

Preliminary Documentation Response – Beerburrum to Nambour (B2N) Rail Upgrade

EPBC 2020/8803

15 December 2021



Australian Government

BUILDING OUR FUTURE



Queensland Government

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Acronyms

Term	Description
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALA	Atlas of Living Australia
Atlas	Atlas of Australian Soils
AU	Assessment Unit
B2N project	Beerburrum to Nambour Rail Upgrade project
BCR	Benefit Cost Ratio
BUS	Bird Utilisation Survey
CHMA	Cultural Heritage Management Agreement
CR2SM project	Caloundra Road to Sunshine Motorway project
D&C	Design & Construct
DAF	Department of Agriculture and Fisheries (QLD)
DAWE	Department of Water, Agriculture and the Environment (Australian Government)
DBC	Detailed Business Case
DES	Department of Environment and Science (QLD)
DoE	Department of the Environment (former Australian Government Department)
DoR	Department of Resources (QLD)
ECI	Early Contractor Involvement
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERM	Environmental Resources Management Australia Pty Ltd
EP Act	<i>Environmental Protection Act 1994</i>
<i>EPBC Act</i>	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
ESCP	Erosion and Sediment Control Plan

Term	Description
ESD	Ecologically sustainable development
FTE	Full time equivalent
FSC	Fauna Spotter-Catcher
GBF	Giant Barred Frog
GSP	Gross State Product
HQP	HQ Plantations
IFC	International Finance Corporation
IS	Infrastructure sustainability
ISC	Infrastructure Sustainability Council
LAMP	Land Access Maintenance Plan
MHQA	Modified Habitat Quality Assessment
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NCL	North Coast Line
NPV	Net present value
NSW	New South Wales
OMP	Offset Management Plan
PD	Preliminary Documentation
PMST	Protected Matters Search Tool
PUP	Public Utilities Plant
QLD	State of Queensland
QLD VMA	<i>Vegetation Management Act 1999 (QLD)</i>
QR	Queensland Rail
RE	Regional Ecosystem
RFI	Request for information
SAMP	Strategic Asset Management Plan
SAT	Spot Assessment Technique

Term	Description
SCC	Sunshine Coast Council
SEQ	South East Queensland
SEQ Koala Strategy	South East Queensland Koala Conservation Strategy 2020-2025
SIG 1.1	MNES Significant Impact Guidelines
SPRAT	Species Profile and Threats Database
TEC	Threatened ecological communities
TMR	Department of Transport and Main Roads
USC	University of the Sunshine Coast
VCA	Voluntary Conservation Agreement
WO	Wildlife Online
WQO	Water Quality Objectives

Definitions

Term	Definition
Barrier	A feature (natural or artificial) that is likely to prevent the movement of koalas. Natural barriers may include steep mountain ranges (cliffs), unsuitable habitats, major rivers / water bodies or treeless areas more than 2 km wide. Artificial barriers may include infrastructure (such as roads, rail, mines, large fences etc.) without effective koala passage measures, or developments that create treeless areas more than 2 km wide (DoE, 2014)
Habitat critical to the survival of a species	Habitat critical to the survival of a species or ecological community refers to areas that are necessary: <ul style="list-style-type: none"> • for activities such as foraging, breeding, roosting, or dispersal • for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators) • to maintain genetic diversity and long-term evolutionary development or • for the reintroduction of populations or recovery of the species or ecological community.
Indicative Disturbance Footprint	The B2N project maximum disturbance footprint for the Early Works, Stage 1 and Stage 2 boundary.
Important population	A population that is necessary for a species' long-term survival and recovery.
Locality	The 10km buffer area surrounding the Project Area, used to search online databases for listed threatened species records.
"NO GO" Areas	This defines polygons within the Project Area where access, impact to vegetation and other type of impact is prohibited
Project Alignment	The existing rail alignment from Beerburrum to Nambour that was defined as the area of investigation as referenced by SMEC (2019) and ARUP (2020).
Project Area	The area of study for consideration of direct and indirect impacts from the B2N project. It includes the Indicative Disturbance Footprint for the Early Works, Stage 1 and Stage 2 boundary and a 50m buffer either side. The Project Area is represented in Figure 3 of Appendix D.3 and Figure 4 or Appendix D.4.
Region	The Sunshine Coast Region being the local government area located in the Sunshine Coast district of south-east Queensland.

Term	Definition
Remnant vegetation	<p>Vegetation:</p> <p>(a) that is:</p> <ul style="list-style-type: none"> (i) an endangered regional ecosystem or (ii) an of concern regional ecosystem or (iii) a least concern regional ecosystem and <p>(b) forming the predominant canopy of the vegetation:</p> <ul style="list-style-type: none"> (i) covering more than 50% of the undisturbed predominant canopy and (ii) averaging more than 70% of the vegetation's undisturbed height and (iii) composed of species characteristic of the vegetation's undisturbed predominant canopy.
Urban area	<p>The majority of the Project Area can be classed as 'urban area', e.g. the existing rail corridor, roads, urban development including residences and hardstand. The <i>EPBC Act Referral Guidelines for the Vulnerable Koala</i> (DoE, 2014) states that urban areas are not likely to contain habitat critical to the survival of the koala, as the existing effects of habitat loss, fragmentation, vehicle strike, dog attack and other threats are likely to continue to degrade these areas over the medium to long-term.</p>

1. Introduction

1.1 Project overview

The Beerburrum to Nambour section of the North Coast Line (NCL) is an important part of the Australian Government's National Land Transport Network. It currently consists of a 39-kilometre single bi-directional rail line, with passing loops at stations. The NCL caters for a mix of passenger transport and essential freight movements that service central and northern Queensland. Services include high speed commuter/passenger tilt trains, long distance passenger services, containerised freight services, heavy haulage single commodity trains and cattle trains.

The ability of the NCL to effectively meet current and future freight and passenger transport demand is hindered by constraints in the section of track between Beerburrum and Nambour. These constraints include a single-track configuration, passing loops at stations only, poor horizontal and vertical alignments and numerous level crossings that reduce train speeds.

The Beerburrum to Nambour Rail Upgrade (B2N) project, involves upgrades of the rail line between Beerburrum and Nambour. The B2N project location is illustrated in [Figure 1 of Appendix D.1](#). The scope of the B2N project includes rail duplication between Beerburrum and Landsborough and other infrastructure improvements, such as station upgrades and additional passing loops between Landsborough and Nambour. The B2N project will address capacity constraints on this section of the rail corridor by increasing the capacity for freight paths and improve reliability and travel time savings for passenger.

The Queensland Government has adopted a staged delivery approach for the B2N project, based on available funding. The stages of the B2N project, also referred to, for the purposes of the EPBC Act approval as the components of the action, include the Early Works, Stage 1 and Stage 2. Stage 2 is not currently funded and timing for delivery is unknown. Impacts of the three stages have been assessed and are documented in the relevant sections of this report.

The Department of Transport and Main Roads (TMR), in consultation with Queensland Rail (QR), is delivering the B2N project on behalf of the Australian and Queensland Governments.

1.2 Environmental Protection and Biodiversity Conservation Act 1999 Referral (EPBC 2020/8803)

On 30 September 2020, TMR lodged a referral under the *Environmental Protection and Biodiversity Conservation Act 1999* (the *EPBC Act*). The referral included Stage 1 and Stage 2 (unfunded). The Early Works package, which includes the re-alignment of a 1km section of Steve Irwin Way in the Glasshouse Mountains and associated relocation of public utilities plant (PUP) such as Telstra, Energex, sewer and water services was not included in the referral, having undergone separate environmental assessment. Upon receipt of the submission, the B2N project was assigned a number in the referral assessment system - EPBC 2020/8803 – by the Australian Government Department of Agriculture, Water and the Environment (DAWE).

Following submission, DAWE issued two formal requests for further information (RFI) to TMR. This resulted in the inclusion of the Early Works component in the referral to enable detailed assessment of the potential for cumulative impacts, in addition to the Stage 1 and Stage 2 components, on Matters of National Environmental Significance (MNES). The inclusion of the Early Works in the referral was formalised in letter from TMR to the DAWE, dated 22 December 2020.

On 12 January 2021, DAWE deemed the B2N project, inclusive of the Early Works component, to be a 'controlled action' requiring further assessment and approval under the *EPBC Act* (Appendix A- Referral decision notice). The decision was based on the consideration of that the project was likely to have a significant impact on listed threatened species (sections 18 and 18A of the *EPBC Act*) and on listed migratory species (sections 20 and 20A of the *EPBC Act*). DAWE confirmed the assessment approach to be Preliminary Documentation (Appendix B- Additional information required for Preliminary Documentation), the subject of this report.

This report provides the Preliminary Documentation requested by the DAWE in their RFI of 27 January 2021.

Compliance with condition 1.3 of DAWE's RFI is addressed below. Specific items for the request are provided in the relevant sections throughout this Preliminary Documentation.

Table 1. Summary of report structure

Reference	Summary description of information required		Report section
2	Description of the Action	Description of site location and current characteristics, description of the proposed action, including construction and operation phases	Section 2
3	Description of the Environment and MNES	Description of potential MNES, current land characteristics of the proposed action site and adjoining areas, and details of listed threatened species and ecological communities and listed migratory species and assessment of habitat	Section 3
4	Quantification of Impacts	Description of intended land uses, description of changes between the referral documentation and Preliminary Documentation, relevant to MNES, area of habitat directly or indirectly impacted by the proposed action, quantity and quality of suitable habitat to be impacted within the proposed action area, and assessment of direct, indirect, consequential and cumulative impacts that may occur during construction and post-construction phases	Section 4
5	Avoidance and Mitigation Measures	Description of proposed measures to avoid and mitigate impacts, assessment of the predicted effectiveness of each proposed avoidance or mitigation measure, and consideration of Policy and Guidance documents	Section 5
6	Environmental Offsets	Description of the offset proposal and its effectiveness	Section 6
7	Economic and Social Matters	Details on social and economic costs and/or benefits of undertaking the proposed action, details of economic benefits and employment opportunities, and public consultation and Indigenous consultation activities	Section 7
8	Ecologically Sustainable Development (ESD)	Description of how the proposed action meets the principles of ecologically sustainable development	Section 8

1.3 Previous studies and information sources

Previous detailed ecological assessments have been undertaken for the B2N project. The first ecological assessment was detailed within the *Review of Environmental Factors* (SMEC 2019) to support the Business Case for the B2N project. This report was first prepared in 2016 and was updated in 2019 to address changes in the B2N project design.

Subsequent ecological assessment was presented in a *Commonwealth Matters Ecological Report* (ARUP 2020) prepared to support an EPBC Act referral to DAWE for the B2N project (refer to Appendix H). The *Commonwealth Matters Ecological Report* (ARUP 2020) detailed the following:

- A description of the ecological values relevant to MNES in the assessment area, with reference to Commonwealth legislation, as derived from the *Review of Environmental Factors* (SMEC 2019) (refer to Appendix I), desktop and field investigations
- An assessment of potential impacts of the B2N project on MNES
- Proposed measures to avoid, minimise and mitigate the potential impacts on MNES
- Impact assessment in accordance with relevant guidelines including the MNES Significant Impact Guidelines (SIG 1.1) (Department of the Environment (DoE), 2013).

A snapshot of these previous studies as well as additional information sources (e.g. publicly available databases, relevant guidelines) and relevance to this assessment is provided in Table 2. Appendix J presents the first Request for Information from DAWE and the response from TMR, Appendix K presents the second Request for Information from DAWE and the response from TMR.

Table 2. Previous studies and information sources

Document	Relevance
Assessment Reports	
Review of Environmental Factors (SMEC 2019) (refer to Appendix I)	<ul style="list-style-type: none"> • To support the Business Case for the B2N project • Contains: <ul style="list-style-type: none"> – Describes the existing environmental and heritage values within the Project Area as of October 2019 – Identifies and assesses potential impacts of the B2N project proposal – Proposes management and mitigation measures – Describes the methods adopted and investigations – Highlights residual matters requiring further investigation, assessment, management or mitigation in future stages of the B2N project development and implementation
Commonwealth Matters Ecological Report (ARUP 2020) (Refer to Appendix H)	<ul style="list-style-type: none"> • To support the EPBC Referral to DAWE • Contains: <ul style="list-style-type: none"> – A description of the ecological values relevant to MNES in the Project Area, with reference to Commonwealth legislation, as derived from desktop and field investigations – An assessment of potential impacts of the B2N project on MNES – Proposed measures to avoid, minimise and mitigate the potential impacts on MNES – Impact assessment in accordance with relevant guidelines including SIG 1.1 (DoE, 2013)

Document	Relevance
University of the Sunshine Coast (USC) (2020 and 2021) Koala Survey Using Detection Dogs Beerburum to Nambour Rail Upgrade	<ul style="list-style-type: none"> USC was contracted by TMR to complete two separate koala surveys using detection dogs across potential koala habitat within the Project Area in August 2020 and during the breeding season (August to January) in January 2021. Contains: <ul style="list-style-type: none"> Results of the two separate survey reports provided to TMR following the surveys
Commonwealth Legislation and Guidelines	
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p>This act administers the protection of the environment within Australia – in particular MNES, which include:</p> <ul style="list-style-type: none"> World Heritage properties National Heritage properties Wetlands of International Importance listed threatened species and ecological communities migratory species Commonwealth marine areas the Great Barrier Reef Marine Park nuclear actions (include. uranium mines) water resources <p>The act will apply to the B2N project being a controlled action for MNES – threatened and migratory spp under S18 &18A and S20 & 20A of the <i>EPBC Act</i>.</p>
<i>EPBC Act Environmental Offsets Policy 2012</i>	<ul style="list-style-type: none"> Applies where a significant residual impact on an MNES is expected to occur as a result of the action. For the B2N project, this policy will apply for the anticipated residual impacts to koala and grey headed flying-fox. The policy provides guidance on the role of offsets and when a proposed offset is considered suitable.
<i>MNES Significant Impact Guidelines (SIG 1.1) (DoE 2013)</i>	<ul style="list-style-type: none"> Provides the overriding guidance on how to determine whether a proposed action is likely to have a significant impact on MNES listed under the EPBC Act. The guidelines outline a self-assessment process which include detailed criteria, to assist in determining whether a referral will be required to DAWE, for a decision by the Australian Government Environmental Minister. In association with the B2N project, significant impact assessments were undertaken for: <ul style="list-style-type: none"> koala (<i>Phascolarctos cinereus</i>), grey-headed flying-fox (<i>Pteropus poliocephalus</i>), giant barred frog (<i>Mixophyes iteratus</i>), whipstick wattle (<i>Acacia attenuata</i>), Mt Emu she-oak (<i>Allocasuarina emuina</i>), swamp stringybark (<i>Eucalyptus conglomerata</i>), macadamia nut (<i>Macadamia integrifolia</i>), and migratory bird species
<i>EPBC Act Referral Guidelines for the Vulnerable Koala (DoE 2014)</i>	<ul style="list-style-type: none"> Provides guidance on the protection and conservation of the distribution of koalas throughout Australia. The guidelines are designed in order to make an EPBC Act assessment on impacts to koalas, as a result of B2N project that occur in areas where koalas are likely or known to occur as per koala habitat mapping included in Figure 3 of Appendix D.3.

Document	Relevance
<i>Draft Guide to Nationally Protected Species Significantly Impacted by Paddock Tree Removal</i> (DAWE, 2021a)	<ul style="list-style-type: none"> The <i>draft Guide to Nationally Protected Species Significantly Impacted by Paddock Tree Removal</i> (DAWE, 2021a) has been developed by DAWE to assist landholders to determine if removing their paddock trees will need approval under national environmental law. The guideline will be utilised to assess nesting, roosting and foraging habitat associated with individual paddock trees in the Project Area as well as identifying where they contribute to maintenance of connectivity between larger patches of vegetation.
<i>EPBC Act Referral Guideline for Management Actions in Grey-headed and Spectacled Flying-fox Camps</i> (DoE 2015a)	<ul style="list-style-type: none"> Provides guidance and reduces significant impacts on the <i>EPBC Act</i> listed flying-foxes with actions aimed at managing their camps. This Guideline is designed to be read from the perspective of a person proposing to take an action that may have a significant impact on the grey-headed or spectacled flying-fox. This guideline was utilised in conjunction with a developed understanding of the <i>EPBC Act</i> assessment process and the ecology of <i>EPBC Act</i> listed flying-fox species to determine if the action would have an effect on identified grey-headed flying-fox camps in the locality.
Referral guideline for 14 birds listed as migratory species under the <i>EPBC Act</i> (DoE, 2015b)	<ul style="list-style-type: none"> Applies to 14 birds which are listed as migratory species under the <i>EPBC Act</i>. These 14 birds are protected under the <i>EPBC Act</i> because they are included in one or more international agreements in which Australia is a party. This guideline provides guidance to assess the potential for significant impacts on one or more of these species. This guideline is relevant as migratory spp were detected in Project Area.
National Recovery Plan for the Grey-headed Flying-fox (DAWE, 2021)	<ul style="list-style-type: none"> The plan sets out the management and research actions required to halt the decline and aid the recovery of the grey-headed flying-fox over the next 10 years. The actions outlined in this plan aim to improve the national population trend, as well as identifying, protecting and increasing the foraging and roosting habitat for the species. The recovery plan has informed the development of proposed mitigation/ management measures.
National recovery plan for <i>Acacia attenuata</i> (Brownlie, 2007)	<ul style="list-style-type: none"> This recovery plan was developed by Heather Brownlie for the DAWE in 2007. The aim of the recovery plan is to preserve known populations of the species through management of identified threats. This recovery plan is relevant to the B2N project, as potential whipstick wattle (<i>Acacia attenuata</i>) habitat has been identified within the Project Area. This recovery plan was utilised as a desktop resource to guide field investigations for the species.
Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the <i>EPBC Act</i> (DAWE, 2010)	<ul style="list-style-type: none"> These guidelines help determine the likelihood of a species' presence or absence at a site. The guidelines were prepared using a variety of expert sources and provide additional guidance to support the assessment process established under SIG 1.1. These guidelines informed the 2021 field survey methodology for detecting threatened frogs.
Survey Guidelines for Australia's Threatened Mammals (DSEWPC, 2011)	<ul style="list-style-type: none"> The guidelines provided details regarding the effort and methods considered appropriate when completing field investigations for mammals listed as threatened under the <i>EPBC Act</i>.
National recovery plan for Stream Frogs of South-east Queensland 2001-2005 (Hines, 2002)	<ul style="list-style-type: none"> This recovery plan was developed by Queensland Parks and Wildlife Service and the Southeast Queensland Threatened Frogs Recovery Team. This recovery plan is relevant to the B2N project, as the giant barred frog is known to occur 100 m east of the Project Area. This recovery plan was utilised as a desktop resource to guide field investigations for the species.
Southern Macadamia Species Recovery Plan (Costello et al., 2007)	<ul style="list-style-type: none"> This recovery plan was developed by Horticulture Australia Limited, Sydney in 2007. This recovery plan is relevant to the B2N project, as potential macadamia nut (<i>Macadamia integrifolia</i>) habitat has been identified within the Project Area. This recovery plan was utilised as a desktop resource to guide field investigations for the species.

Document	Relevance
National recovery plan for Mt Emu she-oak (QPWS, 2007)	<ul style="list-style-type: none"> This recovery plan was developed by the Queensland Parks and Wildlife Service (QPWS) in 2007. The aim of the recovery plan is to preserve known populations of the species through management of identified threats. This recovery plan is relevant to the B2N project, as potential Mt Emu she-oak (<i>Allocasuarina emuina</i>) habitat has been identified within the Project Area. This recovery plan will be utilised as a desktop resource to guide field investigations for the species.
State Guidelines	
Flora Survey Guidelines – Protected Plants NC Act (Flora Survey Guidelines) (DEHP, 2014a)	<ul style="list-style-type: none"> The guidelines provide detail for qualifications required, and methods required for flora surveys. The guideline was utilised to inform flora surveys and to detect listed flora species in the Project Area.

1.4 Attached documents

The following documents have been appended to support this Preliminary Documentation report, further to the EPBC Referral documentation:

- Appendix A: Notification of Referral Decision – Controlled Action (12 January 2021)
- Appendix B: DAWE Additional Information Required for Preliminary Documentation (27 January 2021)
- Appendix C: MNES Baseline Report (ERM, 2021)
- Appendix D: B2N project Figures
- Appendix E: TMR Technical Specifications
- Appendix F: Modified Habitat Quality Assessment
- Appendix G: EPBC Act Offset Calculator.
- Appendix H: Commonwealth Matters Ecological Report (ARUP, 2020)
- Appendix I: Review of Environmental Factors (SMEC, 2019)
- Appendix J: Request for Information 1
- Appendix K: Request for Information 2
- Appendix L: Kirby's Road Environmental Reserve Fauna Survey Report
- Appendix M: Fauna Inventory Assessment Report – Offset Revegetation Areas, London Creek Environmental Reserve
- Appendix N: Examples and Evidence of Efficacy of Proposed Mitigation Measures
- Appendix O: Title Search Lot 1 on RP124412
- Appendix P: Flora Survey Update within Lot 1 on RP124412
- Appendix Q: Notification of no comments received during public consultation period

Importantly, the MNES Baseline Report (ERM, 2021) (Appendix C) contains detailed supporting information, including desktop analysis, detailed descriptions of field methodologies and results of field surveys. Where reference is made to the MNES Baseline Report (ERM, 2021), it may also refer to information contained in attachments to that report.

2. Description of the action

2.1 Response to 2.1 a)

Information Required for Assessment by Preliminary Documentation

2.1 Including:

- a) *The location, boundaries, and size (in hectares) of the disturbance footprint, and of adjoining areas and vegetation, which may be indirectly impacted by the proposal, including from material stockpiles, vehicle access and associated activities.*

The B2N project is located on the Sunshine Coast Regional Council area and it is traversed by the townships of Beerburrum, Glasshouse Mountains, Beerwah, Landsborough, Mooloolah, Eudlo, Palmwoods, Woombye and Nambour. The property allotments intercepted by the Project are listed in Section 4.1. As mentioned above, the B2N project will be delivered on a staged approach (the components) including Early Works, Stage 1 and Stage 2.

The total project disturbance footprint equates to 256.9 ha. Out of the 256.9 ha, 24.21 ha will be impacted by the Early Works, 194.41 ha impacted by Stage 1 and 41.07 ha impacted by Stage 2 works. The above described footprint of impact includes vegetated and non-vegetated areas, vegetation that will become fragmented by other directly impacted areas, areas that will temporarily be impacted, during construction, for site laydowns, stockpiling, access tracks, storage, offices and other associated activities.

Impact by the B2N project (permanent or temporary) outside of the proposed Project Area and without the required approvals will be strictly prohibited. Indirect impacts to adjoining vegetation potentially caused by the proposed activities such as, light, dust, noise and runoff, will be minimised by the implementation of management and mitigation measures detailed in Section 5 of this report.

Other smaller areas within the Project Area containing significant environmental values and habitat features have been identified during this assessment as **"NO GO" Areas**. Extensive assessment undertaken by TMR and its consultants confirmed the "NO GO" Areas will not need to be impacted for design and/or for construction hence, they have been marked as "NO GO".

The Project Area including the Early Works, Stage 1 and Stage 2 footprints and the "NO GO" Areas are illustrated in Figure 10 of Appendix D.10.

2.2 Response to 2.1 b)

Information Required for Assessment by Preliminary Documentation

2.1 Including:

- b) *A description of all components of the proposed action, including the anticipated timing and duration, (including start and completion dates) of each component of the proposed action. This should include a detailed outline of the expected timing of any staged clearing over the construction period.*

As previously described, the components of the B2N project include the Early Works, Stage 1 and Stage 2. Details on the construction and operation of the components is documented in Section 2.3 below.

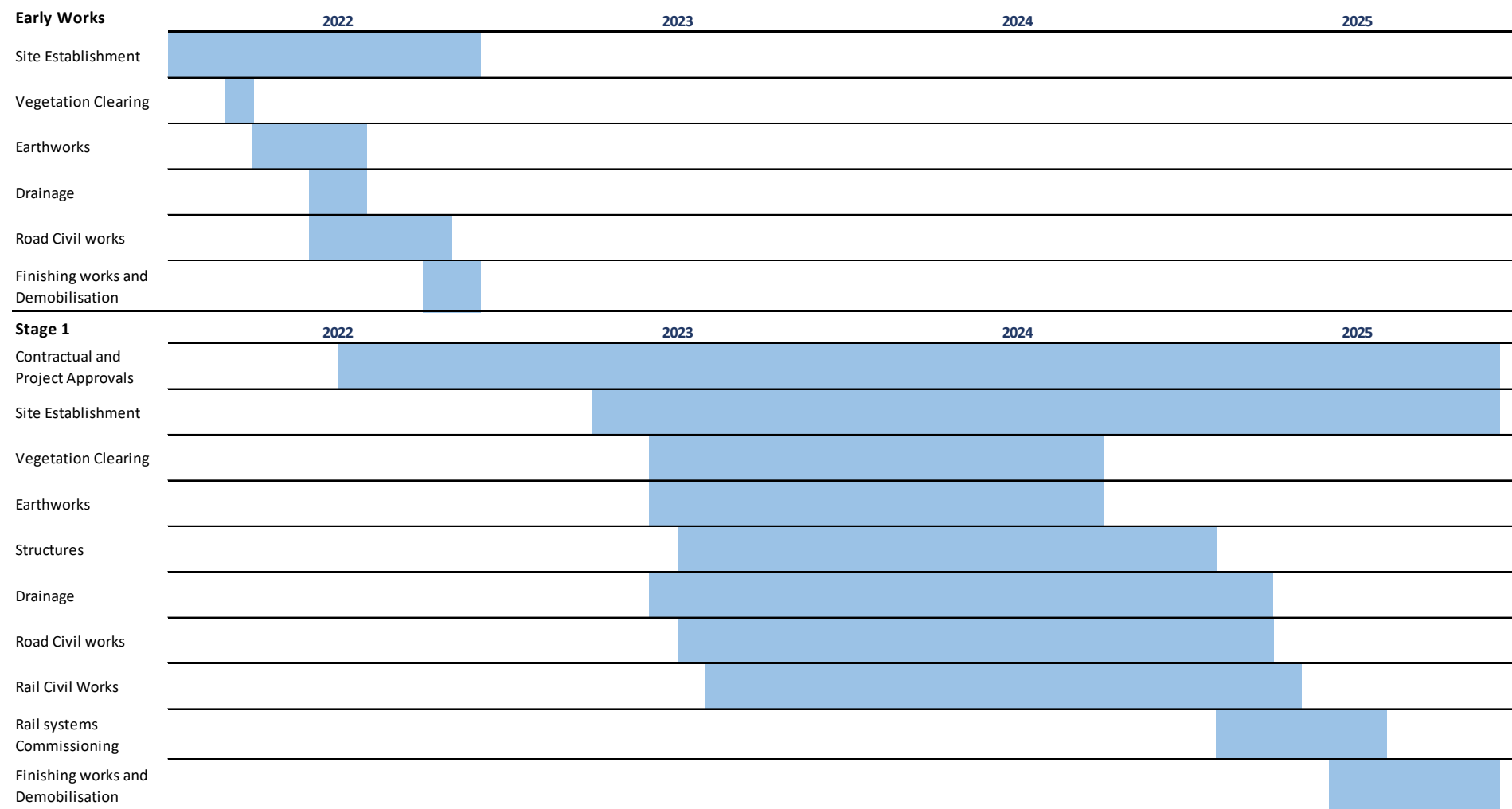
It is important to explain, for context, that the Stage 1 component of the B2N project is following an Early Contractor Involvement (ECI) Contract, which is a contract delivery option introduced by TMR to achieve value for money, alleviate strain on industry and best utilise market capacity. This style of contract, best described as a negotiated Design & Construct (D&C) contract, utilises a two-stage process to select the right contractor for the job. This means that, a detailed schedule of works will only be developed after contract award however, it also means there is more flexibility and opportunities to include environmental matters and considerations at the core of the design and in the construction, hopefully with a better environmental outcome.

TMR has outlined timing for the Early Works and Stage 1 based on the current concept design however, this is subject to change after a detailed design is concluded. TMR is unable to outline timing for Stage 2 works as these are subject to funding. The indicative program is provided in Table 3.

Other factors affecting the timing of the works are:

- Early Works: receiving approval under the EPBC Act and finalising the Steve Irwin Way realignment design
- Stage 1: receiving approval under the EPBC Act, ECI tender and tender award, design development and development of construction staging and methodology in consideration of the final design and constraints posed by environmental approvals, legislative requirements, safety constraints associated with accessing live rail track and other contractual obligations
- Stage 2: receiving approval under the EPBC Act, receiving funding, tender process (not confirmed) and tender award, design development and development of construction staging and methodology in consideration of the final design and constraints posed by environmental approvals, legislative requirements, safety constraints associated with accessing live rail track and other contractual obligations
- Regarding clearing, this normally occurs within the first three months of construction commencing however, once again, this is highly dependent on a detailed design and on the construction methodology that will be adopted by the successful contractor. The fact that the B2N project is in Koala District A, means that clearing needs to be staged to comply with the QLD *Nature Conservation (Koala) Conservation Plan 2017*. This key Queensland legislation imposes sequential clearing requirements on the clearing of koala habitat in order to promote the continued existence of viable koala populations in the wild. Despite no koala populations recorded in the Project Area, presence was identified through field surveys from scats. The requirements of the *Nature Conservation (Koala) Conservation Plan 2017* still stand. Other aspects affecting the timing of clearing include the provision and approval of a detailed certified erosion and sediment control plan and the full approval of a Construction Environmental Management Plan (EMP) before site works begin.

Table 3. Indicative program of works for Early Works and Stage 1



2.3 Response to 2.1 c)

Information Required for Assessment by Preliminary Documentation

2.1 Including:

- c) A description of the construction and operation of the ~~residential~~ development and associated works (i.e. activities that comprise its operation).

A description of the construction activities associated with each component of the B2N project and the party responsible for undertaking the work is documented in Table 4.

Table 4. Construction Activity Summary

Action Component	Activity	Description	Responsibility
Early Works	Site establishment	This involves establishment of site office(s) and field personnel compound(s), preparation of laydown and stockpiling areas and access tracks and installation of required perimeter controls such as erosion and sediment controls, in accordance with the nominated Project Area (refer to Figure 10 of Appendix D.10).	TMR/Contractor
	Vegetation clearing and grubbing	2.57 ha of koala habitat is required to be cleared for the Early Works. Clearing of vegetation must always be accompanied by a qualified koala spotter.	Contractor
	Road civil works	This includes excavations and bulk earthworks (cut/fill), drainage and pavement construction and relocation of water, sewer, telecommunications at the required sequence or in conjunction with road civil works. This may involve under bore or/and open trench to remove existing and install new services.	Contractor
	Finishing works and demobilisation	This includes planting and landscaping of new road batters and rehabilitation of temporarily impacted areas, weed removal and maintenance, watering and monitoring of landscaped area.	Contractor
Stage 1	Site establishment	As described for Early Works.	Contractor
	Vegetation clearing and grubbing	Vegetation clearing in Stage 1 is constrained by sequential clearing in Koala District A, in compliance with the QLD <i>Nature Conservation (Koala) Conservation Plan 2017</i> . Requirements are: (a) clearing of the koala habitat trees is carried out in a way that ensures koalas on the area being cleared (the clearing site) have enough time to move out of the clearing site without human intervention, including, in particular, for clearing sites with an area of more than 3 ha, by— (i) carrying out the clearing in stages and (ii) ensuring not more than the following is cleared in any 1 stage— (A) for a clearing site with an area of 6 ha or less—50% of the site's area (B) (B) for a clearing site with an area of more than 6 ha—3 ha or 3% of the site's area, whichever is the greater and (iii) ensuring that between each stage and the next there is at least 1 period of 12 hours starting at 6p.m. on a day and ending at 6a.m. on the following day during which no trees are cleared on the site (b) clearing of the koala habitat trees is carried out in a way that ensures, while the clearing is carried out, appropriate habitat links are maintained within the clearing site and between the site and its adjacent area, to allow koalas living on the site to move out of the site (c) no koala habitat tree in which a koala is present, and no koala habitat tree with a crown overlapping a tree in which a koala is present, is cleared.	Contractor

Action Component	Activity	Description	Responsibility
		Clearing of vegetation must always be accompanied by a qualified koala spotter.	
	Structures	This include construction of drainage structures such as culvert and bridges, fauna mitigation structures such as underpasses and overbridges or other fauna structures.	Contractor
	Fencing	This includes installation of security, rural and fauna fencing at designed locations. Fauna fencing will be finalised at completion of Project design, the fencing will be in locations to accompany fauna crossings.	Contractor
	Roadworks	As described for Early Works.	Contractor
	Track Works	This includes: cut and remove rail, remove sleepers, excavate & proof roll, place capping and roll Geotextile, place and roll bottom ballast, lay sleepers, lay and clip-up rail install top ballast, lift and place track panel (20m panels), rail weld and stress, tamp and regulate, Place Dynamic Track Stabiliser (DTS), rail grinding.	Contractor
	Overhead Line Equipment (OHLE) Works	This includes: Mast Dressing & Cantilever Install, Cantilever Wire, Contact Wire, Heights & Staggers, Pantograph Check.	Contractor
	Signals Activities	Signals Commissioning, Test Train, Driver Familiarisation, Possession Handback Buffer.	QR
	Rail Tie-in Breakdown	Tie-in locations have been defined as areas which the new and the old rail alignment meet, meaning construction is predominantly in the danger zone, requiring a track possession. This will be programmed well in advance of the works.	Contractor
	Finishing works and demobilisation	As described for Early Works.	Contractor
Offsets	Offsets	Offsets activities include weed management, planting and maintenance of offset sites as per strategy proposed in Section 6.	TMR
Stage 2	General activities	A summary of activities included in Stage 2 include, roadworks, station upgrades and signal works however, a scope and timeline are to be confirmed upon receipt funding.	TMR/ Contractor

The operation of the infrastructure will involve the resumption of passenger, freight and travel train services on the new alignment and reinstatement of the local road network. It will also include ongoing maintenance resumption of the normal maintenance activities in the road and rail corridors.

2.4 Response to 2.1 d)

Information Required for Assessment by Preliminary Documentation

2.1 Including:

- d) *An indicative layout plan for the proposed action area, including the location and type of land use, key infrastructure, ~~and the number and location of dwellings, other buildings, open space, and conservation areas.~~*

An indicative layout plan showing the proposed Project Area in relation to neighbouring properties and the type of land use, key infrastructure, and conservation areas is illustrated in Figure 6 of Appendix D.6 and Figure 10 of Appendix D.10.

3. Description of the Environment and Matters of National Environmental Significance

3.1 Response to 3.1

Information Required for Assessment by Preliminary Documentation

3.1 A description of any potential Matters of National Environmental Significance (MNES) (including but not limited to those listed in this request for information) that occur in the Project Area and adjacent areas.

The potential MNES that may be impacted by the B2N project has been determined from a PMST search conducted in 2021 that included a 2 km search buffer around the Project Area. The Project Area includes the Indicative Disturbance Footprint for Early Works, Stage 1 and Stage 2 plus a 50m buffer either side. The PMST search and information obtained from three ecological field programs (SMEC 2019; ARUP 2019 and ERM 2021) was used to determine the MNES that were the subject of assessment in this Preliminary Documentation. In addition, other relevant documentation included outcomes from field investigations included koala surveys using detection dogs (USC, 2020, 2021). Desktop investigations consisted of reviewing Commonwealth, Federal and State reports associated with MNES, as well as using database queries (for locations of records of listed threatened species within a 10 km buffer to the Project Area) and GIS mapping and high resolution and up-to-date aerial imagery.

It is noted that one individual native guava (*Rhodomyrtus psidioides*) and one individual smooth Davidson's plum (*Davidsonia johnsonii*) were identified on Lot 1 RP124412 during the ARUP 2020 field surveys. ERM conducted additional flora surveys at this allotment in November 2021, detailed results are outlined in Appendix P and a summary of results is provided in this section. During ERM 2021 field surveys, it was confirmed that the two previous records were misidentifications. The native guava was confirmed as bloodhorn (*Ochrosia elliptica*) and the smooth Davidson's plum was instead Davidson's plum (*Davidsonia jerseyana*). Davidson's plum is listed as endangered under the EPBC Act and seven cultivated specimens were recorded on Lot 1 RP124412. The records are depicted in Appendix D.11. The field survey, during which these specimens were identified, was undertaken in compliance with the *Queensland Flora Survey Guidelines – Protected Plants* (DES, 2019). Further assessment by the Queensland Herbarium confirmed the identification of *D. jerseyana*, and given the individuals are located outside of the current known range (restricted to New South Wales (NSW)), supported the conclusion the species was established through human intervention (i.e. planted as part of a past revegetation program). This conclusion was strengthened when a title search for the property identified that there was previously a covenant over a portion of the vegetation on the allotment. The covenant is identified as 'Covenant A' and was between the former owners of the lot and the former Caloundra City Council. Following purchase of the allotment by TMR, the covenant was revoked and is no longer present on the title of the allotment. Appendix O provides a copy of a title search undertaken on 22 September 2021, which shows that the allotment is not encumbered by any covenants. The allotment was revegetated as part of a revegetation program required by a Voluntary Conservation Agreement (VCA) between the former council and landowners. Areas where *D. jerseyana* were found are located within the revegetated sections of the allotment.

The Project Area does not support preferred coastal and lowland subtropical rainforest and wet sclerophyll habitat for *D. Jerseyana* (Threatened Species Scientific Committee 2015) and the occurrence of seven cultivated specimens does not constitute a wild population. Given the specimens are located outside of the species' current known distribution (restricted to NSW), and other individuals or populations were **not** identified, habitat mapping has not been undertaken and a significant impact assessment under Federal guidelines has not been undertaken.

The outcomes of the assessment to determine the MNES that occur in the Project Area, and are the subject of assessment, are summarised in Table 5, below.

Table 5. Summary of MNES

MNES Matter	Relevance
World Heritage Properties	There are no World Heritage properties associated with the Project Area.
National Heritage Properties	<p>The Glass House Mountains National Landscape is a Natural Heritage Place adjacent to the existing rail corridor and proposed Project Area. A significant impact assessment was conducted and outlined in the referral Ecological Assessment Report (ARUP, 2020). The B2N project is not expected to have a significant impact on the values of the National Heritage Place.</p> <p>Significant indirect impacts (e.g. noise and dust) to the National Heritage Place are not anticipated during the construction and operation of the B2N project. The temporary nature of the works in conjunction with implementation of construction environmental management measures are expected to limit the impacts of noise and dust to the National Heritage place.</p>
Wetlands of International Importance	The southern section of the Project Area is located approximately 8 km east of the Moreton Bay Ramsar site. The Moreton Bay Ramsar site is not directly impacted by activities within the Project Area.
Listed threatened species and ecological communities	<p>Eight listed threatened species have been identified as known or likely to occur within and adjacent to the Project Area. A full likelihood of occurrence has been undertaken and species considered as likely or known to occur in the Project Area include:</p> <ul style="list-style-type: none"> • koala (<i>Phascolarctos cinereus</i>) • grey-headed flying-fox (<i>Pteropus poliocephalus</i>) • giant barred frog (<i>Mixophyes iteratus</i>) • white-throated needle-tail (<i>Hirundapus caudacutus</i>) • whipstick wattle (<i>Acacia attenuata</i>) • Mt Emu she-oak (<i>Allocasuarina emuina</i>) • swamp stringybark (<i>Eucalyptus conglomerata</i>) • macadamia nut (<i>Macadamia integrifolia</i>) <p>No threatened ecological communities (TECs) are observed to occur within the Project Area.</p>
Migratory species	<p>Seven migratory species were identified as known or likely to occur within and adjacent to the Project Area. Migratory species considered as likely or known to occur in the Project Area include:</p> <ul style="list-style-type: none"> • white-throated needle-tail (<i>Hirundapus caudacutus</i>) • fork-tailed swift (<i>Apus pacificus</i>) • oriental cuckoo (<i>Cuculus optatus</i>) • rufous fantail (<i>Rhipidura rufifrons</i>) • spectacled monarch (<i>Monarcha trivirgatus</i>) • black-faced monarch (<i>Monarcha melanopsis</i>) • satin flycatcher (<i>Myiagra cyano-leuca</i>)
Commonwealth marine areas	There are no Commonwealth marine areas in or adjacent to the Project Area.
The Great Barrier Reef Marine Park	The Great Barrier Reef Marine Park is not in or adjacent to the Project Area.
Nuclear actions	The B2N project does not involve any nuclear actions.
Actions proposed are on, or will affect Commonwealth land and the environment	The B2N project does not involve any actions on, or affecting, Commonwealth land.

3.2 Response to 3.2

Information Required for Assessment by Preliminary Documentation

- 3.2 *A description and map of the current land use/s, land topography, surface and ground water bodies, waterways and vegetation communities (habitat types as they relate to potentially impacted listed threatened species and listed migratory species) on the proposed action site and adjoining areas.*

3.2.1 Project Area context and land dynamics

The Project Area is part of Queensland's major north-south rail corridor from Brisbane to the Sunshine Coast. Current land uses serve urban and residential purposes interspersed with agricultural lands, state forest and national parks. Located within the coastal lowlands of South East Queensland, the region features coastal plains leading into the Dividing Range. The existing rail corridor is relatively linear and tracks along the boundary of coastal plain and range with minor deviations from linearity. As per the referral, most of the Project alignment can be classed as 'urban area' for the purpose of this assessment, e.g. the existing rail corridor, roads, urban development including residences and hardstand. From Beerburrum to Landsborough, there are minimal changes in elevation ranging from 20-40m AHD. The peaks of the Glasshouse Mountains occur to the west of the Project Area. The continuing sector from Landsborough to Nambour crosses the foothills of the Dividing Range with elevation smoothly fluctuating in the range of 10-100m AHD. Two geological formations are situated beneath the Project Area being Landsborough Sandstone and Woogaroo Subgroup Sandstone. The soils between Beerburrum and Landsborough are classified as Mf12 (Atlas of Australian Soils, [SMEC, 2019]), indicating a low hilly landscape. The Landsborough to Eudlo section was identified as Wf1 (Atlas of Australian Soils (Atlas), [SMEC, 2019]) suggesting low hilly to hilly terrain, with the ongoing Eudlo to Nambour section a similar Wf2 (Atlas, [SMEC, 2019]) classification (hilly to low hilly). Nambour station is located on Mm9 (Atlas, [SMEC, 2019]) soil which is considered steep hilly scarp. Figure 6 of Appendix D.6 illustrates land use and topography and waterways. Vegetation communities are illustrated in Figure 7 Appendix D.7.

3.2.2 Hydrology

The B2N project is located within the Maroochy basin spanning the Pumicestone Passage Catchment, Mooloolah River and Maroochy River sub-catchments (refer to Figure 1 of Appendix D.1 and Figure 2 of Appendix D.2). The B2N project will cross several creeks and tributaries within the Pumicestone Passage Catchment. Waterways associated with the Pumicestone Passage Catchment flow north in to Ramsar wetland. The project boundary is located approximately 8km upstream from the Ramsar wetland along Coochin Creek. The Ramsar wetland is situated to the east of the Bruce Highway and includes a fish habitat area of the Pumicestone Channel). There are no anticipated impacts to the Ramsar wetland due to distance, project nature (low potential for spills, leaks or pollution to enter creeks) and management strategies used within construction to minimise outputs to waterways. Several Matters of State Environmental Significance (MSES) Wetlands of high ecological value are present within the region, at the Beerwah Forest Reserve, to the east of the existing railway corridor. As the Project Area is co-located near the existing rail corridor, little change is likely to occur to infiltration or groundwater expression (SMEC, 2019). MSES wetlands and waterways have been considered as part of the assessment of the B2N project as they provide habitat and resources for EPBC Act listed threatened species. TMR engaged ARUP to prepare the *Beerburrum to Nambour Rail Upgrade Project Waterways Assessment Report* (ARUP, 2021) in 2021. The key finding was the Project has opportunities to replace several the existing waterway crossings (e.g. culverts) and improve the existing aquatic fauna habitat connectivity at waterways and drainage lines traversing the Project boundary (ARUP, 2021). Design and construction mitigation measures are also provided in the report. The hydrology of the region is stated as porous with extensive aquifers of low to moderate productivity (ARUP, 2020).

3.2.3 Vegetation communities and habitats

The Project Area features minimal native vegetation due to the nature of works, being upgrades to an existing rail corridor with some associated road works. Extensive clearing for state forests, agriculture and urban development have also occurred within and adjacent to the Project Area. Structurally, the Project Area is dominated by regrowth vegetation adjacent to the existing rail alignment, with mixed juvenile eucalypt and melaleuca species. Habitat structure is dependent

on intensity of disturbance ranging from minimal to highly disturbed. Remnant vegetation is largely restricted along waterways and drainage lines. Most of the native vegetation is associated with the Glass House Mountains and the foothills surrounding the mountains. Nine regional ecosystems intersect the Project Area in small patches with two listed as endangered, three listed as of concern and four as least concern under the *Queensland Vegetation Management Act 1999* (QLD Gov, 2019) (QLD VMA). No identified regional ecosystems correlate to TECs.

Vegetation community assessments and habitat assessments were undertaken to describe the type and condition of the vegetation communities, and how it relates to MNES habitat, in the Project Area. Ground truthing, based on habitat assessments undertaken during a three-week field survey and high-resolution satellite imagery were used to define areas of habitat for MNES. Quantification of the extent of habitat for listed threatened species is discussed in Section 3.4.

Habitats for MNES known, likely or with the potential to occur within and adjacent to the Project Area have been mapped, based on defined habitat preferences and conditions (as observed from field surveys) and used to inform impact assessments. The vegetation communities used to underpin the habitat mapping for MNES have been described in the likelihood of occurrence table (with reference to RE types where appropriate), informed by data obtained from desktop sources and field surveys (e.g. Species Profile and Threats Database (SPRAT) profiles and/or Conservation Advice where available, supplemented by other primary sources as required).

Habitat mapping was prepared to reflect as accurately as possible actual ground conditions (based on data collected from the 2016, 2019, 2020 and 2021 field investigations and recent high-resolution satellite imagery from 2021).

The Project Area was categorised into broad habitat types. These habitats largely align with vegetation communities that represent potential habitat for a variety of taxa, including MNES. A summary of the habitat types, together with their dominant vegetation communities and structure is provided in Table 6. These descriptions have been used to support the development of habitat maps for MNES provided in Figure 3 of Appendix D.3 and Figure 4 of Appendix D.4.

Table 6. Habitats within the Project Area

Broad Habitat and occurrence in Study Area	Structure	Habitat features
Notophyll vine forest Gallery rainforest (notophyll vine forest) on alluvial plains (includes RE 12.3.1) This comprises approximately 1% of the indicative disturbance footprint.	Tree layer: <i>Eucalyptus tereticornis</i> , <i>Eucalyptus pilularis</i> , <i>Flindersia australis</i> . Shrub layer: <i>Syzygium smithii</i> , <i>Castanospermum austral</i> , <i>Ficus coronate</i> . Ground microhabitat layer: <i>Lomandra hystrix</i> The ground layer is generally sparse. Vine climber species are also present in this community. Rocky debris were also moderately available to provide habitat and sheltering areas for smaller mammals and reptiles.	The thick vine communities may provide habitat for smaller birds that prefer dense shrubland and reptiles. With limited availability of hollow bearing trees, the vegetation community is unlikely to provide suitable habitat for species that rely on hollows for breeding and shelter.
Eucalypt and Melealeuca woodlands – dominated by <i>Eucalyptus grandis</i> +/- <i>Eucalyptus tereticornis</i> +/- <i>Eucalyptus siderophloia</i> +/- <i>Melaleuca quinquenervia</i> Dominated most areas of remnant and regrowth vegetation throughout the Project Area (includes RE 12.3.2, 13.3.11, 12.5.3, 12.9-10.14, 12.3.4, 12.3.5 and 12.3.6) This comprises approximately 25% of the indicative disturbance footprint.	Tree Layer: Mixed Eucalypts (incl. <i>E. tereticornis</i> , <i>E. pilularis</i> , <i>E. microcorys</i> , <i>E. siderophloia</i> , <i>Lephostemon confertus</i> , <i>Lephostemon suaveolens</i>) and <i>M. quinquenervia</i> Shrub layer: <i>Acacia spp</i> , regrowth eucalypts and <i>Lephostemon spp</i> Ground layer: The ground layer is generally sparse and leaf litter is common. Rocky debris uncommon, but some log fall that provides habitat and sheltering areas for smaller mammals and reptiles. In open woodlands/regrowth areas, ground cover is dominated by sparse grass layer.	Larger canopy trees provide habitat for a range of woodland-dependent and generalist species. In some areas in the Project Area associated with remnant vegetation, presence of hollows of varying sizes. Therefore, it is likely to provide habitat to some birds and arboreal species that require hollows for shelter and nesting.

Broad Habitat and occurrence in Study Area	Structure	Habitat features
<p>Closed heathland on seasonally waterlogged alluvial plains usually near coast (Includes RE 12.3.13)</p> <p>This comprises approximately 1% of the indicative disturbance footprint.</p>	<p>Tree layer: <i>occasional fringing sparse to dense Eucalyptus spp. and Acacia spp.</i></p> <p>Shrub layer: <i>occasional fringing sparse to dense Melaleuca quinquenervia, Banksia spp. and Acacia spp.</i></p> <p>Ground microhabitat layer: <i>waterlogged alluvial plains with forbs, grasses and sedges.</i></p>	<p>Limited availability in Project Area. Provides sheltering habitat for small birds and reptiles.</p>
<p>Waterbodies and drainage features</p> <p>There were drainage features (creek lines) throughout the Project Area. These were often associated with fringing riparian vegetative communities as discussed above.</p> <p>This comprises approximately 1% of the indicative disturbance footprint.</p>	<p>Tree layer: occasional fringing sparse to dense Eucalyptus spp. and Acacia spp. Often heavily disturbed by weeds.</p> <p>Shrub layer: occasional fringing sparse to dense <i>Melaleuca quinquenervia</i>, Eucalyptus spp. and Acacia spp. Often heavily disturbed by weeds.</p> <p>Ground microhabitat layer: Sparse to dense grass layer (often exotic species). A lack of rocky or woody debris near farm dams. Therefore, may be little shelter or habitat for smaller reptiles or ground-dwelling species. Would be used as a water source and for movement habitat.</p>	<p>These farm dams and creek lines provide a refuge and movement habitat for a range of bird species, including migratory species and birds of prey.</p>
<p>Grasslands and impacted hardstand with occasional presence of Eucalyptus spp</p> <p>This comprises approximately 72% of the indicative disturbance footprint.</p>	<p>Mixture of road verge vegetation and highly modified environments.</p>	<p>Provides little to no value to MNES due to the extensive clearing that has occurred. Longer grasses may provide some habitat for smaller reptiles and ground-dwelling bird species. Some leaf litter and/or woody debris would provide habitat and shelter availability for smaller ground dwelling animals.</p>

3.2.4 Ecological corridors

The Project Area crosses two mapped regional ecological corridors and one mapped state ecological corridor. At a local scale, waterways and remnant vegetation across the Project Area provide habitat connectivity. Ecologically important corridors associated with the Project Area include Beerburrum East State Forest, Tibrogargan Creek, Coonowrin Creek, Coochin Creek, Mellum Creek and Bluegum Creek, are presented in Appendix D.10. Existing drainage lines and waterways represent important movement corridors for terrestrial fauna species across the Project Area. While still ecologically important, all corridors have a high level of disturbance (e.g. weed infestations). All corridors are likely to be used by highly mobile species such as birds and bats. However, the value of these corridors for terrestrial mammals, reptiles and frogs varies greatly.

The B2N project has also considered koala conservation in context with the Queensland Government's South East Queensland Koala Conservation Strategy 2020-2025 (DES, 2020) (SEQ Koala Strategy). The South East Queensland (SEQ) Koala strategy includes spatial modelling for koala habitat in south east Queensland. The B2N project includes state mapped core koala habitat and koala habitat restoration areas within the indicative disturbance footprint. The koala habitat mapping associated with this preliminary documentation has been ground-truthed. The SEQ Koala strategy targets include:

1. Populations: stabilise koala population numbers in SEQ
2. Koala habitat: a net gain in the total core koala habitat area
3. Koala habitat restoration: commence rehabilitation to restore 10,000 hectares of koala habitat
4. Threat reduction: commence 10 programs in threat priority areas to support at least a 25 per cent reduction in disease, injury and mortality rates in those locations.

The B2N project mitigation measures outlined in Section 5 (i.e. fauna passage corridors) and offsets proposed in Section 6 will benefit the targets of the SEQ Koala Strategy.

3.3 Response to 3.3 a)

Information Required for Assessment by Preliminary Documentation

3.3 *For listed threatened species and ecological communities and listed migratory species that have the potential, or are likely, to be present at and in the vicinity of the project site, including but not limited to those listed in this request for further information, this section must provide the following:*

a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.

This section details the abundance, distribution, ecology and habitat preference of the listed threatened species and communities that are known or likely to occur within and adjacent to the Project Area.

Consistent with the accepted approach for ecological assessment, a likelihood of occurrence assessment was undertaken informed by desktop sources and field investigations. The full likelihood of occurrence outcomes is documented in the *MNES Baseline Report* (ERM, 2021) (Appendix C) with a summary provided in this section.

The likelihood of occurrence approach refines the desktop investigation using site-specific and species-specific habitat information obtained from field surveys. The assessment ranks the likelihood of occurrence within the Project Area as known, likely, potential or unlikely to occur based on the criteria outlined in Table 7.

Table 7. Likelihood of Occurrence Criteria

	Suitable habitat exists	Suitable habitat is limited or does not exist¹
Records within Project Area (based on site surveys and recent (last 20 years) records)	Known	Known
Records in the locality ²	Likely	Unlikely
No records in the locality, but Project Area is within known distribution	Potential	Unlikely
No records in the locality, and Project Area is outside of distribution	Unlikely	Unlikely
¹ Some desired habitat features may be present, but not all habitat may have poor connectivity or habitat may be known to be disturbed. Based on sources reviewed and/or field survey results.		
² 'Locality' refers to a 10 km buffer of the Project Area.		

Habitat and distribution information for MNES is sourced from SPRAT profiles and/or Conservation Advice where available, supplemented by other primary sources (e.g. published literature). Regarding species records, these were sourced from Wildlife Online (WO) and/or Atlas of Living Australia (ALA). Field data used to inform the likelihood of occurrence assessment are based on data presented from field surveys undertaken from 2016-2021. Where species presence cannot be discounted, due to their distribution overlapping the Project Area, they are categorised as potential to occur.

The species identified as known or likely to occur and are the subject of assessment in this Preliminary Documentation, are summarised in Table 8.

Species abundance data is not available for all MNES species known or likely to occur in the Project Area. Desktop research of occurrence records in the locality were undertaken to inform the likelihood of occurrence assessment. Results from previous ecological assessments for the B2N project and the 2021 field investigations also contributed to determining abundance or presence/absence of MNES. Species records in the Project Area are outlined in Table 8. *EPBC Act* listed species field survey records from SMEC surveys (2016, 2019), ARUP (2020) and ERM (2021) are depicted in Figure 11 of Appendix D.11.

Table 8. Likelihood of Occurrence Summary

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
White-throated needletail (<i>Hirundapus caudacutus</i>)	V, M	<p>This species occurs over most types of habitat, but are recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. Whilst rare, they have been recorded on wooded ends of ridges, roosting after dark high in the eucalypt tree canopies.</p> <p>Species likely to fly over and adjacent to the Project Area. The Project Area does contain potential habitat in the form of eucalypt forests. It may also roost and forage in such general woodland habitat. Breeding does not occur in the locality.</p>	Yes	Yes (Project Area)	<p>Known to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Species likely to fly over the Project Area, which also contains potential habitat in the form of tall eucalypt forests. Approximately 30 recent records exist within the Project Area (ALA, 2021). 	Potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Fork-tailed swift (<i>Apus pacificus</i>)	M	<p>In Australia, they occur over cliffs and beaches and over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh.</p> <p>Potential habitat exists in and adjacent to the Project Area. There is a lack of preferred coastal and riparian heathland or swamp habitat.</p>	Yes	Yes (Project Area)	<p>Known to occur</p> <ul style="list-style-type: none"> • Project Area intersects the distribution of the species as mapped on the SPRAT profile. • Potential foraging habitat exists in the Project Area. • Eight recent records (2018-2019) for the species occur within the Project Area/locality. The closest records occur near to Nambour, Landsborough and Beerwah (ALA, 2021). 	Migratory bird potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Oriental cuckoo (<i>Cuculus optatus</i>)	M	<p>The species uses a range of vegetated habitats such as monsoon rainforest, wet sclerophyll forest, open woodlands and appears quite often along edges of forests, or ecotones between forest types. This cuckoo feeds arboreally, foraging for invertebrates on loose bark on the trunks and branches of trees, and among the foliage, including in mistletoes. It will forage from the ground but requires shrubs or trees from which it sallies and returns to consume prey items.</p> <p>Habitat associated with moist forests occur along creeks and major drainage lines in and adjacent to the Project Area.</p>	Yes	Yes (locality)	<p>Likely to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Habitat associated with moist forests occur along major drainage lines exist in the Project Area. Two recent records (2017, 2002) for the species exist within the locality near Landsborough and Beerwah (ALA, 2021). 	Migratory bird potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Rufous fantail (<i>Rhipidura rufifrons</i>)	M	<p>In east and south-east Australia, the rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as tallowwood (<i>Eucalyptus microcorys</i>) and mountain grey gum (<i>E. cypellocarpa</i>). When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, including spotted gum (<i>E. maculata</i>), yellow box (<i>E. melliodora</i>), ironbarks or stringybarks, often with a shrubby or heath understorey.</p> <p>Habitat associated with moist forests occur along creeks and major drainage lines in and adjacent to the Project Area.</p>	Yes	Yes (Project Area)	<p>Known to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Habitat of moist forest environments do occur along major drainage lines in the Project Area. Species observed during field surveys (2021). 	Migratory bird potential habitat mapped in Appendix D.4	1 individual sighting during field surveys (2021) presented in Appendix D.11
Spectacled monarch (<i>Monarcha trivirgatus</i>)	M	<p>The spectacled monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves.</p> <p>Habitat associated with moist forests occur along creeks and major drainage lines in and adjacent to the Project Area.</p>	Yes	Yes (Project Area)	<p>Known to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Habitat is present within the Project Area. Species observed at Survey Point 29 during field surveys (2021) see Figure 11 of Appendix D.11. 	Migratory bird potential habitat mapped in Appendix D.4	2 individual sightings during field surveys (2021) presented in Appendix D.11

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Black-faced monarch (<i>Monarcha melanopsis</i>)	M	<p>The black-faced monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest.</p> <p>Habitat associated with moist forests occur along creeks and major drainage lines in and adjacent to the Project Area.</p>	Yes	Yes (Project Area)	<p>Known</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Habitat of moist forest environments occur along major drainage lines in the Project Area. Observed in Project Area during ecological assessment surveys by WBM in 2006 (WBM and BAAM, 2007). 	Migratory bird potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)
Satin flycatcher (<i>Myiagra cyanoleuca</i>)	M	<p>Satin flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in drier woodlands and open forests.</p> <p>Habitat associated with moist forests occur along creeks and major drainage lines in and adjacent to the Project Area.</p>	Yes	Yes (locality)	<p>Likely to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Habitat of moist forest environments do occur along major drainage lines in the Project Area. Six recent records (2002-2017) for the species occur within the locality. The closest records occur near to Beerburum, Landsborough and Beerwah (ALA, 2021). 	Migratory bird potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Koala (<i>Phascolarctos cinereus</i>)	V	<p>Koalas naturally inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus species as explained by Martin & Handasyde 1999 (as cited in, DoE, 2019h). Koala habitat can be broadly defined as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees.</p> <p>Habitat of eucalypt forests, and preferred food trees, present within and adjacent to the Project Area. Habitat within the Project Area is highly disturbed by weeds, domestic animals, and fragmentation by roads, agricultural land and rail.</p>	Yes	Yes (locality)	<p>Known to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Habitat of eucalypt forests and woodlands, containing koala food tree is present within the Project Area. No sightings were observed during field surveys or targeted dog detection surveys (USC, 2020, 2021), but signs (faecal pellet and scratches) were observed (ARUP, 2020)(see Appendix D.11). Recent records exist in the locality (2014-2020) near to Landsborough, Beerburrum and Palmwoods (ALA, 2021). This data suggests very low koala abundance within and adjacent to the Project Area. 	Potential habitat mapped in Appendix D.3	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Grey-headed flying fox (<i>Pteropus poliocephalus</i>)	V	<p>It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feeds on commercial fruit crops and on introduced tree species in urban areas. Eby (1998) explained that the primary food source is blossom from Eucalyptus and related genera but in some areas, it also utilises a wide range of rainforest fruits (as cited in, DoE, 2019i).</p> <p>The listing advice for this species says that individuals can travel up to 50 km from their known roosting camps, in order to forage. They generally roost within 20 km of food sources which include the nectar and pollen of Eucalyptus, Melaleuca and Banksia native trees.</p> <p>Foraging habitat present in eucalypt woodlands, riparian areas and roost sites are known to occur in the Project Area and locality. The species was observed at identified roost sites during fauna surveys.</p>	Yes	Yes (Project Area)	<p>Known to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Foraging habitat present in eucalypt woodlands and riparian areas. Roost sites are known to occur in the locality. The nearest known roost for the species is at Kolora Park in Palmwoods, which is approximately 100m from the indicative disturbance footprint. Species was observed in locality during field surveys (2021). Observed foraging in the Project Area and roosts in use during the daytime were recorded (ARUP 2020). 	Potential habitat mapped in Appendix D.3	1 individual sighting in locality during field surveys (2021) presented in Appendix D.11

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Giant barred frog (<i>Mixophyes iteratus</i>)	E	<p>The giant barred frog occurs in rainforests and wet sclerophyll forests in upper to lower catchment areas. In consideration of habitat preferences, during surveys in the Cooroy to Curra area of south-east Queensland, giant barred frogs were observed to prefer a closed forest canopy with a relatively light cover of vegetation at ground level (FPE, 2015).</p> <p>Habitat exists along the major drainage lines within and adjacent to the Project Area.</p>	Yes	Yes (Locality, 2020)	<p>Likely to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Suitable habitat exists along the major drainage lines within the Project Area. Species was detected 100 m east of the Project Area during surveys (ARUP 2020) at Mellum Creek. 	Potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Whipstick wattle (<i>Acacia attenuata</i>)	E	<p>The species occupies areas lower than 30 m AHD. It occurs in waterlogged areas containing wet heathland, open forests and woodlands areas, on poorly drained sandy soils or peat swamps that are infertile. Often grows in areas with the following species: <i>Leptospermum whitei</i> and <i>Baeckea frutescens</i>; in wallum with <i>Banksia aemula</i> and <i>Eucalyptus robusta</i>; in woodlands with <i>Corymbia trachyphloia</i>, <i>E. umbra</i> and <i>Banksia oblongifolia</i>; and in open forests of <i>E. umbra</i>, <i>E. racemosa</i> and <i>Melaleuca quinquenervia</i> (Queensland CRA/RFA Steering Committee, 1998).</p> <p>Potential preferred habitat of <i>E. racemosa</i> (RE 12.5.3) open forests on sandy soils, often water-logged, is present within and adjacent to the Project Area.</p>	Yes	Yes (Project Area)	<p>Likely to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Potential habitat associated with RE 12.5.3 present within the Project Area. There is a record within the locality from 2004 (ALA, 2021). It has not been recorded within the past 10 years or from recent targeted field surveys. 	Potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Mt Emu she-oak (<i>Allocasuarina emuina</i>)	E	<p>This species occurs within open and closed heath habitats that are characterised by fine-grained rocky slopes, as well as in Wallum heath in undulating coastal plains. It is found in relatively flat, low-lying coastal areas on areas of slopes of 20 degrees to flat areas (Halford, 1993b). Species associated with habitat for Mt Emu she-oak include <i>Ptilanthium deustum</i>, <i>Hakea actites</i> and <i>Banksia oblongifolia</i>.</p> <p>There is potential habitat of wet heathland (RE 12.3.13), present within the locality.</p>	Yes	Yes (Locality, 2020)	<p>Likely to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. There is potential habitat of wet heathland (RE 12.3.13), present within the locality. Populations for this species occur in the Beerwah conservation areas (RE 12.3.13), within the locality. 	Potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)
Swamp stringybark (<i>Eucalyptus conglomerata</i>)	E	<p>This species occurs on coastal flat areas at approximately 30 m AHD, often in ecotones between Wallum heath and tall open forests. Soils are general infertile and there is poor drainage so that the area is often water-logged (Bean, 1980).</p> <p>There is potential habitat of open forest to woodland of <i>Melaleuca quinquenervia</i> and <i>Eucalyptus robusta</i> (RE 12.3.4), present within and adjacent to the Project Area.</p>	Yes	Yes (Locality, 2020)	<p>Likely to occur</p> <ul style="list-style-type: none"> Project Area intersects the distribution of the species as mapped on the SPRAT profile. Potential habitat of RE 12.3.4 is present within the Project Area. This species was found during field surveys in 2020, however only within the boundary of the Glasshouse Mountain National Park, approximately 50 m outside of the Project boundary (within the locality) (ARUP, 2020). 	Potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Macadamia nut (<i>Macadamia integrifolia</i>)	V	<p>This species often grows in remnant rainforest areas, most commonly in open areas on the edges of such rainforests. It can be found across hill crests, slopes, in gullies and benches. It grows in high nutrient value alluvial and volcanic soils and in areas that are well drained (Barry & Thomas, 1994). In Queensland it can be found in a range of environments, from tall closed forest, simple notophyll mixed very tall closed forests, to simple microphyll-notophyll mid-high closed forests with Araucaria and Argurodendron emergents (Barry & Thomas, 1994).</p> <p>There is potential habitat of <i>Eucalyptus grandis</i>, <i>Lophostemon confertus</i> tall open forest with vine forest understorey ('wet sclerophyll') (RE 12.3.2), present within and adjacent to the Project Area.</p>	Yes	Yes (locality)	<p>Likely to occur</p> <ul style="list-style-type: none"> • Project Area intersects the distribution of the species as mapped on the SPRAT profile. • Potential habitat occurs within RE 12.3.2 • There was one individual plant recorded for this species within the locality, approximately 100 m from the Project Area (ARUP 2020). 	Potential habitat mapped in Appendix D.4	No species sightings occurred during field surveys (2021)

Species name	EPBC Status	Habitat requirements	Distribution in Project Area	Records in the Project Area/ locality (10km)	Comment on likelihood of occurrence in Project Area	Potential habitat mapping	Number of sightings
Native guava (<i>Rhodomyrtus psidioides</i>)	CE	<p>This species is described as a pioneer in disturbed environments (Williams & Adam, 2010). Vegetation types it is found in include subtropical rainforest, warm temperate rainforests, littoral rainforests and wet sclerophyll forests (Keith, 2004).</p> <p>While wet sclerophyll forests are present within the Project Area, it is disturbed, fragmented and weed incursions are common, such that suitable habitat does not occur within the Project Area</p>	Yes	Yes (locality)	<ul style="list-style-type: none"> The B2N Project is within the distribution for the species. There is no suitable habitat present within the Project Area. There is a single record within the locality, from Mount Mellum from 2014 (approximately 4 km from the Project Area). <p>No further assessment has been undertaken for this species as it does not naturally occur within the Project Area.</p>	No habitat mapped	No species sightings occurred during surveys, and incorrect identification documented by ARUP (2020) has been corrected.
Davidson's plum (<i>Davidsonia jerseyana</i>)	E	<p>This species' preferred habitat is coastal and lowland subtropical rainforest and wet sclerophyll forest. There are a number of records within subtropical rainforest from a small area in northern NSW (Threatened Species Scientific Committee, 2015).</p> <p>The Project Area is not within the known distribution for the species.</p>	No	Yes (planted individuals)	<ul style="list-style-type: none"> The B2N Project is not within the distribution for the species. Seven Davidson's plum specimens were identified in the Project Area at Lot 1 on RP124412, between Beerburrum and Beerwah. The specimens were concluded to be cultivated individuals (see Section 3.1). <p>No further assessment has been undertaken for this species as it does not naturally occur within the Project Area.</p>	No habitat mapped	Seven planted individuals sighted (ERM, 2021)

Status listing per EPBC Act: CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory.

Sources of habitat information for all species, unless otherwise stated, were gathered from DAWE Conservation Advice and SPRAT database: (<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>). Each of these is listed in the reference species, specific to the subcategory (e.g. Flora, fauna and migratory).

Threatened ecological communities that potentially occur were identified through desktop investigations. Field investigations confirmed that both TECs are not present within the Project Area (refer to Table 9).

Table 9. Likelihood of Occurrence of Threatened Ecological Communities within the Project Area

TEC Name	EPBC Act Status	Habitat Preferences and Known Distribution	Present in Project Area
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community	Endangered	This community is associated with coastal catchments, typically 30 km of the coast in Queensland and 30–100 km inland from the coast in New South Wales. This community is also known to occur on floodplains or coastland flats associated with former or current coastal river systems. It is dominated by swamp oak (<i>Casuarina glauca</i>), with several eucalypt species or melaleuca species as emergents depending on the local environmental conditions. This TEC can be associated with REs 12.1.1 and areas within 12.3.20, where the canopy is dominated by <i>Casuarina glauca</i> .	Not present
Lowland Rainforest of Subtropical Australia	Critically Endangered	This community is associated with areas of highly fertile basaltic and alluvial soils. The vegetation structure of this ecological community is a closed forest reaching heights of greater than 20 m. The canopy/ sub canopy layer is known to contain a diverse range of species including hoop pine, figs and white booyong. Buttress roots and a diverse range of vine species is also associated with this TEC. This community is unlikely to contain species of Eucalyptus, Melaleuca and Casuarina. This TEC can be associated with the following REs: 12.3.1, 12.5.13, 12.8.3, 12.8.4, 12.8.13, 12.11.1, 12.11.10, 12.12.1 and 12.12.16.	Not present

3.4 Response to 3.3 b)

Information Required for Assessment by Preliminary Documentation

- 3.3 For listed threatened species and ecological communities and listed migratory species that have the potential, or are likely, to be present at and in the vicinity of the project site, including but not limited to those listed in this request for further information, this section must provide the following:
- b) Quantification of the extent of habitat and (if known) the number of individuals present or historical patterns of use on and surrounding the proposed action site (including maps identifying known or potential habitat).

Ground-truthed habitat mapping for MNES is provided in Figure 3 of Appendix D.3 and Figure 4 of Appendix D.4. MNES habitat mapping has been ground-truthed within and adjacent to the Project Area. For MNES fauna, this mapping is an accurate representation of habitat available within the indicative disturbance footprint and within a 50 m buffer of the indicative disturbance footprint. The 50 m buffer area surrounding the indicative disturbance footprint is included to enable the identification of indirect impacts. The MNES flora species mapping is a representation of potential habitat for the species based on ground-truthed assessments and desktop resources (e.g. State RE mapping).

The table below outlines the listed threatened species, ecological communities and listed migratory species that have the potential, or are likely, to be present within the Project Area. Habitat mapping was completed for species known or likely to occur and the area of habitat that occurs within the Project Area is provided in the table below. Species identified as potentially occurring have a known distribution that exists in the Project Area and cannot be discounted from occasionally occurring in the Project Area. However, these species lack records in the locality or have a lack of important habitat features within the Project Area. Therefore, habitat mapping was not completed for these species. As identified in Section 3.1, the *D. Jerseyana* specimens are planted and due to the absence of habitat for the species, or additional records/sightings from field surveys or known populations within the Project Area, the species is identified as known to occur, but not considered further in this assessment. The likelihood of occurrence methodology is outlined in Section 3.2.4.

Table 10. Listed threatened species and listed migratory species that have the potential, or are known/likely, to be present within the Project Area and mapped habitat

Matter	Likelihood of occurrence	Habitat in Project Area Total (ha)	Habitat in the Indicative Disturbance Footprint (ha)
Koala (<i>Phascolarctos cinereus</i>)	Likely	241.72 ha	64.15 ha
Grey-headed flying-fox (<i>Pteropus poliocephalus</i>)	Known	241.72 ha	64.15 ha
Giant barred frog (<i>Mixophyes iteratus</i>)	Likely	0.98 ha	0.1 ha
Fork-tailed swift (<i>Apus pacificus</i>)	Known	N/A	N/A
White-throated needletail (<i>Hirundapus caudacutus</i>)	Known	20.99 ha	5.58 ha
Regent honeyeater (<i>Anthochaera phrygia</i>)	Potential	N/A	N/A
Black-faced monarch (<i>Monarcha melanopsis</i>)	Known	41.61 ha	14.47 ha
Oriental cuckoo (<i>Cuculus optatus</i>)	Likely	41.61 ha	14.47 ha
Rufous fantail (<i>Rhipidura rufifrons</i>)	Known	41.61 ha	14.47 ha
Spectacled monarch (<i>Monarcha trivirgatus</i>)	Known	41.61 ha	14.47 ha
Satin flycatcher (<i>Myiagra cyanoleuca</i>)	Likely	41.61 ha	14.47 ha
Osprey (<i>Pandion haliaetus</i>)	Potential	N/A	N/A
Whipstick wattle (<i>Acacia attenuata</i>)	Likely	46.97 ha	17.93 ha
Mt Emu she-oak (<i>Allocasuarina emuina</i>)	Likely	0.52 ha	0 ha
Swamp stringybark (<i>Eucalyptus conglomerata</i>)	Likely	36.23 ha	11.85 ha
Macadamia nut (<i>Macadamia integrifolia</i>)	Likely	6.45 ha	0.12 ha
Davidson's plum (<i>Davidsonia jerseyana</i>)	Known (planted individuals)	N/A	N/A

As previously described, 17 listed threatened species and listed migratory species are likely or known to occur in the Project Area. No TECs occur within Project Area. GIS mapping was used to determine the extent of threatened species habitat or potential habitat within the Project Area (for those species identified in Table 10). Habitat maps have been prepared using ArcGIS desktop. TMR provided the Project Area boundaries and the cadastral lot boundaries were sourced from Queensland Spatial. ESRI World Topographic Map and World imagery (captured in September 2020) has been used in the overview figures. For the habitat assessment figures where greater detail is required Nearmap imagery captured in May 2021 has been used as the base imagery. Drone footage captured in April-May 2021 was provided by TMR and utilised to distinguish habitat features and refine habitat mapping for the koala and grey-headed flying-fox. Where vegetation that is visible in satellite imagery is not mapped as koala or grey-headed flying-fox habitat; the vegetation does not constitute habitat for these species (i.e. large patches of exotic pines). Ground-truthed habitat mapping within the Project Area is provided in Figure 3 of Appendix D.3 and Figure 4 or Appendix D.4.

3.5 Response to 3.3 c)

Information Required for Assessment by Preliminary Documentation

- 3.3 *For listed threatened species and ecological communities and listed migratory species that have the potential, or are likely, to be present at and in the vicinity of the project site, including but not limited to those listed in this request for further information, this section must provide the following:*
- c) *Assessment of the quality and importance of known or potential habitat for the species or communities within the proposed action site and surrounding areas.*

Extensive field-based assessments have been undertaken for the B2N project across three separate survey periods (2016, 2019, 2020 and 2021) as referenced previously. The MNES Baseline Report is attached in Appendix C. The results from previous studies were utilised as desktop resources to define the final field investigation program that addressed information gaps and to meet requirements for this Preliminary Documentation. Targeted surveys were conducted for MNES values in accordance with relevant survey guidelines. Based on results from field investigations, quality of habitat is generally defined as low (some habitat features exist but lacks diversity, complexity and heavily disturbed), medium (structurally and floristically adequate and some habitat features exist) or high (structurally and floristically diverse and a range of habitat features exist) to support the comparative analysis in the table below. Habitat assessments were conducted at representative sites throughout and adjacent to the Project Area. The Modified Habitat Quality Assessment (MHQA) methodology was also utilised at representative reference sites throughout the Project Area to support offset unitisation where required (refer to Section 6). The habitat mapping for MNES species was completed using the results of ground-truthed surveys within and adjacent to the Project Area (refer to Figure 3 of Appendix D.3 and Figure 4 of Appendix D.4). Survey site locations are displayed in figures (refer to Figure 2 of Appendix D.2).

Table 11. Quality and Importance of Habitat for MNES

Matter	Habitat in Project Area (ha)	Habitat in the Indicative Disturbance Footprint (ha)	Habitat Classification	Quality and Importance of Habitat
Koala	241.72 ha	64.15 ha	Suitable	Low quality - vegetation within the Project Area is generally agricultural land, non-remnant vegetation, plantings or dominated by disturbed areas such as roadsides. This habitat is generally regarded as low importance with some connectivity to adjacent national parks.
Grey-headed flying-fox	241.72 ha	64.15 ha	Suitable	Medium quality - potential foraging resources exist in the Project Area. The grey-headed flying-fox is highly mobile and will utilise foraging resources within the Project Area. No roost sites will be directly or indirectly impacted. The existing suitable habitat consists mostly of modified/agricultural areas or regrowth vegetation in small linear fragments. This includes linear fragments of vegetation in the road reserves along Steve Irwin Way. This habitat is considered generally important as a foraging resource when canopy species are flowering.
Giant barred frog	0.98 ha	0.1 ha	Suitable	Low quality – desktop resources and field assessments concluded that sites at Coochin Creek and Addlington Creek tributaries provide suitable quality habitat. The habitat is considered low quality due to weed impacts, fragmentation and proximity to road and rail line disturbances. This habitat is considered important to the species at Coochin Creek and Addlington Creek tributaries within the Project Area.
White-throated needletail	20.99 ha	5.58 ha	Potential	Medium quality – potential roosting habitat occurs in the Project Area. However, the white-throated needletail is highly mobile and is only likely to utilise tall eucalypt woodlands for occasional roosting. The existing potential habitat areas are generally modified/agricultural areas of regrowth vegetation in small linear fragments. This type of habitat was identified primarily in the buffer areas of the B2N project and will not be directly impacted. This habitat is not considered important to the species within the Project Area.
Migratory birds	41.61 ha	14.47 ha	Suitable	Low quality - consisting of edge habitats that are fragmented and weed degraded. The listed migratory birds are unlikely to use this habitat for breeding. The high mobility of the listed bird species means that fragmentation of habitat is unlikely. This habitat may be utilised for movement but is not considered important to the species within the Project Area.
Whipstick wattle	46.97 ha	17.93 ha	Potential	Low quality – consisting of edge habitats that are fragmented and weed degraded. Impacts to suitable habitat are limited to lower quality habitat or edge habitat that is already moderately to highly disturbed. This habitat is not considered important to the species within the Project Area.
Mt Emu she-oak	0.52 ha	0 ha	Potential	Low quality – consisting of edge habitats that are fragmented and weed degraded. Impacts to suitable habitat are limited to lower quality habitat or edge habitat that is already moderately to highly disturbed. This habitat is not considered important to the species within the Project Area.

Matter	Habitat in Project Area (ha)	Habitat in the Indicative Disturbance Footprint (ha)	Habitat Classification	Quality and Importance of Habitat
Swamp stringybark	36.23 ha	11.85 ha	Potential	Low quality – consisting of edge habitats that are fragmented and weed degraded. Impacts to suitable habitat are limited to lower quality habitat or edge habitat that is already moderately to highly disturbed. This habitat is not considered important to the species within the Project Area.
Macadamia nut	6.45 ha	0.12 ha	Potential	Low quality – consisting of edge habitats that are fragmented and weed degraded. Impacts to suitable habitat are limited to lower quality habitat or edge habitat that is already moderately to highly disturbed. This habitat is not considered important to the species within the Project Area.

3.6 Response to 3.3 d)

Information Required for Assessment by Preliminary Documentation

3.3 For listed threatened species and ecological communities and listed migratory species that have the potential, or are likely, to be present at and in the vicinity of the project site, including but not limited to those listed in this request for further information, this section must provide the following:

- d) Information detailing known populations or records within at least five kilometres of the disturbance footprint and (if known) the size of these populations.

Results from previous ecological assessments for the B2N project and the 2021 field investigations contributed data to understanding MNES species distribution, populations and records. Comprehensive evaluation of species abundance was difficult to determine given the paucity of records. The Project Area occurs primarily in agricultural and urbanised environments where many fauna species are transient in nature. Recent records obtained from desktop sources from 2001-2021, have been collated to provide an indication of listed threatened species distribution close to the Project Area. A summary of known occurrence of MNES known or likely to occur within 5 kilometres of the Project Area is provided in Table 12 and known records is provided in Appendix D.4.

Table 12. Summary of MNES Occurrence in or adjacent to the Project Area

Species name	Summary of known occurrence in or adjacent to Project Area
White-throated needletail (<i>Hirundapus caudacutus</i>)	Known to occur <ul style="list-style-type: none"> Project Area is within the distribution of the species and recent records exist within the Project Area (ALA, 2021). This species is almost exclusively aerial and there are no known populations within the Project Area.
Fork-tailed swift (<i>Apus pacificus</i>)	Known to occur <ul style="list-style-type: none"> Project Area is within the species distribution and eight recent records (2018-2019) for the species occur within the Project Area/locality. The closest records occur near to Nambour, Landsborough and Beerwah (ALA, 2021). This species is almost exclusively aerial and there are no known populations within the Project Area.
Oriental cuckoo (<i>Cuculus optatus</i>)	Likely to occur <ul style="list-style-type: none"> Project Area is within the species distribution and two recent records (2017, 2002) for the species exist within the locality near Landsborough and Beerwah (ALA, 2021). There are no known populations within the Project Area.
Rufous fantail (<i>Rhipidura rufifrons</i>)	Known to occur <ul style="list-style-type: none"> Project Area is within the species distribution and the species was observed during 2021 field surveys at Survey Point 4 and Survey Point 5 (two individuals observed in total), indicating a low density population within the Project Area.
Spectacled monarch (<i>Monarcha trivirgatus</i>)	Known to occur <ul style="list-style-type: none"> Project Area is within the species distribution and one individual was observed at Survey Point 29 during 2021 field surveys, indicating a low density population within the Project Area.
Black-faced monarch (<i>Monarcha melanopsis</i>)	Known to occur <ul style="list-style-type: none"> Project Area is within the species distribution and one observation was recorded in Project Area during ecological assessment surveys by WBM in 2006 (WBM and BAAM, 2007). There are no known populations within the Project Area.
Satin flycatcher (<i>Myiagra cyanoleuca</i>)	Likely to occur <ul style="list-style-type: none"> Project Area is within the species distribution. Six recent records (2002-2017) for the species occur within the locality. The closest records occur near to Beerburum, Landsborough and Beerwah (ALA, 2021). There are no known populations within the Project Area.

Species name	Summary of known occurrence in or adjacent to Project Area
Koala (<i>Phascolarctos cinereus</i>)	<p>Known to occur</p> <ul style="list-style-type: none"> The Project Area occurs within the distribution for the species. No sightings or signs were observed during ERM surveys in 2021. Recent records exist in the locality (2014-2020) near to Landsborough, Beerburum and Palmwoods (ALA, 2021). No signs of koala presence were detected during detection dog surveys in 2020 and 2021 (USC, 2020, 2021), although ARUP (2020) observed signs (scratches). There is a known low density and sparsely distributed population adjacent to the Project Area that extends west to the Sunshine Coast hinterland.
Grey-headed flying fox (<i>Pteropus poliocephalus</i>)	<p>Known to occur</p> <ul style="list-style-type: none"> The Project Area occurs within the distribution for this species. Twenty-nine roost sites are known to occur within a 40 km radius of the Project Area. The nearest known roost for the species is at Kolara Park in Palmwoods at 100m west of the indicative disturbance footprint. Two occupied roost sites were observed during ERM surveys 2021. One at Kolara Park, Palmwoods and one at Peachester Road, Beerwah. The species was observed foraging in the Project Area during the ARUP field surveys in 2020. No roost sites occur within the Project Area, but foraging habitat is within the Project Area. The population distribution and abundance changes seasonally as the species migrates across the East coast in response to flowering eucalypts and related species.
Giant barred frog (<i>Mixophyes iteratus</i>)	<p>Likely to occur</p> <ul style="list-style-type: none"> The Project Area occurs within the distribution for this species. The species was detected 100 m east of the Project Area during surveys (ARUP, 2020) at Mellum Creek. Juveniles and adults were detected during the same survey which indicates that a breeding population exists at this site. The population is restricted to suitable habitat at Mellum Creek and likely in low abundance.
Whipstick wattle (<i>Acacia attenuata</i>)	<p>Likely to occur</p> <ul style="list-style-type: none"> The Project Area occurs within the distribution for this species. There is a record within the Project Area from 2004. It has not been recorded within the past 10 years or from field surveys. There is no known population within the Project Area, although potential habitat occurs.
Mt Emu she-oak (<i>Allocasuarina emuina</i>)	<p>Likely to occur</p> <ul style="list-style-type: none"> The Project Area occurs within the distribution for this species. Populations for this species occur in the Beerwah conservation areas (RE 12.3.13), which is within the locality. No records exist within the Project Area.
Swamp stringybark (<i>Eucalyptus conglomerata</i>)	<p>Likely to occur</p> <ul style="list-style-type: none"> The Project Area is within the distribution for the species. This species was found during field surveys in 2020, however only within the boundary of the Glasshouse Mountains National Park outside of the Project Area (within the locality) (ARUP, 2020). No records exist within the Project Area. The known population is restricted to the Glass House Mountains National Park.
Macadamia nut (<i>Macadamia integrifolia</i>)	<p>Likely to occur</p> <ul style="list-style-type: none"> The Project Area is within the distribution for the species. There was an individual plant recorded for this species within the locality by ARUP (2020). No known populations or other known records exist within the Project Area.
Davidson's plum (<i>Davidsonia jerseyana</i>)	<p>Known to occur</p> <ul style="list-style-type: none"> The Project Area is not within the distribution for the species, and although seven specimens were recorded (planted), no additional individuals, populations or potential habitat occurs within the Project Area.

3.7 Response to 3.3 e)

Information Required for Assessment by Preliminary Documentation

- 3.3 For listed threatened species and ecological communities and listed migratory species that have the potential, or are likely, to be present at and in the vicinity of the project site, including but not limited to those listed in this request for further information, this section must provide the following:

- e) *Information on the survey methodology used, including a map/s of survey points or transects, how the survey points or transects were selected, when surveys were conducted (e.g. dates, time of day, season, etc.) and search effort (e.g. 20 hours over eight days).*

Table 13 details survey methodology used, how the survey points were selected, when surveys were conducted and search effort for the MNES listed threatened species completed in previous studies. The following section also details the survey methodology for the 2021 field survey campaign. Figure 2 Appendix D.2 illustrates survey points.

Table 13. Previous B2N project Field Investigations

Information Source	Target Species / Values	Sampling Effort / Investigation Period	Methods
<i>Review of Environmental Factors (SMEC 2019)</i>	RE, TEC and threatened flora	RE and TEC verification and flora assessment within Project alignment. Conducted over five days from 20-24 June 2016 (35 sites) and on 13 August 2019 (5 sites).	Quaternary Assessments (Nelder et al., 2012) at 39 sites. The flora survey consisted of 34 quaternary survey sites in 2016 and four quaternary survey sites in 2019.
<i>Review of Environmental Factors (SMEC 2019)</i>	Threatened fauna habitat	Threatened fauna habitat within Project alignment. Conducted over five days from 20-24 June 2016 (34 sites) and on 13 August 2019 (5 sites).	As above. Habitat assessments were conducted at each quaternary survey site. While in the field all fauna observed or heard calling were recorded.
<i>Review of Environmental Factors (SMEC 2019)</i>	Koala	Koala SAT	9 sites surveyed in 2016 and 5 sites surveyed in 2019. Two person minutes per tree searching for faecal pellets. Brief search of each tree (30 trees per SAT site) for presence/absence.
<i>Commonwealth Matters Ecological Report (ARUP 2020)</i>	Threatened fauna habitat	9 fauna habitat assessments were undertaken in February – September 2020.	Fauna habitat data recorded included: <ul style="list-style-type: none"> • slope and aspect • level of disturbance • age structure • abundance of fauna features • leaf litter depth and cover • proximity to permanent surface water and • importance of the site as a fauna corridor
<i>Commonwealth Matters Ecological Report (ARUP 2020)</i>	Threatened flora	Flora surveys were conducted from 17-28 February 2020, from 16-18 March 2020 and from 17-18 September 2020. Timing of surveys was suitable for threatened species that have the potential to occur in the Project Area.	Surveys consisted of vegetation community assessments, TEC validations and flora meander surveys using quaternary assessments, as per Neldner et. al, (2019). TEC validations evaluated TEC presence using key diagnostic criteria and condition thresholds outlined within the EPBC Act Approved Conservation Advice.
<i>Commonwealth Matters Ecological Report (ARUP 2020)</i>	Koala	SAT Surveys and Nocturnal Spotlighting	14 SAT surveys were conducted. Nocturnal spotlighting was also conducted at one of the SAT survey site locations for 4 nights, during additional 2020 surveys
<i>Commonwealth Matters Ecological Report (ARUP 2020)</i>	Grey-headed flying-fox	Survey of foraging habitat and permanent or temporary roosts.	During fauna habitat assessments across the Project Area, grey-headed flying-fox foraging habitat and/or roosts were recorded.

Information Source	Target Species / Values	Sampling Effort / Investigation Period	Methods
<i>Commonwealth Matters Ecological Report</i> (ARUP 2020)	Threatened frogs	Nocturnal frog surveys were conducted during 17-20 February 2020 and 2-5 March 2020. Active searches on 4 nights were undertaken at 4 sites that contained potential habitat for giant barred frog	Survey sites were selected based on potential suitable habitat at creeks and creek tributaries crossing the rail corridor. Methods included eye-shine spotlighting, call playback and visual searches for tadpoles. Surveys were conducted after nightfall, during moderate to warm temperatures and following rain events.
<i>Commonwealth Matters Ecological Report</i> (ARUP 2020)	Threatened fish	Field survey at waterways and drainages in the Project Area from 24-26 February 2020. 26 sites were surveyed.	A total of 16 waterways, seven drainages, and two wetland (dams) were surveyed. Rapid assessments using the Queensland AusRivAs field sheets were conducted. Sites were searched for a 100 transect at each location. Macrophyte presence and cover, fish habitat and physical attribute information was recorded.
<i>Koala Detection Dog Survey Report</i> (USC, 2020)	Koala	Detection Dogs. 3 days July – August, 2020	Two detection dogs fitted with GPS trackers using a casual transect technique in identified koala habitat. Total transect length surveyed approximately 34.2 km within and adjacent to Project Area.
<i>Koala Detection Dog Survey Report</i> (USC, 2021)	Koala	Detection Dogs. 4 days January – February, 2021	Two detection dogs fitted with GPS trackers using a casual transect technique in identified koala habitat. Total transect length surveyed approximately 41.9 km within and adjacent to Project Area.

In addition to publicly available desktop sources, the field investigation results from the *Review of Environmental Factors* (SMEC 2019), *Koala Survey Using Detection Dogs Beerburum to Nambour Rail Upgrade* (USC 2020, 2021), *Commonwealth Matters Ecological Report* (ARUP 2020) and the *MNES Baseline Report* (ERM 2021) were examined to define the target MNES values for this Preliminary Documentation report.

Review of Environmental Factors (SMEC 2019)

Surveys conducted for the *Review of Environmental Factors* (SMEC 2019) occurred over five days in June 2016 and August 2019. “The survey sites were intended to provide a systematic overview of the vegetation type, vegetation condition, habitat values and waterway values along the alignment. Vegetation mapped as REs was specifically targeted where possible” (SMEC, 2019). There were thirty-four sites surveyed within the Project Area in 2016 and five sites assessed in 2019. These field investigations assessed threatened and migratory fauna listed under State and Commonwealth legislation for their likelihood of occurrence based on community type (e.g. REs), habitat structure and fauna features (e.g. hollow-bearing trees, foraging resources) suitable to support threatened fauna species. Targeted surveys were undertaken for the koala (14 Spot Assessment Technique [SAT] surveys).

Commonwealth Matters Ecological Report (ARUP 2020)

Surveys conducted for the *Commonwealth Matters Ecological Report* (ARUP 2020) occurred in February, March, September and December of 2020. Based on recommendations for further ecological investigations in the *Review of Environmental Factors* (SMEC 2019), the additional targeted surveys included:

- threatened flora and ecological communities
- koala SAT surveys and nocturnal spotlighting
- grey-headed flying-fox roosting and foraging habitat
- threatened frogs active searches and nocturnal surveys
- threatened fish passage and habitat values assessment
- fauna habitat assessments.

Koala Survey Using Detection Dogs Beerburum to Nambour Rail Upgrade (USC 2020, 2021)

USC was contracted by TMR to complete two separate koala surveys using detection dogs across potential koala habitat within the Project Area in August 2020 and during the breeding season (August to January) in January 2021. Two separate survey reports USC (2020 and 2021) 'Koala Survey Using Detection Dogs Beerburum to Nambour Rail Upgrade' were provided to TMR following the surveys. Two detection dogs were fitted with GPS trackers using a casual transect technique surveying identified koala habitat. The total transect length surveyed is approximately 34.2 km (July 2020) and 41.9 km (January - February 2021) within and adjacent to the Project Area.

3.7.1 Additional field investigations - 2021

Based on a review of the previous assessments and field investigations (summarised above), it was determined that additional field investigations were required to further target EPBC Act listed threatened species and migratory species, to determine likely presence and support the accurate mapping of habitats. This information is used to support mapping of habitats for MNES and quantification of direct and indirect impacts of the B2N project on MNES known and likely to occur in the Project Area.

Specific field methodologies undertaken in 2021 in addition to previous field surveys are described in the following sections.

3.7.2 Survey effort

The field investigations for the ecological assessment were undertaken by a total of 6 ecologists over 9 days, in April to May 2021. They involved a field assessment of terrestrial and aquatic habitats, threatened flora meander searches, deploying camera traps, spotlighting and targeted bird surveys. Oversight, guidance and technical review has been undertaken by Partner / Principal Ecologist Dr David Dique, a 25-year experienced ecologist, for each field investigation. David led the overall field survey design and was present at three of the four field survey periods. Adam Pavitt led the delivery of the field survey program and attended all field surveys. Adam is an experienced ecologist with over six years' experience in undertaking field surveys and environmental assessments. Vegetation assessments, including ground-truthing and mapping of TEC's was led by Senior Ecologist Dr Toivo Zoete, a 30-year experienced botanist and vegetation specialist. A one-day supplementary flora survey was undertaken on 12 November 2021 at Lot 1 on RP124412, by Tim Callaghan, a 6-year experienced field ecologist. A summary of the survey effort is provided in Table 14 and a description of survey techniques follows. For maps of the 2021 field survey points, refer to Figure 2 of Appendix D.2.

Table 14. Additional Field Investigations, April-May and November 2021

Period	Personnel	Assessment
9 April 2021	Principal Ecologist Senior Ecologist Ecologist	Hours: 24 hours Focus: Site familiarisation <ul style="list-style-type: none">driving tour of rail corridor from Beerburum to Woombye led by TMRvegetation and habitat within Project Area relevant to MNES
20 April – 6 May 2021	Principal Ecologist 4 x Ecologists	Hours: 70 hours Focus: Habitat Assessments <ul style="list-style-type: none">35 x habitat assessments relevant to MNES values within and adjacent to the Project Areakoala faecal pellet surveys (SAT)microhabitat surveys
20 April – 6 May 2021	2 x Ecologist	Hours: 80 hours Focus: Ground-truthed habitat mapping <ul style="list-style-type: none">ecologists on foot or driving within and adjacent to the Project Area to ground-truth habitat relevant to MNES values

Period	Personnel	Assessment
20 April – 6 May 2021	2 x Ecologist	Hours: 20 hours Focus: Threatened and migratory birds dawn and dusk bird utilisation surveys <ul style="list-style-type: none"> • 20-minute timed surveys within and adjacent to the Project Area over 9 days • 30 sampling locations • opportunistic observations were recorded as well as records of important foraging tree species
4-5 May 2021	Principal Ecologist 2 x Ecologists	Hours: 8 hours Focus: Nocturnal MNES species <ul style="list-style-type: none"> • spotlighting meander surveys through suitable habitat relevant to MNES values within and adjacent to the Project Area • focusing on large tracts of vegetation adjacent to the Rail Corridor and within the Project Area that contained large hollow bearing trees • 7 sampling locations • approximately 2 hours per survey over 2 nights
27 April – 5 May 2021	2 x Ecologists	Hours: 240 hours Focus: Terrestrial MNES Fauna <ul style="list-style-type: none"> • camera traps deployed at 10 sampling locations within the Project Area • scent baits utilised • 1 x camera trap set for 5 days at each sampling locations
12 November 2021	Ecologist	Hours: 8 hours Focus: Davidsonia spp. <ul style="list-style-type: none"> • flora survey using random meander technique across Lot 1 on RP124412 • specimens collected and provided to the Queensland Herbarium for identification

3.7.3 Vegetation and habitat assessments

Vegetation community assessments and habitat assessments were undertaken to describe the type and condition of the communities in the Project Area. The outcomes of the assessment were used to inform the likelihood of occurrence assessment for listed threatened species and TECs, within the Project Area.

The vegetation assessments undertaken included:

- assessment of water features (such as riparian areas) and habitat values
- recording of topographical features
- defining the barriers of both disturbed and undisturbed areas.

The parameters measured during the terrestrial habitat assessments included:

- context regarding landscape features (connectivity, proximity to water)
- terrestrial flora species present including canopy, shrub and ground-layer height
- condition (weeds, evidence of disturbance, invasive species)
- breeding and roosting habitat features (hollow bearing trees, nests, caves)
- foraging sources (flowering tree species, termite mounds)
- microhabitat presence (woody debris, leaf litter, decorticated bark, bare ground, soil cracks, surface rock and rocky outcrops)
- wetland and/or waterway presence (presence of aquatic vegetation, water depth and condition)
- signs of threatened species (such as scats, scratches and track marks).

The parameters measured during the **aquatic** habitat assessments included:

- features of the waterway including bank height, estimated flow, width and depth of standing water (if any)
- condition and complexity of a riparian zone, including vegetation types present and canopy height
- presence of aquatic habitat necessities including woody debris, shaded areas and free passage of movement
- adjacent land use types and subsequent impacts to the waterways
- details of sediment types present (presence of anoxic sediments)
- presence of litter, erosion caused by land use such as cattle grazing or mechanical impacts
- presence of aquatic flora species
- overall habitat condition and value, including an assessment potential to support aquatic species
- specific detail on vegetation and habitat assessments regarding survey technique, effort and the meeting of survey guideline requirements, is provided in the MNES Baseline Report (ERM, 2021) (Appendix C)
- watercourses within the Project Area were analysed throughout the field investigations.

3.7.4 Targeted species surveys

Extensive targeted surveys were previously conducted in and adjacent to the Project Area in 2016 (SMEC, 2019) and 2019 (ARUP, 2020). For a summary of the previous targeted surveys see Table 13. The species targeted for the 2021 investigations considered information from updated database searches as well as the findings from the *Review of Environmental Factors* (SMEC 2019) and *Commonwealth Matters Ecological Report* (ARUP 2020). The previous studies confirmed presence of some MNES species, therefore additional field investigations in 2021 focused on determining habitats for those species. For species that were deemed to have inadequate survey effort in previous studies (e.g. listed birds and migratory species), a field program was designed to target those species in compliance with survey guidelines. Additionally, suitable habitats were defined for MNES values known or likely to occur in the Project Area.

Targeted surveys for aquatic fauna were undertaken by ARUP (2020), identifying listed aquatic species as unlikely to occur within the Project Area.

The following information summarises the main techniques targeting listed threatened mammals, amphibians and insects within the Project Area.

Faecal pellet surveys were undertaken for koala as per the *Survey Guidelines for Australia's Threatened Mammal* (as listed under the EPBC Act) and the Koala Referral Guidelines. Scat searches are not a specific survey guideline recommendation for locating greater gliders, however, have been listed in the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* to locate cryptic and nocturnal species. Other relevant guidelines and their recommended survey method and extent for the koala and greater glider are as follows:

Koala Referral Guidelines specific requirements

1. Strip transects which involve diurnal distance sampling and density searches.
2. Nocturnal spotlighting for smaller sites to determine presence and density.
3. Scats – Spot Assessment Technique or similar which involves looking at the base of koala food trees for presence of koala scats.

Known roost sites and foraging habitat for the grey-headed flying-fox were surveyed simultaneously with habitat assessments within and adjacent to the Project Area.

Spotlighting was undertaken per guideline requirements focusing on arboreal species, particularly targeting koala and greater glider. Two ecologists spotlighted by foot within suitable habitats and vegetation communities across two nights, access permitted. Large and small tracts of vegetation were targeted for spotlight surveys, as well as sampling occurring within linear fragments of vegetation associated with water courses and roadside vegetation, to adequately sample the vegetation communities and habitats that occur across the Project Area.

Searches for frogs were in accordance with *Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act* (DAWE, 2010), and insects involved microhabitat identification and searches for signs of the species. This occurred with habitat assessments throughout the Project Area. Other searches involved active searches in suitable habitat areas, including overturning of rocks and disturbance of leaf litter.

Habitat mapping was prepared for those listed species known or likely to occur to inform impact assessments.

3.7.5 Bird surveys

Bird utilisation surveys (BUSs) involved 20-minute fix point surveys to provide data based on the species present at each sampling location. Each fixed-point survey site was selected to provide a search radius of at least 100 m for small birds and up to 200 m for large birds.

The survey guidelines for diurnal bird surveys and their requirements are as follows:

Terrestrial Vertebrate Fauna Survey Guidelines for Queensland

1. Diurnal bird surveys involve six x 5 -10 min area searches within 100 x 100 m survey site.
2. Two surveys conducted in the morning (<two hours after sunrise), two in mid-morning (two to four hours after sunrise) and two in less optimal times (four hours after sunrise and two hours before sunset).

The bird surveys were conducted in accordance with the time and effort required by the survey guideline requirements.

It is also noted that specific requirements for species listed in the *Survey Guidelines for Australia's Threatened Birds* (as listed under the EPBC Act) were considered in designing the field survey program. The *Survey Guidelines for Australia's Threatened Birds* recommends that flushing, listening for foraging scratching, and platelets searches for a total of 15 hours over three days, is recommended for the black-breasted button-quail. However, there was a lack of suitable habitat in the Project Area for this species.

The following sections detail the specific BUSs undertaken throughout the Project Area.

3.7.5.1 Point surveys

Point surveys were conducted to target diurnal woodland and riparian bird species. Two ecologists traversed suitable woodland and riparian habitats and conducted 20-minute timed surveys for all birds in the area. Survey Points are displayed in Figure 2 of Appendix D.2.

3.7.5.2 Waterbody surveys

Waterbody surveys were conducted in order to target aquatic species and woodland species utilising the waterbody. Observations were made from a stationary position, and birds were identified by call detection and visual observations. The Project Area contained several artificial waterbodies, drainage lines and creeks likely to act as important water sources in the landscape, particularly during dry conditions. Survey Points are displayed in Figure 2 of Appendix D.2.

3.7.5.3 Birds of prey surveys

Birds of prey surveys were undertaken to target the listed threatened species such as the grey falcon (*Falco hypoleucos*) and generally occurring birds of prey. Birds of prey surveys were undertaken at vantage points (e.g. extensively cleared areas) (see Figure 2 of Appendix D.2) at mid-morning when birds of prey become increasingly active.

3.7.6 Camera traps

The motion activated camera traps were placed across representative remnant vegetation/habitat types. This included riparian woodlands near water sources and eucalypt open forest or woodlands. The cameras were specifically placed in areas that were near water sources. The survey locations were selected on the basis that they provided the greatest likelihood of detecting an abundance and diversity of terrestrial fauna. Plastic bait stations were used at each sampling location to attract/lure fauna to the camera. The scented baits within each container consisted of honey, oats, peanut butter and anchovies to attract a variety of fauna with varying diets.

The cameras were secured onto trees at approximately 1 metre above the ground. They were collected and the information recorded on the SD cards was then analysed on a desktop computer to determine the species recorded.

3.7.6.1 Habitat mapping

Habitat mapping was undertaken for EPBC Act listed threatened species that were identified as likely or known to occur within the Project Area. This was informed by the accumulation of previous studies and additional field investigations undertaken, including ground-truthed habitat surveys.

Habitat maps have been prepared using ArcGIS desktop. TMR provided the Project Area boundaries and the cadastral lot boundaries were sourced from Queensland Spatial. ESRI World Topographic Map and World imagery (captured in September 2020) has been used in the overview figures. For the habitat assessment figures where greater detail is required Nearmap imagery captured in May 2021 has been used as the base imagery. Drone footage captured in April-May 2021 was provided by TMR and utilised to distinguish habitat features and refine habitat mapping for the koala and grey-headed flying-fox. Where vegetation that is visible in satellite imagery is not mapped as koala or grey-headed flying-fox habitat; the vegetation does not constitute habitat for these species (i.e. large patches of exotic pines). Ground-truthed habitat mapping within the Project Area is provided in Figure 3 of Appendix D.3 and Figure 4 of Appendix D.4.

3.8 Response to 3.3 f)

Information Required for Assessment by Preliminary Documentation

- 3.3 *For listed threatened species and ecological communities and listed migratory species that have the potential, or are likely, to be present at and in the vicinity of the project site, including but not limited to those listed in this request for further information, this section must provide the following:*
- f) *An assessment of the adequacy of any surveys undertaken. In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with relevant survey guidelines.*

Table 15 summarises the survey effort for the EPBC Act listed threatened species and migratory species that were targeted during the investigation periods. Table 15 also outlines the survey guideline requirements for each target species and provides commentary associated with survey effort against survey guideline requirements.

Table 15. Survey Guidelines, Survey Effort and Adequacy

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
Birds (including migratory species)			
<i>Falco hypoleucos</i> Grey falcon	There are no targeted survey guidelines for this species. This species is rare with a very large distribution so has been hard to find during previous targeted survey efforts. However, they normally are found in treeless areas except along watercourses and often are found over grasslands (Venn, 2003). Nests are located in tall eucalypts close to watercourses	Dawn and dusk timed surveys (20 mins), bird utilisations surveys across 30 sampling locations in the Project Area.	As a result of vegetation management supporting operation of the existing rail line, adjacent urban and agricultural land use and the narrow linear nature of vegetation between existing North Coast Rail Line and Steve Irwin Way the Project Area is largely absent of remnant vegetation and contains only small, isolated patches of remnant and regrowth native vegetation. On that basis, suitable habitat for these bird species was largely absent from the Project Area. Nonetheless, searches conducted were done so in accordance with the extent and time periods recommended by the guidelines. <i>Guideline requirements met.</i>
<i>Apus pacificus</i> Fork-tailed swift	<i>Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act</i> (DoE, 2015) No survey guidelines specific to the fork-tailed swift – however, recommended to focus survey efforts from high vantage points. This species is found across a range of habitats (non-breeding habitats only), from inland plains to wooded areas. It is exclusively aerial.	Dawn and dusk timed surveys (20 mins), bird utilisations surveys across 30 sampling locations in the Project Area.	As a result of vegetation management supporting operation of the existing rail line, adjacent urban and agricultural land use and the narrow linear nature of vegetation between existing North Coast Rail Line and Steve Irwin Way the Project Area is largely absent of remnant vegetation and contains only small, isolated patches of remnant and regrowth native vegetation. On that basis, suitable habitat for these bird species was largely absent from the Project Area. Nonetheless, searches conducted were done so in accordance with the extent and time periods recommended by the guidelines. <i>Guideline requirements met.</i>

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
<i>Actitis hypoleucos</i> Common sandpiper	<p><i>Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species</i> (DoEE, 2017)</p> <p>Migratory shorebird surveys are recommended for four survey periods in areas of suitable habitat where replication is necessary. Suitable habitat for this species inland can include wetlands and watercourses but is mainly in coastal areas.</p> <p>This survey guideline is mainly for assessing the species at low and high tides, which is not applicable to the Project Area.</p>	Dawn and dusk timed surveys (20 mins), bird utilisations surveys across 30 sampling locations in the Project Area.	<p>This survey guideline is mainly for assessing the species at low and high tides, which is not applicable to the Project Area.</p> <p>As a result of vegetation management supporting operation of the existing rail line, adjacent urban and agricultural land use and the narrow linear nature of vegetation between existing North Coast Rail Line and Steve Irwin Way the Project Area is largely absent of remnant vegetation and contains only small, isolated patches of remnant and regrowth native vegetation. On that basis, suitable habitat for these bird species was largely absent from the Project Area. Nonetheless, searches conducted were done so in accordance with the extent and time periods recommended by the guidelines.</p> <p><i>Guideline requirements met where suitable habitat for these species exists, including watercourses.</i></p>
<i>Calidris acuminata</i> Sharp-tailed sandpiper			
<i>Calidris canutus</i> Red knot			
<i>Calidris melanotos</i> Pectoral sandpiper			
<i>Sternula nereis</i> Australian fairy tern			
<i>Rostratula australis</i> Australian painted snipe	<p><i>Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act</i> (DEWHA, 2017)</p> <p>Searches are recommended through suitable wetland or watercourse areas, with detected via sighting and flushing at dawn and dusk.</p> <p>Targeted stationary observations – 10 hours for 5 days</p> <p>Land-based area searches or line transects – 10 hours for 3 days.</p>	Dawn and dusk timed surveys (20 mins), bird utilisations surveys across 30 sampling locations in the Project Area.	<p>As a result of vegetation management supporting operation of the existing rail line, adjacent urban and agricultural land use and the narrow linear nature of vegetation between existing North Coast Rail Line and Steve Irwin Way the Project Area is largely absent of remnant vegetation and contains only small, isolated patches of remnant and regrowth native vegetation. On that basis, suitable habitat for these bird species was largely absent from the Project Area. Nonetheless, searches conducted were done so in accordance with the extent and time periods recommended by the guidelines.</p> <p><i>Guideline requirements met.</i></p>
<i>Merops ornatus</i> Rainbow bee-eater			

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
<i>Hirundapus caudacutus</i> White-throated needletail	<p>No survey guidelines specific to White-throated needletail, but consideration given to:</p> <p><i>Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act</i> (DEWHA, 2017)</p> <p>Observations should be made as late as possible in the evening of birds coming into roost in tall trees along ridge tops.</p>	<p>Dawn and dusk timed surveys (20 mins), bird utilisations surveys across 30 sampling locations in the Project Area.</p>	<p>As a result of vegetation management supporting operation of the existing rail line, adjacent urban and agricultural land use and the narrow linear nature of vegetation between existing North Coast Rail Line and Steve Irwin Way the Project Area is largely absent of remnant vegetation and contains only small, isolated patches of remnant and regrowth native vegetation. On that basis, suitable habitat for these bird species was largely absent from the Project Area. Nonetheless, searches conducted were done so in accordance with the extent and time periods recommended by the guidelines.</p> <p><i>Guideline requirements met.</i></p>
<i>Lathamus discolor</i> Swift parrot <i>Cyclopsitta diophthalma coxeni</i> Coxen's fig-parrot	<p><i>Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act</i> (DEWHA, 2017)</p> <p>Area searches or transect surveys of suitable habitat, preferably in the early morning and afternoon when birds are most active and vocal. Detection by sighting or call. Slow-moving vehicle transects also effective in expansive areas, detecting loud, distinctive call that can be heard over noise of engine. Targeted surveys of patches of heavily flowering eucalypts may be useful.</p> <p>Area searches or transect searches – 20 hours for 8 days.</p> <p>Target searches of habitat – 20 hours for 8 days.</p> <p>The timing of these surveys on the mainland should be conducted between March and July.</p>	<p>Dawn and dusk timed surveys (20 mins), bird utilisations surveys across 30 sampling locations in the Project Area.</p> <p>Ad hoc observations will be recorded as well as records of important foraging tree species (e.g. <i>figus spp</i>)</p>	<p>As a result of vegetation management supporting operation of the existing rail line, adjacent urban and agricultural land use and the narrow linear nature of vegetation between existing North Coast Rail Line and Steve Irwin Way the Project Area is largely absent of remnant vegetation and contains only small, isolated patches of remnant and regrowth native vegetation. On that basis, suitable habitat for these bird species was largely absent from the Project Area. Nonetheless, searches conducted were done so in accordance with the extent and time periods recommended by the guidelines.</p> <p><i>Guideline requirements met.</i></p>

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
<i>Xanthomyza phrygia</i> Regent honeyeater <i>Monarcha melanopsis</i> Black-faced monarch <i>Monarcha melanopsis</i> Spectacled monarch	<p><i>Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act</i> (DEWHA, 2017)</p> <p>Area searches in suitable habitat, preferably in the morning but other times may also be appropriate. Detection by call is possible when birds are most vocal (outside the breeding season). Otherwise, detection is by sighting.</p> <p>Targeted searches of woodland patches with heavily flowering trees is useful, especially around water points such as dams and creek lines. Also, check among flocks of other blossom nomads such as lorikeets and other honeyeaters. Broadcast surveys immediately before and during the breeding season may also be useful.</p> <p>Area searches for 20 hours over 10 days. Targeted searches for 20 hours over 5 days.</p>	<p>Dawn and dusk timed surveys (20 mins), bird utilisations surveys across 30 sampling locations in the Project Area.</p>	<p>As a result of vegetation management supporting operation of the existing rail line, adjacent urban and agricultural land use and the narrow linear nature of vegetation between existing North Coast Rail Line and Steve Irwin Way the Project Area is largely absent of remnant vegetation and contains only small, isolated patches of remnant and regrowth native vegetation. On that basis, suitable habitat for these bird species was largely absent from the Project Area. Nonetheless, searches conducted were done so in accordance with the extent and time periods recommended by the guidelines.</p> <p><i>Guideline requirements met.</i></p>
Mammals			
<i>Pteropus poliocephalus</i> Grey-headed flying-fox	<p><i>Survey guidelines for Australia's threatened bats</i> (DEWHA, 2010)</p> <p>Flying foxes are recognised easily from a distance while they roost or are in flight and have distinctive audible calls that are heard most frequently in the early morning or under sunny conditions. Other signs include their distinctive odour and droppings. Both the ground and foliage should be examined for flying fox scats.</p> <p>Field surveys conducted by qualified botanist to confirm vegetation communities in the Project Area and presence of food plants.</p> <p>Conduct walking transects (100 m apart) looking for feeding and flying bats as well as detecting their smell. Alternative methods may include night-time audio recordings made at selected sites or fruiting food plants within the Project Area.</p>	<p>Vegetation community assessments to determine presence of suitable habitat and food trees.</p> <p>Spotlight surveys undertaken in spring and summer survey looking for nocturnal species, including feeding flying foxes.</p> <p>2 x Ecologists spotlighting for 2 hours per night for 2 nights.</p>	<p>Known roost sites and potential foraging habitat were surveyed in the previous ecological assessments referenced above and during the 2021 survey period.</p> <p><i>Guideline requirements met.</i></p>

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
<i>Phascolarctos cinereus</i> Koala	<p><i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (DES, 2018)</p> <p>Requires two-person, 30-minute spotlight searches of 100 x 100 m survey site. This can include spotlighting up one side of the 100 x 100 m area and then spotlighting back the other side of the 100 x 100 m area</p> <p>Scat and sign search can coincide with the systematic diurnal active searches, within 50 x 50 m quadrates of the survey site.</p> <p><i>EPBC Act referral guidelines for the vulnerable koala</i> (DoE, 2014)</p> <p>Strip transects which involve diurnal distance sampling and density searches. Nocturnal spotlighting for smaller sites to determine presence and density.</p> <p>Scats – Spot Assessment Technique which involves looking at food trees for presence of koala scats.</p>	<p>Diurnal surveys of incidental fauna sightings and secondary indications of potential presence, including scats, scratches, diggings, tracks or other signs.</p> <p>Specific koala scat surveys undertaken at each habitat assessment location for each survey period using the Spot Assessment technique.</p> <p>2 x Ecologists spotlighting for 2 hours per night for 2 nights.</p>	<p>Surveys in the previous ecological assessments referenced above and during 2021 habitat assessments identified koala habitat occurs within the Project Area. While no koalas were observed from spotlight surveys, or diurnal surveys, the species was considered likely to be present on occasion within the Project Area as a result of ARUP (2020) observing indirect signs via a scat and scratch mark on food trees.</p> <p>USC was contracted by TMR to complete two separate koala surveys using detection dogs across potential koala habitat within the Project Area in August 2020 and during the breeding season (August to January) in January 2021.</p> <p><i>Guideline requirements met</i></p>
<i>Petauroides volans</i> Greater-glider	<p><i>Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i> (DES, 2018)</p> <p>Requires two persons for 30-minute spotlight searches of 100 x 100 m survey site across multiple nights. This can include spotlighting up one side of the 100 x 100 m area and then spotlighting back the other side of the 100 x 100m area.</p> <p>Scat and sign search can coincide with the systematic diurnal active searches, within 50 x 50 m quadrates of the survey site.</p> <p><i>Survey Guidelines for Australia's Threatened Mammals</i> (DSEWPC, 2011)</p> <p>Bright moonlight aids in detecting grey-headed flying-foxes.</p> <p>Spotlighting should be at least two 200 m transects per 5 ha sites. It is also recommended there be 100 m between survey transects.</p>	<p>Survey effort will involve spotlighting in transects throughout any areas identified as containing mature eucalypt forests with hollow-bearing trees.</p> <p>Scat searches were conducted opportunistically during the terrestrial habitat assessments.</p> <p>2 x Ecologists spotlighting for 2 hours per night for 2 nights.</p>	<p>The habitat assessments identified regrowth greater glider foraging habitat within the Project Area. Surveys could not meet guideline requirements within the Project Area, due to a lack of suitable size patches of habitat, and so spotlight surveys were undertaken in large tracts of vegetation adjacent to the Rail Corridor and within the Project Area that contained large hollow bearing trees.</p> <p><i>Guideline requirements met</i></p>

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
<i>Xeromys myoides</i> Water mouse	<p><i>Referral guideline for the vulnerable water mouse - Xeromys myoides</i> (DOE 2015)</p> <p>Habitat assessment, daytime searches for nesting sites and evidence of foraging and Elliott or camera trapping are the most reliable methods for detecting the presence of the water mouse. Surveyors should examine satellite imagery or aerial photographs and topographical maps before commencing a habitat assessment or trapping program. This will help to identify elevated, dry supralittoral areas within mangrove communities which may support active nest structures, allowing these areas to be targeted.</p> <p>This survey guideline is mainly for assessing the species in supralittoral areas, which is not applicable to the Project Area.</p>	<p>Notable habitat features in the Project Area were recorded including vegetation types and species, presence of predator and prey species, supralittoral banks, trees with hollow trunks, as well as any areas of disturbance.</p> <p>Daytime searches included looking for nesting structures or water mouse prey remains for every one hectare of intertidal or supralittoral water mouse habitat.</p> <p>2 x Ecologists spotlighting for 2 hours per night for 3 nights.</p>	<p>Habitat assessments and the deployment of camera traps occurred across 10 days.</p> <p>Due to the lack of potential habitat in the Project Area, the survey effort did not include trapping.</p> <p><i>Guideline requirements met.</i></p>
Insects			
<i>Phyllodes imperialis smithersi</i> Pink underwing moth	<p>There are no targeted survey guidelines for this species.</p> <p>The Pink Underwing Moth is found below the altitude of 600 m in undisturbed, subtropical rainforest on rich volcanic soils and fertile alluvium. It occurs in association with the vine <i>Carronia multisepalea</i>, a collapsed shrub that provides the food and habitat the moth requires in order to breed (Clarke & Spier-Ashcroft 2003; NSW DECC 2005). Where <i>C. multisepalea</i> attains an upright form, the association with the moth does not occur (TSSC 2002).</p> <p>The common fruit-piercing moth (<i>Eudocima fullonia</i>) is differentiated by having adult moths with hind wings that are orange and black (rather than pink and black). Larvae may occur on the same vine but are more uniformly brown and have two eye spots on each side (NSW RMS 2013).</p>	<p>Microhabitat searches for signs of the species to be carried out in conjunction with terrestrial fauna searches.</p>	<p>Microhabitat searches for signs of the species were carried out in conjunction with terrestrial fauna searches and habitat assessments.</p> <p><i>Guideline requirements met.</i></p>

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
Frogs			
<p><i>Mixophyes iterates</i> Giant barred frog</p>	<p><i>Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act</i> (DAWE, 2010)</p> <p>Call playback and spotlighting while walking transect along stream or creek. Most suitably in riparian rainforest and wet sclerophyll forest. Road transects are not effective.</p> <p>Larvae are distinctive and can be collected by dip netting. Multiple sweeps in pools.</p> <p>Seasonal: September–March.</p> <p>Weather conditions: Not during heavy rainfall or stream flow. One week after heavy rainfall.</p> <p>A minimum of two nights under ideal conditions. Should be repeated on at least four separate occasions in activity period.</p> <p>Under optimum weather conditions, that is, substrate and leaf litter wet. At time of peak activity for the species.</p> <p>Stream transect of a minimum of 200 m. Local area study to include reference sites as mandatory.</p>	<p>Nocturnal and call playback surveys near streams during March survey period. Searches conducted after rainfall. Surveys repeated at suitable locations up to 4 nights by suitably qualified ecologist</p> <p>2 x Ecologists spotlighting for 2 hours per night for 2 nights.</p>	<p>Confirmed breeding habitat and foraging habitat was identified outside of the B2N project boundary at Mellum Creek by ARUP (2020).</p> <p>The nocturnal spotlighting surveys were undertaken during suitable conditions for frog activity, i.e. after nightfall and following rainfall.</p> <p>Surveys were carried out during optimum weather conditions, that is, substrate and leaf litter wet, at time of peak activity for the species (September–March) by ARUP 2020.</p> <p><i>Guideline requirements met.</i></p>

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
Plants			
<i>Acacia attenuata</i> Whipstick wattle	<p><i>Flora Survey Guidelines – Protected Plants NC Act (Flora Survey Guidelines)</i> (DEHP, 2014a)</p> <p>Meander surveys to be conducted when and where the species is present. This is based on undertaking surveys during flowering (if applicable) and where habitat is available.</p> <p>Meanders must be undertaken at the rate of one meander every two hectares.</p> <p>The search must be continued (timed) until no new plant species has been recorded for 30 minutes, or when the entire site/habitat has been surveyed.</p>	<p>Meander surveys to be conducted in suitable habitat areas.</p> <p>Meanders to be undertaken at the rate of one meander every two hectares.</p> <p>Undertaken across minimum 5 day by experienced botanist</p>	<p>Meander surveys were conducted in suitable habitat areas in conjunction with habitat assessments. A total of 35 habitat assessments were completed.</p> <p><i>Guideline requirements met.</i></p>
<i>Acronychia littoralis</i> Scented acronychia			
<i>Allocasuarina emuina</i> Mt Emu she-oak			
<i>Baloghia marmorata</i> Jointed baloghia			
<i>Eucalyptus conglomerata</i> Swamp stringybark			
<i>Macadamia integrifolia</i> Macadamia nut			
<i>Rhodamnia rubescens</i> Scrub turpentine			
<i>Rhodomyrtus psidioides</i> Native guava			
<i>Sarcochilus fitzgeraldii</i> Ravine orchid			
<i>Zieria bifida</i>			

Target Species	Survey Guidelines and Requirements	Sampling Technique/ Effort Field Investigation Period April-May 2021	Comment on Survey Adequacy
Habitat Assessments			
<i>Site condition, site context, species stocking rate and vegetation assessments</i>	<p><i>Modified Habitat Quality Assessment (MHQA), (Habitat Assessments Guidelines) (DAWE, 2020)</i></p> <p>The Commonwealth Department's MHQA is an adaptation of the Queensland Government's Guide to determining terrestrial habitat quality (DES 2020). The MHQA better reflects the requirements of the EPBC Act Environmental Offsets Policy (DSEWPC 2012) for determining habitat quality, including consideration of site condition, site context, and species stocking rate, which is detailed in the EPBC Act policy document, How to use the Offsets Assessment Guide (DAWE).</p> <p>Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland (Neldner et al, 2020).</p>	<p>Site specific attributes (site condition, site context, and species stocking rate) will be assessed as per scoring data input contained within the MHQA guidelines.</p> <p>Surveys to be conducted in suitable habitat areas.</p> <p>Undertaken across minimum 5 days by experienced ecologists.</p>	<p>RE assessments were undertaken in accordance with quaternary assessment procedure as outlined in the survey guidelines of Neldner et al. (2020).</p> <p>Habitat assessments involved detailed evaluation of habitat quality and macro/micro features necessary to support general biodiversity as well as specific target species. The habitat assessments were taken often in conjunction with RE assessments, and a total of 37 habitat assessments were completed.</p> <p>The vegetation assessments also involved the assessment for presence/absence of any TECs. This assessment for TECs was done through assessing vegetation within the Project Area and checking this against relevant TEC thresholds and diagnostic guidelines.</p> <p><i>Guideline requirements met</i></p>

4. Quantification of impacts

4.1 Response to 4.1

Information Required for Assessment by Preliminary Documentation

4.1 Provide a description of the intended land uses proposed as part of the completed development, including of the proposed open space and conservation areas and associated ongoing activities, and details of the intended party that would be responsible for future management activities.

Private property and road reserve resumptions and revocation of State Forest have taken place to build and upgrade infrastructure. Upon completion of development, the land will be used for many purposes including public transport such as road and rail, public car parks, recreational trails (the disused rail corridor), State Forest and forestry plantations, private use and environmental revegetation and offsets. Some land parcels will be vacant and potentially on sold in the future.

A description of the intended land uses proposed for land parcels intercepted by the B2N project is provided in Table 16.

Table 16. B2N project land use description

Intended Purpose	Description
Active Transport	Incorporates infrastructure for cycling, walking and other physically active ways of travelling.
Environmental - Offset	Parcel of land utilised as part of an environmental offset to counterbalance a significant residual impact of the B2N project on prescribed environmental matters.
Environmental - Revegetation	The landscape and revegetation works for road construction and associated works.
Park and Ride	Park 'n' ride facilities allow customers to 'park' their vehicle and 'ride' public transport to complete their journey.
Private	Private property.
Road Reserve	Parcel of land that is a made or unmade road, or roadside.
Vacant Land	Parcel of land with no structures in place.
State Forest	Owned and administered by the state of Queensland.
Rail	Facilities necessary for operating a railway.
Rail Corridor	From fence-line to fence-line, or if there are no fences, everywhere within 15m of the outermost rails.
Disused Rail Corridor	Disused rail corridors for uses such as rail trails (e.g. recreational bike riding, walking and horse trails).

Land use, ownership and tenure, lease and management details are specified for all land parcels intercepted by the B2N project in Table 17.

Table 17. B2N project land use, ownership and tenure, lease and management details

Parcel ID	Proposed Tenure	Proposed Owner	Proposed Lessee	Intended Purpose
02-793SP149904	RR	SCC	Nil	Active Transport
02-777CG1135	RR	SCC	Nil	Active Transport
02-136CG757	RR	SCC	Nil	Active Transport
02-2RP72081	RR	SCC	Nil	Active Transport
02-1RP214941	RR	SCC	Nil	Active Transport

Parcel ID	Proposed Tenure	Proposed Owner	Proposed Lessee	Intended Purpose
01-62CP827058	LL	TMR	SCC	Active Transport
02-62CP827058	LL	TMR	SCC	Active Transport
04-71CP827059	LL	TMR	SCC	Active Transport
03-62CP827058	FH	TMR	Nil	Disused Rail Corridor
02-71CP827059	FH	TMR	Nil	Disused Rail Corridor
02-92CP827060	FH	TMR	Nil	Disused Rail Corridor
04-92CP827060	FH	TMR	Nil	Disused Rail Corridor
01-2RP177687	FH	TMR	Nil	Environmental - Offset
01-1RP124412	FH	TMR	Nil	Environmental - Offset (State)
03-1RP124412	FH	TMR	Nil	Environmental - Offset (State)
01-3RP174740	FH	TMR	Nil	Road Reserve
01-3RP135561	FH	TMR	Nil	Road Reserve
04-11RP222413	FH	TMR	Nil	Environmental - Offset
RC_70950-71050	FH	TMR	Nil	Environmental - Revegetation
01-1RP177687	FH	TMR	Nil	Environmental - Offset
03-1RP177687	FH	TMR	Nil	Environmental - Revegetation
02-31CG3387	FH	TMR	Nil	Environmental - Revegetation
02-32CG3458	FH	TMR	Nil	Environmental - Revegetation
02-898CG4790	FH	TMR	Nil	Environmental - Revegetation
02-2SP229834	FH	TMR	Nil	Environmental - Offset
01-896SP168402	FH	TMR	Nil	Environmental - Revegetation
01-853SP168402	FH	TMR	Nil	Environmental - Revegetation
04-49CG2193	FH	TMR	Nil	Environmental - Offset
04-1RP167515	FH	TMR	Nil	Environmental - Offset
02-2RP7660	FH	TMR	Nil	Environmental - Offset
02-1RP7660	FH	TMR	Nil	Environmental - Offset
01-19RP45367	LL	TMR	QR	Park and Ride
01-18RP45367	LL	TMR	QR	Park and Ride
01-17RP45367	LL	TMR	QR	Park and Ride
01-42RP45367	LL	TMR	QR	Park and Ride
01-43RP45367	LL	TMR	QR	Park and Ride
01-18RP201396	LL	TMR	QR	Park and Ride
01-17RP201396	LL	TMR	QR	Park and Ride
01-16RP201396	LL	TMR	QR	Park and Ride
01-15RP201396	LL	TMR	QR	Park and Ride
01-10SP110903	LL	TMR	QR	Park and Ride
01-793SP149904	FH	Private	Nil	Private
01-777CG1135	FH	Private	Nil	Private
01-136CG757	FH	Private	Nil	Private
01-12RP174795	FH	Private	Nil	Private

Parcel ID	Proposed Tenure	Proposed Owner	Proposed Lessee	Intended Purpose
01-2RP72081	FH	Private	Nil	Private
01-RP214941	FH	Private	Nil	Private
02-4RP222399	FH	Private	Nil	Private
02-3RP222399	FH	Private	Nil	Private
02-15RP202234	FH	Private	Nil	Private
02-8CG105	FH	Private	Nil	Private
02-21RP153799	FH	Private	Nil	Private
RC_64390-65000	LL	TMR	QR	Rail Corridor
RC_65200-65800	LL	TMR	QR	Rail Corridor
RC_66100-66220	LL	TMR	QR	Rail Corridor
RC_66800-66900	LL	TMR	QR	Rail Corridor
RC_66700-67000	LL	TMR	QR	Rail Corridor
RC_67700-67820	LL	TMR	QR	Rail Corridor
RC_67900-68320	LL	TMR	QR	Rail Corridor
RC_68500-68800	LL	TMR	QR	Rail Corridor
RC_69300-71000	LL	TMR	QR	Rail Corridor
RC_71350-73300	LL	TMR	QR	Rail Corridor
RC_73180-73650	LL	TMR	QR	Rail Corridor
RC_73650-73800	LL	TMR	QR	Rail Corridor
RC_75000-75180	FH	TMR	TMR	Rail Corridor
RC_75280-75580	LL	TMR	QR	Rail Corridor
RC_75710-76020	LL	TMR	QR	Rail Corridor
RC_76800-78700	LL	TMR	QR	Rail Corridor
RC_72200-72600	LL	TMR	QR	Rail Corridor
02-62CP827058	LL	TMR	QR	Rail Corridor
04-62CP827058	FH	TMR	TMR	Rail Corridor
08-589FTY1876	LL	TMR	QR	Rail Corridor
04-793SP149904	LL	TMR	QR	Rail Corridor
03-71CP827059	LL	TMR	QR	Rail Corridor
01-49CG2193	LL	TMR	QR	Rail Corridor
01-1RP167515	LL	TMR	QR	Rail Corridor
05-71CP827059	LL	TMR	QR	Rail Corridor
01-92CP827060	LL	TMR	QR	Rail Corridor
03-92CP827060	LL	TMR	QR	Rail Corridor
04-RP214941	LL	TMR	QR	Rail Corridor
03-RP214941	LL	TMR	QR	Rail Corridor
01-101CP827062	LL	TMR	QR	Rail Corridor
01-2SP229834	LL	TMR	QR	Rail Corridor
01-15RP202234	LL	TMR	QR	Rail Corridor
01-8CG105	LL	TMR	QR	Rail Corridor

Parcel ID	Proposed Tenure	Proposed Owner	Proposed Lessee	Intended Purpose
01-21RP153799	LL	TMR	QR	Rail Corridor
01-2RP7660	LL	TMR	QR	Rail Corridor
01-1RP7660	LL	TMR	QR	Rail Corridor
02-1AP23631	LL	TMR	QR	Rail Corridor
01-62CP827058	LL	TMR	QR	Rail Corridor
02-853SP168402	LL	TMR	QR	Rail Corridor
02-896SP168402	LL	TMR	QR	Rail Corridor
01-589FTY1876	LL	TMR	TMR	Rail Corridor
02-2RP177687	LL	TMR	QR	Rail Corridor
03-2RP72081	LL	TMR	QR	Rail Corridor
05-92CP827060	LL	TMR	QR	Rail Corridor
01-93CP827061	LL	TMR	QR	Rail Corridor
01-115SP264856	LL	TMR	QR	Rail Corridor
01-115SP264856	LL	TMR	QR	Rail Corridor
01-592CG6252	LL	TMR	QR	Rail Corridor
RC_76800-78700	LL	TMR	QR	Rail Corridor
01-1AP23631	RR	TMR	Nil	Road Reserve
01-71CP827059	RR	SCC	Nil	Road Reserve
06-589FTY1876	RR	TMR	Nil	Road Reserve
02-1RP177687	FH	TMR	Nil	Road Reserve
02-11RP222413	FH	SCC	Nil	Road Reserve
02-1RP124412	RR	SCC	Nil	Road Reserve
01-898CG4790	RR	SCC	Nil	Road Reserve
01-31CG3387	RR	SCC	Nil	Road Reserve
01-32CG3458	RR	SCC	Nil	Road Reserve
02-589FTY1876	RR	TMR	Nil	Road Reserve
02-12RP174795	RR	SCC	Nil	Road Reserve
01-11RP174795	RR	SCC	Nil	Road Reserve
03-1AP23631	SF	DES	Nil	Road
05-1AP23631	RR	TMR	Nil	Road Reserve
03- 62CP827058	RR	TMR	Nil	Road Reserve
01-48CG3132	RR	TMR	Nil	Road Reserve
02-49CG2193	RR	TMR	Nil	Road Reserve
02-1RP167515	RR	TMR	Nil	Road Reserve
01-5RP222399	RR	TMR	Nil	Road Reserve
01-4RP222399	RR	TMR	Nil	Road Reserve
01-3RP222399	RR	TMR	Nil	Road Reserve
01-100SP320400	RR	TMR	Nil	Road Reserve
01-9SP110903	LL	TMR	QR	Park and Ride
01-121CP827064	FH	TMR	TMR	Rail

Parcel ID	Proposed Tenure	Proposed Owner	Proposed Lessee	Intended Purpose
01-133CP827065	LL	TMR	QR	Rail
01-132CP827065	FH	TMR	TMR	Rail
01-152SP109441	LL	TMR	QR	Rail
01-163SP102275	LL	TMR	QR	Rail
01-171SP102276	LL	TMR	QR	Rail
01-182SP102277	LL	TMR	QR	Rail
01-182SP102277	LL	TMR	QR	Rail
01-182SP102277	LL	TMR	QR	Rail
01-191SP105000	LL	TMR	QR	Rail
01-2CP827039	LL	TMR	QR	Rail
01-190SP105000	LL	TMR	QR	Rail
RC_76800-78700	LL	TMR	QR	Rail Corridor
RC_76800-78700	LL	TMR	QR	Rail Corridor
01-1RP81152	RR	TMR	Nil	Road Reserve
01-2RP81152	RR	TMR	Nil	Road Reserve
01-2RP76609	RR	TMR	Nil	Road Reserve
01-3RP76609	RR	TMR	Nil	Road Reserve
01-2RP111079	RR	TMR	Nil	Road Reserve
01-763CG262	RR	TMR	Nil	Road Reserve
01-16L2588	RR	TMR	Nil	Road Reserve
01-512CP835985	RR	TMR	Nil	Road Reserve
01-1SP201520	RR	TMR	Nil	Road Reserve
01-2SP201520	RR	TMR	Nil	Road Reserve
01-4SP201520	RR	TMR	Nil	Road Reserve
01-1SP248298	RR	TMR	Nil	Road Reserve
01-1RP177390	RR	TMR	Nil	Road Reserve
01-2RP177390	RR	TMR	Nil	Road Reserve
01-4RP168075	RR	TMR	Nil	Road Reserve
01-4CG4024	RR	TMR	Nil	Road Reserve
01-236RP864765	RR	TMR	Nil	Road Reserve
01-21L2589	RR	TMR	Nil	Road Reserve
01-22SP129708	RR	TMR	Nil	Road Reserve
01-22SP129708	RR	TMR	Nil	Road Reserve
RC_67200	SF	DES	Nil	State Forest
04-1AP23631	TL	TMR	SCC	Environmental - Offset
06-1AP23631	SF	DES	HQP	State Forest
04-589FTY1876	SF	DES	HQP	State Forest
03-589FTY1876	SF	DES	HQP	State Forest
05-589FTY1876	FH	TMR	Nil	Environmental - Offset
07-1AP23631	RE	DoR	SCC	Environmental - Offset

Parcel ID	Proposed Tenure	Proposed Owner	Proposed Lessee	Intended Purpose
03-853SP168402	FH	TMR	Nil	Vacant Land
09-589FTY1876	FH	TMR	Nil	Vacant Land
03-896SP168402	FH	TMR	Nil	Vacant Land
04-853SP168402	FH	TMR	Nil	Vacant Land
07-589FTY1876	FH	TMR	Nil	Vacant Land
03-49CG2193	FH	TMR	Nil	Vacant Land
03-1RP167515	FH	TMR	Nil	Vacant Land
03-11RP222413	FH	TMR	Nil	Vacant Land
01-11RP222413	FH	TMR	Nil	Vacant Land

Tenure: FH= freehold, LL=lands Lease (Rail corridor sublease), RR= Road reserve; SF= State Forest, TL= Trust Land, RE= Reserve

4.2 Response to 4.2

Information Required for Assessment by Preliminary Documentation

- 4.2 *Include current maps and coordinates/shapefile(s) of the proposed impact area and areas of habitat for MNES proposed to be retained. Maps must clearly identify development footprints, buffer zones, and any conservation areas where impacts will be avoided, and areas of adjacent habitat that would be subject to indirect impacts, including areas that are to be retained within and adjacent to the site.*

The disturbance footprint of the B2N Project follows the existing rail corridor for most of the Project Area, which reduces additional fragmentation in the landscape that has been impacted by urbanisation and agriculture. The Project Area and boundary were designed to avoid direct impacts to the Glass House Mountains National Park and Glass House Mountains National Heritage Place. Fauna passage will be included at suitable bridges and culverts including Coonowrin Creek, Coochin Creek, Tibrogargan Creek and Mellum Creek. Section 5 details the avoidance and mitigation measures that will be used to avoid impacts to MNES matters. Other smaller areas within the Project Area containing significant environmental values and habitat features have been identified during this assessment as "NO GO" Areas. Extensive assessment undertaken by TMR and its consultants confirmed the "NO GO" Areas will not need to be impacted for design and/or for construction hence, they have been marked as "NO GO". Maps of the proposed Project Area including areas that will be impacted and avoided is provided in Figure 2 of Appendix D.2 and Figure 10 of Appendix D.10.

4.3 Response to 4.3

Information Required for Assessment by Preliminary Documentation

- 4.3 *Provide a description of any changes between the referral documentation and Preliminary Documentation relevant to MNES. For example, please consider any changes to timing of construction phases, disturbance footprint, refined design, survey results etc.*

Changes since the referral submission on 30 September 2020 included:

1) Variation request

On 9 June 2021, TMR submitted a variation request under S156A of the EPBC Act to vary the original proposal under referral number EPBC 2020/8803. The variation request was accepted by DAWE on 9 July 2021. The request consisted of removing the below scope from the action being assessed under EPBC 2020/8803 as this scope posed negligible impact to MNES.

(a) The expansion of the Nambour station park 'n' ride facility, including:

- (i) the creation of approximately 60 new parking spaces

- (ii) the linking up of footpath infrastructure
- (iii) roadworks to convert Mill Street to a two-way road, including pavement works and kerb adjustments.

(b) The expansion of the Landsborough station park 'n' ride facility, including:

- (i) the removal of a man-made pond
- (ii) the clearing of all vegetation present within the area bounded by Dyer Street, Caloundra Street and Gantry Road
- (iii) the demolition of properties in this area
- (iv) the construction of approximately 300 new parking spaces
- (v) provision of a dedicated bus interchange within the above footprint
- (vi) services relocations including water, sewer, power and telecommunications within the above footprint
- (vii) the upgrade of the Tytherleigh Avenue and Caloundra Street intersection to allow for improved vehicular movements into the newly built park 'n' ride facility.

(c) The demolition of properties acquired for the B2N project at Steve Irwin Way, Glasshouse Mountains and Beerburrum, on property allotments: 5RP222399, 1RP167515, 49CG2193, 104SP320404 and 853SP168402. This includes:

- (i) minor vegetation clearing to allow truck movements to load the structures
- (ii) removal of approximately 8 dwellings and 13 associated structures (i.e. sheds)
- (iii) removal and disposal of all waste to a licensed facility
- (iv) removal and disposal of all hazardous chemicals to a licensed facility
- (v) ground stabilisation as required to prevent erosion.

2) Design/footprint changes

Further ecological assessment, surveys results and habitat mapping in 2021 provided additional and critical site information on the presence of MNES. This triggered an extensive review of the Project footprint and the consequent refinement of the footprint to reduce impact on MNES. Additionally, the refined footprint better considered temporary disturbance required to enable construction. The footprint changes are documented in Appendix D.13 EPBC Boundary Refinement and Changes from the Referral.

3) Changes to timing

- a. the Early Works, initially planned to be delivered in 2021 have now been postponed and delivery is planned to occur as soon as possible and
 - b. offsets delivery - advanced offset delivery, ahead of impact is currently being planned. The offset sites (outlined in Section 6) have been assessed and are available for advanced delivery before impacts from the B2N project take place.
- 4) Additional flora survey undertaken in November 2021 (during the Preliminary Documentation public notification period) that confirmed previously recorded *D. johnsonii* on Lot 1 on RP124412 was actually *D. jerseyana* and that the native guava (*Rhodomyrtus psidioides*) does not occur in the Project Area

4.4 Response to 4.4 a)

Information Required for Assessment by Preliminary Documentation

- 4.4 Confirm the area of habitat that will be directly and indirectly impacted by the proposed action, including areas where:
- a) Connectivity to surrounding habitat will be retained, removed or functionally lost.

Habitat within the Project Area is already highly disturbed and fragmented. The proposal consists of an upgrade of existing infrastructure, partially within existing alignment and partially on a new alignment. The existing road and rail line create some levels of barriers to fauna movement in addition to noise, dust, weed spread and sound disturbances. Agricultural land use and urban development also degrade the habitat quality within and adjacent to the Project Area. Additional fragmentation and habitat loss will be restricted to areas of vegetation adjacent to existing roads and rail corridor.

Clearing of vegetation is proposed to occur in small, localised strips or small patches to facilitate the upgrade and no large clearing is proposed. Connections between remnant and regrowth vegetation will be avoided where possible and, given MNES species identified in the Project Area are highly mobile, it is anticipated that species will still be able to traverse the landscape. Additionally, the upgraded infrastructure is unlikely to represent an additional obstacle to movement for many species, including the MNES species assessed as known, likely or with potential habitat in the Project Area because connectivity is being maintained by the proposed fauna mitigation measures discussed in Section 5.

The area of habitat that will be directly and indirectly impacted by the proposed action is outlined in Section 4.5. The project team, with input from qualified ecologists, have undertaken preliminary design considerations to understand how the proposed infrastructure can accommodate for fauna movement by the implementation of new design measures (e.g. fauna passages), retention of the existing habitat connectivity where possible and improved connectivity in some areas. Examples of design improvement where impact to ecological matters have been reduced when compared to the original proposal include: the design of the access road at Burns Rd, Glass House Mountains has utilised the existing power easement to minimise clearing of mapped habitat. This measure means that vegetation loss will be limited and the upgraded gravel road in this location will not be a significant barrier to fauna movement in the area.

Fauna crossing locations presented in Figure D.10 were identified from field surveys, habitat mapping, and discussions and input from Sunshine Coast Council on regional fauna corridors. The fauna movement corridors presented in Figure D.10 represent the locations where full consideration of targeted species will be undertaken during the detailed design of the passage. This will use guidance from the TMR Fauna Sensitive Road Design Manual (see Appendix E) and design considerations for these passages will be fully documented in the Environmental Design Report (EDR), to be completed following detailed design. Additionally, landscaping and revegetation of fauna passage surroundings will be in accordance with MRTS16 and guidance from the TMR Fauna Sensitive Road Design Manual. Detailed information on fauna mitigation design cannot be provided before a detailed design is progressed as it would not reflect full consideration of constraints at each location. The specific areas that are benefited by design measures to avoid impacts are summarised in Table 18. Full discussion of avoidance and mitigation measures is found in Section 5.

Table 18. Project Mitigation Measures to Retain or Improve Connectivity

Location	Mitigation Measure	Anticipated Benefit
Beerburrum	Fauna passage corridor, fauna fencing and road signage	<ul style="list-style-type: none"> increase connectivity / fauna movement potential from east to west reduce risk of vehicle collision
Coonowrin Creek	Fauna passage existing bridge	<ul style="list-style-type: none"> increase connectivity / fauna movement potential from east to west reduce risk of vehicle collision improved fish passage
Coochin Creek	Fauna passage existing bridge	<ul style="list-style-type: none"> increase connectivity / fauna movement potential from east to west improved fish passage
Tibrogargan Creek	Fauna passage existing bridge	<ul style="list-style-type: none"> increase connectivity / fauna movement potential from east to west improved fish passage
Mellum Creek	Existing Box Culverts	<ul style="list-style-type: none"> extended and retrofitted to increase fauna movement potential from east to west reduce risk of vehicle collision

Location	Mitigation Measure	Anticipated Benefit
Burns Rd, Glass House Mountains	Use of existing power easement for access	<ul style="list-style-type: none"> • retain habitat / reduce clearing • maintain fauna movement/connectivity opportunities
"NO GO" Areas	smaller areas within the Project Area containing significant environmental values and habitat features have been identified during this assessment and mapped as "NO GO" Areas (see Appendix D.10)	<ul style="list-style-type: none"> • retain habitat / reduce clearing • maintain fauna movement/connectivity opportunities

4.5 Response to 4.4 b)

Information Required for Assessment by Preliminary Documentation

- 4.4 Confirm the area of habitat that will be directly and indirectly impacted by the proposed action, including areas where:
- b) Adjacent habitat will be subject to intensification of ongoing impacts (for example, through increased levels of dust or polluted runoff).

Following completion of rail duplication and associated upgrades there will be increases in rail traffic. The increased movements can intensify intermittent noise and dust disturbances to local fauna traversing or foraging in the buffer area adjacent to the development footprint. The local fauna is already subject to consistent rail and road traffic disturbances, and so the increase is unlikely to be substantial. The impacts to vegetation are generally confined to marginal edge habitats in vegetation neighbouring existing disturbed areas. Construction environmental management plans will include procedures to mitigate impacts from dust, noise and runoff during the construction phase. Existing fauna populations are habituated to urban noise and light impacts in the environment and vegetation clearing is largely restricted to linear strips of vegetation that have existing edge effect disturbances therefore there it is not anticipated that the Project will result in significant intensification of ongoing impacts to adjacent habitat.

Desktop resources and field assessments concluded that Coochin Creek and Addlington Creek tributaries provide suitable quality habitat for the giant barred frog. The habitat is considered low quality due to weed impacts, fragmentation and proximity to road and rail line disturbances. Other sensitive receptors include the Glasshouse Mountains National Park, which provides suitable habitat for MNES. Construction environmental measures such as sediment and erosion control will be utilised to avoid any additional impacts to the species at these locations. Details of avoidance and mitigation measures are provided in Section 5.

Construction and operational noise, air quality and polluted runoff risks and impacts were assessed during the Detailed Business Case (DBC) and are documented in Sections 3 – 6 of the *Review of Environmental Factors* (SMEC 2019). The REF assessed initial and residual impact, once implementation of mitigation measures is achieved. The residual impacts in air quality and noise are mostly expected to be minor and manageable during both construction and operation (SMEC, 2019). Polluted runoff impacts are believed to improve with Water Sensitive Drainage Design.

Table 19 provides a summary of the direct impact area to known or likely to occur MNES for Early Works, Stage 1 and Stage 2. Table 20 provides a summary of the MNES habitat located within early works, Stage 1 and Stage 2 in the 50m buffer zone. Buffer zones and conservation areas avoided adjacent to the alignment are also provided in figures, in Appendix D.10.

Table 19. Direct Impact to Habitat for MNES within the Indicative Disturbance Footprint

Matter	Habitat Classification	Early Works (ha)	Stage 1 (ha)	Stage 2 (ha)	Total (ha)
Koala	Suitable	2.57	56.26	5.32	64.15
Grey-headed flying-fox	Suitable	2.57	56.26	5.32	64.15
Giant barred frog	Suitable	0	0.04	0.06	0.1
White-throated needletail	Potential	0	5.51	0.07	5.58
Fork-tailed swift	Potential	0	0	0	0
Migratory birds (oriental cuckoo, rufous fantail, spectacled monarch, black-faced monarch satin flycatcher)	Suitable	0	13.9	0.57	14.47
Whipstick wattle	Potential	0.22	16.87	0.04	17.13
Mt Emu she-oak	Potential	0	0	0	0
Swamp stringybark	Potential	0.02	11.83	0	11.85
Macadamia nut	Potential	0	0	0.12	0.12

Table 20. MNES Habitat located within the 50m Buffer Zone

Matter	Habitat Classification	Early Works (ha)	Stage 1 (ha)	Stage 2 (ha)	Total (ha)
Koala	Suitable	42.87	116.96	17.74	177.57
Grey-headed flying-fox	Suitable	42.87	116.96	17.74	177.57
Giant barred frog	Suitable	0	0.38	0.5	0.88
White-throated needletail	Potential	0	13.56	1.85	15.41
Fork-tailed swift	Potential	0	0	0	0
Migratory birds (oriental cuckoo, rufous fantail, spectacled monarch, black-faced monarch satin flycatcher)	Suitable	0.32	21.46	5.36	27.14
Whipstick wattle	Potential	0.69	28.61	0.54	29.84
Mt Emu she-oak	Potential	0	0.52	0	0.52
Swamp stringybark	Potential	0.62	20.16	0	20.78
Macadamia nut	Potential	0	0	6.33	6.33

*The residual impacts (e.g. air quality and noise) within the 50m buffer are expected to be minor and manageable during both construction and operation (SMEC, 2019).

4.6 Response to 4.5

Information Required for Assessment by Preliminary Documentation

- 4.5 Confirm the quantity and quality of suitable habitat to be impacted within the proposed action area. Wherever possible the decision to include/exclude habitat needs to be substantiated with field-based assessments. Please provide a discussion wherever field-based assessment/s were not completed, and the suitability of any alternatives used.

The quality of suitable habitat within the Project Area was assessed for each MNES considered known or likely to occur. The quantity of suitable habitat to be impacted is outlined in Section 4.5. Table 8 identifies the habitat requirements for each species, and notes the map these potential habitats are presented in. The quality of habitat for MNES is outlined in Table 21.

Table 21. Quality of Impacted Areas of Habitat for MNES

Matter	Quality of Habitat
Koala	Low quality - vegetation within the Project Area is generally agricultural land, non-remnant vegetation, plantings or dominated by disturbed areas such as roadsides. Vehicle strike, dog attack and other threats currently exist in the Project Area.
Grey-headed flying-fox	Medium quality – 64.15 ha of foraging habitat will be removed. The grey-headed flying-fox is highly mobile and the removal of foraging resources within the Project Area are not considered a significant loss at a local or regional scale. No roost sites will be directly or indirectly impacted.
Giant barred frog	Low quality – desktop resources and field assessments concluded that sites at Coochin Creek and Addlington Creek tributaries provide suitable habitat for the species. The habitat is considered low quality due to weed impacts, fragmentation and proximity to road and rail line disturbances.
White-throated needletail	Medium quality – 5.58 ha of potential roosting habitat will be removed. The white-throated needletail is highly mobile and the removal of roosting resources within the Project Area are not considered a significant loss at a local or regional scale.
Migratory birds	Low quality - consisting of edge habitats that are fragmented and weed degraded. The listed migratory birds are unlikely to use this habitat for breeding. The high mobility of the listed bird species means that fragmentation of habitat is unlikely to be a significant impact from the B2N project.
Whipstick wattle	Low quality – consisting of potential habitat that is fragmented and weed degraded. Impacts to suitable habitat are limited to lower quality or edge habitat that is already moderately to highly disturbed. No individuals of the species were located during field studies.
Mt Emu she-oak	Low quality – consisting of potential habitat that is fragmented and weed degraded. Impacts to suitable habitat are limited to lower quality or edge habitat that is already moderately to highly disturbed. No individuals of the species were located during field studies.
Swamp stringybark	Low quality – consisting of potential habitat that is fragmented and weed degraded. Impacts to suitable habitat are limited to lower quality or edge habitat that is already moderately to highly disturbed. No individuals of the species were located during field studies.
Macadamia nut	Low quality – consisting of potential habitat that is fragmented and weed degraded. Impacts to suitable habitat are limited to lower quality or edge habitat that is already moderately to highly disturbed. No individuals of the species were located during field studies.

4.7 Response to 4.6 a)

Information Required for Assessment by Preliminary Documentation

- 4.6 Provide an assessment of the direct, indirect, consequential and cumulative impacts that may occur during construction and post-construction phases, including:
- a) The nature and extent of impacts (including direct, indirect and facilitated impacts*), including timing and whether the impact is temporary or permanent.
- Note: This should include particular habitat features relevant to impacted MNES that would be affected e.g. hollows, nest trees, refuge or breeding habitat, or other microhabitat features.*
- *Note: Facilitated impacts may include (but are not limited to) the risk of injury or mortality to MNES as a result of the introduction of domestic dogs in a residential area, vehicle strike as a result of increased residential car use and/or the development of domestic pools.*

Existing impacts include the effects of habitat loss, fragmentation, vehicle strike, dog attack and degradation of habitat by weeds. “The majority of the Project boundary can be classed as ‘urban area’ with existing effects of habitat loss, fragmentation, vehicle strike, dog attack, degradation of habitat by weeds and other threats from human activities” (ARUP, 2020). Given the currently increasing urban population and traffic levels within the locality it is considered that these impacts are permanent. Weed incursions were observed in all habitat areas throughout the site, especially along edges of vegetation and waterways. Impacts to vegetation will be confined to marginal edge habitats in vegetation neighbouring existing disturbed areas. A summary of impacts that may occur during the construction phase is summarised in Table 22. Refer to Section 2.2 for the indicative program of works for Early Works and Stage 1. A discussion of extent of impacts for each species known and likely to occur is provided in the following sections.

Table 22. Summary of Potential Construction Phase Impacts to the MNES Known or Likely to Occur

Construction Phase Impacts	Nature of Potential Impact	Extent of Potential Impact	Timing
Clearing vegetation/Habitat loss	Direct impact	Limited to indicative disturbance footprint	In perpetuity
Vehicle Collision	Direct impact	Limited to Project Area	Throughout construction phase
Noise or dust generation	Indirect impact	Limited to Project Area	Throughout construction phase
Spread or introduction of weeds	Indirect impact	Limited to Project Area	Throughout construction phase
Alterations to aquatic habitat structure and hydrology at waterway crossings	Direct impact	Limited to Project Area and downstream of works	Throughout construction phase
Impacts to fish passage	Direct impact	Limited to Project Area and downstream of works	In perpetuity
Impacts to water quality through sedimentation and erosion	Direct impact	Limited to Project Area and downstream of works	Throughout construction phase

A summary of impacts that may occur during the post-construction phase is summarised in Table 23.

Table 23. Summary of Potential Post-construction Phase Impacts to the MNES Known or Likely to Occur

Post-construction Phase Impacts	Nature of Impact	Extent of Impact	Timing
Increased Fragmentation	Direct impact, Cumulative Impact	Local and Regional Fauna Corridors	In perpetuity
Increased rail traffic collisions	Facilitated impact	Limited to rail corridor within the Project Area	In perpetuity
Increased road traffic collisions	Facilitated impact	Limited to Project Area	In perpetuity

The full MNES significant impacts assessments are provided below. The fork-tailed swift is an almost exclusively aerial species. No habitat was mapped for the fork-tailed swift. As there is no evidence of an important population of fork-tailed swift within the Project Area, a significant impact assessment has not been completed for this species. Seven specimens of *D. jerseyana* were identified in the Project Area near Survey Point 29, as depicted in Appendix D.11. These individuals were planted during a revegetation program and will be removed during clearing (see Section 3.1). No other specimens or suitable habitat have been identified in the Project Area, therefore it has been concluded no wild populations occur in the Project Area.

4.7.1 Koala (*Phascolarctos cinereus*)

The B2N project in the Project Area is considered likely to result in a significant impact to the koala.

The koala is generally found in temperate to tropical forests as well as woodlands and semi-arid communities dominated by eucalyptus species (Martin and Handasyde, 1999). The species can be found in habitat broadly defined as woodlands and open forests, if food trees are present (DOE, 2020a).

Koalas are known to occur within urban and rural landscapes, utilising regrowth and remnant eucalypt dominated vegetation in southeast Queensland. The 2020 and 2021 field investigations did not record any sightings of koalas. One potential koala faecal pellet was observed near Landsborough Station Car Park and signs (scratches) were observed (ARUP, 2020). No other records of koalas were observed during the ERM surveys (2021) or by other previous targeted surveys (USC, 2020; USC 2021). The habitat assessments undertaken during the desktop survey and field investigations identified that regrowth dominated by eucalypt and melaleuca species were present within the Project Area including residential areas, road reserves and cleared paddocks. Food trees of forest red gum (*E. tereticornis*), grey gum (*E. propinqua*), tallowwood (*E. microcorys*), swamp box (*Lophostemon suaveolens*), broad-leaved paperbark (*Melaleuca quinquenervia*), pink bloodwood (*Corymbia intermedia*), red mahogany (*E. resinifera*), blackbutt (*E. pilularis*), brown bloodwood (*C. trachyphloia*), rusty gum (*Angophora leiocarpa*) and grey ironbark (*E. siderophloia*) were recorded within the Project Area. Habitat maps are provided in Appendix D.3 and D.4.

The Project Area is located within the coastal range in South-East Queensland (SEQ). Koala habitat has been identified within the Project Area and is characterised by remnant and regrowth mixed eucalypt and melaleuca species within the road reserves and adjacent vegetation. Conservative mapping and calculations of potential koala habitat within a 50 km radius of the Project Area determined that 344,510 ha of potential habitat is available. The impacts to 64.15 ha of koala habitat within the Project Area equates to 0.018% of the 344,510ha available in the area. Largely, this vegetation is dominated by regrowth mixed juvenile eucalypt and melaleuca species. It is highlighted that the koala habitat differs from conclusions made by ARUP (2020) as the primary methodology to determine value was based on desktop information, and ground-truthed surveys were not undertaken throughout the Project Area in 2020.

The EPBC Act Referral *Guidelines for the Vulnerable Koala (Combined Populations of Queensland, New South Wales and the Australian Capital Territory)* (Koala Referral Guidelines) (DoE 2014) state that decisions as to whether an action is likely to have a significant impact on the koala typically come down to two key considerations:

- adversely affecting habitat critical to the survival of the koala and/or

- interfering substantially with the recovery of the koala through the introduction or exacerbation of key threats in areas of habitat critical to the survival of the koala.

The assessment process for koala habitat involved extensive desktop reviews (including previous survey efforts) as well as the field investigations in 2021. There were no sightings of the species during the field investigations. Koala habitat has been identified within and adjacent to the Project Area. This habitat is characterised by vegetation communities containing remnant or regrowth *Eucalypt*, *Angophora*, *Lophostemon*, *Melaleuca* and *Corymbia* species. The Project Area (including buffer area) encompassed 39.93 ha of remnant vegetation that is koala habitat and 24.22 ha of regrowth vegetation that is koala habitat.

In accordance with Attachment 1 of the Koala Referral Guidelines the Project Area habitat assessments on average define structural forms of vegetation as open-forest with a canopy of 10-30 metres and mid-dense (30-70%) percentage foliage cover of tallest plant layer. The Koala Referral Guidelines define habitat as 'critical to the survival of the koala' if it receives a score of five or more using the koala habitat assessment tool. For the B2N project, habitat within the Project Area received a score of seven and is therefore considered to be habitat critical to the survival of the koala. For the full assessment of koala habitat, refer to Table 24.

Table 24. Critical Koala Habitat Analysis

Attribute	Description	Score
Koala Occurrence	Field surveys confirmed koala presence at Landsborough and Beerburum via scats and scratch marks (ARUP, 2020) as referred to in tables 8 and 15. No other records of koalas were observed during the ERM surveys (2021) or by other previous targeted surveys (USC, 2020; USC 2021), indicating a low density population. One koala record obtained from relevant databases exists within 5km of the Project Area from 2014.	+2
Vegetation Composition	The Project Area is largely cleared or dominated by native and invasive grasslands. The structural form of vegetation is primarily considered regrowth. There is a total of 64.15 ha of potential koala habitat ground-truthed within the Project Area. This is along a linear Project Area of approximately 40km in length. This habitat contains predominately regrowth <i>Eucalyptus</i> spp. and <i>Melaleuca</i> sp. This potential koala habitat therefore contains more than two known koala food trees.	+2
Habitat Connectivity	The habitat assessment identified 64.15 ha of potential koala habitat in the Project Area. Linear fragments of vegetation adjacent to the Project Area are largely small and surrounded by cleared agricultural areas and adjacent to existing roadways or rail. Overall, the habitat within the Project Area is largely disconnected to other larger remnant patches by roads (e.g. Steve Irwin Way) and the existing rail line, however the habitat is considered part of a contiguous landscape greater than 500 ha.	+2
Key Existing Threats	Evidence of wild dogs was recorded in the Beerburum State forest during Koala Survey Using detection dogs Beerburum to Nambour Rail Upgrade (USC 2020). SEQ is known for the threat of vehicle collisions and wild dogs causing a significant threat to koalas (DES, 2021).	+1
Recovery Value	<p>B2N is a length of linear infrastructure that has the potential to impact the interim recovery objectives, by increasing the east-west barrier to corridors and connective habitat that allow movement of koalas between large areas of habitat. However, the proposal is for an upgrade of existing infrastructure, with appropriate design for fauna crossings to facilitate ongoing koala movement across the landscape.</p> <p>The interim recovery objectives for the koala are:</p> <ul style="list-style-type: none"> • protect and conserve the quality and extent of habitat refuges for the persistence of the species during droughts and periods of extreme heat, especially in riparian environments and other areas with reliable soil moisture and fertility • maintain the quality, extent and connectivity of large areas of koala habitat surrounding habitat refuges • the Project Area occurs predominately in existing, highly cleared residential, road reserves, rail corridor and agricultural areas. 64.15 ha of koala habitat occurs within the Project Area, and there is no evidence of koala use or important populations in the vicinity of the Project Area. It is unlikely to impact habitat that is important for achieving the interim recovery objectives. 	0
Total Habitat Score		7

It is noted that based on the information provided prior to lodgement of this Preliminary Documentation that DAWE considered that the site contains habitat critical to the survival of the Koala with a score of 8. However, additional ground-truthed habitat assessments has determined that a score of 7 is more appropriate for the following reasons:

- a) Recovery value (0) – DAWE scored koala occurrence as +1 due to habitat fragments in the Project Area around the railway to be upgraded being disturbed, dominated by edge environments and unlikely to be important for the long-term survival of the species. Further to this assessment, mitigation measures (e.g. fauna corridors) will more readily facilitate the potential for dispersal between areas of habitat from east to west. The Project Area occurs predominately in existing fragmented sections of vegetation with existing edge effects and threats, not in large, connected areas of koala habitat. Therefore, the habitat is unlikely to be important for achieving the interim recovery objectives and a score of 0 is more appropriate for recovery value.

4.7.1.1 Adverse effects on habitat critical to the survival of the koala

The potential clearing impact to koala habitat is 64.15 ha (Early Works: 2.57 ha, Stage 1: 56.26 ha and Stage 2: 5.32 ha). This is along a linear Project Area of approximately 40km in length. Therefore, the habitat that will be impacted is relatively minor in relation to the larger context of available koala habitat. Additionally, the clearing will not increase the level of fragmentation in the landscape, where barriers to movement such as the existing roads and rail, already occur. Furthermore, such clearing will not disconnect the Project Area from larger, adjacent vegetation patches or State Forests.

Based on the referral guidelines, the loss of 64.15 ha of marginal quality habitat critical to the survival is likely to have a significant impact on koalas. It is also noted that threatening processes related to dog mortality and vehicle fatalities are not likely to increase as a result of the B2N project, such that key threats are not exacerbated and will not substantially interfere with recovery efforts for the koala in the region.

4.7.1.2 Recovery of the koala

The B2N project is unlikely to interfere with the recovery of the koala as:

- the habitat to be removed is a small proportion of available habitat in the locality along an approximately 40 km long corridor and exists largely in a disturbed and cultivated landscape (Conservative mapping and calculations of potential koala habitat within a 50 km radius of the Project Area determined that 344,510 ha of potential habitat is available. The impacts to 64.15 ha of koala habitat within the Project Area equates to 0.018% of the 344,510ha available in the area)
- there is limited evidence of koala presence in the locality
- the development will not substantially increase the risk of dog attack to the koala
- the risk of vehicle strike is already considered high (DES, 2021)
- the construction and operational works will be carried out with precautionary measures that minimise the risk of spread or introduction of invasive species and disease
- project activities are occurring in an already cleared and modified landscape that is used for urban and agricultural purposes. Thus, the discrete pockets of clearing, along an approximately 40 km long corridor, of koala habitat is unlikely to create an increased barrier to movement for the species.

The full assessment as to why the development works will not impact the recovery of the koala, is provided in Table 25.

Table 25. Impacts on Koala Recovery Assessment

Criteria	Discussion	Criteria triggered?
<i>Impacts which are likely to substantially interfere with the recovery of the koala may include one or more of the following:</i>		
Increasing koala fatalities in habitat critical to the survival of the koala due to dog attacks to a level that is likely to result in multiple, ongoing mortalities.	<p>The project involves the upgrade of an existing railway already classed as an urban area. Most of the Project Area can be classed as 'urban area', e.g. the existing rail corridor, roads, urban development including residences and hardstand.</p> <p>The project boundary is in relatively proximity to the existing rail line, reducing the potential impact of the works on key Koala vegetation and habitats.</p> <p>As the Project Area is classified as an urban area, there are existing effects of habitat loss, fragmentation, vehicle strikes and dog attacks.</p> <p>The works are unlikely to result in increased incidents of dog attacks than there are currently. However, there is unlikely to be a reduction in the current incident rate of dog attacks.</p>	No
Increasing koala fatalities in habitat critical to the survival of the koala due to vehicle-strikes to a level that is likely to result in multiple, ongoing mortalities.	<p>The project involves the upgrade of an existing railway already classed as an urban area. The project boundary is in relatively proximity to the existing rail line, reducing the potential impact of the works on key Koala vegetation and habitats.</p> <p>As the Project Area is classified as an urban area, there are existing effects of habitat loss, fragmentation, vehicle strikes and dog attacks.</p> <p>Therefore, the works are unlikely to result in increased incidents of vehicle strikes than there are currently. However, there is unlikely to be a reduction in the current incident rate of vehicle strikes.</p>	No
Facilitating the introduction or spread of disease or pathogens for example Chlamydia or Phytophthora cinnamomi, to habitat critical to the survival of the koala, that are likely to significantly reduce the reproductive output of koalas or reduce the carrying capacity of the habitat.	<p>The project is not expected to introduce any new diseases that may impact the Koala. The project is not likely to increase the frequency of koala interaction that may lead to increased disease spread, due in part to the very low evidence of koalas in the locality.</p> <p>The project is not likely to introduce disease that may cause species decline. The project is also unlikely to facilitate the spread of disease or pathogens.</p>	No
Creating a barrier to movement to, between or within habitat critical to the survival of the koala that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the koala.	<p>As the Project Area is classified as an urban area, there are existing effects of habitat loss, fragmentation, vehicle strikes and dog attack. As the Project Area is near the existing rail line, there is minimal risk of increasing the severity of current habitat fragmentation.</p> <p>Wildlife proof temporary and permanent fencing guided by TMR standard drawing and Fauna Sensitive Road Design Manual will be considered in conjunction with fauna crossings. It is not expected that there will be an increase in habitat or fauna fragmentation from the Project considering the mitigation measures identified in Section 5.</p> <p>While koala movement across the landscape can still occur, east-west connectivity is disrupted by the existing rail corridor and Steve Irwin Way, with some informal provisions for safe fauna movement at existing culverts and bridge structures. Based on targeted koala surveys and koala detection dog surveys, there appears to be low koala abundance within and adjacent to the Project Area. Therefore, the B2N project is not considered likely to impact population genetics and movement between populations.</p> <p>The project will not significantly increase these current threats within the Project boundary or within the disturbance footprint.</p>	No

Criteria	Discussion	Criteria triggered?
Changing hydrology, which degrades habitat critical to the survival of the koala to the extent that the carrying capacity of the habitat is reduced in the long-term.	<p>Within the Project indicative disturbance footprint there is 64.15 ha of koala habitat.</p> <p>Hydraulic and hydrologic modelling will be undertaken as part of the detailed drainage design requirements to address flooding and other drainage issues in compliance with the Australian Rainfall and Runoff: A Guide to Flood Estimation. Modelling will be undertaken to demonstrate compliance with all requirements such as afflux, immunity, velocities, time of inundation, demonstration of SFAIRP, and so on). The following design events will be included as a minimum in the modelling exercise: 63%, 50%, 20%, 10%, 5%, 2%, 1% and 0.05% Annual Exceedance Probability (AEP) events and scour protection systems will be designed to flood events up to a 1% AEP. Flood modelling will also incorporate climate change effects. This will minimise impacts to koala habitat. These measures are further discussed in Section 5.</p> <p>Therefore, it is low risk that severe changes would occur and degrade critical habitat for the koala in the long-term.</p>	No

4.7.2 Grey-headed flying-fox (*Pteropus poliocephalus*)

The proposed works in the Project Area is considered likely to lead to a significant impact to the grey-headed flying-fox.

The grey-headed flying-fox is listed as 'Vulnerable' under the EPBC Act and has been concluded as known to occur within the Project Area. The Project Area occurs in a small section of the distribution of the grey-headed flying-fox, which extends throughout eastern Australia. Many myrtaceous tree species that make up the diet of the grey-headed flying-fox flower at different times of the year. Important winter and spring vegetation communities are those that contain *Eucalyptus tereticornis*, *E. albens*, *E. crebra*, *E. fibrosa*, *E. melliodora*, *E. paniculata*, *E. pilularis*, *E. robusta*, *E. seeana*, *E. sideroxylon*, *E. siderophloia*, *Banksia integrifolia*, *Castanospermum australe*, *Corymbia citriodora*, *C. eximia*, *C. maculata*, *Grevillea robusta*, *Melaleuca quinquenervia* or *Syncarpia glomulifera* (Eby and Law 2008; Eby 2016; Eby et al., 2019). The Project Area contains many of these myrtaceous species and rainforest species with fleshy fruits. Where the existence of these important winter and spring flowering vegetation communities is verified in the field, they are considered habitat critical to the survival of the Grey-headed Flying-fox (DAWE, 2021). The total amount of grey-headed flying-fox habitat within the indicative disturbance footprint was mapped as 64.15 ha (Early Works: 2.57 ha, Stage 1: 56.26 ha and Stage 2: 5.32 ha). Conservative mapping and calculations of potential flying-fox foraging resources within a 50 km radius of the Project Area determined that 344,510 ha of foraging resources are available. The impacts to 64.15 ha of resources within the Project Area equates to 0.018% of available habitat in the area. While the habitat loss is considered minimal at a regional scale, the grey-headed flying-fox foraging habitat to be cleared is considered habitat critical to the survival of the species, and so a significant impact to the species has been conservatively concluded.

The significant impact guidance for 'vulnerable' species in SIG 1.1, refers to impacts to 'important populations' of a species (DoE, 2013). Important population is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity
- populations that are near the limit of the species' range (DoE, 2013).

The proposed B2N project has been assessed in the following ways. Initially, field investigations and mapping have designated a total of 64.15 ha of grey-headed flying-fox habitat within the Project Area. A significant impact assessment based on guidance provided in the SIG 1.1, is presented in Table 26.

Table 26. Significant Impact Assessment for Grey-headed Flying-fox

Criteria	Description	Criteria Triggered?
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>		
lead to a long-term decrease in the size of an important population of a species	<p>The grey-headed flying-fox is considered to exist as one national population split into separate colonies due to the constant genetic exchange and movement between camps throughout the species' entire geographic range (DoE, 2021).</p> <p>No roost sites will be directly or indirectly affected by the Project works. The amount of foraging habitat to be cleared is 64.15 ha. This species is expected to forage within the Project Area on an opportunistic and occasional basis. On a local and regional scale, the removed habitat makes up a small proportion of foraging resources.</p> <p>Intensification of light and noise are not expected to adversely affect local populations of grey-headed flying-fox. The Project Area exists in an already urbanised environment and local populations of grey-headed flying-fox are expected to be tolerant of anthropogenic activities. During the construction phase, construction environmental management plans will detail mitigation measures to avoid impacts to flying-fox roost sites that are in close proximity to the Project Area (e.g. suitably experienced wildlife spotters present and timing works to avoid important lifecycle stages for the species).</p> <p>The Project Area does not support an important population of the species. Therefore, the B2N project is unlikely to lead to a long-term decrease in the size of the population.</p>	No
reduce the area of occupancy of an important population	<p>Like general roosting trends for the species a small number of local camps support a continuous presence of grey-headed flying-foxes while others are associated with consistent, annual variations of use. The B2N project will involve clearing foraging habitat, given the abundant accessibility of eucalypts in the locality and the greater SEQ landscape, the removal of vegetation is unlikely to have a significant impact on the area of occupancy of the species. The clearing of such small linear patches of vegetation across the Project Area, which will not remove habitat patches altogether, will ensure that the area of occupancy for the species is not significantly reduced.</p>	No
fragment an existing important population into two or more populations	<p>Grey-headed flying-foxes are highly mobile and forage over extensive areas. The clearing of 64.15 ha of grey-headed flying-fox habitat will not further fragment the existing population. This clearing impact will only remove discrete pockets of foraging habitat. Such small clearings will ensure that grey-headed flying-fox habitat remains connected, both within and outside of the Project Area.</p>	No
adversely affect habitat critical to the survival of a species	<p>The Project Area contains myrtaceous species and rainforest species with fleshy fruits that are seasonal foraging resources considered habitat critical to the survival of the grey-headed flying-fox.</p> <p>Nonetheless, the impact will adversely affect habitat critical to the survival of the species at a local scale. Despite this, clearing will impact only a small proportion of habitat within the larger landscape. Conservative mapping and calculations of potential flying-fox foraging resources within a 50 km radius of the Project Area determined that 344,510 ha of foraging resources are available. The removal of 64.15ha of foraging resources within the Project Area equates to 0.018% of the 344,510ha available in the region. Thus, the significant impact to habitat critical to the survival of the species is restricted to a 'local' impact.</p>	Yes
disrupt the breeding cycle of an important population	<p>Colonies of grey-headed flying-fox rest, socialise, breed and give birth at roosting sites also known as camps. No known camps will be removed as part of the Project works.</p> <p>Intensification of light and noise during construction are not expected to adversely affect the breeding cycle of local colonies of grey-headed flying-fox. The Project Area exists in an already urbanised environment and local populations of grey-headed flying-fox are expected to be tolerant of anthropogenic activities. During the construction phase, construction environmental management plans will detail mitigation measures to avoid impacts to flying-fox roost sites that are in close proximity to the Project Area (e.g. suitably experienced wildlife spotters present and timing works to avoid important lifecycle stages for the species). Thus, the species will still be able to successfully breed in the Project Area.</p>	No

Criteria	Description	Criteria Triggered?
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>The Project Area contains myrtaceous species and rainforest species with fleshy fruits that are foraging resources considered habitat critical to the survival of the grey-headed flying-fox.</p> <p>Nonetheless, the impact will not adversely affect the quality of habitat to the extent that the species is likely to decline. This is because clearing will occur in such small proportions of the larger landscape, at only 0.018% of available habitat in the region. The seasonal foraging resources to be removed are commensurate to an abundance of other vegetation communities within the locality.</p> <p>Hygiene measures to be implemented during construction will minimise weed encroachment into adjacent habitat which consequently means habitat quality degradation will be prevented.</p>	No
result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	The B2N project is not anticipated to introduce invasive species that are harmful to the grey-headed flying-fox. The project activities during construction and operation will adopt and follow biosecurity measures to mitigate the introduction or further spread of invasive species in the Project Area.	No
introduce disease that may cause the species to decline or	<p>There is currently limited information necessary to assess and quantify the risks posed to grey-headed flying-fox populations by the introduction of diseases (DAWE, 2021).</p> <p>The B2N project is not anticipated to introduce diseases to local grey-headed flying-fox colonies. There no evidence to suggest the proposed disturbance would introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. This includes following biosecurity measures and ensuring proper personal protection equipment (PPE) is worn if a flying-fox is encountered. Only appropriately trained and licensed workers will handle wildlife.</p>	No
interfere with the recovery of the species.	<p>The National Recovery Plan for the grey-headed flying-fox (DAWE, 2021), outlines 9 specific recovery objectives intended to be achieved over ten years. They are:</p> <ol style="list-style-type: none"> 1. Identify, protect and increase native foraging habitat that is critical to the survival of the grey-headed flying-fox. 2. Identify, protect and increase roosting habitat of grey-headed flying-fox camps. 3. Determine trends in the grey-headed flying-fox population so as to monitor the species' national distribution, habitat use and conservation status. 4. Build community capacity to coexist with flying-foxes and minimise the impacts on urban settlements from new and existing camps while avoiding interventions to move on or relocate entire camps. 5. Increase public awareness and understanding of grey-headed flying-foxes and the recovery program and involve the community in the recovery program where appropriate. 6. Improve the management of grey-headed flying-fox camps in areas where interaction with humans is likely. 7. Significantly reduce levels of licenced harm to grey-headed flying-foxes associated with commercial horticulture. 8. Support research activities that will improve the conservation status and management of grey-headed flying-foxes. 9. Reduce the impact on grey-headed flying-foxes of electrocution on power lines, and entanglement in netting and on barbed-wire. <p>The first recovery objective is applicable to this assessment because native foraging habitat that is critical to the survival of the grey-headed flying-fox has been identified in the Project Area. As previously outlined the seasonal foraging resources to be removed are commensurate to an abundance of other vegetation communities within the locality. The removal of 65.15ha of resources within the Project Area equates to 0.014% of the 344,510ha available in the region. Therefore, the B2N project will not interfere with the recovery of the species.</p>	No

4.7.3 Giant barred frog (*Mixophyes iteratus*)

The proposed works in the Project Area is unlikely to lead to a significant impact to the giant barred frog.

The significant impact guidance for “endangered” species in SIG 1.1, refers to impacts to ‘a population’ of a species (DoE, 2013). A population of a species is defined as an occurrence of the species in a particular area. Occurrences include but are not limited to:

- A geographically distinct regional population, or collection of local populations, or
- A population, or collection of local populations that occurs within a particular bioregion (DoE, 2013).

An ‘invasive species’ is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species (DoE, 2013).

‘Habitat critical to the survival of a species or ecological community’ refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community (DoE, 2013).

The proposed B2N project has been assessed in the following ways. Initially, field investigations and mapping have designated a total of 0.1 ha of giant barred frog habitat within the indicative disturbance footprint. A significant impact assessment based on guidance provided in the SIG 1.1, is presented in Table 27.

Table 27. Significant Impact Assessment for Giant barred frog

Criteria	Description	Criteria Triggered?
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>		
lead to a long-term decrease in the size of a population	<p>Assessment of potential habitat concluded that only 0.1 ha of Giant Barred Frog habitat will be impacted within the indicative disturbance footprint.</p> <p>The nearest known population is located at Mellum Creek approximately 100 metres east of the indicative disturbance footprint and will not be directly impacted by the works. No Giant Barred Frogs were detected during the 2021 surveys in the Project Area. The species was detected 100 m east of the Project Area during surveys (ARUP, 2020) at Mellum Creek.</p> <p>The identified habitat for giant barred frog is in proximity of the existing rail corridor, which is currently subject to urban disturbance. Current habitat within the Project Area is considered fragmented, disturbed and poor-quality breeding habitat for the Giant Barred Frog. The nearest suitable habitat is located upstream and downstream of the Project Area and the species will have full access to this habitat throughout the works.</p> <p>Indirect impacts to suitable habitat through construction activities (surface water changes, erosion, sedimentation changes), will be minimised through construction environmental management measures. Therefore, this project is highly unlikely to lead to a long-term decrease in the size of an important population of a species, due to unsuitable habitat within the Project Area and sufficient environmental measures preventing indirect impact outside of the Project boundary.</p>	No

Criteria	Description	Criteria Triggered?
reduce the area of occupancy of the species	<p>The Giant Barred Frog was detected at Mellum Creek, situated 100 m east of the Project boundary.</p> <p>Within the Project Area there is suitable habitat either side of the existing railway. Suitable habitat is available and mapped at Mellum Creek and Addlington Creek. However, this habitat is fragmented, disturbed and unlikely to be suitable for breeding. Lack of detection during surveys suggests that it is unlikely an important population occurs within the indicative disturbance footprint.</p> <p>Indirect impacts (e.g. changes to hydrology, erosion) within the Project Area will be managed through construction environmental management mitigation measures and sound drainage design.</p>	No
fragment an existing population into two or more populations	<p>The Giant Barred Frog was not detected within the Project Area during the 2021 surveys. Previous reports suggest presence at Mellum Creek approximately 100m east of the Project boundary. It is unlikely an important population occurs within the indicative disturbance footprint. Therefore, fragmentation of an important population is unlikely to occur.</p>	No
adversely affect habitat critical to the survival of a species,	<p>Within the Project Area there is suitable habitat either side of the existing railway. Suitable habitat is available and mapped at Mellum Creek and Addlington Creek. However, this habitat is fragmented, disturbed and unlikely to support breeding and so not considered habitat critical to the survival of the species.</p> <p>Indirect impacts upstream or downstream (e.g. changes to hydrology, erosion) of the Project Area, will be managed through construction environmental management mitigation measures and sound drainage design.</p> <p>Therefore, it is highly unlikely that the Project will adversely affect habitat critical to the survival of the species within or adjacent to the Project Area.</p>	No
disrupt the breeding cycle of a population	<p>An important population has not been identified and the habitat within the Project Area is unlikely to support breeding due to the disturbed state. Therefore, it is unlikely that the Project will disrupt the breeding cycle of an important population.</p>	No
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>An important population has not been identified within the Project Area, and suitable habitat is available and mapped at Mellum Creek and Addlington Creek, it is fragmented, disturbed and not suitable for breeding.</p> <p>Indirect impacts to suitable habitat adjacent to the indicative disturbance footprint (e.g. surface water changes, erosion, sedimentation changes), will be minimised through construction environmental management measures.</p> <p>Therefore, the Project is highly unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.</p>	No
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<p>Significant invasive species that are harmful to the Giant Barred Frog are known or likely to occur near the Project boundary, including invasive weeds, mosquito fish, tilapia and the cane toad.</p> <p>The Project is not considered likely to result in the increase of the existing threats or establishment of new invasive species harmful to the species. Mitigation measures will be used to ensure standard biosecurity procedures are followed to manage the introduction or spread of invasive species.</p>	No
introduce disease that may cause the species to decline or	<p>Chytrid fungus is a significant threat to the Giant Barred Frog. However, the Project is not expected to result in the introduction or further spread of this disease. Biosecurity measures will be implemented during the Project to manage the risk of chytrid fungus being introduced or spread to new habitats. Measures will also be taken to prevent the introduction of disease that may impact the species.</p> <p>Therefore, this project is considered unlikely to introduce disease that may cause the species to decline or interfere with the recovery of the species.</p>	No

Criteria	Description	Criteria Triggered?
interfere with the recovery of the species.		No

4.7.4 White-throated needletail (*Hirundapus caudacutus*)

The proposed works in the Project Area is unlikely to lead to a significant impact to the white-throated needletail.

The significant impact guidance for 'vulnerable' species in SIG 1.1, refers to impacts to 'important populations' of a species (DoE, 2013). Important population is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity
- populations that are near the limit of the species' range (DoE, 2013).

The proposed B2N project has been assessed in the following ways. Initially, field investigations and mapping have designated a total of 5.58 ha of potential white-throated needletail habitat within the indicative disturbance footprint. A significant impact assessment based on guidance provided in the SIG 1.1, is presented in Table 28.

Table 28. Significant Impact Assessment for the White-throated needletail

Criteria	Description	Criteria Triggered?
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>		
lead to a long-term decrease in the size of an important population of a species	The Project Area follows the existing railway corridor with 5.58 ha of potential roosting habitat for the species within the indicative disturbance footprint. This area is considered disturbed, and effects of disturbance are currently ongoing. There are approximately 30 records from the last 20 years within the Project Area. These records are likely to be aerial flyover observations or observations of the species during short roosting periods. However, the species was not detected during targeted surveys in 2020-2021. On this basis, there is no evidence to indicate an important population occurs within the Project Area. Therefore, as an important population does not occur within the Project Area, the Project will not result in the long-term decrease in the size of an important population of the species.	No
reduce the area of occupancy of an important population	As there is no important population within the Project Area, the Project will not reduce the area of occupancy of an important population.	No
fragment an existing important population into two or more populations	As there is no important population within the Project Area, the Project will not fragment an existing important population.	No
adversely affect habitat critical to the survival of a species	The indicative disturbance footprint contains 5.58 ha of potential habitat for the species, although no important population was identified within the Project Area. Therefore, it is considered that no habitat critical to the survival of the species occurs within the Project Area.	No
disrupt the breeding cycle of an important population	As this species does not breed in Australia, it is highly unlikely that the Project will disrupt the breeding cycle of an important population.	No
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As suitable habitat within the Project Area is already disturbed, fragmented and of low quality, the Project will not lead to a decrease in the quality of habitat to the extent the species will decline.	No
result in invasive species that are harmful to a vulnerable species becoming established in the endangered species' habitat	Within the indicative disturbance footprint, invasive species are already present due to urban disturbance. Following biosecurity measures, the works within the Project Area will mitigate the spread or introduction of invasive species harmful to the species. Therefore, it is unlikely that the Project will result in the spread or establishment of an invasive species that is harmful to the white-throated needletail or becoming established in its potential habitat.	No

Criteria	Description	Criteria Triggered?
introduce disease that may cause the species to decline or	The B2N project is not anticipated to introduce diseases to the species. There is no evidence to suggest the proposed disturbance will introduce a disease that would cause the species to decline. Additionally, precautions will be taken to ensure that the spread of disease does not occur. Direct impacts from construction, operation and maintenance of the corridor are highly unlikely to introduce or spread disease within the Project Area.	No
interfere with the recovery of the species.	Given the aerial nature of the species and the absence of an important population within the Project Area, it is unlikely that the Project will interfere with the recovery of the species.	No

4.7.5 Migratory bird species

The proposed works in the Project Area is unlikely to lead to a significant impact to the listed migratory bird species: oriental cuckoo (*Cuculus optatus*), rufous fantail (*Rhipidura rufifrons*), spectacled monarch (*Monarcha trivirgatus*), black-faced monarch (*Monarcha melanopsis*), satin flycatcher (*Myiagra cyanoleuca*), white-throated needletail (*Hirundapus caudacutus*) and fork-tailed swift (*Apus pacificus*).

The significant impact guidance for 'migratory' species in SIG 1.1, refers to impacts to migratory species. A migratory species 'Population', means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia (DoE, 2013). An area of 'important habitat' for a migratory species is:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- habitat that is of critical importance to the species at particular life-cycle stages, and/or
- habitat utilised by a migratory species which is at the limit of the species range, and/or
- habitat within an area where the species is declining (DoE, 2013).

An 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species-specific behavioural patterns (for example, site fidelity and dispersal rates) (DoE, 2013).

The proposed B2N project has been assessed in the following ways. Initially, field investigations and mapping have designated a total of 14.47 ha of migratory species (oriental cuckoo, rufous fantail, spectacled monarch, black-faced monarch and satin flycatcher) habitat within the indicative disturbance footprint. The fork-tailed swift is an almost exclusively aerial species. No habitat was mapped for the fork-tailed swift. As there is no evidence of an important population of fork-tailed swift within the Project Area, a significant impact assessment has not been completed for this species. Appendix D.4 identifies the desktop migratory bird records and potential migratory bird habitat in the Project Area. Appendix D.11 identifies the field survey migratory bird records in the Project Area. A significant impact assessment based on guidance provided in the SIG 1.1 for oriental cuckoo, rufous fantail, spectacled monarch, black-faced monarch and satin flycatcher, is presented in Table 29.

Table 29. Significant Impact Assessment for Migratory bird species

Criteria	Description	Criteria Triggered?
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>		
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	The listed migratory bird species are all highly mobile. The high level of disturbance (e.g. weeds, noise and introduced predators) to the existing habitat within the Project Area means they are in all probability only utilised for movement by these species and not for breeding. One spectacled monarch and two rufous fantails were observed in the 2021 field survey, and unlikely to be considered an ecologically significant proportion of the population. Therefore, this project is highly unlikely to destroy or isolate an area of important habitat for listed migratory bird species within the Project Area.	No

Criteria	Description	Criteria Triggered?
result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The B2N project is not anticipated to introduce invasive species that are harmful to the listed migratory species. The existing environment within the Project Area is significantly weed impacted. The project activities during construction and operation phases will adopt and follow biosecurity measures to mitigate the introduction or further spread of invasive species in the Project Area.	No
seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The listed migratory bird species are all highly mobile. The high level of disturbance (e.g. weeds, noise and introduced predators) to the existing habitat within the Project Area means they are in all probability only utilised for movement by these species and not for breeding. The extent of migratory bird habitat to be cleared 14.47 ha. Therefore, this project is highly unlikely to disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of listed migratory species.	No

4.7.6 Whipstick wattle (*Acacia attenuata*)

The proposed works in the Project Area is unlikely to lead to a significant impact to the listed whipstick wattle.

The significant impact guidance for 'endangered' species in SIG 1.1, refers to impacts to 'a population' of a species (DoE, 2013). A population of a species is defined as an occurrence of the species in a particular area. Population that is necessary for a species' long-term survival and recovery. Occurrences include but are not limited to:

- A geographically distinct regional population, or collection of local populations, or
- A population, or collection of local populations that occurs within a particular bioregion (DoE, 2013).

An 'invasive species' is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species (DoE, 2013). 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community (DoE, 2013).

The proposed B2N project has been assessed in the following ways. Initially, field investigations and mapping have designated a total of 17.13 ha of whipstick wattle habitat within the indicative disturbance footprint. A significant impact assessment based on guidance provided in the SIG 1.1, is presented in Table 30.

Table 30. Significant Impact Assessment for Whipstick wattle

Criteria	Description	Criteria Triggered?
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>		

Criteria	Description	Criteria Triggered?
lead to a long-term decrease in the size of a population	<p>The Project Area follows the existing railway corridor with 17.13 ha of potential habitat for the species within the indicative disturbance footprint. This area is considered disturbed, and effects of disturbance are currently ongoing. There is a single historic record of the Whipstick Wattle within the Project Area. However, there are no database records within the past 10 years and the species was not detected during targeted surveys in 2020-2021. On this basis, there is no evidence to indicate an important population occurs within the Project Area.</p> <p>Indirect impacts from construction (e.g. changes to surface water, sedimentation and water flow) are considered low risk and the implementation of construction environmental management measures will mitigate risk to suitable habitat outside of the Project Area.</p> <p>Therefore, as an important population does not occur within the Project Area, the Project will not result in the long-term decrease in the size of a population of the species.</p>	No
reduce the area of occupancy of the species	As there is no important population within the Project Area, there are no database records within the past 10 years and the species was not detected during targeted surveys in 2020-2021, the Project will not reduce the area of occupancy of the species.	No
fragment an existing population into two or more populations	As there is no important population within the Project Area, the Project will not fragment an existing important population.	No
adversely affect habitat critical to the survival of a species	Habitat critical to the survival of the species, as defined in the National Recovery Plan for <i>Acacia attenuata</i> , shows a close association with the ecotone between wet heathland and open eucalypt forest communities (Brownlie, 2007). The Project Area contains 17.13 ha of potential habitat for the species, although no individuals were observed, and no important population identified within the Project Area. Therefore, it is considered that no habitat critical to the survival of the species occurs within the Project Area.	No
disrupt the breeding cycle of a species	As there is no important population within the Project Area, it is highly unlikely that the Project will disrupt the breeding cycle of an important population.	No
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As suitable habitat within the Project Area is already disturbed, fragmented and of low quality, the Project will not lead to a decrease in the quality of habitat to the extent the species will decline.	No
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Within the indicative disturbance footprint, invasive species are already present due to urban disturbance. Following biosecurity measures, the works within the Project will mitigate the spread or introduction of invasive species harmful to the species. Therefore, it is unlikely that the Project will result in the spread or establishment of an invasive species that is harmful to the species or becoming established in the species potential habitat.	No
introduce disease that may cause the species to decline or	<p>No pathogen or disease is known to have a harmful effect on the Whipstick Wattle to the extent that species decline will occur. No individuals of the Whipstick Wattle have been reported in the Project Area in the last 10 years suggesting the risk to species decline is very low.</p> <p>Direct impacts from construction, operation and maintenance of the corridor are highly unlikely to introduce or spread disease within the Project Area.</p>	No
interfere with the recovery of the species.	Given the lack of known records and the absence of an important population within the Project Area, it is unlikely that the Project will interfere with the recovery of the species.	No

4.7.7 Mt Emu she-oak (*Allocasuarina emuina*)

The proposed works in the Project Area is unlikely to lead to a significant impact to the listed Mt Emu she-oak.

The significant impact guidance for 'endangered' species in SIG 1.1, refers to impacts to 'a population' of a species (DoE, 2013). A population of a species is defined as an occurrence of the species in a particular area. Occurrences include but are not limited to:

- A geographically distinct regional population, or collection of local populations, or
- A population, or collection of local populations that occurs within a particular bioregion (DoE, 2013).

An 'invasive species' is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species (DoE, 2013).

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community (DoE, 2013).

The proposed B2N project has been assessed in the following ways. Initially, field investigations and mapping have no Mt Emu She-oak habitat within the disturbance footprint, within the buffered disturbance footprint there is 0.5 ha of Mt Emu She-oak habitat. A significant impact assessment based on guidance provided in the SIG 1.1, is presented in Table 31.

Table 31. Significant Impact Assessment for Mt Emu she-oak

Criteria	Description	Criteria Triggered?
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>		
lead to a long-term decrease in the size of a population	<p>The Project Area follows the existing railway corridor and will not impact suitable habitat within the indicative disturbance footprint. This area is considered disturbed, and effects of disturbance are currently ongoing. There is no record of the Mt Emu She-oak within the Project Area, but the species does occur in the Beerwah conservation areas (Beerwah Forest Reserve). The Beerwah Forest Reserve is 4 km east of the Project Area. There was no Mt Emu She-oak habitat identified within the indicative disturbance footprint and the species was not detected during targeted surveys in 2020-2021. On this basis, there is no evidence to indicate an important population occurs within the Project Area.</p> <p>Indirect impacts from construction (e.g. changes to surface water, sedimentation and water flow) are considered low risk and the implementation of construction environmental management measures will mitigate risk to suitable habitat outside of the Project Area.</p> <p>Therefore, as an important population does not occur within the Project Area, the Project will not result in the long-term decrease in the size of an important population of the species.</p>	No
reduce the area of occupancy of the species	As there is no important population within the Project Area, the Project will not reduce the area of occupancy of an important population.	No
fragment an existing population into two or more populations	As there is no important population within the Project Area, the Project will not fragment an existing important population.	No
Adversely affect habitat critical to the survival of a species	<p>The Project Area does not fall within the known distribution of existing populations, as outlined in the National recovery plan for Mt Emu she-oak (QPWS, 2007). Further study is required to identify habitat characteristics critical to survival (QPWS, 2007).</p> <p>The significant habitat of <i>A. emuina</i> may include:</p> <ul style="list-style-type: none"> • all areas where the species currently occurs; • areas of heathland vegetation adjacent to known populations (providing potential habitat for natural recruitment); • corridors of remnant vegetation that link populations with other nearby areas of apparently suitable habitat that do not currently contain the species; and • areas of habitat that may be used for future translocation and reintroduction. <p>The Project Area contains 0.52 ha (with 0 ha in the indicative disturbance footprint) of potential habitat for the species and no important population was identified within the Project Area. Therefore, it is considered that no habitat critical to the survival of the species due to the general absence of closed and wallum heath, and the presence of <i>Melaleuca quinquenervia</i> occurs within the Project Area,</p>	No
disrupt the breeding cycle of a population	As there is no important population within the Project Area, it is highly unlikely that the Project will disrupt the breeding cycle of an important population.	No
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As suitable habitat within the Project Area is already disturbed, fragmented and of low quality, the Project will not lead to a decrease in the quality of habitat to the extent the species will decline.	No

Criteria	Description	Criteria Triggered?
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Within the indicative disturbance footprint, invasive species are already present due to urban disturbance. Following biosecurity measures, the works within the Project will mitigate the spread or introduction of invasive species harmful to the species. Therefore, it is unlikely that the Project will result in the spread or establishment of an invasive species that is harmful to the species or becoming established in the species potential habitat.	No
introduce disease that may cause the species to decline or	<p>No pathogen or disease is known to have a harmful effect on the Mt Emu She-oak to the extent that species decline will occur. No individuals of the Mt Emu She-oak have been reported in the Project Area, suggesting the risk to species decline is very low.</p> <p>Direct impacts from construction, operation and maintenance of the corridor are highly unlikely to introduce or spread disease within the Project Area.</p>	No
interfere with the recovery of the species.	Given the lack of known records and the absence of an important population within the Project Area, it is unlikely that the Project will interfere with the recovery of the species.	No

4.7.8 Swamp stringybark (*Eucalyptus conglomerata*)

The proposed works in the Project Area is unlikely to lead to a significant impact to the listed swamp stringybark.

The significant impact guidance for 'endangered' species in SIG 1.1, refers to impacts to 'a population' of a species (DoE, 2013). A population of a species is defined as an occurrence of the species in a particular area.

Occurrences include but are not limited to:

- A geographically distinct regional population, or collection of local populations, or
- A population, or collection of local populations that occurs within a particular bioregion (DoE, 2013).

An 'invasive species' is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources or which is a predator of native species (DoE, 2013).

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community (DoE, 2013).

The proposed B2N project has been assessed in the following ways. Initially, field investigations and mapping have designated a total of 20.78 ha of swamp stringybark exists adjacent to the Project Area. A significant impact assessment based on guidance provided in the SIG 1.1, is presented in Table 32.

Table 32. Significant Impact Assessment for Swamp stringybark

Criteria	Description	Criteria Triggered?
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>		
lead to a long-term decrease in the size of a population	<p>The Project Area follows the existing railway corridor with 11.85 ha of potential habitat for the species within the indicative disturbance footprint. This area is considered disturbed, and effects of disturbance are currently ongoing. It is considered unlikely that the B2N project will extract individuals of this species, as the known population is situated within Glasshouse Mountains National Park. The location of the National Park is outside of the indicative disturbance footprint. On this basis, there is no evidence to indicate an important population occurs within the Project Area.</p> <p>Indirect impacts from construction (e.g. changes to surface water, sedimentation and water flow) are considered low risk and the implementation of construction environmental management measures will mitigate risk to suitable habitat outside of the Project Area.</p> <p>Therefore, as an important population does not occur within the Project Area, the Project will not result in the long-term decrease in the size of an important population of the species.</p>	No
reduce the area of occupancy of the species	As there is no important population within the Project Area, the Project will not reduce the area of occupancy of an important population.	No
fragment an existing population into two or more populations	As there is no important population within the Project Area, the Project will not fragment an existing important population.	No

Criteria	Description	Criteria Triggered?
adversely affect habitat critical to the survival of a species	There is no commonwealth made recover plan for this species. Listed important populations, critical habitat are not defined. The Project Area contains 11.85 ha of potential habitat for the species, although no individuals were observed, and no important population identified within the indicative disturbance footprint. Therefore, it is considered that no habitat critical to the survival of the species occurs within the Project Area.	No
disrupt the breeding cycle of a population	As there is no important population within the Project Area, it is highly unlikely that the Project will disrupt the breeding cycle of an important population.	No
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As suitable habitat within the Project Area is already disturbed, fragmented and of low quality, the Project will not lead to a decrease in the quality of habitat to the extent the species will decline.	No
result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Within the indicative disturbance footprint, invasive species are already present due to urban disturbance. Following biosecurity measures, the works within the Project will mitigate the spread or introduction of invasive species harmful to the species. Therefore, it is unlikely that the Project will result in the spread or establishment of an invasive species that is harmful to the species or becoming established in the species potential habitat.	No
introduce disease that may cause the species to decline or	. No individuals of the swamp stringybark have been reported in the indicative disturbance footprint, suggesting the risk to species decline is very low. . The swamp stringybark population identified in the Glasshouse Mountains National Park will not to be directly impacted by project works as machinery and personnel are prohibited from entering the park. A permit would be required from Queensland Parks and Wildlife Services to access the park for project related tasks, and this is not anticipated. This population is also situated upstream from the works which provides added protection from infection by pathogens that could indirectly spread from the site through runoff. Biosecurity and erosion and sediment control measures outlined in Section 5 will ensure indirect impacts to this population are avoided.	No
interfere with the recovery of the species.	Given the lack of known records and the absence of an important population within the indicative disturbance footprint, it is unlikely that the Project will interfere with the recovery of the species. Recovery objectives are consistent with the Approved Conservation Advice for Swamp Stringybark (DAWE, 2008).	No

4.7.9 *Macadamia nut (Macadamia integrifolia)*

The proposed works in the Project Area is unlikely to lead to a significant impact to the listed macadamia nut.

The significant impact guidance for 'vulnerable' species in SIG 1.1, refers to impacts to 'important populations' of a species (DoE, 2013). Important population is defined as a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity
- populations that are near the limit of the species' range (DoE, 2013).

The proposed B2N project has been assessed in the following ways. Initially, field investigations and mapping have designated a total of 0.12 ha of potential macadamia nut habitat within the Project Area. A significant impact assessment based on guidance provided in the SIG 1.1, is presented in Table 33.

Table 33. Significant Impact Assessment for Macadamia nut

Criteria	Description	Criteria Triggered?
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>		
lead to a long-term decrease in the size of an important population of a species	<p>The Project Area follows the existing railway corridor with 0.12 ha of potential habitat for the species within the indicative disturbance footprint. This area is considered disturbed, and effects of disturbance are currently ongoing. A single individual was detected during surveys on a private property outside of the indicative disturbance footprint. It is likely that the individual plant was a result of revegetation planting on the property. On this basis, there is no evidence to indicate an important population occurs within the Project Area.</p> <p>Indirect impacts from construction (e.g. changes to surface water, sedimentation and water flow) are considered low risk and the implementation of construction environmental management measures will mitigate risk to suitable habitat outside of the Project Area.</p> <p>Therefore, as an important population does not occur within the Project Area, the Project will not result in the long-term decrease in the size of an important population of the species.</p>	No
reduce the area of occupancy of an important population	As there is no important population within the Project Area, the Project will not reduce the area of occupancy of an important population.	No
fragment an existing important population into two or more populations	As there is no important population within the Project Area, the Project will not fragment an existing important population.	No
adversely affect habitat critical to the survival of a species	The Project Area contains 0.12 ha of potential habitat for the species, one individual plant is situated on an adjacent private property, and no important population was identified within the Project Area. Therefore, it is considered that no habitat critical to the survival of the species occurs within the Project Area.	No
disrupt the breeding cycle of an important population	As there is no important population within the Project Area, it is highly unlikely that the Project will disrupt the breeding cycle of an important population.	No
modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	As suitable habitat within the Project Area is already disturbed, fragmented and of low quality, the Project will not lead to a decrease in the quality of habitat to the extent the species will decline.	No
result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	Within the indicative disturbance footprint, invasive species are already present due to urban disturbance. Following biosecurity measures, the works within the Project will mitigate the spread or introduction of invasive species harmful to the species. Therefore, it is unlikely that the Project will result in the spread or establishment of an invasive species that is harmful to the species or becoming established in the species potential habitat.	No
introduce disease that may cause the species to decline or	<p>No pathogen or disease is known to have a harmful effect on <i>Macadamia integrifolia</i> to the extent that species decline will occur. No individuals of the <i>Macadamia integrifolia</i> have been reported in the Project Area in the last 10 years suggesting the risk to species decline is very low.</p> <p>Direct impacts from construction, operation and maintenance of the corridor are highly unlikely to introduce or spread disease within the Project Area.</p>	No
interfere with the recovery of the species.	Given the lack of known records and the absence of an important population within the Project Area, it is unlikely that the Project will interfere with the recovery of the species.	No

4.8 Response to 4.6 b)

Information Required for Assessment by Preliminary Documentation

4.6 Provide an assessment of the direct, indirect, consequential and cumulative impacts that may occur during construction and post-construction phases, including:

- b) Details of any policy guidelines, relevant studies, surveys or consultations with species experts/field specialists, which were not included in the referral or additional information provided in support of the referral.*

Policy guidelines: No additional policy guidelines were referred to, however an updated PMST search was undertaken (attached to MNES Baseline Report, Appendix C). A total of six threatened flora species, seven threatened bird species, one threatened insect species and one threatened mammal species were identified in the latest PMST search that had not been considered in previous PMST searches. These species are listed in Table 34 below and received further consideration in the development of field survey methodology for the 2021 field surveys. These species were assessed and included in an updated likelihood of occurrence assessment (Appendix C). Species considered known or likely to occur in the Project Area are addressed in this report.

Relevant studies: Based on the review of previous assessments, it was determined that additional field investigations were required to further target EPBC Act listed threatened species and migratory species, to determine likely presence and mapping of habitats. This information was used to support quantification of direct and indirect impacts of the B2N project on MNES known and likely to occur in the Project Area. Section 3 outlines the additional field surveys and their methodologies.

Table 34. Outlying Additional EPBC Act Threatened Species Identified in the Updated PMST Search

Scientific Name	Common Name	EPBC Act Threat listing
Flora		
<i>Acronychia littoralis</i>	scented acronychia	Endangered
<i>Baloghia marmorata</i>	marbled balogia	Vulnerable
<i>Rhodamnia rubescens</i>	scrub turpentine	Critically endangered
<i>Rhodomyrtus psidioides</i>	native guava	Critically endangered
<i>Sarcocylus fitzgeraldii</i>	ravine orchid	Vulnerable
<i>Zieria bifida</i>	N/A	Endangered
Birds (including migratory)		
<i>Cyclopsitta dophthalma coxeni</i>	Coxen's fig-parrot	Endangered
<i>Falco hypoleucos</i>	grey falcon	Vulnerable
<i>Sternula nereis</i>	Australian fairy tern	Vulnerable
<i>Actitis hypoleucos</i>	common sandpiper	Migratory
<i>Calidris acuminata</i>	sharp-tailed sandpiper	Migratory
<i>Calidris melanotos</i>	pectoral sandpiper	Migratory
<i>Calidris canutus</i>	red knot	Endangered
Insects		
<i>Phyllodes imperialis smithersi</i>	pink underwing moth	Endangered
Mammals		
<i>Xeromys myoides</i>	water mouse	Vulnerable

Consultations with species experts: Oversight, guidance and technical review has been undertaken by Partner / Principal Ecologist Dr David Dique, a 25-year experienced ecologist. David led the overall field survey design and was present at three of the four field survey periods.

Over the last 20 years, David has become recognised as a specialist in koala ecology, research, conservation and management planning. David completed his PhD on koalas in South-east Queensland in 2004, and since then has played key roles on expert panels for State and Federal Governments in koala management policy development. This includes developing the Queensland koala habitat mapping, participation as an invited expert on a panel for the review of the status of koalas in Australia and contributing as an invited expert for the development the EPBC Act koala referral guidelines.

Adam Pavitt led the delivery of the field survey program and attended all field surveys. Adam is an experienced ecologist with over six years' experience in undertaking field surveys and environmental assessments. Adam has contributed to flying-fox plans, programs and monitoring for various councils throughout Queensland and New South Wales. This includes experience monitoring flying-fox roosts and developing flying-fox roost management plans in the Sunshine Coast Region for local council. Tim Callaghan supported Adam for a flora survey in November 2021.

Vegetation assessments, including ground truthing and mapping of TEC's was led by Senior Ecologist Dr Toivo Zoete, a 30-year experienced botanist and vegetation specialist. Most of Dr Toivo's work has been in relation to biodiversity/ecology studies, including vegetation management (landscaping maintenance, revegetation guidelines, species prescriptions, rehabilitation monitoring and corrective actions, weed and pest monitoring and management plans), environmental impact assessment (EIA), and planning for infrastructure and resource (including closure) projects in Australia, the Asia Pacific region, and Algeria. Toivo is familiar with a wide range of legal and policy settings, including Commonwealth, State, and overseas jurisdictions, as well as the Performance Standards of the International Finance Corporation (IFC). Toivo has conducted projects in environments ranging from alpine meadows to intertidal wetlands, and from tropical rainforests to semi-arid communities.

Specimens collected from Lot 1 on RP124412 during the November 2021 field survey were provided to the Queensland Herbarium for identification.

No further consultation with experts/field specialists were required.

Additional information provided in support of the referral: Responses to requests for further information post-referral (dated 23 November 2020 and 22 December 2020), is contained within this PD Response Report.

4.9 Response to 4.6 c)

Information Required for Assessment by Preliminary Documentation

- 4.6 Provide an assessment of the direct, indirect, consequential and cumulative impacts that may occur during construction and post-construction phases, including:
- c) A local and regional scale analysis of likely impacts, with reference to the project's potential contribution to cumulative impacts in the context of development patterns in the locality and region.

At the local and regional scale, the impacts to MNES values are limited to the narrow, linear alignment within the proposed indicative disturbance footprint. As stated above, a large portion of the Project Area is already cleared or developed and associated with urban/agricultural areas.

In consideration of cumulative impacts, three development projects relevant to MNES values exist in the region and include:

- Caloundra South Master Planned Community
- Bruce Highway Upgrade between Caloundra Road and the Sunshine Motorway
- Beerwah East Identified Growth Area.

Additional detail on these projects is provided in the following sections.

4.9.1 The Caloundra South Master Planned Community

The Caloundra South Master Planned Community (CSMPC) is located approximately 8 km east of the B2N project. CSMPC is located 6 km south-west of Caloundra and occurs predominantly in agricultural and forestry land. The CSMPC project has been approved under EPBC Act (Approval 2011/5987) to construct a master planned community on 2,400 ha of land. Approval was originally granted in June 2013, and most recently was approved with variations in June 2020.

A condition of the EPBC Act Approval 2011/5987 is for the person undertaking the action to make an annual compliance report available on their website. SMEC prepared the *2020/2021 Annual Compliance Report - EPBC 2011/5987*, which outlines that compliance has been achieved with all conditions of the EPBC Act Approval and respective requirements of the approved management plans (SMEC, 2021). Key activities and achievements regarding development and environmental management activities are largely related to mitigation measures and offsets for impacts to the wallum sedge frog (*Litoria olongburensis*).

Wallum sedge frog habitat is not anticipated to be impacted by the B2N project. As such, it is considered that there are no cumulative impacts to MNES values as a result of the B2N project.

4.9.2 The Bruce Highway Upgrade between Caloundra Road and the Sunshine Motorway

The Bruce Highway Upgrade between Caloundra Road and the Sunshine Motorway (CR2SM) project involves the upgrade of a seven-kilometre section of the Bruce Highway between Caloundra Interchange and the Sunshine Motorway at Sippy Downs. The CR2SM project is located approximately 8 km north-east of the B2N project boundary at Landsborough. The CR2SM project was deemed a controlled action on 18 May 2015 and was approved, subject to conditions, on 2 September 2016 (EPBC Act Approval 2015/7464).

The total koala habitat cleared was recorded as 18.76 ha (TMR, 2021). The removal of habitat critical to the survival of the koala is appropriate for assessment of cumulative impacts with the B2N project. Targeted koala field surveys from

2010 to 2015 for the CR2SM project, found there was a low level of koala use within the CR2SM project area except for one site in the locality at Tanawha which recorded high koala activity (RPS, 2015).

Under a condition of the EPBC Act Approval 2015/7464, TMR purchased Lot 2 RP51879 (freehold lot on Missing Link Road, Glenview) in 2016 from a private landowner, and a Voluntary Declaration is now in place. An offset management plan was prepared for the 50.07 ha offset site to protect and maintain it, in perpetuity. Offset sites will also be secured for the B2N project to be protected in perpetuity.

The offset site for the CR2SM project and proposed offset sites for the B2N project will collectively provide habitat for the benefit of the koala. Given that TMR is the proponent for both the CR2SM project and B2N project, there will be synergies in managing the offset sites. Importantly, both projects have committed to improved fauna movement infrastructure and passageways being installed in their respective project areas.

Accordingly, cumulative impact to the koala has been minimised. Both projects have committed to improved fauna movement infrastructure and passageways being installed in their respective project areas, as well as offsets.

4.9.3 The Beerwah East Identified Growth Area

The Beerwah East Identified Growth Area (Beerwah IGA) has been nominated as an identified growth area within the South East Queensland Regional Plan (DoLGP, 2017). The 1,278 ha Stockland landholding is located adjacent to the B2N project at Beerwah. The loss of wallum frog habitat was identified as an impact from the Beerwah IGA. Beerwah IGA requires appropriate land use and management to sustain wallum frog habitat (BMT, WBM, 2015). The EPBC Act listed wallum sedge frog is not impacted by the B2N project and appropriate land management and rehabilitation to the east of the Beerwah IGA is anticipated to increase the suitable habitat for wallum frog species (BMT, WBM, 2015).

4.9.4 Local and Regional Scale Impacts

Local scale impacts to the MNES matters known or likely to occur in the Project Area were assessed via MNES Significant Impact Assessments (Section 4.7). Based on assessment of impacts from the B2N project alongside cumulative impacts in the context of development patterns in the locality and region there are no significant regional scale cumulative impacts. The B2N project will not affect the function of regional fauna movement corridors for MNES values in the area and potential impacts resulting from the Project will be offset. Table 35 summarises the local and regional scale impacts to MNES.

Table 35. Summary of local and regional scale impacts to MNES populations

Matter	Local scale impacts	Regional scale impacts
Koala	As the Project Area is classified as an urban area, there are existing effects of habitat loss, fragmentation, vehicle strikes and dog attack. However, as the Project Area is near the existing rail line, there is minimal risk of increasing the severity of current habitat fragmentation. Full MNES Significant Impact Assessment for this species is provided in Section 4.7 and accounts for the local scale impacts to the species.	In review of the development projects relevant to MNES values existing in the region there are no anticipated regional scale cumulative impacts to the species. Koala habitat was cleared during construction of the CR2SM project. However, offsets were established in 2016 and there is no anticipated overlap in the timing of habitat removal between the B2N project and the CR2SM project. Where residual impacts occur offsets will be delivered.
Grey-headed flying-fox	The Project Area contains myrtaceous species and rainforest species with fleshy fruits that are seasonal foraging resources considered habitat critical to the survival of the grey-headed flying-fox. Full MNES Significant Impact Assessment for this species is provided in Section 4.7 and accounts for the local scale impacts to the species.	In review of the development projects relevant to MNES values existing in the region there are no anticipated regional scale cumulative impacts to the species.

Matter	Local scale impacts	Regional scale impacts
Giant barred frog	The nearest known population is located at Mellum Creek approximately 100 metres east of the Project boundary and will not be directly impacted by the works. No Giant Barred Frogs were detected during surveys in the Project Area, but previous reports suggest low abundances throughout drainage channels. Full MNES Significant Impact Assessment for this species is provided in Section 4.7 and accounts for the local scale impacts to the species.	In review of the development projects relevant to MNES values existing in the region there are no anticipated regional scale cumulative impacts to the species.
White-throated needletail	There are no anticipated local scale impacts to the white-throated needletail. Full MNES Significant Impact Assessment for this species is provided in Section 4.7 and accounts for the local scale impacts to the species.	In review of the development projects relevant to MNES values existing in the region there are no anticipated regional scale impacts to the species.
Migratory birds (oriental cuckoo, rufous fantail, spectacled monarch, black-faced monarch and satin flycatcher)	The listed migratory bird species are all highly mobile. The high level of disturbance (e.g. weeds, noise and introduced predators) to the existing habitat within the Project Area means they are in all probability only utilised for movement by these species and not for breeding. The extent of migratory bird habitat to be cleared is small (14.47 ha). Therefore, this project is highly unlikely to disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of listed migratory species. Full MNES Significant Impact Assessment for this species is provided in Section 4.7 and accounts for the local scale impacts to the species.	In review of the development projects relevant to MNES values existing in the region there are no anticipated regional scale cumulative impacts to migratory species.
Whipstick wattle/ Mt Emu she-oak/swamp stringybark	The Project Area follows the existing railway corridor and no recent records of any of these species occurs within the Project Area despite targeted surveys and a review of databases. Full MNES Significant Impact Assessment for these species is provided in Section 4.7 and accounts for the local scale impacts.	In review of the development projects relevant to MNES values existing in the region there are no anticipated regional scale cumulative impacts to these species.
Macadamia nut	A single individual was detected during surveys on a private property within the Project Area. It is likely that the individual plant was a result of revegetation planting on the property. Full MNES Significant Impact Assessment for this species is provided in Section 4.7 and accounts for the local scale impacts to the species.	In review of the development projects relevant to MNES values existing in the region there are no anticipated regional scale cumulative impacts to the species.

4.10 Response to 4.6 d)

Information Required for Assessment by Preliminary Documentation

- 4.6 Provide an assessment of the direct, indirect, consequential and cumulative impacts that may occur during construction and post-construction phases, including:
- d) Assess the long-term viability of remaining populations/areas if the proposal proceeds.

Where areas of habitat for MNES are anticipated to be significantly impacted by the B2N project, suitable offsets will be established considering the objectives of relevant conservation advice, recovery plans or threat abatement plan. Table 36 summarises the assessment of long-term viability of remaining populations/areas if the proposal proceeds.

Table 36. Summary of viability of remaining MNES populations

Matter	Comment on remaining populations/areas
Koala	The low-quality habitat values and low abundance of species records within the Project Area indicate that no consequential and cumulative impacts are likely to occur during construction and post-construction phases. Offsets for impacted habitat will be established considering the objectives of relevant conservation advice, recovery plans or threat abatement plan and the implementation of design measures to accommodate fauna movement (e.g. fauna passages) will improve the existing habitat connectivity. The B2N project will not affect the function of regional fauna movement corridors. The long-term viability of remaining populations/areas are not anticipated to be significantly impacted.
Grey-headed flying-fox	64.15 ha of potential foraging resources will be removed. Offsets for impacted habitat will be established considering the objectives of relevant conservation advice, recovery plans or threat abatement plan. The grey-headed flying-fox is highly mobile and the removal of foraging resources within the Project Area are not considered a significant loss at a regional scale. Conservative mapping and calculations of potential habitat within a 50 km radius of the Project Area determined that 344,510ha of potential habitat is available. The impacts to 64.15ha of habitat within the Project Area equate to 0.018% of the 344,510ha available in the area. No roost sites will be directly or indirectly impacted. The long-term viability of remaining populations/areas are not anticipated to be significantly impacted.
Giant barred frog	Desktop resources and field assessments concluded that sites at Mellum Creek and Addlington Creek tributaries provide suitable quality habitat within the Project Area. The habitat is considered low-quality due to weed impacts, fragmentation and proximity to road and rail line disturbances. It is unlikely that populations of the species will persist directly within the indicative disturbance footprint due to existing disturbances. Where the species exists upstream or downstream of the B2N project construction environmental management plans will be utilised to mitigate indirect impacts from runoff. The long-term viability of remaining populations/areas are not anticipated to be significantly impacted.
White-throated needletail	5.58 ha of potential roosting habitat will be removed within the indicative disturbance footprint. The white-throated needletail is highly mobile, almost exclusively aerial and the removal of potential roosting resources within the Project Area are not considered a significant loss. The long-term viability of remaining populations/areas are not anticipated to be significantly impacted.
Migratory birds	The existing 14.47 ha of habitat within the indicative disturbance footprint consists primarily of edge habitats that are fragmented and weed degraded. The high mobility of the listed bird species means that fragmentation of habitat is unlikely to be a significant impact from the B2N project. The long-term viability of remaining populations/areas are not anticipated to be significantly impacted.
Whipstick wattle	The existing 17.13 ha of potential habitat within the indicative disturbance footprint consists primarily of edge habitats that are fragmented and weed degraded. Impacts to suitable habitat are limited to these lower quality areas of habitat or edge habitat that is already moderately to highly disturbed. The long-term viability of remaining populations/areas that may occur outside of the Project Area are not anticipated to be significantly impacted.
Mt Emu she-oak	This species was not identified within the indicative disturbance footprint and very limited areas of potential habitat exist in the wider Project Area (0.52 ha). Impacts to suitable habitat are limited to lower quality habitat or edge habitat that is outside of the indicative disturbance footprint. The long-term viability of remaining populations/areas that may occur outside of the Project Area are not anticipated to be significantly impacted.
Swamp stringybark	The existing 11.85 ha of potential habitat within the indicative disturbance footprint consists primarily of edge habitats that are fragmented and weed degraded. Impacts to suitable habitat are limited to these lower quality areas of habitat or edge habitat that is already moderately to highly disturbed. The long-term viability of remaining populations/areas that may occur outside of the Project Area are not anticipated to be significantly impacted.
Macadamia nut	This species was not identified within the indicative disturbance footprint. The existing 6.45 ha of potential habitat within the Project Area consists primarily of edge habitats that are fragmented and weed degraded. Impacts to suitable habitat are limited to these lower quality areas of habitat or edge habitat that is already moderately or highly disturbed. The long-term viability of remaining populations/areas that may occur outside of the Project Area are not anticipated to be significantly impacted.

4.11 Response to 4.6 e)

Information Required for Assessment by Preliminary Documentation

- 4.6 Provide an assessment of the direct, indirect, consequential and cumulative impacts that may occur during construction and post-construction phases, including:

- e) *A risk assessment of potential impacts from the action that are likely to be unpredictable, severe, or irreversible.*

SMEC (2019) (See Appendix I) undertook a residual impact assessment that considered the potential direct and indirect impacts of the B2N project, during construction and operation, attached in Appendix I. The residual impact assessment (SMEC 2019) included consideration of:

- spread of declared weeds
- loss and/or disturbance to remnant vegetation
- impacts to individual species
- matters relating to the quality of water
- increased noise and light.

Most potential impacts were assessed as being minor or moderate impact. No potential impacts were identified as unpredictable, severe, or irreversible.

Since the *Review of Environmental Factors* (SMEC 2019) was prepared, detailed field investigations have been undertaken in 2021, during which no additional items have been identified as being unpredictable, severe, or irreversible. Accordingly, a risk assessment is not required.

4.12 Response to 4.6 f)

Information Required for Assessment by Preliminary Documentation

- 4.6 *Provide an assessment of the direct, indirect, consequential and cumulative impacts that may occur during construction and post-construction phases, including:*
- f) *An assessment of likely changes to fragmentation along the length of the Project Area as a result of the proposed action, and implications for any relevant MNES. This must include an assessment of changes to vegetation, fencing and any suitable fauna movement solutions proposed.*

The B2N project is an upgrade of an existing linear piece of infrastructure. Most impacts occur in habitat that is fragmented by existing rail corridor, roads, urban areas and agricultural land use. Ecologically important corridors associated with the Project Area include Beerburrum East State Forest, Tibrogargan Creek, Coonowrin Creek, Coochin Creek, Mellum Creek and Bluegum Creek. The existing drainage lines and waterways represent important movement corridors for terrestrial fauna species across the Project Area. While still ecologically important, all corridors have a high level of disturbance (e.g. weed infestations). All corridors are likely to be used by highly mobile species such as birds and bats. However, the value of these corridors for terrestrial mammals, reptiles and frogs varies greatly. The B2N project is not anticipated to further impact the function of these fauna movement corridors.

Key ecological corridors, as mentioned above, will be the focus for the design and installation of fauna mitigation structures. ERM has provided a concept of fauna mitigation structures that could potentially be installed at these key locations, this concept will be developed by the Contractor during detailed design. The six key areas, listed above, and concept fauna mitigation structures plan is depicted in Figure 10 of Appendix D.10, and are based on the identification of ecologically important corridors from field studies, habitat mapping, and input from Sunshine Coast Council and B2N design team. A combination of fauna crossings and fauna proof fencing is proven to work effectively to maintain fauna movement in existing corridors, as previously installed successfully on a number of TMR projects, and these are being proposed for B2N with effectiveness evidenced in section 5.

5. Avoidance and mitigation

5.1 Response to 5.1 a)

Information Required for Assessment by Preliminary Documentation

5.1 *Provide a consolidated description of all proposed measures to avoid and mitigate impacts, including those provided in the referral and any additional to those described in the referral.*

This should include:

- a) *Discussion of consideration and assessment of alternative strategies, plans and measures to avoid and mitigate impacts (e.g. alternative plans, retention of habitat/movement corridors/buffers, and fauna-friendly development and road design).*

Table 22 and Table 23 identified the potential impacts associated with construction and operation of the infrastructure. The following section provides the rationale used by the project team for identifying potential impacts and suitable measures to avoid and mitigate those impacts. Table 37 delve into each potential impact and the corresponding proposed avoidance and mitigation measures.

The proposed works are largely comprised of upgrades to existing infrastructure and are planned to occur predominantly in areas adjacent to the existing rail corridor, or areas subject to previous disturbance associated with agricultural operations or urban development. Clearing extents have been minimised wherever possible, to reduce the impact of habitat loss and fragmentation. Additional fauna mitigation measures are also being proposed to mitigate construction and operational impacts. The below paragraphs explain the strategies used to reduce and mitigate impact and key concepts that will be utilised in designing effective fauna mitigation measures, after contract award.

Following the EPBC Act referral on 30 September 2020, TMR engaged Environmental Resources Management (ERM) to undertake additional ecological assessment required to respond to the Preliminary Documentation request, including additional field surveys. Extensive desktop and field work were done as discussed in earlier sections of this report, most importantly, detailed habitat mapping for all MNES likely and known to occur in the Project Area. The recent MNES habitat mapping (ERM, 2021) is considerably larger and more accurate than the mapping provided at the referral stage and it is backed-up by field surveys.

On 31st May 2021, TMR and ERM held a workshop to discuss the 2021 field findings and MNES mapping and to review the further developed reference design and critically analyse permanent and temporary disturbance requirements such as the design at hand, site laydowns, access tracks, stockpiling areas, ancillary facilities and other constructability constraints. The aim of the workshop was to identify opportunities to further reduce the impact on MNES whilst still making the delivery of the infrastructure possible. The result, a refined boundary labelled the 'EPBC PD boundary' and referred herein as the 'Project Area'.

Although MNES habitat mapping significantly increased when compared to the referral documentation and additional construction areas were identified during the workshop, when comparing the referral boundary and the EPBC PD boundary, there is a net reduction of impact on mapped MNES habitat of 1.36 ha. Importantly, there was a meaningful reduction on impact provided by the accurate mapping and there was a genuine effort made to avoid areas of high ecological values named 'NO GO' areas. The boundary refinement and changes from the referral are detailed in Figure 13 of Appendix D.13.

Furthermore, consultation with the SCC during the assessment process enabled consideration of ecological values at local and regional scale and will result in a more holistic approach to fauna sensitive design at the B2N project. Key aspects discussed with SCC included confirmation of fauna movement corridors at Coonowrin creek, Coochin creek, Tibrogargan creek and Mellum creek and awareness of SCC current and planned projects to integrate the B2N project measures and enhance biodiversity in the region.

Owing to the knowledge obtained from the abovementioned processes, it is confirmed that the B2N project strategies to avoid and mitigate impact are and will be a mix of:

1. Avoidance: i.e. by critically reviewing the original boundary and constraints and changing it with an alternative that reduced impact, reducing clearing in key areas, providing protective measures, processes and procedures that will prevent impact during construction and education of field personnel.
2. Mitigation: i.e. sensitive and holistic permanent fauna structures design (i.e. overpasses, underpasses, signage, fencing, lighting and so on), particularly at key fauna movement corridors as mentioned above and construction mitigation strategies addressed by the implementation of plans, procedures (i.e. pre-clearance measures discussed in section 5.2) and temporary fauna mitigation measures (i.e. temporary fencing, tree protection, and so on). Fragmentation and connectivity issues will be mitigated by the design and installation of permanent fauna proof fencing and fauna crossings to be guided by the habitat mapping, the TMR standard drawings and the TMR Fauna Sensitive Road Design Manual (Appendix E).
3. Enhancement: i.e. review of existing fauna movement corridors and local and regional conservation objectives and improving connectivity in these corridors by a combination of revegetation, mitigation structures, rehabilitation and offset measures.

'Fauna-friendly' design, including fauna passage, fauna proof fencing, refuge areas and so on will be targeted to relevant species, in review of habitat mapping, and will incorporate aquatic, terrestrial and aerial fauna. The fauna sensitive design will be undertaken in consultation with a suitably qualified ecologist. Fish passage design will be incorporated in the waterways mapped in the Queensland spatial layers as waterways for waterway barrier works and will follow the Department of Agriculture and Fisheries (DAF) codes. Additionally, there is further opportunity for innovation in fauna/ecological design and sustainability imposed by the requirement for the Project to achieve an 'excellent' rating under the Infrastructure Sustainability (IS) rating scheme. This will be led by the Contractor and will be managed by TMR in the subsequent design stages.

5.2 Response to 5.1 b)

Information Required for Assessment by Preliminary Documentation

5.1 Provide a consolidated description of all proposed measures to avoid and mitigate impacts, including those provided in the referral and any additional to those described in the referral.

This should include:

- b) Details about pre-clearance and clearance procedures to ensure that species are detected and managed to minimise mortality, stress, injury, or introduction of disease.

After tender award, the successful Contractor will be required to submit a Construction Environmental Management Plan (EMP(C)) which will be reviewed for acceptance by TMR. The EMP(C) is an operational document that identifies site processes to deliver sound environmental management. This plan must meet the requirements of the TMR Technical Specification MRTS51, MRTS52 and MRTS16(Appendix E). A consolidation of all measures being proposed to avoid and mitigate impact is provided in Table 37. Sections 5.2.1 and 5.2.2 below highlight key pre-clearance and clearance measures to be included in the EMP(C) and implemented on site to ensure that species are detected and managed to minimise mortality, stress, injury, or introduction of disease are:

5.2.1 Pre-clearance

- Project inductions and pre-start meetings will be used as a tool to inform contractors of listed threatened flora and fauna species, MNES habitat and 'NO GO' areas, hygiene practices and reporting procedures. Increased awareness will minimise the risk of accidental clearing and establish protocols for calling upon the fauna spotter-catcher (FSC) to relocate fauna individuals or postpone works where necessary. Induction knowledge will also assist with project personnel being able to identify fauna species, adhere to hygiene practices and improve reporting should deviation from established procedures occur.
- Physical demarcation of MNES habitat and mapped threatened flora individuals.
- Physical demarcation and signage erected at 'NO GO' areas to prevent unapproved access.
- Physical demarcation of proposed disturbance footprint, by a qualified surveyor, with further verification/sign-off from TMR prior to clearance, will delineate the extent of clearing according to the approved footprint of disturbance within the Project Area, reducing the risk of accidental clearing of unapproved areas.
- Pre-clearance surveys, within the demarcated clearing limits, will be undertaken on foot, by a qualified ecologist or FSC. Inspections will focus on habitat features such as hollows, nests, termite mounds, woody debris, burrows and these will be physically marked, where possible (i.e. by using flagging tape or spray paint) and GPS location recorded for further inspection and or salvage during clearing.
- The documentation of the pre-clearance surveys or pre-clearance reports will include the full list of fauna species detected during the pre-clearance surveys, the significant habitat features and their location and any additional recommendations for clearing.
- A wildlife carer and/or veterinarian will be contacted by the Project team, before clearing activities commencing, to plan for care of injured fauna captured during project works.
- Pre-clearance survey requirements specific to the Giant Barred Frog (GBF):
 - one night-time calling and spotlight event and one diurnal habitat investigation by a qualified fauna spotter-catcher. Pre-clearing survey to occur in clearing areas/waterways mapped potential or confirmed breeding habitat for the species. Any GBF individuals found or captured are to be relocated to areas of retained habitat outside of the disturbance area and on the outside of any exclusion fencing.
 - pre-clearance survey at mapped or potential GBF habitat will be valid for a single connected habitat area for a period of one week, after which time another pre-clearance survey must be completed before clearing is to be undertaken. The validity of a pre-clearance survey can be retained indefinitely if a frog exclusion fence is installed

and maintained around the perimeter of the potential/mapped habitat area. Pre-clearance report to include information on date of survey and date of clearing to demonstrate compliance with this requirement.

- Temporary frog exclusion fencing is to be installed, ahead of clearing, where construction occurs adjacent to mapped or potential GBF breeding habitats. Fencing is to consist of shade cloth buried 50mm into the ground, be 500mm in height and include an overhang at the lip to deter frogs climbing over.
- Install relevant signage on frog exclusion fencing to alert construction staff and to prevent personnel on site from entering these areas without approval. This will minimise the risk for disease introduction/spread.
- Pre-clearance surveys of potential habitat for listed threatened flora will be conducted to determine if listed threatened plant species are present within the proposed work zones. If present, potential impact of the works and additional permitting requirements will be assessed and ability to translocate the species shall be reviewed.
- Prior to undertaking any clearing works, the Contractor must undertake a weed (environmental and declared) audit of the Project Area and ancillary areas. The weed audit must identify weed species, locations of weeds, extent, and density of weeds. The weed audit must identify recommendations for the management of weeds before/during clearing and throughout the construction works.
- Following the weed audit, the Contractor must prepare a Weed & Pathogen Management Plan and implement pathogen (Chytrid Fungus) control procedures to minimise the spread of pathogens to and from the site including vehicle, machinery and foot traffic. It is expected that some of the hygiene practices related to weed hygiene (e.g. plant/vehicle washdown and weed removal prior to clearing) will prevent the spread of pathogens including Chytrid Fungus. Successful weed treatment will take place at least two weeks prior to clearing commencing. Mechanical rather than chemical weed removal will be used within 50m from waterways.

5.2.2 Clearance

- Immediately prior to clearance, a licensed and suitably qualified FSC will search the clearing area for fauna. The FSC role includes the detection, capture, and removal of wildlife from the disturbance footprint to adjacent suitable habitat. The FSC will have specialised skills and experience in the detection, identification, capture and removal of wildlife. Additionally, the FSC will understand basic ecological principles and knowledge of appropriate local release sites for wildlife.
- Clearing in areas mapped as MNES habitat will be minimised during the relevant species peak breeding period. For example, clearing of GBF habitat will be minimised between September and April when frogs are actively breeding.
- Clearing in waterways is to be undertaken preferably in dry periods and erosion protection is to be installed at the completion of each shift. In-stream works duration is to be minimised as much as possible.
- Regular water quality monitoring will be carried out whilst clearing in waterways is ongoing.
- Plant and vehicles are not to be serviced or refuelled within 50m of waterways.
- Spill response equipment must be available all during clearing in sensitive habitat areas (i.e. waterways).
- The FSC must always be present during vegetation clearing or disturbance to any structures that may serve as wildlife habitat.
- The FSC will visually inspect previously marked habitat features to locate fauna.
- Where listed fauna species are encountered, relocation will occur where required or in some circumstances clearing will be postponed until the species relocates (e.g. koala), dependent on advice from FSC/ecologist.
- Where wildlife is captured during clearing, and confirmed suitable for relocation, it will be released to the nearest suitable habitat outside of the clearing limits. Immediately after capture, and prior to release, all animals will be identified to species level and examined for signs of injury or illness. A licenced wildlife carer and veterinarian will be on standby to take any wildlife requiring further examination or treatment.
- Relocation and handling of threatened frogs to be consistent with the relevant handling requirements in the Interim hygiene protocol for handling amphibians from the DES Wildlife Management Technical Manual.
- The FSC will remain on site during clearing to reduce the risk of impacts to MNES and other fauna species.

- A wildlife carer and veterinarian will be on standby/available as arranged by the Project team to treat and rehabilitate injured wildlife.
- All fauna interactions will be recorded, and records made available to TMR for further reporting.

5.3 Response to 5.1 c)

Information Required for Assessment by Preliminary Documentation

5.1 Provide a consolidated description of all proposed measures to avoid and mitigate impacts, including those provided in the referral and any additional to those described in the referral.

This should include:

- c) A description (including maps and imagery) of the location, boundaries and size of buffer areas or proposed exclusion zones, and details on how these areas will be enhanced, protected and maintained. Also include a description of any fences or barriers which may be installed around areas where impacts will be avoided.

Figure 10 of Appendix D.10 shows the Project Area including the 'NO GO' areas where impact will be avoided. Hard fencing or barricading will be installed and maintained to prevent incidental impact to the 'NO GO' areas. The Project Area will be surveyed, by a qualified surveyor, and flagging will be erected at the boundary and maintained all throughout the works. Flagging of threatened plant individuals will be installed at a 50m buffer, where possible.

Temporary frog fencing will be installed at the edge of the works within mapped giant barred frog habitat areas to prevent frogs entering the construction area. Temporary frog fencing will consist of shade cloth buried 50mm into the ground, be 500mm in height and include an overhang at the lip to deter frogs climbing over.

Permanent koala proof fencing design will be in accordance with TMR standard drawing SD 1603 (Appendix E). Wildlife proof fencing is generally located to funnel fauna into crossings, around mapped habitat areas and at locations where fauna kills are recorded to be high (refer to the TMR Fauna Sensitive Road Design Manual in Appendix E for further details on wildlife proof fencing design considerations). Koala proof and other fauna fencing design will consider other fauna mitigation structures such as underpasses or overpasses, refuge poles, and so on and these will be strategically located to promote habitat connectivity for existing and revegetated areas. Key ecological corridors have been identified and these areas will be the focus for the design and installation of fauna mitigation structures. Mitigation measures will also consider protection of fauna against threats such as vehicle and train strike and wild dog attack. The key areas and concept fauna mitigation structures plan is depicted in Figure 10 of Appendix D.10.

During construction, regular inspections will be undertaken to check the effectiveness and condition of exclusion flagging, barricading and temporary fencing. Permanent fencing maintenance will be undertaken in accordance with road and rail asset management procedures which align with the broader Queensland Government Strategic Asset Management Plan Framework.

5.4 Response to 5.1 d)

Information Required for Assessment by Preliminary Documentation

5.1 Provide a consolidated description of all proposed measures to avoid and mitigate impacts, including those provided in the referral and any additional to those described in the referral.

This should include:

- d) Details of any rehabilitation measures to be implemented for disturbed areas, including rehabilitation objectives, target species, timing of rehabilitation stages, methodology, maintenance measures, schedules, and monitoring.

The TMR Technical Specification MRTS16 Landscape and Revegetation Works (included in Appendix E) set out detailed methods and processes for site revegetation and landscaping. The specification document includes the requirements for

rehabilitation objectives, timing of rehabilitation stages, methodology, maintenance measures, schedules, and monitoring. The Contractor is required to develop a landscaping design and construction methodology that is compliant with the aforementioned TMR document. Details on seed/plant species, densities, planting media, and so on will be developed during design and will consider the ecological features of the site and habitat mapping.

Other rehabilitation measures will include salvaging of hollow logs, woody debris, mature trees and other habitat features during clearance for reuse in rehabilitated areas and offset sites.

Additional to landscaping and rehabilitation of disturbed areas is the revegetation of TMR owned sites which forms part of the offset strategy discussed in Section 6.

5.5 Response to 5.1 e)

Information Required for Assessment by Preliminary Documentation

5.1 *Provide a consolidated description of all proposed measures to avoid and mitigate impacts, including those provided in the referral and any additional to those described in the referral.*

This should include:

e) *Details of any ongoing mitigation and management measures during the operation of the facility.*

Ongoing mitigation and management measures relevant to the scope of this application include all permanent structures and devices built to facilitate the movement of and to protect fauna and land revegetated/rehabilitated, post-disturbance, within the approved Project area. To ensure environmental benefits from these assets and land are realised in the long-term, a combination of verification, monitoring and ongoing maintenance takes place at project completion.

The Queensland Government Strategic Asset Management Plan (SAMP) Framework provides guidance materials to assist government departments and statutory authorities to prepare strategic asset management plans with the objective of helping make better use of assets for the cost-effective delivery of community services. TMR and QR have their own internal policies and procedures for asset management of infrastructure they are responsible for. These internal policies and procedures align with whole of government objectives.

Construction and operation monitoring and maintenance of fauna mitigation structures and other measures committed to in this submission are detailed in Table 37 below. During operation, assets will be managed in compliance with TMR and QR's internal asset management policies and procedures by their owners. It is important to note that, strong focus is placed on the design and extensive consultation with the asset owner maintenance experts and team leads is key to help ensure that, not only structures and revegetated areas are easy to maintain but also, to identify any additional requirements and processes that may need to be included in the current day-to-day operations and corridor management processes.

5.6 Response to 5.2 a-e)

Information Required for Assessment by Preliminary Documentation

5.2 *For each measure proposed, indicate the:*

- a) *responsible party*
- b) *environmental outcomes to be achieved and the likelihood of success*
- c) *milestones / performance / completion criteria*
- d) *proposed monitoring and evaluation program*
- e) *contingency measures.*

Table 37 summarises the proposed avoidance and mitigation measures based on potential impacts assessed in Section 4 (Tables 22 and 23), and it addresses the:

- Responsible party: the party responsible for implementing the mitigation measure

- Environmental outcome: the aim of the mitigation measure
- Performance criteria: indicators to determine success of a mitigation measure
- Monitoring and evaluation program: activities undertaken to track the mitigation measure has been implemented, and whether there are opportunities for improvement
- Contingency measures: measures to be implemented where a mitigation measure is failing or not performing as intended.

The evaluation of the effectiveness of proposed avoidance and other mitigation measures is provided in Section 5.7.

Table 37. Summary of potential impacts and proposed avoidance and mitigation measures

Potential Impact	Avoidance/mitigation Measure	Responsible Party	Environmental Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
Pre-design/ pre-contract award						
Risks to MNES not clearly identified and/or not clearly communicated to Contractors	<p>The Proponent (TMR) has implemented a project management framework which seeks to ensure that the project will deliver outcomes that are consistent with organizational policy and strategic objectives. This includes compliance with legislative and approval requirements such as an approval under the EPBC Act.</p> <p>Environmental management follows the TMR Environmental Management Process Manual (Appendix E). The manual is aligned with the abovementioned project framework and outlines the deliverables required through each project phase. Additionally, the manual documents governance mechanisms such as roles and responsibilities, project approval processes and reporting requirements. The TMR Environmental Management Systems (EMS) is a live SharePoint system which contains the tools required to deliver environmental management in accordance with the manual. These includes, forms, report templates, reference and guidance materials and so on.</p> <p>Risks and impacts associated with MNES and EPBC approval conditions for the B2N project were evaluated and will be managed through the project framework, the Environmental Management Process Manual and the TMR's EMS. Further details on the TMR project management framework are available at: OnQ Project Management Framework (Department of Transport and Main Roads) (tmr.qld.gov.au) and a copy on the Environmental Management Process Manual is included in Appendix E of this PD.</p>	TMR	No direct impact to MNES during project planning and delivery	<p>Full compliance with contract and approval requirements.</p> <p>Verified documentation of processes and reporting of compliance throughout all project phases.</p>	<p>Monitoring and evaluation of environmental management processes implementation is in compliance with MRTS51 Environmental Management, MRTS52 Erosion and Sediment Control and MRTS16 Landscape and Revegetation Works requirements (Appendix E). Examples are:</p> <p>Environmental inspections</p> <p>Monthly environmental reporting</p> <p>Environmental auditing</p> <p>Environmental approval compliance reporting</p>	TMR will issue supplementary requirements/specifications where changes to contract documents and approval conditions are identified after contract award. Changes will be managed through the same project management framework
Design and operation measures						
Habitat loss	Review of habitat mapping (Figure 3, Appendix D.3) during detailed design and further reducing the design footprint where possible	Contractor	Reduced impact to MNES habitat consequently reducing fragmentation	Final design provides a reduced footprint from the reference design	Design review and approval process to verify reduced footprint	Seek alternative design solutions to reduce impact
East-west fragmentation affecting dispersal	<p>Fauna mitigation structures such as fauna proof fencing, fauna crossings, fauna refuge areas and other structures aiming at assisting fauna movement will be incorporated in the design.</p> <p>The design of structures to facilitate fauna movement will be developed in consultation with a suitably qualified ecologist and key stakeholder (i.e. SCC and Australia Zoo) and target relevant fauna species. The design will use guidance from the TMR Fauna Sensitive Road Design Manual (Appendix E) and design considerations will be documented in the EDR. A suitably qualified ecologist will be consulted during the design of fauna mitigation structures.</p> <p>Landscaping and revegetation design, particularly surrounding fauna crossings and mitigation structures, will ensure full habitat connectivity from one end of the crossing to the other. Planting requirements will consider the plant type and species that are compatible with existing regional ecosystems and habitat types (assessed and documented in the ERM MNES Baseline Report, Appendix C).</p> <p>As a minimum, the design will deliver fauna passage at Coochin Creek rail bridge, Coonowrin Creek rail bridge and Tibrogargan Creek rail bridge. Additionally, fauna passage design will be assessed for all locations marked in Figure 10 of Appendix D.10, being identified as key fauna movement corridors for aquatic and terrestrial fauna.</p>	Contractor	Fauna movements not adversely impacted by the project	<p>No mapped habitat isolated, unless it is a protected nature strip (i.e.by fencing) for fauna to retreat within the built infrastructure until it can move through the broader landscape via a connected crossing.</p> <p>Adequate movement opportunity provided across the built infrastructure, particularly at identified ecological corridors (Figure 10, Appendix D.10)</p> <p>Fauna mitigation structures well-installed and maintained</p>	<p>A project specific Fauna Monitoring Program is to be developed and implemented to assess the effectiveness of fauna mitigation structures installed.</p> <p>Note:</p> <p>The design contractor and suitably qualified ecologist must develop the monitoring program during detailed design.</p>	<p>Where the fauna monitoring program identified problems, adaptive management options (i.e. retrofit crossings and fencing, further monitoring, research and so on) will be pursued.</p> <p>Increased maintenance where required.</p>

Potential Impact	Avoidance/mitigation Measure	Responsible Party	Environmental Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
Impacts to fish movement due to poor design	<p>In addition, the design will incorporate:</p> <ul style="list-style-type: none"> ○ A dry fauna passage under the new rail corridor at Beerburrum with appropriate koala proof fencing to guide koalas to a safe crossing beneath the rail ○ An overhead rope ladder bridge provided over Steve Irwin Way (approximately aligned with the above underpass) for other arboreal fauna ○ The rehabilitation of approximately 3.5 ha of vegetation (i.e. through planting of Koala habitat trees) on either side of the disused rail corridor at Beerburrum, from Beerburrum Road to the northern end of the National Park. This will assist in reducing fragmentation and facilitate fauna movement (refer to figure 10 of Appendix D.10) 	Contractor	Improved connectivity through mapped koala habitat and the Glasshouse Mountains NP	Mitigation measures in Beerburrum designed and constructed successfully in accordance with this proposal and with the TMR standard drawings	<p>A project specific Fauna Monitoring Program is to be developed and implemented to assess the effectiveness of fauna mitigation structures installed.</p> <p>Note: The design contractor and suitably qualified ecologist must develop the monitoring program during detailed design.</p>	<p>Where the fauna monitoring program identified problems, adaptive management options (i.e. retrofit crossings and fencing, further monitoring, research and so on) will be pursued.</p> <p>Increased maintenance where required.</p>
	The design will comply with the requirements of the <i>Fisheries Act 1994</i> , <i>Accepted development codes for waterway barrier works</i> and development approval conditions.	Contractor	No fish entrapment within the built infrastructure	<p>Fish passage requirements considered throughout the design and documented in the EDR.</p> <p>Full compliance with legislative requirements for fish passage</p>	<p>EDR and design drawings review and approval</p> <p>Quarterly environmental audits</p>	Re-design when non-conformances/breaches are identified
Increased rail and road fauna kills	The design will review traffic requirements and fauna crossings requirements and provide for adequate fauna proof fencing, wildlife crossing signage and fauna refuge areas to protect fauna from collision with traffic and from predators while crossing the road/rail network.	Contractor/ TMR	Reduced fauna injury/mortality in the road/rail network, when compared with pre-construction data.	<p>Design of fauna exclusion fencing will maximise its effectiveness in preventing access to the road/rail and minimise impacts on native vegetation (i.e. locate fauna fencing as close to the road/rail infrastructure as possible).</p> <p>Fauna refuge structures will be designed in consideration of fauna crossings and fauna fencing requirements.</p>	<p>Baseline monitoring</p> <p>Ongoing road/rail kill monitoring</p> <p>Fauna Monitoring Program</p>	Additional measures installed where road/rail kills are reported to have increased
Construction Measures						
Habitat loss and degradation and direct impact to MNES fauna	Thoughtful selection of site laydown areas, batter placements and stockpiling locations, within the approved disturbance footprint, in consideration of environmentally sensitive areas/receivers	Contractor	No impact to MNES from ancillary activities	<p>Documented rationale for choosing the location for site ancillary facilities in consideration of mapped MNES and sensitive receivers</p> <p>Disturbance boundary clearly delineated and demarcated</p> <p>No incidents involving MNES habitat clearing and/or degradation outside the approved disturbance footprint</p>	<p>Weekly inspections</p> <p>Quarterly independent audits</p> <p>Monthly environmental reporting</p>	<p>Regular reviews of the EMP(C) to ensure change management procedures and risks to MNES from proposed site works or areas is carefully assessed.</p> <p>Enact an Incident Management Procedure and implement corrective and preventative actions</p>

<p>Prior to clearing vegetation, the following measures will be implemented:</p> <ul style="list-style-type: none"> Project inductions and pre-start meetings will be used as a tool to inform contractors of listed threatened flora and fauna species, MNES habitat and 'NO GO' areas, hygiene practices and reporting procedures. Increased awareness will minimise the risk of accidental clearing and establish protocols for calling upon the fauna spotter-catcher (FSC) to relocate fauna individuals or postpone works where necessary. Induction knowledge will also assist with project personnel being able to identify fauna species, adhere to hygiene practices and improve reporting should deviation from established procedures occur. Physical demarcation of MNES habitat and mapped threatened flora individuals. Physical demarcation and signage erected at 'NO GO' areas to prevent unapproved access. Physical demarcation of proposed disturbance footprint, by a qualified surveyor, with further verification/sign-off from TMR prior to clearance, will delineate the extent of clearing according to the approved footprint of disturbance within the Project Area, reducing the risk of accidental clearing of unapproved areas. Pre-clearance surveys, within the demarcated clearing limits, will be undertaken on foot, by a qualified ecologist or FSC. Inspections will focus on habitat features such as hollows, nests, termite mounds, woody debris, burrows and these will be physically marked, where possible (i.e. by using flagging tape or spray paint) and GPS location recorded for further inspection and or salvage during clearing. The documentation of the pre-clearance surveys or pre-clearance reports will include the full list of fauna species detected during the pre-clearance surveys, the significant habitat features and their location and any additional recommendations for clearing. A wildlife carer and/or veterinarian will be contacted by the Project team, before clearing activities commencing, to plan for care of injured fauna captured during project works. Pre-clearance survey requirements specific to the Giant Barred Frog (GBF): <ul style="list-style-type: none"> one night-time calling and spotlight event and one diurnal habitat investigation by a qualified fauna spotter-catcher. Pre-clearing survey to occur in clearing areas/waterways mapped potential or confirmed breeding habitat for the species. Any GBF individuals found or captured are to be relocated to areas of retained habitat outside of the disturbance area and on the outside of any exclusion fencing. pre-clearance survey at mapped or potential GBF habitat will be valid for a single connected habitat area for a period of one week, after which time another pre-clearance survey must be completed before clearing is to be undertaken. The validity of a pre-clearance survey can be retained indefinitely if a frog exclusion fence is installed and maintained around the perimeter of the potential/mapped habitat area. Pre- clearance report to include information on date of survey and date of clearing to demonstrate compliance with this requirement. Temporary frog exclusion fencing is to be installed, ahead of clearing, where construction occurs adjacent to mapped or potential GBF breeding habitats. Fencing is to consist of shade cloth buried 50mm 	Contractor	No adverse impact to biodiversity resulting from clearing operations	Full adherence to clearance procedures and no incidents resulting in adverse impact to MNES	<p>Weekly inspections</p> <p>Quarterly independent audits</p> <p>Monthly environmental reporting</p> <p>Survey pick-ups on actual clearing quantities</p>	Review EMP(C) and relevant sub-plans to amend site procedures where breaches and non-conformances are identified
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Potential Impact	Avoidance/mitigation Measure	Responsible Party	Environmental Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
	<p>into the ground, be 500mm in height and include an overhang at the lip to deter frogs climbing over.</p> <ul style="list-style-type: none">○ Install relevant signage on frog exclusion fencing to alert construction staff and to prevent personnel on site from entering these areas without approval. This will minimise the risk for disease introduction/spread.○ Pre-clearance surveys of potential habitat for listed threatened flora will be conducted to determine if listed threatened plant species are present within the proposed work zones. If present, potential impact of the works and additional permitting requirements will be assessed and ability to translocate the species shall be reviewed.○ Prior to undertaking any clearing works, the Contractor must undertake a weed (environmental and declared) audit of the Project Area and ancillary areas. The weed audit must identify weed species, locations of weeds, extent, and density of weeds. The weed audit must identify recommendations for the management of weeds before/during clearing and throughout the construction works.○ Following the weed audit, the Contractor must prepare a Weed & Pathogen Management Plan and implement pathogen (Chytrid Fungus) control procedures to minimise the spread of pathogens to and from the site including vehicle, machinery and foot traffic. It is expected that some of the hygiene practices related to weed hygiene (e.g. plant/vehicle washdown and weed removal prior to clearing) will prevent the spread of pathogens including Chytrid Fungus. Successful weed treatment will take place at least two weeks prior to clearing commencing. Mechanical rather than chemical weed removal will be used within 50m from waterways.					

Potential Impact	Avoidance/mitigation Measure	Responsible Party	Environmental Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
	<p>During vegetation clearing, the following measures will be implemented:</p> <ul style="list-style-type: none"> Immediately prior to clearance, a licensed and suitably qualified FSC will search the clearing area for fauna. The FSC role includes the detection, capture, and removal of wildlife from the disturbance footprint to adjacent suitable habitat. The FSC will have specialised skills and experience in the detection, identification, capture and removal of wildlife. Additionally, the FSC will understand basic ecological principles and knowledge of appropriate local release sites for wildlife. Clearing in areas mapped as MNES habitat will be minimised during the relevant species peak breeding period. For example, clearing of GBF habitat will be minimised between September and April when frogs are actively breeding. Clearing in waterways is to be undertaken preferably in dry periods and erosion protection is to be installed at the completion of each shift. In-stream works duration is to be minimised as much as possible. Regular water quality monitoring will be carried out whilst clearing in waterways is ongoing. Plant and vehicles are not to be serviced or refueled within 50m of waterways. Spill response equipment must be available all during clearing in sensitive habitat areas (i.e. waterways). The FSC must always be present during vegetation clearing or disturbance to any structures that may serve as wildlife habitat. The FSC will visually inspect previously marked habitat features to locate fauna. Where listed fauna species are encountered, relocation will occur where required or in some circumstances clearing will be postponed until the species relocates (e.g. koala), dependent on advice from FSC/ecologist. Where wildlife is captured during clearing, and confirmed suitable for relocation, it will be released to the nearest suitable habitat outside of the clearing limits. Immediately after capture, and prior to release, all animals will be identified to species level and examined for signs of injury or illness. A licenced wildlife carer and veterinarian will be on standby to take any wildlife requiring further examination or treatment. Relocation and handling of threatened frogs to be consistent with the relevant handling requirements in the Interim hygiene protocol for handling amphibians from the DES Wildlife Management Technical Manual. The FSC will remain on site during clearing to reduce the risk of impacts to MNES and other fauna species. A wildlife carer and veterinarian will be on standby/available as arranged by the Project team to treat and rehabilitate injured wildlife. All fauna interactions will be recorded, and records made available to TMR for further reporting. 	Contractor	No adverse impact to fauna/flora resulting from clearing operations	Full adherence to clearance procedures and no incidents resulting in adverse impact to MNES	<p>Weekly inspections</p> <p>Quarterly independent audits</p> <p>Monthly environmental reporting</p> <p>Survey pick-ups on actual clearing quantities</p>	Review EMP(C) to amend site procedures where breaches are identified
	Additional financial incentive provided where it can be demonstrated further reduction of impact to mapped koala and grey headed flying-fox habitat within the approved disturbance footprint.	TMR	Habitat protection and biodiversity conservation	As defined in the project Key Result Areas (KRAs)	As defined in the project Key Result Areas (KRAs)	As defined in the project Key Result Areas (KRAs)

Potential Impact	Avoidance/mitigation Measure	Responsible Party	Environmental Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
East-west fragmentation resulting in impacts to dispersal	Removal of old rail infrastructure and rehabilitation of the disused rail corridor to promote connectivity through previously disturbed areas (i.e. at Beerburum) – refer to Figure 10, Appendix D10	Contractor	Fauna movements not adversely impacted by redundant infrastructure Improved connectivity through mapped koala habitat and the Glasshouse Mountains NP in previously disturbed corridor	No fauna trapped in the old rail corridor Improved east-west fauna movements	Weekly inspections	Contract scope changed to reflect additional rehabilitation requirements for the redundant rai corridor
Direct/indirect impact to GHFF and GHFF roosts	All identified flying-fox roosts will be shown in plans and on construction drawings. Equipment maintenance, construction access and ancillary facilities to be located as far as possible from established GHFF roosts.	Contractor	Preservation of GHFF roosts	No records of GHFF impacted by project works	Weekly inspections	Alternative locations selected for the placement of site ancillary facilities where issues with current locations are identified
	Staging of works will avoid high risk works within 100m of active roost sites during flying-fox breeding and rearing seasons, particularly the roost site at Kolora Park. High-risk works include construction works that have high noise levels, such as pile driving. High risk and high-noise inducing construction activities such as pile driving will be avoided within 100m of the of the Kolora Park flying-fox roost between October and December	Contractor	Preservation of GHFF roosts	No records of GHFF impacted by project works, particularly pile driving and other noise and vibration inducing activities	Weekly inspections	Wildlife carer and veterinarian on standby to treat and rehabilitate injured wildlife
Water quality degradation	Design of erosion control measures by a certified professional in erosion and sediment control (CPESC) and in compliance with the IECA best practice and MRTS52 requirements.	Contractor	Water quality pre and post construction maintained	Strict adherence and minimum 80% compliance with the certified erosion and sediment control plans	Weekly surface water quality monitoring	Review and amendment of erosion and sediment control plans
	Implementation of the erosion and sediment control measures designed			Offsite discharges do not cause pollution	Post-rainfall water quality monitoring	Emergency response procedure effected immediately if required
	A Water Quality Monitoring program will be developed and implemented			No environmental harm (i.e. large water pollution incidents) recorded during construction	Weekly ESC inspections Quarterly independent audits	
					Monthly environmental reporting	
Increased fauna injury/fatality due to collision with construction traffic/machinery	Speed control and monitoring devices (i.e. VMS boards) will be installed in the construction limits .	Contractor	No adverse impact to fauna, particularly MNES, due to construction traffic	Project road rules enforced and obeyed	Devices installed to monitor adherence to site road rules (i.e. VMS boards, speed limit signage)	Additional traffic control and combined measures (i.e. increased visibility) installed to provide safer crossings for fauna in the construction site.
	Speed limits will be policed in the construction site			All fauna injury due to construction traffic attended to promptly and treatment provided	Weekly inspections	
	Wildlife crossing signage will be erected where there is high potential of wildlife crossing through the construction site				Police monitoring	
	Wildlife injury/mortality due to construction traffic will be reported and attended to immediately					
	As previously discussed, activities with high likelihood of impacting on fauna (i.e. clearing) will always be supervised by a qualified FSC.	Contractor	No impact from construction affecting MNES fauna survival	giant-barred frog and koala proof temporary fencing installed in mapped habitat and/or surrounding key movement corridors	Weekly inspections	Review temporary fencing requirements and modify/install additional fencing as identified
	Installation of temporary fauna proof fencing surrounding areas identified as fauna movement corridors and/or mapped as habitat for MNES will prevent fauna entering the construction zone				Quarterly independent audits	
					Monthly environmental reporting	
Construction noise, dust and lighting impacting on MNES fauna	On-ground mitigation measures to prevent impacts from construction noise, dust and lighting will be prescribed in the EMP(C). For example, dust suppression, noise attenuation and lighting modifications will be implemented throughout construction.	Contractor	No impact from construction affecting MNES fauna survival	The EMP(C) measures to minimize dust, noise and lighting impacts will be implemented successfully No records of injured MNES fauna due to construction, noise, dust and lighting impacts.	Weekly inspections Quarterly independent audits Monthly environmental reporting	Review EMP(C) measures and amend as required

Potential Impact	Avoidance/mitigation Measure	Responsible Party	Environmental Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
Impacts to fish movement due to poor construction practices	Construction will comply with the <i>Accepted development requirements for operational work that is constructing or raising waterway barrier works</i> from the Department of Agriculture and Fisheries.	Contractor	No adverse impact to fisheries during construction	No major fish entrapment and kills reported during construction	Weekly inspections	Review EMP(C) measures and working method statements and modify as required
				No water pollution reported during in-stream works	Quarterly independent audits	
	Disturbance within the waterway bed and banks will be minimised and erosion and sediment controls will be implemented during in-stream works.				Monthly environmental reporting	
	Construction will comply with Queensland guidelines for fish salvage.			Fish salvage and translocation undertaken successfully during the works		

5.7 Response to 5.3

Information Required for Assessment by Preliminary Documentation

- 5.3 *Provide an assessment of the predicted effectiveness of each proposed avoidance or mitigation measure, noting that the effectiveness of a particular measure is a reflection of confidence in the ability of the measure to reduce the risk of a threat. The assessment of effectiveness should be evidence based and include examples of demonstrated success of a particular measure to achieve the desired avoidance/mitigation outcome.*

Each proposed avoidance and mitigation measure were assessed for effectiveness within the proposed works. Reference has been included to TMR project examples, guidelines and evidence that demonstrates effectiveness of proposed measures. The criteria for assessment are defined as:

- High Effectiveness – no impact to species and/or habitats due to prevention and/or avoidance
- Moderate Effectiveness – direct and indirect impacts are minimised, no substantial recurring impact
- Low Effectiveness – minimal reduction in impact through control, survey and observation measures.

Evaluation and examples/evidence of each proposed avoidance and mitigation measure and effectiveness is displayed in Table 38, below.

Table 38. Evaluation of Proposed Avoidance and Mitigation Measures

Mitigation Measure	Effectiveness	Evidence and examples
Pre-design or pre-award avoidance/mitigation measures such as implementation of the project management framework and of the Environmental Process Manual	High effectiveness	<ul style="list-style-type: none"> Project management framework is at the core of TMR's business and TMR has delivered several projects under this framework. A recent example of a TMR project successfully delivered under a similar project management framework, for a project which required approval under the EPBC Act, is the Bruce Highway upgrade from Caloundra Road to Sunshine Motorway (known as the CR2SM project), approved under EPBC 2015/7464. Four annual compliance reports from this project are publicly available to demonstrate effectiveness of the project management framework and successful implementation of the Environmental Process Manual and TMR's MRTS specifications.
Design and operation of fauna sensitive infrastructure	Moderate effectiveness	<ul style="list-style-type: none"> As part of TMR's environmental management framework and as a result of project environmental assessment, TMR has delivered and continues to deliver fauna sensitive infrastructure all throughout Queensland. Our Fauna Sensitive Road Design Manual (Appendix E) is used to design, construct and maintain roads/rail that better accommodate the needs of fauna, by reducing habitat or population fragmentation and the impact of road traffic. When considering the suitability of fauna friendly infrastructure as a possible mitigation measure, we consider a number of issues, including: <ul style="list-style-type: none"> the design needs of the target species existing landscape connectivity current and future land uses adjacent to the project physical design constraints such as topography, geometry, accessibility and drainage road safety and funding availability for both construction and an ongoing maintenance commitment the suitability of alternative mitigation measures such as signage, habitat restoration and reduced speed limits. <p>TMR engages with key stakeholders to understand where there are particular high-risk locations for animal-vehicle collisions along the existing road/rail network that need to be managed. We monitor the installed fauna sensitive infrastructure and report on the effectiveness of installed measures.</p> <p>Where monitoring of fauna mitigation measures has identified issues (i.e. increased fragmentation) requiring an alternative resolution, adaptive management options such as alternative corridor connections, increased corridor widths, additional fauna proof fencing will be considered to improve the effectiveness of mitigation measures .</p> <p>A successful example of fauna sensitive road design, particularly for koalas, including fauna proof fencing, fauna underpass, wildlife road signage and a follow-up monitoring program to demonstrate effectiveness has occurred for the Eton Range Realignment Project approved under EPBC 2015/7552. Adaptive measures were also proposed post-monitoring. A summary factsheet has been included in Appendix N.1 and details of the monitoring program can be viewed on: Eton Range Realignment Project Department of Transport and Main Roads (tmr.qld.gov.au). Overall, the infrastructure was shown to be effective at funnelling koalas away from the road towards the safety of the underpass. It was also determined the infrastructure assisted in preventing or reducing koala deaths</p>

Mitigation Measure	Effectiveness	Evidence and examples
Construction mitigation measures associated with impact to fauna and flora and the general environment addressed by the successful implementation of a EMP(C) i.e. vegetation management, dust, noise, vibration management and so on	High effectiveness	<ul style="list-style-type: none"> The pre-clearing and clearing measures detailed in Table 37 have been used extensively and successfully over the years by TMR and its contractors. The TMR technical specifications: MRTS51, MRTS52, MRTS16 (Appendix E) detail the minimum requirements to be adhered to by contractors to mitigate impacts to fauna and flora during construction. Monitoring of compliance with MRTS requirements and its effectiveness over the years has demonstrated construction measures to be highly effective in avoiding/mitigating impact. The CR2SM project, approved under EPBC 2015/7464, provides a great evidence where MRTS51 requirements, particularly for pre-clearance and clearance have been successfully implement and resulted in reduced impact to koala habitat. Annual reporting on compliance with condition 3 of EPBC 2015/7464 demonstrated that the successful implementation of construction measures, in accordance with MRTS requirements, have resulted in 18.76ha of koala habitat being cleared by the project (well under the allowable limit of 35.3ha). Construction is now concluded, and post-construction monitoring is underway. Compliance reporting is ongoing and publicly available in the project webpage: https://www.tmr.qld.gov.au/projects/bruce-highway-caloundra-road-to-sunshine-motorway
Construction requirements associated with design and installation of erosion and sediment control measures in accordance with the IECA Best Practice and MRTS52	High effectiveness	<ul style="list-style-type: none"> Best Practice erosion and sediment control design and installation is proven highly effective for most development sites requiring disturbance of soils and protection of sensitive environments. In Queensland, releases to waters from development sites and water pollution is regulated under the <i>Environmental Protection Act 1994</i> (the EP Act). The Department of Environment and Science (DES, Qld) regulates compliance with the EP Act. Previous success in the implementation of best practice erosion and sediment control and compliance with legal and MRTS52 requirements is evidenced in the commendation letter from DES to the construction contractor at the CR2SM project, included in Appendix N.2.
Signalisation of wildlife crossing and regulation of lower driving speed limits throughout the construction zone	High effectiveness	<ul style="list-style-type: none"> The Department of Environment and Science Koala-sensitive Design Guideline : A guide to koala-sensitive design measures for planning and development activities, highlights speed control as an effective measure to reduce impacts from traffic on koalas. This measure is anticipated to have moderate effectiveness when used alone. The combined use of this measure with other measures i.e. avoidance of high-risk activities during breeding season, improving visibility, signalisation of wildlife crossing points, is believed to have higher effectiveness. At the B2N project, given the low koala population density, speed reduction and wildlife signs if required through the construction zone, is anticipated to have high effectiveness in reducing risk of traffic collision with koalas and other native fauna.
Installation of temporary fences around proposed work zones	High effectiveness	<ul style="list-style-type: none"> Successful implementation of pre-clearance measures in combination with temporary frog exclusion fencing is evidenced at the CR2SM project. The project has captured and relocated one giant-barred frog individual from the construction area to an excluded area without injuries. Annual compliance reporting under EPBC 2015/7464 is available in the project webpage

5.8 Response to 5.4

Information Required for Assessment by Preliminary Documentation

5.4 Please discuss how all Policy and Guidance documents (i.e. Recovery Plans, Threat Abatement Plans and Conservation Advices) have been considered. That is, having regard to and providing a discussion on the objectives of the documents. For example, the National Recovery Plan for the Regent Honeyeater states an objective to:

'Reverse the long-term population trend of decline and increase the numbers of regent honeyeaters to a level where there is a viable, wild breeding population, even in poor breeding years'.

Please provide a discussion on how the proposed action is consistent with relevant species' objectives or alternatively, how the proposed avoidance, mitigation/management and offsetting will compensate for any residual significant impact, thereby ensuring consistency with the objective for relevant EPBC Act species.

The B2N Project Area follows the existing rail corridor where possible to minimise potential impacts to MNES. The design will incorporate alternative strategies, plans and measures to mitigate impacts, as recommended in this report. Where residual impacts occur offsets will be implemented. Proposed offsets are outlined in Section 6. The Policy and Guidance documents relevant to the koala and grey-headed flying-fox are considered below.

EPBC Act Referral guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DoE 2014)

In accordance with the koala referral guidelines the interim recovery objectives for the koala are:

- protect and conserve the quality and extent of habitat refuges for the persistence of the species during droughts and periods of extreme heat, especially in riparian environments and other areas with reliable soil moisture and fertility
- maintain the quality, extent and connectivity of large areas of koala habitat surrounding habitat refuges.

The Project Area occurs predominately in existing, highly cleared residential, road reserve and agricultural areas. 64.15 ha of koala habitat is anticipated to be impacted within the Project Area (Early Works: 2.57 ha, Stage 1: 56.26 ha and Stage 2: 5.32 ha), and there is no recent evidence of important populations in the vicinity of the Project Area. Therefore, the B2N project is unlikely to impact habitat that is important for achieving the interim recovery objectives. Offsets will be implemented to account for the residual impact to koala habitat.

The National Recovery Plan for the grey-headed flying-fox (DAWE, 2021)

In accordance with the National Recovery Plan for the grey-headed flying-fox, nine specific recovery objectives are intended to be achieved over ten years. They are:

- identify, protect and increase native foraging habitat that is critical to the survival of the grey-headed flying-fox
- identify, protect and increase roosting habitat of grey-headed flying-fox camps
- determine trends in the grey-headed flying-fox population to monitor the species' national distribution, habitat use and conservation status
- build community capacity to coexist with flying-foxes and minimise the impacts on urban settlements from new and existing camps while avoiding interventions to move on or relocate entire camps
- increase public awareness and understanding of grey-headed flying-foxes and the recovery program, and involve the community in the recovery program where appropriate
- improve the management of grey-headed flying-fox camps in areas where interaction with humans is likely
- significantly reduce levels of licenced harm to grey-headed flying-foxes associated with commercial horticulture
- support research activities that will improve the conservation status and management of grey-headed flying-foxes

- reduce the impact on grey-headed flying-foxes of electrocution on power lines, and entanglement in netting and on barbed-wire.

The first two recovery objectives are applicable to the B2N project. The other seven objectives are not relevant.

The first recovery objective is applicable to this assessment because native foraging habitat that is critical to the survival of the grey-headed flying-fox has been identified in the Project Area. As previously outlined the seasonal foraging resources to be removed are commensurate to an abundance of other vegetation communities within the locality. The removal of 48.3ha of resources within the Project Area equates to 0.014% of the 344,510ha available within a 40 km radius of the Project Area. Therefore, the B2N project will not interfere with the recovery of the species.

The second recovery objective is applicable to the project as desktop and field investigation have identified grey-headed flying fox camps within the vicinity of the Project Area. The works will remove 64.15 ha (Early Works: 2.57 ha, Stage 1: 56.26 ha and Stage 2: 5.32 ha) of resources for the species but will not directly impact existing roosting sites. Offsets will be implemented to account for the residual impact to grey-headed flying-fox habitat.

6. Proposed offsets

6.1 Response to 6.1 a-b)

Information Required for Assessment by Preliminary Documentation

6.1 Demonstrate how the offset proposal:

- a) Meets the principles outlined in the EPBC Offsets Policy.
- b) Addresses the considerations and requirements outlined in the EPBC Offsets Policy, including but not limited to sections 6 and 7 of the EPBC Offsets Policy.

The residual impact on koala and grey-headed flying fox habitat requiring an offset is calculated at 64.15 ha including 2.57 ha for the Early Works and 56.26 ha for Stage 1 and an additional 5.32 ha for Stage 2 works. This section presents the offset strategy for the 64.15 ha of direct impact on koala and grey-headed flying-fox habitat. The strategy currently includes up to a 200ha land-based offset comprised of:

1. land located on Lot 1AP23631 adjacent to the Project Area, where better quality habitat has been ground-truthed in Beerburum (≈5ha)
2. eleven land parcels owned by TMR and adjacent to the Project Area (≈48.5 ha) and
3. two land parcels owned by the Sunshine Coast Regional Council (SCC) and located within 15km of the Project Area (≈152 ha).

The proposed offset strategy described in this section is deemed suitable as defined in the EPBC Offsets Policy based on recent review of the impact site and the offset sites and the strategy will be later complemented by a detailed Offset Area Management Plan (OMP) that outlines specific requirements to deliver and manage the offset. Note, the proposed offset strategy across the 16 land parcels is excess to requirements, and further refinement following landholder negotiations will define the precise offset within the OMP. Land that is in surplus to project requirements and not required by TMR is normally sold. Land use must meet approved local planning schemes.

6.1.1 The offset sites

There are twelve TMR owned land parcels to be used for the purposes of this offset. One of the allotments Lot 1 AP2363, is currently undergoing acquisition from State Forest by TMR and is proposed to receive an end tenure of environment reserve with local council as the long-term manager of this land. The TMR parcels account for approximately 50ha and are adjacent to the Project Area. The land parcels are not subject to future planning and development, contain regrowth vegetation, are connected to vegetation contained within the Glass House Mountains National Park and other key drainage lines and fauna movement corridors along the Project Area. A portion of these parcels have been previously cleared and so there is an opportunity for revegetation and enhancement, and this is proposed to commence on the land prior to the B2N clearing commencing, if possible. Additionally, proposed land tenure of the sites and the proposed method of securing and protecting the offset for the life of the impact (further discussed in Section 6.4.3) meet the policy requirements.

The two proposed SCC land parcels are located at Peachester (Lot 736C311476) and Obi Obi (Lot 176MCH798 & 178MCH865). Both parcels contain remnant and regrowth vegetation and are connected to vegetation contained within London Creek Environment Reserve at Peachester and the Obi Obi offset site is situated between Maleny National Park and Kondalilla National Park. The Obi offset site provides an offset area of approximately 100 ha. This site is located about 15 km north-east from the B2N project Area at Landsborough. The Peachester offset site provides an offset area of approximately 52.35 ha. This offset site is located about 4.5 km west from the B2N project Area at Landsborough.

Current tenure of the SCC owned sites and the proposed method of securing and protecting the offset for the life of the impact (further discussed in Section 6.4.3) meet the policy requirements. The grey-headed flying-fox was observed roosting at the Obi site in 2012 (O2Ecology 2012) and evidence of koalas (pellets) recorded during habitat quality assessments in 2021. Furthermore, presence of the koala has been confirmed adjacent to the Peachester site (within 1km), in May 2020 and the grey-headed flying-fox confirmed foraging on *Eucalyptus pilularis* in 2020 at the site (FPE,

2021). Both offset sites also contain eucalypt dominated vegetation, regarded as providing foraging resources for the grey-headed flying-fox and koala.

The principles from the *EPBC Offsets Policy* and how the offset strategy for the B2N Project will meet the policy, is outlined in Table 39. Table 39. Alignment of the proposed Offset with the *EPBC Offset Policy* Principles (Box 1)

EPBC Act Offset Principles (DSEWPC, 2012)	Proposed Offset Strategy Alignment
Must deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action	<p>The proposed action will result in the loss of up to 64.15 ha of koala and grey-headed flying-fox habitat within the Project Area. The proposed offset will result in the protection and enhancement of remnant and regrowth koala and grey-headed flying-fox habitat.</p> <p>Management actions will be undertaken to ensure the offset area remains protected and habitat quality is maintained and improved throughout the lifetime of the offset. Examples of the management measures include biomass control as well as weed and pest management. The offset site will be management exclusively for conservation purposes for at least the same duration as the impact on the protected matter arising from the action. The management actions that will be detailed in an OMP (to be developed) will be implemented for a period of 10 years. These management objectives are consistent with the principles outlined in koala recovery plans and the <i>EPBC Act</i> koala referral guidelines (DoE, 2014). Actions that would be implemented to protect the offset area including the prevention of vegetation clearing, erosion and sediment control and weed and pest management principles. The offset area, in TMR owned land parcels adjacent to the Project Area, will ensure that habitat connectivity is maintained and improved through the Project Area.</p> <p>The OMP will detail the specific management measures that will improve population viability and survival so that an overall conservation outcome is achieved.</p>
Must be built around direct offsets but may include other compensatory measures	<p>The offsets proposed for the koala and grey-headed flying-fox are direct land-based offsets, partially adjacent to the Project Area and at local council owned sites located at Peachester and Obi. The offset areas being proposed contains a potential 200ha that can be offset. The proposal offsets the removal of up to 64.15ha of vegetation that is potential habitat for the koala and grey-headed flying-fox. The proposed offset strategy is to secure a land-based offset that meets 100% of the offset obligation and be managed in accordance with an OMP to be prepared post-approval. Direct offsets will be the most efficient method to mitigate the impacts to the koala and grey-headed flying-fox within the Project Area. Direct offsets will also benefit other MNES species within the Project Area and Sunshine Coast region.</p>
Must be in proportion to the level of statutory protection that applies to the protected matter	<p>Both the koala and grey-headed flying-fox are listed as vulnerable under the EPBC Act. The Offset Assessment Guide populates the 'Annual probability of extinction' cell with a score of 0.2% for both species. Therefore, all calculations within the Offsets Assessment Guide considers the appropriate level of statutory protection for both protected matters.</p>
Must be of a size and scale proportionate to the residual impacts on the protected matter	<p>Up to 200ha of offset is available across several land parcels, as per the proposed offset strategy, to account for the loss of 64.15 ha of koala and grey-headed flying-fox habitat within the Project Area. The land within the 16 land parcels exceeds requirements to meet the <i>EPBC Act</i> Offset Policy. Approximately 150ha will be required to meet the 100% land based offset obligation, and 200ha is available. The land parcels are either adjacent to Conservation Estate, or form connections between large parcels of vegetated areas/Conservation Estate. When preparing an OMP, considerations aligned with the EPBC Act offset policy include:</p> <ul style="list-style-type: none"> • Risk of loss that a proposed offset site is under • Time it will take an offset to yield a conservation gain for the protected mater • Risk of conservation gain not being realised.
Must effectively account for and manage the risks of the offset not succeeding.	<p>A direct offset and the preparation of an OMP will allow for the ongoing management and maintenance of the offset area. This will ensure that conservation objectives and mitigation measures for the offset site are upheld. A monitoring schedule, to be included in the OMP, will ensure problems are identified early and rectified promptly. The offset area contains no infrastructure, therefore no impacts from construction and operation activities will occur. Additionally, key threats to the offset area will be actively managed throughout the duration of the offset life, including promotion of eucalypt regrowth, vegetation protection and weed management. This will be completed in accordance with the proposed OMP.</p>

EPBC Act Offset Principles (DSEWPC, 2012)	Proposed Offset Strategy Alignment
Must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see section 7.6)	Regrowth and remnant areas within the proposed offset area are not currently protected by law or part of a recovery plan/planning scheme for the koala or grey-headed flying-fox. The offset area has not been previously used as part of a recovery plan or conservation outcome. Development is unlikely in the offset area. However, it is likely that the offset area will experience impacts of increased weed infestations without management actions. Thus, the proposed offset site is an additional protection to what is currently in place.
Must be efficient, effective, timely, transparent, scientifically robust and reasonable	The direct 100% land-based offset is the most efficient and effective way to counteract the impact to koala and grey-headed flying-fox habitat within the Project Area. The offset will be implemented as soon as possible once approval has been received under the EPBC Act for the Project, providing timely delivery. Particularly within TMR owned land parcels adjacent to the Project Area, there is opportunity to commence offsets as soon as possible. The MHQA methodology has been used to quantify the condition of habitats in the indicative disturbance footprint and the offset area. The OMP will contain mitigation and management measures that will be implemented for the duration of the offset.
Must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced	The OMP will include clear and detailed objectives, as well as the specific timelines that will be in place to ensure management of the offset area are followed and implemented. The responsibilities of the Proponent and landholder will be detailed within the OMP. Monitoring and auditing measures will also be detailed, and their outcomes reported in line with requirements to be detailed in the OMP.

6.2 Response to 6.1 c)

Information Required for Assessment by Preliminary Documentation

6.1 Demonstrate how the offset proposal:

- c) *Directly contributes to the ongoing viability of the EPBC listed species or ecological community and will deliver an overall conservation outcome that improves or maintains the viability of the protected matter, as compared to what is likely to have occurred under the status quo, i.e. if neither the action nor the offset had taken place.*

The proposed offset strategy contributes to the ongoing viability of the *EPBC Act* listed species (koala and grey-headed flying-fox) confirmed through detailed field surveys over multiple seasons and years in the impact and offset sites. The proposed offset strategy is to secure a land-based offset that meets 100% of the offset obligation and managed in accordance with an OMP to be prepared post approval.

The offset will deliver improved condition and quality of the vegetation within the proposed offset area through management of regrowth vegetation to remnant status and implementing weed management procedures. This will result in the increased carrying capacity of the habitat within the offset area. The increase in carrying capacity will increase its value to both the koala and grey-headed flying-fox, as well as other threatened and non-threatened species within the broader locality. The focus on reaching remnant status and enhancing remnant vegetation will allow for the establishment of mature trees, which will ensure foraging and sheltering opportunities for the koala, grey-headed flying-fox and other species dependent upon such resources. The offset area contains known koala food trees species and grey-headed flying fox foraging resources and thus ensuring the offset area is improved in condition and quality will ensure the ongoing viability of local koala populations and provide additional grey-headed flying-fox foraging resources. The offset areas are connected to adjacent vegetation and will maintain species viability through ensuring habitat connectivity across the landscape. MHQA assessments were undertaken in the impact area (condition score of 4.2), and the offset area (condition score of 6.0) (see Appendix F).

There are twelve TMR owned land parcels to be used for the purposes of this offset. These account for approximately 50ha and are adjacent to the Project Area. The land parcels are not subject to future planning and development, contain regrowth vegetation, are connected to vegetation contained within the Glass House Mountains National Park and other key drainage lines and fauna movement corridors along the Project Area. A portion of these parcels have been previously cleared and so there is an opportunity for revegetation and enhancement, and this is proposed to commence on the land prior to the B2N clearing commencing. They currently provide limited ecological value to MNES, and so the revegetation

of these parcels, and being adjacent to important Conservation Estate or connected to vegetated corridors will enhance movement opportunities for the koala and grey-headed flying-fox across the landscape. The proposed offset will deliver a conservation gain to these parcels, where the status quo would see limited increase in habitat or protection in the current state.

6.3 Response to 6.1 d)

Information Required for Assessment by Preliminary Documentation

6.1 Demonstrate how the offset proposal:

- d) *Compensates for the impact over the entire duration of the impact (i.e. should impacts be in perpetuity, the offsets must also be delivered in perpetuity).*

The land on which offsets will take place will be secured for on the life of the approval. Construction of Early Works and Stage 1 is due to be completed in 2025 however, as the timeframe for delivery of Stage 2 is unknown, it is proposed that land security will last for at least the duration of construction of all stages or a minimum of 10 years, whichever is greater. The mechanisms for securing tenure for the purposes of this offset is discussed in Section 6.4.3.

The offset proposal compensates for the impact as:

1. The vegetation occurring in the proposed offset sites has a greater quality score than vegetation occurring in the impact area based on the MHQA methodology (refer to Appendix F).
2. Through revegetation, weed management, enhancement and protection against disturbance, the quality score of the offset sites will improve even further with time.
3. The land parcels delivered in collaboration with SCC are proposed to be part of the local government's environmental reserve network, which offers good protection, and in perpetuity.
4. The twelve TMR owned land parcels are connected to conservation areas, are part of important ecological corridors including waterways that reach into the Pumicestone Passage, and will be protected in perpetuity with mechanisms discussed in Section 6.4.3.

6.4 Response to 6.2

Information Required for Assessment by Preliminary Documentation

6.2 For further details regarding offset requirements, see Attachment B.

The below sections detail how the Proponent will meet the requirement from Attachment B in the DAWE request for further information (Appendix B).

6.4.1 Details in relation to the proposed offset package a)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 Details in relation to the proposed offset package, including:

- a) *A description of the proposed offset site(s) including location, size, condition, and relevant ecological/species habitat features, landscape context and cadastre boundaries of the offset site(s) (supported by mapping).*

The proposed offset described in this section is suitable based on recent field inspections in July and August 2021 of the proposed offset land parcels, and is available following consultation with SCC, who agree to the land parcels being used for the offset. The total amount of land required for offset will be calculated post approval.

There are twelve TMR owned land parcels to be used for the purposes of this offset. These account for approximately 50ha and are adjacent to the Project Area. The land parcels are not subject to future planning and development, contain regrowth vegetation, are connected to vegetation contained within the Glass House Mountains National Park and other key drainage lines and fauna movement corridors along the Project Area. A portion of these parcels have been previously cleared and so there is an opportunity for revegetation and enhancement, and this is proposed to commence on the land prior to the B2N project clearing commencing. The land within the twelve proposed TMR owned land parcels is proposed to be enhanced with plantings of tree species that will provide habitat and foraging resources suitable for both the koala and grey-headed flying-fox. Quantification of the stocking rate for trees planted and determination of suitable species will be outlined in the OMP. Revegetation of these sites will improve opportunity for fauna movement through important ecological corridors throughout the Project Area.

The two proposed SCC land parcels are located at Peachester (Lot 736C311476) and Obi Obi (Lot 176MCH798 & 178MCH865). Both parcels contain remnant and regrowth vegetation and are connected to vegetation contained within London Creek Environment Reserve at Peachester and the Obi Obi offset site is situated between Maleny National Park and Kondalilla National Park. The Obi Obi offset site provides an offset area of approximately 100ha and is located about 15 km north-east from the B2N project Area at Landsborough. The Peachester offset site provides an offset area of approximately 52.35 ha and is located about 4.5 km west from the B2N project Area at Landsborough. Current land tenure of the SCC owned sites and the proposed method of securing and protecting the offset for the life of the impact (further discussed in Section 6.4.3) meet policy requirements. The grey-headed flying-fox was observed roosting at the Obi Obi offset site in 2012 (02Ecology, 2012) (See Appendix L) and koala pellets were recorded during ERM habitat quality assessments in 2021. Furthermore, presence of the koala has been confirmed adjacent to the Peachester site (within 1km), in May 2020 and the grey-headed flying-fox confirmed foraging on *Eucalyptus pilularis* in 2020 at the site (FPE, 2021) (See Appendix M). Both offset sites also contain eucalypt dominated vegetation, regarded as providing foraging resources for the grey-headed flying-fox. Weed control at both sites in conjunction with protection of remnant vegetation will provide a net gain in foraging resources for local populations of grey-headed flying-fox and koala.

Details of the TMR owned offset sites are outlined in Table 40. Maps of the offset sites are contained within Figure 8 of Appendix D.8.

Table 40. TMR owned offset sites

Offset Site	Description	Total Area (ha)	Potential values for MNES	Relevant ecological/species habitat features
Beerburum (1AP23631)	Remnant vegetation, future disused rail corridor	5ha	<ul style="list-style-type: none"> • Adjacent to Glass House Mountains National Park. Habitat values present for MNES. Enhance connectivity from west to east 	Koala Grey-headed flying-fox
Beerwah (2SP229834, 121CG3742, 120SP221891)	Reserve, non-remnant bushland, cleared	11.6ha	<ul style="list-style-type: none"> • Adjacent to Coochin Creek • Increases connectivity along creek line west to east 	Koala Grey-headed flying-fox
Glass House Mountains (11RP222413)	Agricultural land (crops), residential, roadside bushland, cleared	6.1ha	<ul style="list-style-type: none"> • Small dams and watercourses • Adjacent to Glass House Mountains National Park 	Koala Grey-headed flying-fox
Glass House Mountains (1RP177687, 2RP177687, 589FTY1876)	Agricultural land (crops), remnant vegetation, cleared	9.9ha	<ul style="list-style-type: none"> • Small dams and drainage lines • Adjacent to Glass House Mountains National Park • Increases connectivity west to east 	Koala Grey-headed flying-fox

Offset Site	Description	Total Area (ha)	Potential values for MNES	Relevant ecological/species habitat features
Glass House Mountains (49CG2193, 1RP167515,)	Agricultural land (crops), cleared	8ha	<ul style="list-style-type: none"> Enhance connectivity from west to east Near proposed fauna passage corridor 	Koala Grey-headed flying-fox
Glass House Mountains (1RP7660, 2RP7660)	Agricultural land (crops), cleared	6.5ha	<ul style="list-style-type: none"> Adjacent to tributary of Coochin Creek which connects to Pumicestone Passage Adjacent to culvert under Youngs Road 	Koala Grey-headed flying-fox

Note: tenure (current and proposed) for TMR owned allotments are detailed in Table 17

Details of the proposed SCC owned offset sites are outlined in Table 41. Maps of the offset sites are contained within Figure 9 of Appendix D.9.

Table 41. SCC offset sites

Offset Site Details	Description	Total Area (ha)	Potential values for MNES
Name: London Creek Environmental Reserve Lot and plan: 736C311476 Tenure: Freehold Zone: Rural	Remnant and regrowth bushland	52.35ha	<ul style="list-style-type: none"> Adjacent to Crohamhurst Conservation Park Increases connectivity west to east Contains remnant vegetation Watercourses present Survey reports available koala detected in 2020 surveys
Name: Kirby's Road Environment Reserve Lot and plan: Lot 176MCH798 & 178MCH865 Tenure: Freehold Zone: Rural	Remnant and regrowth vegetation	100-200ha	<ul style="list-style-type: none"> Connected to vegetation contained within Maleny National Park and Kondalilla National Park Contains remnant vegetation and watercourses Increases connectivity

6.4.2 Details in relation to the proposed offset package b)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 Details in relation to the proposed offset package, including:

- b) Evidence of the presence of, or usage by, relevant protected matter(s) on, or adjacent to the proposed offset site(s), and the presence and quality of habitat for protected matter(s) on the proposed offset site.

The offsets proposed in TMR owned allotments are adjacent to the Project Area hence, adjacent to the impact. Extensive desktop and field surveys in accordance with relevant guidelines were undertaken within and adjacent to the Project Area as discussed in Section 3 and Appendix C. The presence of relevant protected matter(s) in the proposed offset sites are therefore commensurate to those identified as likely or known to occur in the Project's ecological assessment.

The SCC has provided ecological assessment reports for the proposed offset site at Peachester (Lot and Plan: 736C311476). The key findings include koala presence confirmed on camera at the site during May 2020 and the grey-headed flying-fox confirmed foraging on *Eucalyptus pilularis* in 2020 (FPE, 2021). The site contains extensive areas of

complex vegetation for grey-headed flying-fox foraging and koala habitat. In total there is 20.37ha of remnant vegetation and 65.41ha of regrowth vegetation.

The Obi Obi (Lot and Plan: 10SP231637) site was visited during August 2021. The grey-headed flying-fox was observed roosting at the site (location -26.7997, 152.9654) in 2012 (02Ecology, 2012) and a koala pellet was recorded (location -26.9547, 152.951) during habitat quality assessments in 2021. The site is mapped containing remnant vegetation RE 12.12.15 (*Corymbia intermedia* +/- *Eucalyptus propinqua*, *E. siderophloia*, *E. microcorys*, *Lophostemon confertus* open forest on Mesozoic to Proterozoic igneous rocks) and RE 12.12.1 (Simple notophyll vine forest usually with abundant *Archontophoenix cunninghamiana* (gully vine forest) on Mesozoic to Proterozoic igneous rocks). Both RE types contain suitable foraging and shelter habitat for koala and grey-headed-flying-fox.

The quality of the habitat on both the offset and the impact site were assessed during field investigations using the MHQA methodology. The overall habitat score in the Project Area (i.e. impact site) was 4.2. The overall habitat score within the proposed offset (for regrowth and remnant vegetation) was 6.0. The MHQA assessment can be found in Appendix F.

6.4.3 Details in relation to the proposed offset package c)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 Details in relation to the proposed offset package, including:

- c) Current and likely future tenure of the proposed offset site and details of how the offset site will be legally secured for the full duration of the impact.

TMR has acquired land to build and upgrade infrastructure for the B2N project. Current and proposed tenure of TMR acquired land parcels is listed in Table 17. TMR proposes that offset land is protected by a Voluntary Declaration for a minimum period of the full duration of the impact, proposed in perpetuity, in accordance with the policy.

For the SCC owned land parcels where offsets for the B2N project are proposed, TMR will work in close collaboration with the SCC to secure tenure and zoning of the offset for the full duration of the impact. The sites will be included in future coordinated reserve management and outlined in the OMP.

While the requirement is to deliver offsets as per the EPBC Offsets Policy, to legally secure offsets in Queensland, the requirements are outlined in the *Environmental Offsets Act 2014* (Offsets Act, QLD).

Section 29 of the *Offsets Act* outlines that offsets can be secured using one of the legally binding mechanisms on Title, and these are as follows:

- Voluntary Declaration under the *Vegetation Management Act 1999*
- Protected areas such as a nature refuge or wildlife reserve under the *Nature Conservation Act 1992* and
- A statutory covenant under the *Land Act 1994* or *Land Title Act 1994*.

It should be noted that under Section 29 of the Offsets Act, a protected area is not considered a legally secured offset area if the protected area is declared before the offset condition is imposed.

It is currently proposed, subject to agreement by all parties that the landowner will enter a Voluntary Declaration to legally secure the offset on title prior to construction commencing. This land would subsequently be managed by an Offset Land Manager. Following consultation, the SCC has provided in-principle agreement for the offset.

6.4.4 Details and justification demonstrating how the proposed offset package will maintain/improve the viability of the protected matter(s) a)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 Details and justification demonstrating how the proposed offset package will maintain or improve the viability of the protected matter(s) consistent with the EPBC Environmental Offsets Policy and EPBC Act Offsets Assessment Guide. This includes:

- a) Offset completion criteria (i.e. environmental outcomes) to be achieved, and reasoning for these in reference to relevant statutory recovery plans, conservation advices, and threat abatement plans (e.g. within

15 years of commencement of the action, 85 per cent of the offset site contains X number of Koala habitat trees).

An OMP will be prepared that will outline the specific environmental outcomes and define metrics and management measures that are to be implemented and monitored and reported throughout the duration of the offset.

The following sections give an indication as to how the proposed offset area will aim to maintain or improve the viability of the koala and grey-headed flying-fox, in a way that is consistent with the EPBC Act Offsets Policy and relevant guidelines.

The main environmental outcomes to be achieved using direct offsets is to ensure that the viability and protection of koala and grey-headed flying-fox populations is sustained for the life of the B2N project and beyond.

The aim of offset management is to improve the quality of vegetation so that it reaches a higher habitat quality score. A demonstrated increase in tree size and number will be provided against a baseline condition assessment that will be undertaken and presented in the OMP. Part of the offset process will be to undertake a full condition assessment of the offset area, and to implement measurable completion criteria from the MHQA. This will be defined in the OMP but examples of the type of completion criteria are as follows:

- quality and availability of food, shelter and foraging habitat
- measurable increase in tree abundance/change in size class
- native plant species richness (trees, shrubs, grasses and forbs).

Regrowth vegetation will be assessed in accordance with quaternary/tertiary assessments as described by Neldner *et al.* (2020) at regular intervals during the monitoring campaign.

6.4.5 Details and justification demonstrating how the proposed offset package will maintain/improve the viability of the protected matter(s) b)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 **Details and justification demonstrating how the proposed offset package will maintain or improve the viability of the protected matter(s) consistent with the EPBC Environmental Offsets Policy and EPBC Act Offsets Assessment Guide. This includes:**

- b) *Milestones to demonstrate adequate progress towards achieving the offset completion criteria (e.g. within 10 years of commencement of the action the proponent must increase, by at least 20 per cent, the number of available Koala food trees at the offset site).*

The key milestones to demonstrate progress of the OMP (as described in Section 6.4.4.6), is summarised in Table 42.

Table 42. Key OMP Milestones

Action	Key Milestone	Timeframe
Baseline condition assessment	Establish the baseline condition of offset areas	Within 3 months prior to commencement of revegetation
Implement OMP	Commencement of revegetation	6 months following receipt of EPBC Act Approval and approval of the OMP
Assessment of regrowth vegetation	Increase in tree size and number	Twice yearly for the first 5 years Annually each year from years 6-10
5-year review	15% of offset well progressed to remnant status Assessment against baseline condition	At the end of year 5
10-year review	regrowth vegetation in offset transition to remnant status	At the end of year 10

6.4.6 Details and justification demonstrating how the proposed offset package will maintain/improve the viability of the protected matter(s) c)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 **Details and justification demonstrating how the proposed offset package will maintain or improve the viability of the protected matter(s) consistent with the EPBC Environmental Offsets Policy and EPBC Act Offsets Assessment Guide. This includes:**

- c) *Specific environmental management activities and mitigation that will attain and maintain the completion criteria, including the management of threats to relevant species and the timing of actions (e.g. complete the planting, and ensure a survival rate of 90 per cent, of at least 15, 000 seed, sapling, or tube stock (or equivalent) Koala food tree species within five years following commencement of the action; reduce the invasive weed coverage on the offset site to 5 per cent within five years following commencement of the action implement an annual non-native feral pest control program over a 10 year period).*

An OMP will be prepared that will outline the specific environmental outcomes and management measures that are to be implemented and monitoring throughout the duration of the offset. Management activities proposed for the offset are summarised in Table 43.

A demonstrated increase in tree size and number will be provided against a baseline condition assessment that will be undertaken and presented in the OMP. Adaptive management will be implemented such that annual monitoring will support management of the proposed offset area to meet predefined performance criteria as part of the developed OMP.

Table 43. OMP Management Activities

Management Activities	Management Goal	Timeframe
Remnant vegetation		
Weed management activities (i.e. inspection and treatment)	Weeds do not stifle sapling growth. Reduce the weed coverage percentage across the offset site.	Annually – to align with OMP.
Pest animal management	Net reduction of pest animal occurrence in conjunction with State Government pest animal management campaigns.	Annually – to align with OMP.
Regrowth vegetation		
Retention of juvenile koala habitat trees	Natural regeneration of the vegetation within the proposed offset	Refer key milestones in Table 42.
Weed management activities (i.e. inspection and treatment)	Weeds do not stifle sapling growth.	Annually – To align with OMP.
Water juveniles trees/saplings	In times of drought – Water saplings to maintain an increase in density of koala habitat trees/ foraging resources of 30% annually to achieve 80% of the maximum benchmark value for recruitment in line with the Regional Ecosystem benchmark. Benchmark values are derived from Queensland Government BioCondition Benchmarks (QLD Herbarium, 2021)	0 – 5 years. Refer key milestones in Table 42. To align with OMP.
Increase habitat tree species/foraging resources	Increase density of koala habitat trees/ foraging resources by 30% annually to achieve 80% of the benchmark value for recruitment in line with the Regional Ecosystem benchmark	5- 10 years. Refer key milestones in Table 42. To align with OMP.
Cleared areas		
Revegetation/planting	Increase foraging resources to achieve 80% of the Regional Ecosystem benchmark value. Species and stoking rate will be outlined in OMP.	Refer key milestones in Table 42.

Management Activities	Management Goal	Timeframe
Water seedlings	Water seedlings to maintain an increase in density of koala habitat trees/ foraging resources of 30% annually to achieve 80% of the maximum benchmark value for recruitment in line with the Regional Ecosystem benchmark.	Monthly for first year. Increase frequency and duration in times of drought. To align with OMP.
Weed management activities (i.e. inspection and treatment)	Weeds do not stifle seedling growth.	Monthly for first year. Annually for years 2 – 5 – To align with OMP.

6.4.7 Details and justification demonstrating how the proposed offset package will maintain/improve the viability of the protected matter(s) d)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 Details and justification demonstrating how the proposed offset package will maintain or improve the viability of the protected matter(s) consistent with the EPBC Environmental Offsets Policy and EPBC Act Offsets Assessment Guide. This includes:

- d) *Baseline survey information to determine the presence of relevant protected matters and the extent and quality of the respective habitat(s) at the proposed offset site(s) in accordance with the relevant survey guidelines or using a scientifically robust and repeatable methodology.*

Habitat quality assessments in accordance with MHQA methodology were undertaken at the Peachester and Obi Obi proposed offset sites. Additionally, field investigations for the Fauna Inventory Assessment Report (FPE, 2021) completed adjacent to the Peachester (Lot and Plan: 736C311476) offset site included the following survey techniques:

- Opportunistic sightings and active search;
- Nocturnal eye-shine spotlighting;
- Small mammal trapping using folding solid-sided traps (Elliott / Sherman) and wire cage traps;
- Funnel trap and pitfall combination along drift fences;
- Camera trap monitoring;
- Harp trapping along potential bat flyways;
- Acoustic monitoring for microbat species; and
- Bio Acoustic Recorder monitoring.

Field investigations for the Kirby's Road Environmental Reserve Fauna Survey Report (02Ecology, 2012) completed within the Obi Obi offset site included the following survey techniques:

- General habitat assessment for all vertebrate fauna and semi-aquatic species;
- Assessment of habitats for potential occurrence of threatened species;
- Opportunistic daytime searches for all vertebrates (mammals, birds, reptiles and amphibians);
- Nocturnal searches (spotlighting) for fauna in selected habitats;
- One (1) motion sensor infrared camera;
- Bird surveys at each site at dawn and dusk and throughout the day;
- Systematic trapping (seven (7) sites during the wet season and five (5) sites post-wet season) with
- 20 Elliot traps, 10 cages, eight (8) funnels and two (2) pitfalls;
- Unmanned recording of bird, frog and bat calls using a Song Meter (SM2BAT); and
- Targeted survey for bats using acoustic Anabat detectors and a harp trap.

The quality of habitat at the TMR owned offset areas has been assessed following field investigations of the Project Area. These parcels are adjacent to the Project Area. Data captured during habitat and vegetation assessments within and adjacent to the Project Area have been used to assess the habitat quality of the proposed land parcels using the MHQA methodology.

The data used to collect information on habitat quality and species presence has been summarised in Section 3.7. Additional baseline quality assessments will be undertaken and documented as part of the OMP. Outcomes of the habitat quality assessments for the grey-headed flying-fox and koala using the MHQA method is attached as Appendix F.

The benchmarks used for comparison for the habitat quality assessments are specific to the Regional Ecosystem (RE) present in the corresponding assessment unit (AU). The BioCondition Assessment Manual (DSITIA 2015) outlines that; “As for any assessment relying on a limited number of field sites, the location of these sites is very important for the overall adequacy of the assessment. The delineation of assessment units and the number of sites to assess will depend upon the overall objective of the assessment”. The objective of the habitat quality assessment is to assess and quantify habitat quality for koala and grey-headed flying-fox at the impact and offset sites. Assessment units were selected as they constitute the highest proportion of REs that are suitable as habitat for koala and grey-headed flying-fox. Nine regional ecosystems intersect the Project Area in small patches with two listed as endangered, three listed as of concern and four as least concern under the Queensland Vegetation Management Act 1999 (QLD Gov, 2019) (QLD VMA). To determine the most representative sites to use as AU for the MHQA, the Project Area and offset sites were categorised into broad habitat types. These habitats largely align with vegetation communities that represent potential habitat for a variety of taxa, including MNES. A summary of the habitat types in the Project Area, together with their dominant vegetation communities and structure is provided in Section 3.2.3.

Within the Project Area, RE’s associated with notophyll vine forest associated with creek lines, and Eucalypt and Melaleuca woodlands are utilised for shelter, movement and foraging habitat for the koala and grey-headed flying-fox. The AU’s in the impact area were located within vegetation communities that are considered habitat for koala and grey-headed flying-fox and were compared against RE benchmarks for RE 12.5.3 (AU1), RE 12.3.2 (AU2) and RE 12.3.1a (AU3). Habitat utilisation and vegetation communities that represent habitat for koala and grey-headed flying-fox at the offset sites also include notophyll vine forest associated with creek lines, and Eucalypt and Melaleuca woodlands and were compared against RE benchmarks for RE 12.9-10.16 (AU1), RE 12.12.15 (AU2) and RE 12.9-10.14/12.9-10.14A (AU3). Sample sites for each AU in the impact area are located at the corresponding survey points depicted in Appendix D.2. Sample sites for each AU in the offset sites are located at the corresponding survey points depicted in Appendix D.8 and D.9.

Site specific attributes (site condition, site context, and species stocking rate) were assessed as per scoring data input contained within the Habitat Assessments Guidelines.

6.4.8 Details and justification demonstrating how the proposed offset package will maintain/improve the viability of the protected matter(s) e)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 Details and justification demonstrating how the proposed offset package will maintain or improve the viability of the protected matter(s) consistent with the EPBC Environmental Offsets Policy and EPBC Act Offsets Assessment Guide. This includes:

- e) *A monitoring and corrective action program to measure the success of the environmental outcomes, which must include performance indicators, milestone outcomes, monitoring requirements, trigger values, corrective measures, and identified roles and responsibilities in accordance with the requirements in section 3 of the Departments Environmental Management Plan Guidelines:*
<https://www.environment.gov.au/epbc/publications/environmental-management-plan%ADguidelines>

To ensure compliance with offset conditions and the success of approved environmental offsets it is crucial that appropriate systems of governance are established. With respect to determining compliance against relevant approval conditions including offset conditions, an adaptive management framework will be implemented into the OMP. This process will monitor the management objectives and ensure to that the performance criteria objectives of natural regeneration and decreases of key existing threats are adhered to. Contents of the monitoring and corrective action program include, but are not limited to:

- conditions of approval reference table
- project description and objectives
- roles and responsibilities of personnel in charge of the environmental management
- description of reporting requirements
- summarise all the identified threats to matters protected under the *EPBC Act*
- how the potential impacts of the proposal will be managed.

- the schedule or triggers for auditing the implementation and effectiveness of the plan.

6.4.9 Details and justification demonstrating how the proposed offset package will maintain/improve the viability of the protected matter(s) f)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 Details and justification demonstrating how the proposed offset package will maintain or improve the viability of the protected matter(s) consistent with the EPBC Environmental Offsets Policy and EPBC Act Offsets Assessment Guide. This includes:

- f) Evidence of how the proposed offset completion criteria for the offset will be maintained over the duration of the offset.

With respect to offset management, ongoing monitoring and reporting requirements of the offset will be established and undertaken according to the OMP. Under the OMP, monitoring will be conducted in a way that assesses the ecological changes of the offset and assesses the progress towards achieving the management objectives. OMP will include the schedule or triggers for auditing the implementation and effectiveness of the plan.

In accordance with *Environmental Management Plan Guidelines* (DAWE, 2014), review of the OMP will be undertaken:

- following significant environmental incidents
- when there is a need to improve performance in an area of environmental impact
- periodically, for actions undertaken over long timeframes such as one, two or five years.

Variations to the approved OMP will be submitted to the Department for the Minister's written approval as a revised OMP.

6.4.10 Details and justification demonstrating how the proposed offset package will maintain/improve the viability of the protected matter(s) f)

Information Required for Assessment by Preliminary Documentation – Attachment B

6.2 Details and justification demonstrating how the proposed offset package will maintain or improve the viability of the protected matter(s) consistent with the EPBC Environmental Offsets Policy and EPBC Act Offsets Assessment Guide. This includes:

- g) Justification of how the offset package meets the EPBC Act Offsets Assessment Guide, in particular:
- Evidence of the likely effectiveness of any proposed management actions (i.e. rehabilitation / restoration / re-creation of habitat) to support quality improvement and/or maintenance of the proposed offset site(s) for the relevant protected matter(s).
 - The time over which management actions will deliver the proposed improvement or maintenance of habitat quality for the relevant protected matter(s).
 - The risk of damage, degradation or destruction to any proposed offset site(s), in the absence of any formal protection and/or management, over a foreseeable time period (20 years). This information is important in determining the comparative benefit of a proposed offset.
 - Evidence to support 'confidence in results' for averted loss and quality scores.

The following section contains information on the effectiveness of the offset for improving the quality of habitat, management action timing, the risk of damage to the offset without future protection, and confidence intervals for averted loss and quality scores. This information has been input into the offsets calculator, of which a breakdown of this calculator input for the koala and grey-headed flying-fox is found in Table 44. Note, a single calculation has been undertaken given the similarities in habitat for the two species, and that at 10 years it is proposed that the entire offset will benefit both species (with regrowth vegetation transitioning to remnant status).

Table 44. Input Parameters for the Offset Calculator for the Koala and Grey-headed Flying-fox

Offset Calculator Factor	Project Relevance and Explanation
Quality of critical habitat being removed	The MHQA (2021) requires the quality of the habitat to be impacted by a project to be defined. The MHQA tool has been used for the impacted areas and calculated to be a score of 4.2 out of 10. For the full MHQA output, refer to Appendix F.
Start quality of offset area	The start quality of the offset area is considered a score of 6.0 out of 10.
Future quality of offset area without offset	The quality of the proposed offset without protection in the offset package likely to decrease to a score of 5 out of 10.
Future quality of offset area with offset	The future quality of the offset site would be estimated at 7 out of 10 (increase in remnant vegetation, management of weeds).
Time over which loss is averted	<p>The time over which loss is averted in the foreseeable timeframe over which changes in the level of risk to a proposed offset can be considered and quantified (Section F of the Offset calculation guidelines). This is the time that any measures for securing a site for conservation purposes is intended to last.</p> <p>It is noted that the longer the time frame, the more value this provides in terms of achieving conservation outcomes (DSEWPC, 2012). The proposed offset has been chosen as it provides both remnant and regrowth habitat for koala and grey-headed flying-fox and connects the Project Area to the broader landscape. The offset is proposed to be secured via an on-title agreement, pending consultation with SCC, for 20 years.</p>
Time until ecological benefit	The time until ecological benefit is the estimated time that it will take for the habitat quality improvement of the proposed offset to be achieved. The proposed protection of vegetation, as well as implementation of weed management measures and protection of natural regeneration of vegetation, will likely result in an ecological benefit being realised in a 10-year period.
Risk of loss (%) without offset	As the site can be cleared and currently has no formal weed management, the risk of loss without an offset is estimated to be 2.4%, for this area in Queensland.
Risk of loss (%) with offset	The proposed offset will ensure that the vegetation is enhanced and protected through means such as a Voluntary Declaration. This will allow for management objectives to be implemented through an OMP which will include protection of natural regeneration of vegetation and weed management. The Voluntary Declaration is legally binding and will provide for a lower risk of loss. The risk of loss is 0%.
Confidence in result (%)	<p>A confidence level of 100% for the proposed offset is based on the demonstrated experience of the SCC in managing land and the legislative requirement to retain and manage the offset to enhance the quality of the habitat. The confidence level in the one-unit gain in the offset quality is 90%.</p> <p>It is noted that there is a low risk that unforeseen events may occur that may result in impacts to vegetation (e.g. bushfire).</p>
Percentage of impact offset	The output of the calculator that is produced as a result of input parameters is 146.03%. This score will change to reflect the final selection of offset areas. For the full excel spreadsheet of the calculator inputs and outputs, refer to Appendix G.

7. Economic and social matters

7.1 Response to 7.1

Information Required for Assessment by Preliminary Documentation

- 7.1 *Provide details on the social and economic costs and/or benefits of undertaking the proposed action, including the basis for any estimations of costs and/or benefits. Where possible, please include the total economic capital investment and economic ongoing value of the project.*

A detailed economic analysis was undertaken for the B2N project during the development of a detailed business case (DBC). This analysis was undertaken in two forms: a cost benefit analysis, which measured the incremental direct benefits associated with the B2N project against a base ('without' project) case and an economic impact assessment, which measured the macroeconomic impacts resulting from economy-wide productivity benefits following the delivery of the B2N project, such as changes in Gross State Product (GSP) and employment.

The CBA for the B2N project produced a benefit cost ratio (BCR) of 1.48 with a corresponding net present value (NPV) of \$262.0 million. Sensitivity testing of the CBA concluded that under most tests, the BCR remained above 1.00. Across all tests, the BCR ranged between 0.75 (capping of demand after 10 years) to 2.98 (4 per cent real discount rate). In addition to sensitivity testing, five alternative scenarios were modelled to estimate the impact on the B2N project of different assumptions of economic growth, demographics forecasts and the impact of other planned (but unfunded) infrastructure projects. Under all these scenarios, the lowest BCR for the B2N project was 0.95 (impact of Cross River Rail and Beerwah to Caloundra South).

TMR's approach to infrastructure planning, agreed with State and Federal stakeholders, for example Infrastructure Australia, is to assess a central case but, undertake several sensitivity tests as mentioned above. This central or core case for key assumptions such as population forecasts is consistent across whole of Government, including infrastructure, health and education for example. Specifically, the DBC relied upon the Queensland Government Statistics Office (QGSO) forecasts of population, medium series, as stated above, consistent with all planning across the State.

QGSO and TMR also develop several sensitivity assumptions, including for example, competing or complementary infrastructure upgrades, or growth in key cost assumptions such as fuel costs or parking charges. The status of these alternative assumptions is that they are sensitivities, and no likelihood as to their occurrence is established - they are "what if" scenarios. The planning of a project such as B2N relies on the central / core scenario rather than the assumptions.

Infrastructure Australia has fully considered the project (including the costs benefit analysis) and concluded that Infrastructure Australia is confident that the project will deliver benefits that exceed its estimated costs, providing a net benefit to the Australian economy, a copy of the [project evaluation summary](#) is available for public viewing on the Infrastructure Australia website.

7.2 Response to 7.2

Information Required for Assessment by Preliminary Documentation

- 7.2 *Identify if economic benefits and employment opportunities are in addition to what would have been expected if the action were not to take place.*

The economic impact assessment concluded that the B2N project will, in NPV terms, increase Queensland's economic output by approximately \$1.6 billion from 2016 to 2071. The B2N project will have a positive impact on job creation, with an average of 136 full time equivalent (FTE) positions created in Queensland as a result of the B2N project each year from 2016 to 2021 during construction (or 669 in total over the construction period). Over the 50-year analysis period, the total Queensland supported jobs on average is 312 FTE. The results of the two forms of economic analysis demonstrate that the B2N project can be considered economically viable as, under reasonable assumptions, the benefits outweigh the costs.

7.3 Response to 7.3

Information Required for Assessment by Preliminary Documentation

7.3 Provide details of any public stakeholder consultation activities, including the outcomes of those consultations.

A social impact evaluation was undertaken during the development of the DBC in 2016. This evaluation was informed through extensive community consultation and it identified that:

- Key potential positive impacts from the B2N project include:
 - increased employment opportunities during construction and project management
 - contribution to achieving objectives of the draft SEQ Regional Plan – ShapingSEQ
 - improved accessibility to health care and medical facilities, sports and recreation facilities and opportunities for active transport
 - improved access to more productive employment areas
 - improved disability access at upgraded stations, which are currently non-compliant, resulting in improved access to rail transport for disadvantaged groups
 - enabler of localised development as a result of increased local economic activity.
- Key potential negative impacts from the B2N project include:
 - private property impacts resulting in a loss of community cohesion
 - potential impacts during construction as a result of noise and dust, and increased construction traffic in the vicinity of worksites
 - impact on heritage township character
 - localised change in local amenity due to increased noise from station operations and to the visual environment as a result of views of the new infrastructure.

The impact risk assessment performed in the social impact evaluation identified opportunities to mitigate these social impacts through effective design treatments, construction planning and management and planning for post-construction through legacy outcomes.

The social impact evaluation concluded that while there are localised negative impacts to be addressed in subsequent project stages, the broader social benefits of the B2N project are significant. This is particularly in relation to its contribution towards achieving broader regional transport objectives that will benefit the longer-term livelihoods and accessibility for local communities and the Sunshine Coast region.

7.4 Response to 7.4

Information Required for Assessment by Preliminary Documentation

7.4 Provide details of any consultation with Indigenous stakeholders.

Kabi First Nation Traditional Owners Native Title Claim Group is the registered Aboriginal party for the Project Area. Ongoing public and Indigenous stakeholder consultation is occurring and will continue to occur in the subsequent phases of the Project. Outcomes of the consultation process are documented and formalised through cultural heritage assessments, community reference group meetings, online consultation and via the implementation of a cultural heritage management agreement (CHMA) that is endorsed by the Aboriginal party.

8. Ecologically sustainable development

8.1 Response to 8.1

Information Required for Assessment by Preliminary Documentation

8.1 *Provide a description of how the proposed action meets the principles of ecologically sustainable development, as defined in section 3A of the EPBC Act.*

Ecologically sustainable development (ESD) is defined in the *National Strategy for Ecologically Sustainable Development 1992* (the National Strategy) as 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.

The National Strategy requires government departments to develop institutional arrangements to ensure that the principles and objectives of ESD are delivered at State and Federal level. Accordingly, the *EPBC Act* promotes ESD through the conservation and ecologically sustainable use of natural resources. Five principles of ESD are outlined in the *EPBC Act*, that guide the way in which DAWC practically seeks to achieve ESD, and are:

- (a) *decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations*
- (b) *if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation*
- (c) *the principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations*
- (d) *the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making*
- (e) *improved valuation, pricing and incentive mechanisms should be promoted.*

TMR adheres to the principles of ESD through the implementation of our Environment and Heritage Policy and Strategy. The strategy developed with consideration of the Queensland Government's priorities and community outcomes to build Queensland's economy, strengthen Queensland's communities and to protect Queensland's environment outlined how these were to be achieved through a defined set of strategic opportunities, priorities, challenges and commitments.

Additionally, TMR has committed that all infrastructure projects greater than \$100 million should strive to achieve an 'excellent' rating under the Infrastructure Sustainability Council (IS Council) Infrastructure Sustainability Rating Scheme.

This requires that the B2N project considers sustainable outcomes at the forefront of all decision making from the planning, through the design through to construction and operation of the asset.

Sustainability assessments undertaken during the DBC found that the Project is likely to help increase sustainable outcomes and alignment with Qld's government sustainability strategy.

The principles that are most likely to help increase sustainability comprise the 'whole-of-life' impacts. Sustainability principles with lesser potential to increase overall project sustainability, however, should still be explored through design, construction and operation include context, strategic planning, leadership, knowledge sharing and innovation, climate change adaptation, natural hazards adaptation and resilience, resource recovery, land selection, green infrastructure, social return, equity and valuing externalities.

The DBC sustainability assessment also highlighted ecology and heritage as key areas for development during detailed design, with a great potential for a higher sustainability score rating. The assessment also identified several issues and opportunities for consideration as the design is developed further. Of significance are issues and opportunities for maximising the sustainability in relation to material use, climate change adaptation, water management during construction, and resource recovery.

Since the DBC, the B2N project has started to develop a sustainability framework, in the form of a contractual document to guide more sustainable decision making in future project stages. TMR will liaise closely with the appointed contractors to ensure this framework is successfully delivered and sustainable outcomes are achieved.

9. References

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Appendix A Notification of Referral Decision – Controlled Action (12 January 2021)

Appendix B DAWE Additional Information Required for Preliminary Documentation (27 January 2021)

Appendix C MNES Baseline Report (ERM, 2021)

Appendix D B2N Project Figures

Appendix D.1 Project Overview Plan

Appendix D.2 Survey Locations

Appendix D.3 Koala and Grey-headed Flying-fox Habitat within the Disturbance Footprint

Appendix D.4 MNES Habitat within the Disturbance Footprint

Appendix D.5 Grey-headed Flying-fox Potential Foraging Resources

Appendix D.6 Land use, Topography and Waterway

Appendix D.7 Regional Ecosystem

Appendix D.8 TMR Proposed Offset Site

Appendix D.9 Sunshine Coast Council Proposed Offset Sites

Appendix D.10 Indicative Site Layout

Appendix D.11 EPBC Act Listed Species Field Survey Records

Appendix D.12 Koala Habitat Rehabilitation

Appendix D.13 EPBC Boundary Refinement and Changes from the Referral

Appendix E TMR Framework Documents

Appendix F Modified Habitat Quality Assessment

Appendix G EPBC Act Offset Calculator

Appendix H Commonwealth Matters Ecological Report

Appendix I Review of Environmental Factors

Appendix J Request for Information 1

Appendix K Request for Information 2

Appendix L Kirby's Road Environmental Reserve Fauna Survey Report

Appendix M Fauna Inventory Assessment Report- Offset Revegetation Areas, London Creek Environmental Reserve

Appendix N Examples and Evidence of Efficacy of Proposed Mitigation Measures

Appendix N.1 Koala Monitoring Publication Factsheet Eaton Range Realignment

Appendix N.2 Letter from DES Regarding Best Practice ESC Implementation

Appendix O Title Search Lot 1 on RP124412

Appendix P Flora survey update within Lot 1 RP 124412

ARUP completed flora surveys for the B2N project from 17 to 28 February 2020, from 16 to 18 March 2020 and from 17 to 18 September 2020. It was reported that one individual record of smooth Davidson's plum (*Davidsonia johnsonii*) and one individual record of native guava (*Rhodomyrtus psidioides*) were observed at Lot 1 on RP124412 in the Project Area. The species were described as planted individuals, as part of a revegetation program (ARUP, 2021).

Additional flora surveys undertaken by ERM at Lot 1 on RP124412 on 12 November 2021 identified seven individuals of a *Davidsonia* species, later confirmed by the Queensland Herbarium to be *Davidsonia jerseyana*. The latest survey and findings concluded that the two species recorded by ARUP were misidentifications. The native guava was confirmed as the non-threatened species bloodhorn (*Ochrosia elliptica*) and the smooth Davidson's plum was confirmed as Davidson's plum (*Davidsonia jerseyana*) by the Queensland Herbarium.

Davidson's plum (*Davidsonia jerseyana*) is listed as endangered under the EPBC Act and seven specimens were recorded on Lot 1 on RP124412. The records are depicted in Appendix D.11. Further assessment concluded the species were established through human intervention (i.e. planted as part of a past revegetation program). This conclusion was strengthened when a title search for the property identified that there was previously a covenant over a portion of the vegetation on the allotment. The covenant is identified as 'Covenant A' and was between the former owners of the lot and the former Caloundra City Council. Following purchase of the allotment by TMR, the covenant was revoked and is no longer present on the title of the allotment. Appendix O provides a copy of a title search undertaken on 22 September 2021, which shows that the allotment is not encumbered by any covenants. The allotment was revegetated as part of a revegetation program and a Voluntary Conservation Agreement between previous owners and council. The Davidson's plum individuals found during the latest survey, are located within the revegetated sections of the allotment, previously protected by the covenant. It is also confirmed that *Davidsonia* sp. were included in the species list for this revegetation program.

The Threatened Species Scientific Committee (TSSC) Conservation Advice for Davidson's plum describes the habitat and distribution as: "*Davidson's plum is found in coastal and lowland subtropical rainforest and wet sclerophyll forest restricted to the Brunswick and Tweed River catchments of the north coast of NSW*". The southern-most confirmed record of the species is located near Mullumbimby, NSW with records extending only a short distance inland on the Brunswick River. The most north-western confirmed record is at Chillingham (NSW, DEC, 2004). There is an unconfirmed record even further north near the border gate at Tomewin (Watson, 1987) (NSW, DEC, 2004). There are no confirmed records for southern Queensland (NSW, DEC, 2004)". The Project Area is outside of the species current known distribution, and suitable habitat does not occur at this location. Other individuals or populations were **not** identified and habitat preferences for the species were not recorded hence, habitat mapping has not been undertaken and a significant impact assessment under Federal guidelines has not been prepared.

Appendix Q Summary of Public Comments