common.	No suitable habitat within the survey area.		
Avicennia marina subsp. australasica	Grey Mangrove	EN		11	18/11/2019	VBA	**Negligible**	Tidal mudflats in bays, estuaries and creek-mouths from Port Phillip bay to Corner Inlet	No suitable habitat within the survey area.		
Banksia saxicola	Rock Banksia	EN		2	11/03/1983	VBA	**Low**	Apparently restricted to higher peaks and sheltered gullies and slopes in the Grampians and on Wilsons Promontory (e.g. Sealers Cove), usually in rocky sites.	No suitable habitat within the study area. Records within 10 km are dated.		
Billardiera scandens	Velvet Apple-berry	EN		1	15/10/2012	VBA	**Low**	Occurs in dry open-forests and woodlands, primarily in north-east Victoria. Recorded from Wilson's Prom.	No suitable habitat within the survey area.		
Brachyscome salkiniae	Elegant Daisy	VU		1	1/01/1967	VBA	**Low**	Woodlands and forests on sandy or loamy soil. Frequently found on river banks and flats. East Gippsland and west into the Latrobe Valley.	Potential habitats in survey area heavily modified/degraded and unlikely to support his species. Single record in region is dated.		
Burnettia cuneata	Lizard Orchid	EN		1	4/11/1983	VBA	**Moderate**	Occurs in dense, wet heathy vegetation in near-coastal areas.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Caladenia aurantiaca	Orange-tip Finger-orchid	EN		7	26/08/2003	VBA	**Moderate**	North-facing slopes. Grows in damp coastal to near-coastal heaths or heathy woodlands east of Melbourne (e.g. Cranbourne, Yarram, Cape Conran, Mallacoota) on well-drained sandy soils.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Caladenia oenochila	Wine-lipped Spider-orchid	CE		1	21/09/1963	VBA	**Low**	Relatively common in moist, often grassy forest or woodland, often in shaded habitats.	Limited/poor quality habitat within survey area and few/dated records in survey area.		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Caladenia orientalis	Eastern Spider Orchid	EN	EN	1	31/10/2008	VBA	**Moderate**	Coastal heathlands and heathy woodlands between the Mornington Peninsula and Yarram, on well-drained sandy soil. Also known from forest south of Moe, Yinnar South and Middle Tarwin	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Caladenia tessellata	Thick-lipped Spider-orchid		VU	Modelled	N/A	PMST	**Moderate**	Confined to eastern Victoria. Found in near-coastal heathy woodlands to open forest, on well drained sandy soils.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Caladenia vulgaris	Slender Pink-fingers	VU		2	11/11/1995	VBA	**Moderate**	Locally common in heathland and coastal scrub on moisture-retentive sandy soils.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9, 22.6 - 28.7).	No individuals detected in Waratah Bay road reserve or Great Southern Rail Trail reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Calystegia soldanella	Sea Bindweed	EN		2	17/03/2009	VBA	**Low**	A sand-binding trailer of coastal dune habitats. Mostly found eastward from Lakes Entrance. Isolated records further west near Wilsons Promontory and Walkerville.	Record nearby is the western-most point of this species' range. Low likelihood of habitat occurring in the southernmost 5km of alignment.		
Chaetospora turbinata	Top Bog-sedge	VU		3	11/06/1983	VBA	**Low**	Of localised occurrence in its 4 disjunct localities in Victoria (Grampians, Anglesea, Cape Liptrap and Howe Range east of Mallacoota), occurring on moist, usually coarse, sandy soils, in open woodland and heath.	Suitable habitat may be present in damp heathlands and lowland forests in south of alignment however restricted range and disjunct, known populations suggest species unlikely to occur in sub-optimal/modified habitats.		
Chiloglottis jeanesii	Mountain Bird-orchid	VU		2	11/12/2002	VBA	**Moderate**	Localised in mountainous regions east of Melbourne (e.g. Dandenong Ranges, Toorongo, Baw Baw National Park) where sometimes locally common in fern gullies and wet sclerophyll forests.	Potential habitat in damp and wet forest communities in low-lying areas/gullies through Strzelecki Ranges (KP61.4, 63.6, 66.9, 71.7).	No individuals detected. Habitat considered sub-optimal and species unlikely to occur within remaining, unsurveyed location (KP63.6)	**Low**
Chlorovibrissea bicolor	Two-tone Vibrissea	EN		1	1/01/1976	VBA	**Moderate**	On logs in running water, in wet shaded fern gullies or rainforests of south-eastern Australia. The only species of Pin that fruits wholly or partially in running water.	Limited records however inconspicuous species that is likely overlooked. Potential habitat in major creeks and waterways in Strzelecki Ranges, namely Little Morwell River and Stony Creek (KP61.4, 63.6, 66.6, 66.9).	No individuals detected. Habitat considered sub-optimal and species unlikely to occur within remaining, unsurveyed location (KP63.6)	**Low**
Cladium procerum	Leafy Twig-rush	EN		2	6/01/1997	VBA	**Low**	Swamps and the margins of streams and lakes, near the coast. Tolerates low to moderate levels of salinity.	Found around Wilsons Promontory and nearby at Shallow Inlet. No suitable habitat in survey area.		
Colobanthus apetalus var. apetalus	Coast Colobanth	EN		1	6/01/1997	VBA	**Moderate**	Mostly scattered along the coast, usually on sheltered dune slopes and in dune swales, but rarely common. Known from Cape Liptrap Coastal Park and Wilson's Prom.	Potential habitat along Waratah Bay coastline (KP0).	Targeted surveys not completed due to avoidance of dunes via HDD.	**Moderate**
Corybas aconitiflorus	Spurred Helmet-orchid	EN		2	5/07/2014	VBA	**Moderate**	Colonies grow in sheltered positions, on damp sand and under ferns and shrubs. Localised and uncommon in southern parts of eastern Victoria. Isolated westerly occurrence near Portland and Edenhope.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Corybas fimbriatus	Fringed Helmet-orchid	EN		3	3/06/2015	VBA	**Moderate**	Usually forming colonies on moist, shaded sandy soil near the coast and generally east of Western Port. Recorded near Shallow Inlet.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Corymbia maculata	Spotted Gum	VU		6	9/09/2021	VBA	**Negligible**	Only known in Victoria from the Mottle Range, south of Buchan.	Outside of natural range. Records likely from planted individuals.		
Craspedia canens	Grey Billy-buttons	CE		24	17/09/2019	VBA	**Low**	Known only from grassland (often bordering swamps) at low altitude between c. Cranbourne and Traralgon.	Frequently recorded to the north of the alignment in Latrobe Valley. No suitable habitat within survey area.		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Cyathea cunninghamii	Slender Tree-fern	CE		4	5/10/2016	VBA	**High**	Confined to deep gullies in wet forests in Victoria, seldom common. Otway Range, Dandenong Ranges, Tarra-Bulga NP, Wilsons Promontory and Mt Drummer. Recorded to east and west of survey area at similar elevations.	Potential habitat in wet forest communities in low-lying areas/gullies through Strzelecki Ranges (KP 61.4, 63.6, 66.6, 66.9, 71.7).	Not recorded during targeted surveys. Habitat considered sub-optimal and species unlikely to occur within remaining, unsurveyed location (KP63.6)	**Low**
Cymbonotus lawsonianus	Bear's-ear	EN		7	16/08/2009	VBA	**Moderate**	Scattered in woodland communities. Few eastern collections from areas south of the Great Dividing Range. Known from Morwell NP to the east.	Potential habitat in dry forest and woodland communities along roadsides on the northern half of the Strzelecki Ranges (KP 67.9, 68.9, 69.6, 70.2, 71.9 – 73.8, 74.9 – 76.5).	Not recorded during targeted surveys. Given the inconspicuous nature of these species, their presence within the survey area cannot be completely ruled out. However, it is considered unlikely the survey area would support a large or significant population and the associated habitat is considered 'sub-optimal'.	**Low**
Dianella amoena	Matted Flax-lily	CE	EN	23	15/10/2012	VBA	**High**	Mostly confined to dry grassy woodland and grassland communities south of the Dividing Range. Suitable habitat in limited occurrences (e.g. roadsides) in Latrobe Valley. Known from roadside in McFarlane Road which is intersected by survey area.	Potential habitat in roadsides supporting grassland and woodland communities in Latrobe Valley with limited disturbance/modification. In particular, McFarlane Road (KP 76.5, 79.7, 79.8).	Not recorded during targeted surveys.	**Low**
Dianella longifolia var. grandis	Glaucous Flax-lily	CE		1	27/08/1992	VBA	**Low**	Occurs in lowland plains grassland and grassy woodlands (e.g. Volcanic Plain and Riverina) as well as around rocky outcrops at higher altitudes than the var. longifolia (e.g. between Swifts Creek and Omeo, Benambra-Corryong district, Don River near Launching Place). Overall, rather rare in the State.	Very limited occurrence of sub-optimal habitat within survey area. Only one record from 30 years ago.		
Eucalyptus arenicola	Gippsland Lakes Peppermint	EN		1	19/11/1991	VBA	**Negligible**	Occurs in coastal and near-coastal areas in the Gippsland Lakes region in sandy soils.	Survey area outside natural range of species. One occurrence falls into the search region and is the western-most record of the species. Habitat for the species is unlikely to occur within the study area.		
Eucalyptus fulgens	Green Scentbark	EN		16	19/02/2008	VBA	**High**	Occurring east from Healesville. Lowland forest. Grows on moist loam soils of valleys in the foothills	Potential habitat between Yinnar-Driffield Road and Morwell River, in the Latrobe Valley (KP76.5 - 77.4)	No individuals found in survey area.	**Low**
Eucalyptus globulus subsp. globulus	Southern Blue-gum	EN		3	3/08/2021	VBA	**Moderate**	Indigenous stands known in Victoria from the area south of the Strzelecki Ranges, naturalised through southern Victoria. Hybridises with subsp. psuedoglobulus throughout survey area. Eucalyptus globulus subsp. pseudoglobulus recorded throughout survey area in roadsides and farmland between Tarwin River East Branch and Mirboo North	Potential habitat in roadsides and farmland between Tarwin River East Branch and Mirboo North (KP40.6 - 57.4).	No individuals found in survey area.	**Low**
Eucalyptus kitsoniana	Bog Gum	CE		66	9/09/2021	VBA	**Present**	Endemic to Victoria. Coastal lowlands from Yarram west to cape Otway and Mt Richmond. Also occurs at Wilson's Promontory, and nearby on Snake Island.	Potential habitat in low-lying/wet areas in the Tarwin Valley, primarily associated with roadsides and remnant bushland (KP 6.5, 15.3, 22.6 – 28.7, 31.6 – 33.7).	over 500 individual trees recorded within the survey area, with major populations within the Great Southern Rail Trail reserve (KP 23.0 – 28.4), and the Dumbalk-Stony Creek Road reserve (KP 31.5 – 33.5).	**Present**
Eucalyptus strzeleckii	Strzelecki Gum	CE	VU	1449	19/03/2021	VBA	**Present**	Largely restricted to the western section of the Strzelecki Range, from Neerim South in the north, south to Foster, and with a few isolated records from the Otway ranges. Favours ridges, slopes and streambanks and deep fertile soils.	Roadsides, waterways, farmland and remnant bushlands in Tarwin Valley and Latrobe Valley (KP 29.4, 31.5, 34.9, 40.7, 63.6, 78.0, 78.2).	104 individual trees recorded within the survey area, with major populations at Stony Creek (KP 29.4), unnamed creek line at KP 34.9, Tarwin River East Branch (KP 40.6) and Morwell River and associated terraces (KP 76.5 – 78.6).	**Present**
Eucalyptus yarraensis	Yarra Gum	CE		17	9/09/2021	VBA	**Present**	Heavy clay soils on river flats and flood plains	Farmland and woodlands in Latrobe Valley (KP76.5-79.8)	18 individual trees recorded within the survey area from a single population in an unused rail reserve at KP 78.9.	**Present**

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Exocarpos syrticola	Coast Ballart	EN		1	11/12/1983	VBA	**Low**	Confined to coastal dunes and cliffs on Wilsons Promontory, and scattered to the west. Locally common.	Records largely confined to Wilsons Promontory region. Sub-optimal habitat on coast in dunes in Waratah Bay.		
Geranium solanderi var. solanderi	Austral Crane's-bill	EN		1	21/02/2006	VBA	**Moderate**	Damp to dry, usually sheltered sites in grassy woodlands, often along drainage lines or in seepage areas. Recorded in Morwell NP to the east.	Potential habitat in dry forest and woodland communities along roadsides on the northern half of the Strzelecki Ranges (KP 67.9, 68.9, 69.6, 70.2, 71.9 – 73.8, 74.9 – 76.5).	Not recorded during targeted surveys. Given the inconspicuous nature of these species, their presence within the survey area cannot be completely ruled out. However, it is considered unlikely the survey area would support a large or significant population and the associated habitat is considered 'sub-optimal'.	**Low**
Glycine latrobeana	Clover Glycine	VU	VU	Modelled	N/A	PMST	**None**	Found across south-eastern Australia in native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer, on sand or loamy sand soils.	Outside of known range of species. No suitable habitat.		
Grevillea chrysophaea	Golden Grevillea	VU		2	1/09/2003	VBA	**Low**	Grows in eucalypt woodland or heath in silty sand to sandy loam in the Brisbane Ranges (Anakie-Steiglitz area), and Gippsland in the area roughly enclosed by Traralgon, Woodside and Sperm Whale Head-Licola.	Recorded in Morwell NP to the east, at the edge of regional range. Whilst sub-optimal habitat present in study area, unlikely to support this species based on current range/extent.		
Heterozostera nigricaulis	Australian Grass-wrack	EN		3	17/03/2009	VBA	**Negligible**	Forms large meadows in shallow coastal waters to a depth of c. 15 m.	No suitable habitat within the survey area.		
Hydrocotyle comocarpa	Fringed Pennywort	CE		1	17/09/1995	VBA	**Negligible**	Rare in Victoria where known by a single collection from Cape Liptrap, South Gippsland, in dense *Leptospermum laevigatum* scrub. This locality represents the only known mainland occurrence of the species (otherwise known from Pearson and Kangaroo Islands (South Australia), and Flinders Island (Tasmania)).	No suitable habitat within the survey area.		
Juncus revolutus	Creeping Rush	EN		6	8/03/1983	VBA	**Low**	Restricted to damp saline and sub saline communities near the coast. A small number of outlying populations occur around saline lakes on the volcanic plain.	Known from Shallow Inlet to east of survey area in Waratah Bay. No suitable habitat within the survey area.		
Lachnagrostis rudis subsp. rudis	Rough Blown-grass	EN		8	6/01/1997	VBA	**Low**	Uncommon. Occurs in moist shaded forests, swamp margins near the coast. Scattered along coast from South Australian border to Lake Tyers.	Known from Cape Liptrap to west and Wilsons Prom to east. No suitable habitat within the survey area.		
Lawrencia spicata	Salt Lawrencia	EN		1	2/01/2007	VBA	**Low**	An occasional component of saltmarsh communities along the coast, rare in saline depressions and around salt lakes of south-western Victoria (e.g. Polkommet near Horsham, Harrow district, Camperdown, Lake Corangamite).	No suitable habitat within the survey area.		
Leptecophylla oxycedrus	Crimson Berry	CE		1	23/09/2008	VBA	**Low**	In Victoria it is restricted to coastal granitic areas of Wilsons Promontory, Corner Inlet and Cape Woolamai (Phillip Is.), where it occurs in coastal shrubland or open-forest.	Restricted to granitic areas to east (e.g. Wilsons Prom), which do not occur within survey area.		
Limonium australe var. australe	Yellow Sea-lavender	EN		4	8/03/1989	VBA	**Low**	Mangrove and Saltmarsh communities near Point Lonsdale, Westernport, Shallow Inlet and Corner Inlet.	No suitable habitat within the survey area.		
Machaerina laxa	Lax Twig-sedge	EN		1	2/02/1997	VBA	**Low**	Rare, confined to a few sites in the south-west (Portland-Nelson area, Port Campbell National Park) and the northern part of Wilsons Promontory. Occurs in wet sandy areas in heathlands and heathy swamps.	Known from Cape Liptrap to west and Wilsons Prom to east. No suitable habitat within the survey area.		

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Melaleuca armillaris subsp. armillaris	Giant Honey-myrtle	EN		6	9/09/2021	VBA	**Negligible**	Also WA (naturalised), SA (naturalised), NSW (native), ACT (naturalised), Tas (native and naturalised). Mainly confined to near-coastal sandy heaths, scrubs slightly raised above saltmarsh, riparian scrubs, rocky coastlines and foothill outcrops eastwards from about Marlo. Occurrences to the west are naturalized from cultivated stock.	Outside of natural range. Records likely from planted individuals.		
Monotoca glauca	Currant-wood	EN		19	6/08/2014	VBA	**High**	Occurs on infertile sandy soils at sea-level or on near-coastal high-rainfall ranges. Grows in open-forest, heathy woodland, wet closed scrub and margins of cool-temperate rainforest.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Oxalis rubens	Dune Wood-sorrel	EN		6	15/04/2011	VBA	**Moderate**	Confined to coastal dunes and scrub, growing on stabilised sand-dunes, in Banksia integrifolia woodland, and beaches among Spinifex sericeus.	Potential habitat along Waratah Bay coastline (KP0).	Targeted surveys not completed due to avoidance of dunes via HDD.	**Moderate**
Pittosporum revolutum	Rough-fruit Pittosporum	EN		1	9/03/2012	VBA	**None**	Uncommonly found in lowland dry forest, and warm temperate rainforest margins. Distributed from Cann River east to the NSW border. One disjunct population at Mt Nowa Nowa.	Outside the reported range of this species, no suitable habitat.		
Platysace ericoides	Heath Platysace	EN		2	1/09/2003	VBA	**Negligible**	Confined to the coastal plain and foothills mostly between Moe and Orbost, usually occurring in dry forest, often with shallow, rocky soils.	Edge of known range of this species. No suitable habitat in survey area.		
Poa billardierei	Coast Fescue	EN		2	13/05/1989	VBA	**High**	Coastal sand dunes from near Nelson in the far south-west, to the NSW border. Scattered occurrences infrequently collected in recent times.	Potential habitat along Waratah Bay coastline (KP0).	Targeted surveys not completed due to avoidance of dunes via HDD.	**Moderate**
Prasophyllum spicatum	Dense Leek-orchid	CE	VU	Modelled	N/A	PMST	**Moderate**	Occurs in coastal heathland and near-coastal heathy forest on sandy soils	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Pteris epaleata	Netted Brake	EN		2	15/02/2002	VBA	**Moderate**	New Zealand, South Pacific islands. Although restricted in distribution in Victoria, it is often locally abundant and conspicuous, favouring seepages, stream banks and damp flats in shady forests (e.g. Beech Forest in the Otway Range, Dandenong Ranges where rare, Wilsons Promontory, etc.).	Potential habitat in damp and wet forest communities in low-lying areas/gullies through Strzelecki Ranges (KP61.4, 63.6, 66.9, 71.7).	No individuals detected. Habitat considered sub-optimal and species unlikely to occur within remaining, unsurveyed location (KP63.6)	**Low**
Pterostylis alveata	Coastal Greenhood	VU		5	18/05/2010	VBA	**Low**	Found mostly in near-coastal areas east of Melbourne in coastal woodland and scrub on stabilised dunes.	Sub-optimal habitat with survey area. Closest record to the study area was recorded 84 years ago.		
Pterostylis chlorogramma	Green-striped Greenhood	EN	VU	Modelled	N/A	PMST	**Moderate**	Grows in moist areas of heathy and shrubby forest, on well-drained soils.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Pterostylis cucullata subsp. cucullata	Leafy Greenhood	EN	VU	1	10/02/1965	VBA	**Moderate**	Widely distributed but disjunct, mostly occurring in small groups in coastal areas, sometimes near inland watercourses.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Pterostylis fischii	Fisch's Greenhood	EN		2	1/09/2003	VBA	**Low**	Near-coastal open forests and woodlands to montane woodlands, often among grass and bracken, on well-drained soils.	Limited records from east of survey area in Latrobe Valley on western edge of species range. No suitable habitat for this species in proximity to these records.		
Pterostylis grandiflora	Cobra Greenhood	EN		6	4/05/2011	VBA	**Moderate**	Generally restricted and uncommon in near-coastal eastern Victoria, growing on moist, shady slopes in open-forest, on well-drained soil.	Potential habitat in drier forests on northern slopes of Strzelecki Range. May also occur in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP 3.5 – 6.3, 8.7 – 8.9, 67.9 – 76.5).	No individuals detected in road reserve or Strzelecki Ranges. Assume presence in woodlands on private land as surveys have not been completed due to access constraints.	**Moderate**

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Pterostylis lustra	Small Sickle Greenhood	EN		1	14/02/2002	VBA	**Moderate**	Widespread and sometimes locally common, growing in swampy areas under thickets of *Leptospermum lanigerum* (Woolly Tea-tree), on permanently wet, black alkaline mud.	Potential habitat in swampy areas in southern section of Great Southern Rail Trail (KP22.6-26.5).	Not recorded during targeted surveys.	**Low**
Pterostylis pedoglossa	Prawn Greenhood	EN		2	5/09/1970	VBA	**Low**	Scattered in coastal and near-coastal heath and grasstree plains east of Melbourne, often on moist peaty soils.	Known from Wilsons Promontory. Low potential for suitable coastal heath habitat in south of project alignment near coast.		
Pterostylis tenuissima	Swamp Greenhood		VU	Modelled	N/A	PMST	**Low**	South-west Victoria and Wilsons Promontory and Cape Schanck in the east. Black peaty mum under dense cover of *Leptospermum lanigerum*.	Population present at Wilsons Promontory. Low potential for habitat along roadside vegetation in the near-coast section of study area.		
Pterostylis x ingens	Sharp greenhood	VU		1	1/01/1967	VBA	**Low**	Favours moist areas around swamps and stream banks on heavy soils.	A natural hybrid of two common species (P. falcata x P. nutans) which occur in the region. However, one record only from 1967.		
Sambucus australasica	Yellow Elderberry	CE		1	3/09/2012	VBA	**None**	Confined to near-coastal warm-temperate rainforest communities between Orbost and the New South Wales border, very rare in Victoria.	Known from one record nearby, outside the species reported range. Habitat potential to occur near coast in pockets of damp forest.		
Senecio psilocarpus	Swamp Fireweed		VU	Modelled	N/A	PMST	**Low**	Restricted to several sites in herb-rich winter-wet swamps throughout the south of the state, to the west of Sale. Grows on volcanic clays and peaty soils (Threatened Species Section 2011b).	No records from within study area. Swampy wetland habitats are rare within the survey area.		
Sowerbaea juncea	Rush Lily	VU		3	1/09/2003	VBA	**Moderate**	Locally common in damp, near-coastal heath and woodland communities. Marlo to NSW border, with disjunct occurrences in Wilsons Promontory and between Traralgon and Sale, to near Yarram. Known from one population in Wilsons Promontory and a solitary record in the mid-section of the project alignment.	Potential habitat in woodlands in Waratah Bay and southern extent of Tarwin Valley (KP3.5 - 6.3, 8.7 - 8.9).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Thelymitra alpicola	Alpine Sun-orchid	CE		1	18/11/2013	VBA	**Moderate**	Grows in alpine, sub-alpine and montane heathlands, in moist areas around the edges of sphagnum bogs, beside streams or in soaks and swamps. Soils are generally dark sandy, clayey or peaty loams.	Potential habitat in damp or wet forests in Strzelecki Ranges (57.4, 58.5 – 59.8, 61.4, 61.6, 60.6, 61.9, 62.3 – 63.6, 64.6 – 66.0, 66.6, 66.9 – 67.0, 68.7, 69.6, 70.2).	No individuals detected. Surveys not completed in woodlands (KP58.5 - 59.8, 60.6) due to access constraints.	**Moderate**
Thelymitra epipactoides	Metallic Sun-orchid	EN	EN	Modelled	N/A	PMST	**Low**	Found in coastal heathland, grassland and woodland, but extending further inland into similar habitats in the west of its range. On moist or dry sandy soils.	No records within study area and likely to be outside species range.		
Thelymitra incurva	Swamp Sun-orchid	CE		1	10/01/2000	VBA	**Low**	Heathlands and heathy woodlands, around the edges of grasstree plains. Often on disturbed sites, roadsides and gravel scrapes. Prefers moist coarse sandy and peaty loams.	One record nearby Mirboo North. This record is outside of usual reported range and likely incorrectly identified.		
Thelymitra matthewsii	Spiral Sun-orchid	EN	VU	Modelled	N/A	PMST	**Low**	Widely distributed but rare, in coastal sandy flats or slightly elevated sites (to 400 m) in well-drained soils (sandy loams to gravelly limestone soils) in open forest. Plants colonise disturbed sites and slowly disappear as these sites stabilise.	Whilst heathy woodlands in South may provide habitat, the dense nature of vegetation, combined with heavy grazing in cleared areas, suggest habitat to be unsuitable for this species in the survey area.		
Tmesipteris elongata	Slender Fork-fern	CE		2	18/08/1982	VBA	**Moderate**	Known from few scattered localities in Victoria (Otway and Strzelecki Ranges, upper Tyers River, Wilsons Promontory) and rare. An epiphyte of *Dicksonia antarctica*, which grows in the wet forest and gullies of Cape Liptrap coastal park on the south-western edge of the project alignment, and through the Darlimurla and Mirboo regions.	Potential habitat in wet areas supporting *Dicksonia antarctica* in woodlands in Waratah Bay and damp/wet forests in Strzelecki Ranges (KP 3.5 – 6.3, 57.4, 58.5 – 59.8, 61.4, 61.6, 60.6, 61.9, 62.3 – 63.6, 64.6 – 66.0, 66.6, 66.9 – 67.0, 68.7, 69.6, 70.2).	No individuals detected. Surveys not completed in woodlands (KP58.5 - 59.8, 60.6) due to access constraints.	**Moderate**

Scientific name	Common name	FFG	EPBC	Count (sum)	Last record	Source	Desktop likelihood	Habitat	Potential habitat within survey area	Survey findings	Final likelihood
Tmesipteris ovata	Oval Fork-fern	EN		4	1/03/1983	VBA	**Moderate**	Localised in wet forest near Gembrook and Emerald, Morwell National Park, Wilsons Promontory and East Gippsland. A generalist epiphyte of tree ferns which are known to grow in the wet forest and gullies of Cape Liptrap coastal park on the south-western edge of the alignment, and through Darlimurla and Mirboo regions.	Wet areas supporting tree ferns in damp/wet forests in Strzelecki Ranges (KP 57.4, 58.5 – 59.8, 61.4, 61.6, 60.6, 61.9, 62.3 – 63.6, 64.6 – 66.0, 66.6, 66.9 – 67.0, 68.7, 69.6, 70.2).	No individuals detected. Assume presence in unsurveyed woodlands (KP58.5 - 59.8, 60.6) due to access constraints.	**Moderate**
Tmesipteris parva	Small Fork-fern	EN		3	5/10/1997	VBA	**Moderate**	On tree-ferns, occurring between Gembrook and Warburton and in east and south Gippsland. A generalist epiphyte of tree ferns which are known to grow in the wet forest and gullies of Cape Liptrap coastal park on the south-western edge of the alignment, and through Darlimurla and Mirboo regions.	Wet areas supporting *Dicksonia antarctica* in woodlands in Waratah Bay (KP 3.5-6.3).	No individuals detected in Waratah Bay road reserve. Surveys not completed on private land due to access constraints.	**Moderate**
Xanthosia tasmanica	Southern Xanthosia	EN		1	19/04/2011	VBA	**Low**	Occurring mainly in coastal areas in heath on sand.	Known from Wilsons Promontory. No suitable sand heath habitat in the dune area.		
Xerochrysum palustre	Swamp Everlasting	CE	VU	Modelled	N/A	PMST	**Low**	Occurs in lowland swamps, usually on black cracking clay soils, scattered from near the South Australian border north-west of Portland to Bairnsdale district, but rare due to habitat depletion.	No high-quality lowland swamps in the alignment to provide suitable habitat.		
Zoysia macrantha subsp. walshii	Walsh's Couch	EN		1	11/05/1983	VBA	**Negligible**	Grows in alpine, sub-alpine and montane heathlands, in moist areas around the edges of sphagnum bogs, beside streams or in soaks and swamps. Soils are generally dark sandy, clayey or peaty loams.	No habitat for this species occurs within the survey area.		

Appendix 3 NVR analysis

Scenario test – native vegetation removal

This report provides offset requirements for internal testing of different proposals to remove native vegetation. **This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.** A report must be obtained from the Department of Environment, Land, Water and Planning (DELWP).

Date of issue: **06/05/2024**
Time of issue: **3:04 pm**

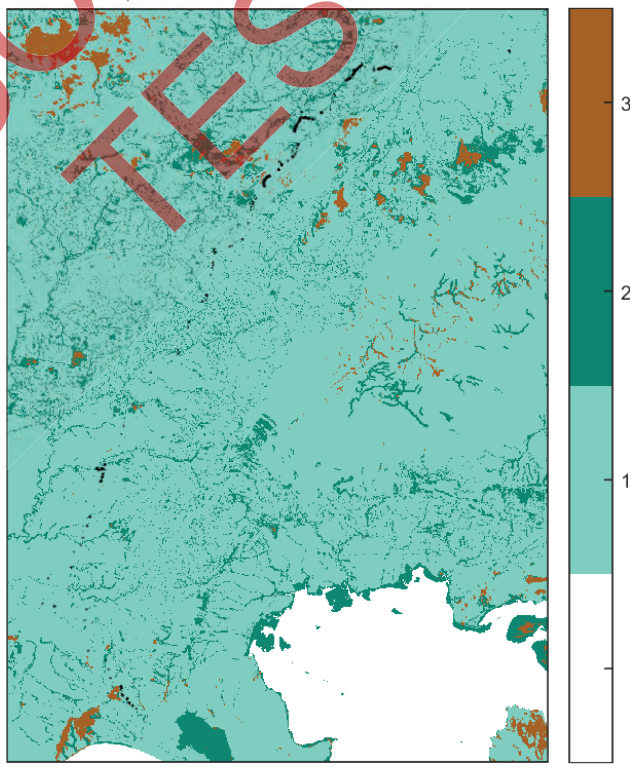
Report ID: Scenario Testing

Project ID	Veg_Loss_06052024_v2

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	20.800 ha
Extent of past removal	0.000 ha
Extent of proposed removal	20.800 ha
No. Large trees proposed to be removed	184
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species.The native vegetation is also in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map).

1. Location map



Scenario test – native vegetation removal

Offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

General offset amount[1]	0.984 general habitat units
Vicinity	West Gippsland Catchment Management Authority (CMA) or Latrobe City, South Gippsland Shire Council
Minimum strategic biodiversity value score[2]	0.266
Large trees*	16 large trees
Species offset amount[3]	3.833 species units of habitat for Eastern Spider-orchid, *Caladenia orientalis* 14.740 species units of habitat for Strzelecki Gum, *Eucalyptus strzeleckii*
Large trees*	168 trees
*** The total number of large trees that the offset must protect**	184 large trees to be protected in either the general, species or combination across all habitat units protected

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

1 The general offset amount required is the sum of all general habitat units in Appendix 1.

2 Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

3 The species offset amount(s) required is the sum of all species habitat units in Appendix 1.

Scenario test – native vegetation removal

Next steps

Any proposal to remove native vegetation must meet the application requirements of the Detailed Assessment Pathway and it will be assessed under the Detailed Assessment Pathway.

This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.

If you wish to remove the mapped native vegetation you must submit the related shapefiles to the Department of Environment, Land, Water and Planning (DELWP) for processing, by email to ensymnvrtool.support@delwp.vic.gov.au. DELWP will provide a *Native vegetation removal report* that is required to meet the permit application requirements in accordance with *Guidelines for the removal, destruction or lopping of native vegetation* (Guidelines).

Appendix 1: Description of native vegetation to be removed

The species-general offset test was applied to your proposal. This test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the species offset threshold. The threshold is set at 0.005 per cent of the mapped habitat value for a species. When the proportional impact is above the species offset threshold a species offset is required. This test is done for all species mapped at the site. Multiple species offsets will be required if the species offset threshold is exceeded for multiple species.

Where a zone requires species offset(s), the species habitat units for each species in that zone is calculated by the following equation in accordance with the Guidelines:

Species habitat units = extent x condition x species landscape factor x 2, where the species landscape factor = 0.5 + (habitat importance score/2)

The species offset amount(s) required is the sum of all species habitat units per zone

Where a zone does not require a species offset, the general habitat units in that zone is calculated by the following equation in accordance with the Guidelines:

General habitat units = extent x condition x general landscape factor x 1.5, where the general landscape factor = 0.5 + (strategic biodiversity value score/2)

The general offset amount required is the sum of all general habitat units per zone.

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-67.5	Patch	strz0023	Endangered	11	no	0.500	0.511	0.511	0.406	0.577	0.403	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-67.10	Patch	strz0023	Endangered	0	no	0.500	0.046	0.046	0.590	0.470	0.034	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-67.11	Patch	strz0023	Endangered	0	no	0.500	0.082	0.082	0.240	0.641	0.067	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-65.1	Patch	strz0045	Endangered	1	no	0.590	0.108	0.108	0.500	0.678	0.107	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-a	Patch	strz0023	Endangered	0	no	0.800	0.250	0.250	0.100	0.666	0.334	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-82.1	Patch	strz0045	Endangered	0	no	0.430	0.098	0.098	0.120	0.801	0.076	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-b	Patch	strz0029	Endangered	0	no	0.800	0.160	0.160	0.481	0.647	0.211	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-59.2	Patch	strz0029	Endangered	6	no	0.800	0.444	0.444	0.167	0.602	0.569	504558 Strzelecki Gum *Eucalyptus strzeleckii*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-269	Patch	strz0016	Vulnerable	0	no	0.600	0.038	0.038	0.630	0.530	0.035	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-268	Patch	strz0016	Vulnerable	0	no	0.600	0.060	0.060	0.627	0.533	0.055	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-270	Patch	strz0016	Vulnerable	1	no	0.600	0.127	0.127	0.468	0.735	0.132	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-57	Patch	strz0016	Vulnerable	5	no	0.700	0.178	0.178	0.179	0.643	0.204	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-53.2	Patch	strz0029	Endangered	0	no	0.630	0.022	0.022	0.191	0.476	0.020	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-350	Patch	strz0016	Vulnerable	0	no	0.500	0.510	0.510	0.230		0.235	General
2-400	Patch	strz0029	Endangered	0	no	0.200	0.030	0.030	0.290		0.006	General
2-278	Patch	strz0030	Depleted	0	no	0.600	0.072	0.072	0.410	0.495	0.065	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-44.1	Patch	strz0029	Endangered	0	no	0.190	0.012	0.012	0.400	0.200	0.003	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-293	Patch	strz0030	Depleted	0	no	0.400	0.039	0.039	0.544	0.340	0.021	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-206	Patch	strz0030	Depleted	0	no	0.500	0.254	0.254	0.390	0.428	0.181	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-298	Patch	strz0030	Depleted	0	no	0.200	0.133	0.133	0.100	0.185	0.031	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-299	Patch	strz0029	Endangered	0	no	0.200	0.077	0.077	0.285	0.200	0.019	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-105	Patch	strz0030	Depleted	0	no	0.400	0.121	0.121	0.300	0.147	0.055	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-106	Patch	strz0030	Depleted	0	no	0.400	0.136	0.136	0.300	0.111	0.060	504558 Strzelecki Gum *Eucalyptus strzeleckii*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
2-108	Patch	strz0029	Endangered	0	no	0.200	0.093	0.093	0.330	0.100	0.021	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-205	Patch	strz0029	Endangered	0	no	0.600	0.309	0.309	0.342		0.187	General
1-305	Patch	strz0029	Endangered	0	no	0.300	0.022	0.022	0.350		0.007	General
1-305.1	Patch	strz0029	Endangered	0	no	0.300	0.029	0.029	0.350		0.009	General
2-42.1	Patch	strz0029	Endangered	0	no	0.380	0.008	0.008	0.157		0.003	General
2-102	Patch	strz0053	Endangered	0	no	0.430	0.118	0.118	0.380	0.234	0.063	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-27.2	Patch	gipp0053	Endangered	1	no	0.230	0.025	0.025	0.460	0.160	0.007	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-17.2	Patch	gipp0937	Endangered	0	no	0.360	0.007	0.007	0.600	0.410	0.004	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.410	0.004	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-8	Patch	gipp0016	Vulnerable	0	no	0.180	0.011	0.011	0.410	0.300	0.003	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.300	0.003	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-339	Patch	gipp0053	Endangered	0	no	0.600	0.052	0.052	0.460	0.378	0.043	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-339.1	Patch	gipp0053	Endangered	0	no	0.600	0.112	0.112	0.747	0.459	0.098	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-74.1	Patch	gipp0083	Endangered	0	no	0.420	0.220	0.220	0.410	0.439	0.133	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.439	0.133	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-363	Patch	gipp0793	Vulnerable	0	no	0.600	0.281	0.281	0.450	0.580	0.267	503660 Eastern Spider-orchid *Caladenia orientalis*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
										0.580	0.267	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-364	Patch	gipp0793	Vulnerable	0	no	0.600	0.070	0.070	0.450	0.412	0.059	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-74.2	Patch	gipp0083	Endangered	6	no	0.460	0.572	0.572	0.553	0.610	0.423	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.580	0.415	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-399	Patch	gipp0793	Vulnerable	0	no	0.400	0.339	0.339	0.460	0.452	0.197	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.466	0.199	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-398	Patch	gipp0793	Vulnerable	0	no	0.600	0.185	0.185	0.450	0.554	0.172	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.554	0.172	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-346	Patch	gipp0793	Vulnerable	0	no	0.600	0.087	0.087	0.410	0.426	0.075	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.426	0.075	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1	Patch	gipp0016	Vulnerable	0	no	0.290	0.008	0.008	0.410	0.430	0.003	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.430	0.003	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-215	Patch	strz0793	Vulnerable	0	no	0.200	0.048	0.048	0.400	0.210	0.012	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.210	0.012	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-216	Patch	gipp0083	Endangered	0	no	0.400	0.146	0.146	0.440	0.276	0.075	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.301	0.076	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-221	Patch	gipp0793	Vulnerable	0	no	0.200	0.056	0.056	0.460		0.012	General
1-10	Patch	gipp0053	Endangered	0	no	0.270	0.005	0.005	0.310		0.001	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-9.1	Patch	gipp0793	Vulnerable	0	no	0.280	0.033	0.033	0.310		0.009	General
2-9.2	Patch	gipp0793	Vulnerable	0	no	0.340	0.020	0.020	0.310		0.007	General
2-11	Patch	gipp0793	Vulnerable	1	no	0.430	0.020	0.020	0.324		0.009	General
2-11.1	Patch	gipp0793	Vulnerable	0	no	0.430	0.034	0.034	0.310		0.014	General
2-369	Patch	strz0029	Endangered	0	no	0.200	0.035	0.035	0.320		0.007	General
2-234	Patch	strz0793	Vulnerable	0	no	0.200	0.077	0.077	0.308		0.015	General
2-12.3	Patch	gipp0053	Endangered	0	no	0.600	0.039	0.039	0.330	0.540	0.036	503660 Eastern Spider-orchid *Caladenia orientalis*
1-13.1	Patch	strz0016	Vulnerable	0	no	0.480	0.126	0.126	0.436	0.511	0.092	503660 Eastern Spider-orchid *Caladenia orientalis*
1-13.2	Patch	strz0016	Vulnerable	2	no	0.480	0.079	0.079	0.762	0.548	0.058	503660 Eastern Spider-orchid *Caladenia orientalis*
2-237	Patch	gipp0793	Vulnerable	0	no	0.800	0.124	0.124	0.380	0.672	0.166	503660 Eastern Spider-orchid *Caladenia orientalis*
2-242	Patch	gipp0793	Vulnerable	0	no	0.600	0.170	0.170	0.800	0.441	0.147	503660 Eastern Spider-orchid *Caladenia orientalis*
2-245	Patch	gipp0793	Vulnerable	0	no	0.200	0.405	0.405	0.534	0.524	0.123	503660 Eastern Spider-orchid *Caladenia orientalis*
2-246	Patch	strz0793	Vulnerable	0	no	0.400	0.149	0.149	0.460	0.369	0.081	503660 Eastern Spider-orchid *Caladenia orientalis*
2-250	Patch	strz0793	Vulnerable	0	no	0.400	0.058	0.058	0.460	0.202	0.028	503660 Eastern Spider-orchid *Caladenia orientalis*
2-100.1	Patch	gipp0053	Endangered	0	no	0.250	0.025	0.025	0.420		0.007	General
2-394	Patch	strz0023	Endangered	0	no	0.200	0.041	0.041	0.200		0.007	General

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Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-76.1	Patch	strz0018	Vulnerable	0	no	0.280	0.024	0.024	0.260	0.594	0.011	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-67.6	Patch	strz0023	Endangered	8	no	0.500	0.166	0.166	0.615	0.629	0.135	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-67.7	Patch	strz0023	Endangered	8	no	0.500	0.148	0.148	0.680	0.646	0.122	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-67.9	Patch	strz0023	Endangered	9	no	0.500	0.498	0.498	0.363	0.670	0.416	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-104.1	Patch	gipp0175	Endangered	0	no	0.400	0.036	0.036	0.410	0.060	0.015	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-67.8	Patch	strz0023	Endangered	7	no	0.500	0.108	0.108	0.740	0.528	0.083	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-72.3	Patch	strz0023	Endangered	2	no	0.490	0.107	0.107	0.334	0.516	0.080	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-72.2	Patch	valp0023	Endangered	3	no	0.800	0.179	0.179	0.409	0.632	0.234	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-72.5	Patch	strz0023	Endangered	4	no	0.490	0.108	0.108	0.520	0.750	0.092	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-72.4	Patch	valp0023	Endangered	13	no	0.490	0.429	0.429	0.366	0.590	0.334	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-72.1	Patch	strz0023	Endangered	3	no	0.400	0.103	0.103	0.140	0.530	0.063	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-72.2	Patch	strz0023	Endangered	4	no	0.400	0.364	0.364	0.124	0.484	0.216	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-62.1	Patch	strz0045	Endangered	6	no	0.570	0.195	0.195	0.186		0.099	General
1-391	Patch	strz0029	Endangered	0	no	0.700	0.243	0.243	0.480	0.562	0.265	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-266	Patch	strz0029	Endangered	5	no	0.800	0.743	0.743	0.221	0.518	0.902	504558 Strzelecki Gum *Eucalyptus strzeleckii*

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Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-59.3	Patch	strz0029	Endangered	9	no	0.770	0.425	0.425	0.285	0.640	0.537	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-59.4	Patch	strz0029	Endangered	8	no	0.770	0.314	0.314	0.161	0.632	0.395	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-59.1	Patch	strz0029	Endangered	0	no	0.770	0.364	0.364	0.297	0.693	0.474	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-274	Patch	strz0016	Vulnerable	0	no	0.900	0.121	0.121	0.577	0.784	0.194	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-274.1	Patch	strz0016	Vulnerable	0	no	0.900	1.922	1.922	0.443	0.689	2.922	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-50	Patch	strz0016	Vulnerable	2	no	0.450	0.087	0.087	0.480		0.043	General
1-50.1	Patch	strz0016	Vulnerable	0	no	0.450	0.063	0.063	0.480		0.032	General
2-236	Patch	gipp0793	Vulnerable	0	no	0.800	0.153	0.153	0.800	0.672	0.205	503660 Eastern Spider-orchid *Caladenia orientalis*
2-238	Patch	gipp0793	Vulnerable	0	no	0.600	0.037	0.037	0.380	0.550	0.034	503660 Eastern Spider-orchid *Caladenia orientalis*
1-241	Patch	gipp0793	Vulnerable	0	no	0.600	0.193	0.193	0.757	0.426	0.165	503660 Eastern Spider-orchid *Caladenia orientalis*
2-895	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.070	0.520		0.016	General
1-1048	Scattered Tree	strz0030	Depleted	1	no	0.200	0.070	0.070	0.180	0.710	0.024	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1099	Scattered Tree	strz0016	Vulnerable	1	no	0.200	0.070	0.070	0.550	0.610	0.023	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1092	Scattered Tree	strz0016	Vulnerable	1	no	0.200	0.070	0.070	0.500	0.655	0.023	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1101	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.020	0.550	0.610	0.006	504558 Strzelecki Gum *Eucalyptus strzeleckii*

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Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1-1102	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.007	0.550	0.610	0.002	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1104	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.018	0.550	0.610	0.006	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1118	Scattered Tree	strz0016	Vulnerable	1	no	0.200	0.070	0.070	0.136	0.615	0.023	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1167	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.021	0.707	0.618	0.007	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1168	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.021	0.800	0.699	0.007	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1176	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.029	0.305	0.558	0.009	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1177	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.029	0.230	0.530	0.009	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1185	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.031	0.230	0.730	0.011	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1422	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.069	0.150	0.699	0.024	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1421	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.069	0.150	0.680	0.023	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1751	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.070	0.500	0.587	0.022	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1818	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.070	0.520	0.750	0.025	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1819	Scattered Tree	strz0023	Endangered	0	no	0.200	0.031	0.027	0.520	0.750	0.009	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-897	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.051	0.380		0.011	General
2-1828	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.051	0.380		0.011	General

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1-1927	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.290	0.100	0.015	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-954	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.064	0.300	0.180	0.015	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1945	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.300		0.014	General
2-957	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.064	0.300	0.180	0.015	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-342	Scattered Tree	gipp1106	Vulnerable	0	no	0.200	0.031	0.031	0.630	0.330	0.008	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.011	0.008	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-21	Scattered Tree	strz1106	Vulnerable	1	no	0.200	0.070	0.054	0.567	0.366	0.015	503660 Eastern Spider-orchid *Caladenia orientalis*
2-20	Scattered Tree	strz1106	Vulnerable	1	no	0.200	0.070	0.055	0.580	0.233	0.014	503660 Eastern Spider-orchid *Caladenia orientalis*
1-22	Scattered Tree	strz1106	Vulnerable	1	no	0.200	0.070	0.070	0.506	0.242	0.017	503660 Eastern Spider-orchid *Caladenia orientalis*
1-199	Scattered Tree	gipp1106	Vulnerable	1	no	0.200	0.070	0.070	0.380	0.230	0.017	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.230	0.017	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-219	Scattered Tree	gipp1106	Vulnerable	1	no	0.200	0.070	0.070	0.439	0.480	0.021	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.414	0.021	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-607	Scattered Tree	gipp1106	Vulnerable	1	no	0.200	0.070	0.070	0.731	0.582	0.022	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-923	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.370		0.014	General
2-924	Scattered Tree	strz0030	Depleted	1	no	0.200	0.070	0.070	0.100	0.166	0.016	504558 Strzelecki Gum *Eucalyptus strzeleckii*

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1-382	Scattered Tree	gipp1106	Vulnerable	1	no	0.200	0.070	0.070	0.450	0.494	0.021	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.494	0.021	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-369.1	Scattered Tree	gipp0053	Endangered	1	no	0.200	0.070	0.070	0.450	0.430	0.020	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-364	Scattered Tree	gipp1106	Vulnerable	1	no	0.200	0.070	0.049	0.450	0.445	0.014	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-365	Scattered Tree	gipp0053	Endangered	1	no	0.200	0.070	0.026	0.450	0.531	0.008	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-370	Scattered Tree	gipp0053	Endangered	1	no	0.200	0.070	0.057	0.450	0.540	0.018	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-367	Scattered Tree	gipp0053	Endangered	1	no	0.200	0.070	0.034	0.450	0.534	0.010	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-809	Scattered Tree	gipp0083	Endangered	1	no	0.200	0.070	0.070	0.920	0.370	0.019	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-812	Scattered Tree	gipp0083	Endangered	1	no	0.200	0.070	0.070	0.920		0.020	General
2-852	Scattered Tree	gipp0029	Endangered	1	no	0.200	0.070	0.070	0.930	0.320	0.019	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.320	0.019	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-c	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.612	0.738	0.024	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.738	0.024	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-d	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.350	0.320	0.019	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-e	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.510	0.596	0.022	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-f	Scattered Tree	strz1106	Vulnerable	1	no	0.200	0.070	0.070	0.800	0.420	0.020	503660 Eastern Spider-orchid *Caladenia orientalis*

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1-g	Scattered Tree	gipp0053	Endangered	1	no	0.200	0.070	0.070	0.460	0.340	0.019	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-h	Scattered Tree	gipp0053	Endangered	1	no	0.200	0.070	0.070	0.940	0.506	0.021	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.506	0.021	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-i	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.070	0.354	0.140	0.016	503660 Eastern Spider-orchid *Caladenia orientalis*
1-j	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.324	0.102	0.016	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-k	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.261		0.013	General
2-l	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.110	0.140	0.016	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-m	Scattered Tree	strz0030	Depleted	1	no	0.200	0.070	0.070	0.304	0.240	0.017	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-n	Scattered Tree	strz0030	Depleted	1	no	0.200	0.070	0.070	0.310	0.210	0.017	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1382	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.160	0.450	0.020	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-1384	Scattered Tree	strz0029	Endangered	0	no	0.200	0.031	0.031	0.160		0.005	General
2-1387	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.049	0.490	0.662	0.016	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-1385	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.056	0.490	0.667	0.019	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-o	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.063	0.450	0.598	0.020	504558 Strzelecki Gum *Eucalyptus strzeleckii*
1-p	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.053	0.480	0.460	0.015	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-1	Patch	gipp0055	Endangered	0	no	0.290	0.008	0.008	0.450	0.290	0.003	504558 Strzelecki Gum *Eucalyptus strzeleckii*

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3-2	Patch	strz0029	Endangered	0	no	0.650	0.033	0.033	0.490	0.672	0.036	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-3	Patch	strz0029	Endangered	0	no	0.650	0.027	0.027	0.490	0.650	0.029	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-4	Patch	strz0016	Vulnerable	0	no	0.790	0.042	0.042	0.520	0.790	0.059	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-5	Patch	strz0016	Vulnerable	0	no	0.790	0.027	0.027	0.454	0.747	0.038	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-6	Patch	strz0016	Vulnerable	0	no	0.680	0.024	0.024	0.350	0.680	0.027	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-7	Patch	gipp1106	Vulnerable	0	no	0.380	0.028	0.028	0.460	0.377	0.015	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-8	Patch	gipp1106	Vulnerable	0	no	0.380	0.055	0.055	0.460	0.380	0.029	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-9	Patch	gipp1106	Vulnerable	0	no	0.630	0.030	0.030	0.440	0.630	0.031	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-10	Patch	gipp1106	Vulnerable	0	no	0.630	0.007	0.007	0.440	0.630	0.008	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-11	Patch	strz1106	Vulnerable	0	no	0.300	0.034	0.034	0.326	0.317	0.013	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.317	0.013	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-12	Patch	strz1106	Vulnerable	0	no	0.380	0.013	0.013	0.320	0.380	0.007	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.380	0.007	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-13	Patch	strz1106	Vulnerable	0	no	0.660	0.022	0.022	0.502	0.681	0.024	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.681	0.024	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-14	Patch	strz1106	Vulnerable	0	no	0.660	0.022	0.022	0.481	0.677	0.024	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.677	0.024	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-15	Patch	strz1106	Vulnerable	0	no	0.400	0.033	0.033	0.340	0.316	0.017	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.316	0.017	504558 Strzelecki Gum *Eucalyptus strzeleckii*
3-16	Patch	strz0029	Endangered	0	no	0.610	0.019	0.019	0.330	0.600	0.019	504558 Strzelecki Gum *Eucalyptus strzeleckii*

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
4-1	Patch	gipp0793	Vulnerable	0	no	0.800	0.255	0.255	0.431	0.440	0.294	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.371	0.315	504558 Strzelecki Gum *Eucalyptus strzeleckii*
4-3	Patch	gipp0793	Vulnerable	0	no	0.600	0.788	0.788	0.737	0.561	0.738	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.569	0.742	504558 Strzelecki Gum *Eucalyptus strzeleckii*
2-4	Patch	gipp0937	Endangered	0	no	0.400	0.008	0.008	0.378	0.268	0.004	503660 Eastern Spider-orchid *Caladenia orientalis*
										0.268	0.004	504558 Strzelecki Gum *Eucalyptus strzeleckii*
4-5	Patch	strz0016	Vulnerable	0	no	0.600	0.240	0.240	0.190	0.558	0.224	504558 Strzelecki Gum *Eucalyptus strzeleckii*
4-6	Patch	strz0029	Endangered	2	no	0.800	0.157	0.157	0.569	0.770	0.222	504558 Strzelecki Gum *Eucalyptus strzeleckii*
5-1	Patch	strz0023	Vulnerable	0	no	0.600	0.148	0.148	0.500	0.635	0.145	504558 Strzelecki Gum *Eucalyptus strzeleckii*
5-2	Patch	gipp0151	Vulnerable	8	no	0.550	0.120	0.120	0.820	0.578	0.104	504558 Strzelecki Gum *Eucalyptus strzeleckii*
5-3	Patch	gipp0151	Vulnerable	0	no	0.440	0.016	0.016	0.860	0.446	0.010	504558 Strzelecki Gum *Eucalyptus strzeleckii*
5-4	Patch	gipp0151	Vulnerable	0	no	0.200	0.006	0.006	0.410		0.001	General
5-5	Patch	gipp0151	Vulnerable	0	no	0.470	0.009	0.009	0.440		0.005	General
2-359	Patch	gipp0055	Endangered	0	no	0.200	0.043	0.043	0.360		0.009	General
2-360	Patch	gipp0055	Endangered	0	no	0.600	0.257	0.257	0.360		0.157	General

Appendix 2: Information about impacts to rare or threatened species' habitats on site

This table lists all rare or threatened species' habitats mapped at the site.

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Strzelecki Gum	*Eucalyptus strzeleckii*	504558	Vulnerable	Dispersed	Habitat importance map ; special site	0.0082
Eastern Spider-orchid	*Caladenia orientalis*	503660	Endangered	Dispersed	Habitat importance map	0.0057
Netted brake	*Pteris comans*	502778	Rare	Dispersed	Habitat importance map	0.0029
Bassian Pomaderris	*Pomaderris oraria subsp. oraria*	502665	Rare	Dispersed	Habitat importance map	0.0025
Bass Guinea-flower	*Hibbertia hirticalyx*	505438	Rare	Dispersed	Habitat importance map	0.0021
Small Shade-nettle	*Australina pusilla subsp. pusilla*	504257	Rare	Dispersed	Habitat importance map	0.0020
Promontory Peppermint	*Eucalyptus willisii s.s.*	504480	Rare	Dispersed	Habitat importance map	0.0018
Australian Mudfish	*Neochanna cleaveri*	4703	Critically endangered	Dispersed	Habitat importance map	0.0017
Bog Gum	*Eucalyptus kitsoniana*	501290	Rare	Dispersed	Habitat importance map	0.0015
Australian Grayling	*Prototroctes maraena*	4686	Vulnerable	Dispersed	Habitat importance map	0.0008
Dune Wood-sorrel	*Oxalis rubens*	502390	Rare	Dispersed	Habitat importance map	0.0008
Dense Leek-orchid	*Prasophyllum spicatum*	504506	Endangered	Dispersed	Habitat importance map	0.0008
Currant-wood	*Monotoca glauca*	503859	Rare	Dispersed	Habitat importance map	0.0007
Small Sickle Greenhood	*Pterostylis lustra*	504876	Endangered	Dispersed	Habitat importance map	0.0007
Small Wax-lip Orchid	*Glossodia minor*	501446	Rare	Dispersed	Habitat importance map	0.0006
Yellow Elderberry	*Sambucus australasica*	502998	Vulnerable	Dispersed	Habitat importance map	0.0005
Lax Twig-sedge	*Baumea laxa*	500378	Rare	Dispersed	Habitat importance map	0.0004
Spurred Helmet-orchid	*Corybas aconitiflorus*	500835	Rare	Dispersed	Habitat importance map	0.0004
Rough-fruit Pittosporum	*Pittosporum revolutum*	502542	Rare	Dispersed	Habitat importance map	0.0004

Soft Slender Tussock-grass	*Poa sp. aff. tenera (Hairy)*	504867	Rare	Dispersed	Habitat importance map	0.0004
Prawn Greenhood	*Pterostylis pedoglossa*	502809	Vulnerable	Dispersed	Habitat importance map	0.0004
Thick-lip Spider-orchid	*Caladenia tessellata*	500547	Vulnerable	Dispersed	Habitat importance map	0.0004
Woolly Waterlily	*Philydrum lanuginosum*	502494	Vulnerable	Dispersed	Habitat importance map	0.0003
Veined Spear-grass	*Austrostipa rudis subsp. australis*	504940	Rare	Dispersed	Habitat importance map	0.0003
Southern Xanthosia	*Xanthosia tasmanica*	504088	Rare	Dispersed	Habitat importance map	0.0003
Green Leek-orchid	*Prasophyllum lindleyanum*	502702	Vulnerable	Dispersed	Habitat importance map	0.0003
Green Scentbark	*Eucalyptus fulgens*	505175	Rare	Dispersed	Habitat importance map	0.0003
Floodplain Fireweed	*Senecio campylocarpus*	507136	Rare	Dispersed	Habitat importance map	0.0003
Sticky Wattle	*Acacia howittii*	500044	Rare	Dispersed	Habitat importance map	0.0003
Swamp Greenhood	*Pterostylis tenuissima*	502819	Vulnerable	Dispersed	Habitat importance map	0.0002
Rough Blown-grass	*Lachnagrostis rudis subsp. rudis*	500159	Endangered	Dispersed	Habitat importance map	0.0002
Annual Fireweed	*Senecio glomeratus subsp. longifructus*	507144	Rare	Dispersed	Habitat importance map	0.0002
Grey Billy-buttons	*Craspedia canens*	504643	Endangered	Dispersed	Habitat importance map	0.0002
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	10220	Vulnerable	Dispersed	Habitat importance map	0.0002
Silky Kidney-weed	*Dichondra sp. 1*	505786	Rare	Dispersed	Habitat importance map	0.0002
Slender Pink-fingers	*Caladenia vulgaris*	504449	Rare	Dispersed	Habitat importance map	0.0002
Rush Lily	*Sowerbaea juncea*	503207	Rare	Dispersed	Habitat importance map	0.0002
Rough Daisy-bush	*Olearia asterotricha*	502300	Rare	Dispersed	Habitat importance map	0.0002
Forest Red-box	*Eucalyptus polyanthemos subsp. longior*	504754	Rare	Dispersed	Habitat importance map	0.0002
Lewin's Rail	*Lewinia pectoralis pectoralis*	10045	Vulnerable	Dispersed	Habitat importance map	0.0001
Cobra Greenhood	*Pterostylis grandiflora*	502798	Rare	Dispersed	Habitat importance map	0.0001
Powerful Owl	*Ninox strenua*	10248	Vulnerable	Dispersed	Habitat importance map	0.0001

Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0001
Silky Golden-tip	*Goodia pubescens*	504600	Rare	Dispersed	Habitat importance map	0.0001
Parsley Xanthosia	*Xanthosia leiophylla*	504562	Rare	Dispersed	Habitat importance map	0.0001
Small Fork-fern	*Tmesipteris parva*	503405	Rare	Dispersed	Habitat importance map	0.0001
Swamp Skink	*Lissolepis coventryi*	12407	Vulnerable	Dispersed	Habitat importance map	0.0001
Lace Monitor	*Varanus varius*	12283	Endangered	Dispersed	Habitat importance map ; special site	0.0001
Greater Glider	*Petauroides volans*	11133	Vulnerable	Dispersed	Habitat importance map	0.0001
Fringed Helmet-orchid	*Corybas fimbriatus*	500839	Rare	Dispersed	Habitat importance map	0.0001
Leafy Twig-sedge	*Cladium procerum*	500786	Rare	Dispersed	Habitat importance map	0.0001
White-throated Needletail	*Hirundapus caudacutus*	10334	Vulnerable	Dispersed	Habitat importance map	0.0001
Flinders Pygmy Perch	*Nannoperca sp. 1*	903041	Vulnerable	Dispersed	Habitat importance map	0.0001
Australasian Bittern	*Botaurus poiciloptilus*	10197	Endangered	Dispersed	Habitat importance map	0.0001
Nodding Baeckea	*Euryomyrtus ramosissima subsp. prostrata*	504258	Rare	Dispersed	Habitat importance map	0.0001
Variable Bossiaea	*Bossiaea heterophylla*	500438	Rare	Dispersed	Habitat importance map	0.0001
Glossy Grass Skink	*Pseudemoia rawlinsoni*	12683	Vulnerable	Dispersed	Habitat importance map	0.0001
One-flower Early Nancy	*Wurmbea uniflora*	503583	Rare	Dispersed	Habitat importance map	0.0001
Filmy Maidenhair	*Adiantum diaphanum*	500131	Endangered	Dispersed	Habitat importance map	0.0001
Southern Toadlet	*Pseudophryne semimarmorata*	13125	Vulnerable	Dispersed	Habitat importance map	0.0001
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map	0.0001
Blotched Sun-orchid	*Thelymitra benthamiana*	503369	Vulnerable	Dispersed	Habitat importance map	0.0001
Jungle Bristle-fern	*Cephalomanes caudatum*	502094	Rare	Dispersed	Habitat importance map	0.0001
Winter Sun-orchid	*Thelymitra hiemalis*	505006	Endangered	Dispersed	Habitat importance map	0.0001
Purple Blown-grass	*Lachnagrostis punicea subsp. filifolia*	504222	Rare	Dispersed	Habitat importance map	0.0001

Fisch's Greenhood	*Pterostylis fischii*	502795	Rare	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000
Wavy Swamp Wallaby-grass	*Amphibromus sinuatus*	503625	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Masked Owl	*Tyto novaehollandiae novaehollandiae*	10250	Endangered	Dispersed	Habitat importance map	0.0000
Purple Blown-grass	*Lachnagrostis punicea subsp. punicea*	504206	Rare	Dispersed	Habitat importance map	0.0000
Yarra Gum	*Eucalyptus yarraensis*	501326	Rare	Dispersed	Habitat importance map	0.0000
Leafy Greenhood	*Pterostylis cucullata subsp. cucullata*	505911	Endangered	Dispersed	Habitat importance map	0.0000
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0000
Oval Fork-fern	*Tmesipteris ovata*	503404	Rare	Dispersed	Habitat importance map	0.0000
Golden Pomaderris	*Pomaderris aurea*	502651	Rare	Dispersed	Habitat importance map	0.0000
Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
Lanky Buttons	*Leptorhynchos elongatus*	501941	Endangered	Dispersed	Habitat importance map	0.0000
Austral Moonwort	*Botrychium australe*	500445	Vulnerable	Dispersed	Habitat importance map	0.0000
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0000
Orange-tip Finger-orchid	*Caladenia aurantiaca*	500523	Rare	Dispersed	Habitat importance map	0.0000
Wiry Bog-sedge	*Schoenus carsei*	503043	Rare	Dispersed	Habitat importance map	0.0000
Swamp Everlasting	*Xerochrysum palustre*	503763	Vulnerable	Dispersed	Habitat importance map	0.0000
Slender Fork-fern	*Tmesipteris elongata*	503403	Vulnerable	Dispersed	Habitat importance map	0.0000
Blue-billed Duck	*Oxyura australis*	10216	Endangered	Dispersed	Habitat importance map	0.0000
Coast Wirilda	*Acacia uncifolia*	504210	Rare	Dispersed	Habitat importance map	0.0000
Green-striped Greenhood	*Pterostylis chlorogramma*	504728	Vulnerable	Dispersed	Habitat importance map	0.0000
Velvet Apple-berry	*Billardiera scandens s.s.*	504290	Rare	Dispersed	Habitat importance map	0.0000

Blunt-leaf Pomaderris	*Pomaderris helianthemifolia subsp. hispida*	505427	Rare	Dispersed	Habitat importance map	0.0000
Lacey River Buttercup	*Ranunculus amplus*	505019	Rare	Dispersed	Habitat importance map	0.0000
Tremont Bundy	*Eucalyptus aff. goniocalyx (Dandenong Ranges)*	507008	Vulnerable	Dispersed	Habitat importance map	0.0000
Rough-grain Love-grass	*Eragrostis trachycarpa*	501197	Rare	Dispersed	Habitat importance map	0.0000
Forest Bitter-cress	*Cardamine papillata*	505034	Vulnerable	Dispersed	Habitat importance map	0.0000
Maroon Leek-orchid	*Prasophyllum frenchii*	502709	Endangered	Dispersed	Habitat importance map	0.0000
Dwarf Milkwort	*Polygala japonica*	502623	Vulnerable	Dispersed	Habitat importance map	0.0000
Slender Tree-fern	*Cyathea cunninghamii*	500896	Vulnerable	Dispersed	Habitat importance map	0.0000

Habitat group

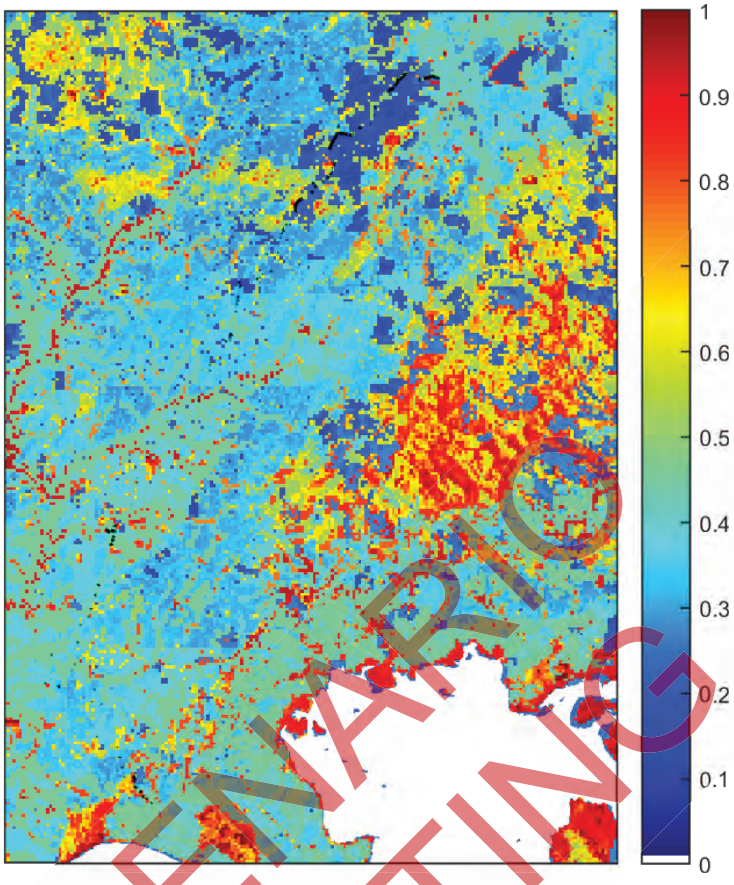
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance scores in dispersed species habitat maps and selected VBA records
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

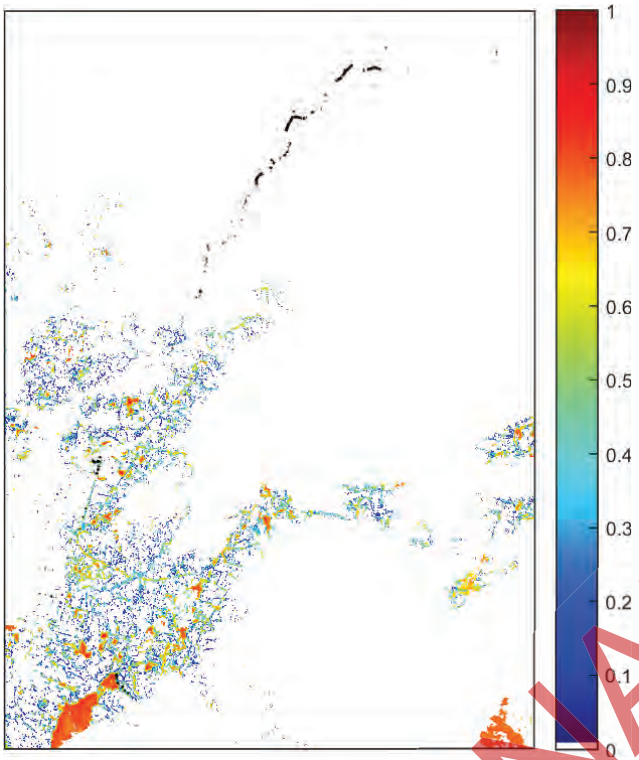
Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map

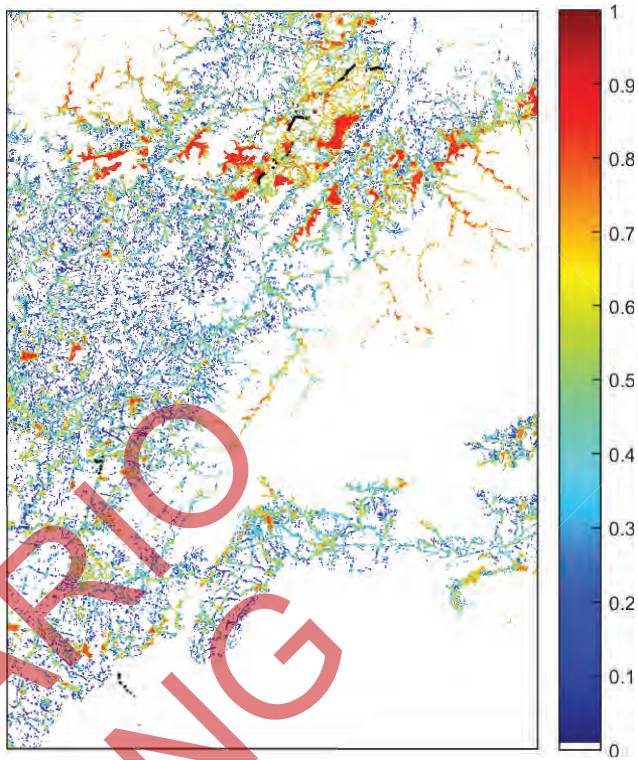


3. Habitat importance maps

Eastern Spider-orchid
Caladenia orientalis
503660



Strzelecki Gum
Eucalyptus strzeleckii
504558



Scenario test – native vegetation removal

This report provides offset requirements for internal testing of different proposals to remove native vegetation. **This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.** A report must be obtained from the Department of Environment, Land, Water and Planning (DELWP).

Date of issue: **17/07/2023**
Time of issue: **5:21 pm**

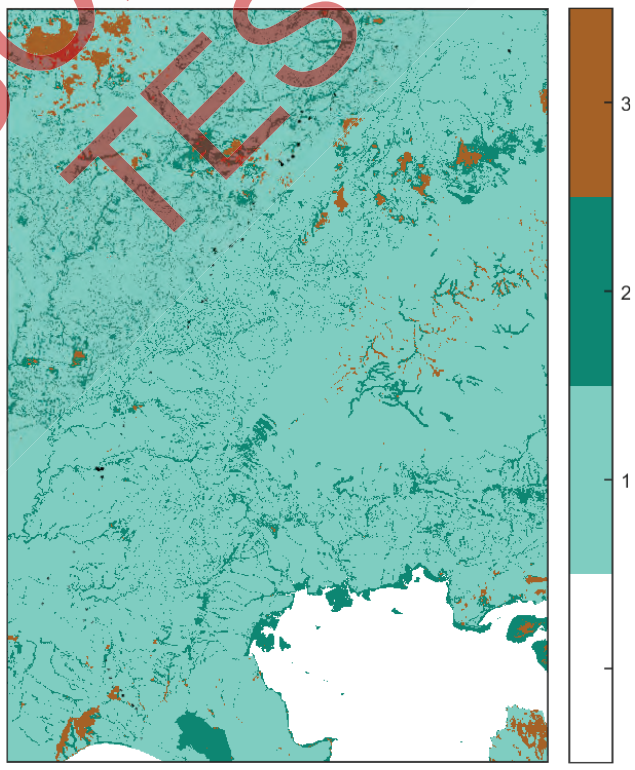
Report ID: Scenario Testing

Project ID	Veg_Loss_Mitigation

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	6.649 ha
Extent of past removal	0.000 ha
Extent of proposed removal	6.649 ha
No. Large trees proposed to be removed	51
Location category of proposed removal	Location 2 The native vegetation is in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map). Removal of less than 0.5 hectares of native vegetation in this location will not have a significant impact on any habitat for a rare or threatened species.

1. Location map



Scenario test – native vegetation removal

Offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

General offset amount[1]	3.225 general habitat units
Vicinity	West Gippsland Catchment Management Authority (CMA) or Latrobe City, South Gippsland Shire Council
Minimum strategic biodiversity value score[2]	0.326
Large trees	51 large trees

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

1 The general offset amount required is the sum of all general habitat units in Appendix 1.

2 Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

Scenario test – native vegetation removal

Next steps

Any proposal to remove native vegetation must meet the application requirements of the Detailed Assessment Pathway and it will be assessed under the Detailed Assessment Pathway.

This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.

If you wish to remove the mapped native vegetation you must submit the related shapefiles to the Department of Environment, Land, Water and Planning (DELWP) for processing, by email to ensymnvrtool.support@delwp.vic.gov.au. DELWP will provide a *Native vegetation removal report* that is required to meet the permit application requirements in accordance with *Guidelines for the removal, destruction or lopping of native vegetation* (Guidelines).

Appendix 1: Description of native vegetation to be removed

The species-general offset test was applied to your proposal. This test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the species offset threshold. The threshold is set at 0.005 per cent of the mapped habitat value for a species. When the proportional impact is above the species offset threshold a species offset is required. This test is done for all species mapped at the site. Multiple species offsets will be required if the species offset threshold is exceeded for multiple species.

Where a zone requires species offset(s), the species habitat units for each species in that zone is calculated by the following equation in accordance with the Guidelines:

Species habitat units = extent x condition x species landscape factor x 2, where the species landscape factor = 0.5 + (habitat importance score/2)

The species offset amount(s) required is the sum of all species habitat units per zone

Where a zone does not require a species offset, the general habitat units in that zone is calculated by the following equation in accordance with the Guidelines:

General habitat units = extent x condition x general landscape factor x 1.5, where the general landscape factor = 0.5 + (strategic biodiversity value score/2)

The general offset amount required is the sum of all general habitat units per zone.

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
2-a	Patch	strz0023	Endangered	0	no	0.800	0.250	0.250	0.100		0.165	General
2-82.1	Patch	strz0045	Endangered	0	no	0.430	0.098	0.098	0.120		0.035	General
2-270	Patch	strz0016	Vulnerable	1	no	0.600	0.127	0.127	0.468		0.084	General
2-57	Patch	strz0016	Vulnerable	5	no	0.700	0.178	0.178	0.179		0.110	General
1-53.2	Patch	strz0029	Endangered	0	no	0.630	0.022	0.022	0.191		0.012	General
2-400	Patch	strz0029	Endangered	0	no	0.200	0.030	0.030	0.290		0.006	General
2-278	Patch	strz0030	Depleted	0	no	0.600	0.072	0.072	0.410		0.046	General
2-44.1	Patch	strz0029	Endangered	0	no	0.190	0.012	0.012	0.400		0.002	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
2-293	Patch	strz0030	Depleted	0	no	0.400	0.039	0.039	0.544		0.018	General
2-206	Patch	strz0030	Depleted	0	no	0.500	0.254	0.254	0.390		0.132	General
2-298	Patch	strz0030	Depleted	0	no	0.200	0.133	0.133	0.100		0.022	General
2-299	Patch	strz0029	Endangered	0	no	0.200	0.077	0.077	0.285		0.015	General
2-108	Patch	strz0029	Endangered	0	no	0.200	0.093	0.093	0.330		0.019	General
2-42.1	Patch	strz0029	Endangered	0	no	0.380	0.008	0.008	0.157		0.003	General
2-102	Patch	strz0053	Endangered	0	no	0.430	0.118	0.118	0.380		0.053	General
2-27.2	Patch	gipp0053	Endangered	1	no	0.230	0.025	0.025	0.460		0.006	General
2-17.2	Patch	gipp0937	Endangered	0	no	0.360	0.007	0.007	0.600		0.003	General
2-8	Patch	gipp0016	Vulnerable	0	no	0.180	0.011	0.011	0.410		0.002	General
2-364	Patch	gipp0793	Vulnerable	0	no	0.600	0.070	0.070	0.450		0.045	General
2-215	Patch	strz0793	Vulnerable	0	no	0.200	0.048	0.048	0.400		0.010	General
2-221	Patch	gipp0793	Vulnerable	0	no	0.200	0.056	0.056	0.460		0.012	General
2-369	Patch	strz0029	Endangered	0	no	0.200	0.035	0.035	0.320		0.007	General
2-234	Patch	strz0793	Vulnerable	0	no	0.200	0.077	0.077	0.308		0.015	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
2-12.3	Patch	gipp0053	Endangered	0	no	0.600	0.039	0.039	0.330		0.024	General
1-13.2	Patch	strz0016	Vulnerable	2	no	0.480	0.079	0.079	0.762		0.050	General
2-246	Patch	strz0793	Vulnerable	0	no	0.400	0.149	0.149	0.460		0.065	General
2-250	Patch	strz0793	Vulnerable	0	no	0.400	0.058	0.058	0.460		0.026	General
2-100.1	Patch	gipp0053	Endangered	0	no	0.250	0.025	0.025	0.420		0.007	General
2-394	Patch	strz0023	Endangered	0	no	0.200	0.041	0.041	0.200		0.007	General
1-59.4	Patch	strz0029	Endangered	8	no	0.770	0.314	0.314	0.161		0.211	General
2-895	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.070	0.520		0.016	General
1-1048	Scattered Tree	strz0030	Depleted	1	no	0.200	0.070	0.070	0.180		0.012	General
2-1167	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.021	0.707		0.005	General
2-1168	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.021	0.800		0.006	General
2-1176	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.029	0.305		0.006	General
2-1177	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.029	0.230		0.005	General
2-1185	Scattered Tree	strz0016	Vulnerable	0	no	0.200	0.031	0.031	0.230		0.006	General
2-1751	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.070	0.500		0.016	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
2-897	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.051	0.380		0.011	General
2-1828	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.051	0.380		0.011	General
2-1945	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.300		0.014	General
2-957	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.300		0.014	General
2-21	Scattered Tree	strz1106	Vulnerable	1	no	0.200	0.070	0.054	0.567		0.013	General
2-20	Scattered Tree	strz1106	Vulnerable	1	no	0.200	0.070	0.055	0.580		0.013	General
1-22	Scattered Tree	strz1106	Vulnerable	1	no	0.200	0.070	0.070	0.506		0.016	General
2-607	Scattered Tree	gipp1106	Vulnerable	1	no	0.200	0.070	0.070	0.731		0.018	General
2-923	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.370		0.014	General
2-924	Scattered Tree	strz0030	Depleted	1	no	0.200	0.070	0.070	0.100		0.012	General
2-369.1	Scattered Tree	gipp0053	Endangered	1	no	0.200	0.070	0.070	0.450		0.015	General
2-364	Scattered Tree	gipp1106	Vulnerable	1	no	0.200	0.070	0.070	0.450		0.015	General
2-c	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.612		0.017	General
2-d	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.350		0.014	General
2-e	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.510		0.016	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
2-i	Scattered Tree	strz0023	Endangered	1	no	0.200	0.070	0.070	0.354		0.014	General
2-l	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.110		0.012	General
2-m	Scattered Tree	strz0030	Depleted	1	no	0.200	0.070	0.070	0.304		0.014	General
2-n	Scattered Tree	strz0030	Depleted	1	no	0.200	0.070	0.070	0.310		0.014	General
2-1382	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.160		0.012	General
2-1384	Scattered Tree	strz0029	Endangered	0	no	0.200	0.031	0.031	0.160		0.005	General
2-1387	Scattered Tree	strz0029	Endangered	1	no	0.200	0.070	0.070	0.490		0.016	General
3-1	Patch	gipp0055	Endangered	0	no	0.290	0.008	0.008	0.450		0.002	General
3-2	Patch	strz0029	Endangered	0	no	0.650	0.033	0.033	0.490		0.024	General
3-3	Patch	strz0029	Endangered	0	no	0.650	0.027	0.027	0.490		0.020	General
3-4	Patch	strz0016	Vulnerable	0	no	0.790	0.042	0.042	0.520		0.037	General
3-5	Patch	strz0016	Vulnerable	0	no	0.790	0.027	0.027	0.454		0.023	General
3-6	Patch	strz0016	Vulnerable	0	no	0.680	0.024	0.024	0.350		0.016	General
3-7	Patch	gipp1106	Vulnerable	0	no	0.380	0.028	0.028	0.460		0.012	General
3-8	Patch	gipp1106	Vulnerable	0	no	0.380	0.055	0.055	0.460		0.023	General
3-9	Patch	gipp1106	Vulnerable	0	no	0.630	0.030	0.030	0.440		0.021	General
3-10	Patch	gipp1106	Vulnerable	0	no	0.630	0.007	0.007	0.440		0.005	General
3-11	Patch	strz1106	Vulnerable	0	no	0.300	0.034	0.034	0.326		0.010	General
3-12	Patch	strz1106	Vulnerable	0	no	0.380	0.013	0.013	0.320		0.005	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
3-13	Patch	strz1106	Vulnerable	0	no	0.660	0.022	0.022	0.502		0.016	General
3-14	Patch	strz1106	Vulnerable	0	no	0.660	0.022	0.022	0.481		0.016	General
3-15	Patch	strz1106	Vulnerable	0	no	0.400	0.033	0.033	0.340		0.013	General
3-16	Patch	strz0029	Endangered	0	no	0.610	0.019	0.019	0.330		0.012	General
4-1	Patch	gipp0793	Vulnerable	0	no	0.800	0.255	0.255	0.431		0.219	General
4-3	Patch	gipp0793	Vulnerable	0	no	0.600	0.788	0.788	0.737		0.616	General
2-4	Patch	gipp0937	Endangered	0	no	0.400	0.008	0.008	0.378		0.003	General
4-5	Patch	strz0016	Vulnerable	0	no	0.600	0.240	0.240	0.190		0.128	General
4-6	Patch	strz0029	Endangered	2	no	0.800	0.157	0.157	0.569		0.148	General
5-2	Patch	gipp0151	Vulnerable	8	no	0.550	0.120	0.120	0.820		0.090	General
5-3	Patch	gipp0151	Vulnerable	0	no	0.440	0.016	0.016	0.860		0.010	General
5-4	Patch	gipp0151	Vulnerable	0	no	0.200	0.006	0.006	0.410		0.001	General
5-5	Patch	gipp0151	Vulnerable	0	no	0.470	0.009	0.009	0.440		0.005	General
2-359	Patch	gipp0055	Endangered	0	no	0.200	0.043	0.043	0.360		0.009	General
2-360	Patch	gipp0055	Endangered	0	no	0.600	0.257	0.257	0.360		0.157	General

Appendix 2: Information about impacts to rare or threatened species' habitats on site

This table lists all rare or threatened species' habitats mapped at the site.

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Strzelecki Gum	*Eucalyptus strzeleckii*	504558	Vulnerable	Dispersed	Habitat importance map ; special site	0.0022
Eastern Spider-orchid	*Caladenia orientalis*	503660	Endangered	Dispersed	Habitat importance map	0.0014
Netted brake	*Pteris comans*	502778	Rare	Dispersed	Habitat importance map	0.0012
Bassian Pomaderris	*Pomaderris oraria subsp. oraria*	502665	Rare	Dispersed	Habitat importance map	0.0010
Australian Mudfish	*Neochanna cleaveri*	4703	Critically endangered	Dispersed	Habitat importance map	0.0009
Dune Wood-sorrel	*Oxalis rubens*	502390	Rare	Dispersed	Habitat importance map	0.0004
Bog Gum	*Eucalyptus kitsoniana*	501290	Rare	Dispersed	Habitat importance map	0.0004
Australian Grayling	*Prototroctes maraena*	4686	Vulnerable	Dispersed	Habitat importance map	0.0004
Dense Leek-orchid	*Prasophyllum spicatum*	504506	Endangered	Dispersed	Habitat importance map	0.0003
Bass Guinea-flower	*Hibbertia hirticalyx*	505438	Rare	Dispersed	Habitat importance map	0.0003
Promontory Peppermint	*Eucalyptus willisii s.s.*	504480	Rare	Dispersed	Habitat importance map	0.0003
Currant-wood	*Monotoca glauca*	503859	Rare	Dispersed	Habitat importance map	0.0003
Small Shade-nettle	*Australina pusilla subsp. pusilla*	504257	Rare	Dispersed	Habitat importance map	0.0003
Small Sickle Greenhood	*Pterostylis lustra*	504876	Endangered	Dispersed	Habitat importance map	0.0003
Lax Twig-sedge	*Baumea laxa*	500378	Rare	Dispersed	Habitat importance map	0.0002
Green Leek-orchid	*Prasophyllum lindleyanum*	502702	Vulnerable	Dispersed	Habitat importance map	0.0002
Floodplain Fireweed	*Senecio campylocarpus*	507136	Rare	Dispersed	Habitat importance map	0.0001
Sticky Wattle	*Acacia howittii*	500044	Rare	Dispersed	Habitat importance map	0.0001
Rough Blown-grass	*Lachnagrostis rudis subsp. rudis*	500159	Endangered	Dispersed	Habitat importance map	0.0001
Southern Xanthosia	*Xanthosia tasmanica*	504088	Rare	Dispersed	Habitat importance map	0.0001

Yellow Elderberry	*Sambucus australasica*	502998	Vulnerable	Dispersed	Habitat importance map	0.0001
Small Wax-lip Orchid	*Glossodia minor*	501446	Rare	Dispersed	Habitat importance map	0.0001
Lewin's Rail	*Lewinia pectoralis pectoralis*	10045	Vulnerable	Dispersed	Habitat importance map	0.0001
Silky Kidney-weed	*Dichondra sp. 1*	505786	Rare	Dispersed	Habitat importance map	0.0001
Soft Slender Tussock-grass	*Poa sp. aff. tenera (Hairy)*	504867	Rare	Dispersed	Habitat importance map	0.0001
Filmy Maidenhair	*Adiantum diaphanum*	500131	Endangered	Dispersed	Habitat importance map	0.0001
Annual Fireweed	*Senecio glomeratus subsp. longifructus*	507144	Rare	Dispersed	Habitat importance map	0.0001
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	10220	Vulnerable	Dispersed	Habitat importance map	0.0001
Woolly Waterlily	*Philydrum lanuginosum*	502494	Vulnerable	Dispersed	Habitat importance map	0.0001
Prawn Greenhood	*Pterostylis pedoglossa*	502809	Vulnerable	Dispersed	Habitat importance map	0.0001
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map	0.0001
Glossy Grass Skink	*Pseudemoia rawlinsoni*	12683	Vulnerable	Dispersed	Habitat importance map	0.0001
Spurred Helmet-orchid	*Corybas aconitiflorus*	500835	Rare	Dispersed	Habitat importance map	0.0000
Australasian Bittern	*Botaurus poiciloptilus*	10197	Endangered	Dispersed	Habitat importance map	0.0000
Thick-lip Spider-orchid	*Caladenia tessellata*	500547	Vulnerable	Dispersed	Habitat importance map	0.0000
Rough-fruit Pittosporum	*Pittosporum revolutum*	502542	Rare	Dispersed	Habitat importance map	0.0000
Grey Billy-buttons	*Craspedia canens*	504643	Endangered	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000
Veined Spear-grass	*Austrostipa rudis subsp. australis*	504940	Rare	Dispersed	Habitat importance map	0.0000
Swamp Greenhood	*Pterostylis tenuissima*	502819	Vulnerable	Dispersed	Habitat importance map	0.0000
Leafy Greenhood	*Pterostylis cucullata subsp. cucullata*	505911	Endangered	Dispersed	Habitat importance map	0.0000
Parsley Xanthosia	*Xanthosia leiophylla*	504562	Rare	Dispersed	Habitat importance map	0.0000
Rough Daisy-bush	*Olearia asterotricha*	502300	Rare	Dispersed	Habitat importance map	0.0000

Silky Golden-tip	*Goodia pubescens*	504600	Rare	Dispersed	Habitat importance map	0.0000
Green Scentbark	*Eucalyptus fulgens*	505175	Rare	Dispersed	Habitat importance map	0.0000
Leafy Twig-sedge	*Cladium procerum*	500786	Rare	Dispersed	Habitat importance map	0.0000
Powerful Owl	*Ninox strenua*	10248	Vulnerable	Dispersed	Habitat importance map	0.0000
Winter Sun-orchid	*Thelymitra hiemalis*	505006	Endangered	Dispersed	Habitat importance map	0.0000
Cobra Greenhood	*Pterostylis grandiflora*	502798	Rare	Dispersed	Habitat importance map	0.0000
Forest Red-box	*Eucalyptus polyanthemos subsp. longior*	504754	Rare	Dispersed	Habitat importance map	0.0000
Slender Pink-fingers	*Caladenia vulgaris*	504449	Rare	Dispersed	Habitat importance map	0.0000
Blotched Sun-orchid	*Thelymitra benthamiana*	503369	Vulnerable	Dispersed	Habitat importance map	0.0000
Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
White-throated Needletail	*Hirundapus caudacutus*	10334	Vulnerable	Dispersed	Habitat importance map	0.0000
Jungle Bristle-fern	*Cephalomanes caudatum*	502094	Rare	Dispersed	Habitat importance map	0.0000
Lace Monitor	*Varanus varius*	12283	Endangered	Dispersed	Habitat importance map	0.0000
Small Fork-fern	*Tmesipteris parva*	503405	Rare	Dispersed	Habitat importance map	0.0000
Rush Lily	*Sowerbaea juncea*	503207	Rare	Dispersed	Habitat importance map	0.0000
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0000
Wavy Swamp Wallaby-grass	*Amphibromus sinuatus*	503625	Vulnerable	Dispersed	Habitat importance map	0.0000
Swamp Everlasting	*Xerochrysum palustre*	503763	Vulnerable	Dispersed	Habitat importance map	0.0000
Purple Blown-grass	*Lachnagrostis punicea subsp. punicea*	504206	Rare	Dispersed	Habitat importance map	0.0000
Slender Fork-fern	*Tmesipteris elongata*	503403	Vulnerable	Dispersed	Habitat importance map	0.0000
Swamp Skink	*Lissolepis coventryi*	12407	Vulnerable	Dispersed	Habitat importance map	0.0000
Greater Glider	*Petauroides volans*	11133	Vulnerable	Dispersed	Habitat importance map	0.0000
Yarra Gum	*Eucalyptus yarraensis*	501326	Rare	Dispersed	Habitat importance map	0.0000

Variable Bossiaea	*Bossiaea heterophylla*	500438	Rare	Dispersed	Habitat importance map	0.0000
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0000
Wiry Bog-sedge	*Schoenus carsei*	503043	Rare	Dispersed	Habitat importance map	0.0000
Purple Blown-grass	*Lachnagrostis punicea subsp. filifolia*	504222	Rare	Dispersed	Habitat importance map	0.0000
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
One-flower Early Nancy	*Wurmbea uniflora*	503583	Rare	Dispersed	Habitat importance map	0.0000
Blue-billed Duck	*Oxyura australis*	10216	Endangered	Dispersed	Habitat importance map	0.0000
Coast Wirilda	*Acacia uncifolia*	504210	Rare	Dispersed	Habitat importance map	0.0000
Oval Fork-fern	*Tmesipteris ovata*	503404	Rare	Dispersed	Habitat importance map	0.0000
Masked Owl	*Tyto novaehollandiae novaehollandiae*	10250	Endangered	Dispersed	Habitat importance map	0.0000
Fringed Helmet-orchid	*Corybas fimbriatus*	500839	Rare	Dispersed	Habitat importance map	0.0000
Rough-grain Love-grass	*Eragrostis trachycarpa*	501197	Rare	Dispersed	Habitat importance map	0.0000
Tremont Bundy	*Eucalyptus aff. goniocalyx (Dandenong Ranges)*	507008	Vulnerable	Dispersed	Habitat importance map	0.0000
Austral Moonwort	*Botrychium australe*	500445	Vulnerable	Dispersed	Habitat importance map	0.0000
Maroon Leek-orchid	*Prasophyllum frenchii*	502709	Endangered	Dispersed	Habitat importance map	0.0000
Forest Bitter-cress	*Cardamine papillata*	505034	Vulnerable	Dispersed	Habitat importance map	0.0000
Fisch's Greenhood	*Pterostylis fischii*	502795	Rare	Dispersed	Habitat importance map	0.0000
Dwarf Milkwort	*Polygala japonica*	502623	Vulnerable	Dispersed	Habitat importance map	0.0000
Lanky Buttons	*Leptorhynchos elongatus*	501941	Endangered	Dispersed	Habitat importance map	0.0000
Slender Tree-fern	*Cyathea cunninghamii*	500896	Vulnerable	Dispersed	Habitat importance map	0.0000
Green-striped Greenhood	*Pterostylis chlorogramma*	504728	Vulnerable	Dispersed	Habitat importance map	0.0000

Habitat group

- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species

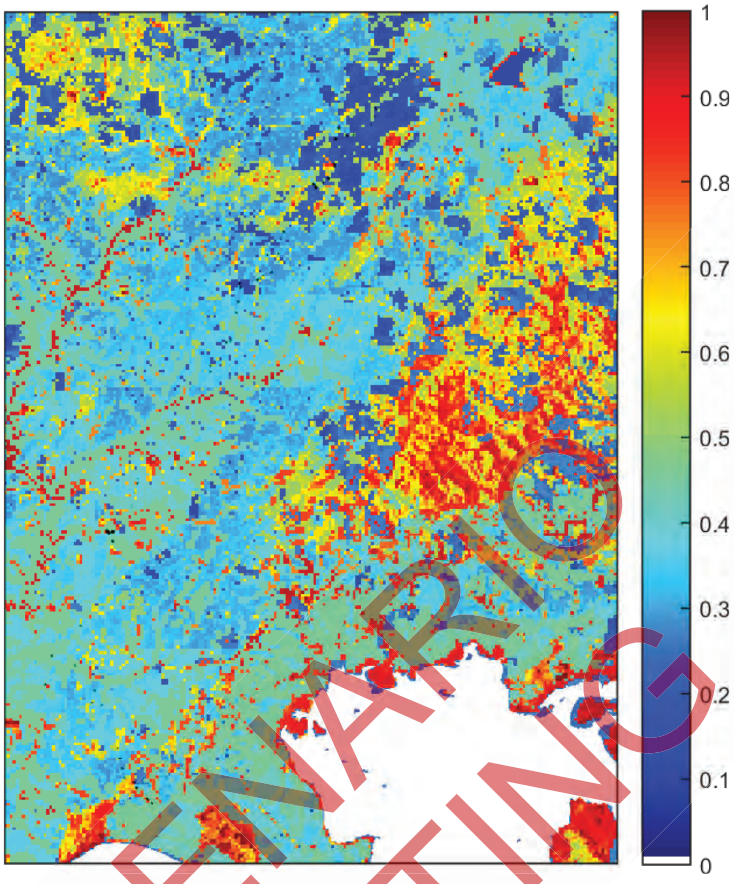
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance scores in dispersed species habitat maps and selected VBA records
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map



SCENARIO TESTING

Appendix 4 Survey data

Table 4a. Fauna species recorded with the survey area

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
Agile antechinus	*Antechinus agilis*	Mammal	Remote sensing camera, Elliot Trapping	KP 22.9, KP 61.4, KP 63.6, KP 64.8, KP 68.1, KP 68.3, KP 70.3	Not listed
Antechinus sp.	*Unidentifiable Antechinus sp.*	Mammal	Remote sensing camera	KP 57.4, KP 62.8, KP 63.6, KP 65.0, KP 68.1, KP 68.3	
Australian boobook	*Ninox boobook*	Bird	Spotlighting, acoustic recorder	KP 65.0, KP 67.9	Not listed
Australian magpie	*Gymnorhina tibicen*	Bird	Remote sensing camera, diurnal bird survey, drone survey	KP 6.4, KP 10.6, KP 15.3, KP 21.8, KP 21.9, KP 25.4, KP 27.6, KP 27.7, KP 33.9, KP 57.4, KP 61.4, KP 65.7, KP 66.2, KP 70.2, KP 78.2	Not listed
Australian raven	*Corvus coronoides*	Bird	Diurnal bird survey	KP 33.9, KP 23.9, KP 57.4, KP 61.4, KP 65.7, KP 78.2	Not listed
Australian reed warbler	*Acrocephalus australis*	Bird	Diurnal bird survey	KP 48.4	Not listed
Australian shelduck	*Tadorna tadornoides*	Bird	Diurnal bird survey	KP 33.9, KP 45.1	Not listed
Australian wood duck	*Aix sponsa*	Bird	Diurnal bird survey, incidental observation	KP 21.8, KP 21.9, KP 33.9, KP 35.0, KP 78.2	Not listed
Barn owl	*Tyto alba*	Bird	Incidental observation	KP 35.0	Not listed
Bassian thrush	*Zoothera lunulata*	Bird	Remote sensing camera	KP 61.4, KP 63.6	Not listed
Bell miner	*Manorina melanophrys*	Bird	Diurnal bird survey	KP 61.4, KP 65.7	Not listed
Black swan	*Cygnus atratus*	Bird	Diurnal bird survey	KP 45.1	Not listed
Black-faced cuckoo-shrike	*Coracina novaehollandiae*	Bird	Diurnal bird survey	P33.9, KP 67.9	Not listed
Blue-tongue lizard	*Tiliqua scincoides*	Reptile	Remote sensing camera	KP 23.5, KP 27.1	Not listed
Brown thornbill	*Acanthiza pusilla*	Bird	Remote sensing camera; diurnal bird survey	KP 15.3, KP 21.8, KP 21.9, KP 27.6, KP 33.9, KP 61.4,	Not listed

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
				KP 62.3, KP 63.6, KP 65.0, KP 65.7, KP 69.4, KP 67.0, KP 67.9, KP 70.2	
Brushtail possum	*Trichosurus vulpecula*	Mammal	Remote sensing camera, incidental observation, drone surveys	KP 35.0, KP 61.4, KP 62.9, KP 63.6, KP 64.8, KP 68.0, KP 68.1, KP 69.6	Not listed
Buff-banded rail	*Gallirallus philippensis*	Bird	Diurnal bird survey	KP 22.6	Not listed
Buff-rumped thornbill	*Acanthiza reguloides*	Bird	Diurnal bird survey	KP 21.8, KP 65.7, KP 69.4, KP 70.2, KP 71.0	Not listed
Bush rat	*Rattus fuscipes*	Mammal	Remote sensing camera	KP 57.4	Not listed
Cattle egret	*Bubulcus ibis*	Bird	Incidental observation	KP 52.7, KP 55.1	Marine (EPBC Act)
Chestnut teal	*Anas castanea*	Bird	Diurnal bird survey, incidental observation	KP 35.0, KP 78.2	Not listed
Common blackbird	*Turdus merula*	Bird	Remote sensing camera	KP 21.8, KP 22.6, KP 23.5, KP 57.4, KP 61.4	N/A (Introduced)
Common bronzewing	*Phaps chalcoptera*	Bird	Remote sensing camera	KP 57.4, KP 61.4, KP 67.9	Not listed
Common eastern froglet	*Crinia signifera*	Amphibian	Spotlighting and call playback, incidental observation	KP 10.6, KP 22.6, KP 33.9, KP 44.2, KP 67.0, KP 78.1 – KP 78.2	Not listed
Common myna	*Acridotheres tristis*	Bird	Diurnal bird survey	KP 15.3, KP 33.9	N/A (Introduced)
Common ringtail possum	*Pseudocheirus peregrinus*	Mammal	Remote sensing camera, spotlighting, drone surveys	KP 25.4, KP 26.7, KP 27.3, KP 27.7, KP 57.3, KP 61.4, KP 62.5, KP62.7, KP 62.9, KP 63.0, KP 63.1, KP 63.4, KP 63.6, KP 64.6, KP 64.9, KP 65.0, KP 65.5, KP 65.9, KP 66.0, KP 66.4, KP 66.9, KP 68.1, KP 68.5, KP 69.3, KP 69.6, KP 70.0, KP 70.1, KP 70.2, KP 70.3, KP 70.7, KP 71.0, KP 71.3, KP 71.4, KP	Not listed

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
				71.5, KP 71.6, KP 71.7, KP 71.8	
Common starling	*Sturnus vulgaris*	Bird	Diurnal bird survey	KP 10.6, KP 15.3, KP 33.9, KP 78.2	N/A (Introduced)
Common wombat	*Vombatus ursinus*	Mammal	Remote sensing camera, spotlighting, incidental observation, drone surveys	KP 23.3, KP 23.5, KP 24.0, KP 26.6, KP 26.7, KP 27.7, KP 57.4, KP 61.4, KP 62.4, KP 63.0, KP 63.6, KP 63.8, KP 64.6, KP 64.8, KP 65.0, KP 65.4, KP 65.5, KP 66.6, KP 66.7, KP 66.9, KP 68.3, KP 69.4, KP 70.6, KP 71.4	Not listed
Crested pigeon	*Ocyphaps lophotes*	Bird	Diurnal bird survey	KP 10.6, KP 22.6	Not listed
Crimson rosella	*Platycercus elegans*	Bird	Remote sensing camera; diurnal bird survey	KP 10.6, KP 22.6 KP 21.8, KP 33.9, KP 63.6, KP 65.0, KP 65.7, KP 67.9, KP 68.5, KP 71.0	Not listed
Domestic dog	*Canis lupus familiaris*	Mammal	Remote sensing camera	KP 57.4, KP 61.4	N/A (Introduced)
Dusky antechinus	*Antechinus swainsonii*	Mammal	Remote sensing camera	KP 61.4, KP 63.6, KP 63.8	Not listed
Eastern banjo frog	*Limnodynastes dumerilii*	Amphibian	Dip netting, tiles, spotlighting	KP 23.9, KP 34.9, KP 67.0	Not listed
Eastern grey kangaroo	*Macropus giganteus*	Mammal	Remote sensing camera, spotlighting, drone surveys	KP 26.6, KP 61.4, KP 62.9, KP 63.6, KP 65.6, KP 66.3, KP 69.2, KP 69.7, KP 71.5, KP 71.6	Not listed
Eastern rosella	*Platycercus eximius*	Bird	Diurnal bird survey	KP 10.6, KP 22.6, KP 33.9, KP 71.0, KP 78.2	Not listed
Eastern spinebill	*Acanthorhynchus tenuirostris*	Bird	Diurnal bird survey	KP 21.9, KP 65.0, KP 65.7	Not listed
Eastern whipbird	*Psophodes olivaceus*	Bird	Remote sensing camera; diurnal bird survey	KP 6.4, KP 61.4, KP 65.0	Not listed
Eastern yellow robin	*Eopsaltria australis*	Bird	Remote sensing camera; diurnal bird survey	KP 21.8, KP 21.9 KP 23.3, KP 23.5, KP 24.0, KP 26.8, KP	Not listed

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
				62.3, KP 64.9, KP 68.5, KP 71.0	
Eurasian coot	*Fulica atra*	Bird	Incidental observation	KP 35.0	Not listed
European carp	*Cyprinus carpio*	Fish	Incidental observation	KP 35.0	N/A (Introduced)
European rabbit	*Oryctolagus cuniculus*	Mammal	Remote sensing camera	KP 23.5, KP 24.0, KP 27.7, KP 57.4, KP 61.4	N/A (introduced)
Fan-tailed cuckoo	*Cacomantis flabelliformis*	Bird	Diurnal bird survey	KP 61.4, KP 65.0, KP 65.7, KP 67.0, KP 69.4, KP 70.2	Not listed
Fuscous honeyeater	*Lichenostomus fuscus*	Bird	Diurnal bird survey	KP 27.6, KP 65.0	Not listed
Golden whistler	*Pachycephala pectoralis*	Bird	Diurnal bird survey	KP 21.8, KP 27.6, KP 61.4, KP 62.3, KP 65.0, KP 67.0, KP 68.5, KP 70.2	Not listed
Gould's wattle bat	*Chalinolobus gouldii*	Mammal	Ultrasonic recorder	KP 57.4	Not listed
Grey butcherbird	*Cracticus torquatus*	Bird	Diurnal bird survey	KP 61.4	Not listed
Grey currawong	*Strepera versicolor*	Bird	Remote sensing camera, drone surveys	KP 70.6, KP 71.6	Not listed
Grey fantail	*Rhipidura albiscapa*	Bird	Remote sensing camera; diurnal bird survey	KP 10.6, KP 21.8, KP 21.9, KP 22.6, KP 23.5 KP 23.9, KP 27.6, KP 33.9, KP 57.4, KP 61.4, KP 62.3, KP 65.0, KP 65.7, KP 67.0, KP 67.9, KP 68.5, KP 69.4, KP 70.2, KP 71.0, KP 78.2	Not listed
Grey goshawk	*Accipiter novaehollandiae*	Bird	Incidental observation	KP 67.9	Vulnerable (FFG Act)
Grey-headed flying-fox	*Pteropus poliocephalus*	Mammal	Acoustic recorder	KP 67.9	Vulnerable (FFG Act and EPBC Act)
Grey shrike-thrush	*Colluricincla harmonica*	Bird	Remote sensing camera; diurnal bird survey	KP 6.4, KP 21.9, KP 22.6, KP 23.9, KP 24.0, KP 26.6, KP 27.6, KP 57.4, KP 61.4, KP	Not listed

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
				62.3, KP 64.8, KP 65.0, KP 65.7, KP 67.0, KP 68.1, KP 68.5, KP 21.8, KP 69.4, KP 70.2, KP 71.0	
Hardhead	*Aythya australis*	Bird	Diurnal bird survey	KP 45.1	Vulnerable (FFG)
Koala	*Phascolarctos cinereus*	Mammal	Remote sensing camera, Incidental observation, spotlighting, drone surveys, acoustic recorders	KP 21.7, KP 21.9, KP 22.5, KP 22.6, KP 23.1, KP 24.0, KP 24.7, KP 25.2, KP 25.4, KP 25.8, KP 26.6, KP 28.7, KP 61.4, KP 62.7, KP 62.8, KP 65.0, KP 67.0, KP 67.9, KP 69.0, KP 70.7, KP 71.1, KP 71.4, KP 71.5, KP 71.7, KP 73.1	Not listed
Lace monitor	*Varanus varius*	Reptile	Remote sensing camera	KP 68.0	Endangered (FFG Act)
Large forest bat	*Vespadelus darlingtoni*	Mammal	Ultrasonic recorder	KP 57.4	Not listed
Latham's snipe	*Gallinago hardwickii*	Bird	Incidental observation	P78.9	Not listed
Laughing kookaburra	*Dacelo novaeguineae*	Bird	Diurnal bird survey	KP 21.9, KP 22.6, KP 33.9, KP 61.4, KP 78.2	Not listed
Little forest bat	*Vespadelus vulturnus*	Mammal	Ultrasonic recorder	KP 57.4	Not listed
Long-eared bat sp.	*Nyctophilus sp.*	Mammal	Ultrasonic recorder	KP 57.4	Not listed
Lowland Burrowing Crayfish	*Engaeus quadrimanus*	Invertebrate	Norrocky trap	KP 63.5, 66.6	Not listed
Lowland copperhead	*Austrelaps superbus*	Reptile	Incidental observation	KP 23.5	Not listed
Magpie-lark	*Grallina cyanoleuca*	Bird	Spotlighting, diurnal bird survey	KP 25.4	Not listed
Metallic skink	*Niveoscincus metallicus*	Reptile	Tiles	KP 23.0, KP 23.9	Not listed
Mosquito Fish	*Gambusia holbrooki*	Fish	Dip netting	KP 78.1, KP 78.2	N/A (introduced)
Noisy miner	*Manorina melanocephala*	Bird	Diurnal bird survey	KP 10.6, KP 33.9, KP 78.2	Not listed

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
Pacific black duck	*Anas superciliosa*	Bird	Diurnal bird survey, incidental observation	KP 35.0, KP 48.4, KP 78.2	Not listed
Peregrine falcon	*Falco peregrinus*	Bird	Diurnal bird survey	KP 22.6	Not listed
Peron's tree frog	*Litoria peronii*	Amphibian	Spotlighting and call playback	KP 44.2, KP 67.0	Not listed
Pied currawong	*Strepera graculina*	Bird	Diurnal bird survey	KP 22.6, KP 57.4, KP 65.0, KP 65.7, KP 67.0, KP 67.9, KP 68.5, KP 69.4, KP 71.0	Not listed
Powerful Owl	*Ninox strenua*	Bird	Acoustic recorder	KP 21.9	Vulnerable (FFG Act)
Rainbow lorikeet	*Trichoglossus moluccanus*	Bird	Diurnal bird survey	KP 10.6, KP 33.9	Not listed
Rattus sp.	*Unidentified rat*	Mammal	Remote sensing camera	KP 23.5, KP 27.1, KP 27.3	
Red fox	*Vulpes vulpes*	Mammal	Remote sensing camera, opportunistic	KP 23.3, KP 23.5, KP 27.6, KP 57.4, KP 61.4, KP 62.4, KP 62.7, KP 62.8, KP 63.1, KP 63.6, KP 68.0	N/A (Introduced)
Red wattlebird	*Anthochaera carunculata*	Bird	Diurnal bird survey	KP 10.6, KP 22.6, KP 71.0	Not listed
Red-bellied black snake	*Pseudechis porphyriacus*	Reptile	Incidental observation	KP 76.4	Not listed
Red-browed finch	*Neochmia temporalis*	Bird	Diurnal bird survey	KP 21.8, KP 21.9	Not listed
Redfin perch	*Perca fluviatilis*	Fish	Incidental observation	KP 78.1	N/A (Introduced)
Red-necked wallaby	*Notamacropus rufogriseus*	Mammal	Remote sensing camera	KP 63.6	Not listed
Rufous fantail	*Rhipidura rufifrons*	Bird	Diurnal bird survey	KP 70.2	Marine and Migratory (EPBC Act)
Rufous whistler	*Pachycephala rufiventris*	Bird	Diurnal bird survey	KP 21.8, KP 22.6, KP 61.4	Not listed
Sambar deer	*Rusa unicolor*	Mammal	Remote sensing camera	KP 68.0	N/A (Introduced)
Scared kingfisher	*Todiramphus sanctus*	Bird	Diurnal bird survey	KP 22.6	Not listed
Shining bronze cuckoo	*Chrysococcyx lucidus*	Bird	Diurnal bird survey	KP 67.9	Not listed
Short-beaked echidna	*Tachyglossus aculeatus*	Mammal	Remote sensing camera, incidental observation, drone surveys	KP 24.6, KP 26.6, KP 27.1, KP 57.4, KP 61.4, KP 62.8, KP 63.6, KP	Not listed

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
				63.8, KP 64.9, KP 65.0, KP 68.0	
Silvereye	*Zosterops lateralis*	Bird	Diurnal bird survey	KP 22.6	Not listed
Southern forest bat	*Vespadelus regulus*	Mammal	Ultrasonic recorder	KP 57.4	Not listed
Spotted dove	*Cpilopelia chinensis*	Bird	Remote sensing camera, diurnal bird survey	KP 23.3	Not listed
Spotted marsh frog	*Limnodynastes tasmaniensis*	Amphibian	Spotlighting	KP 67; KP 78.1 – 78.2	Not listed
Spotted pardalote	*Pardalotus punctatus*	Bird	Diurnal bird survey	KP 57.4, KP 61.4, KP 62.3, KP 65.0, KP 65.7, KP 67.0, KP 68.5, KP 69.4, KP 70.2, KP 71.0	Not listed
Striated pardalote	*Pardalotus striatus*	Bird	Diurnal bird survey	KP 61.4, KP 65.7, KP 67.9, KP 69.4, KP 71.0	Not listed
Striated thornbill	*Acanthiza lineata*	Bird	Diurnal bird survey	KP 62.3, KP 67.0, KP 67.9, KP 68.5, KP 69.4, KP 70.2	Not listed
Striped marsh frog	*Limnodynastes peronii*	Amphibian	tiles, incidental observation, spotlighting	KP 23.9, KP 67.0, KP 78.1-KP 78.2	Not listed
Sugar glider	*Petaurus breviceps*	Mammal	Drone surveys	KP 61.4, KP 63.6, KP 66.4, KP 69.6	Not listed
Sulphur-crested cockatoo	*Cacatua galerita*	Bird	Diurnal bird survey	KP 68.5, KP 61.4	Not listed
Superb fairy-wren	*Malurus cyaneus*	Bird	Remote sensing camera; diurnal bird survey	KP 6.4, KP 23.3, KP 23.9, KP 26.6, KP 57.4, KP 21.8, KP 61.4, KP 63.6, KP 65.0, KP 67.9, KP 68.5	Not listed
Superb lyrebird	*Menura novaehollandiae*	Bird	Incidental observation	KP 65.0	Not listed
Swamp rat	*Rattus lutreolus*	Mammal	Elliot trapping	KP 22.7	Not listed
Swamp wallaby	*Wallabia bicolor*	Mammal	Remote sensing camera, spotlighting, drone surveys	KP 26.6, KP 27.1, KP 57.4, KP 61.4, KP 61.9, KP 62.4, KP 62.7, KP 62.8, KP 62.9, KP 63.0, KP 63.1, KP 63.5, KP 63.6, KP 63.8, KP 64.6,	Not listed

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
				KP 64.8, KP 64.9, KP 65.0, KP 65.3, KP 66.0, KP 67.0, KP 68.0, KP 68.1, KP 68.3, KP 68.6, KP 69.1, KP 69.3, KP 69.6, KP 70.3, KP 70.4, KP 71.7	
Tawny Frogmouth	*Podargus strigoides*	Bird	Diurnal bird survey	KP 61.4	Not listed
Variegated fairy-wren	*Malurus lamberti*	Bird	Remote sensing camera	KP 23.5, KP 24.0	Not listed
Wallaby sp.	*Unidentifiable Wallabia sp.*	Mammal	Remote sensing camera	KP 63.5	Not listed
Wedge-tail eagle	*Aquila audax*	Bird	Incidental observation, diurnal bird survey	KP 23.1	Not listed
Welcome swallow	*Hirundo neoxena*	Bird	Diurnal bird survey	KP 21.8, KP 23.9, KP 48.4, KP 78.2	Not listed
Whistling tree frog	*Litoria verreauxii*	Amphibian	Spotlighting and call playback	KP 33.9, KP 44.2, KP 67.0, KP 78.1-KP 78.2	Not listed
White-browed scrubwren	*Sericornis frontalis*	Bird	Remote sensing camera; diurnal bird survey	KP 6.4, KP 22.6, KP 24.0, KP 57.4, KP 61.4, KP 62.3, KP 63.6, KP 65.0	Not listed
White-eared honeyeater	*Lichenostomus leucotis*	Bird	Diurnal bird survey	KP 22.6	Not listed
White-faced heron	*Egretta novaehollandiae*	Bird	Diurnal bird survey	KP 33.9, KP 78.1, KP 78.2	Not listed
White-lipped snake	*Drysdalia coronoides*	Reptile	Incidental observation	KP 74.9	Not listed
White-necked heron	*Ardea pacifica*	Bird	Diurnal bird survey	KP 22.6	Not listed
White-plumed honeyeater	*Lichenostomus penicillatus*	Bird	Diurnal bird survey	KP 69.4, KP 71.0	Not listed
White-throated treecreeper	*Cormobates leucophaea*	Bird	Remote sensing camera; diurnal bird survey	KP 21.8, KP 22.6, KP 27.6. KP 27.7, KP 57.4, KP 61.4, KP 62.3, KP 65.0, KP 65.7, KP 67.0, KP 67.9, KP 68.3, KP 70.2, KP 71.0	Not listed

Common Name	Scientific Name	Class	Survey type	Site observed	FFG status
Willie wagtail	*Rhipidura leucophrys*	Bird	Diurnal bird survey	KP 22.6	Not listed
Yellow thornbill	*Acanthiza nana*	Bird	Diurnal bird survey	KP 71.0	Not listed
Yellow-billed spoonbill	*Platalea flavipes*	Bird	Incidental observation	KP 78.2	Not listed
Yellow-faced honeyeater	*Caligavis chrysops*	Bird	Diurnal bird survey	KP 22.6, KP 27.6, KP 61.4, KP 62.3, KP 65.0, KP 65.7, KP 67.0, KP 68.5, KP 69.4, KP 70.2	Not listed
Yellow-rumped thornbill	*Acanthiza chrysorrhoa*	Bird	Diurnal bird survey	KP 22.6, KP 23.9	Not listed
Yellow-tailed black cockatoo	*Calyptorhynchus funereus*	Bird	Diurnal bird survey, drone surveys	KP 62.3, KP 65.0, KP 65.7, KP 66.7, KP 67.0, KP 70.2, KP 71.0	Not listed

Appendix 5 MNES significant impact tests

Migratory species

Species: Shorebirds including Sanderling, Red-necked Stint, Double-banded Plover, Caspian Tern, Eastern Curlew, Crested Tern.

Significant impact criteria	Assessment of impacts
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	There is no known area of important habitat for these species intersecting the survey area, although Shallow Inlet, which is located approximately 3.5 kms east of the survey area, is considered to be a site of national importance for the Red-necked Stint and Double-banded Plover. The majority of these species do not breed in Australia (or the site is not considered to contain a significant regular breeding colony as is the case for Caspian Tern), with Crested Tern the only species with the potential to utilise the survey area for breeding. HDD methods are proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species. As such, the project is unlikely to substantially modify, destroy or isolate an area of important habitat for these migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	No invasive species that are harmful to these migratory species are expected to become established within the survey area as a result of the project.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The majority of these species, including Sanderling, Red-necked Stint, Double-banded Plover and Eastern Curlew, do not breed in Australia, and therefore breeding will not be disturbed for these species. For the Caspian tern, no significant breeding colonies will be impacted, as only three significant regular breeding colonies have been identified in Victoria, which are located at Corner Inlet, Mud Island and Mallacoota. For Crested Tern, which have the potential to utilise the survey area for breeding, there will be no disturbance to this habitat, due to the use of HDD methods to avoid the beach and dune system in Waratah Bay. Indirect impacts, including noise and light impacts, have the potential to disrupt the breeding cycle a population of Crested Tern. In particular, noise associated with the drilling for the Victorian shore crossing at Waratah Bay, which will involve HDD works, will occur 24 hours per day, 7 days per week, for a period of approximately 12 months to ensure the stability of the bore hole. As such, the project is considered unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of the population of these migratory species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the following migratory shorebirds: Sanderling, Red-necked Stint, Double-banded Plover, Caspian Tern, Eastern Curlew and Crested Tern.

Species: Latham's snipe.

Significant impact criteria	Assessment of impacts
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Important habitat for Latham's snipe is described as areas that have previously been identified as internationally important for the species or areas that support at least 18 individuals of the species (DoEE, 2017). No nationally important habitat for the species occurs within the study area and an individual Latham's snipe was recorded opportunistically utilising a waterbody near KP 78.8. There will be no direct disturbance to habitat for this species. Indirect impacts include the potential release of pollution and/or sediment into waterways and potential light pollution. Trenchless technologies such as HDD will be utilised, including ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water. Potential light pollution will be short term, and will only occur during the construction phase, and therefore will unlikely lead to a long-term decrease in the size of the population. As such, the project is unlikely to substantially modify, destroy or isolate an area of important habitat for these migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	No invasive species that are harmful to Latham's snipe are expected to become established within the survey area as a result of the project.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	There will be no direct disturbance to habitat for this species. Latham's snipe do not breed in Australia, and therefore breeding will not be disturbed for this species.. Indirect impacts, including noise and light impacts, have the potential to disrupt the feeding, migration and resting behaviour. In particular, noise associated HDD works have the potential to disrupt the species. These impacts are however temporary in nature and limited to project construction. As such, the project is considered unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of the species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on Latham's snipe.

Species: Woodland birds including satin flycatcher rufous fantail

Significant impact criteria	Assessment of impacts
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Satin flycatcher and rufous fantail were identified to have the potential to occur within woodland patches in the north and south of the survey area. The survey area contains potential foraging habitat for both species and potential breeding habitat for satin flycatcher. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes reviewing proposed alignment through the Strzelecki Ranges to ensure the AoD sits outside of remnant

Significant impact criteria	Assessment of impacts
	vegetation, and utilise HDD methods where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality. As such, the project is unlikely to substantially modify, destroy or isolate an area of important habitat for these migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	No invasive species that are harmful to these migratory species are expected to become established within the survey area as a result of the project.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Whilst the project will result in the removal of habitat with the potential to be used for the purpose of breeding (in the case of satin flycatcher), feeding. migration or resting behaviour both species are known to occur over a broad geographic area and the amount of habitat removed represents a small proportion of available habitat within the locality. As such, the project is considered unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of the population of these migratory species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact the migratory woodland bird species of satin flycatcher and rufous fantail.

Eastern Curlew

Species: *Numenius madagascariensis*

Listing: Critically Endangered, Marine, Migratory

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of a population	The project is unlikely to lead to a long-term decrease in the size of a population of the Critically Endangered Eastern Curlew. HDD methods are proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species. Furthermore, neither of these species breed in Australia, and therefore no breeding populations will be impacted.
Reduce the area of occupancy of the species	The project will not reduce the area of occupancy for the Eastern Curlew. There will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species.
Fragment an existing population into two or more populations	The project will not fragment an existing population of Eastern Curlew into two or more populations. There will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species.
Adversely affect habitat critical to the survival of a species	Critical habitat to the survival of the far eastern curlew includes a mosaic of feeding and roosting habitat such as:

Significant impact criteria	Assessment of impacts
	• Sheltered intertidal sandflats or mudflats that are open and without vegetation or covered with seagrass. • Mudflats surrounding areas of mangrove, salt flats, saltmarshes, rockpools, beaches along the tideline. • Upper tidal flats. • Areas with soft substrates containing little or no hard material such as rocks, shells, grit, coral or debris. The project is unlikely to adversely affect habitat critical to the survival of the Eastern Curlew. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for either species). There will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species.
Disrupt the breeding cycle of a population	Both the Eastern Curlew are non-breeding visitors to Australia. As such, the project will not disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the Eastern Curlew are likely to decline. These species do not breed within Australia. Furthermore, there will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The project is unlikely to result in invasive species that are harmful to the Eastern Curlew becoming established in their habitat.
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce disease that may cause the Eastern Curlew to decline.
Interfere with the recovery of the species.	The project is not expected to interfere with the recovery of these species. The Eastern Curlew does not breed within Australia, and therefore the survey area does not represent breeding habitat for this species. Furthermore, there will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Critically Endangered Eastern Curlew.

Gippsland Red Gum (*Eucalyptus tereticornis* subsp. *mediana*) Grassy Woodland and Associated Native Grassland

Listing: Critically endangered

Significant impact criteria	Assessment of impacts
Reduce the extent of an ecological community	The AoD intersects 0.11 ha of this TEC. Direct and indirect impacts will be avoided through the use of HDD within the reserve where this TEC occurs. Therefore, the project will not reduce the extent of this ecological community.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	The project is unlikely to fragment or increase fragmentation of this ecological community. Direct and indirect impacts will be avoided through the use of HDD within the reserve where this TEC occurs. Furthermore, the TEC already exists in a fragmented state along a road reserve.
Adversely affect habitat critical to the survival of an ecological community	The project is unlikely to adversely affect habitat critical to the survival of this TEC. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for this TEC). Direct and indirect impacts to this TEC will be avoided through the use of HDD within the road reserve where this TEC occurs.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	The project is unlikely to modify or destroy abiotic factors necessary for this TECs survival. HDD methods will be utilised to avoid any direct and indirect impacts to this TEC as a result of the project.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	The project is unlikely to cause a substantial change in the species composition of an occurrence of this TEC. Direct and indirect impacts to this TEC will be avoided through the use of HDD within the road reserve where 0.11 ha of this TEC intersects the AoD.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: Assisting invasive species, that are harmful to the listed ecological community, to become established, or Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or	The project is unlikely to cause a substantial reduction in the quality or integrity of an occurrence of this TEC. Direct and indirect impacts to this TEC will be avoided through the use of HDD within the road reserve where 0.11 ha of this TEC intersects the AoD.
Interfere with the recovery of an ecological community.	Threats to this TEC include vegetation clearance, fragmentation of remnants, inappropriate management regimes, weed invasion, pest animals, infrastructure and maintenance works (DEWHA 2008). Direct and indirect impacts to this TEC will be avoided through the use of HDD within the road resave where this TEC intersects with the AoD. Construction mitigation measures will also be implemented, including wash down of machinery, to

Significant impact criteria	Assessment of impacts
	prevent the spread of weeds throughout the survey area. Overall, the project is considered unlikely to interfere with the recovery of this TEC.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Critically Endangered ecological community Gippsland Red Gum (*Eucalyptus tereticornis* subsp. *mediana*) Grassy Woodland and Associated Native Grassland. Avoidance to the community is a commitment of the project and will be achieved through the implementation of EPR ECO1.

Eastern Spider Orchid

Species: *Caladenia orientalis*

Listing: Endangered

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of a population	The project is unlikely to lead to a long-term decrease in the size of a population of *Caladenia orientalis*. There are no known populations within the survey area, however available habitat has the potential to be located within woodland around Waratah Bay which have not yet been accessed. The majority of direct and indirect impacts to potential populations are likely to be avoided through HDD/micro-siting and construction controls, and any direct removal of habitat is limited to degraded edges or fragmented patches along boundaries.
Reduce the area of occupancy of the species	Whilst it is possible that the area of occupancy of this species may be reduced through clearance of habitat that potentially supports this species, this habitat is considered highly likely to be already degraded or fragmented. The AoD is located degraded edges or fragmented patches along boundaries, with higher quality habitat likely to be present outside the AoD.
Fragment an existing population into two or more populations	The project is unlikely to fragment an existing population into two or more populations. Any direct removal of potential habitat will be limited to degraded edges or fragmented patches along boundaries.
Adversely affect habitat critical to the survival of a species	The project is unlikely to adversely affect habitat critical to the survival of *Caladenia orientalis.* No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for *Caladenia orientalis*). Habitat for this species includes coastal heathland and heath-woodland, generally on deep sands (TSSC 2016). The majority of direct and indirect impacts to habitat for potential populations of these species are likely to be avoided through HDD/micro-siting and construction controls, and any direct removal of habitat is limited to degraded edges or fragmented patches along boundaries.
Disrupt the breeding cycle of a population	The project is unlikely to disrupt the breeding cycle of a population of *Caladenia orientalis.* The majority of direct and indirect impacts to potential populations are likely to be avoided through HDD/micro-siting and construction controls, and any direct removal of habitat is limited to degraded edges or fragmented patches along boundaries. Whilst individuals may be impacted, works are unlikely to disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat	The project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that this species is likely to decline. The potential habitat located within the AoD is limited to degraded edges or fragmented patches along

Significant impact criteria	Assessment of impacts
to the extent that the species is likely to decline	boundaries. Construction controls will be implanted to avoid indirect impacts to potential habitat outside the AoD.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Construction measures, including wash down of machinery, will be implemented such that it is unlikely that invasive species would be introduced.
Introduce disease that may cause the species to decline, or	Construction measures, including wash down of machinery, will be implemented such that it is unlikely that diseases would be introduced.
Interfere with the recovery of the species.	Key threats to this species relevant to the project include habitat loss, disturbance and modification and weed invasion (TSSC 2016). The majority of direct and indirect impacts to potential populations are likely to be avoided through HDD/micro-siting. Construction measures, including wash down of machinery, will be implemented to reduce the introduction of exotic grasses and weeds. As such, the project is considered unlikely to interfere with the recovery of these species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Endangered *Caladenia orientalis*.

Australasian Bittern

Species: *Botaurus poiciloptilus*

Listing: Endangered

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of a population	The project is unlikely to lead to a long-term decrease in the size of an Australasian Bittern population. There will be no direct disturbance to habitat for this species. Indirect impacts include the potential release of pollution and/or sediment into waterways and potential light pollution. Trenchless technologies such as HDD will be utilised, including ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water. Potential light pollution will be short term, and will only occur during the construction phase, and therefore will unlikely lead to a long-term decrease in the size of the population.
Reduce the area of occupancy of the species	The project will not reduce the area of occupancy for the Australasian Bittern. There will be no direct disturbance to habitat for this species, with trenchless technologies such as HDD utilised for areas of aquatic habitat.
Fragment an existing population into two or more populations	The project will not fragment an existing population into two or more populations. There will be no direct disturbance to habitat for this species, with trenchless technologies such as HDD utilised for areas of aquatic habitat.
Adversely affect habitat critical to the survival of a species	The project is unlikely to adversely affect habitat critical to the survival of the Australasian Bittern. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for the Australasian Bittern). Habitat critical to the survival of this species is considered to be all natural habitat (including constructed wetlands with suitable habitat) in which the Australasian Bittern is known or likely to occur (TSSC 2019). Based on this, whilst wetland habitats are considered critical habitat for this species, there will be no direct disturbance to habitat for this species, and indirect impacts including potential release of pollution and/or sediment into waterways or potential light pollution will be managed using mitigation measures described in Section 8.3.2 to ensure that habitat is not adversely impacted.
Disrupt the breeding cycle of a population	There will be no direct impacts to breeding habitat for this species as a result of the project. Indirect impacts, including light pollution, have the potential to disrupt the breeding cycle of a population. Where feasible, works within the section of the alignment which contains critical habitat for this species will be undertaken outside of the breeding period (October to February) to reduce this indirect impact.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The habitat within the survey area would not be modified or destroyed to the point that the species is likely to decline, given that there will be no direct disturbance to habitat, and indirect impacts will be managed using the mitigation measures described in Section 8.3.2.

Significant impact criteria	Assessment of impacts
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The type and scale of potential impacts associated with the project construction and operation phase are not anticipated to favour the establishment of invasive species. Hygiene controls to reduce the risk of the spread or introduction of aquatic weeds would be included in the project CEMP.
Introduce disease that may cause the species to decline, or	The project would not result in the introduction of a disease that is harmful to the Australasian Bittern.
Interfere with the recovery of the species.	The National Recovery Plan for the Australasian Bittern identifies principal threats as including the loss and degradation of wetland habitats through altered water regimes, clearing for urban and agricultural development and climate change (DCCEEW 2022). Given there will be no direct impacts to aquatic habitat for this species, and indirect impacts such as sedimentation can be readily managed, the project is not considered to substantially interfere with the recovery of the species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the endangered Australasian Bittern.

Gang-gang Cockatoo

Species: *Callocephalon fimbriatum*

Listing: Endangered

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of a population	The project is unlikely to lead to a long-term decrease in the size of a population of Gang-gang Cockatoo. The survey area contains potential foraging and breeding habitat for this species. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes reviewing proposed alignment through the Strzelecki Ranges to ensure the AoD sits outside of remnant vegetation, and utilise HDD methods where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality. As such, there is unlikely to be a long-term decrease in the size of a population of this highly mobile species.
Reduce the area of occupancy of the species	Whilst the project will result in the removal of foraging habitat for this species, the amount of habitat removed represents a small proportion of available habitat within the locality. Furthermore, the linear nature of the project means that the overall area of occupancy of this species will not be reduced.
Fragment an existing population into two or more populations	The project will not fragment the existing Gang-gang Cockatoo population into two or more populations. Suitable habitat will remain undisturbed outside of the AoD. This species is highly mobile, and therefore populations will not become fragmented as a result of vegetation removal for this linear project.
Adversely affect habitat critical to the survival of a species	The project is unlikely to adversely affect habitat critical to the survival of the Gang-gang Cockatoo. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for the Gang-gang Cockatoo). Habitat considered critical to the survival of the Gang-gang Cockatoo includes all foraging habitat during both the breeding and non-breeding season (DAWE 2022). Foraging habitat will be directly impacted within the survey area. Measures to reduce the removal and disturbance of native vegetation, which provides

Significant impact criteria	Assessment of impacts
	habitat for this species, includes reviewing proposed alignment through the Strzelecki Ranges to ensure the AoD sits outside of remnant vegetation, and utilise HDD methods where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality.
Disrupt the breeding cycle of a population	Breeding habitat for this species includes hollow-bearing trees with hollows around 20 cm diameter. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes reviewing proposed alignment through the Strzelecki Ranges to ensure the AoD sits outside of remnant vegetation, and utilise HDD methods where feasible to further reduce impacts to native vegetation. Further measures including undertaking works within critical habitat containing potential hollows for this species outside of the breeding period (October to January) where feasible to reduce potential light disturbance. These measures will reduce the potential of disruption to the breeding cycle of a population of Gang-gang Cockatoo.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the Gang-gang Cockatoo is likely to decline. The survey area contains potential foraging and breeding habitat for this species. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes reviewing proposed alignment through the Strzelecki Ranges to ensure the AoD sits outside of remnant vegetation, and utilise HDD methods where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The project is unlikely to result in invasive species that are harmful to the Gang-gang Cockatoo becoming established in its habitat. Known species that are potentially harmful or detrimental to Gang-gang Cockatoo (e.g. aggressive bird species such as the Noisy Miner which are nest-hollow competitors) are present along the alignment already.
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce disease that may cause the Gang-gang Cockatoo to decline.
Interfere with the recovery of the species.	Threats to the species recovery include habitat loss, wildfire, climate change and competition for suitable nesting hollows. The survey area contains potential foraging and breeding habitat for this species. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes reviewing proposed alignment through the Strzelecki Ranges to ensure the AoD sits outside of remnant vegetation, and utilise HDD methods where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality. Due to this, it is unlikely that the project will interfere with the recovery of the species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Endangered Gang-gang Cockatoo.

Swamp Skink

Species: *Lissolepis coventryi*

Listing: Endangered

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of a population	The project is unlikely to lead to a long-term decrease in the size of a population of Swamp Skink. Potential habitat occurs for this species within scrub and woodland habitats around Waratah Bay. The majority of the proposed AoD is located on the edge of potential habitat for this species, and it is expected that potential populations would utilise the extensive areas of available habitat adjacent to the project. The removal of potential suitable habitat from within a large contiguous patch is unlikely to lead to a direct decline in the size of a population.
Reduce the area of occupancy of the species	Whilst the project will result in the removal of potential habitat for this species, the amount of habitat removed represents a small proportion of available habitat within the locality. Where there is potential habitat for this species, measures for the avoidance and minimisation of impacts to vegetation, including utilising HDD methods where feasible to further reduce impacts to native vegetation, are proposed. Whilst permanent removal of potentially suitable habitat would reduce the area of available habitat within the survey area, habitat surrounding may still be utilised by Swamp Skink, should they be present. As such, the overall area of occupancy would remain unchanged post construction.
Fragment an existing population into two or more populations	There are no known existing populations of Swamp Skink within the survey area, however potential habitat represents areas where targeted surveys for this species have not been undertaken. The majority of the proposed AoD is located on the edge of potential habitat for this species, and it is expected that potential populations would utilise the extensive areas of available habitat adjacent to the survey area. Further measures for the avoidance and minimisation of impacts to vegetation, including utilising HDD methods where feasible, are proposed. As such, it is unlikely that the project will fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of a species	No Critical habitat is defined for this species, however all typical habitat for this species across its distribution is likely to be critical to the Swamp Skinks survival. Typical habitat includes: • Densely vegetated wetlands (both freshwater and saltwater), including swamps and adjacent wet heaths often dominated by Melaleuca or Leptospermum thickets. • Low-lying marshes, lagoon margins and sedgelands or saltmarshes. • Habitats with shelter sites including burrows (e.g., those made by freshwater crustations), fallen timber, rocks, driftwood and other ground debris. • Areas with dense ground cover and little to know overstory. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for the Swamp Skink). The survey area potentially contains this habitat in areas near Waratah Bay which have not been surveyed. The AoD represents a small proportion of potential habitat within the wider survey area, and is mainly on the edge of a wider area of potential habitat for this species. Further measures for the avoidance and minimisation of impacts to vegetation, including utilising HDD methods where feasible, are proposed. " Therefore, the project is unlikely to adversely affect habitat critical to the survival of the Swamp Skink.
Disrupt the breeding cycle of a population	The project will remove some potentially suitable habitat for this species which could be utilised as breeding habitat. This potential habitat is within a larger patch of vegetation, and it is likely that if the species utilises the survey area for foraging, breeding and

Significant impact criteria	Assessment of impacts
	sheltering, then the local population would use the entire patch of habitat. As such, it is unlikely that the breeding cycle of a population will be disrupted as a result of the project.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The habitat within the survey area would not be modified or destroyed to the extent that the species is likely to decline, given the extent and quality of adjacent habitats.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Invasive fauna species are already present within the survey area (e.g. foxes, rats). It is unlikely that the project would result in further introduction of invasive species.
Introduce disease that may cause the species to decline, or	The project would not result in the introduction of a disease that is harmful to the Swamp Skink.
Interfere with the recovery of the species.	The removal of potential suitable habitat is counter to the recovery of this species, however, the extent and nature of vegetation removal in the context of available suitable habitat within the broader locality would not interfere with the recovery of this species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Endangered Swamp Skink

Hooded Plover

Species: *Thinornis cucullatus cucullatus*

Listing: Vulnerable, Marine

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	The project is unlikely to lead to a long-term decrease in the size of an important population of the vulnerable Hooded Plover. Whilst there are no important populations identified within the survey area, Waratah Bay has the potential to host an undescribed important population of Hooded Plover. There are numerous records located along the inlet for this species, and the area could act as important habitat for breeding. The population could potentially act as a source population for breeding or dispersal. There will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species. There is the potential for indirect impacts including noise and light to breeding populations of Hooded Plover. These impacts will only be for the duration of the construction phase, which will be approximately 12 months.
Reduce the area of occupancy of an important population	The project is unlikely to reduce the area of occupancy of an important population of Hooded Plover. There will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species. Therefore, the area of occupancy will not be reduced.
Fragment an existing important population into two or more populations	The project is unlikely to fragment an existing important population into two or more populations. There will be no direct disturbance to habitat for this species, with HDD

Significant impact criteria	Assessment of impacts
	methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species. Therefore, there will be no fragmentation of habitat.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of these species includes open beaches, sand dunes adjacent to beaches, tidal bays and estuaries, and any other habitat these species are known to occur. There will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species. Therefore, the project is unlikely to adversely affect habitat critical to the survival of these species.
Disrupt the breeding cycle of an important population	There will be no direct impacts to breeding habitat for these species as a result of the project. Indirect impacts, including noise and light impacts, have the potential to disrupt the breeding cycle of the population of Hooded Plovers near the study area. This Hooded Plover population around Waratah Bay has the potential to be an undescribed important population. There are numerous records located along the inlet for this species, and the area could act as important habitat for breeding. The population could potentially act as a source population for breeding or dispersal. These impacts will only be for the duration of the construction phase, which will be approximately 12 months. Therefore, there is the potential that the breeding cycle will be disrupted for one breeding season.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that these species are likely to decline. There will be no direct disturbance to habitat for this species, with HDD methods proposed to avoid the beach and dune system in Waratah Bay, which is the primary habitat for these species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The project is unlikely to result in invasive species that are harmful to this species becoming established in their habitat.
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce disease that may cause this species to decline.
Interfere substantially with the recovery of the species.	Key threats to these species include disturbance by humans and domestic dogs, walkers and horse riders, nest and egg destruction by off-road vehicles, feral predators; and destruction of nest sites through flood or storm damage. There will be no direct impacts to breeding habitat as a result of the project. Indirect impacts, including noise and light impacts, have the potential to disrupt the breeding cycle of the population of Hooded Plovers along Waratah Bay. In particular, noise associated with the drilling for the Victorian shore crossing at Waratah Bay, which will involve HDD works, will occur 24 hours per day, 7 days per week, for a period of approximately 12 months to ensure the stability of the bore hole. Overall, due to the short-term nature of these indirect impacts, the project is considered unlikely to interfere substantially with the recovery of this species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Hooded Plover.

Growling Grass Frog

Species: *Litoria raniformis*

Listing: Vulnerable

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	Any viable population of Growling Grass Frog is considered to be an important population. A viable population for this species is defined as "*one which is not isolated from other populations or waterbodies, such that it has the opportunity to interact with other nearby populations or has the ability to establish new populations…*". The project is unlikely to lead to a long-term decrease in the size of a Growling Grass Frog population. There will be no direct disturbance to habitat for this species. Indirect impacts include the potential release of pollution and/or sediment into waterways and potential light pollution. Trenchless technologies such as HDD will be utilised, including ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water. Temporary protective fencing has also been recommended to prevent unnecessary access to areas of critical habitat for this species. Potential light pollution will be short term, and will only occur during the construction phase, and therefore will unlikely lead to a long-term decrease in the size of the population.
Reduce the area of occupancy of an important population	The project is unlikely to reduce the area of occupancy of an important population of Growling Grass Frog. There will be no direct loss of aquatic habitat, and mitigation measures, including ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water, will be implemented to reduce indirect impacts.
Fragment an existing important population into two or more populations	The project is unlikely to fragment an existing important population of Growling Grass Frog into two or more populations. Trenchless technologies such as HDD will be utilised, to ensure no direct loss of aquatic habitat.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival to this species differs throughout its range. In Victoria, habitat includes: • Vegetation within or at the edges of permanent water (e.g., slow-flowing streams, swamps, lagoons, and lakes). • Artificial waterbodies in disturbed areas (e.g., farm dams, irrigation channels, irrigated rice crops and disused quarries), especially where natural habitat is no longer available. • Sites with a large proportion of emergent, submerged and floating vegetation, and slow-flowing or still water. • Sites with tick vegetation, logs, rocks and other ground debris where frogs can overwinter. The project is unlikely to adversely affect habitat critical to the survival of Growling Grass Frog. There will be no direct impact to habitat for Growling Grass Frog. Mitigation measures as described above will be implemented to reduce indirect impacts.
Disrupt the breeding cycle of an important population	The project is unlikely to disrupt the breeding cycle of an important population of Growling Grass Frog. There will be no direct loss of breeding habitat. Mitigation measures to minimise the release of sediments or pollutants into the water will be utilised to reduce indirect impacts to breeding habitat.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that these species are likely to decline. There will be no direct disturbance to habitat for this species, with HDD methods proposed to aquatic habitat.

Significant impact criteria	Assessment of impacts
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive fauna species are already present within the survey area (e.g. foxes, cats). It is unlikely that the project would result in further introduction of invasive species.
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce a disease that may cause the species to decline. In particular, Chytrid fungus is known to infect the Growling Grass Frog, and as such, washdown measures of machinery will be implemented to ensure that this disease is not introduced to site.
Interfere substantially with the recovery of the species.	Key threats to the Growling Grass Frog include loss and degradation of habitat, barriers to movement, disease, predation and introduction of biocides (Clemann and Gillespie 2012). There will be no direct loss of habitat for this species as a result of the project. Mitigation measures will be implemented to reduce indirect impacts such as introduction of diseases and biocides. As such, the project is considered unlikely to interfere substantially with the recovery of the Growling Grass Frog.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Vulnerable Growling Grass Frog.

Blue-winged Parrot

Species: *Neophema chrysostoma*

Listing: Vulnerable, Marine

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	There are no described important populations of the species. The threatened species scientific committee recommends a national recovery plan be developed. It is anticipated that important populations will be defined at this time. The project is unlikely to lead to a long-term decrease in the size of an important population of the Blue-winged Parrot. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes HDD methods or realignment of the AoD where feasible to further reduce impacts to native vegetation. The survey area represents a small proportion of potential habitat for this species within the wider locality.
Reduce the area of occupancy of an important population	Whilst the project will result in the removal of foraging habitat for this species, the amount of habitat removed represents a small proportion of available habitat within the locality. Furthermore, the linear nature of the project means that the overall area of occupancy of this species will not be reduced.
Fragment an existing important population into two or more populations	The project will not fragment the existing Blue-winged Parrot population into two or more populations. Suitable habitat will remain undisturbed outside of the AoD. This species is highly mobile, and therefore populations will not become fragmented as a result of vegetation removal for this linear project.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of this species includes areas of: • Foraging and staging habitats found from coastal, sub-coastal and inland areas, right through to semi-arid zones including: grasslands, grassy woodlands and semi-arid chenopod shrubland with native and introduced grasses, herbs and shrubs. • Wetlands both near the coast and in semi-arid zones used for foraging and staging.

Significant impact criteria	Assessment of impacts
	• Eucalypt forests and woodlands within the breeding range in Tasmania, coastal south-eastern South Australia and southern Victoria. • Live and dead trees and stumps with suitable hollows within the breeding range. The project is unlikely to adversely affect habitat critical to the survival of the Blue-winged Parrot. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for the Blue-winged Parrot).
Disrupt the breeding cycle of an important population	The Blue-winged Parrot breeds in southern Victoria in spring and summer. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes utilising HDD methods or realignment of the AoD where feasible to further reduce impacts to native vegetation. Further measures including undertaking works within critical habitat containing potential hollows for this species outside of the breeding period (spring and summer) where feasible to reduce potential light or noise disturbance. These measures will reduce the potential of disruption to the breeding cycle of a population of Blue-winged Parrot.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the Blue-winged Parrot is likely to decline. The survey area contains potential foraging and breeding habitat for this species. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes utilising HDD methods or realignment of the AoD where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The project is unlikely to result in invasive species that are harmful to this species becoming established within potential habitat. In particular, wash down procedures of machinery will be implemented to prevent the spread of weeds into areas of habitat.
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce disease that may cause these species to decline.
Interfere substantially with the recovery of the species.	Key threats to the Blue-winged Parrot include habitat loss and deterioration of habitat quality. The survey area contains potential foraging and breeding habitat for this species. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes utilising HDD methods or realignment of the AoD where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality. Due to this, it is unlikely that the project will interfere with the recovery of the species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on Blue-winged Parrot.

Dwarf Galaxias

Species: *Galaxiella pusilla*

Listing: Vulnerable

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	There are 12 identified populations that are considered to be 'important populations' to maintain the genetic diversity of these species, listed in the species Conservation Advice. In addition, any population found in a permanent water body is considered important for

Significant impact criteria	Assessment of impacts
	breeding and dispersal, as they act as a key source population for the reestablishment of populations in ephemeral or semi-permanent habitat. There are no known important populations/subpopulations of Dwarf Galaxias within the survey area. The project is unlikely to lead to a long-term decrease in the size of a population of this species. There will be no direct disturbance to habitat for this species. Indirect impacts include the potential release of pollution and/or sediment into waterways and potential light pollution. Trenchless technologies such as HDD will be utilised, including ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water.
Reduce the area of occupancy of an important population	The project is unlikely to reduce the area of occupancy of an important population of Dwarf Galaxias. There will be no direct disturbance to habitat for this species. Indirect impacts include the potential release of pollution and/or sediment into waterways and potential light pollution. Trenchless technologies such as HDD will be utilised, including ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water.
Fragment an existing important population into two or more populations	The project is unlikely to fragment an existing important population of Dwarf Galaxias into two or more populations. There will be no direct disturbance to habitat for this species, and therefore no fragmentation of habitat will occur.
Adversely affect habitat critical to the survival of a species	Dwarf Galaxias occur in slow flowing and still, shallow, permanent, and temporary, freshwater habitats, which also includes wetlands and ephemeral wetlands. Habitat critical to the survival of this species includes: • All known freshwater habitats where the species is currently found or has previously been found, including translocated subpopulations. • Hydrologically connected waterways that have the required substrate, riparian vegetation, and water quality characteristics within 25 km of known sites, which are suitable for natural migration during flooding events or future translocations. • Native riparian vegetation surrounding known and potential habitat, particularly native vegetation that provides shading and litter input to wetlands and streams. The project is unlikely to adversely affect habitat critical to the survival of this species. There will be no direct impact to habitat. Mitigation measures, including utilising trenchless technologies such as HDD and ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water will be implemented to reduce indirect impacts.
Disrupt the breeding cycle of an important population	The project is unlikely to disrupt the breeding cycle of an important population of Dwarf Galaxias. There will be no direct loss of breeding habitat. Mitigation measures to minimise the release of sediments or pollutants into the water will be utilised to reduce indirect impacts to aquatic habitats.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. There will be no direct impact to habitat. Mitigation measures, including utilising trenchless technologies such as HDD and ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water will be implemented to reduce indirect impacts.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The project is unlikely to result in invasive species that are harmful to this species becoming established within potential habitat. In particular, wash down procedures of machinery will be implemented to prevent the spread of weeds into areas of habitat.

Significant impact criteria	Assessment of impacts
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce disease that may cause these species to decline.
Interfere substantially with the recovery of the species.	Key threats to the Dwarf Galaxias include wetland drainage, climate change, habitat damage through grazing and lack of regeneration, feral fish competitors and predators. There will be no direct impacts to habitat for this species, and mitigation measures will be implemented to reduce the indirect impacts such as the release of sediments or pollutants into the water. As such, the project is unlikely to interfere substantially with the recovery of Dwarf Galaxias.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Vulnerable Dwarf Galaxias.

Australian Grayling

Species: Prototroctes maraena

Listing: Vulnerable

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	The National Recovery Plan for Australian grayling identifies important rivers for the species. Rivers listed in the plan support important populations of the species. Within Victoria 34 rivers or rivers systems are identified (Backhouse G, O'Connor, J and Jackson, J. 2008). Of those 34 rivers, 1 the Tarwin River is intersected by the survey area (KP 41.4). No direct impacts to the Tarwin River are proposed and therefore the project is considered unlikely to lead to a to a long-term decrease in the size if an important population of the species. Potential sources of Indirect impacts include the potential release of pollution and/or sediment into waterways and potential light pollution. Trenchless technologies such as HDD will be utilised, including ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water.
Reduce the area of occupancy of an important population	The project is unlikely to reduce the area of occupancy of an important population of Australian grayling. There will be no direct disturbance to habitat for this species. Indirect impacts include the potential release of pollution and/or sediment into waterways and potential light pollution. Trenchless technologies such as HDD will be utilised, including ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water.
Fragment an existing important population into two or more populations	The project is unlikely to fragment an existing important population of Australian Grayling into two or more populations. There will be no direct disturbance to habitat for this species, and therefore no fragmentation of habitat will occur. The project will not pose an impediment to upstream and downstream fish movements.
Adversely affect habitat critical to the survival of a species	Australian grayling is a diadromous species moving between freshwater and estuarine/marine environments as part of its lifecycle and has been recorded as far as 100 km inland (Backhouse G, O'Connor, J and Jackson, J. 2008). The species also is not known to show specific fidelity to a specific river or stream instead using waterways on an opportunistic and intermittent basis with adult fish typically only spawning once in their lifetime (Backhouse G, O'Connor, J and Jackson, J. 2008). Due to its large range lifecycle critical habitat is therefore difficult to define and is broadly defined as all habitat where the species has potential to occur. However, it is acknowledged that habitats which support spawning, refuge and juvenile phases of the life cycle are limited in distribution and therefore likely to be of particular importance.

Significant impact criteria	Assessment of impacts
	The Tarwin River where it intersects the study area is likely to be used by the species when migrating upstream and downstream and meets the definition of critical habitat. However, as no direct impacts to the waterway are proposed and indirect impacts are to be managed the project is not considered likely to adversely affect habitat critical to the survival of a species.
Disrupt the breeding cycle of an important population	The project is unlikely to disrupt the breeding cycle of an important population of Australian grayling. There will be no direct loss of species habitat, nor will the project pose and impediment to fish movement. Mitigation measures to minimise the release of sediments or pollutants into the water will be utilised to reduce indirect impacts to aquatic habitats.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. There will be no direct impact to habitat. Mitigation measures, including utilising trenchless technologies such as HDD and ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water will be implemented to reduce indirect impacts.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The project is unlikely to result in invasive species that are harmful to this species becoming established within potential habitat. In particular, wash down procedures of machinery will be implemented to prevent the spread of weeds into areas of habitat.
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce disease that may cause these species to decline.
Interfere substantially with the recovery of the species.	Key threats to Australian grayling as identified by the species recovery plan include Barriers to fish movement, river regulation, siltation, impact of introduced fish, climate change, disease and fishing inclusive of angling and white bating (Backhouse G, O'Connor, J and Jackson, J. 2008). With the exception of siltation, the project is not considered to have the potential to exacerbate any of these key threats. Impacts as they relate to siltation will be mitigated by various measures, including utilising trenchless technologies such as HDD and ensuring appropriate setbacks from aquatic habitat to minimise the release of sediments or pollutants into the water. As such, the project is unlikely to interfere substantially with the recovery of Australian Grayling.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Vulnerable Australian grayling

Swamp Antechinus

Species: *Antechinus minimus maritimus*

Listing: Vulnerable

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	There are no documented important populations for this species within the conservation advice. Potential habitat occurs for this species within scrub and woodland habitats around Waratah Bay. The majority of the proposed AoD is located on the edge of potential habitat for this species, and impacts are likely to be minimal due to HDD. It is also expected that any potential important populations if present, would utilise the extensive areas of available habitat adjacent to the project rather than edges. The removal of potential suitable habitat from within a large contiguous patch is unlikely to lead to a direct decline in the size of a population.

Significant impact criteria	Assessment of impacts
Reduce the area of occupancy of an important population	The permanent removal of potentially suitable habitat would reduce the overall area of available habitat within the survey area for an important population, however this habitat is on the edge of a larger contiguous patch, which may still be utilised by Swamp Antechinus should they be present. As such, the overall area of occupancy would remain unchanged post construction.
Fragment an existing important population into two or more populations	The habitat in the survey area would not be fragmented by the proposed works, as any resultant disturbance would be on the edge of potential habitat, leaving the larger contiguous patch intact. Therefore, an existing important population would not be fragmented.
Adversely affect habitat critical to the survival of a species	No critical habitat has been declared for this species. Swamp Antechinus are habitat specialists. Habitat for this species includes: • Dense wet heathlands, tussock grasslands, sedgelands, damp gullies, swamps and some shrubby woodlands, in environments with little exposure to the sun. • Areas with mature dense vegetation with thick ground cover, and with topsoil and thick leaf litter they can burrow under. The project is unlikely to adversely affect habitat critical to the survival of the Swamp Antechinus. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for the Swamp Antechinus)). The survey area has the potential to contain suitable habitat for this species in areas near Waratah Bay which have not been surveyed. The AoD represents a small proportion of potential habitat within the wider survey area, and is mainly on the edge of a wider area of potential habitat for this species. Further measures for the avoidance and minimisation of impacts to vegetation, including utilising HDD methods where feasible, are proposed. "
Disrupt the breeding cycle of an important population	The project is unlikely to disrupt the breeding cycle of an important population of Swamp Antechinus. Breeding occurs for this species in June-August. Whilst the project would directly remove some potentially suitable habitat, this habitat is within a larger patch of contiguous vegetation. It is likely that if the species uses the survey area for breeding then the local population would use the entire patch of habitat.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The habitat within the survey area would not be modified or destroyed to the extent that the species is likely to decline, given the extent and quality of adjacent habitats.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive fauna species are already present within the survey area (e.g. foxes, rats). It is unlikely that the project would result in further introduction of invasive species.
Introduce disease that may cause the species to decline, or	The project would not result in the introduction of a disease that is harmful to the Swamp Antechinus.
Interfere substantially with the recovery of the species.	Key threats to the Swamp Antechinus relevant to the project include habitat loss and fragmentation, and small remnant habitat size. The project will result in the removal of a small amount of potential habitat, located on the edge of a larger contiguous patch of vegetation. Due to the small scale of the clearing, and the amount of potential habitat which will remain untouched, the project is not considered to interfere substantially with the recovery of the Swamp Antechinus.

Significant impact criteria	Assessment of impacts
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Vulnerable Swamp Antechinus.

Grey-headed Flying-fox

Species: *Pteropus poliocephalus*

Listing: Vulnerable

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	The project is unlikely to lead to a long-term decrease in the size of an important population of the Greg-headed Flying-fox. All Grey-headed Flying-fox individuals are considered part of single, mobile population (DAWE 2021). There are no known breeding camps located within the survey area, with the survey area providing foraging habitat only. Due to the large range and high mobility of the species, the relatively small scale of clearing of foraging habitat will not lead to a long-term decrease in the size of the Grey-headed Flying-fox population. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes utilising HDD methods or realignment of the AoD where feasible to further reduce impacts to native vegetation.
Reduce the area of occupancy of an important population	Whilst the project will result in the removal of foraging habitat for this species, the amount of habitat removed represents a small proportion of available habitat within the locality. Furthermore, the linear nature of the project means that the overall area of occupancy of this species will not be reduced.
Fragment an existing important population into two or more populations	The project will not fragment the existing Grey-headed Flying-fox population into two or more populations. Suitable habitat will remain undisturbed outside of the AoD. This species is highly mobile, and therefore populations will not become fragmented as a result of vegetation removal for this linear project.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of the Grey-headed Flying-fox includes important winter and spring flowering vegetation communities that include Eucalypt, Banksia, Grevillia, Melaleuca and Syncarpia species (individual species listed in the National Recovery Plan). Critical habitat may also be vegetation communities which: • Contain native species that are known to be productive as foraging habitat during the final weeks of gestation. • Contain native species used for foraging and occur within 20 km of a nationally important camp. • Contain native or exotic species used for roosting at the site of a nationally important camp. Backyard fruit trees, orchards or non-native foraging trees are not included as critical habitat. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for the Grey-headed Flying-fox). Foraging habitat will be directly impacted within the survey area. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes utilising HDD methods or realignment of the AoD where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality. Therefore, the project is unlikely to adversely affect habitat critical to the survival of the Grey-headed Flying-fox.

Significant impact criteria	Assessment of impacts
Disrupt the breeding cycle of an important population	The project is unlikely to disrupt the breeding cycle of an important population of Grey-headed Flying-fox. There are no known breeding camps located within the survey area, with the project impacting foraging habitat only.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the Grey-headed Flying-fox is likely to decline. The survey area contains potential foraging habitat for this species. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes utilising HDD methods or realignment of the AoD where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The project is unlikely to result in invasive species that are harmful to this species becoming established within potential habitat.
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce disease that may cause these species to decline.
Interfere substantially with the recovery of the species.	The primary known threat to the survival of the Grey-headed Flying-fox is loss and degradation of foraging and roosting habitat (DAWE 2021). The survey area contains potential foraging habitat for this species. Measures to reduce the removal and disturbance of native vegetation, which provides habitat for this species, includes utilising HDD methods or realignment of the AoD where feasible to further reduce impacts to native vegetation. Overall, the amount of habitat to be removed represents a small proportion of available habitat within the locality. Due to this, it is unlikely that the project will interfere with the recovery of the species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Vulnerable Grey-headed Flying-fox.

River Swamp Wallaby-grass

Species: *Amphibromus fluitans*

Listing: Vulnerable

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	Important populations of *Amphibromus fluitans* have not been identified, however a large population was recorded within the survey area in a small wetland adjacent to the Morwell River. Mitigation measures to avoid and minimise impacts to this species include micro-siting with the aim of locating the AoD as far from the known wetland habitat as possible, as well as construction controls to reduce impacts to the habitat. This species also has the potential to occur within areas which have not yet been surveyed due to access constraints. Should a population be identified within this area, mitigation measures including micro-siting will be utilised to avoid any populations where feasible. With the above measures, it is unlikely that the project will lead to a long-term decrease in the size of an important population of this species.
Reduce the area of occupancy of an important population	The project is unlikely to reduce the area of occupancy of an important population. There will be no removal of habitat for known populations of this species. This species also has the potential to occur within areas which have not yet been surveyed due to access constraints. Should a population be identified within this area, mitigation measures including micro-siting will be utilised where feasible to avoid any populations.

Significant impact criteria	Assessment of impacts
Fragment an existing important population into two or more populations	The project is unlikely to fragment an existing important population into two or more populations. The known population adjacent to the Morwell River will not be fragmented as a result of the project. Should further populations be identified in areas which have not yet been surveyed, mitigation measures including micro-siting will be utilised where feasible to avoid any populations.
Adversely affect habitat critical to the survival of a species	No critical habitat has been declared for this species. *Amphibromus fluitans* occurs in both natural and artificial waterbodies, including swamps, lagoons, billabongs and dams. The project is unlikely to adversely affect habitat critical to the survival of *Amphibromus fluitans*. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for *Amphibromus fluitans*). Mitigation measures including micro-siting with the aim of locating the AoD as far from the known wetland habitat as possible, as well as construction controls to reduce impacts to the habitat will be implemented. "
Disrupt the breeding cycle of an important population	The project is unlikely to disrupt the breeding cycle of an important population. This species requires periodic flooding of habitat to maintain wet conditions and allow for flowering and fruiting. The project is unlikely to disrupt this periodic flooding of habitat.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that these species are likely to decline. Mitigation measures will be implemented to reduce the impact to the quality of habitat for the known population. Should further populations be identified in areas which have not yet been surveyed, mitigation measures including micro-siting will be utilised where feasible to avoid potential populations.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Construction measures, including wash down of machinery, will be implemented such that it is unlikely that invasive species would be introduced.
Introduce disease that may cause the species to decline, or	Construction measures, including wash down of machinery, will be implemented such that it is unlikely that diseases would be introduced.
Interfere substantially with the recovery of the species.	Key threats to *Amphibromus fluitans* include grazing and trampling by livestock, hydrological changes and invasion of remnant habitats by exotic grasses and weeds (DEWHA 2008). The project is unlikely to result in hydrological changes, and construction measures, including wash down of machinery, will be implemented to reduce the introduction of exotic grasses and weeds. As such, the project is considered unlikely to interfere substantially with the recovery of this species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Vulnerable *Amphibromus fluitans*.

Strzelecki Gum

Species: *Eucalyptus strzeleckii*

Listing: Vulnerable

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	The project is unlikely to lead to a long-term decrease in the size of an important population of *Eucalyptus strzeleckii*. There are no identified important populations of this species intersecting with the AoD. Only one individual directly intersects with the AoD, with impacts avoided through HDD/micro-siting and constructional controls.

Significant impact criteria	Assessment of impacts
	Additional trees may be impacted on land not yet accessed, however the above mitigation measures will be utilised should a population be identified in these areas.
Reduce the area of occupancy of an important population	The project is unlikely to reduce the area of occupancy of an important population of *Eucalyptus strzeleckii*. Direct and indirect impacts to this species will be avoided through HDD/micro-siting and construction controls.
Fragment an existing important population into two or more populations	The project is unlikely to fragment an existing important population into two or more populations. There are no identified important populations of this species within the AoD. Only one individual directly intersects the AoD, and direct and indirect impacts to this species will be avoided through HDD/micro-siting and construction controls.
Adversely affect habitat critical to the survival of a species	The project is unlikely to adversely affect habitat critical to the survival of *Eucalyptus strzeleckii.* No critical habitat has been currently declared for this species, a recovery action for this species is to identification of critical habitat. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for *Eucalyptus strzeleckii*). Habitat for this species includes deep, grey fertile loams in hilly, often wet sites (Carter 2006). Where habitat for this species intersects the survey area, individuals of *Eucalyptus strzeleckii* have been identified, with the exception of land which have not yet been accessed. Only one individual directly intersects the AoD, and mitigation measures will be implemented to reduce indirect impacts to habitat outside the AoD.
Disrupt the breeding cycle of an important population	The project is unlikely to disrupt the breeding cycle of an important population. No identified important populations intersect the survey area, and mitigation measures will be implemented to reduce indirect impacts to individuals outside the AoD.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove or isolate the availability or quality of habitat to the extent that the species is likely to decline. Mitigation measures will be implemented to reduce impacts to native vegetation which provides habitat for this species, including minor realignment of the AoD to avoid indirect impacts, and the use of HDD to avoid impacts by boring under vegetation.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The project is unlikely to result in invasive species that are harmful to this species becoming established within its habitat. In particular construction mitigation measures, including wash down of machinery, will be implemented to reduce the likelihood of weeds becoming established within habitat for *Eucalyptus strzeleckii*.
Introduce disease that may cause the species to decline, or	The project is unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species.	Threats to the species recovery relevant to the project include weed invasion, lack of recruitment, tree removal and changes to hydrology. There is potential for direct impacts to a single known tree, with the potential for additional trees to be identified in areas not yet accessed. Direct and indirect impacts will be avoided through HDD/micro-siting and construction controls. Due to this, the project is considered unlikely to interfere substantially with the recovery of the species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Vulnerable *Eucalyptus strzeleckii*.

Woodland orchids

Species: *Caladenia tessellata, Prasophyllum spicatum, Pterostylis chlorogramma* and *Pterostylis cucullata subsp. cucullata*

Listing: Vulnerable

Significant impact criteria	Assessment of impacts
Lead to a long-term decrease in the size of an important population of a species	The project is unlikely to lead to a long-term decrease in the size of an important population of *Caladenia tessellata*, *Prasophyllum spicatum*, *Pterostylis chlorogramma* or *Pterostylis cucullata subsp. cucullata*. There are no known populations within the survey area, however available habitat has the potential to be located within woodland around Waratah Bay which have not yet been accessed. The majority of direct and indirect impacts to potential populations are likely to be avoided through HDD/micro-siting and construction controls, and any direct removal of habitat is limited to degraded edges or fragmented patches along boundaries.
Reduce the area of occupancy of an important population	The project is unlikely to reduce the area of occupancy of an important population of these woodland orchid species. As outlined above, it is unlikely that an important population occurs within the survey area. Whilst it is possible that the area of occupancy of the species may be reduced through clearance of habitat that supports these species, this habitat considered highly likely to be already degraded or fragmented, and therefore is unlikely that the area of occupancy for an important population will be reduced.
Fragment an existing important population into two or more populations	The project is unlikely to fragment an existing important population into two or more important populations. Any direct removal of potential habitat will be limited to degraded edges or fragmented patches along boundaries.
Adversely affect habitat critical to the survival of a species	The project is unlikely to adversely affect habitat critical to the survival of these orchid species. No habitats within the survey area are identified on the Register of Critical Habitat (note that the Register of Critical Habitat currently does not include any listings for these orchid species). The majority of direct and indirect impacts to habitat for potential populations of these species are likely to be avoided through HDD/micro-siting and construction controls, and any direct removal of habitat is limited to degraded edges or fragmented patches along boundaries.
Disrupt the breeding cycle of an important population	The project is unlikely to disrupt the breeding cycle of an important population of these orchid species. It is unlikely that an important population occurs within the survey area. The majority of direct and indirect impacts to potential populations are likely to be avoided through HDD/micro-siting and construction controls, and any direct removal of habitat is limited to degraded edges or fragmented patches along boundaries.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The potential habitat located within the AoD is limited to degraded edges or fragmented patches along boundaries. Construction controls will be implanted to avoid indirect impacts to potential habitat outside the AoD.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Construction measures, including wash down of machinery, will be implemented such that it is unlikely that invasive species would be introduced.
Introduce disease that may cause the species to decline, or	Construction measures, including wash down of machinery, will be implemented such that it is unlikely that diseases would be introduced.
Interfere substantially with the recovery of the species.	Threats to these species relevant to the project include disturbance/destruction or plants and habitat and weed invasion. The majority of direct and indirect impacts to potential populations are likely to be avoided through HDD/micro-siting. Construction measures,

Significant impact criteria	Assessment of impacts
	including wash down of machinery, will be implemented to reduce the introduction of exotic grasses and weeds. As such, the project is considered unlikely to interfere substantially with the recovery of these species.
Conclusion	After considering the above statements, the project is unlikely to have a significant impact on the Vulnerable *Caladenia tessellata*, *Prasophyllum spicatum*, *Pterostylis chlorogramma* and *Pterostylis cucullata* subsp. *cucullata*.

Appendix 6 Priority habitat extent

Habitat by species	Use of survey area	Extent in survey area (ha)	Impacts (pre-mitigation) (ha)	Impacts (post-mitigation) (ha)	Percentage of habitat impacted (post-mit)
Aquatic fauna					
Australian grayling	Foraging	2.03	0.03	0.00	0.0%
Dwarf Galaxias	Breeding and foraging	2.03	0.03	0.00	0.0%
Growling Grass Frog	Breeding and foraging	0.43	0.00	0.00	0.0%
Narracan Burrowing Crayfish	Breeding and foraging	5.60	0.03	0.00	0.0%
South Gippsland Spiny Crayfish	Breeding and foraging	5.60	0.03	0.00	0.0%
Flinders Pygmy Perch	Breeding and foraging	2.55	0.03	0.00	0.0%
Platypus	Breeding and foraging	2.03	0.03	0.00	0.0%
Ground-dwelling fauna					
Swamp Skink	Breeding and foraging	54.70	1.27	0.28	0.5%
Swamp Antechinus	Breeding and foraging	63.52	1.27	0.28	0.4%
Glossy Grass Skink	Breeding and foraging	54.70	1.27	0.28	0.5%
Southern Toadlet	Breeding and foraging	54.70	1.27	0.28	0.5%
White-footed Dunnart	Breeding and foraging	54.70	1.27	0.28	0.5%
Owls, raptors and large fauna					
Grey-headed Flying-fox	Foraging	218.42	4.17	1.08	0.5%
White-bellied Sea-Eagle	Foraging	65.74	1.27	0.28	0.4%
Grey Goshawk	Foraging	155.32	2.51	0.94	0.6%
Lace Monitor	Breeding and foraging	218.42	4.17	1.08	0.5%
Little Eagle	Breeding and foraging	0.00	0.00	0.00	0.0%
Powerful Owl	Breeding and foraging	233.96	4.58	1.08	0.5%
Shorebirds					
Eastern Curlew	Foraging	18.02	0.00	0.00	0.0%
Hooded Plover	Foraging	18.02	0.00	0.00	0.0%
Sanderling	Foraging	18.02	0.00	0.00	0.0%
Red-necked Stint	Foraging	18.02	0.00	0.00	0.0%
Double-banded Plover	Foraging	18.02	0.00	0.00	0.0%
Red-capped Plover	Breeding and foraging	18.02	0.00	0.00	0.0%
Caspian Tern	Foraging	18.02	0.00	0.00	0.0%
Crested Tern	Foraging	18.02	0.00	0.00	0.0%
Waterbirds and waders					
Australasian Bittern	Foraging	0.00	0.00	0.00	0.0%
Cattle Egret	Foraging	1.37	0.13	0.00	0.0%
Latham's Snipe	Foraging	0.00	0.00	0.00	0.0%
Hardhead	Foraging	1.89	0.13	0.00	0.0%
Woodland birds					
Gang-gang Cockatoo	Foraging	155.32	2.51	0.94	0.6%
Blue-winged Parrot	Foraging	155.32	2.51	0.94	0.6%
Satin Flycatcher	Breeding and foraging	155.32	2.51	0.94	0.6%
Rufous Fantail	Breeding and foraging	155.32	2.51	0.94	0.6%

Habitat by species	Use of survey area	Extent in survey area (ha)	Impacts (pre-mitigation) (ha)	Impacts (post-mitigation) (ha)	Percentage of habitat impacted (post-mit)
Coastal flora					
Coast Wirilda	Growth and reproduction	8.82	0	0	0.0%
Coast Bitter-bush	Growth and reproduction	8.82	0	0	0.0%
Coast Colobanth	Growth and reproduction	8.82	0	0	0.0%
Dune Wood-sorrel	Growth and reproduction	8.82	0	0	0.0%
Coast Fescue	Growth and reproduction	8.82	0	0	0.0%
River Swamp Wallaby-grass					
River Swamp Wallaby-grass	Growth and reproduction	5.68	0.82	0.39	6.9%
Strzelecki Ranges damp forest flora species					
Alpine Sun-orchid	Growth and reproduction	100.62	1.24	0.66	0.7%
Slender Fork-fern	Growth and reproduction	100.62	1.24	0.66	0.7%
Oval Fork-fern	Growth and reproduction	100.62	1.24	0.66	0.7%
Threatened eucalyptus species					
Strzelecki Gum	Growth and reproduction	9.07	0.44	0	0.0%
Bog Gum	Growth and reproduction	71.85	2.21	0.28	0.4%
Yarra Gum	Growth and reproduction	0.98	0	0	0.0%
Waratah Bay woodland flora					
Eastern Spider Orchid	Growth and reproduction	54.70	1.27	0.28	0.5%
Thick-lipped Spider-orchid	Growth and reproduction	54.70	1.27	0.28	0.5%
Dense Leek-orchid	Growth and reproduction	54.70	1.27	0.28	0.5%
Green-striped Greenhood	Growth and reproduction	54.70	1.27	0.28	0.5%
Leafy Greenhood	Growth and reproduction	54.70	1.27	0.28	0.5%
Silver Everlasting	Growth and reproduction	54.70	1.27	0.28	0.5%
Lizard Orchid	Growth and reproduction	54.70	1.27	0.28	0.5%
Orange-tip Finger-orchid	Growth and reproduction	54.70	1.27	0.28	0.5%
Slender Pink-fingers	Growth and reproduction	54.70	1.27	0.28	0.5%
Spurred Helmet-orchid	Growth and reproduction	54.70	1.27	0.28	0.5%
Fringed Helmet-orchid	Growth and reproduction	54.70	1.27	0.28	0.5%
Currant-wood	Growth and reproduction	54.70	1.27	0.28	0.5%
Cobra Greenhood	Growth and reproduction	54.70	1.27	0.28	0.5%
Rush Lily	Growth and reproduction	54.70	1.27	0.28	0.5%
Small Fork-fern	Growth and reproduction	54.70	1.27	0.28	0.5%

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