Prepared for
Queensland Department of Transport and Main Roads
ABN: 39 407 690 291

Overarching Environmental Mitigation Plan

Logan and Gold Coast Faster Rail

14-Feb-2025

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Overarching Environmental Mitigation Plan

Logan and Gold Coast Faster Rail

Client: Queensland Department of Transport and Main Roads

ABN: 39 407 690 291

Prepared by

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Executive Summary

The Queensland Department of Transport and Main Roads (TMR) (the Proponent) is proposing to duplicate the existing rail line from two to four tracks between Kuraby and Beenleigh Stations, to support the growing population and customer demand between Brisbane, Logan and the Gold Coast (the 'Logan and Gold Coast Faster Rail Project', herein referred to as the 'proposed action'). The proposed action is located within the Brisbane City Council and Logan City Council local government areas (LGAs), approximately 16 km south-east of the Brisbane central business district (CBD).

The proposed action was referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 17 December 2022 for assessment of Matters of National Environmental Significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The proposed action was determined a 'Controlled Action' on 11 April 2023 to be assessed by Preliminary Documentation for controlling provisions: Listed threatened species and communities (section 18 & 18A).

This Overarching Environmental Mitigation Plan (OEMP) has been prepared to inform the Design and Construction (D&C) phase, including the Contractors Environmental Management Plan (EMP(C)) on the management and mitigation measures recommended to protect MNES listed under the EPBC Act. Additionally, mitigation measures have been developed drawing from statutory documents such as species Approved Conservation Advice and National Recovery Plans.

The OEMP sets out the objectives and mitigation measures prescribed to avoid, minimise and manage potential impacts to MNES as a result of the construction of the proposed action. In effect, this OEMP is the proposed action's action management plan. This OEMP is intended to provide core mitigation measures that will be incorporated into the design development process as well as the delivery-phase management plans (e.g. construction environmental management plans (EMP(C)) prepared by the future D&C Contractors.

The OEMP provides an outline of management strategies for each environmental factor (relevant to MNES) describing management objectives, proposed controls, timing, responsibilities, performance criteria and their associated monitoring and contingency measures. The management and mitigation strategies provided can be implemented by the D&C Contractor for the purpose of mitigating potential impacts to MNES from proposed action activities.

Mitigation measures have been informed by recommendations made in the Appendix B, Supplementary MNES Report (AECOM, 2024) for the proposed action alongside best practice recommendations to avoid, minimise, mitigate and manage impacts to the environmental factors identified in the risk assessment. All management measures within this document are designed following the 'SMART' principle, being Specific, Measurable, Achievable, Relevant and Time bound. Additionally, they incorporate adaptive management measures, where appropriate.

As part of the OEMP, a Fauna Monitoring Program (FMP) has been developed to outline actions for the design and pre-construction phase to enable a baseline understanding of fauna activities, during the construction phase to monitor and assess mitigation, and during post-construction phase to monitor and assess effectiveness of long-term fauna measures within key biodiversity areas within the Impact area and associated buffer zones.

1.0 Introduction

This Overarching Environmental Mitigation Plan (OEMP) has been prepared for the Queensland Department of Transport and Main Roads (TMR) for the Logan and Gold Coast (LGC) Faster Rail Project (the proposed action). It has been developed in response to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Request for Information dated 4 May 2023. This OEMP has been developed to inform the Design and Construction (D&C) phase, including the Contractors Environmental Management Plan (EMP(C)) on the management and mitigation measures recommended to protect Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Additionally, mitigation measures have been developed drawing from statutory documents such as species Approved Conservation Advice and National Recovery Plans.

1.1 Purpose of the OEMP

The purpose of this OEMP is to set out the objectives and mitigation measures prescribed to avoid, minimise and manage potential impacts to MNES as a result of the construction of the proposed action. In effect, this OEMP is the proposed action's **action management plan**.

The proposed action was determined to be a 'controlled action' under the EPBC Act based on potential significant impacts to listed threatened species and ecological communities (Section 18 and 18A).

The OEMP addresses potential impacts to these MNES as a result of the proposed action, with a specific focus on five species with a significant impact:

- Glossy black cockatoo (*Calyptorhynchus lathami lathami*)
- Grey-headed flying-fox (*Pteropus poliocephalus*)
- Koala (*Phascolarctos cinereus*)
- Regent honeyeater (*Anthochaera phrygia*)
- Swift parrot (*Lathamus discolor*).

This OEMP is intended to provide core mitigation measures that will be incorporated into the design development process as well as the delivery-phase management plans (e.g. construction environmental management plans (EMP(C)) prepared by the future D&C Contractors. This OEMP provides mitigation and management measures to avoid or minimise potential impact on MNES species within the Impact area. This OEMP will be updated to incorporate any changes resulting from the Detailed Design phase. Any conditions imposed on the EPBC approval shall prevail over the elements of this OEMP where there is an inconsistency.

The D&C Contractor will be required to incorporate the outcomes, performance criteria, monitoring and control measures from this OEMP and any other pertinent information (e.g. conditions of approval, information from tender document and specifications) into a project-specific EMP(C). The detailed control measures within the EMP(C) must be directed to the outcomes and performance criteria in this OEMP and may include those control measures in this OEMP or other specific mitigation measures supporting the outcomes and performance criteria of this OEMP as prescribed by a suitably qualified person. The EMP(C) is a dynamic document as part of adaptive management and will be updated to incorporate further information and public concerns, approval conditions, changes in environmental management procedures in the light of on-going monitoring results, new techniques and relevant legislative requirements.

The management measures within the EMP(C) plans will follow the 'SMART' principle, being Specific, Measurable, Achievable, Relevant and Time bound and will incorporate adaptive management measures. Additionally, statutory documentation, relevant guidelines (as described in Section 3.0) and industry standards/specifications have been considered in the development of the EMP(C). The EMP(C) plans may be developed in stages, with the relevant EMP(C) developed prior to commencement of construction of the relevant stage of the proposed action.

1.2 Proposed action background

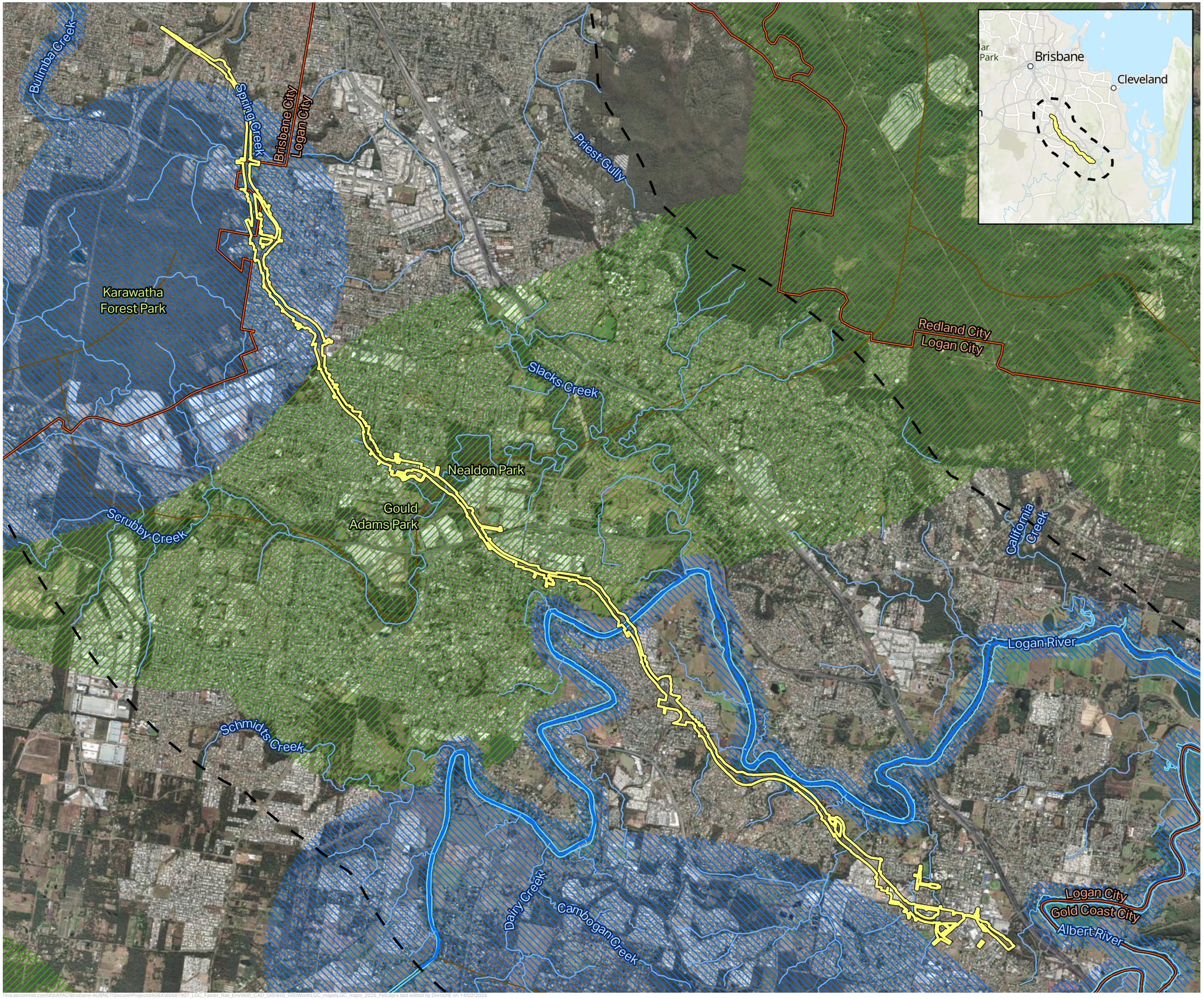
The Gold Coast rail line connects Gold Coast City and Logan City with the Brisbane Central Business District (CBD) and Brisbane Airport. The rail line is subject to strong growth in passenger demand, driven by population growth in the Brisbane to Gold Coast corridor.

The Kuraby to Beenleigh section lies on the Beenleigh and Gold Coast line constituting approximately 18.7 kilometre (km) of double track railway between Kuraby Station in the north and Beenleigh Station in the south. This section of rail forms a crucial part of the Brisbane to Gold Coast transport corridor that plays a vital role in supporting the economic viability of the wider South East Queensland (SEQ) region, connecting jobs and workers, and businesses to other businesses. The Kuraby to Beenleigh section caters for a mix of express services to and from the Gold Coast and all stops passenger services to and from Beenleigh. The current capacity of the Kuraby to Beenleigh section is dependent on the mix of express and all-stops services in operation. During peak periods, express services that travel from the Gold Coast into Brisbane must share a single track with all-stops trains between Kuraby and Beenleigh, while contra-peak services use the other track creating a bottleneck and inhibiting capacity from the Gold Coast.

TMR plan to double the number of Beenleigh and Gold Coast train services over the next 20 years. The proposed action proposes to increase the number of tracks from two to four between Kuraby and Beenleigh, widening and straightening the corridor, with modernised rail systems, station upgrades, active travel opportunities and level crossing removals, to support the growing population and rail patronage demand. The proposed action has been co-funded by the State and Federal Government and the proposed corridor is gazetted as future railway land in accordance with section 242 of the *Transport Infrastructure Act 1994* (Queensland).

Of the 18.7 km rail upgrade, most of the proposed action includes widening within the existing brownfield rail corridor, and only 1 km at Trinder Park is located within greenfield where the rail line will be straightened to meet rail safety standards compliance. By preferentially aligning to the existing rail corridor and previously disturbed areas, the proposed action avoids disturbance of remnant and High Value Regrowth vegetation, and limits acquisition of freehold land containing non-remnant vegetation.

After avoidance and mitigation measures are applied, the proposed action is still likely to have a potential significant impact to threatened fauna due to unavoidable impacts within the Impact area. Therefore, the proposed action has an obligation to provide suitable offsets for significantly impacted MNES, which are discussed in detail in the Offset Area Management Plans (OAMPs). For the purpose of this OEMP, the ‘Impact area’ is the proposed action’s footprint (permanent and temporary disturbance areas) that will be directly impacted as shown in Figure 1.



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0 2,000 m

- Study area
- Impact area
- Watercourse (major)
- Watercourse (minor)
- LGA boundaries

Mapped biodiversity corridor

- Riparian centrelines
- Terrestrial centrelines
- Regional
- State

Figure 1 Proposed action Impact area

Project: Logan and Gold Coast Faster Rail
Report: Overarching Environmental Mitigation Plan
Client: Department of Transport and Main Roads
Project Number: 60681907
Date: 14/02/2025

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1.3 Terminology

The terminology provided in Table 1 is used throughout this document to describe the proposed action:

Table 1 Terminology used throughout this document.

Desktop search	Purpose
Proposed action	The duplication of the existing rail corridor between Kuraby and Beenleigh Station from two to four tracks, including associated station and rail system upgrades.
Impact area	Area where direct impacts will occur which include vegetation clearing required to facilitate the proposed action (see Section 1.2 for detailed scope of proposed action) encompassing an area of 194.46 hectares (ha) shown in Figure 1.
Buffer zones	Areas located outside the Impact area used to assess potential indirect impacts for relevant MNES (that is, grey-headed flying-fox, greater glider, yellow-bellied glider and Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions Threatened Ecological Community), and where TMR commits to monitoring, mitigation and management measures throughout the construction of the proposed action.
Indirect impact area	Areas where indirect impacts assessed to occur for relevant MNES and included in offset acquittal.
Study area	A 5 km buffer around the approximate centre point of the Impact area as shown in Figure 1. The study area represents the extent of the desktop searches. The study area traverses both the Logan City and Brisbane City Local Government Areas (LGA) (Figure 1).
Conservation significant species and communities	Species listed as critically endangered, endangered, vulnerable or migratory under the EPBC Act.
Introduced flora	Introduced flora species listed as Weed of National Significance (WoNS) under the EPBC Act or listed as prohibited or restricted matter under the Queensland Biosecurity Act 2014.
Introduced fauna	Introduced fauna species listed as feral animals under the EPBC Act or listed as prohibited or restricted under the *Biosecurity Act 2014*.

1.4 Existing environment

The Impact area is approximately 194.46 ha in size, extending 18.7 km from Kuraby to Beenleigh. The Impact area extends over Brisbane City Council and Logan City Council local government areas, predominantly characterised by the existing rail corridor within an urban setting.

Existing land uses include previously cleared areas of rail corridor and traverses adjacent to residential housing, commercial and industrial districts. As the Impact area encroaches privately held residential allotments, the requirement for land acquisition within the Impact area is being progressed. TMR will continue to consult with property owners who may be subject to a partial or full land resumption as the design progresses. As the lots are typical to residential backyards, the environmental values are limited.

Most of the Impact area is dominated by the existing rail alignment and surrounding residential setting, with sparse foraging trees present in landscaped areas and residential backyards. Areas of bushland are intersected, especially adjacent to the existing alignment at Scrubby Creek and Edens Landing and at the proposed straightening of the alignment through Trinder Park. Despite the high degree of disturbance and urban modification within the Impact area, areas of open Eucalypt woodland in remnant and high value regrowth condition occurs, generally located at Karawatha Forest, Acacia Forest Park, Nealdon Park and Gould Adams Park and Hugh Muntz Gardens.

The Study area consists of existing land uses such as low density and medium density residential areas, commercial and industrial districts, neighbourhood centres, sport and recreation facilities, rural area, and environmental management and conservation zones. The Impact area is generally flat with some gently undulating areas in the southern extent. The ground is low lying with elevations generally between 10 m Australian Height Datum (AHD) and 50 m AHD. There are several waterway crossings which are lower than 5 m AHD.

2.0 Proposed Works

2.1 Scope and Objectives

The proposed action proposes to duplicate the existing rail corridor between Kuraby and Beenleigh Station from two to four tracks, which requires a wider rail corridor and track straightening works. Additional upgrades to modernised rail systems, station upgrades and level crossing removals are proposed to take place.

The Queensland Government, together with the Australian Government, has committed towards the upgrades including the key features of the proposed action including:

- Duplication of approximately 18.7 km of rail corridor and upgrades to associated rail systems between Kuraby and Beenleigh Stations resulting in an increase from two tracks to four tracks
- Eight station upgrades including a station relocation (Trinder Park Station) to improve accessibility, safety and amenity, including platform straightening, new pedestrian bridges with lifts and improve bus stop, park ‘n’ ride and kiss ‘n’ ride facilities
- Removal of existing rail level crossings at Trinder Park (Railway Parade), Holmview (Spanns Road) and Beenleigh (Holmview Road)
- Adjacent local road network alterations associated with the railway duplication.
- Dedicated active transport along the corridor
- Extension of the existing cattle siding at Holmview Station
- Dedicated rail maintenance access road adjacent to the rail corridor.

2.2 Design

The proposed action is currently in a reference design phase. Ecological surveys completed between August 2022 and January 2024 confirmed ecological values and protected matters with potential to be impacted. An additional targeted vegetation survey was undertaken in August 2024 to determine the presence, condition class and extent of the *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions* Threatened Ecological Community (TEC) uplisted to Endangered in October 2022.

Avoidance, minimising impact and applying mitigation measures are the primary strategies to manage potential for significant impact. Avoidance will directly reduce the scale and intensity of potential impacts through suitable site selection and design optimisation. Secondly, minimising impact by reviewing design options, construction methodology, property acquisition requirements and working collaboratively with designers, the delivery team and ecologists identified opportunities to further reduce vegetation clearance and potential impact on MNES. Mitigation, after consideration of reasonable avoidance and minimisation measures, will further reduce the likelihood or severity of potential impacts occurring.

Over the 18.7 km length of the proposed action, the design has prioritised widening within the existing brownfield operational rail corridor, except for a 1 km greenfield section of track near the current Trinder Park Station site, where the rail line requires straightening to comply with rail safety standards. The proposed relocation of Trinder Park Station will provide significant benefit to the efficiency of rail operations and will reduce property acquisitions and community impact. Through design optimisation, the proposed action has proposed to position the park-and-ride facility for Trinder Park station relocation to the east of the station to further reduce fragmentation of habitat.

While most of the corridor avoids impacts to environmental values outside the alignment, there are discrete locations where corridor widening will impact habitat for listed threatened species see Appendix A

Figure 2. This has been verified by extensive ecological surveys. TMR anticipate the greatest impact to habitat extent, fragmentation and connectivity will occur at the northern end of the alignment where the track is straightened through Acacia Forest Park.

Design refinements have sought to refine the Impact area to previously cleared areas and minimise habitat removal. Fauna movement options (further discussed in Appendix B) have been investigated and will be further refined during Detailed Design to minimise fauna fragmentation and hazards, especially at Trinder Park.

TMR has implemented a project management framework which seeks to ensure that the proposed action will deliver outcomes that are consistent with organizational policy and strategic objectives. This includes compliance with legislative and approval requirements including the approval under EPBC Act.

Environmental management follows the TMR Environmental Management Process Manual (TMR, 2023). 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 (retrievable at: https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Environmental-processes-manual).

Risks and impacts associated with MNES for the proposed action 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).

2.3 Construction

The proposed action is currently within competitive procurement phases which is forecast for completion Q1 2025. At the completion of this procurement phase, a Contract will be awarded that encompasses Design and Construction activities under an Alliance delivery model.

Given the proposed action is at reference design stage, the definitive construction methods are yet to be finalised. The anticipated construction process for the proposed action encompasses the following activities:

- Enabling works:
  - Site facility and access establishment
  - Stockpile locations
  - PUP (water, sewer, communications) relocation and protection
  - Temporary public access arrangements.
- General corridor:
  - Civil works, comprising clearing and grubbing of sites, topsoil stripping, bulk earthworks (excavation, embankment), rock excavation and rock dowelling and capping, to facilitate construction of:
    - Rail maintenance access roads (RMARs)
    - Corridor fencing
    - Stormwater and drainage infrastructure
    - Active transport corridor (ATC).
  - Trackworks, comprising track delivery, installation, welding and grinding, turnout installation and rail tamping
  - Rail systems works, including overhead line equipment and signalling installation (see Plate 1 below)

- Decommissioning redundant railway infrastructure.

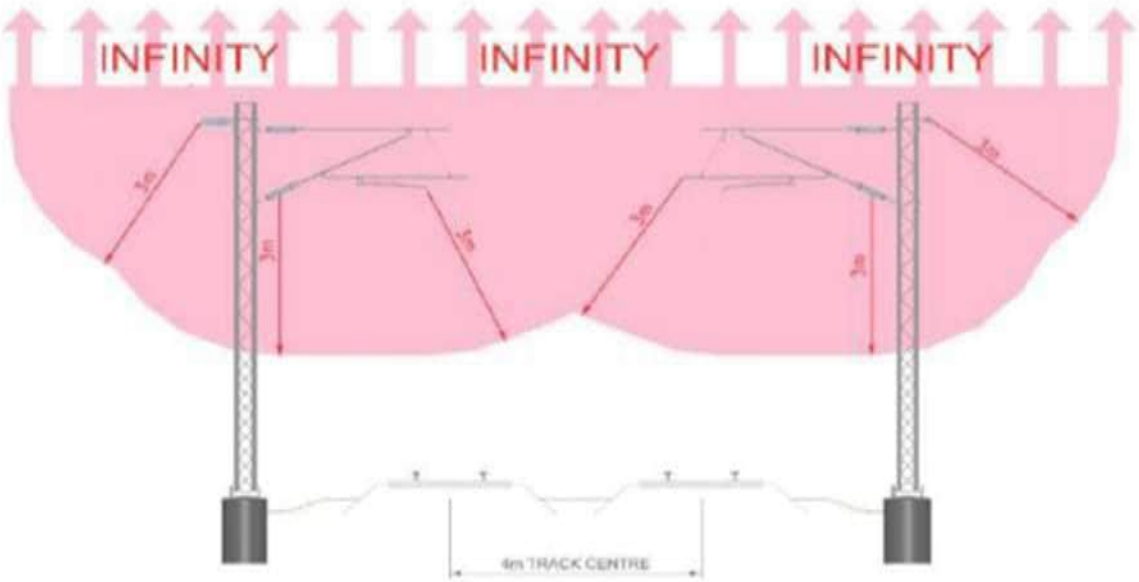

Plate 1 Overhead Line Equipment: Queensland Rail, 2016

- Stations and structures:
  - Demolition of bridges, buildings, platforms etc
  - Construction of island and side platforms, lifts and overbridges and buildings and canopies
  - Construction of rail bridges over roads, road bridges over rail and footbridges
  - Construction of duplicated rail bridges over Logan River and Scrubby Creek
  - Construction of retaining walls
  - Possible jetty works for Logan River rail bridge
  - Pier protection works for existing bridges.
- Precincts:
  - Upgrades to local road connections
  - New and upgraded car parks
  - New and upgraded pedestrian walkways.

Access to the Impact area will be via main roads and local roads in and around the rail corridor.

The final location of site works and material stockpiles will be identified during Detailed Design. All works within the Impact area will align with EPBC approval requirements.

The proposed action timing is subject to the outcomes of the approvals and planning process, granting of approvals and further discussion with stakeholders. Construction of the proposed action is anticipated to take approximately five years.

2.4 Operation

The proposed action is limited to construction only. Activities facilitated by construction of the proposed action encompass the following:

- Operation of approximately 18.7 km of rail corridor and upgrades to associated rail systems between Kuraby and Beenleigh Stations, doubling the operational capacity between Kuraby and Beenleigh Stations, increasing the volume and frequency of services.
- Maintenance access for ongoing management of the rail network by Queensland Rail.
- Operation of eight upgraded stations, including the relocated Trinder Park Station, with:
  - improved accessibility, safety and amenity
  - platform straightening, new pedestrian bridges, new station buildings and new island platforms
  - updated station accessibility systems including hearing loops, CCTV and help points will comply with *Disability Discrimination Act 1992*
  - improved rail staff facilities and customer services
  - improved primary path of access from the station platforms to the surrounding precinct.
- Operation of new and upgraded Park 'n' Ride facilities, including a new multi-story Park 'n' Ride at Beenleigh Station with an integrated bus interchange (subject to further funding decision), including:
  - improved bus facilities for transit interchange, new kiss ‘n’ ride facilities, and new *Disability Discrimination Act 1992* compliant parking
  - new station entrance at Beenleigh Station with improved pedestrian and traffic access, multi-storey car park and bus station with improved transit interchange and accessibility to the station via a raised concourse.
- Operation of an upgraded cattle siding at Holmview Station, including an extension of existing siding to full 680 m length.
- Provision of dedicated active transport corridor (ATC) along the rail corridor.
  - Average ATC width of 6 m
  - ATC facilities and paths to be linked by bridges to alternate between one side of the rail corridor and the other.
- Operation of realigned local road network to accommodate duplication of the rail corridor as well as removal of rail level crossings at Spanns Road, Trinder Park (Railway Parade) and Holmview Road.

3.0 Supporting guidance documents

Recommendations within this report for conservation significant species and communities including mitigation measures and certain species-specific aspects (e.g. buffer zones and fauna monitoring programs) prescribed throughout this report have drawn on the proven effectiveness of measures and recommendations outlined in the below mentioned statutory documents and relevant guidelines including:

- A review of noise, light and dust impacts on grey-headed flying-fox camps (Ecosure, 2021)
- Approved Conservation Advice for the Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Department of Climate Change Energy the Environment and Water, 2022)
- Conservation Advice for *Anthochaera phrygia* (regent honeyeater) (Department of Environment and Science, 2015)
- Conservation Advice for *Calyptorhynchus lathami lathami* (south-eastern glossy black-Cockatoo) (Department of Climate Change Energy the Environment and Water, 2022)
- Conservation Advice for *Dasyurus maculatus maculatus* (southeastern mainland population) (Spotted-tailed Quoll) (Department of Climate Change Energy the Environment and Water, 2023)
- Conservation Advice for *Gossia gonoclada* (angle-stemmed myrtle) (Threatened Species Scientific Committee, 2016)
- Conservation Advice for *Lathamus discolor* (swift parrot) (Threatened Species Scientific Committee, 2016)
- Conservation Advice for *Macadamia integrifolia* (macadamia nut) (Department of the Environment Water Heritage and the Arts, 2008)
- Conservation Advice for *Petauroides volans* (greater glider (southern and central)) Department of Climate Change Energy the Environment and Water, 2022)
- Conservation Advice for *Petaurus australis australis* (yellow-bellied glider (south-eastern)) (Department of Agriculture, Water and the Environment, 2022)
- Conservation Advice for *Phascolarctos cinereus* (koala) combined populations of Queensland, New South Wales and the Australian Capital Territory (Department of Agriculture Water and the Environment, 2022)
- Conservation Advice for *Gallinago hardwickii* (Latham's snipe) (Department of Climate Change Energy the Environment and Water, 2024)
- Conservation Advice for the Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Department of Climate Change Energy the Environment and Water, 2022)
- EPBC Act Policy Statement 3.21: *Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (Department of the Environment and Energy, 2017)
- EPBC Act referral guideline for management actions in Grey-headed and Spectacled flying fox camps (Department of the Environment, 2015)
- EPBC Act referral guideline for the endangered koala (Department of Climate Change Energy the Environment and Water, 2023)
- Fauna Sensitive Transport Infrastructure Delivery Manual Volume 2 (Department of Transport and Main Roads, 2024)
- National light pollution guidelines for wildlife (Department of Climate Change Energy the Environment and Water, 2023)

- National Recovery Plan for the angle-stemmed Myrtle (*Austromyrtus gonoclada*) (Austromyrtus gonoclada Recovery Team, 2001)
- National recovery plan for the grey-headed flying fox (Department of Agriculture, Water and Environment, 2021)
- National Recovery Plan for the koala (*Phascolarctos cinereus*) (combined populations of Queensland, New South Wales and the Australian Capital Territory) (Department of Agriculture Water and the Environment, 2022)
- National Recovery Plan for the regent honeyeater (*Anthochaera phryg*ia) (Department of the Environment, 2016)
- National Recovery Plan for the swift parrot *(Lathamus discolor)* (Department of Climate Change, Energy, the Environment and Water, 2024).
- Queensland Government, South East Queensland—selected regional ecosystems (Queensland Government, 2024)
- Threat abatement plan for predation by feral cats (The Commonwealth of Australia, 2015)
- Threat abatement plan for predation by the European red fox (Department of the Environment Water Heritage and the Arts, 2008)
- TMR Koala-sensitive Design Guideline (Department of Environment and Science, 2019)
- Youngentob, Marsh and Skewes (2021), A review of koala habitat and assessment criteria and methods.

Further discussion of the statutory documents' objectives and how the proposed action is consistent with them is provided in Section 4.0.

4.0 State Legislative Context

In addition to the environmental management strategies proposed to protect MNES species outlined in Section 7.0, TMR and the D&C Contractor have duty of care obligations under State environment legislation. These obligations under State legislation alongside TMR's business as usual environmental management frameworks are considered in place through the assessment. Duty of care obligations are described for information in Table 2.

Table 2 Summary of Duty of Care Obligations

Legislation	Approval	Authority	Trigger	Comment
Environmental Protection Act 1994	General environmental duty	Department of Environment, Tourism, Science and Innovation (DETSI) (formerly the Department of Environment, Science and Innovation or DESI)	Works with potential to cause environmental harm	General environmental duty, a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all practical measures to prevent or minimise the harm. Duty to notify environmental harm applies to a person who, while carrying out an activity, becomes aware that serious or material environmental harm is caused or threatened by the persons or someone else's act or omission in carrying out the activity. Where serious or material environmental harm occurs, an Incident Notification Form will be completed and forwarded to the site supervisor and the Principal. The site supervisor must then contact DETSI to notify them of the event, its nature and the circumstances in which the incident happened. The DETSI incident reporting hotline number is: 1300 130 372.
Biosecurity Act 2014	Restricted invasive species management obligations	Department of Agriculture and Fisheries	Weed management obligation	The ecological assessment identified a total of 17 exotic species, including species listed as 'Restricted' under the *Biosecurity Act 2014*. Environmental management plans developed prior to works commencing will prescriptively outline the controls needed to manage weed, pests and disease may impact native flora biodiversity values of the Impact area and surrounding land.

Legislation	Approval	Authority	Trigger	Comment
Nature Conservation Act 1992	Protected plant permit	DETSI	Protected plant permit required when clearing '*in the wild*' native vegetation: • Within a high-risk area, containing or within 100 m of threatened or near threatened plants. • Outside of a high-risk area containing threatened or near threatened plants.	Various polygons of high-risk flora trigger area intersect the Project. Ecological assessments identified the presence of: • Angle-stemmed myrtle (*Gossia gonoclada*) • Scrub turpentine (*Rhodamnia rubescens*) • Macadamia nut (Macadamia integrifolia). Of the above, both Macadamia nut and Scrub turpentine was observed in disturbed areas and the local vegetation was not characteristic of suitable habitat for either species. Therefore, neither species were considered to be '*in the wild*' and therefore not applicable to the clearing permit. The angle-stemmed myrtle was observed approximately 14 m west outside of the Impact area. A targeted flora survey will be required to be completed in all high-risk flora trigger areas that are intersected by the Project. The targeted survey is required to be reported in a Flora Survey Report and will be required to be submitted to DESI.
	Species Management Program (SMP)	DETSI	Tampering with animal breeding places, including: • Least concern (non-colonial breeders): low risk impact • Least concern (colonial breeders), special least concern and endangered vulnerable or near threatened (EVNT) fauna species: high risk impact.	Suitable breeding/roosting habitat has been identified within the Impact area. A high risk and low risk SMP will be required to be prepared and approved by DETSI prior to commencement of the clearing works. Depending on timing an updated fauna breeding place survey may be required to inform the high risk SMP.

5.0 Environmental Management and Responsibilities

This section outlines the responsibilities, auditing and review requirements for the proposed action based on the *Environmental Management Plan Guidelines* (Department of the Environment 2014).

The D&C Contractor will be required to incorporate relevant information from this OEMP and any other pertinent information (e.g. conditions of permits, Project specifications and technical standards) into a project-specific EMP(C).

5.1 Responsibilities

TMR will be responsible for the conditions of the EPBC approval and will ensure the project-specific EMP(C) incorporates the requirements of this OEMP. TMR will implement assurance activities to ensure construction activities implement relevant mitigation measures in accordance with this OEMP.

As part of these assurance activities, TMR will coordinate the response to and reporting of non-compliances with the controlled action approval conditions, should they occur. As part of this, TMR will coordinate the implementation of suitable corrective actions (working with its D&C Contractor) and undertake notification process to relevant authority/s.

Implementation responsibilities that will be passed to the D&C Contractor are outlined under Section 9.0. TMR retains responsibility for the obligations of the EPBC controlled action approval.

5.2 Inductions

As the Principal Contractor, the D&C Contractor will be responsible for inductions so that all persons undertaking works within the Impact area have completed a site induction prior to commencing work and be made aware of this OEMP and the relevant project-specific EMP(C) requirements.

At a minimum the environmental induction will cover:

- Key environmental issues at the site, including in relation to:
  - Key biodiversity areas of the Impact area
  - Ecologically sensitive areas
  - Erosion and sediment control
  - Water quality and hydrology
  - Waste management and storage of hazardous materials
  - Vegetation management
  - Conservation significant fauna and general fauna management
  - Air, light, noise and vibration management.
- Mitigation measures to be adopted and where to find guidance on their appropriate installation and operation
- Any applicable ‘no-go’ zones
- Undertaking works in accordance with approvals.

5.3 Non-Conformance and Corrective Actions

Site inspections will be undertaken using a checklist to confirm that the management procedures identified in the EMP(C) are in place and operating in the manner prescribed. Where elements of the management plans are not in place or have not been installed in the correct manner, a non-conformance will be documented, and associated corrective action prescribed, implemented and evidence of close out captured.

Site inspections will also seek to identify areas for improvement and identify measures to be introduced to mitigate against impacts from future construction activities. These will be incorporated into the EMP(C), and D&C Contractor will be required to have these 'toolboxed' with all contractors. Records of toolbox talks that incorporate environmental elements should be maintained.

5.4 Auditing & Verification

Auditing will be undertaken to document compliance with approval conditions, commitments and the requirements of this OEMP.

In line with TMR's *Environmental Process Manual (2023)*, the Main Roads Technical Specification (MRTS) 51 Environmental Management includes a Hold Point to assess the suitability of the EMP(C) prior to works commencing. In effect, this Hold Point is used to verify that planned construction activities have incorporated relevant obligations and management requirements from this OEMP. Where gaps are identified by TMR throughout review of the EMP(C), these will need to be addressed prior to works commencing.

MRTS51 and its site-specific Annexure MRTS51.1 has various pre- and post-clearing inspections and reporting requirements by suitably qualified persons (e.g. ecologists, fauna spotter catchers) to ensure requirements such as those outlined in this OEMP are being incorporated into high-risk clearing activities. Additionally, there are Hold Points (or similar) allocated for these pre- and post-Clearing activities to ensure fauna and potential breeding places are identified and carefully managed throughout clearing works.

Throughout future Detailed Design phases, specific mitigation measures will be validated through the Design verification processes and associated Design reports.

Ongoing environmental audits will be undertaken in line with TMR's assurance programs which will be based on risk (e.g. based on construction activities, or seasonality, etc). Additionally, TMR will approve the assurance (auditing and inspection) programs the D&C Contractor will implement as part of the approval of the EMP(C). Assurance activities will verify the implementation of this OEMP's requirements, in addition to other Project-specific compliance obligations. As a minimum, this OEMP will be audited on an annual basis.

Environmental Inspections (referred in Section 9.0) will be undertaken by both TMR and the D&C Contractor. Environmental inspections will typically occur on a weekly basis and will generate an action management process to ensure any rectification / maintenance is implemented effectively and in a timely manner.

5.5 Communication

Information for the proposed action including geospatial datasets with key environmental features or constraints will be shared with the D&C Contractor.

5.6 EMP(C) Review

Review of the EMP(C) by the D&C Contractor will occur:

- Prior to construction following the finalisation of design
- Annually throughout the construction phase
- Following the identification of a potential performance improvement for an environmental impact
- Following a significant environmental incident
- At the completion of construction.

The EMP(C) will also be reviewed and endorsed by TMR to ensure compliance with EPBC approval conditions, in addition to other obligations relevant to the proposed action.

5.7 Environmental Incidents, Hazards and Complaints, Emergency Response

All environmental incidents and complaints must be reported to the Project Environmental Manager and Site Supervisor.

If any incident results in non-compliance with the EPBC approval conditions, it will be reported to the TMR as soon as practicable, with initial notification within 24 hours of identification of non-compliance. TMR will report any breach of the EPBC Approval to DCCEEW within five business days of becoming aware of the breach.

6.0 Risk Assessment

6.1 Risk Assessment Framework

The risk assessment framework for the proposed action activities on MNES species has been informed by *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines* and the *Environmental Management Plan Guidelines* (DAWE, 2014) and is presented in Table 3.

Table 3 Risk assessment framework

Risk Matrix						
		Consequence				
		Minor	*Moderate*	*High*	*Major*	*Critical*
Likelihood	*Highly Likely*	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Likelihood	Consequence
Highly likely – is expected to occur in most circumstances.	*Critical* – Severe widespread loss of environmental amenity and irrecoverable environmental damage.
Likely – Will probably occur during the life of the proposed action.	*Major* – Major loss of environmental amenity and real danger of continuing.
Possible – Might occur during the life of the proposed action.	*High* – Substantial instances of environmental damage that could be reversed with intensive efforts.
Unlikely – Could occur but considered unlikely or doubtful.	*Moderate* – Isolated but substantial instances of environmental damage that could be reversed with intensive efforts.
Rare – May occur in exceptional circumstances.	*Minor* – Minor incident of environmental damage that can be reversed.

6.2 Initial risk assessment

An initial risk assessment of potential impacts to listed threatened species has been undertaken to capture the most material risks for the proposed action and to inform the level of mitigation appropriate to avoid, minimise or mitigate risks to MNES as far as practicable. The risk assessment considers:

- Direct impacts to listed threatened species as a result of the proposed action (e.g. loss of habitat)
- Indirect impacts to listed threatened species as a result of the proposed action (e.g. noise and dust impacts to habitat and populations).

Results of the environmental risk assessment relating to this OEMP are shown below in Table 4. This high-level risk assessment has focussed on the specific impacts on environmental factors with potential to have carryover effects on MNES species within the Impact area. This initial risk assessment has been undertaken prior to the implementation of any mitigation measures. The residual risk, following implementation of mitigation measures, has been outlined in Section 10.0 of this document.

During subsequent phases, the effectiveness of mitigation measures will be considered further by the D&C Contractor when developing the project-specific EMP(C).

Unmitigated risks to MNES from proposed action activities are considered highest during the proposed action's construction phase. Due to the low impact nature of the proposed action during its operation,

risks are considered low for all environmental factors. Construction mitigation measures are considered in Section 7.0.

Table 4 Initial risk assessment for impacts to MNES

Potential impact	Risk to MNES	Likelihood	Consequence	Risk
Direct impacts				
Flora and fauna				
Flora and fauna - Vegetation clearing resulting in loss of habitat for conservation significant flora and fauna	• Reduced patch size of vegetation communities potentially compromising the viability of the community and associated habitat. • Loss of habitat causing a reduction in biological diversity or loss of local populations and genotypes. • Loss of or disturbance to microhabitat features such as tree hollows, leaf litter, ground timber, dense shrubs and hollows. • Increase in edge effects, leading to fragmentation, increase in light and noise penetration, alterations in microclimates, and increased weed/pest incursion. • Loss of floristic diversity and the food resources this provides such as foliage, flowers, nectar, fruit and seeds. • Destruction of abiotic features necessary to support vegetation communities and habitat types.	Highly likely	High	High
Flora and fauna - Loss of fauna movement and habitat fragmentation	• Dissection and disconnection of vegetation and habitats. • Increase in edge effects[1], light and noise penetration, alterations in microclimates, and increased weed/pest incursion. • Reduced area of vegetation and habitat patches. • Isolation between vegetation and habitat patches. • Impacts to the success of seed dispersal, species recruitment and ultimately the long-term viability and persistence of vegetation and habitats. • Destruction of abiotic features that are necessary to support vegetation. • Reduction of fauna movement opportunities, leading to reduced species recruitment, genetic flow and ultimately affect the long-term viability and persistence of fauna populations within the landscape.	Highly likely	High	High

[1] Defined as the consequences on vegetation and wildlife that occur as a result of one type of vegetation sharing a border with another.

Potential impact	Risk to MNES	Likelihood	Consequence	Risk
Flora and fauna- Injury and mortality of fauna	• Strike from moving vehicles/machinery – key issue for ground dwelling species, particularly those with poor mobility. • Entrapment in habitat during removal – key issue during tree felling for species that use tree hollows or hollow logs for roosting and denning. • Entrapment in trenches/holes – key issue for ground dwelling species (reptiles and small mammals, particularly those that are active at night and cannot detect trenches to avoid.	Possible	Moderate	Medium
Flora and fauna - Introduction, spread of introduced flora and fauna (weeds and pests) and pathogens	Introduction and/or spread of weeds, pest and pathogens can become a significant biosecurity risk for the proposed action's public amenity or environment. The proposed action environment is urban and fragmented nature of the Impact area, weeds were frequently observed within disturbed (that is non remnant) and undisturbed (that is, remnant and high value regrowth) vegetation and evidence of pests were common.	Likely	Minor	Low
Indirect impacts				
Hydrology, erosion and water quality				
Changes to hydrology	Erosion, sediment runoff and alterations to surface water and ground water levels which can adversely impact: • Soil structure and composition through the loss of topsoil and exposure of subsoil, which often has poor physical and chemical properties. • Water quality and nutrient levels. • Vegetation composition and health. • Water turbidity. • Potential loss or contamination of existing ground water sources which may also affect groundwater. • The Logan River, Spring Creek, Slacks Creek, Scrubby Creek, and wetlands near Scrubby Creek, Edens Landing and Holmview are likely to be the most susceptible to erosion, sediment runoff and alteration to hydrology.	Likely	Minor	Low
Water quality		Likely	Minor	Low
Erosion and sediment control		Likely	Minor	Low
Environmental spills	• Cause environmental spills due to the use of vehicles, machinery and the use/storage of fuels and chemicals.	Likely	Minor	Low

Potential impact	Risk to MNES	Likelihood	Consequence	Risk
Nuisance (Dust, Noise, Vibration and Light)				
Dust and air quality	• Soil exposed through vegetation clearing or ground disturbance can lead to dust generation, which in turn can reduce the abundance and diversity of terrestrial and aquatic habitats if excessive levels are sustained overtime.	Likely	Minor	Low
Noise, light and vibration	Activity and noise are occurring in areas adjoining retained habitat, potential impacts may include the following: • Reduced foraging ability by auditory predators due to increased background noise. • Increased risk of predation by visual predators due to increased background noise. • Increased potential for collisions with vehicles. • Human visitation causing disturbance to foraging or breeding behaviours.	Likely	Minor	Low

7.0 Environmental Management Strategies

Based on the outcomes of the initial risk assessment, this section identifies the following key environmental factors for the proposed works:

- Flora and fauna
- Hydrology, erosion and water quality
- Nuisance (dust, noise, vibration and light).

An outline of management strategy is provided for each environmental factor (relevant to MNES) describing:

- Objective and issue
- Control
- Timing
- Responsibility
- Outcome Performance Criteria
- Monitoring and Evaluation Program
- Contingency Measures.

The management and mitigation strategies provided can be implemented by the D&C Contractor for the purpose of mitigating potential impacts to MNES from proposed action activities. These environmental management measures will be used to inform the EMP(C) for the proposed action.

Mitigation measures have been informed by recommendations made in the Appendix B, Supplementary MNES Report (AECOM, 2024) for the proposed action alongside best practice recommendations to avoid, minimise, mitigate and manage impacts to the environmental factors identified in the risk assessment. All management measures within this document are designed following the ‘SMART’ principle, being Specific, Measurable, Achievable, Relevant and Time bound. Additionally, they incorporate adaptive management measures, where appropriate.

The EMP(C) will, at a minimum, cover key environmental factors at the site and provide an overview of mitigation measures to be adopted and their appropriate installation.

8.0 Vegetation clearing

The highest risk activities with regards to impacts to threatened species are direct impacts due to vegetation clearing that may lead to loss of fauna movement and habitat fragmentation, and injury and mortality of fauna during construction of the proposed action. The proposed action is located within an urban environment and approximately 90% supports a mosaic of residential areas and developed areas including the existing rail corridor and stations comprising of non-remnant and regrowth vegetation. Historical broad scale clearing for agricultural purposes is also evident. The remaining approximate 10% of the Impact area comprises remnant vegetation, high value regrowth, and water bodies.

Key Biodiversity Areas were determined based on extensive survey data collected within the impact area to assist in the effective management and mitigation of impacts to MNES flora and fauna. Key Biodiversity Areas were selected through the analysis of threatened fauna species observed during targeted field surveys, species records, desktop assessment of biodiversity corridors including ground truthed and modelled biodiversity corridors and/or large areas of remnant vegetation. Key Biodiversity Areas generally represent high quality, intact patches of remnant vegetation where existing disturbance levels and fragmentation are relatively low.

These areas are likely to support breeding and foraging habitat for multiple MNES species whilst contributing to fauna movement throughout the broader landscape. Based off ground truthed habitat mapping it is predicted that if MNES species were to occur they would have preference for these Key Biodiversity Areas due to the presence of habitat features that meet the ecological requirements of

MNES species. As a precautionary approach buffer zones have been applied for MNES species (to asses for potential indirect impacts and where prescribed mitigation measures and monitoring will be implemented) and communities outside of the Impact area (i.e. outside of direct impact areas) and where the provision of buffer zones is considered ecologically relevant.

Habitat for the following species/ communities are considered to be ecologically relevant for buffer zones including:

- Approximately 2.2 ha of breeding and roosting habitat for grey-headed flying-fox
- Approximately 7.26 ha of breeding habitat for greater glider and yellow-bellied glider each
- Approximately 4.80 ha of ground-truthed areas of Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions.

Refer to Section 6.4, Table 34 of the Appendix B, MNES Supplementary Report for further justification and controls relevant to indirect impacts within the nominated buffer zones.

8.1 Loss of conservation significant flora habitat

Table 5 outlines maximum extent of impacts proposed to occur to approximately 3.32 ha of habitat for conservation significant flora and communities. This corresponds with locations mapped in Appendix A Figure 2. Key biodiversity areas were identified based on threatened flora species observed during targeted field surveys.

Table 5 Potential habitat loss to TEC and conservation significant flora known to occur within the Impact area

MNES	Maximum direct Impact area (ha)
Subtropical floodplain eucalypt TEC	1.30
Angle-stemmed Myrtle (*Gossia gonoclada*)	0.00[2]
Macadamia nut[3] (*Macadamia integrifolia*)	0.016
Scrub turpentine (*Rhodamnia rubescens)*	0.01

8.2 Loss of conservation significant fauna habitat

Table 6 below outlines the maximum extent of impact proposed to occur for the conservation significant fauna species assessed as being significantly impacted by the construction of the proposed action, which is divided into breeding, foraging, shelter (where applicable) and dispersal habitat. Key fauna biodiversity areas (Appendix A) were selected through the analysis of threatened fauna species observed during targeted field surveys, species records, desktop assessment of biodiversity corridors including ground truthed and modelled biodiversity corridors and/or large areas of remnant vegetation.

Table 6 Area of significant direct and indirect impact to Matters of National Environmental Significance

Common Name	Potential habitat utilisation	Maximum direct Impact area (ha) per habitat	Total direct Impact area (ha) per species
Grey-headed flying-fox	Breeding/Roosting	0.54	**45.33**
	Foraging/Dispersal	42.60	
	Indirect impact	2.20	
Koala	Breeding/Foraging (including functionally lost areas)	27.48	**107.74**
	Shelter and dispersal	80.27	

[2] This individual was observed approximately 14 m outside the impact area.
[3] Not occurring in the wild.

Common Name	Potential habitat utilisation	Maximum direct Impact area (ha) per habitat	Total direct Impact area (ha) per species
Regent honeyeater	Foraging and dispersal	42.28	**42.28**
Swift parrot	Foraging and dispersal	42.28	**42.28**
South-eastern glossy black-cockatoo	Breeding	18.91	**41.74**
	Breeding and foraging	7.13	
	Foraging	2.19	
	Dispersal	13.51	

Additional to the MNES species significantly impacted by the proposed action, Key Biodiversity Areas and native vegetation within the Impact area may also support a broader range of species (Table 7) as assessed in the Appendix B, Supplementary MNES Report.

Table 7 Other known or potentially occurring MNES fauna habitat values within the Impact area

MNES	EPBC Act status	Likelihood of occurrence
CONSIDERED IN IMPACT ASSESSMENT PROCESS		
Angle-stemmed myrtle (*Gossia gonoclada*)	E	Known
Australian painted snipe (*Rostratula australis)*	E	Potential
Greater glider (southern and central) (*Petauroides volans)*	E	Potential
Macadamia nut (*Macadamia integrifolia)*	V	Known
Mary River cod (*Maccullochella mariensis)*	E	Potential
Spotted-tailed quoll (southern sub-species) (*Dasyurus maculatus maculatus)*	E	Potential
Swift parrot (*Lathamus discolor)*	CE	Potential
White-throated needle tail (*Hirundapus caudacutus)*	V, Mi	Likely
Yellow-bellied glider (south-eastern) (*Petaurus australis australis*)	V	Potential

8.3 Loss of fauna movement and habitat fragmentation

The majority of the Impact area is located within an urban environment and has been largely co-located on or adjacent to the existing railway corridor, habitats have already been subjected to disturbance, fragmentation, weed incursion and edge effects. This disturbed habitat is already likely to restrict north-south and east-west fauna movement, as well as the presence of existing barriers such as fences, roads, buildings and lack of canopy cover.

The proposed action will also impact mapped and/or ground truthed biodiversity or fauna movement corridors in key biodiversity areas for MNES. Ground truthed fauna movement corridors and associated key biodiversity areas are located in areas surrounding Beenleigh Park, Wally Tate Park, Kuraby State School (Springs Creek), Karawatha and Acacia Forest Park, Gould Adams Park, Nealdon Park, Edens Landing and Logan River (refer to Appendix A Figure 2).
Impacts to fauna movement and habitat fragmentation as a result of either partial or full clearing for the proposed action are likely to result in:

- Increase in edge effects, light and noise penetration, alterations in microclimates, and increased weed/pest incursion
- Reduced area of vegetation and habitat patches

- Impacts to the success of seed dispersal, species recruitment and ultimately the long-term viability and persistence of vegetation and habitats
- Increased distance to suitable habitat further reducing fauna movement opportunities, leading to reduced species recruitment, genetic flow and ultimately affect the long-term viability and persistence of fauna populations within the landscape.

Conservation significant fauna which may be susceptible to fragmentation and reduced movement opportunities include koala, greater glider and yellow-bellied glider. The yellow-bellied glider and greater glider are considered to have low dispersal ability, have a large home range and/or require large areas of intact habitat. Gaps between areas of suitable habitat may restrict movement of individuals and access to required habitat resources while also increasing risk of predation from domesticated dogs.

8.4 Injury and mortality of fauna

The proposed action has the potential to cause injuries or mortality to conservation significant fauna as well as other native fauna. Fauna may be injured or killed as a result of the proposed action through:

- Strike from moving vehicles/machinery – key issue for ground dwelling species, particularly those with poor mobility
- Entrapment in habitat during removal – key issue during tree felling for species that use tree hollows or hollow logs for roosting and denning
- Entrapment in trenches/holes – key issue for ground dwelling species (reptiles and small mammals), particularly those that are active at night and cannot detect trenches to avoid.

Arboreal or terrestrial conservation significant fauna such as koala, yellow-bellied glider and greater glider are the most susceptible to injury and mortality as a result of the proposed action. Vehicle strike is a key threatening process for koala (Department of Agriculture Water and the Environment, 2022).

8.5 Introduction, spread of introduced flora and fauna (weeds and pests) and pathogens

The introduction and/or spread of weeds, pest and pathogens can become a significant biosecurity risk for the proposed action's public amenity or environment (that is vegetation, habitat and ecosystems). Weeds, pests and pathogens can also compromise the integrity and outcompete native species, reduce the germination of native flora, increase the intensity and/or frequency of fires, and threaten the long-term survival of conservation significant species and communities.

Due to the urban and fragmented nature of the Impact area, weeds were frequently observed within disturbed (that is non remnant) and undisturbed (that is remnant and high value regrowth) vegetation and evidence of pests were common.

A total of twenty-eight introduced flora species were recorded within the study area during the field surveys including six of Weeds of National Significance (WONS). These species have been identified as being centrally important among all levels of government, organisations, and individuals with weed management responsibilities. WONS includes:

- Alligator weed (*Alternanthera philoxeroides*)
- Cat's claw creeper (*Dolichandra unguis-cati*)
- Climbing Asparagus fern (*Asparagus aethiopicus*)
- Common lantana (*Lantana camara*)
- Common Prickly Pear (*Opuntia stricta*)
- Fire weed (*Senecio madagascariensis*).

Ten introduced fauna species were recorded during field surveys, one of which is restricted under the *Biosecurity Act 2014*, European carp (*Cyprinus Carpio*). Introduced fauna species included:

- Bony bream (*Nematalosa erebi*)

- Cane toad (*Rhinella marina*)
- Common myna (*Sturnus tristis*)
- European carp (*Cyprinus carpio*)
- European fox (*Vulpes vulpes*)
- Indian myna (*Acridotheres tristis*)
- Mosquitofish (*Gambusia holbrooki*)
- Mozambique Tilapia (*Oreochromis mossambicus*)
- Northern mallard (*Anas platyrhynchos*)
- Southern platyfish (*Xiphophorus maculatus*)
- Spotted dove (*Spilopelia chinensis*)
- Swordtail (*Xiphophorus helleri*).

Additionally, given the disturbed and fragmented nature of the Impact area, other introduced fauna species considered likely to occur include:

- Black rat (*Rattus rattus)*
- European brown hare *(Lepus europaeus)*
- Feral cats *(Felis catus)*
- Wild Pigs *(Sus scrofa)*
- Wild/domestic dog (*Canis lupus familiaris*).

9.0 Environmental objectives and controls

A range of measures have and will be implemented to avoid, minimise, mitigate, rehabilitate and remediate potential direct, indirect and facilitated impacts to all known or potentially occurring conservation significant species and communities. These measures will be specific to a particular phase and/or occur across multiple phases of the proposed action delivery. For each measure proposed, this report outlines:

- Objective and issue
- Control
- Timing
- Responsibility
- Outcome
- Performance Criteria
- Monitoring and Evaluation Program
- Contingency Measures.

The following controls (refer Table 8) describe the required measures to be implemented to reduce potential impacts from construction of the proposed action on MNES with the following objectives:

- Stay within permitted clearance areas
- Minimise the impacts of works on native vegetation within the Impact area
- Avoid the disturbance of remnant vegetation outside the Impact area during construction works
- Recognise and preserve the extent and integrity of EPBC listed fauna and flora species and their supporting habitat
- Manage weed incursion during construction.

Mitigation measures specific to relevant[4] conservation significant flora, fauna and communities are detailed in Table 9 below which provides a structured breakdown of species-specific mitigation for the Detailed Design and construction phases of the proposed action. The relevant conservation statutory documents have been consulted when developed these mitigation measures (refer Section 3.0).

[4] Based on conservation significant flora, fauna and communities with a potential risk as per risk assessment outlined in Section 7.0 of the Appendix B MNES Supplementary Report

9.1 General environmental controls

Table 8 General flora and fauna impacts and controls

Impact	Control type	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
Vegetation removal	**Avoidance/ minimise**	Throughout the proposed action's procurement phase, the Impact area has been further refined and reduced. As a result, footprint optimisations/reductions have occurred. The Impact area now encompasses 194.46 hectares (ha), compared to 293.95 ha originally assessed at the time of referral in 2022. While a high level of conservatism in mapping for threatened species habitat has already been undertaken, footprint refinement has resulted in an overall impact reduction for MNES species habitat. 'Major change areas' of reduction to MNES are shown in PD Report, Figure 1. In addition, the following design refinements have been implemented, resulting in footprint reductions and therefore reduction of impact to areas of ecological values for the proposed action: • Design refinement has occurred around Battle Park, which contains important Logan City Council offsets. Changes to the rail maintenance access roads (RMAR) as well as the horizontal clearances to fence lines has resulted in reduction of impacts to the Council vegetation. • A bridge crossing the rail corridor at Spann's Road and Church Road had previously contained spiral ramps, predominantly aimed at cycle users, which resulted in more land take and vegetation clearance. Following further design analysis, a modified option was provided that uses two separate ramps, one for cyclists and one for pedestrians, on the approaches to the bridge. This has resulted in less land take and vegetation removal, while providing for all users. • Along the rail corridor, batter slopes have been changed from a 1:4 (25%) to a steeper 1:2 (50%) slope. While this has been a departure from QR standards for the treatment of batter slopes, this will result in less land take and impacts to adjacent vegetation. • Retaining wall structures are now proposed adjacent to Edens Landing to further reduce vegetation clearing, loss of koala and grey-headed flying-fox habitat, maintain riparian fauna movement pathways, erosion and sedimentation to the Logan River, including a >15 m buffer between the construction boundary and the Logan River. Although retaining walls were incorporated into the Refined Reference Design – which enabled a considerable footprint reduction in comparison to the initial design - – throughout the Procurement Phase solutions were further verified to apply more traditional and cost-efficient rail earthworks option (i.e. cut-fill embankment) in this area. Importantly, this change has been able to maintain the footprint that the Retaining wall approach required, as such there is no change to the required footprint between retaining wall and traditional earthworks option in this area • As the proposed action progresses into the detailed design phase, future designing activities will continue to incorporate not only the civil engineering standards, Asset Owner requirements (i.e. Queensland Rail) but importantly as stated previously the design will also incorporate the below fauna-related guidelines: - TMR's Fauna Sensitive Transport Infrastructure Delivery manual 2024 - Department of Environment, Science & Innovation (DESI) Koala-sensitive Design Guideline 2022 - Retaining wall structures will be designed in accordance with Australian design standards and advice sought from a	Design and planning	Designer / Constructor	Reduced impact to MNES during planning and construction phases.	Final design provides reduction in footprint and direct/indirect impacts from reference design.	Design review process to verify reduced impact footprint.	Alternative design solutions to reduce impact where performance criteria not adequately met.

Impact	Control type	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
		qualified ecologist to determine suitable fauna movement infrastructure. • Temporary construction laydown areas have been re-evaluated to look at further opportunities to minimise vegetation clearing, and avoid mapped and ground truthed biodiversity corridors, and conservation significant flora, fauna and community habitat. Re-evaluation outcomes have included incorporating requirements for Contractors to locate laydowns in areas that do not require vegetation clearing as part of their future site planning; and maximising offsite pre-fabrication to avoid playdowns entirely. • A review of the Site Access Schedule (SAS) boundary has been undertaken, which represents both the temporary construction and permanent infrastructure areas planned to occur within in the impact area. Based on the latest design information, property resumptions, and targeted surveys, has resulted in further refinement of the original permanent and temporary areas being used. Vegetation clearing has been further reduced through avoidance and by utilising existing disturbed areas within the impact area.						
	Mitigation	• Extent of clearing to be limited to the Impact area. • Minimise the clearing footprint, including avoiding/minimising clearing to mapped and ground truthed biodiversity corridors, conservation significant flora, fauna and communities, watercourses and drainage features and native vegetation. • Co-locate and microsite temporary construction areas such as earthworks, carparks and laydown areas. • Vegetation clearing boundaries (and no-go areas for areas which may support hollow bearing trees, conservation significant fauna breeding, foraging and shelter habitat, microhabitat features and within proximity to watercourses and wetlands) are established with appropriate visual and/or physical demarcation. High visibility tape, barricade webbing or similar will be utilised. If fencing or flagging is in poor condition, it will be replaced to reduce the potential of accidental clearing.	All phases of design and construction.	Designer / Constructor	No unauthorised adverse impacts to vegetation and habitats resulting from clearing operations, except in approved areas.	No authorised adverse impact to MNES and no incidents involving MNES habitat clearing and/or degradation outside the approved project footprint. Disturbance boundary to be clearly delineated and demarcated. Buffer zones for MNES values applied to reduce indirect impacts.	Environmental Inspections. TMR/Contractor Assurance program. Weekly and monthly environmental reporting. Monitoring of actual clearing areas and locations.	Review EMP(C) to amend site procedures where breaches and non-conformances identified.
	Management	Vegetation Management Plan to be prepared, implemented and audited as part of the EMP(C). Primary objectives of the plan will be to outline: • Relevant roles and responsibilities of personnel implementing and auditing the plan. • Specific requirements for clearing vegetation around waterways and drainage features. • Show plans of areas to be cleared within the ultimately approved EPBC boundary and areas to be protected, ‘no-go zones’ and proposed rehabilitation areas. Vegetation clearing to not exceed the approved disturbance limit. • Outline pre-clearing protocols, including, establishment of exclusion zones and on-ground identification of vegetation to be retained. • Outline vegetation clearing protocols, including Pre-clearing fauna inspections, sequential/staged clearing requirements. • Exhaust opportunities to re-distribute habitat features alongside impact area in a way that does not cause safety / future maintenance issues (e.g. woody debris, tree hollows and boulders/rocks). • Design and construction solutions are to be explored to minimise any impacts to vegetation proposed for retention during construction in accordance with AS4970-2009 - Protection of trees on development sites and AS4373-2007 - Pruning of amenity trees.	Construction	Designer / Constructor	No unauthorised adverse impacts to vegetation and habitats resulting from clearing operations.	Full adherence to clearing procedures and MRTS16 Landscape and Revegetation. No unauthorised adverse impacts to vegetation and habitats resulting from clearing operations.	Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting. Monitoring of actual clearing areas and locations.	Review EMP(C) to amend site procedures where breaches and non-conformances identified.

Impact	Control type	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
		• Locate infrastructure and construction areas (that is, access, laydown areas, site offices, parking, fencing, stockpiles and storage) within cleared or disturbed areas, outside of exclusion zones and/or Tree Protection Zones (TPZ) of vegetation to be retained. • Where works are proposed within the TPZ of trees to be retained, a suitably qualified arborist in accordance with Australian Standard 4970 will assess tree health and identify mitigation measures to avoid impacts from construction activities.						
Loss of fauna movement and habitat fragmentation	**Avoidance/ minimise**	Permanent fauna connectivity structures to be incorporated in the design scope of the proposed action. These permanent connectivity structures aim to maintain or improve the current ecological connectivity for fauna across the proposed action's Impact area and existing rail line and rail corridor. Locations of proposed fauna passage provision, fauna friendly/fauna exclusion fencing, and fauna infrastructure are described in Appendix B. The final design of the fauna infrastructure is to be based on the known requirements for the target species (based on relevant statutory documents), the current alignment of the proposed action corridor and results of the habitat connectivity modelling. Most connectivity solutions are associated with bridge underpasses (e.g. log rail) and culverts and will be designed and constructed consistent with the *TMR Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024) and *Koala-sensitive Design Guideline (2022)*. In the case where the proposed wildlife movement solutions are culverts and underpasses, the wildlife movement solutions will: • Provide dry passage clear of batters/rock abutments/scour protection to ensure long term viability • Provide connectivity and shelter • Maintain natural streamflow • Without limiting safety of flooding issues, fauna furniture will be installed in culverts to allow refuge from predators for arboreal species. Provision has also been made for revegetation of the new rail corridor within the vicinity of Compton Road, Logan River, Edens Landing Station and Holmview Station to enhance habitat values and movement corridors which are currently sparsely vegetated. Design requirements (including these mitigation measures) will be documented in the Environmental Design Report (EDR), to be completed during the Detailed Design phase. Additionally, landscaping and revegetation of fauna passage surroundings will be in accordance with TMRs MRTS16 and guidance from the *TMR Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024) . The fauna movement corridors presented in Appendix A represent indicative locations and mitigation measures based on current assessment work (that is, desktop assessment, ecological surveys and connectivity modelling). Further assessment of these mitigation measures for targeted species will be undertaken during the Detailed Design phase. Locations of proposed fauna passage provision, fauna friendly/fauna exclusion fencing, and fauna infrastructure are described in Appendix B. Permanent Fauna Fencing: The TMR standard drawing SD1603 - Fencing - Koala Proof Fence and Gate as referenced within Chapter 6, section 13 Fauna Exclusion Fencing will be used as the rail corridor fencing base design where Koala / fauna exclusion fencing is proposed to be installed in Key Biodiversity Areas, as shown on	Design and planning	Designer / Constructor	Fauna movements not adversely impacted by the proposed action, especially for koala, greater glider and yellow-bellied glider.	Adherence to *TMR Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024) as well as implementation of mitigation measures to retain or improve connectivity (Appendix B). Adequate fauna exclusion fencing provided around the perimeter of developed areas and key biodiversity areas to prevent fauna entrapment. Adequate movement opportunity provided across built infrastructure, particularly at identified mapped and ground truthed biodiversity/fauna movement corridors. Fauna mitigation structures well-installed and maintained.	A project-specific Fauna Monitoring Program (FMP) (refer section 11.0). TMR/Contractor Assurance program.	Where the FMP identifies problems or non-conformances with performance criteria, adaptive management options (i.e. retrofit crossings and fencing, further monitoring, research and so on) will be pursued. Increased maintenance where required.

Impact	Control type	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
		Appendix A Figure 2. An appropriately qualified and experienced ecologist will also be required to consider: ○ The Department of Environment, Science & innovations (DESI) Koala-sensitive Design Guideline 2022 ○ National Recovery Plan for Grey-headed Flying-fox (DAWE, 2021) (specifically Recovery Objective 9) ○ TMR's Fauna Sensitive Transport Infrastructure Delivery manual 2024 during the detailed design phase to ensure fencing is fit-for-purpose. In the instance that adjustments are proposed from the baseline fence design, these adjustments will be reviewed by an appropriately qualified and experienced ecologist for suitability in relation to the relevant MNES species. Where adjustments present hazards to these species, additional mitigation measures will be applied to reduce the risk to relevant MNES species to as far as reasonably possible. Barbed-wire occurrences in Key Biodiversity Areas based on the Asset Owner's Security Risk requirements will apply the following Barded-wire Hierarchical treatment: ○ Remove hazard through avoidance of using barbed-wire wherever possible; ○ Replacement of the top strand barbed-wire with plane wire; ○ Enhance visibility through plastic strand-wrapping or addition of electrical fence tape of similar; ○ Affixing reflective / bat tags at suitable spacings. As a minimum requirement, fencing in all Key Biodiversity Areas will be fauna exclusion fencing and incorporate reflective discs / bat tags (generally in accordance Bat Conservation & Rescue QLD Inc guidance document Mitigating Barbed Wire Risk For Wildlife, 2021). Temporary fauna fencing: in effect, where temporary fencing is required it will replicate the SD1603 unless the SD1615 fencing design or other suitable alterative as informed by an appropriately suitably qualified and experienced ecologist can be applied. Wherever possible, permanent fencing will be installed.						
	Mitigation	Temporary construction areas will be rehabilitated as soon as practicable after the completion of construction works to reconnect fragmented habitats and reduce degradation risk.	Construction	Designer / Constructor	Fauna movement corridors rehabilitated as soon as practicable upon completion of works within those areas.	Adherence to proposed action's *MRTS16 Landscape and Revegetation Works* and guidance from the *TMR Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024).	Monthly environmental reporting. TMR/Contractor Assurance program.	Regular reviews of EMP(C) to ensure change management procedures and risks to vegetation, habitats and fauna movement from proposed site works or areas is carefully assessed.
		A qualified fauna spotter catcher[5] will be engaged prior to any vegetation clearing to ensure that legislative obligations with respect to protection of native fauna are met. The responsibilities of the fauna spotter catcher will ensure that: • Pre-clearance searches of habitat to be undertaken, with habitat features/trees clearly identified and searched for fauna presence. • Hollows to be inspected for south-eastern glossy black cockatoo, yellow-bellied glider and greater glider breeding places (as well as other native fauna) prior to clearing using work platforms, inspection cameras, or other suitable methods. • Clearing only occurs once a spotter/catcher gives sign off that vegetation has been inspected and is clear of native fauna identified as present on the site.	Pre-construction/ Construction	Designer / Constructor, Fauna spotter catcher	No adverse impacts to fauna, especially MNES koala, greater glider, yellow-bellied glider, south-eastern glossy black cockatoo, swift parrot, Latham's snipe and wetlands migratory birds resulting from clearing operations.	Full adherence to clearing procedures and no incidents resulting in adverse impact to fauna. Impacts to active breeding places in accordance with relevant permits e.g. Species Management Program under Queensland *Nature Conservation Act 1992.*	Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting. Monitoring of actual clearing areas and locations.	Review EMP(C) to amend site procedures where breaches and non-conformances identified.

[5] That is, a person holding a Rehabilitation Permit under Queensland's Department of Environment and Science.

Impact	Control type	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
		• Clearing commences in areas of least connectivity and directs fauna towards retained areas, in particular towards remnant vegetation with the Impact area. • Clearing is sequenced to ensure adequate time for fauna to relocate towards retained areas.						
		Wildlife friendly lighting will be considered throughout design. For example, light impacts are to be minimised through the use of sensor lighting and/ or directional lighting.	Pre-construction/ Construction	Designer / Constructor	No adverse impacts to fauna, especially nocturnal koala, greater glider, yellow-bellied glider and grey-headed flying fox.	Development of design informed by *TMR Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024). Fauna mitigation structures well-installed and maintained.	TMR/Contractor Assurance program. Fauna Monitoring Program (refer section 11.0). TMR/Contractor Assurance program.	Where the fauna monitoring program Identifies problems or non-conformances with performance criteria, adaptive management options (i.e. retrofit crossings and fencing, further monitoring, research and so on) will be pursued. Increased maintenance where required.
		If works extend outside of the Impact area, an investigation is to be undertaken in accordance with the relevant TMR / Project Incident Management Procedure.	Construction	Designer / Constructor	No unauthorised adverse impacts to vegetation and habitats.	No unauthorised impacts outside of impact areas.	Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting. Monitoring of actual clearing areas and locations.	Enact an Incident Management Procedure and implement corrective and preventative actions.
Injury and mortality of fauna	**Mitigation**	Traffic Management Plan for construction sites and access will outline the current and expected flow of vehicle movements and identify potential collision points for terrestrial fauna.	Pre-construction/ Construction	Designer / Constructor	Reduced fauna injury/mortality, especially for koala and MNES, in SAS boundary.	Design and location of fauna exclusion fencing will maximise its effectiveness in preventing access to the road/rail and construction areas and minimise impacts on native vegetation (i.e. locate fauna fencing as close to the road/rail infrastructure as possible). Fauna refuge structures (Appendix B) will be designed in consideration of fauna crossings and fauna fencing requirements.	Ongoing road/rail kill monitoring. Fauna Monitoring Program (refer section 11.0).	Additional measures installed where fauna Injury/mortality reported to have increased.
		Reduction of traffic movements and speed on arterial roads and on/off ramps during dawn and dusk periods, where animal activity is likely to be high.	Construction	Designer / Constructor	No adverse impact to fauna, particularly for koala and MNES, due to construction traffic.	Proposed action's road rules and Traffic Management Plan enforced and obeyed. All fauna injury due to construction traffic attended to promptly and treatment provided.	Devices installed within construction site to monitor adherence to site road rules (for example, Vehicle Monitoring System boards, speed limit signage). Environmental Inspections. Police monitoring.	Additional traffic control and combined measures (i.e. increased visibility) installed to provide safer crossings for fauna within construction site. Review EMP (C) to amend site procedures where breaches and non-

Impact	Control type	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
								conformances identified.
		Speed limits on site access roads with appropriate signage. It is recommended vehicles maintain designated speed limit for construction site access within the Impact area.	Construction	Designer / Constructor	No adverse impact to MNES fauna, particularly koala, due to traffic.	All fauna injury due to construction traffic attended to promptly and treatment provided.	TMR/Contractor Assurance program. Police monitoring.	Additional traffic control and combined measures (i.e. increased visibility) installed to provide safer crossings for fauna within construction site.
	Mitigation	A qualified fauna spotter catcher[6] will be engaged prior to any vegetation clearing. The responsibilities of the fauna spotter catcher will ensure that: • Pre-clearance searches of habitat to be undertaken, with habitat features/trees clearly identified and searched for fauna presence. • Hollows to be inspected for south-eastern glossy black cockatoo, yellow-bellied glider and greater glider breeding places prior to clearing using work platforms, inspection cameras, or other suitable methods. • Clearing only occurs once a spotter/catcher gives sign off that vegetation has been inspected and is clear of native fauna identified as present on the site. • Clearing commences in areas of least connectivity and directs fauna towards retained areas, in particular towards remnant vegetation with the Impact area. Clearing is sequenced to ensure adequate time for fauna to relocate towards retained areas.	Construction	Designer / Constructor, Fauna spotter catcher.	No adverse impacts to fauna, especially MNES koala, greater glider, yellow-bellied glider, south-eastern glossy black cockatoo, swift parrot, Latham's snipes and wetland migratory birds resulting from clearing operations.	Full adherence to clearing procedures and no incidents resulting in adverse impact to fauna. Impacts to active breeding places in accordance with relevant permits e.g. Species Management Program under Queensland *Nature Conservation Act 1992*.	Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting. Monitoring of actual clearing areas and locations.	Review EMP(C) to amend site procedures where breaches and non-conformances identified.
		Temporary exclusion fencing to be established around cleared areas in locations of known conservation significant fauna habitat to prevent wildlife from returning to work areas. Temporary fauna fencing: in effect, where temporary fencing is required, it will replicate the SD1603 (Transport and Main Roads, 2024) unless the SD1615 (Transport and Main Roads, 2021) fencing design or other suitable alterative as informed by an appropriately suitably qualified and experienced ecologist can be applied. Wherever possible, permanent fencing will be installed.	Pre-construction	Designer / Constructor	Fauna Access and/or interaction with construction areas or activities is avoided through effective exclusion devices.	Adherence to *TMR Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024) as well as implementation of fencing exclusion fencing (Appendix B). Fauna mitigation structures well-installed and maintained.	Fauna Monitoring Program (refer section 11.0). Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting.	Review EMP(C) to amend site procedures where breaches and non-conformances identified. Where the Fauna Monitoring Program identifies problems or non-conformances with performance criteria, adaptive management options (e.g. additional fencing) will be pursued. Review temporary fencing requirements and modify/install additional fencing as identified.
		Rehabilitation of temporary construction areas to be undertaken sequentially and as soon as practicable after clearing. If they cannot be rehabilitated, temporary fencing is to be erected to avoid fauna injury/mortality.	Construction	Designer / Constructor	Avoid construction impacts on MNES fauna survival.	Adherence to MRTS16 Landscape and Revegetation, *TMR Fauna Sensitive Transport Infrastructure Delivery manual* (Department of	Fauna Monitoring Program (refer section 11.0).	Review EMP(C) to amend site procedures where breaches and non-

[6] That is, a person holding a Rehabilitation Permit under Queensland's Department of Environment and Science.

Impact	Control type	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
						Transport and Main Roads, 2024) as well as implementation of fauna exclusion fencing (Appendix B). Fauna mitigation structures well-installed and maintained.	Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting.	conformances identified. Where the Fauna Monitoring Program identifies problems or non-conformances with performance criteria, adaptive management options (i.e. additional fencing) will be pursued. Fauna mitigation structures well-installed and maintained.
		Install fauna awareness signage in locations along access tracks where native fauna are likely to cross.	Operation	Designer / Constructor	Adverse impacts reduced from operation affecting MNES fauna survival.	Adherence to *TMR Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024) as well as implementation of mitigation measures to retain or improve connectivity (Appendix B). Fauna mitigation structures well-installed and maintained.	Fauna Monitoring Program (refer section 11.0). TMR/Contractor Assurance program.	Review EMP(C) to amend site procedures where breaches and non-conformances identified. Where the Fauna Monitoring Program identifies problems or non-conformances with performance criteria, adaptive management options (i.e. additional fencing) will be pursued. Review temporary fencing requirements and modify/install additional fencing as identified.
		Wherever possible, use existing access and disturbed areas when crossing waterways.	Construction	Designer / Constructor	No unauthorised adverse impact to aquatic MNES species during construction.	No major entrapment and kills reported for aquatic species during construction. Water quality requirements required by relevant jurisdictional legislation / guidelines met. Fish salvage and translocation undertaken successfully during the works.	Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting.	Review EMP(C) measures and working method statements and modify as required.
Introduction, spread of introduced flora and fauna (weeds and pests) and pathogens	**Mitigation**	Biosecurity management measures to be managed for conservation significant species and communities and in accordance with General Biosecurity Obligation (GBO) Queensland *Biosecurity Act 2014* and EMP(C). This will include: • Weeds, pest and pathogen monitoring and management measures and control • Inspections/monitoring.	Pre-construction	Designer / Constructor	No unauthorised adverse impact to MNES species brought about by biosecurity hazards due to the works.	Full adherence to environmental management plans to manage weed, pests and disease.	Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting.	Review EMP(C) and environmental management plans to amend site procedures where breaches and non-conformances are identified.

Impact	Control type	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
							Monitoring of actual clearing areas and locations.	
		Undertake a pre-clearance weed survey with subsequent report outlining requirements for treatment and management, which are to be implemented and reported on in accordance with the proposed action's EMP(C).	Construction	Designer / Constructor	No unauthorised adverse impact to MNES species brought about by biosecurity hazards due to the works.	Full adherence to environmental management plans and EMP(C) to manage weed, pests and disease.	Pre-clearance weed survey. Environmental Inspections. TMR/Contractor Assurance program. Monthly environmental reporting. Monitoring of actual clearing areas and locations.	Review EMP(C) and environmental management plans to amend site procedures where breaches and non-conformances are identified.
		Only move contaminated or weed/pathogen infested soils in accordance with MRTS51 Environmental Management D&C Contractor to comply with all biosecurity matters applicable to site and associated movement controls. Obligations required to be met include: • *Contaminated Land Act 1991* • *Biosecurity Act 2014* • *Environmental Protection Act 1994.*	During all phases of construction.	Designer / Constructor	No unauthorised adverse impact to MNES species brought about by biosecurity hazards due to the works.	Full adherence to GBO, dispersal permits environmental management plans and EMP(C).	TMR/Contractor Assurance program. Monthly environmental reporting.	Review EMP(C) and environmental management plans to amend site procedures where breaches and non-conformances are identified.
		Vegetation waste from clearing and grubbing that is free from weeds, pest and pathogens will be used in conjunction with soil erosion and sediment control measures including brush matting, mulch or fauna logs (Clause 7.2.5 of MRTS04).	During all phases of construction.	Designer / Constructor	No unauthorised adverse impact to MNES species brought about by biosecurity hazards due to the works.	Full adherence to GBO environmental management plans and EMP(C).	Monitoring and evaluation of environmental management processes implementation is in compliance with MRTS51 Environmental Management, MRTS04 General Earthworks.	Review EMP(C) and environmental management plans to amend site procedures where breaches and non-conformances are identified.

9.2 Species-specific controls

Mitigation measures specific to relevant[7] conservation significant flora, fauna and communities are detailed in Table 9 below. These measures have been prescribed through consultation of relevant statutory documents including relevant conservation advice, recovery plans, threat abatement plans, and other guidance documents specific to these species and communities.

Table 9 Specific mitigation measures to manage potential impacts to conservation significant flora, fauna and communities

MNES	Controls	Performance Criteria	Location	Timing	Responsible party
	Conservation significant flora and communities				
Subtropical floodplain eucalypt TEC	<u>Detailed design phase:</u> • Exhaust all opportunities to avoid and minimise the clearing footprint of TEC. • Construction footprints will be strictly limited to the smallest required in order to facilitate bridge construction at the Scrubby creek location. As such, all other temporary disturbances such as siting of laydown areas, site offices and access tracks are prohibited from within the TEC area. <u>Construction phase:</u> • Site-inductions and toolbox talks to convey specific information to construction personnel and raise awareness/identification of the TEC, as well as protocols relating to the protection of the TEC. • Pre-clearance searches within TEC to be undertaken by a suitably qualified fauna spotter catcher, with habitat features identified and searched for fauna presence. • Habitat features such as mature trees or stags with hollows adjacent to the Impact area will be retained. • Clearly delineate a 50 m buffer zone from the boundary of clearing (that is direct impact area) as per the Approved Conservation Advice (Department of Climate Change Energy the Environment and Water, 2022) with high visibility flagging to minimise indirect impacts and ensure vegetation removal is not undertaken outside Impact area. • Indirect impacts will be managed through dust, water quality, erosion and sediment controls, with their performance validated through monitoring and observations. • Monitoring will occur within the buffer zone at Gould Adams Park/Nealdon Park, to assess quality and species composition, and monitor if erosion and sediment control and dust suppression is compliant with standards and/or commensurate with pre-construction ambient conditions. Monitoring will include: - **Pre-construction**: A BioCondition survey will be undertaken by a suitably qualified ecologist prior to construction commencing, and include baseline (pre-construction) dust, erosion and sediment monitoring. - **During-construction**: Ongoing dust deposition monitoring will occur as well as rainfall event-triggered water quality monitoring and review of performance of erosion and sediment controls. - **Post-construction:** Where dust, water quality, erosion and sediment controls are compliant with standards and/or commensurate with pre-construction ambient conditions, and no signs of TEC degradation are evident, ongoing monitoring (if required) will be determined by a suitably qualified ecologist. • Dust will be controlled throughout the construction phase within direct TEC areas and buffer zones through dust suppression (e.g. soil binders, watercarts), speed restrictions, appropriate erosion and sediment measures, and progressive stabilisation / revegetation of temporary disturbance areas. • Core patches and/or habitat patches to be maintained (i.e. clear edges rather than dissect patches) to avoid fragmentation and weed, pest and pathogen incursion. • Put in place effective sediment and erosion control methods prior to / during vegetation clearing and civil works to control runoff and prevent movement of weeds and pathogens entering waterways and into adjoining ecological communities outside of the Impact area. • Potential acid sulfate soils (PASS) may be present in the Impact area. As such, acid sulfate soil testing, monitoring and management will occur across the entire Impact area. See Section 9.4 and Table 11 for additional information. • PASS encountered during construction will be managed in accordance with relevant Federal and State guidelines, including *Queensland Acid Sulfate Soil Technical Manual (Department of Resources and Department of Environment, Science and Innovation 2024), National Acid Sulfate Soils Guidance (Department of Agriculture and Water Resources, 2018)* and *Best*	Final design provides a reduced footprint from the reference design. No unauthorised clearing of TEC. Topsoil records show topsoil containing WONS or declared pests was treated or appropriately disposed. No new Phytophthora dieback infestations identified in the buffer zone or TEC adjacent to the impact area, attributable to the proposed action. No fires in the buffer zone or TEC adjacent to the impact area, attributable to the proposed action. Full adherence to the ESCP within the EMP(C). Rehabilitation to include species that meet Regional Ecosystem indicator species relevant to the TEC. Full adherence to environmental management plans and EMP(C) including early eradication of new weed incursions.	Within known locations as per Appendix B Supplementary MNES Report, Appendix B Figure 14.	Prior, during and after vegetation clearing.	Designer / Constructor.

[7] Based on the conservation significant flora, fauna and communities potentially impacted by the proposed action.

MNES	Controls	Performance Criteria	Location	Timing	Responsible party
	Practice Erosion and Sediment Control Guidelines (International Erosion Control Association (IECA), 2019) so that there is no impact on the TEC. Based on this, the risk of PASS impacting the TEC is considered low. • Weed and seed certificates and regular weed hygiene inspections to be undertaken for all machinery entering the Project area to prevent introduction of new weed infestations within TEC. Machinery will be suitably cleaned prior to working within the TEC area to avoid introduction of any new weed species. • Strict control of ignition sources to minimise the risk of accidental fires (Department of Climate Change Energy the Environment and Water, 2022). • Rehabilitation of disturbed habitat to be undertaken in suitable locations (i.e. outside railway corridor) using native species in accordance with the proposed action's MRTS16 Landscape and Revegetation. • Rehabilitation will be considered against the landscape and maintenance requirements of the future asset owner. • Rehabilitation of temporarily disturbed habitat using species that meet the Regional Ecosystem indicator relevant to the TEC.				
Angle-stemmed myrtle	<u>Construction phase:</u> • No clearing of angle-stemmed myrtle habitat will occur. Vegetation clearing will be restricted to the Impact area. • Establish exclusion zone fencing to exclude pedestrian and machinery access as far as possible from the angle-stemmed myrtle – exclusion zone to include the full extent of the tree protection zone, but no less than 10 m from the individual. • The Design & Construction (D&C) Contractor must engage a suitably qualified and experienced ecologist to undertake a pre-construction survey within 100 m of individual plant location to inspect for Myrtle Rust (high risk of disease-induced death to species). • Should Myrtle rust be positively identified, and it is assessed as having a high-risk of spread to the region immediately surrounding the individual, a biosecurity hygiene program is to be established. • Rehabilitation of disturbed habitat to be undertaken in suitable locations (i.e. outside railway corridor) using native species in accordance with the proposed action's MRTS16 Landscape and Revegetation. • Rehabilitation will be considered against the landscape and maintenance requirements of the future asset owner.	Final design provides a reduced footprint from the reference design. No unauthorised clearing of habitat within the exclusion zone. No new WONS or myrtle rust infestations identified within the exclusion zone. Full adherence to environmental management plans and EMP(C) including early eradication of new weed incursions. Topsoil records show topsoil containing WONS or declared pests was treated or appropriately disposed. Pre-clearance surveys to confirm the presence of seedling recruitment.	Within known locations as per Appendix B Supplementary MNES Report, Appendix B Figure 17.	Prior, during and after vegetation clearing.	Designer / Constructor.
	Fauna				
Hollow dependent fauna – south-eastern glossy black cockatoo, greater glider and yellow-bellied glider	<u>Detailed design phase:</u> • Exhaust all opportunities for design refinement to avoid areas where species-specific hollows occur. • Design to embody pre-construction management measures (i.e. fauna movement infrastructure opportunities) outlined in Section 6.2 of the Appendix B, MNES Supplementary Report. <u>Construction phase:</u> • Site inductions and pre-start meetings to convey specific information to construction personnel and raise awareness/identification of species on site, as well as protocols relating to the protection of species and their habitat. For example, habitat tree inspection and management requirements; contact lists of nearby veterinary centres/wildlife hospitals and procedures for sick or injured fauna requiring rescue to be provided at induction. • Fauna spotter catcher will provide targeted advice in relation to additional controls throughout known fauna breeding periods where clearing works cannot be scheduled to avoid these times. • Qualified and experienced fauna spotter catchers to undertake pre-clearance surveys in suitable habitat prior to planned vegetation clearance.	Final design provides a reduced footprint from the reference design. No unauthorised clearing of hollow dependent fauna habitat. No records of hollow dependent fauna impacted by project works. Surveys of hollow-bearing trees carried out within 1-2 weeks prior to clearing events.	Within potential habitat, as per Appendix B Supplementary MNES Report, Appendix B Figure 15, Figure 18 and Figure 20.	Prior, during and after vegetation clearing.	Designer / Constructor, Fauna spotter catcher.

MNES	Controls	Performance Criteria	Location	Timing	Responsible party
	• The pre-clearance survey will be undertaken in advance of clearing activities (e.g. 1-2 weeks) to identify MNES occupation and breeding places to allow for any associated permits and programming to ensure that hollow-bearing trees / habitat features containing MNES fauna and/or breeding places are managed suitably. Where necessary, additional pre-clearing inspections will occur immediately in advance of clearing activities to re-check for presence. • Pre-clearance surveys will: - Survey and assess areas of potential habitat for conservation significant fauna - Identify mark and map potential and known foraging and breeding places for to direct fauna spotter catchers to appropriate manage during clearing - Identify opportunities for salvage of relevant microhabitat (such as tree hollows) features prior to clearing - Where hollows / habitat features have been identified, best attempts will be made to salvage and preserve these (acknowledging age / decay / structural damage may constrain this). Salvaged features will be reinstalled or placed within / alongside the impact area where safety and access allow. Adjoining areas – including Acacia Forest Park based on acceptance by landholder – may be used to re-site habitat features. - Felled timber from the clearing process will be reviewed for suitability in terms of carved hollows – either at the Impact area (greater glider (southern and central), yellow-bellied glider and glossy black-cockatoo (south-eastern), or at the offset property for south-eastern glossy black cockatoo. - All hollow-bearing trees will be inspected by a suitably qualified fauna spotter catcher prior to clearing to identify any denning or nesting individuals. - Encourage fauna to leave hollows of their own accord through tree tapping and other measures. - MNES species will be removed from active denning/nesting trees within the clearance footprint immediately prior to clearing and translocated to suitable habitat adjacent to the Impact area. Gliders are to be released 2 hours after sunset into trees that contain suitable hollows. - Where species need to be physically removed from hollows, trees will be dismantled (in sections if necessary) under the direction of trained and experienced fauna spotter catchers. - Trees will be felled immediately after removing wildlife to prevent animals from returning to hollows. - Fauna spotter catcher to undertake a ground inspection once the hollow bearing tree has been felled to identify presence of young or injured fauna. • Rehabilitation of disturbed habitat to be undertaken in suitable locations (i.e. outside railway corridor) using native species in accordance with the proposed action's MRTS16 Landscape and Revegetation, Rehabilitation will be considered against the landscape and maintenance requirements of the future asset owner. • For the yellow-bellied glider and greater glider, barbed wire occurrences in Key Biodiversity Areas based on the Asset Owner's Security Risk requirements, will apply the following hierarchy: o Remove hazard through avoidance of using barbed-wire wherever possible o Replacement of the top strand barbed-wire with plane wire (as per greater glider Conservation Advice) o Enhance visibility through plastic strand-wrapping or addition of electrical fence tape of similar o Affixing reflective / bat tags at suitable spacings o As a minimum requirement, fencing in all Key Biodiversity Areas will be fauna exclusion fencing and incorporate reflective discs / bat tags (generally in accordance Bat Conservation & Rescue QLD Inc guidance document Mitigating Barbed Wire Risk For Wildlife) [controls in this document will have suitability for gliders as well as bats in regards to barb-wire fencing]. • Installation of electrostatic wildlife guards on Overhead Line Equipment (OHLE) to minimise electrocution (Plate 1) (TMR, 2014; Queensland Rail, 2016) . • Dust will be controlled throughout the construction phase within direct and indirect impact areas through dust suppression (e.g. soil binders, watercarts), speed restrictions, appropriate erosion and sediment measures, and progressive stabilisation / revegetation of temporary disturbance areas. • Appropriate weed, pathogen and disease hygiene practices and management to be implemented for the species as per the OEMP (this report).	Full adherence to environmental management plans and EMP(C) including eradication of feral cats in Key Biodiversity Areas. A list of contact details of local wildlife rescue organisations and carers maintained on site at all times. No fires in MNES species habitat. MNES habitat species endemic to the region included in species lists in landscape and revegetation plan.			

MNES	Controls	Performance Criteria	Location	Timing	Responsible party
	• Domestic dogs are to be prohibited on the construction site at all times.				
Grey-headed flying-fox	**Detailed Design phase:** • Exhaust all opportunities for design refinement to avoid, or otherwise minimise impacts where camps occur. • Eliminate the use of barbed wire fencing in areas of known breeding/roosting habitat (Appendix B, MNES Supplementary Report, Figure 19) in accordance with the Fauna Sensitive Transport Infrastructure Delivery manual (Department of Transport and Main Roads, 2024). • Design to apply the considerations within the National Recovery Plan for Grey-headed Flying-fox (DAWE, 2021) (specifically Recovery Objective 9) to account for Flying-fox friendly design principles including removal of barbed/razor wire. • For the Grey-headed flying-fox as per conservation advice, barbed wire occurrences in Key Biodiversity Areas based on the Asset Owner's Security Risk requirements, will apply the following hierarchy: - Remove hazard through avoidance of using barbed-wire wherever possible; - Replacement of the top strand barbed-wire with plane wire; - Enhance visibility through plastic strand-wrapping or addition of electrical fence tape of similar; - Affixing reflective / bat tags at suitable spacings. • As a minimum requirement, fencing in all Key Biodiversity Areas will be fauna exclusion fencing and incorporate reflective discs / bat tags (generally in accordance Bat Conservation & Rescue QLD Inc guidance document Mitigating Barbed Wire Risk For Wildlife). • Roost Activity Observations (i.e. monitoring) to be undertaken in advance of activity commencing to visually verify grey-headed flying-fox presence and estimated roost abundance at the previously identified roost locations, being: - Voyager Drive, Kuraby - Jacaranda Avenue, Kingston; and, - Ridgewood Reserve, Edens Landing. **Construction phase:** • Site inductions and pre-start meetings to convey specific information to construction personnel and raise awareness/identification of species on site, as well as and protocols relating to the protection of species and their habitat. For example, habitat tree inspection and management requirements; contact lists of nearby veterinary centres/wildlife hospitals and procedures for sick or injured fauna requiring rescue to be provided at induction. • EMP (C) to outline roost information and align with OEMP requirements, including relevant management procedures and site procedures (e.g. clearing procedure). • Areas where grey-headed flying-fox roosts occur within the Impact area or within a 300 m buffer zone, light management controls and compliance monitoring will be undertaken, for the period between dusk and dawn, in accordance with the "Bat light mitigation toolbox" section outlined in the *DCCEEW National Light Pollution Guidelines for Wildlife, Appendix I – Bats.* (Department of Climate Change Energy the Environment and Water, 2023) • Noise and vibration indirect impacts are considered low given the existing urban environment – specifically alongside a functioning rail corridor - and it is likely camps have developed a tolerance to the existing noise, light and human activity disturbances. Nonetheless, noise and vibration controls will be implemented across the entire Impact area in accordance with the following guidelines: - Queensland Environmental Protection (Noise) Policy 2019, Schedule 1 - Acoustic quality objectives; - TMR's Volume 2 - Transport Noise Management Code of Practice, and, - TMR's MRTS51 *Environmental Management Technical Specification,* Section 8.5 - TMR's *Interim Guideline Operational Railway Noise and Vibration, Section 2, Section 3 and Section 4.* • Dust controls will be implemented within entire Impact area and during construction phase through various control measures including dust suppression (e.g. soil binders, watercarts), speed restrictions, appropriate erosion and sediment measures, and progressive stabilisation / revegetation of temporary disturbance areas. • Prior to vegetation clearing within the Impact area, disturbance boundary to be clearly delineated and demarcated with high-visibility flagging tape. • Vegetation clearing across entire Impact area to be supervised by a suitably qualified fauna spotter catcher with knowledge and experience relevant to management of flying-foxes and their	Final design provides a reduced footprint from the reference design. No unauthorised clearing of grey-headed flying-fox habitat. Grey-headed flying-fox habitat species endemic to the region included in species lists in landscape and revegetation plan. No records of GHFF impacted by project Works.	Within known and potential habitat, as per Appendix B Supplementary MNES Report, Appendix B Figure 19.	Prior, during and after vegetation clearing.	Designer / Constructor, Fauna spotter catcher.

MNES	Controls	Performance Criteria	Location	Timing	Responsible party
	habitat, who can identify dependent young and is aware of climatic extremes (i.e. heat stress or cyclone event) and food stress events. • For any clearing activities, a fauna spotter catcher will undertake a pre-clearing fauna inspection which will check for presence of new camps as well as verify the presence / abundance at known/previously identified camps. • Prior to works commencing within 300 m buffer zone from camps, the fauna spotter catcher will assess the presence of any grey-headed flying-foxes, including checking for breeding activity (pregnant females, crèched young and/or dependent young). Based on this assessment, the fauna spotter catcher will advise whether vegetation clearing can commence. • If a new flying-fox camp is found within 300 m of the proposed Impact area (other than at Voyager Drive, Kuraby, Jacaranda Avenue, Kingston and Ridgewood Reserve), the suitably qualified fauna spotter catcher will review the proposed construction activities, including timing and appropriate management measures in accordance with the *Referral guideline for management actions in grey-headed and spectacled flying fox camps* (Department of the Environment, 2015). • Other than under exceptional circumstances[8], vegetation clearing activities within 300 m buffer zone surrounding known grey-headed flying-fox camps (i.e. Voyager Drive, Kuraby, Jacaranda Avenue, Kingston and Ridgewood Reserve, Edens Landing): - To occur in low-risk times (i.e. outside of August – November breeding / crèche periods). Works required under exceptional circumstances will be guided by a fauna spotter catcher. - Should be prioritised at night, as this is when individuals are less likely to be present. - Will not occur during or immediately after climatic extremes (heat stress[9] or cyclone events[10]), or during or immediately after a period of significant food stress[11]. - Will be sequentially staged to commence at maximum distance away from the camp, and then proceed towards camp to enable the individuals to become accustomed to the activities and to allow them to self-disperse / retract into adjoining vegetation. - The flying fox heat stress forecaster (Animal Ecology Lab, 2024) and Bureau of Meteorology weather forecast will be reviewed within 24 hours when vegetation clearing is proposed within 300 m of a camp. Where forecasts indicate daily ambient temperatures ≥ 38º C AND clearing proposed within 300 m buffer zone from camp, fauna spotter catcher to complete hourly temperature check and assess if camps contain notable signs of stress (such as excessive fanning or flyouts). Vegetation clearing works to immediately cease if temperatures exceed 38º C within 300 m of camp, or notable signs of stress are observed within camps. • Other than under exceptional circumstances, high impact activities[12] within 100 m of camps: - To occur in low-risk times (i.e. outside of August – November breeding / crèche periods), Works required under exceptional circumstances will be guided by a fauna spotter catcher. - Should be to be prioritised at night, as this is when individuals are less likely to be present. - Will not occur during or immediately after climatic extremes (heat stress or cyclone events), or during or immediately after a period of significant food stress. - Will be staged to commence at maximum distance away from the camp, and then proceed towards camp to enable the individuals to become accustomed to the activities and to allow them to self-disperse / retract into adjoining vegetation. - The flying fox heat stress forecaster (Animal Ecology Lab, 2024)and Bureau of Meteorology weather forecast will be reviewed within 24 hours when high impact activities proposed within 100m of a camp. Where forecasts indicate daily ambient temperatures > 38º C AND high impact activities proposed within 100 m buffer zone from camp, fauna spotter catcher to complete hourly temperature check and assess if camps contain notable signs of stress (such as excessive fanning or flyouts). High impact works to immediately cease if temperatures exceed 38º C within 100m of camp, or notable signs of stress are observed within camps.				

[8] Exceptional circumstances may include, but are not limited to, preparation for severe/inclement weather; maintaining public safety; and responding to emergencies or incidents.
[9] A 'heat stress event' is defined as a day on which the maximum temperature does (or is predicted to) meet or exceed 38°C (Department of the Environment, 2015).
[10] A cyclone event is defined as a cyclone that is identified by the Australian Bureau of Meteorology (www.bom.gov.au/cyclone/ index.shtml) (Department of the Environment, 2015).
[11] Food stress events may be apparent if large numbers of low body weight animals are being reported by wildlife carers in the region (Department of the Environment, 2015).
[12] Impact pile driving, impact guard rail installation or removal, saw cutting, rock / concrete breaking (hammering), rock removal or placement

MNES	Controls	Performance Criteria	Location	Timing	Responsible party
	• Vegetation outside Impact area and adjacent to camps will be retained to maintain vegetation integrity allowing individuals to naturally move/retract to cooler areas reducing heat-related stress/mortality and support the persistence of the camp. • Only a qualified and suitable fauna spotter catcher or wildlife carer with up-to-date Lyssavirus vaccines are to handle bats. Personnel must not attempt to touch or handle a flying fox. If interaction with a flying-fox is required, a Fauna Spotter Catcher must be contacted. This information will also be conveyed to all construction personnel during site inductions. Fauna handling will be in accordance with: - 'Code of Practice: Care of Sick, Injured or Orphaned Protected - Animals in Queensland, Nature Conservation Act 1992', - Relevant approvals, licences, permits. • Any injured fauna are to be taken to: 139 Wacol Station Road, WACOL QLD 4076, 1300 ANIMAL (1300-264-625). • Installation of electrostatic wildlife guards on Overhead Line Equipment (OHLE) to minimise electrocution (Plate 1) (Transport and Main Roads, 2024; Queensland Rail, 2016) • Domestic dogs are to be prohibited on the construction site at all times. • Rehabilitation of disturbed habitat to be undertaken in suitable locations (i.e. outside railway corridor) using native species in accordance with the proposed action's MRTS16 Landscape and Revegetation, Rehabilitation will be considered against the landscape and maintenance requirements of the future asset owner.				
Koala	<u>Detailed design phase:</u> • Design to embody pre-construction management measures (i.e. fauna movement infrastructure opportunities) outlined in Section 6.2 of the Appendix B, Supplementary MNES Report. <u>Construction phase:</u> • Site inductions and pre-start meetings to convey specific information to construction personnel and raise awareness/identification of species on site, as well as and protocols relating to the protection of species and their habitat. For example, Pre-clearing inspection and management requirements; contact lists nearby of veterinary centres/wildlife hospitals and procedures for sick or injured fauna requiring rescue to be provided at induction. • During the construction phase, impacts due to increased human presence and domestic dog attacks will be mitigated by installing temporary koala exclusion fencing around the perimeter of Key Biodiversity Areas. Where applicable, permanent fencing will be installed as a priority including the provision of fauna crossing structures to limit human and dog interactions. • Install refuge poles along easements to facilitate rapid escape into treed habitat areas. • Domestic dogs are to be prohibited on the construction site at all times. • Works near high-risk koala habitat areas should be avoided during early morning, dusk and night (i.e. prior to 6am and after 6pm), which are high koala activity periods. Where works cannot be avoided (i.e. based on corridor access / safety constraints) during early morning, dusk and night temporary koala exclusion fencing will be erected to avoid koalas entering the Impact area. Additionally, pre-start meetings will convey information to construction personnel noting works are being undertaken in a high-risk koala habitat area which requires increased vigilance. Pre-start meeting will relay procedures in the event a koala is identified within the Impact area. • Where early morning, dusk or night works are required, lights will be directed away from fauna sensitive habitat to minimise light spill into adjacent habitats. • To reduce noise and vibration all construction vehicles to comply with maintenance schedules and operational restrictions designed to limit noise impact during construction. Vehicles and machinery to be switched off when not in use. • During the clearing phase prior to vegetation clearing, trees (or areas) with koalas present are clearly flagged (e.g. individual tree marked with a specific colour; signage / flagging tape for larger areas containing many trees), and an exclusion zone set in place, and all personnel notified of location. • In the event a koala is identified within proposed construction areas, works are to stop within 50 m of the koala or where the canopy of any other tree overlaps (whichever is greater). • Works should not resume until the koala(s) leave the area on its own accord. • To avoid potentially blocking the movement of koalas, temporary laydown areas for equipment/infrastructure (i.e. culverts, rail track and machinery) must be located within cleared areas as to not impede koala movement into suitable habitat outside of the Impact area. • Install signs on the tracks and go-slow points where koalas are known to occur and enforce speed limits.	Final design provides a reduced footprint from the reference design. No unauthorised clearing of koala habitat. No records of koala impacted by project works. Koala habitat species endemic to the region included in species lists in landscape and revegetation plan. Design of temporary koala exclusion fencing will maximise its effectiveness in preventing access to the rail corridor and minimise impacts on native vegetation (i.e. locate fauna fencing as close to the rail infrastructure as possible).	Within known and potential habitat, as per Appendix B Supplementary MNES Report, Appendix B Figure 16.	Prior to vegetation clearing and during vegetation clearing.	Designer / Constructor, Fauna spotter catcher.

MNES	Controls	Performance Criteria	Location	Timing	Responsible party
	• Temporary koala exclusion fencing shall be installed around the perimeter of known key fauna biodiversity areas to minimise the emigration of koalas from the site into the clearing works. Key fauna biodiversity areas are summarised in Section 8.0 and displayed in Appendix A • Figure 2 of the OEMP (this report). • Where temporary fencing is required, it will replicate the TMR Standard Drawing SD1603 (Transport and Main Roads, 2024), unless TMR Standard Drawing SD1615 fencing design (Transport and Main Roads, 2021) or other suitable alterative as informed by an appropriately qualified and experienced ecologist can be applied. • Temporary koala exclusion fencing will be inspected weekly to ensure fencing is in good condition and maintained so there are no points of egress for koalas into the construction site. If fencing is in poor condition, it should be rectified as soon as possible to reduce the potential of koala emigration into developed areas. • Notwithstanding that trenches/excavations/pits will be located within temporary koala exclusion fencing areas, prior to works commencing trenches/excavations/pits will be visually checked for koala entrapment/injury. Where trenches/excavations/pits are required to remain open for extended periods unsupervised (e.g. over weekends, holiday-shutdowns, extended poor weather) suitable exclusion zones (e.g. barriers, fencing, covers, or similar will be applied to avoid fauna entrapment / injury. • In the instance a koala (or other fauna) is observed within trenches/excavations/pits a suitably qualified fauna spotter catcher will be engaged to respond to the situation. • In the event a sick or injured koala is found within or adjacent to the Impact area, an appropriately qualified koala spotter catcher[13] is to be contacted for observation and potential medical intervention. • The release of koalas to the wild must be conducted in accordance with the relevant provisions outlined in Queensland Nature Conservation (Koala) Conservation Plan 2017 (Koala Plan). • Clearing of koala habitat trees is to comply with the sequential clearing requirements prescribed in Part 3, Section 10 of the Koala Plan. These include: - Clearing of koala habitat trees carried out in a way that ensures koalas within the clearing site have enough time to move out without human intervention, including in particularly clearing sites with an area of more than 3 ha, specifically in the following locations: ▪ Karawatha/Acacia Forest Park (20.10 ha) ▪ Kuraby (Spring Creek) (11.90 ha). - Clearing of koala habitat trees in the aforementioned areas must be cleared in accordance with the Koala Plan (Queensland Government, 2023) including: ▪ Carrying out the clearing in stages; and ▪ Ensuring not more than the following is cleared in any one stage either a) For a clearing site with an area of 6 ha or less- 50% of the site's area or b) For a clearing site with an area of more than 6 ha-3 ha or 3% of the site's area, whichever is greater; and ▪ Ensuring that between each stage and the next there is at least one period of 12 hours starting at 6pm on a day and ending at 6 am on the following day and during this time no trees are cleared on the site. ▪ Clearing of the koala habitat trees are carried out in a way that ensures, while the clearing is being carried out, that 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. ▪ 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 until such time the koala has dispersed to a safe area at its own accord, as deemed by a suitably qualified koala fauna spotter catcher. ▪ Clearing of koala habitat trees within mapped koala habitat areas to be undertaken in the presence of a koala spotter. The koala spotter's primary role is to locate koalas in the trees to be removed. The koala spotter must have qualifications and experience or demonstrated skills and knowledge in: - Locating koalas in koala habitats - Conducting arboreal fauna surveys.				

[13] As per the *Nature Conservation (koala) Conservation Plan 2017* a suitably qualified koala spotter catcher means a person who has qualifications and experience or demonstrated skills and knowledge in locating koalas or koala habitats or conducting arboreal fauna surveys.

MNES	Controls	Performance Criteria	Location	Timing	Responsible party
	• Retrofit existing culverts and underpass at appropriate locations to include fauna ledges to aid koala movement. • Install speed reduction signs, road signage and road pavement stencils to reduce speed limits, alert drivers to speed and allow detection of koalas during construction. • Rehabilitation of disturbed habitat to be undertaken in suitable locations (i.e. outside railway corridor) using native species in accordance with the proposed actions MRTS16 Landscape and Revegetation. • Rehabilitation will be considered against the landscape and maintenance requirements of the future asset owner.				
Swift parrot and regent honeyeater	Construction phase: • Site inductions and pre-start meetings to convey specific information to construction personnel and raise awareness/identification of species on site, as well as and protocols relating to the protection of species and their habitat. For example, a contact list of nearby veterinary centres/wildlife hospitals and procedures for sick or injured fauna requiring rescue to be provided at induction. • Prior to construction works commencing, the fauna spotter catcher will confirm the presence of any individuals that may be disturbed by the activity. • Rehabilitation of disturbed habitat to be undertaken in suitable locations (i.e. outside railway corridor) using native species in accordance with the proposed action's MRTS16 Landscape and Revegetation. • Rehabilitation will be considered against the landscape and maintenance requirements of the future asset owner. • Domestic dogs are prohibited on the construction site at all times.	Final design provides a reduced footprint from the reference design No unauthorised clearing of swift parrot or regent honeyeater habitat Swift parrot and regent honeyeater species endemic to the region included in species lists in landscape and revegetation plan.	Within known and potential habitat, as per Appendix B Supplementary MNES Report, Appendix B Figure 12 and Figure 13.	Prior to vegetation clearing, during vegetation clearing.	Designer / Constructor, Fauna spotter catcher.

9.3 Proposed measures alignment with species specific statutory documents

Table 10 below provides a discussion on the objectives of the Recovery Plan and/or Approved Conservation Advice for each conservation significant species and/or community with the potential to occur within the Impact area, and how the proposed action's proposed mitigation measures will achieve those objectives. Where it has been assessed that the proposed action results in a significant impact to MNES, this will be compensated in the offset package (including provision for hollow tree replacement and habitat creation where applicable), as outlined in the Offset Area Management Plans (OAMPs).

Table 10 Assessment of Recovery Plan objectives against proposed measures

Recovery Plan	Objectives	Assessment against Plan
TEC - Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions Approved Conservation Advice for the Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Department of Climate Change Energy the Environment and Water, 2022)	A recovery plan is not available for this TEC. As such, the Approved Conservation Advice for the TEC has been used for this assessment. To undertake priority actions to meet the conservation objective, the overarching principle is to maintain existing areas of the ecological community that are relatively intact and of higher quality. The following main objectives relevant to the species includes: **Protect the ecological community** • Conserve remaining patches • Manage actions to minimise impacts • Apply buffer zones • Prevent the introduction and spread of exotic species. **Manage and restore the ecological community** • Manage weeds, pests and diseases • Manage trampling, browsing and grazing • Manage other activity and access causing degradation • Manage appropriate fire regimes • Undertake restoration. **Communicate, engage with and support** • Raise awareness • Gather and provide information • Coordinate efforts.	**The proposed action mitigation measures are not inconsistent with the objectives of the Conservation Advice, through the following:** **Protect the ecological community:** • Impacts to the TEC have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. The potential impact area on the TEC has been reduced to 1.30 ha of direct impacts and 4.80 ha of indirect impacts through design refinements that have reduced the Impact area. As the design has progressed, direct impacts to the TEC at Hugh Muntz Park have been entirely avoided, and the low-risk of indirect impacts occurring will be further appropriately managed. As such, the proposed action will not lead to significant impacts to the TEC. **Conserve remaining patches:** • Core patches and/or habitat patches will be maintained (i.e. clear edges rather than dissect patches which will occur given it is an existing corridor and so proposed clearing will occur along edges) to avoid fragmentation and weed, pest and pathogen incursion. Habitat features such as mature trees or stags with hollows adjacent to the Impact area will be retained. **Manage actions to minimise impacts:** • Erosion and sedimentation controls will be implemented as part of the Erosion and Sediment Control Plan (ESCP) in accordance with 'Best Practice Erosion and Sediment Control Document' (ICEA, 2008) and MRTS 52 Erosion & Sediment Control to be implemented as part of the EMP(C). • Air quality controls and light management controls have also been prescribed to minimise impacts and will be implemented as part of the EMP(C). • Potential acid sulfate soils (PASS) may be present in the Impact area, including adjacent to Scrubby Creek at Gould Adams Park/Nealdon Park, Logan River, and Edens Landing near Ridgewood Reserve North and Edens Parkland. PASS was confirmed to be present in Beenleigh near Holmview Station and adjacent to Beenleigh Station. The field screening results show that PASS may be present at depths ranging from 6 to 16.5 metres below ground (mbgl) and may be encountered during the installation of pre-cast bridge piers at these depths. PASS encountered during construction will be managed in accordance with relevant Federal and State guidelines, including National Acid Sulfate Soils Guidance (2018) and Best Practice Erosion and Sediment Control Guidelines (International Erosion Control Association (IECA), 2019) so that there is no impact on the TEC. The bridge

Recovery Plan	Objectives	Assessment against Plan
	Research and monitoring • Mapping – Update and validate mapping about condition, extent • Options for management • Monitoring.	piers at Scrubby Creek will be installed so that in-situ PASS will not be exposed to the atmosphere, and material removed during installation will be neutralised and disposed of at an appropriately licensed facility. While some groundwater waste will be generated during the bridge pier installation, sustained dewatering of the aquifer is not required, so there will be no impact on regional groundwater levels or surface water that the TEC depends on. Based on the considerations described above, the risk of PASS impacting the TEC is considered low. **Apply buffer zones:** • A 50m TEC buffer zone from the boundary of clearing has been assessed within the Significant Impact Assessment. No vegetation clearing will be undertaken within this 50 m buffer zone and potential indirect impacts will be managed through light management, dust monitoring and erosion and sediment control. **Prevent the introduction and spread of exotic species & Manage weeds, pests and diseases:** • Environmental management plans developed prior to works commencing will prescriptively outline the controls needed to manage weed, pests and disease that may impact the TEC. **Manage trampling, browsing and grazing & manage other activity and access causing degradation:** • No trampling, browsing and grazing is permitted within TEC within or adjacent to the Impact area. Activity and access (such as construction access) will be limited to the minimum footprint required to facilitate bridge construction. No access or activity will occur within the 50 m buffer zone adjacent to the TEC, and as such impacts are unlikely to be significant. **Manage appropriate fire regimes:** • The area is at low risk of accidental fire from construction activities and ignition sources will be strictly controlled to minimise the risk of accidental fires. **Mapping – Update and validate mapping about condition, extent:** • Comprehensive flora and fauna surveys have been undertaken across the study area and surrounds to determine the quality and extent of the TEC and aid in design refinement. **Undertake restoration:** • Rehabilitation of temporarily disturbed habitat using species that meet the Regional Ecosystem indicator relevant to the TEC. **Communicate, engage with and support:** • Site-inductions and toolbox talks to convey specific information to construction personnel and raise awareness/identification of the TEC, as well as protocols relating to the protection of the TEC. **<u>The following objectives are not relevant to the proposed action, and will not be discussed further:</u>** • Research and monitoring.
Angle-stemmed myrtle Recovery plan for the angle-stemmed myrtle Austromyrtus gonoclada 2001-2005 (Austromyrtus gonoclada Recovery Team, 2001) Conservation Advice *Gossia gonoclada* angle-stemmed myrtle (Department of Climate Change Energy the Environment and Water, 2023)	The overall objective of the recovery plan is to arrest the decline of *G. gonoclada* in the wild and to maintain viable in situ populations. The following main recovery objectives relevant to the species include: • Secure existing populations. • Locate new populations. • Provide secure habitat by negotiating a conservation agreement with the appropriate management authority or landholder. • Establish new populations within appropriate habitat in southeast Queensland. • Undertake ecological investigations. • Facilitate local community awareness and involvement in the conservation of the species. • Manage and reduce threats for each population.	**<u>The proposed action mitigation measures are not inconsistent with the objectives of the Recovery Plan as there will be no clearing of the individual observed adjacent to the Impact area.</u>** Noting that this individual plant is existing alongside an active corridor and historical disturbance including ballast / earthworks stockpiling has occurred, the level of exposure of this individual throughout the proposed action is commensurate to what it has been experiencing. To preserve this specimen, exclusion zone fencing to exclude construction pedestrian and machinery access as far as possible from the angle-stemmed myrtle will be implemented. The exclusion zone will include the full extent of the tree protection zone, but no less than 10 m from the individual. Additional targeted monitoring for Myrtle rust will occur and if identified a Hygiene program established by a suitably qualified person. Environmental management plans developed prior to works commencing will prescriptively outline the controls needed to manage weed, pests and disease, such as Weeds of national significance (WoNS) or myrtle rust infestations that could impact the species. As such, the proposed action will not lead to significant impacts to the species.
Greater Glider Conservation Advice for *Petauroides volans* (greater glider (southern and central))(Threatened Species Scientific Committee, 2016)	A recovery plan is not available for this species. As such, the Approved Conservation Advice for the species has been used for this assessment. The primary conservation objective is that within the next three generations, the population size as well as the extent, quality and connectivity of habitat required to maintain the population will have increased. The following main objectives relevant to the species include: • Habitat loss, disturbance and modification management • Climate change considerations • Invasive species management • Ex-situ recovery actions • Stakeholder engagement/community engagement • Survey and monitoring priorities • Information and research priorities.	**<u>The proposed action mitigation measures are not inconsistent with main objectives from the Recovery Plan, through the following:</u>** **Habitat loss, disturbance and modification management:** • A 50 m buffer zone has been applied around breeding habitat (where deemed ecologically relevant) to assess potential for indirect impacts and where monitoring and adaptive management will occur • Impacts to the greater glider have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. The potential impact area to greater glider habitat has been reduced from 49.52 ha to 34.89 ha (including functionally lost areas) through design refinements that have reduced the level of impact to habitat. • Salvaged hollows will be reinstalled or placed within / alongside corridor impact area where safety and access allow. • Rehabilitation of disturbed habitat to be undertaken in suitable locations (i.e. outside railway corridor) using native species in accordance with the proposed action's MRTS16 Landscape and Revegetation. **Invasive species management:** • Environmental management plans developed prior to works commencing will prescriptively outline the controls needed to manage weed, pests and disease that may impact the greater glider.

Recovery Plan	Objectives	Assessment against Plan
		Stakeholder engagement/community engagement: • Planning and design of the proposed action has involved consultation with relevant stakeholders including the broader community. **Survey and monitoring priorities:** • An OEMP and Fauna Monitoring Program (FMP) will be implemented pre, during and post construction to determine use and effectiveness of fauna movement infrastructure. **<u>The following objectives are not relevant to the proposed action, and will not be discussed further:</u>** • Climate change considerations • Ex-situ recovery actions • Information and research priorities.
Grey-headed flying-fox National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus (Department of Agriculture, Water and the Environment, 2021)*	The overall objectives of the Grey-headed flying-fox recovery plan are to improve the national population trend by reducing the impact of the threats through habitat identification, protection, restoration and monitoring as well as to assist communities and Grey-headed Flying-foxes to coexist through better education, stakeholder engagement, research, policy and continued support to fruit growers. The following main recovery objectives relevant to the species include: • 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 so as 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.	**It has been assessed that the proposed action may be inconsistent with the overall objective outlined within the Recovery Plan for the species. The proposed actions have the potential to cause significant impacts to the species. As such, significant impacts to direct impact areas and relevant indirect areas (i.e. buffers) will be compensated in the offset package, as outlined in the OAMP (inclusive of habitat creation).** **<u>The proposed action mitigation measures are not inconsistent with main objectives from the Recovery Plan, through the following:</u>** **Identify, protect and increase native foraging habitat that is critical to the survival of the Grey-headed Flying fox:** • Impacts to grey-headed flying-fox have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. The direct impact area on grey-headed flying -fox habitat has been reduced from 61.34 ha to 45.33 ha through changes in design, which involved refinement of the Impact area. • The proposed action will involve the clearing of 42.60 ha of foraging habitat. Monitoring and management measures outlined in Section 9.2 of this document will be undertaken within a 300 m buffer zone from all three camps at Voyager Drive, Kuraby, Jacaranda Avenue, Kingston and Ridgewood Reserve, Edens Landing. **Identify, protect and increase roosting habitat of Grey-headed Flying-fox camps.** • Impacts to grey-headed flying-fox have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. The potential impact area on grey-headed flying -fox habitat has been reduced from 61.34 ha to 45.33 ha through changes in design, which involved refinement of the Impact area. • The proposed action will involve the clearing of 0.54 ha of roosting/breeding habitat. Indirect impacts to 2.2 ha breeding/roosting habitat have been acquitted via offsets at Voyager Drive, Kuraby, Jacaranda Avenue, Kingston. **Determine trends in the Grey-headed Flying-fox population so as to monitor the species' national distribution, habitat use and conservation status.** • Known roosts within the Impact area have been assessed do not meet the criteria of a nationally-important flying-fox camp, being likely temporary in nature. An FMP will be implemented to monitor the size, status and occupancy. **Reduce the impact on Grey-headed Flying-foxes of electrocution on power lines, and entanglement in netting and on barbed-wire.** • The OEMP will include a hierarchical approach and provision of elimination/modification of barbed wire fencing in Key Biodiversity Areas within known areas of roosting/breeding habitat. • Installation of electrostatic wildlife guards on Overhead Line Equipment (OHLE) to minimise electrocution (Plate 1) (TMR, 2014; Queensland Rail, 2016). **<u>The following objectives are not relevant to the proposed action, and will not be discussed further:</u>** • 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.
Koala National Recovery Plan for the Koala *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory) (Department of Agriculture Water and the Environment, 2022b)	The overall goal of the recovery plan is to stop the trend of decline in population size of the listed Koala, by having resilient, connected, and genetically healthy metapopulations across its range, and to increase the extent, quality and connectivity of habitat occupied. The following main recovery objectives relevant to the species include: • The area of occupancy and estimated size of populations that are declining, suspected to be declining, or predicted to decline are instead stabilised then increased. • The area of occupancy and estimated size of populations that are suspected and predicted to be stable are maintained or increased.	**It has been assessed that the proposed action may be inconsistent with the overall objective outlined within the Recovery Plan for the species. The proposed action has the potential to cause significant impacts to the species. As such, significant impacts to direct impact areas and relevant indirect areas (i.e. buffers) will be compensated in the offset package, as outlined in the OAMP.** **<u>The proposed action mitigation measures are not inconsistent with main objectives from the Recovery Plan, through the following:</u>** **The area of occupancy and estimated size of populations that are declining, suspected to be declining, or predicted to decline are instead stabilised then increased:** • The proposed action will involve the clearing of 25.54 ha of foraging habitat. However, foraging habitat will be acquired for conservation to offset the residual impact.

Recovery Plan	Objectives	Assessment against Plan
	• Metapopulation processes are maintained or improved. • Partners, communities and individuals have a greater role and capability in listed Koala monitoring, conservation and management.	**The area of occupancy and estimated size of populations that are suspected and predicted to be stable are maintained or increased:** • Impacts to the koala have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. Impact area to koala habitat has been reduced from 177.15 ha to 107.74 ha through changes in design, which involved refinement of the Impact area. • The proposed action will involve the clearing of 25.54 ha of foraging habitat. However, foraging habitat will be acquired for conservation to offset the residual impact. • Fauna movement infrastructure will facilitate fauna movement and increase habitat connectivity, genetic diversity and access to previously isolated patches to suitable habitat. **Metapopulation processes are maintained or improved:** • The selection of Offset sites was informed by the recovery plan and included strategic selection of site characteristics on a landscape scale. On ground revegetation and restoration programmes will be implemented in previously cleared offset sites, improving the indicators for ecosystem health for the metapopulation. • Proposed fauna movement infrastructure will increase habitat connectivity and access to previously isolated habitat. This increased connectivity between potential sub-populations will likely increase genetic diversity within the metapopulation. **The following objectives are not relevant to the proposed action, and will not be discussed further:** • Partners, communities and individuals have a greater role and capability in listed Koala monitoring, conservation and management.
Macadamia Nut National Recovery Plan for Macadamia Species	The overall objective of the recovery plan is to ensure the long-term viability of all four Macadamia species through maintaining existing populations and implementing measures to promote recovery. The following main recovery objectives relevant to the species include: • Continue to identify and evaluate the extent and quality of Macadamia species populations and their habitat. • Reduce and manage the major threatening processes affecting Macadamia species and their habitat. • Increase knowledge of Macadamia species and their ecology to affect their conservation and management. • Improve awareness and understanding of Macadamia species, especially their conservation management requirements and major threats. • Manage, monitor and evaluate the National Recovery Plan for Macadamia Species.	**The proposed action mitigation measures are not inconsistent with the objectives of the Conservation Advice, through the following:** **Continue to identify and evaluate the extent and quality of Macadamia species populations and their habitat:** • Targeted flora surveys were carried out to identify flora species, including Macadamias, in the Impact area. (Note, all individuals observed during targeted flora surveys were located in residential backyards and likely planted stock not considered to be 'in the wild' as per Flora Survey Guidelines- Protected Plants (Department of Environment, Science and Innovation, 2020). • Observed specimen were recorded during field surveys and stored GIS. **The following objectives are not relevant to the proposed action, and will not be discussed further:** • Reduce and manage the major threatening processes affecting Macadamia species and their habitat. • Increase knowledge of Macadamia species and their ecology to affect their conservation and management. • Improve awareness and understanding of Macadamia species, especially their conservation management requirements and major threats. • Manage, monitor and evaluate the National Recovery Plan for Macadamia Species.
Regent Honeyeater National Recovery Plan for the Regent Honeyeater (*Anthochaera phrygia*) (Department of the Environment, 2016)	The objectives of this recovery plan are 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. • Enhance the condition of habitat across the regent honeyeater range to maximise survival and reproductive success and provide refuge during periods of extreme environmental fluctuation.	**Despite the assessment that a significant impact is unlikely, DCCEEW considers that the proposed action will adversely affect habitat critical to the survival of regent honeyeater and swift parrot, and therefore considers that a significant impact is likely. As such, significant impacts to direct impact areas will be compensated in the offset package, as outlined in the OAMP (inclusive of habitat creation).** **The proposed action mitigation measures are not inconsistent with main objectives from the Recovery Plan, through the following:** **Enhance the condition of habitat across the regent honeyeater range to maximise survival and reproductive success and provide refuge during periods of extreme environmental fluctuation:** • Impacts to regent honeyeater have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. Residual impacts will be compensated via offsets as outlined in the OEMP. • Suspected habitat corridors consisting of eucalypt woodland, for example Karawatha State Forest were excluded from the Impact area, as such the project is not inhibiting landscape scale movements. **The following objectives are not relevant to the proposed action, and will not be discussed further:** • 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.
South-eastern glossy black cockatoo Conservation Advice for *Calyptorhynchus lathami lathami* (South-eastern Glossy Black Cockatoo) (Department of Climate Change Energy the Environment and Water, 2022)	Conservation advice objectives are: • To protect and enhance the extent and quality of habitat across the subspecies range. • To address critical knowledge of the subspecies' ecological needs to guide and refine management strategies. • Enhance community awareness and stewardship of the conservation of the subspecies.	**It has been assessed that the proposed action has the potential to cause significant impacts to the species. As such, significant impacts to direct impact areas will be compensated in the offset package, as outlined in the OAMP (inclusive of hollow tree replacement and habitat creation).** **The proposed action mitigation measures are not inconsistent with main objectives from the Recovery Plan, through the following:** **To protect and enhance the extent and quality of habitat across the subspecies range:** • Impacts to the South-eastern glossy-black cockatoo have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. The potential impact area on South-eastern glossy-black cockatoo habitat has been reduced from 54.34 ha to 41.74 ha through changes in design, which involved refinement of the Impact area.

Recovery Plan	Objectives	Assessment against Plan
		• The OAMP incorporates salvage of hollows and/or habitat features (where salvageable). Salvaged features will be reinstalled or placed within / alongside corridor impact area where safety and access allow. Vegetation clearing in general will be avoided where feasible, this includes riparian vegetation (vegetation in proximity of water points). **<u>The following objectives are not relevant to the proposed action, and will not be discussed further:</u>** • To address critical knowledge of the subspecies' ecological needs to guide and refine management strategies. • Enhance community awareness and stewardship of the conservation of the subspecies.
Swift parrot National Recovery Plan for the Swift Parrot *(Lathamus discolor)*(Department of Climate Change, Energy the Environment and Water, 2024)	The long-term objective of this recovery plan is that the Swift Parrot population has increased in size to such an extent that the species no longer qualifies for listing as threatened under any of the Environment Protection and Biodiversity Conservation Act 1999 listing criteria. The following main recovery objectives relevant to the species include: • By 2032, maintain or improve the extent, condition and connectivity of habitat of the Swift Parrot. • By 2032, anthropogenic threats to Swift Parrot are demonstrably reduced. • By 2032, measure and sustain a positive population trend.	**Despite the assessment that a significant impact is unlikely, DCCEEW considers that the proposed action will adversely affect habitat critical to the survival of regent honeyeater and swift parrot, and therefore considers that a significant impact is likely. As such, significant impacts to direct impact areas will be compensated in the offset package, as outlined in the OAMP (inclusive of habitat creation).** **<u>The proposed action is not inconsistent with main objectives from the Recovery Plan, through the following:</u>** **Maintain or improve the extent, condition and connectivity of habitat of the Swift Parrot:** • Impacts to the swift parrot have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. The potential impact area on swift parrot habitat has been reduced from 64.80 ha to 42.28 ha through changes in design, which involved refinement of the Impact area. • Foraging habitat will be acquired for conservation to offset the residual impact to the Swift Parrot. **The following objectives are not relevant to the proposed action, and will not be discussed further:** • Anthropogenic threats to Swift Parrot are demonstrably reduced. • By 2032, measure and sustain a positive population trend.
Yellow-bellied glider (south eastern) Conservation Advice for *Petaurus australis australis* (yellow-bellied glider (south-eastern)(Department of Agriculture Water and the Environment, 2022)	The primary conservation and recovery outcome for *P. australis* is that Population size has stabilised because sufficient areas of habitat are protected from extensive severe fire, fragmentation and timber harvesting, known threats are mitigated and key habitat features (e.g., sap trees, hollow-bearing trees) and habitat connectivity are retained. The following main recovery objectives relevant to the species include: • Manage habitat loss, disturbance and modifications • Protect habitat suitable as refuge form climate change • Mange invasive species • Stakeholder engagement • Survey and monitoring priorities.	**<u>The proposed action is not inconsistent with main objectives from the Recovery Plan, through the following:</u>** **Manage habitat loss, disturbance and modifications:** • Impacts to the yellow-bellied glider have been avoided where possible, exhausting all opportunities to avoid and minimise clearing, reducing the overall impact. The potential impact area to yellow-bellied glider habitat has been reduced from 49.42 ha to 34.89 ha (including functionally lost areas) through changes in design, which involved refinement of the Impact area. • Salvaged hollows will be reinstalled or placed within / alongside corridor impact area where safety and access allow. The limited effectiveness of artificial structures like nestboxes and glider poles has been taken into consideration in the OEMP and a Fauna Monitoring Program (FMP) will be implemented pre, during and post construction to determine use and effectiveness of fauna movement infrastructure. • The OAMP includes a hierarchical approach for provision of the exclusion/modification of barbed-wire fencing in Key Biodiversity Areas. **Protect habitat suitable as refuge form climate change:** • Climate change has been considered in the selection of offset sites, which will protect the species from impacts like timber harvesting and inappropriate fire management. **Mange invasive species** • Pest control will be performed on offset sites if these present a threat or cause a decline in habitat quality. **Survey and monitoring priorities:** • An OEMP and Fauna Monitoring Program (FMP) will be implemented pre, during and post construction to determine use and effectiveness of fauna movement infrastructure.

9.4 Hydrology, erosion and water quality

The significant impact assessment determined no anticipated impacts to MNES aquatic species due to a lack of presence or minimal habitat disruption. There are also no wetlands of international significance in the Impact area. Therefore, impacts related to changes to hydrology, erosion and sedimentation are low risk to MNES and expected to be managed sufficiently through business-as-usual construction controls as well as design controls expected for a linear infrastructure project of this scale.

The proposed action proposes to lengthen/replace existing culverts and install additional bridge piers over Scrubby Creek, Slacks Creek and the Logan River. The proposed action has the potential to cause erosion, sediment runoff, alterations to surface water and ground water levels or disturb acid sulfate soils, which can adversely impact:

- Soil structure and composition through the loss of topsoil and exposure of subsoil, which often has poor physical and chemical properties
- Water quality including turbidity
- Vegetation composition and health
- Potential loss or contamination of existing ground water sources which may also affect groundwater.

Potential acid sulfate soils (PASS) may be present in the Impact area, including adjacent to Scrubby Creek at Gould Adams Park/Nealdon Park, Logan River, and Edens Landing near Ridgewood Reserve North and Edens Parkland. PASS was confirmed to be present in Beenleigh near Holmview Station and adjacent to Beenleigh Station. The field screening results show that PASS may be present at depths ranging from 6 to 16.5 metres below ground (mbgl) and may be encountered during the installation of pre-cast bridge piers at these depths. PASS encountered during construction will be managed in accordance with relevant Federal and State guidelines, including *Queensland Acid Sulfate Soil Technical Manual (*DoR & DESI, 2024), *National Acid Sulfate Soils Guidance* (2018) and *Best Practice Erosion and Sediment Control Guidelines* (International Erosion Control Association (IECA), 2019), in particular so there is so that there is no impact on the TEC. The bridge piers at Scrubby Creek within vicinity of the TEC will be installed so that in-situ PASS will not be exposed to the atmosphere, and material removed during installation will be neutralised and disposed of at an appropriately licensed facility. While some groundwater waste will be generated during the bridge pier installation, sustained dewatering of the aquifer is not required, so there will be no impact on regional groundwater levels or surface water that the TEC depends on. Based on the considerations described above, the risk of PASS impacting the TEC is considered low.

9.4.1 Environmental objectives and controls

The following controls (Table 11) describe the required measures to be implemented to reduce potential impacts from construction associated with proposed action on MNES which are directed to the following objectives:

- Minimise adverse effect on water quality and potential downstream impacts to MNES habitat from loss of soil by minimising the disturbance of ground surfaces and implementing effective erosion and sediment controls where required.
- Minimise downstream impacts to MNES habitat from proposed changes to hydrology and fauna passage.

Table 11 Environmental impacts and controls – hydrology, erosion, and water quality

Issue	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
Changes to hydrology	Design effort to understand likely changes to hydrology and associated flooding impacts. Design options at waterway crossings to consider provision of fauna movement including fish passage and terrestrial fauna through mapped and/or ground truthed biodiversity or fauna movement corridors.	Design	Designer / Constructor	• Adverse impacts to fauna movements are avoided or minimised. • Terrestrial fauna movement maintained or improved through mapped and/or ground truthed biodiversity or fauna movement corridors.	Fish passage requirements considered throughout the design and documented in the EDR.	EDR/s; design drawings review and approval. TMR/Contractor Assurance program.	Re-design when substantial non-conformances/breaches are identified.
Water quality	Develop stormwater quality management and water sensitive urban design by a suitably qualified person. This will include environmentally sensitive areas at Slacks Creek, Scrubby Creek, Logan River and associated tributaries. Alternatives to typical water quality improvement devices will be investigated through Detailed Design due to the constrained nature of the Impact area, including: • Grassed swales, • Gross pollutant traps, • Underground HumeCeptors • Water-sensitive urban design (WSUD) landscaping / vegetation.	Design	Designer / Constructor	• Adverse effect on water quality is avoided or minimised through water quality assessment and implementation of MUSIC modelling. • Environmental harm by contaminant discharge to receiving waters during rainfall and storm events is avoided or minimised through suitable drainage solutions in design. • Environmental harm by contaminant discharge is avoided or minimised through the development of suitable water quality improvement devices.	• Stormwater quality management and water sensitive urban design will be developed by a suitably qualified person.	Baseline water quality monitoring will confirm existing water quality in receiving waters and establish realistic and achievable water quality objectives for the proposed action through construction and operation.	Adaptive management to be applied where objectives not met. In the event of an environmental incident / potential release of contaminants, water quality sampling will be undertaken at upstream and downstream of the Impact area and results compared against the relevant Project water quality objectives / requirements.
Soil management/ Erosion and sediment control	**Acid sulfate soils** • Potential acid sulfate soils (PASS) may be present in the Impact area, including adjacent to Scrubby Creek at Gould Adams Park/Nealdon Park, Logan River, and Edens Landing near Ridgewood Reserve North and Edens Parkland. PASS was confirmed to be present in Beenleigh near Holmview Station and adjacent to Beenleigh Station. Based on the measures described below, the risk of PASS impacting the TEC is considered low. • The D&C Contractor will engage a suitably qualified person with acid sulfate experience to advise management and monitoring measures for acid sulfate soils within the entire Impact area. • If targeted acid sulfate soil testing confirms the presence within or within vicinity to the TEC at Gould Adams Park/Nealdon Park, the D&C Contractor must develop an Acid Sulfate Soils Management Plan (ASSMP). The ASSMP must detail the management and monitoring requirements for soils, surface waters and groundwaters to be implemented during the construction phase of the Project. Spoil treatment requirements (i.e. liming rates) and disposal/reuse opportunities will also be prescribed. • Where the testing confirms the soils are not acid sulfate soils, but instead naturally acidic soils, the D&C Contractor must develop an Acidic Soils Management Plan (ASMP). The	Pre-construction/ Construction	Designer / Constructor	• Effective erosion and sediment control measures are implemented. • Loss of soil through erosion is minimised.	Erosion and Sediment management will comply with the following acts and guidelines: • *Queensland Acid Sulfate Soil Technical Manual (Department of Resources and Department of Environment, Science and Innovation, 2024)* • *National Acid Sulfate Soils Guidance (Commonwealth of Australia, 2018)* • *Best Practice Erosion and Sediment Control Guidelines (International Erosion Control Association (IECA), 2019)*	Monitoring by visual inspection will be carried out by the D&C Contractor including following rainfall events during the construction phase. Monitoring will also occur following rainfall events during construction where there is more than 25 millimetres within a 24-hour period to assess the integrity and effectiveness of erosion and sediment control structures.	• Review and amendment of erosion and sediment control plans. • Emergency response procedure effected immediately if required.

Issue	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
	ASMP must detail the management and monitoring requirements for soils, surface waters and groundwaters to be compiled during the construction phase of the Project. Spoil treatment requirements (i.e. liming rates) and disposal/reuse opportunities will also be prescribed. • Any waste generated that has the potential to produce acid sulfate soils will be appropriately managed. • No stockpiling of potential acid sulfate soils will occur within Scrubby Creek or in close proximity to the waterway, or in an area where exposed acid sulfate material can oxidise and cause potential harm to the surrounding TEC. • Any runoff accumulating within the earthworks areas removing potentially acid sulfate materials will be tested, treated and managed in a manner that achieves applicable water quality requirements. • Visual monitoring will occur on a daily basis throughout earthworks to ensure acid sulfate soils are being managed appropriately, with further verification occurring through scheduled Environmental Inspections (typically weekly in frequency) and Audits (frequency targeted to risk). • Acid sulfate soil management and assessment will be undertaken in accordance with *Queensland Acid Sulfate Soil Technical Manual (Department of Resources and Department of Environment, Science and Innovation, 2024), National Acid Sulfate Soils Guidance* (Commonwealth of Australia, 2018), *and Best Practice Erosion and Sediment Control Guidelines (International Erosion Control Association* (IECA), 2019). **Erosion and sediment control** Develop, implement and audit an Erosion and Sediment Control Plan (ESCP) in accordance with '*Best Practice Erosion and Sediment Control Document'* (ICEA, 2008) and *MRTS 52 Erosion & Sediment Control* to be implemented as part of the EMP(C) and outlining measures for the prevention of erosion and sedimentation during construction. The ESCP should include information about: • Adequate measures for erosion prevention including treatment of all exposed ground with suitable stabilisation products during extended construction works and landscaping as soon as practicable upon construction completion. • Strategies to minimise risk and manage sedimentation or contamination such as silt fences, bunding and silt curtains to receiving waters. • Chemical Spill Procedures to manage potential contaminants during construction. • Refuelling, chemical storage and maintenance activities are undertaken in designated						

Issue	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
	containment areas away from environmentally sensitive locations. Containment areas will be designed and managed in accordance with relevant regulatory requirements and standards. • Include surface water quality monitoring and management measures.						
Environmental spills	All materials and hazardous substances are to be stored and handled in accordance with relevant standards and guidelines including the *AS 1940 – 2017 The storage and handling of flammable and combustible liquids* and the *Work Health and Safety Act 2011.* All hazardous chemicals, toxic materials and / or flammable liquids are to be identified in accordance with AS 1216 – 2006 Class labels for dangerous goods and are handled and stored in accordance with AS 2508 (Lst 4) Safe storage and handling information cards for dangerous goods. Store hazardous materials, chemicals, oils and fuels away from watercourses, in clearly designated areas. Undertake regular inspections and maintenance of machinery and infrastructure.	During all phases of construction and operation.	Designer / Constructor	No adverse impact to fauna/flora resulting from spills.	No incidents resulting in adverse impacts to MNES.	Monitoring by visual inspection will be carried out by the D&C Contractor during the construction phase. Monitoring will also occur following rainfall events in accordance with the EMP (C) to assess the effectiveness of erosion and sediment control structures.	Review EMP(C) to amend site procedures where breaches are identified.

9.5 Dust, Noise, Vibration and Light

Activities during construction have potential to create adverse air quality, noise, vibration and lighting impacts on MNES species, however, given the proposed action takes place predominantly within an urbanised environment, these factors are considered to be a low risk for MNES species. Nuisance impacts to protected fauna species can be minimised through business-as-usual controls through the construction period.

9.5.1 Environmental objectives and controls

The following controls (Table 12) describe the required measures to be implemented to reduce potential impacts from construction associated with the proposed action on MNES directed to the following objective species (and where applicable align with recovery objectives outlined in MNES species Recovery Plans and/or Approved Conservation Advice as per Section 3.0):

- Conduct work in a manner that minimises adverse effects to fauna habitat to MNES

Table 12 Environmental impacts and controls – dust, noise, vibration, and light

Issue	Control	Timing	Responsibility	Outcome	Performance Criteria	Monitoring and Evaluation Program	Contingency Measures
Air quality	The D&C Contractor's EMP(C) to include specific mitigation measures to minimise air quality impacts to sensitive receivers, including measures such as: • Water trucks, or a similar wetting agent device, will be used to minimise dust emissions from vehicle travel on unsealed roads. Particular focus will be applied for unsealed road sections which are located near residential sensitive receptors. • The application of water will be required if excessive dust is being generated and transported off-site. Water application will be considered where the placement of fill material is required to areas near existing sensitive receptors. • Stockpiles and laydown areas will be located away from sensitive receptors and utilise screening (either natural or man-made) to minimise the likelihood of emissions. • If required, long term stockpiles will be stabilised with soil binders or similar. • Construction vehicle loads will be covered prior to leaving the construction site. • Monitoring of weather conditions will be undertaken to understand the potential for the transport of construction dust towards sensitive receptors, using existing BoM stations and site observations. The intensity of construction work will be adjusted in accordance with the EMP (C) (i.e. if works occur in sensitive areas as well as exceeding a given wind speed and direction). • Stage construction works to minimise the area of disturbed soil at any one time. • The speed limit on unsealed roads will be limited to 40 km/h. • Pre-construction baseline dust deposition monitoring for high risk activities and dust gauges to assess dust levels during construction will be considered as part of the D&C Contractors air quality monitoring program incorporated into the EMP (C). • Vehicles are to be turned off when not in use.	During all phases of planning and design, construction and operation.	Designer / Constructor	No impact from construction affecting MNES fauna survival.	The EMP(C) measures to minimise dust, noise and lighting impacts will be implemented successfully.	• Environmental Inspections • TMR/Contractor Assurance program • Monthly environmental reporting.	Review EMP(C) measures and amend as required.
Noise, vibration and light	Lighting design will be targeted and restricted to the minimum amount required to maintain public safety in areas proximal to high value habitat areas to avoid light spill.	Design.	Designer / Constructor				
	Clearing activities will be restricted to daylight hours (with the exception of grey-headed flying fox camp areas) to reduce impacts from construction light and noise on threatened species, except where constrained by rail corridor access and other genuine limitations (safety or similar).	During all phases of construction.					
	All equipment, vehicles and machinery used during construction will be maintained in good working order. Where noise assessments predict noise emissions above nominated criteria, hoarding / shielding / noise reduction measures will be applied to machinery contributing to elevated emissions.	During all phases of construction.	Designer / Constructor				
	EMP(C) to include measures to mitigate the air quality, noise and vibration risk associated with the proposed action in accordance with Queensland Environmental Protection Regulation 2019, Environmental Protection (Air) Policy 2019 and Environmental Protection (Noise) Policy 2019.	During all phases of construction.	Designer / Constructor				
	Where night works are required, lights will be directed to minimise light spill into adjacent habitats to reduce impacts on nocturnal fauna species. Where required, hoarding / shielding will also be used to ensure light spill is not affecting nocturnal fauna in sensitive locations.	During all phases of construction.	Construction Contractor				

10.0 Residual risk assessment

Table 13 provides an assessment of the avoidance, minimisation and mitigation measures proposed in this OEMP and assesses the residual risk for MNES. It predicts the likely effectiveness of the proposed measures in achieving environmental objectives by demonstrating their effectiveness on similar rail projects.

In general, the following understanding of effectiveness is applied based on the hierarchy of mitigation:

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

Overall, the measures proposed for the proposed action are considered to have a moderate to high effectiveness based on TMR's demonstrated experience in managing environmental impacts.

10.1 Application of effective mitigation measures

The mitigation measures prescribed through this plan have drawn on the proven effectiveness of measures outlined within TMR's *Fauna Sensitive Road Design: Volume 1 and Volume 2* (publicly available documents). These technical publications are foundational management requirements incorporated into TMR's MRTS 51 – Environmental management specification and as such are consistently applied across TMR's portfolio of infrastructure works.

Volume 1, Chapter 7 provides statistical evidence and specific examples on the efficacy of past and existing practices, and drawing on lessons, recommendations and expert advice, informs the content of Volume 2: Preferred Practices. As outlined in Volume 2, Chapter 1, section 1.3:

> *"[The volume] is based on research that has specifically investigated the effectiveness of fauna impact mitigation measures. The research was conducted by the TMR, other state and international road agencies, and national and international research institutes. Information was collected from multiple resources including desktop research, conversations with knowledgeable people and agencies, and field research."*

TMR's Fauna Sensitive Road Design Volume 1 and Volume 2 prescribe measures to achieve fauna sensitive outcomes using an array of overpass, underpass, non-structural measures, fencing, habitat enhancements and other mitigation measures. More specifically, it provides species-specific design considerations for fish, amphibians, turtles, platypuses, arboreal mammals, koalas, birds, bats and macropods. Additionally, the Department of Environment, Science & Innovation (DESI) provide key koala mitigation measures as part of their *Koala-sensitive Design Guideline* (2022) (Koala Sensitive Guidelines) which has been incorporated into this plan for application to the proposed action. As stated in the Koala Sensitive Guidelines, the measures are based on current best-practice. Additionally, the Koala Sensitive Guidelines note:

> *The Guideline sets out actions that can be taken to:*
>
> - *Ensure koala safety and movement through enhancements to the design and layout of development*
> - *Manage risks to koalas on-site during construction phases.*
>
> *The Guideline supports adoption of Koala Sensitive Design (KSD) principles at all stages of the development process, including during planning for the site layout, the construction period and the ongoing end-use of the landscape.*

As such, measures identified for application within this OEMP are supported by evidence in field research, literature review, and current industry best practice in terms of effective fauna mitigation. This, in conjunction with the effectiveness risk assessment presented in Table 13 substantiate the efficacy of mitigation and management measures for the proposed action.

Table 13 Residual risk assessment of impacting activities for MNES species

Potential impacts	Initial risk			Effectiveness of mitigation	Residual risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Flora and fauna							
Flora and fauna - Vegetation clearing resulting in loss of habitat for conservation significant flora and fauna	Highly likely	High	High	**High effectiveness** Through the design process of the proposed action direct impacts to habitat important to conservation significant flora and fauna have been avoided and/or minimised wherever possible. However, the scale of habitat removal required is such that significant impacts remain for five listed threatened species remains: • Greater glider • Koala • Yellow-bellied glider (south-eastern) • South-eastern glossy black cockatoo • Grey-headed flying fox • Regent honeyeater* • Swift parrot*. *Despite the assessment that a significant impact is unlikely, the proposed action has incorporated adverse impacts affecting habitat critical to the survival of regent honeyeater and swift parrot to align with DCCEEW's view that a significant impact is likely. Mitigation to avoid significant habitat removal beyond areas required for the permanent aspects of proposed action design include identification of high-value and no-go areas to be protected through design and construction. Pre-clearing and clearing measures detailed in this OEMP have been used extensively and successfully over the years by TMR and its contractors. Monitoring of compliance with MRTS requirements and its effectiveness over the years has demonstrated construction measures to be highly effective in avoiding/mitigating impact.	Highly likely	Moderate	High

Potential impacts	Initial risk			Effectiveness of mitigation	Residual risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
				The Bruce Highway upgrade from Caloundra Road to Sunshine Motorway (known as the CR2SM project), approved under EPBC 2015/7464, provides great evidence where MRTS51 requirements, particularly for pre-clearance and clearance have been successfully implemented 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 18.76 ha of koala habitat being cleared by the project (well under the allowable limit of 35.3 ha). Construction is now concluded, and post-construction monitoring is underway. Compliance reporting is ongoing and publicly available in the project webpage. **Species-specific mitigation** Section 9.0 includes a summary of mitigation specific to relevant conservation significant flora, fauna and communities which has been built based on published guidance of known threats to each species or community appropriate to risks presented by this proposed action.			
Flora and fauna - Loss of fauna movement and habitat fragmentation	Highly likely	High	High	**High effectiveness** Pre-construction (design) management measures have been identified to retain or improve connectivity within the Impact area, given the existing rail corridor intersects and allows for east-west movement of biodiversity (especially near bridges and culverts). TMR are currently proposing to construct wildlife movement solutions based on the known requirements for the target species, the current alignment of the proposed action corridor and results of the habitat connectivity modelling. These will be fully assessed as part of the Detailed Design. Most connectivity solutions are associated with bridge underpasses (e.g. log rail)	Unlikely	Moderate	Low

Potential impacts	Initial risk			Effectiveness of mitigation	Residual risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
				and culverts and will be designed and constructed consistent with *Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024). In the case where the proposed wildlife movement solutions are culverts and underpasses, the wildlife movement solutions will: • Provide dry passage clear of batters/rock abutments/scour protection to ensure long term viability • Provide connectivity and shelter • Maintain natural streamflow • Without limiting safety of flooding aspects, fauna furniture will be installed in culverts to allow refuge from predators for arboreal species. The *Fauna Sensitive Transport Infrastructure Delivery manual* (Department of Transport and Main Roads, 2024) and *Koala-sensitive Design Guideline* (2022) provides information to assist practitioners to design, construct and maintain road that better accommodate the need of fauna. An equivalent manual is not available for rail infrastructure, however the principles within the manual stand for linear infrastructure applications. The manual is built up from industry best practice and expertise as well as case studies of success stories. A successful example of fauna sensitive road design, particularly 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. 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.			

Potential impacts	Initial risk			Effectiveness of mitigation	Residual risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
				The significant impact assessment for MNES considers that these design measures are in place, and no significant impacts to MNES were assessed as a result of impacts to connectivity criteria. **Species-specific mitigation** Section 9.0 includes a summary of mitigation specific to relevant conservation significant flora, fauna and communities which has been built based on published guidance of known threats to each species or community appropriate to risks presented by this proposed action.			
Flora and fauna - Injury and mortality of fauna	Possible	Moderate	Medium	**High effectiveness** In addition to fauna exclusion fencing proposed to control and improve fauna movement, pre-construction and construction controls will be implemented to reduce risk of fauna injury or mortality. Controls such as traffic management through potential collision points (speed limits and signage), as well as employment of qualified fauna spotter catchers prior to vegetation clearing are common controls employed to meet legislative obligations with respect to protection of native fauna. *The Department of Environment and Science Koala-sensitive Design Guideline 2022:* A guide to koala-sensitive design measures for planning and development activities, highlights speed control of construction vehicles 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.	Rare	Moderate	Low

Potential impacts	Initial risk			Effectiveness of mitigation	Residual risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
				Mitigation to avoid significant habitat removal beyond areas required for the permanent aspects of proposed action design include identification of high-value and no-go areas to be protected through design and construction. Pre-clearing and clearing measures have been used extensively and successfully over the years by TMR and its contractors. Monitoring of compliance with MRTS requirements and its effectiveness over the years has demonstrated construction measures to be highly effective in avoiding/mitigating impact. **Species-specific mitigation** Section 9.0 includes a summary of mitigation specific to relevant conservation significant flora, fauna and communities which has been built based on published guidance of known threats to each species or community appropriate to risks presented by this proposed action.			
Flora and fauna - Introduction, spread of introduced flora and fauna (weeds and pests) and pathogens	Likely	Minor	Low	**Moderate effectiveness** In the context of an urbanised environment which already experiences weed and pest incursion, biosecurity management measures. Biosecurity management measures to be managed for listed key threatening processes for relevant conservation significant species and communities and in accordance with Queensland *Biosecurity Act 2014* as part of this OEMP, and EMP(C). This should include: • Weeds, pest and pathogen monitoring and management measures and control • Inspections/monitoring.	Possible	Minor	Low
Hydrology, erosion and water quality							
Changes to hydrology	Likely	Minor	Low	**High effectiveness** The significant impact assessment determined no anticipated impacts to aquatic species due to a lack of presence or minimal	Possible	Minor	Low
Water quality	Likely	Minor	Low		Possible	Minor	Low

Potential impacts	Initial risk			Effectiveness of mitigation	Residual risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Erosion and sediment control	Likely	Minor	Low	habitat disruption. There are also no wetlands of international significance in the Impact area. Therefore, impacts related to changes to hydrology, erosion and sedimentation are low risk to MNES and expected to be managed sufficiently through business-as-usual construction controls as well as design controls expected for a linear infrastructure project of this scale. Management will be in accordance with the following acts and guidelines: • *Environment Protection Act 1994* • *Water Act 2000* • *Fisheries Act 1994* • Queensland Acid Sulfate Soils Technical Manual (Department of Science Information Technology Innovation and the Arts 2014) • Best Practice Erosion and Sediment Control Guidelines (International Erosion Control Association (IECA), 2019). • *AS 1940 - 2017 The storage and handling of flammable and combustible liquids and the Work Health and Safety Act 2011.* An example of previous success in the implementation of best practice erosion and sediment control and compliance with legal and MRTS2 requirements is evidenced in the commendation letter from DES to the construction contractor for the CR2SM project, approved under EPBC 2015/7464.	Possible	Minor	Low
Environmental spills	Likely	Minor	Low		Rare	Minor	Low
Nuisance (Dust, Noise, Vibration, Light)							
Dust and air quality	Likely	Minor	Low	**High effectiveness** Activities during construction have potential to create adverse air quality, noise, vibration and lighting impacts on MNES species, however given the proposed action takes place predominantly urbanised environment, these factors are considered to be a low risk for MNES species. Nuisance	Possible	Minor	Low
Noise, light and vibration	Likely	Minor	Low		Possible	Minor	Low

Potential impacts	Initial risk			Effectiveness of mitigation	Residual risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
				impacts to protected fauna species can be minimised through business-as-usual controls through the construction period. Operational activities are considered to have a lower potential of impacts as use of the site will be restricted to maintenance. Work will be conducted in a manner that minimises nuisance to MNES species in accordance with the following National and State policy and guidelines: • National Environment Protection Measure for Ambient Air Quality • *Environment Protection Act 1994* • Environmental Protection (Air) Policy 2019 • National Light Pollution Guidelines for Wildlife (Department of Climate Change Energy the Environment and Water, 2023)			

11.0 Fauna Monitoring Program

A Fauna Monitoring Program (FMP) has been developed to outline actions for the design and pre-construction phase to enable a baseline understanding of fauna activities, during the construction phase to monitor and assess mitigation, and during post-construction phase to monitor and assess effectiveness of long-term fauna measures within key biodiversity areas within the Impact area and associated buffer zones (refer Appendix C).

The intent of the FMP is to:

- Ensure permanent fauna mitigation measures are incorporated at suitable locations to ensure they are the most appropriate and effective.
- Demonstrate the effectiveness of fauna mitigation measures including fauna connectivity infrastructure (i.e. underpasses, glider poles, escape poles and fencing at key biodiversity areas with specific regard to species-specific requirements).
- Ensure that meaningful data is collected to implement corrective actions in a timely and meaningful manner. The FMP will prescribe suitable and practicable fauna monitoring scope, frequencies and durations for targeted MNES species relevant to the proposed action.

The FMP outlines requirements for the following phases:

- Detailed Design / Pre-construction (pre-construction) phase – to enable baseline understanding
- Construction phase – to monitor and assess mitigation, and apply corrective actions, and
- Post-construction phase – to ensure long-term efficacy of mitigation.

TMR will coordinate the FMP (through the successful D&C contractor), and where needed will assist in monitoring prior to site mobilisation and following practical completion where post-construction monitoring is required after the Alliance activities has ceased.

12.0 References

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Appendix A

EPBC Proposed action area figures

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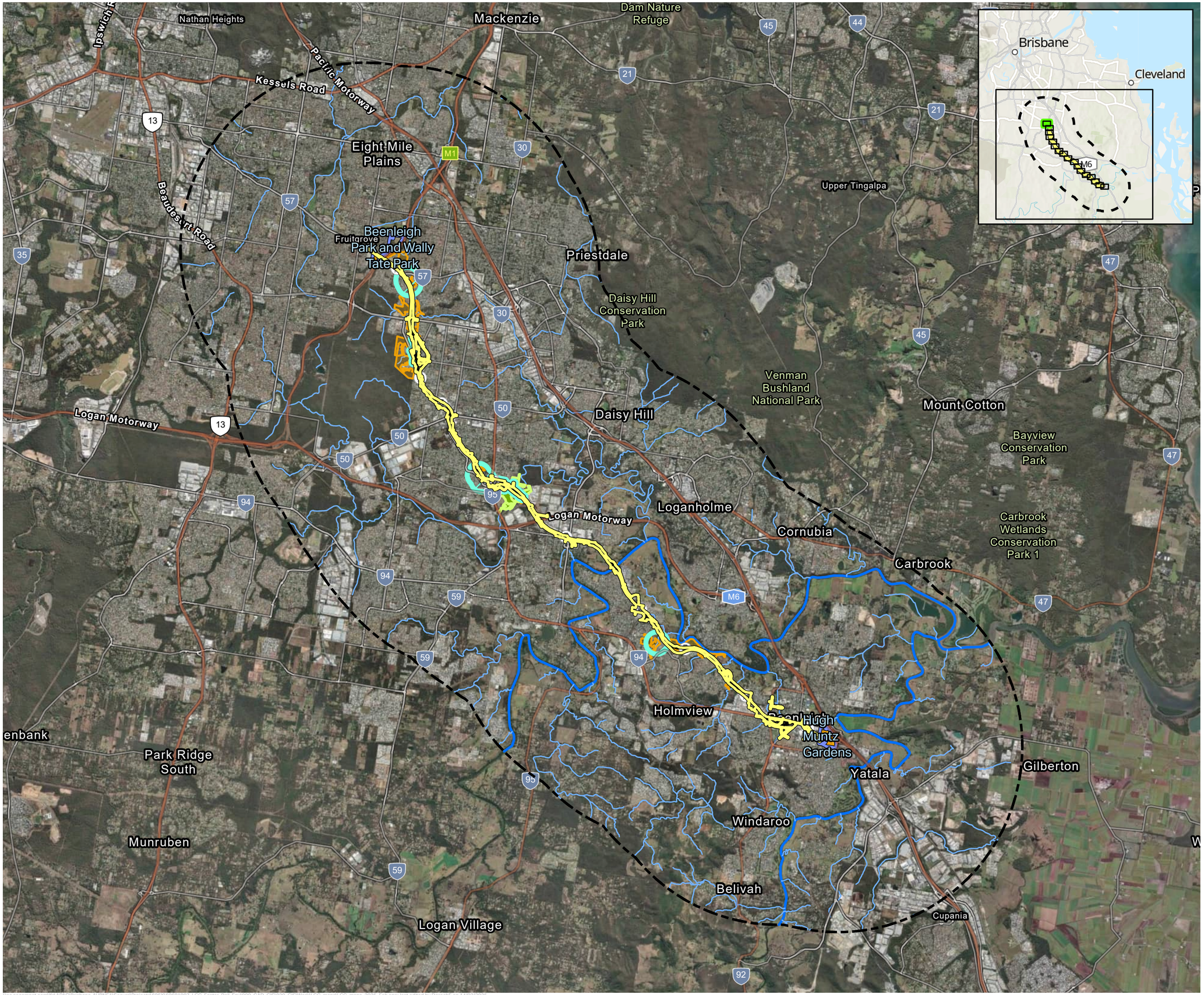

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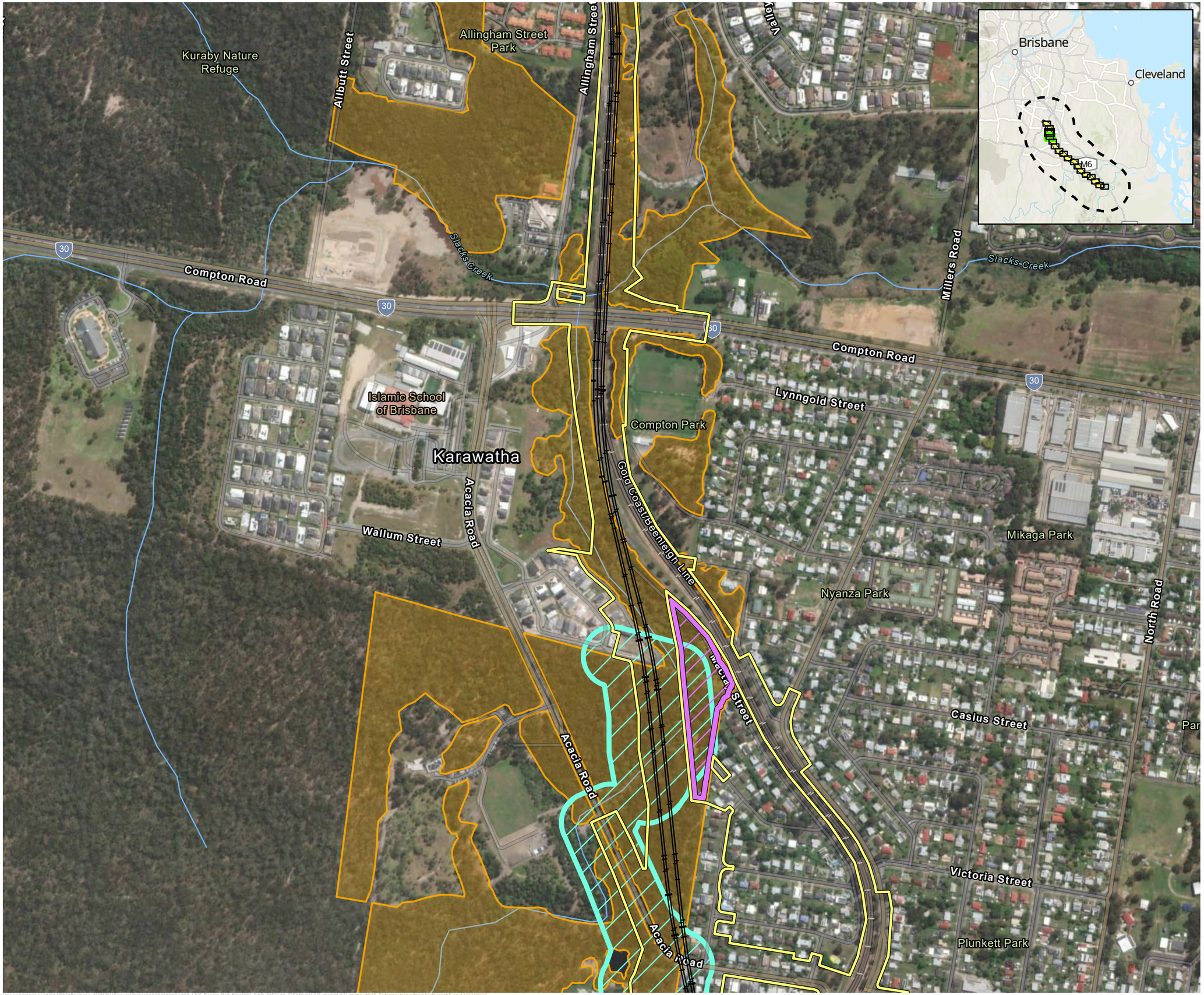

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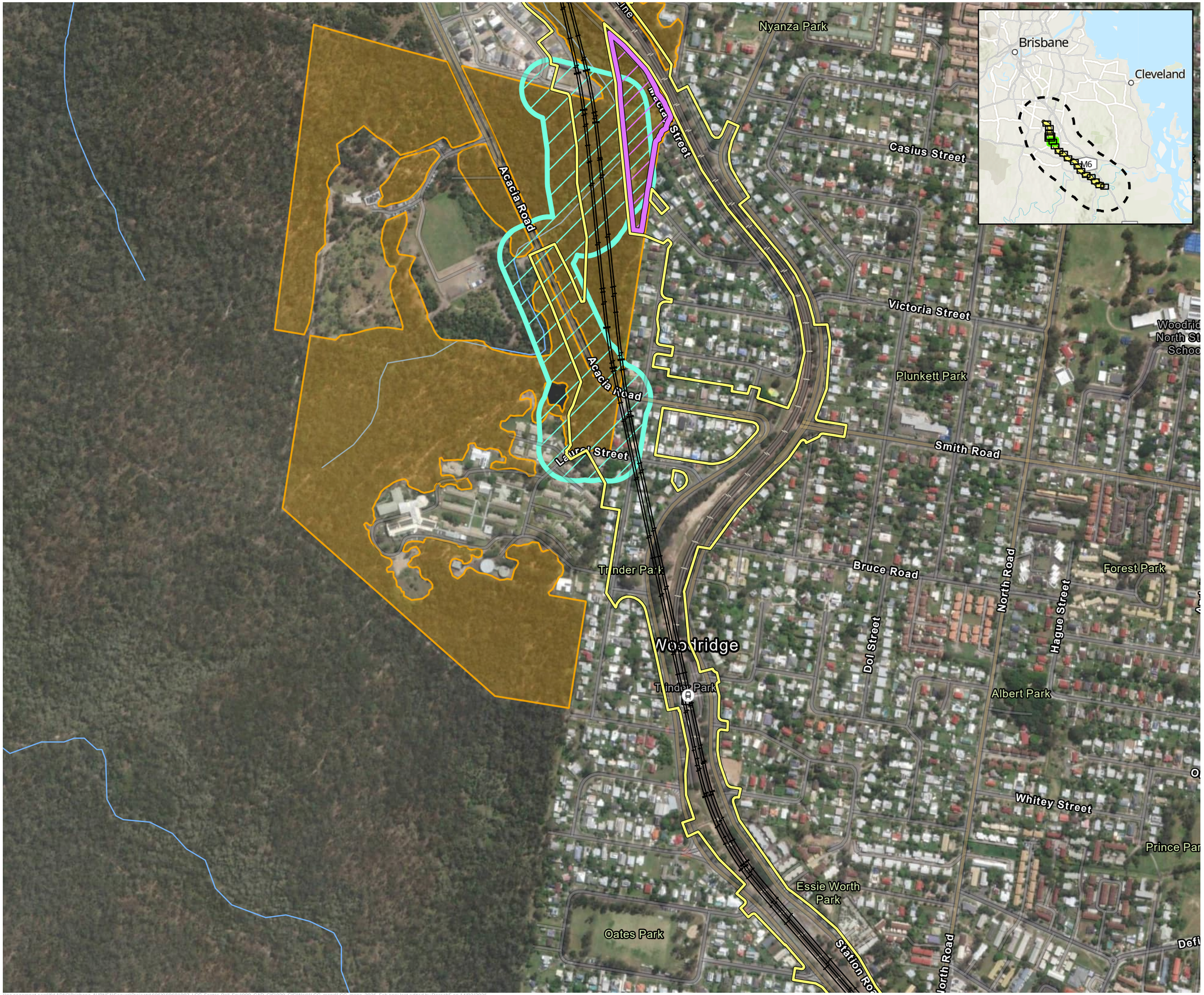

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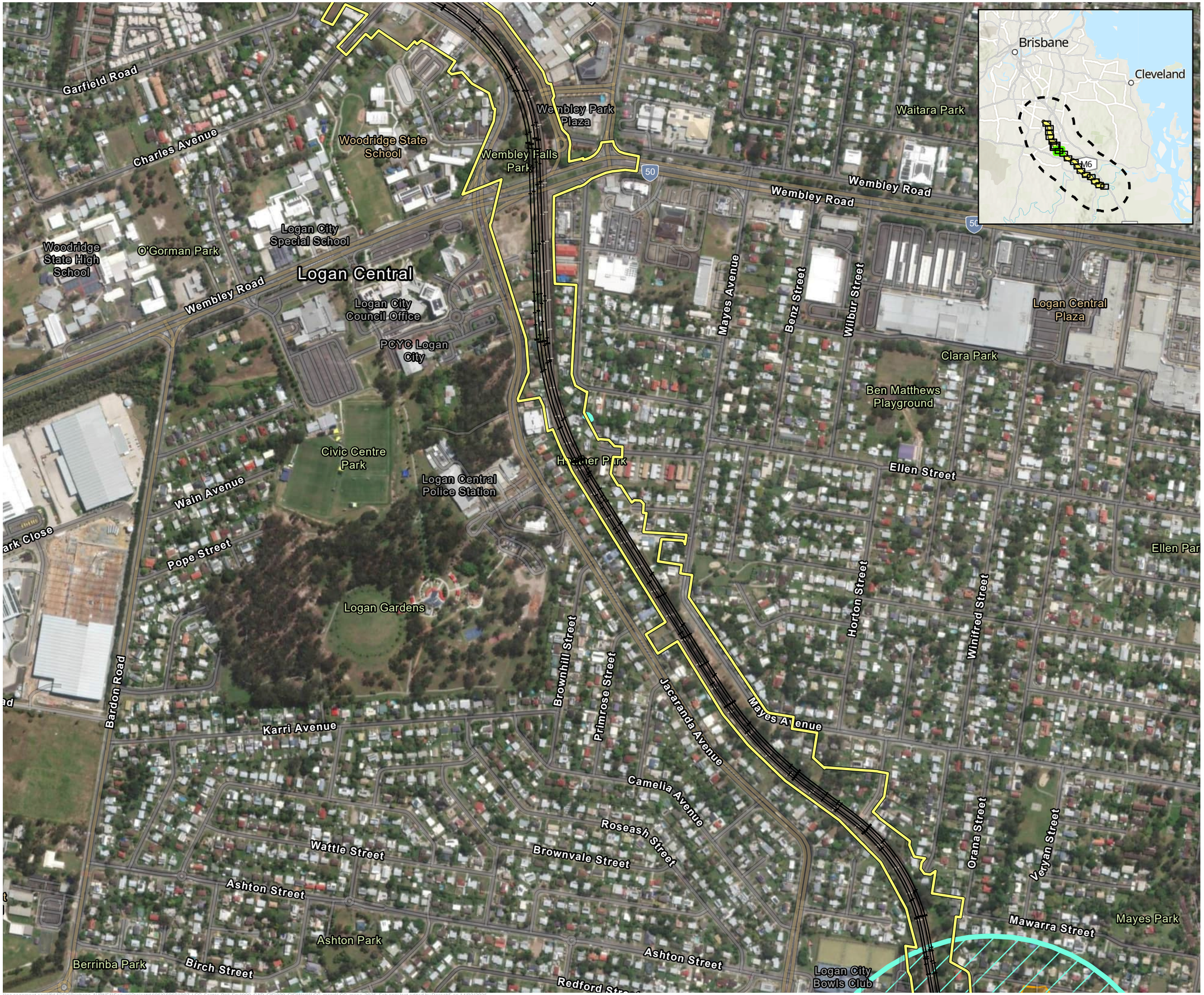

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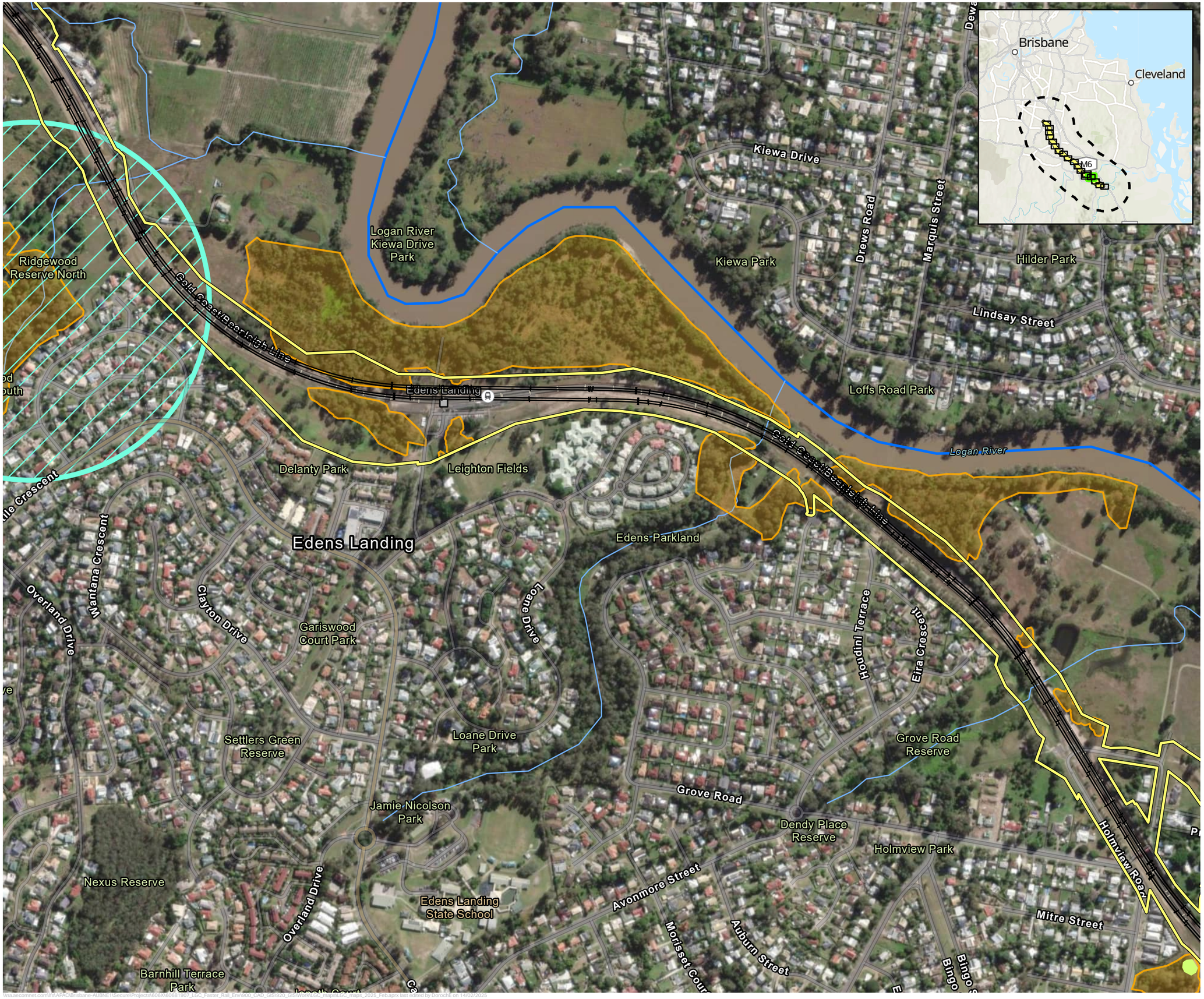

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- December 2023 reference design rail alignment
- Existing railway station

Key Biodiversity Areas (AECOM, 2024)

- Key MNES fauna biodiversity areas (AECOM, 2024)
- Macadamia nut habitat (AECOM, 2024)
- Macadamia nut habitat (GHD, 2021)
- Angle-stemmed myrtle habitat (AECOM, 2024)
- Subtropical eucalypt floodplain forest and woodland TEC (AECOM, 2024)
- Ground truthed fauna movement corridor (AECOM, 2024)
- Functionally lost (greater glider, yellow-bellied glider, koala)
- Indirect impact (grey-headed flying-fox)
- Buffer zone (greater glider, yellow-bellied, grey-headed flying-fox, TEC)

Figure 2 Key biodiversity areas

Project: Logan and Gold Coast Faster Rail
Report: Overarching Environmental Mitigation Plan
Client: Department of Transport and Main Roads
Project Number: 60681907
Date: 14/02/2025

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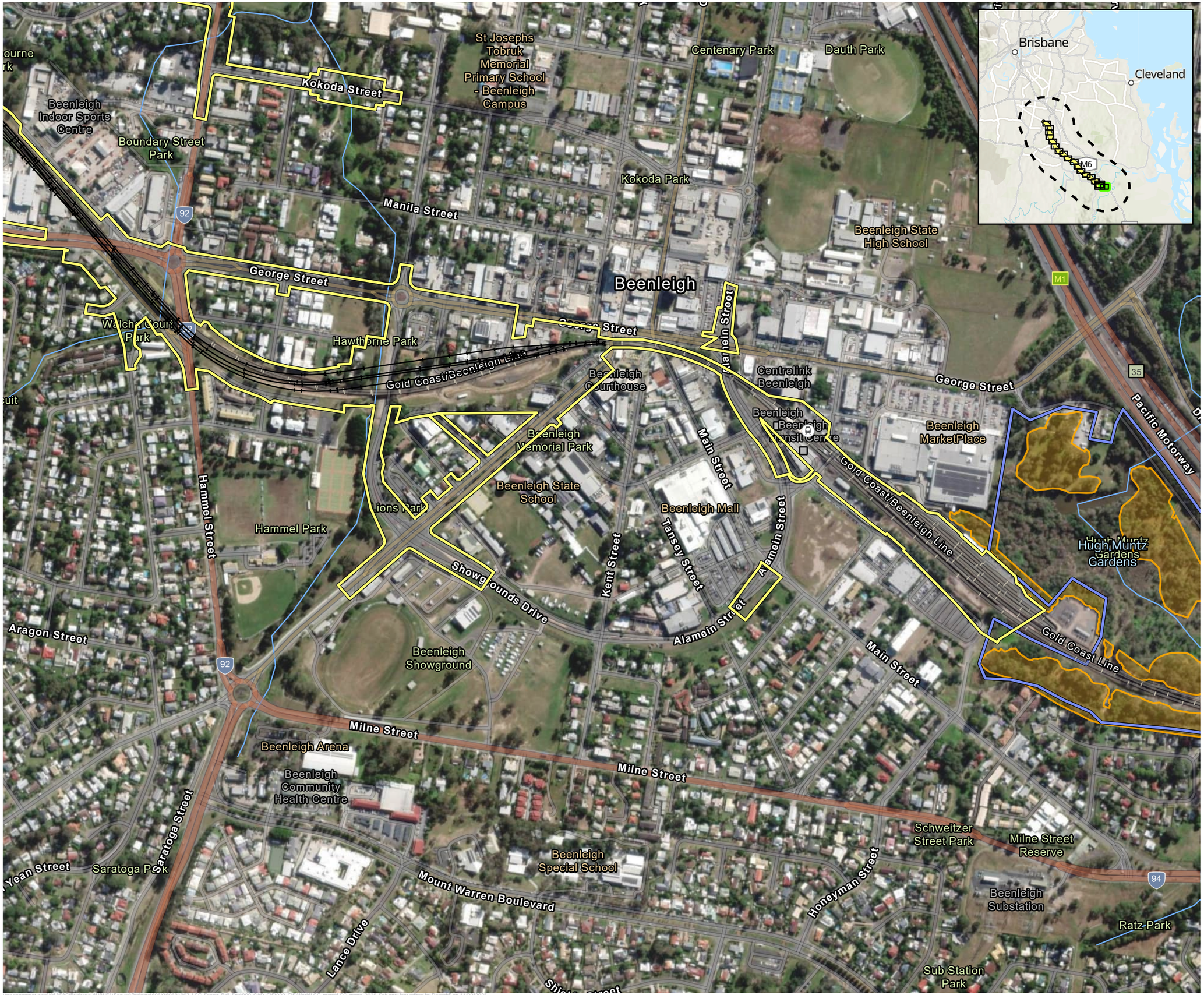

AECOM

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- Study area
- Impact area
- Watercourse (major)
- Watercourse (minor)
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- Existing railway station

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Appendix B

Indicative Fauna Passage Figures

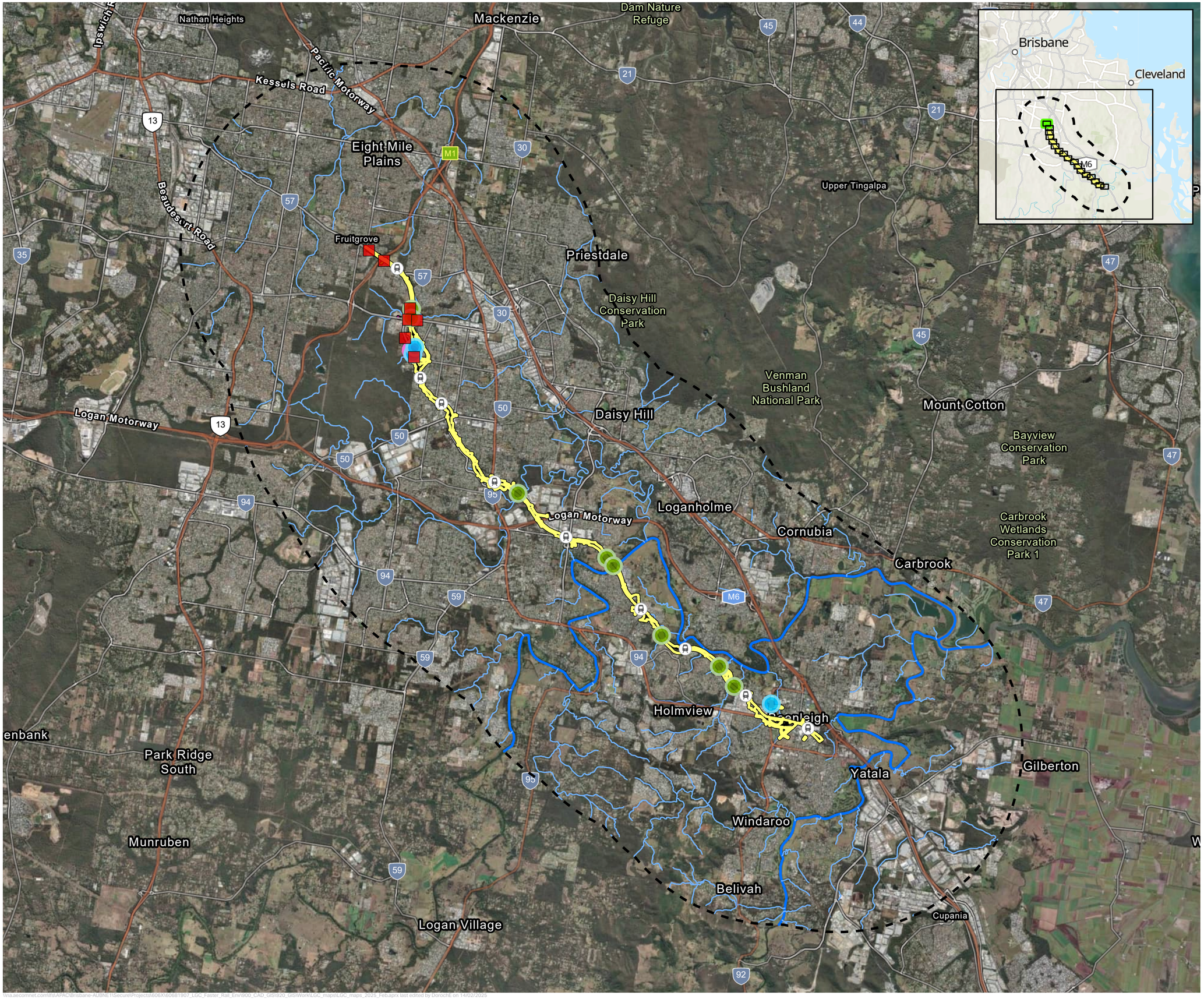
Appendix B Indicative Fauna Passage Figures

The fauna movement corridors presented in Table B-1 represents indicative locations and mitigation measures. Further assessment of these mitigation measures for targeted species will be undertaken during the Detailed Design phase.

Table B-1 Mitigation measures to retain or improve connectivity – for investigation / refinement through Detailed Design

Location	Mitigation measure	Anticipated benefit
Beenleigh Road, Kuraby	• Fauna exclusion fencing • Fauna escape pole • Overhead line equipment (OHLE) electrostatic wildlife guard • Wildlife road signage • Barbed-wire hierarchical treatment	• Reduce risk of vehicle/train collision • Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders)
Beenleigh Road to Compton Road	• Fauna fencing • Fauna escape pole • Fauna passage – new underpass (e.g. log rail bridge) and/or replacement of existing culvert retrofitted with fauna furniture • OHLE electrostatic wildlife guard • Wildlife road signage • Revegetation • Barbed-wire hierarchical treatment	• Reduce risk of vehicle/train collision • Direct fauna to fauna passage increasing east to west movement • Culvert retrofitted and/or new underpass to increase connectivity/fauna movement potential from east to west • Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders) • Improve habitat values
Smith Road /Acacia Forest Park	• Fauna fencing • Fauna escape pole • Glider poles • New dedicated fauna underpass retrofitted with fauna furniture and/or replacement of existing culvert retrofitted with fauna furniture • Wildlife road signage • Barbed-wire hierarchical treatment	• Reduce risk of vehicle/train collision • Direct fauna to fauna passage increasing east to west movement • Culvert retrofitted to increase connectivity/fauna movement potential from east to west • Glider poles increase species movement potential from east to west
Trinder Park	• Fauna fencing • Fauna escape pole • OHLE electrostatic wildlife guard • Barbed-wire hierarchical treatment	• Reduce risk of vehicle/train collision • Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders)
Woodridge (east of station)	• OHLE electrostatic wildlife guard • Barbed-wire hierarchical treatment	• Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders)
Kingston (west of station)	• Fauna fencing • Fauna escape pole • OHLE electrostatic wildlife guard • Barbed-wire hierarchical treatment •	• Reduce risk of vehicle/train collision • Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders)
Scrubby Creek	• Fauna fencing • Fauna escape pole • Fauna passage – new underpass (e.g. log rail bridge) • OHLE electrostatic wildlife guard • Barbed-wire hierarchical treatment	• Reduce risk of vehicle/train collision • Direct fauna to fauna passage increasing east to west movement • Culvert retrofitted and/or new underpass to increase connectivity/fauna movement potential from east to west • Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders)

Location	Mitigation measure	Anticipated benefit
Loganlea / Logan River	• Fauna fencing • Fauna escape pole • Fauna passage – new underpass (e.g. log rail bridge) and/or replacement of existing culvert retrofitted with fauna furniture • OHLE electrostatic wildlife guard • Revegetation • Barbed-wire hierarchical treatment	• Reduce risk of vehicle/train collision • Direct fauna to fauna passage increasing east to west movement • Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders) • Culvert retrofitted and/or new underpass to increase connectivity/fauna movement potential from east to west • Improve habitat values
Edens Landing Station	• Fauna fencing • Fauna escape pole • Fauna passage – new underpass (e.g. log rail bridge) and/or replacement of existing culvert retrofitted with fauna furniture • OHLE electrostatic wildlife guard • Revegetation • Barbed-wire hierarchical treatment	• Reduce risk of vehicle/train collision • Direct fauna to fauna passage increasing east to west movement • Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders) • Culvert retrofitted and/or new underpass to increase connectivity/fauna movement potential from east to west • Improve habitat values
Holmview Station	• Fauna exclusion fencing • Fauna escape pole • Fauna passage – new underpass (e.g. log rail bridge) • OHLE electrostatic wildlife guard • Revegetation • Barbed-wire hierarchical treatment	• Reduce risk of vehicle/train collision • Direct fauna to fauna passage increasing east to west movement • Culvert retrofitted and/or new underpass to increase connectivity/fauna movement potential from east to west • Reduce risk of injury or mortality to fauna from OHLE (particularly for gliders) • Improve habitat values
Beenleigh, Kokoda Street	• Fauna exclusion fencing • Fauna passage – replacement of existing culvert retrofitted with fauna furniture • Barbed-wire hierarchical treatment	• Direct fauna to fauna passage increasing east to west movement • Culvert retrofitted and/or new underpass to increase connectivity/fauna movement potential from east to west



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- Study area
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- Roadside Fauna signage and wildlife advisory marking

Fauna passage

- Included in design scope
- To be further investigated during detailed design

Glider poles

- To be further investigated during detailed design

Fauna friendly/fauna exlcusion fencing

- Included in design scope
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Extent of fauna exclusion fencing has been prescribed under the guidance of a suitably qualified and experienced ecologist based on ground-truthed Target Species, Key Biodiversity Areas and High Value Habitat.

Figure 3 Indicative fauna fencing and fauna passage locations

Project: Logan and Gold Coast Faster Rail
Report: Overarching Environmental Mitigation Plan
Client: Department of Transport and Main Roads
Project Number: 60681907
Date: 14/02/2025

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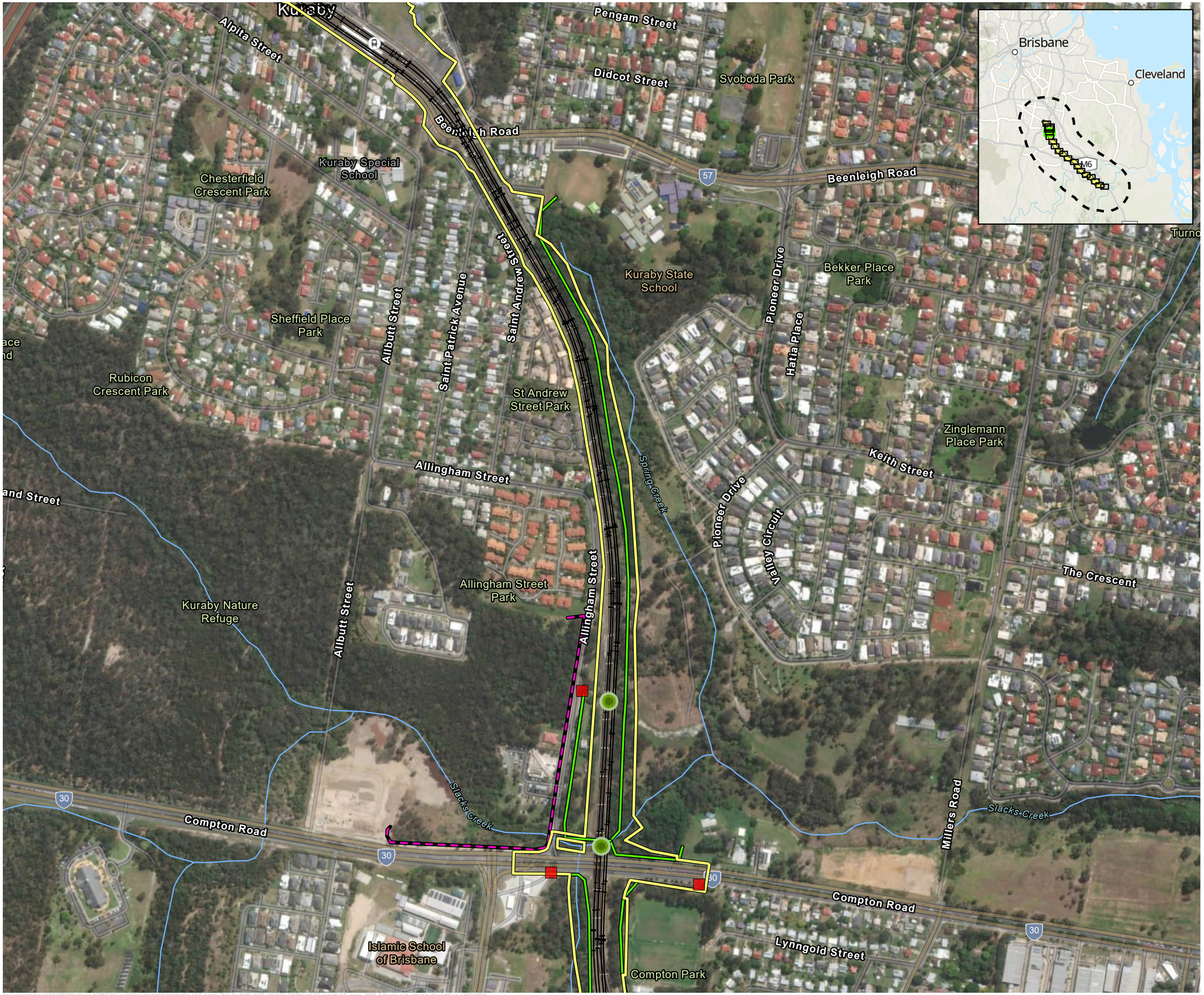

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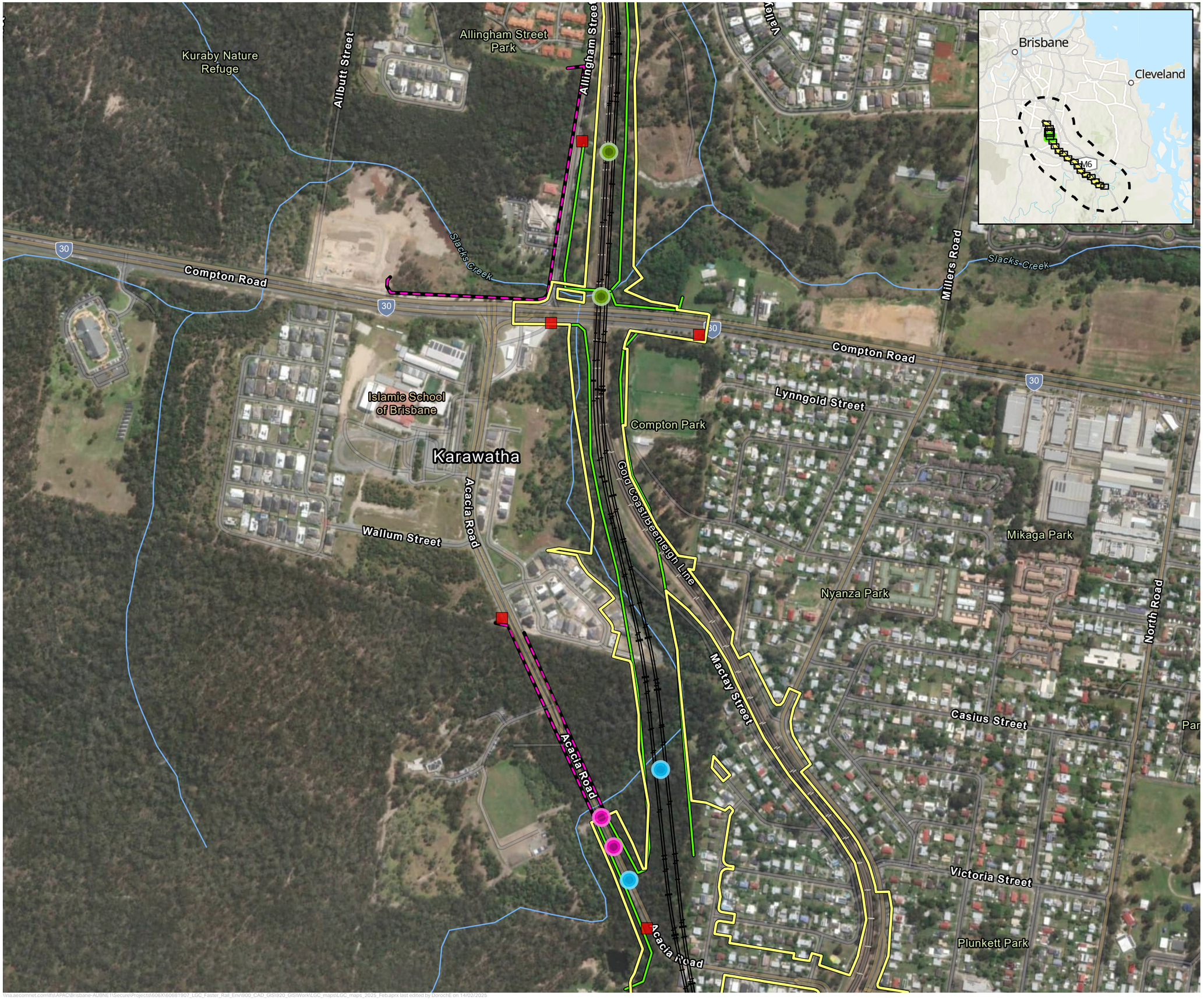

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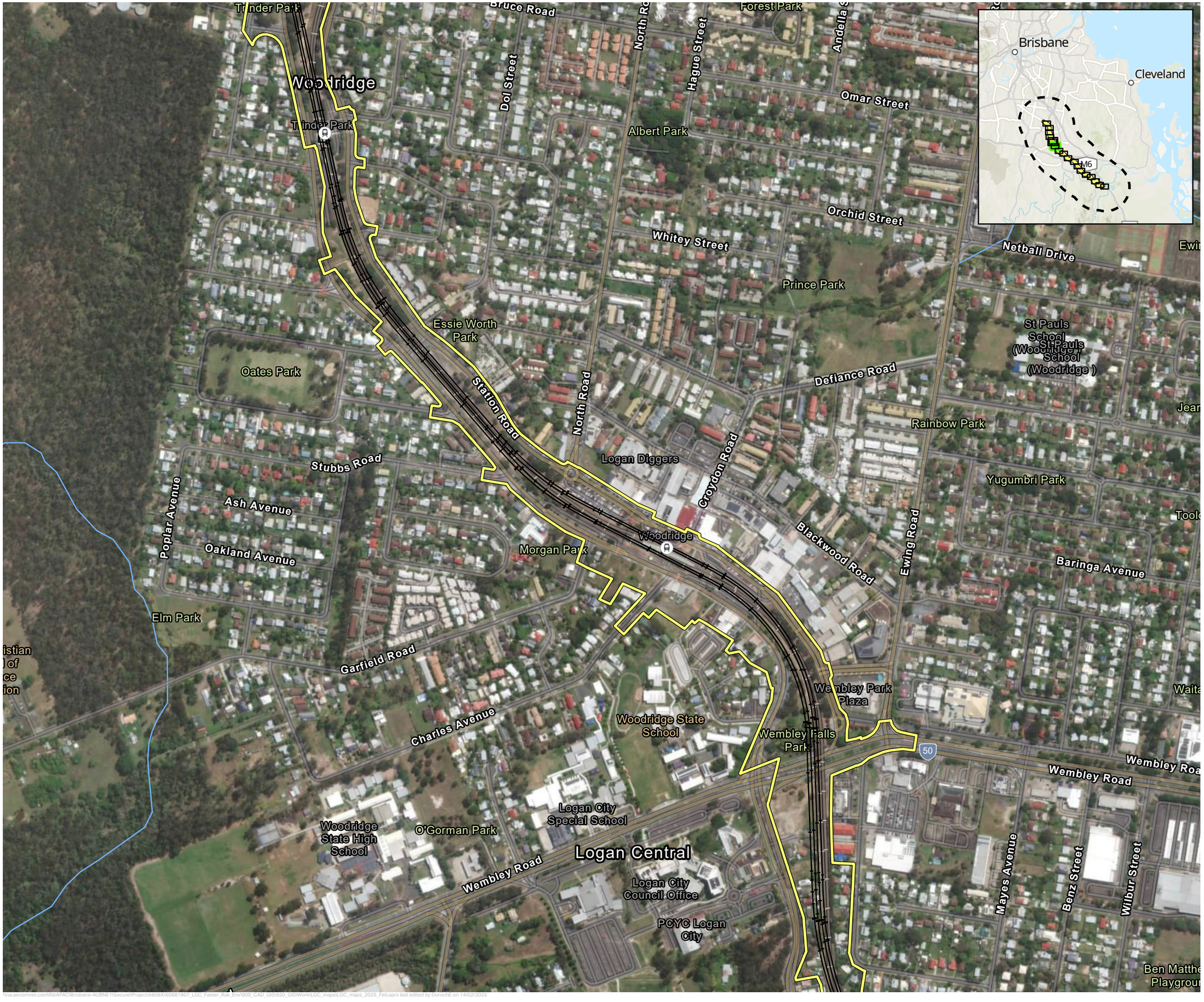

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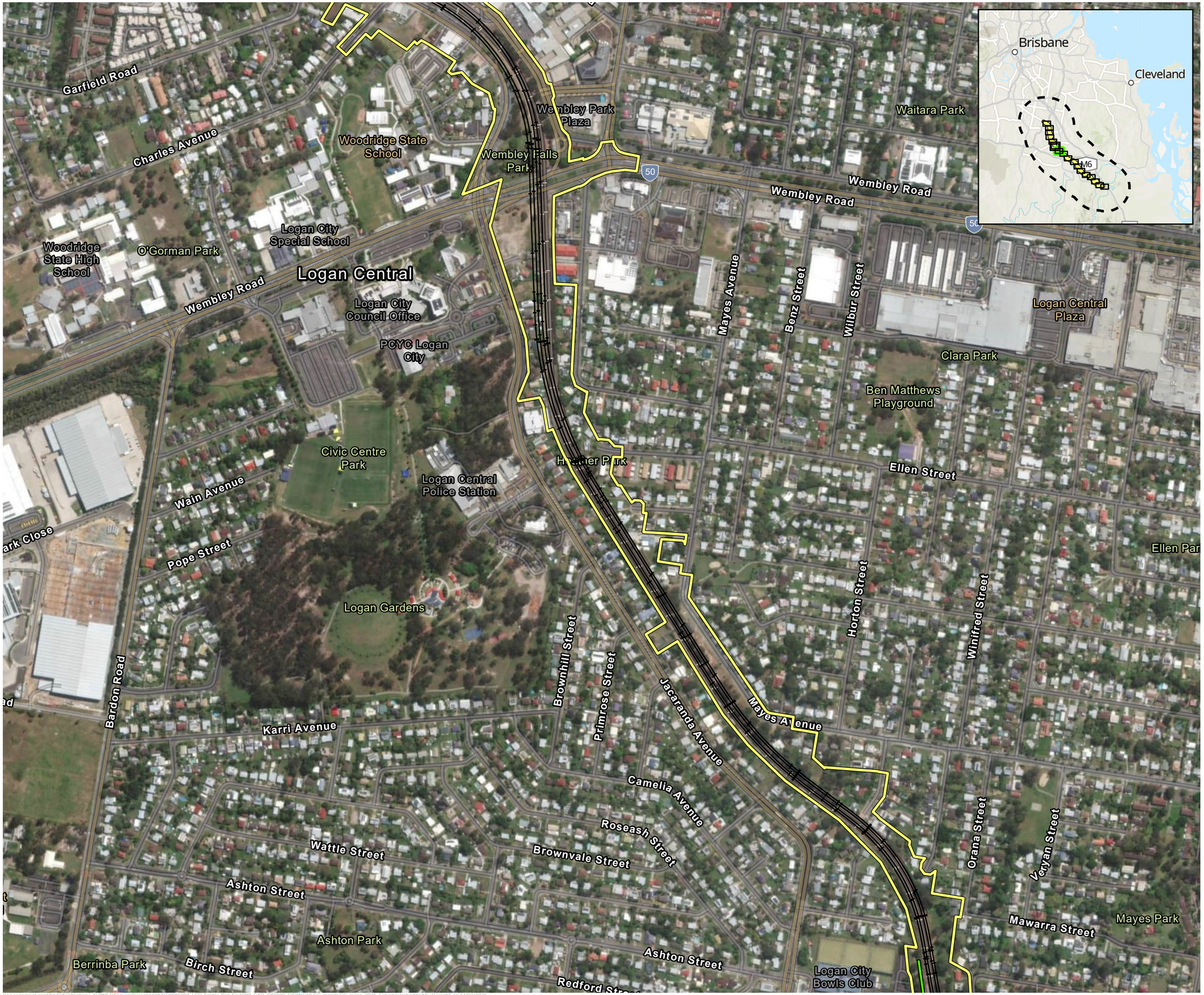

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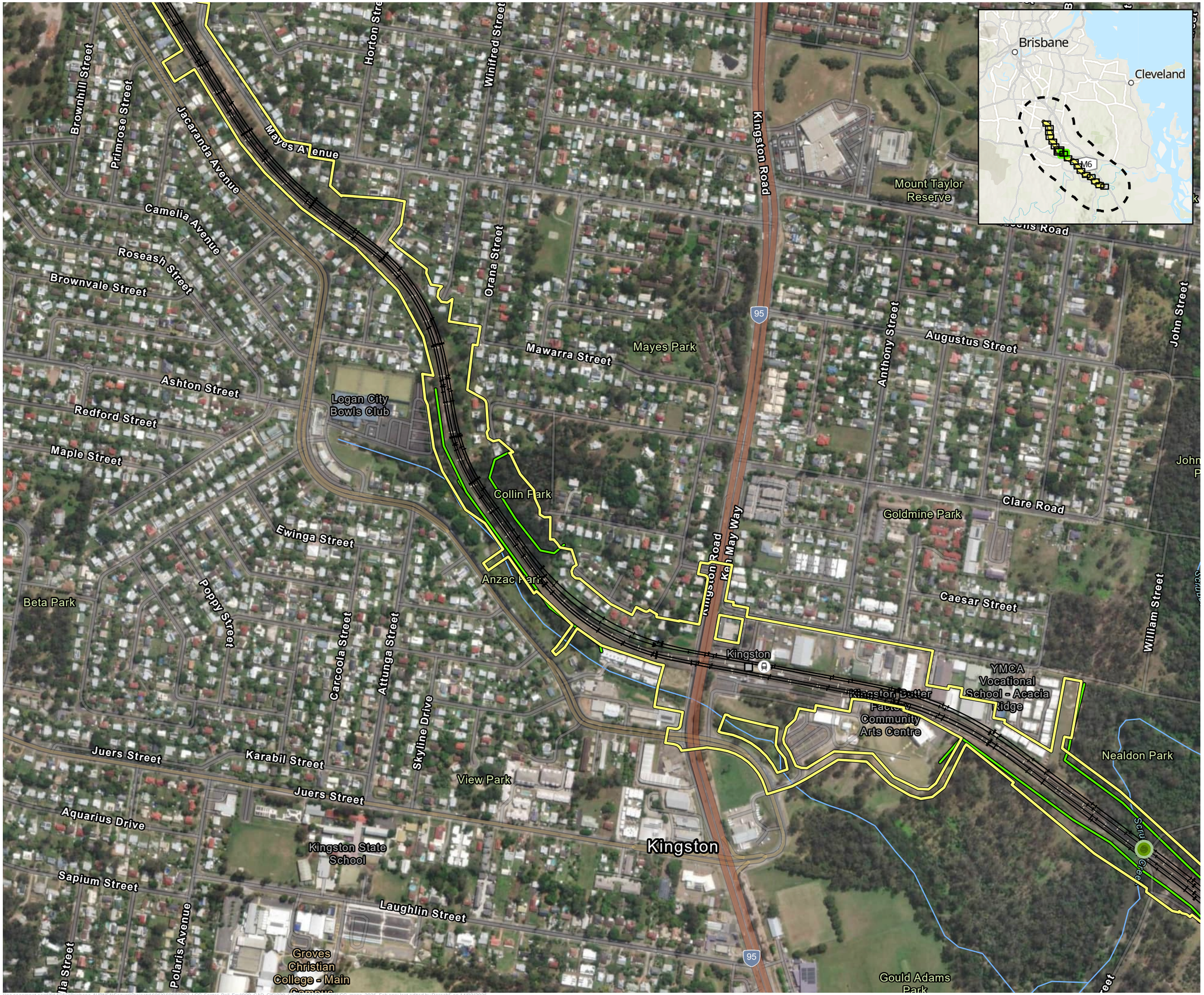

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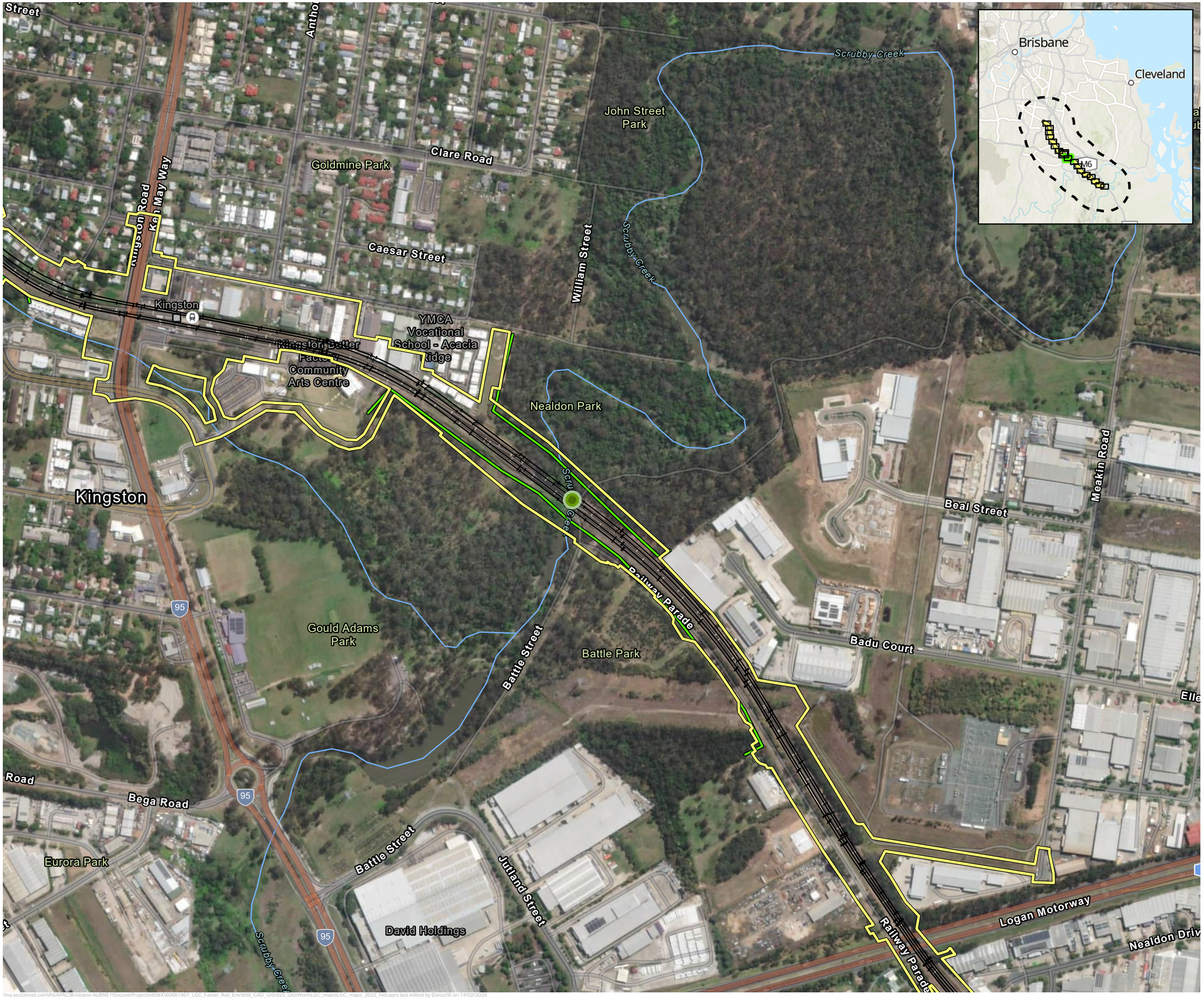

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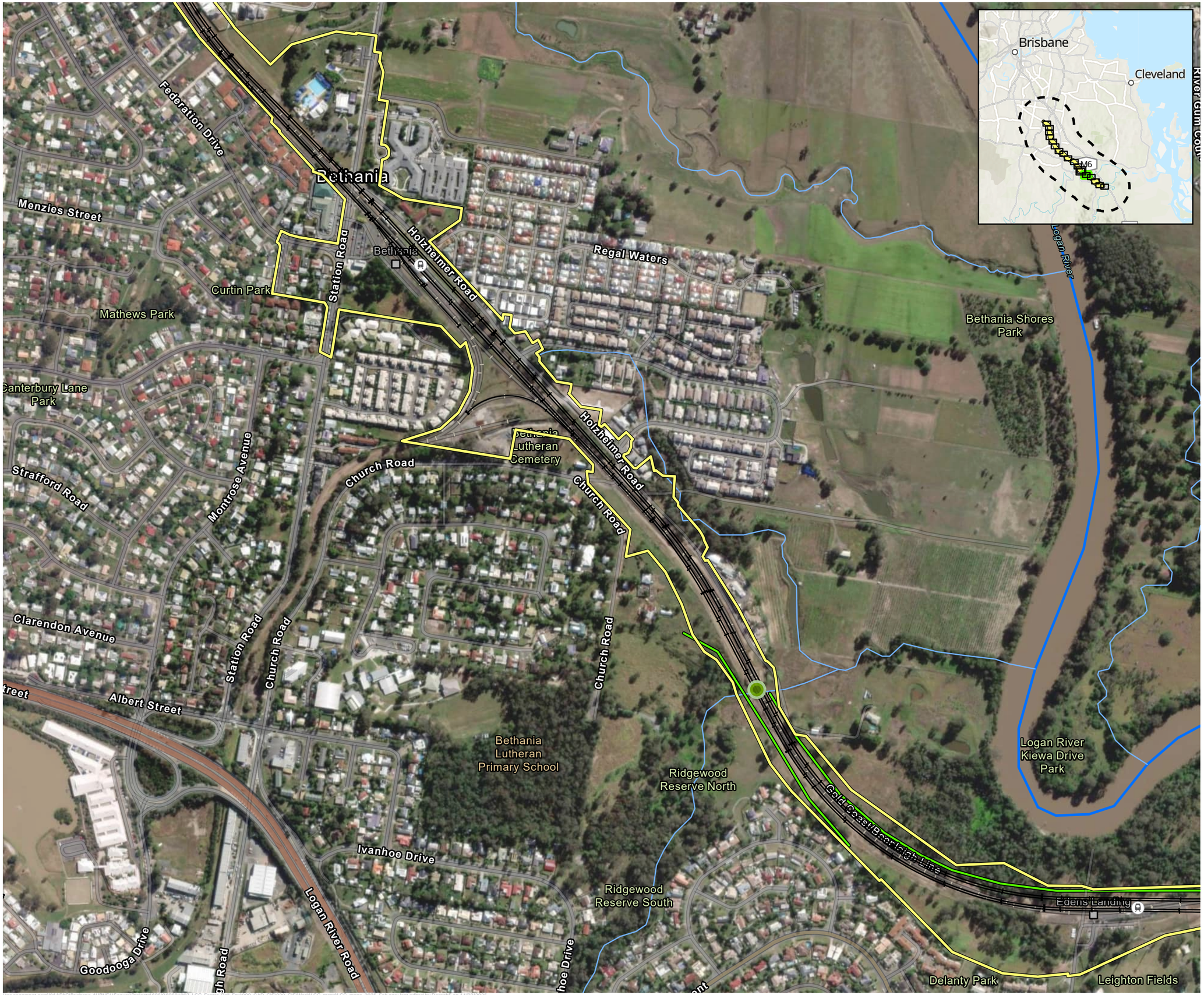

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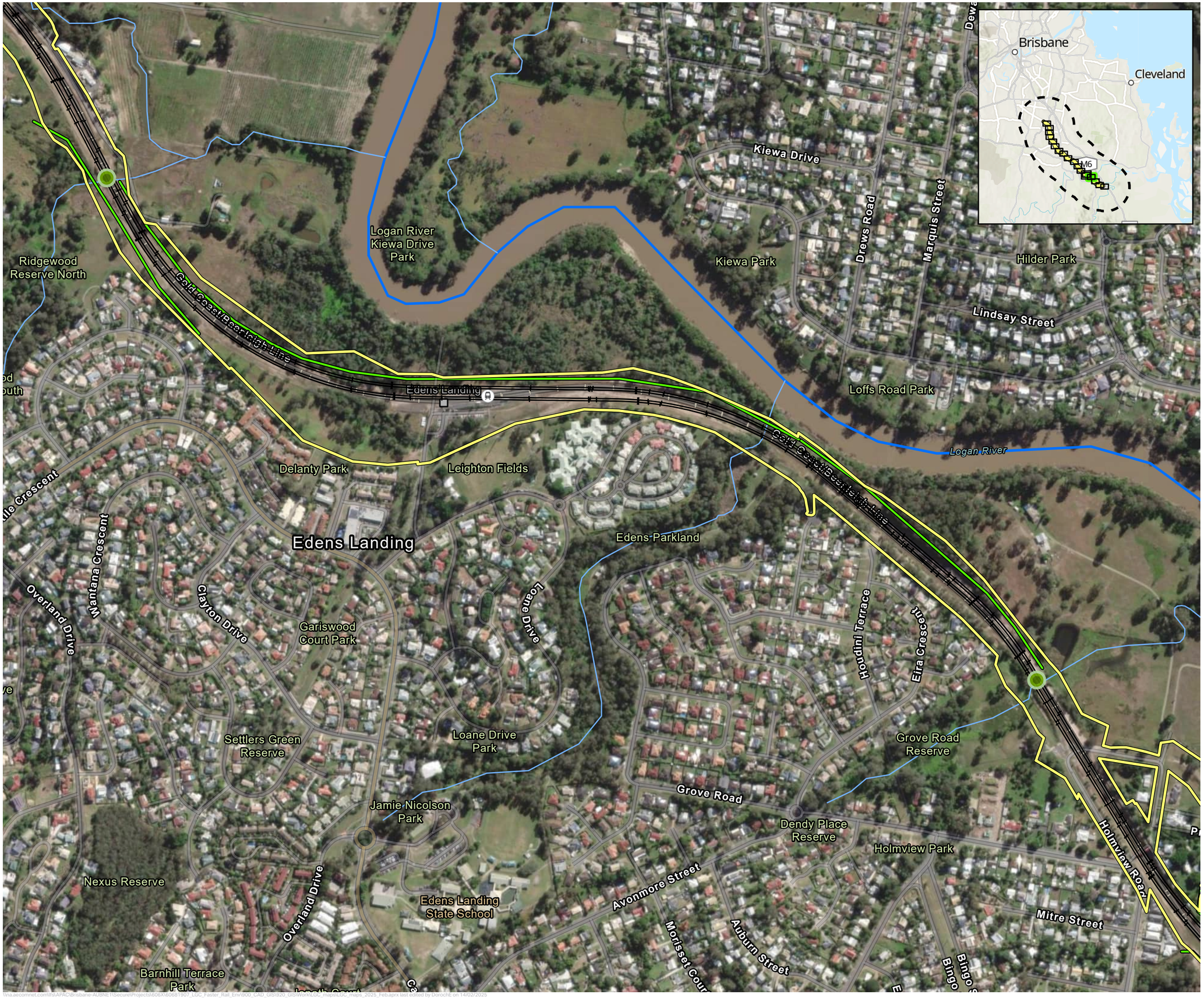

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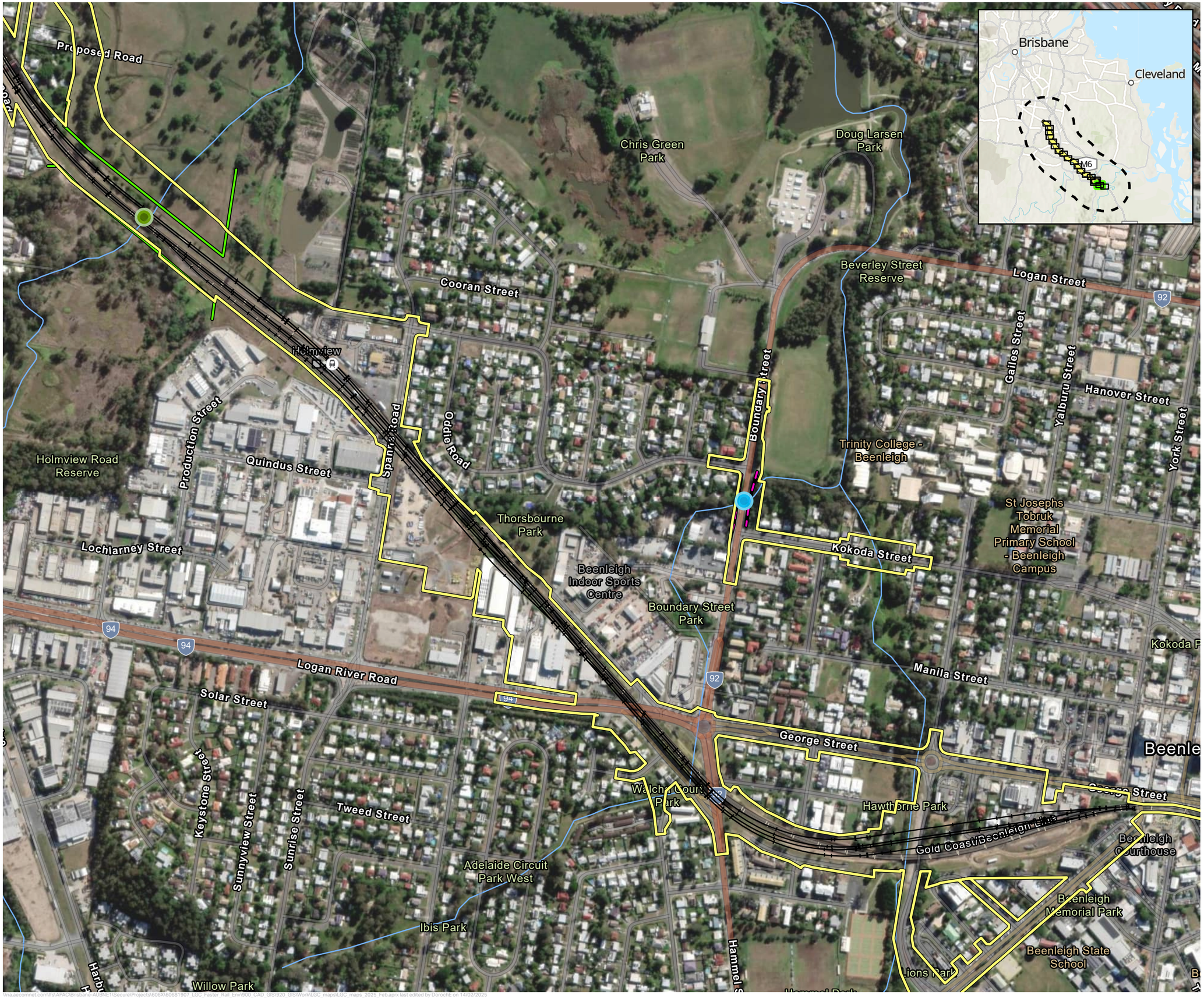

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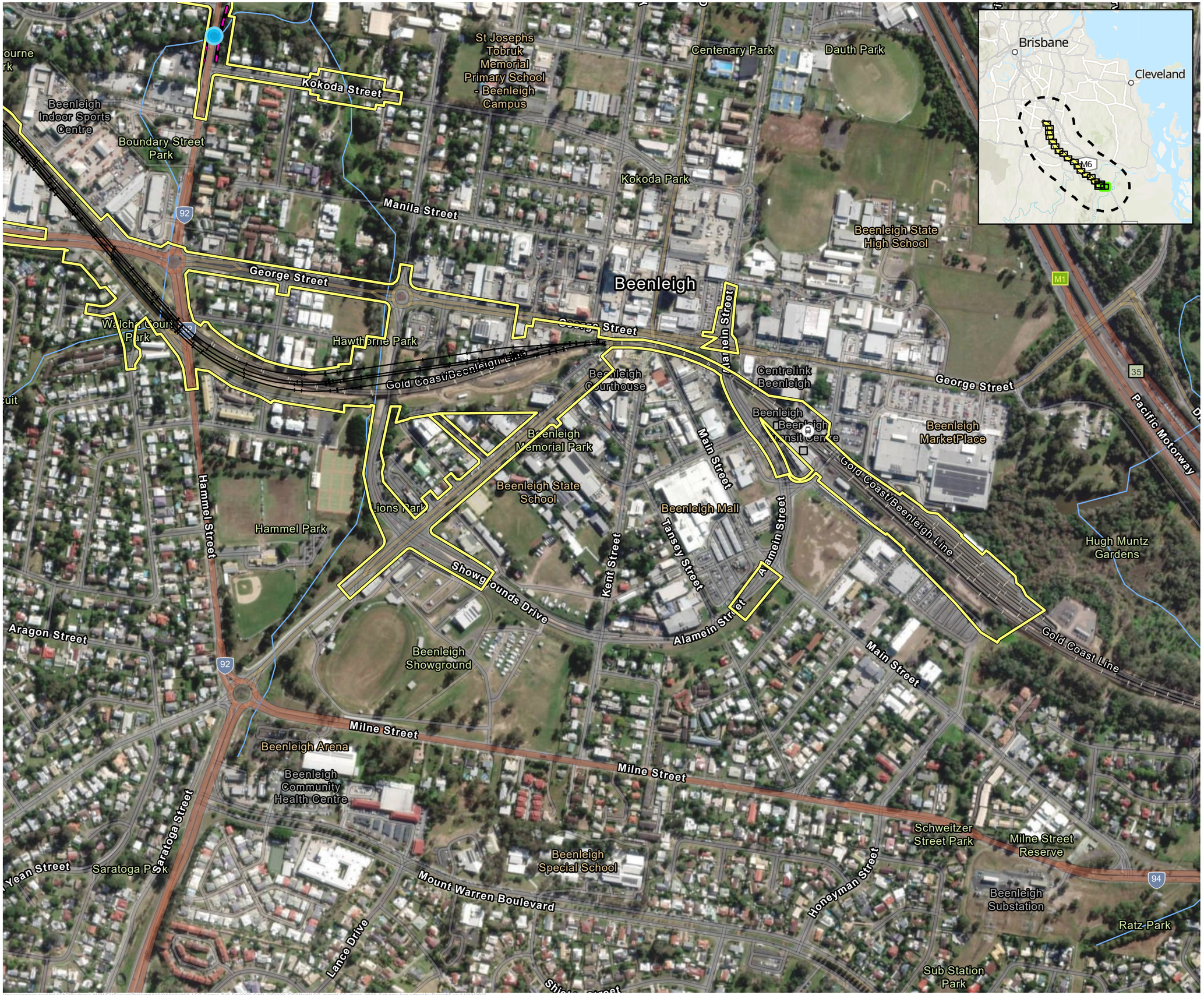

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- Included in design scope
- To be further investigated during detailed design

Extent of fauna exclusion fencing has been prescribed under the guidance of a suitably qualified and experienced ecologist based on ground-truthed Target Species, Key Biodiversity Areas and High Value Habitat.

Figure 3 Indicative fauna fencing and fauna passage locations

Project: Logan and Gold Coast Faster Rail
Report: Overarching Environmental Mitigation Plan
Client: Department of Transport and Main Roads
Project Number: 60681907
Date: 14/02/2025

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Appendix C

Fauna Monitoring Program

Appendix C Fauna Monitoring Program

1.0 Introduction

This Fauna Monitoring Program (FMP) has been prepared on behalf of Queensland Department of Transport and Main Roads (TMR) for the Logan and Gold Coast (LGC) Faster Rail Project (the proposed action).

This FMP will inform fauna monitoring requirements for the Design & Construction (D&C) phase for relevant Matters of National Environmental Significance (MNES) threatened fauna species[1] listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), specifically:

1. What information will be collected,
2. Frequency and duration of monitoring, and
3. The responsible party.

This FMP is intended to be progressively evaluated and where needed updated for efficacy and relevance during the D&C phase. Updates to the FMP will be completed by a suitably qualified ecologist, with monitoring outcomes for MNES (Table 1-4) reviewed during D&C by suitably qualified environmental representatives/contractors.

2.0 Purpose

This FMP outlines actions for the design and pre-construction phase to enable a baseline understanding of fauna activities, during the construction phase to monitor and assess mitigation, and during post-construction phase to monitor and assess effectiveness of long-term fauna measures within key MNES fauna biodiversity areas within the Impact area and associated buffer zones.

The intent of the FMP is to:

- Ensure permanent fauna mitigation measures are incorporated at suitable locations to ensure they are the most appropriate and effective
- Demonstrate the effectiveness of fauna mitigation measures including fauna connectivity infrastructure (i.e. underpasses, glider poles, escape poles and fencing at key Matters of National Environmental Significance (MNES) fauna biodiversity areas with specific regard to species-specific requirements).
- Ensure that meaningful data is collected to implement corrective actions in a timely and meaningful manner. The FMP will prescribe suitable and practicable fauna monitoring scope, frequencies and durations for targeted MNES species relevant to the proposed action

Relevant conservation significant fauna species that this FMP applies to are:

- Koala (*Phascolarctos cinereus*)
- Glossy black-cockatoo (*Calyptorhynchus lathami lathami*)
- Grey-headed flying-fox (*Pteropus poliocephalus*)
- Yellow-bellied glider (south-eastern) (*Petaurus australis australis*)
- Greater glider (southern and central) (*Petauroides volans*)
- Swift parrot (*Lathamus discolor*)
- Regent honeyeater (*Anthochaera phrygia*).

Although the monitoring program has a focus on relevant conservation significant species and their utilisation of fauna movement infrastructure, it will also collect evidence of use by other fauna species.

[1] Based on the conservation significant fauna assessed with a potential risk as assessed in the Supplementary MNES Report, Section 7.0, Table 33.

This FMP is intended to be undertaken during the following phases:

- Detailed Design / Pre-construction (used interchangeably) phase – to enable baseline understanding
- Construction phase – to monitor and assess mitigation, and apply corrective actions, and
- Post-construction phase – to ensure long-term efficacy of mitigation.

TMR will be responsible for the implementation of the FMP notwithstanding that coordination may occur through the successful Proposed action's D&C Contractor.

Monitoring as part of the FMP will run for a minimum of four years as per *TMR Fauna Sensitive Transport Infrastructure Delivery Manual,* Section 4.10, Chapter 3 (Department of Transport and Main Roads, 2024).

It is understood this FMP may be conditioned as part of an approval for the proposed action.

3.0 Guidelines

Relevant sections of the following guidelines have been used to complement AECOM's specialist ecologist experience in developing a fit-for-purpose FMP including:

- TMR Fauna Sensitive Transport Infrastructure Delivery Manual (Department of Transport and Main Roads, 2024)
- Koala Sensitive Design Guideline (State of Queensland, 2022)
- National Light Pollution Guidelines for Wildlife (Department of Climate Change Energy the Environment and Water 2023).

Relevant sections of the abovementioned guidelines used to complement this fit-for-purpose FMP which are referenced within Table 1, able 2, Table 3 and Table 4.

4.0 Monitoring

This FMP has been designed in accordance with monitoring requirements for relevant conservation significant fauna species, as outlined in the Proposed action's Overarching Environmental Mitigation Plan (OEMP) as well as pre-construction fauna measures outlined in the Supplementary MNES Report, (refer Section 6.2, Table 34). Based on this information, species-specific fauna monitoring programs (Table 1, able 2, Table 3 and Table 4) have been developed to include:

- Purpose / outcome of the fauna monitoring program
- Species-specific monitoring plan detailing methods for pre-construction, during-construction and post-construction phases
- Details on frequency and duration of monitoring and reporting requirements.

The D&C Contractor will assist the Proponent in fulfilling the requirements of the FMP. This will include maintaining data records and assessing if mitigation and monitoring is meeting interim milestones. Data will include field survey data, forms, reports, spatial data, camera footage and photos. If required, this data will be made available to DCCEEW upon request through reports.

Table 1 Proposed fauna monitoring program for koala

	Pre-construction	During-construction	Post-construction
Target species: Koala			
Purpose / Outcome: Monitoring of species to estimate and compare pre, during and post-construction population abundance and density within key MNES fauna biodiversity areas (as per OEMP, Figure 2) and to assess implementation of construction mitigations. Furthermore, analyse and understand use and effectiveness of koala culverts, retrofitted fauna furniture (e.g. log rail bridge, refuge poles etc), koala exclusion fencing (temporary and permanent) and success of habitat enhancement.			
Monitoring methods (e.g., cameras, sand plots)	• Remote-triggered cameras on pre-existing culverts and areas of proposed locations of log rail bridges • Fence checks and roadkill monitoring scanning the railway corridor for any signs of injury / mortality within accessible areas of the existing Proposed action area boundary in proximity to key MNES fauna biodiversity areas (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(f))* • Scat detection (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(e))* • Sand plots at proposed locations of pre-existing culverts and areas of proposed locations of log rail bridges (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(g))*	• Fence checks and monitoring for signs of injury / mortality throughout the Proposed action area boundary (as part of set Weekly Environmental Inspections and informal visual observations (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(f))* • Scat detection (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(e))* • Sand plots at locations of proposed locations of pre-existing culverts and areas of proposed locations of log rail bridges (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(g))*	• Scat detection (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(e))* • Sand plots at locations of fauna underpasses (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(g))* • Thorough Koala Exclusion Fence inspection to be undertaken as part of 5-week Breeding season monitoring to confirm integrity of fence and implement corrective actions if needed.
Monitoring locations (i.e. based on existing/anticipated fauna movement corridors)	**Koala culverts and/or log rail bridge** • Beenleigh Road/Compton Road • Acacia Forest Park • Scrubby Creek • Logan River • Holmview Station • Beenleigh, Kokoda Street • Edens Landing Station	**Targeted revegetation areas** • Loganlea/Logan River • Holmview Station • Edens Landing Station • Beenleigh Road to Compton Road	**Koala exclusion fencing** • Beenleigh Road to Compton Road • Acacia forest Park • Trinder Park • Kingston (west of station) • Scrubby Creek • Loganlea/Logan River • Edens Landing Station • Holmview Station • Beenleigh, Kokoda Street
Monitoring duration and frequency (e.g. targeted to breeding season, pre and post clearing, ongoing monitoring)	• 5-week period over breeding season (August-November) annually. • Remote-triggered cameras to be set for the 5-week period at locations of existing and proposed culverts and/or log rail bridges as per the abovementioned locations. • Sand tracking and scat detection to be undertaken three times a week within the 5-week monitoring period within proposed areas of koala culverts and/or log rail bridges as per the abovementioned locations. **Contingency for monitoring duration and frequency:** Where the 5-week monitoring period cannot be undertaken during the koala breeding season (August-November), monitoring will be extended to a 10-week monitoring period to account for lower koala activity levels.	• 5-week period over breeding season (August-November) annually during construction phase. • Remote-triggered cameras to be set for the 5-week monitoring period at locations of existing and proposed culverts and/or log rail bridges as per the abovementioned locations. • Thorough Koala Exclusion Fence inspection to be undertaken at least annually prior to breeding season to rectify any fencing damage / issues prior to higher koala mobility periods. • Sand tracking and scat detection to be undertaken three times a week within the 5-week monitoring period within proposed areas of koala culverts and/or log rail bridges as per the abovementioned locations.	• 5-week period over breeding season (August-November) annually for minimum two years. • Remote-triggered cameras to be set for the 5-week period at locations of koala culverts and/or log rail bridges as per the abovementioned locations. • Thorough Koala Exclusion Fence inspection to be undertaken as part of 5-week Koala Breeding season monitoring • Sand tracking and scat detection to be undertaken three times a week within the 5-week monitoring period at locations of koala culverts and/or log rail bridges as per the abovementioned locations. • Monitoring of revegetated areas to be incorporated into the 5-week monitoring period to capture evidence of use. **Contingency for monitoring duration and frequency:** If data is unavailable for a suitably qualified ecologist to complete a robust assessment of pre-construction/post-construction monitoring of species to estimate the use and effectiveness of fauna movement infrastructure and/or compare population abundance and density, then up to 4 years (or as determined by suitably qualified ecologist) post-construction monitoring to be undertaken.
Reporting	• Annual compliance report • Adaptive management approach to ensure notification and improvement works identified at the time of monitoring are implemented ahead of the formal reporting period		

Table 2 Proposed fauna monitoring plan for grey-headed flying-fox

	Pre-construction	During-construction	Post-construction
Target species: Grey-headed flying-fox			
Purpose / Outcome: Assess direct injury/mortality does not occur as a result of design and construction activities and monitoring to identify if the species deterred from using the Impact area during night works and assess implementation of construction mitigations			
Monitoring methods and timing	• Monitoring of flying-fox camps within Impact area or within buffer zone (300 m) to be undertaken prior to site establishment in the camp vicinity to inform timing & extent of works to minimise impacts (*TMR Fauna Sensitive Transport Infrastructure Delivery manual – Chapter 10, Section 8).* • Monthly visual camp counts and breeding status assessment – record number of flying foxes, breeding status and whether young are present. Record any injured, sick or dead flying-foxes. • Fence checks and monitoring for signs of injury / mortality (e.g. electrocution and/or entanglement) throughout the Proposed action area boundary (as part of as part Koala Fence inspection (above)	• Camp count, breeding status assessment and stress level assessment (e.g. species is airborne for 5 minutes or more, excessive vocalisations, excessive fanning, star lifting and abortion events) during nightworks within Impact area and/or 300 m buffer zone (DESI, 2020) • Noise and vibration monitoring as required by the following guidelines will be implemented to manage potential noise and vibration impacts to grey-headed flying fox at roost locations: - Queensland Environmental Protection (Noise) Policy 2019, Schedule 1 - Acoustic quality objectives - TMR's Volume 2 - Transport Noise Management Code of Practice - TMR's MRTS51 *Environmental Management Technical Specification,* Section 8.5 - TMR's *Interim Guideline Operational Railway Noise and Vibration, Section 2, Section 3 and Section 4.* • Fence checks and monitoring for signs of injury / mortality (e.g. electrocution and/or entanglement) throughout the Proposed action area boundary (as part of set Weekly Environmental Inspections and informal visual observations	Reporting of hazards and fauna injuries/deaths (e.g. maintenance/inspection observations), including the incidence of electrocution from powerlines assessing the efficacy of Overhead Line Equipment (OHLE) electrostatic wildlife guards as a mitigation measure.
Monitoring locations	Within breeding/roosting habitat (including buffer zones) within: • Voyager Drive, Kuraby • Jacaranda Avenue, Kingston • Ridgewood Reserve, Edens Landing (outside of Impact area)		• Locations of installed OHLE electrostatic wildlife guards within key MNES fauna biodiversity areas
Monitoring durations and frequency	• Monthly monitoring to supplement results from AECOM's targeted field surveys for camp counts and camp status (i.e. juveniles or pregnant mothers present) to be undertaken prior to site establishment in the vicinity to confirm camp presence • Monitor breeding habitat within buffer zones to assess pre-existing indirect impacts due to noise, light and vibration • Three-day diurnal survey in either early Autumn, late spring and early summer during high flowering/fruiting periods and high species activity periods (mating and/or rearing periods) **Contingency for monitoring duration and frequency:** Where the three-day diurnal survey cannot be undertaken during either early Autumn, late spring and early summer, surveys will be undertaken during winter to account for winter flowering eucalypt species.	Vegetation clearing within 300m of known camps, or high impact activities[2] within 100 m of camps. Where a monitoring data set (for light, dust, noise, vibration) demonstrates to a suitably qualified ecologist that construction impacts are being managed appropriately and therefore present a lower risk to this species – monitoring frequency may be adjusted. Conversely, if data is unavailable for a suitably qualified ecologist to complete a robust assessment of the effectiveness construction management measures, then additional / ongoing monitoring may be prescribed.	Reporting of fauna hazards and injuries/deaths (e.g. maintenance/inspection observations), including the incidence of electrocution from powerlines assessing the efficacy of OHLE electrostatic wildlife guards as a mitigation measure.
Reporting	• Monthly Environmental Report (including weekly noise and vibration monitoring results) • Annual compliance report • Annual return of operations	• Monthly Environmental Report (including weekly noise and vibration monitoring results) • Review of fauna spotter catcher records • Annual compliance report • Annual return of operations	• Incident report: Reporting of fauna injuries/deaths (e.g. maintenance/inspection observations), including the incidence of electrocution from powerlines assessing the efficacy of OHLE electrostatic wildlife guards as a mitigation measure.

[2] Impact pile driving, impact guard rail installation or removal, saw cutting, rock / concrete breaking (hammering), rock removal or placement.

Table 3 Proposed fauna monitoring for greater glider (southern and central) and yellow-bellied glider (south eastern)

	Pre-construction	During-construction	Post-construction
Target species: Greater glider (southern and central) and yellow-bellied glider (south-eastern)			
Purpose / Outcome: Monitoring of species to estimate and compare pre-construction, during and post-construction population abundance and density within key MNES fauna biodiversity areas (as per OEMP, Figure 2) and ecologically relevant buffer zones (50 m surrounding breeding habitat within Acacia Forest Park and Scrubby Creek) and assess effectiveness of construction mitigation measures. Furthermore, analyse and understand the use and effectiveness of glider poles and carved hollows.			
Monitoring methods and timing	• Remote-triggered cameras placed within areas of ground-truthed potential hollow areas buffer zones (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(a))* • Nocturnal spotlighting surveys to coincide with the deployment of remote-triggered cameras. Surveys to include one day prior to deployment and one day post collection of remote-triggered cameras • Scat detection (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(e))*	• Remote motion sensor and infrared wildlife cameras within: - Areas of ground-truthed potential hollow areas and buffer zones - Areas planned for glider connectivity infrastructure (e.g. glider poles / rope bridges / or similar (if applied). If installation has occurred • Remote motion sensor and infrared wildlife cameras on glider poles to usage (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(a))* • Scat detection (refer *TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(e))* • Fence checks and monitoring for signs of injury / mortality (e.g. electrocution and/or entanglement) throughout the Proposed action area boundary (as part of set Weekly Environmental Inspections and informal visual observations	• Remote motion sensor and infrared wildlife cameras within: - Areas of ground-truthed potential hollow areas and buffer zones - Areas planned for glider connectivity infrastructure (e.g. glider poles / rope bridges / or similar (if applied). If installation has occurred, on carved hollows to record usage • Remote motion sensor and infrared wildlife cameras on installed glider connectivity infrastructure for usage (refer TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(a)) • Scat detection (refer TMR Fauna Sensitive Transport Infrastructure Delivery manual – Appendix A, Table A2(e)) – *Appendix A, Table A2(e))*
Monitoring locations	• Key MNES fauna biodiversity areas and ecologically relevant buffer zones (as per OEMP).		
Monitoring durations and frequency	• 5-week period over the greater glider (southern and central) breeding season (March-June) annually • NOTE: Yellow-bellied glider (south-eastern) reproduction varies and occurs seasonally (Department of Agriculture, 2022), and as such monitoring frequency is based from known greater glider (southern and central) breeding seasons. • Remote-triggered cameras to be set for the 5-week period at locations of carved hollows • Scat detection to be undertaken three times a week within the 5-week monitoring period within areas of proposed glider poles and pre-installed carved hollows **Contingency for monitoring duration and frequency:** Where the 5-week monitoring period cannot be undertaken during greater glider breeding season, monitoring duration will be extended to 8-weeks monitor activity levels during foraging events.	• 5-week period over breeding season (March-June) annually for the duration of construction. • Remote-triggered cameras to be set for the 5-week period at locations of carved hollows and glider poles • Scat detection to be undertaken three times a week within the 5-week monitoring period within areas of proposed glider poles and pre-installed carved hollows **Contingency for monitoring duration and frequency:** Where the 5-week monitoring period cannot be undertaken during greater glider breeding season, monitoring duration will be extended to 8-weeks monitor activity levels during foraging events.	• 5-week period over breeding season (March-June) annually for minimum two years. • Remote-triggered cameras to be set for the 5-week period at locations of carved hollows and glider poles • Scat detection to be undertaken three times a week within the 5-week monitoring period within areas of proposed glider poles and pre-installed carved hollows **Contingency for monitoring duration and frequency:** If data is unavailable for a suitably qualified ecologist to complete a robust assessment of pre-construction/post-construction monitoring of species to estimate the use and effectiveness of fauna movement infrastructure and/or compare population abundance and density, then up to 4 years (or as determined by suitably qualified ecologist) post-construction monitoring to be undertaken.
Reporting	• Monthly Environmental Report (including weekly noise and vibration monitoring results) • Annual compliance report • Adaptive management approach to be adopted to ensure notification and improvement works identified at the time of monitoring are implemented ahead of the formal reporting period		

Table 4 Proposed fauna monitoring program for glossy black-cockatoo, regent honeyeater and swift parrot

	Pre-construction	During-construction	Post-construction
Target species: Glossy black-cockatoo, swift parrot and regent honey eater			
Purpose / Outcome: Assess direct injury/mortality does not occur as a result of design and construction activities and effectiveness of construction mitigation measures			
Monitoring methods	• Fence checks and monitoring for signs of injury / mortality (e.g. electrocution and/or entanglement) throughout the Proposed action area boundary (as part of as part Koala Fence inspection (above) • Observation (diurnal) surveys	• Fence checks and monitoring for signs of injury / mortality (e.g. electrocution and/or entanglement) throughout the Proposed action area boundary (as part of set Weekly Environmental Inspections and informal visual observations • Observation (pre-clearance) surveys	• Reporting of fauna hazards and injuries/deaths (e.g. maintenance/inspection observations), including the incidence of electrocution from powerlines assessing the efficacy of OHLE electrostatic wildlife guards as a mitigation measure.
Monitoring locations	• Key MNES fauna biodiversity areas (as per OEMP)		• Locations of installed OHLE electrostatic wildlife guards within key MNES fauna biodiversity areas
Monitoring durations and frequency	• Diurnal area surveys to be undertaken in accordance with *Survey guidelines for Australia's threatened birds* (Department of the Environment Water Heritage and the Arts, 2010) for: - Swift parrot mainland presence (autumn-winter): 20 hours over 8 days - Glossy black cockatoo breeding season (March-August): 5 hours over 1 day - Regent honeyeater breeding season (September-November): 20 hours over 10 days • Fence checks to occur as part Koala Fence inspection (above)	• Pre-clearance surveys in advance of vegetation clearing. Pre-clearance surveys to be undertaken by a suitably qualified fauna spotter catcher	• Reporting of fauna injuries/deaths (e.g. maintenance/inspection observations), including the incidence of electrocution from powerlines assessing the efficacy of OHLE electrostatic wildlife guards as a mitigation measure.
Reporting	• Annual compliance report	• Monthly Environmental Report (including weekly noise and vibration monitoring results) • Review of Fauna Spotter Catcher records, annual return of operations and incident reports	• Incident reports

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