11.4 Appendix D – Ecological Assessment

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1.0 Introduction

Base Consulting Group (Base) was engaged by Gladstone Area Water Board (GAWB) to prepare this summary Ecological Assessment Report (EAR) to support an application for a material change of use for the Landing Road Pump Station (LRPS) and Raw Water (RW) pipeline (the Project). This EAR is an assessment of the ecological values and potential ecological impacts specifically associated with the Project. A detailed description of the Project is provided in Section 1.1.

Previous ecological assessments have been completed for a larger area associated with the East End Pipeline Project (EEPL) to support a Matters of National Environmental Significance (MNES) self-assessment (AECOM, 2024a) (Appendix A) and a Protected Plants Survey Report (AECOM, 2024b) (Appendix B).The 2024 assessments included desktop and field surveys across the EEPL. This EAR relies on and summarises information from, the EEPL MNES and Protected Plants Report (AECOM 2024a; 2002b).

For the purpose of this EAR, the following terms have been referred to throughout the document:

- **Study Area**: as per the Project footprint surveyed and depicted as the Project area in the MNES and Protect Plants Reports (AECOM 2024a; 2024b). The Study Area depicted in this EAR has also incorporated an additional 100 m buffer. The section of pipeline relevant to this EAR begins south of Yarwun and continues southwest generally following Gladstone Mount Larcom Road before ending adjacent to Aldoga Road.
- **Project Area**: The 'developable footprint' where all potential disturbance activities are proposed for the construction and operation of the LRPS and RW pipeline (Figure 2). With the disturbance footprint of the pipeline being the general easement width of approximately 15 m. All impact calculations outlined in Section Field Verified Vegetation Communities 4.2.1.1are based on an easement width of 15 m.

Site Context

Figure 1

BASE/

RAGLAN
AMBROSE
MOUNT LARCOM
Landing Road Raw Water Pump Station
YARWUN
GLADSTONE REGIONAL
GLADSTONE
CLINTON
Wilmot Lagoon
Tondoon Creek Weir
Larcom Creek
Pink Lily Lagoon
BRUCE HIGHWAY
Calliope River
DAWSON HIGHWAY
CALLIOPE
BENARABY
BOYNE ISLAND
TANNUM SANDS
Boyne River
Awoonga Reservoir
GREAT BARRIER REEF
Raglan Creek
Calliope River

Legend

- Raw Water pipeline
- Landing Road Raw Water Pump Station
- Cities / Towns
- Highway
- Rail
- Local Government Areas
- Watercourse / Drainage Features
- Nature Refuges
- Protected areas of Queensland

Scale @ A3: 1 : 150000

0 5 10 km

N

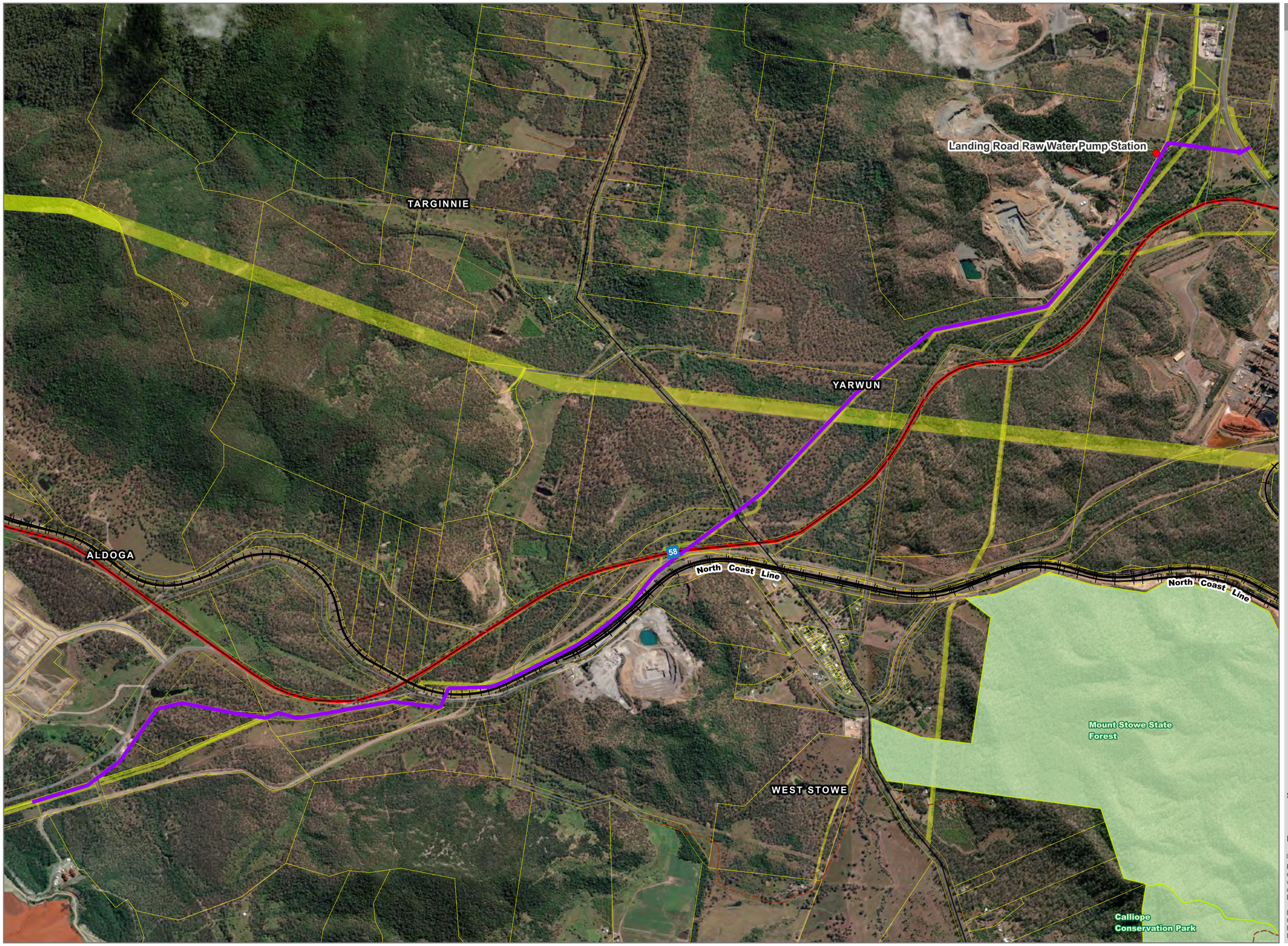
Datum: GDA2020 **Job Number: J0000**

DATA SOURCE:
QSPATIAL _2024; The State of Queensland (Department of Resources) 2024; Esri, Nearmap, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community;

Project Area

Figure 2

BASE/



Legend

- Raw Water pipeline
- Landing Road Raw Water Pump Station
- DCDB
- Easement / Stock Routes
- Cities / Towns
- Highway
- State Controlled Roads
- Rail
- Local Government Areas
- Watercourse / Drainage Features
- Protected areas of Queensland

Scale @ A3: 1 : 17679

0 0.6 1.2 km

N

Datum: GDA2020 **Job Number: J0000**

DATA SOURCE:
QSPATIAL 2024; The State of Queensland (Department of Resources) 2024; Esri, Nearmap, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community;

1.1 Project description

The Gladstone Area Water Board (GAWB) is a bulk water service provider based in Gladstone, Central Queensland. GAWB provides raw water (RW) and treated water (TW) to power stations and heavy industry in and around Gladstone, and TW to the Gladstone Regional Council for municipal water supply.

The East End TW pipeline (EE TW pipeline) services Gladstone Regional Council's Mount Larcom Reservoir, Rio Tinto Alcan Yarwun's Residue Management Area, Fortescue Future Industries' Green Electrolyser Facility, Cement Australia's East End Mine and is the only TW supply to the Mt Larcom township. The TW supply is fed from the existing GAWB Boat Creek Pump station (BCP) to East End Reservoir (EER).

Installed in 1981, the EE TW pipeline comprises 22.4 km of Ductile Iron Cement Lined (DICL) and Asbestos Cement (AC) pipeline. The AC pipeline is present from the BCP to Cement Australia and from East End Mine to the EER. The BCP is gravity supplied by Mt Miller Reservoir, via 3.5 km of DICL pipeline. As the only pipeline delivering water along this alignment, most customers use the TW for RW purposes.

The existing TW pipeline is at end of life. The asset has aged and ground conditions have contributed to the deterioration. The TW pipeline has incurred 39 failures in the past 13 years, as many as 13 failures have occurred within the past 24 months.

With the onset of new customers associated with hydrogen production, an increased demand for RW exceeding the capacity of the EE TW pipeline is forecast. GAWB has elected to install a new RW pipeline from BCP to the EDQ Connection at Aldoga and replace the EE TW pipeline with a new pipeline for its entire length. The RW pipeline is referred to as the 'Landing Road (LR) to EDQ RW pipeline'. Due to the elevation change between Landing Road and Aldoga, the new RW pipeline requires a pump station to enable the RW delivery. A location for a pump station has been selected at Landing Road, Yarwun and is referred to as the LRPS.

The introduction of the LR to EDQ RW pipeline to the Gladstone State Development Area (GSDA) will permit the transfer of industrial customers utilising high value treated water to raw water.

For the purposes of this report the Project Area is located within the existing EE TW easement. The Project components consist of the RW pipeline and the LRPS. The new LRPS will be located approximately 1 km downstream of the existing BCP in Yarwun, which will be the pump station for the new RW pipeline. The new RW pipeline begins in Yarwun and continues to an area south of Aldoga Road.

General construction methods for the project include open trenched construction and trenchless sections. These are determined in the Preliminary Design and to be reviewed and confirmed by the construction contractor (AECOM, 2024a). Trenchless sections are recommended to minimise clearing and disturbance in sensitive areas such as riparian vegetation.

2.0 Relevant Legislation

2.1 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* is the Australian Government's central piece of legislation. It provides the legal framework to protect and manage nationally and internationally important flora and fauna, ecological communities and heritage places (Matters of National Environmental Significance).

A Protected Matters Search Tool (PMST) was conducted over the Project Area and the surrounding 10 km buffer to identify the potential for MNES to occur within the vicinity of the Project Area. Results of the PMST search and results relating to MNES can be found within Section Desktop Assessment 3.2 and Appendix C.

2.1.1 Commonwealth Biosecurity

Under the EPBC Act, the Commonwealth can, among other things, list key threatening processes, develop and implement threat abatement plans (TAPs) and outline recovery plans to manage and reduce the impact of invasive species. As defined by the Department of Climate Change, Energy, the Environment and Water (DCCEEW, 2022), invasive species include diseases, fungi and parasites, feral animals, insects and other invertebrates, introduced marine pests and weeds.

2.1.1.1 Weeds

The Australian Weeds Strategy 2017–2027 (DAWR, 2017) outlines a coordinated strategy for weed management across Australia. It provides consistent guidance on weed management and identifies Weeds of National Significance (WoNS), which are nationally agreed priority plants for control and management. Thirty-two WoNS are outlined in the Australian Weeds Strategy 2017–2027 (DAWR, 2017). The strategy also addresses roles and responsibilities for weed management, outlining the various roles of government (national, state and local), industry and individuals in weed management. Any WoNS identified during field surveys are discussed in Section 4.2.1.2.

2.1.1.2 Pest animals

The Australian Pest Animal Strategy 2017-2027 (DAWR, 2017) outlines a national strategy for the management of vertebrate animals in Australia. This strategy outlines that it is the landholder's responsibility to detect and report new occurrences of pest animals and manage pest animals on their own land. Landholders also have a responsibility to manage pest animal problems on their own land and where relevant, plan pest animal management activities jointly with neighbours. Section 4.2.2.2 discusses if any pest fauna were identified in the Project Area.

2.1.2 Biosecurity Act 2015

The Commonwealth *Biosecurity Act 2015* establishes a strong biosecurity system, which protects our way of life from the threat of exotic pests and diseases to our unique environment, the economy, our health and our agricultural industries.

The Biosecurity Act 2015 has been designed to be flexible and responsive to changes in technology and biosecurity challenges. Being able to adapt quickly is important as international passenger travel and trade are growing and evolving every year.

The Biosecurity Act 2015 also determines how biosecurity threats to flora, fauna and human health are managed on and between individual properties in Australia. The management of biosecurity within a property must consider:

- Weeds, pests, diseases, and contaminants that are present within the property and surrounding habitats that must not be spread.
- Weeds, pests, diseases, and contaminants that are present within the surrounding region that must not be introduced into the property.
- The potential impacts on ecological health, agricultural or horticultural activities, and human health.
- The mitigation methods that can be undertaken to reduce biosecurity risks.
- Communication techniques that can be used to inform all stakeholders involved in the property.
- Legal requirements outlined in the Biosecurity Act 2015.

The impacts and risks in relation to the *Biosecurity Act 2015* are discussed in Section 5.0.

2.2 State Legislation

A range of State environmental legislation is applicable to development within Queensland. The applicability of this legislation is largely guided by a series of mapping layers and scheduled flora and fauna species. The following sections outlines the State legislation relevant to ecological values within the Project Area.

2.2.1 *Nature Conservation Act 1992*

The *Nature Conservation Act 1992* (NC Act) classifies and protects significant areas (Protected Areas) and protects threatened plant and animal species. The *Nature Conservation (Plants) Regulation 2020* (NC (Plants) Reg) and the *Nature Conservation (Animals) Regulation 2020* (NC (Animals) Reg) list native plant and animal species as Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern. Matters of State Environmental Significance outlined in the NC Act and associated regulations were considered in this report using a WildNet Database Search within a 10 km radius from the Project Area (Appendix D). Species listed under the NC (Plants) Reg or NC (Animals) Reg with the potential to occur within the Project Area are shown in Appendix E.

A search of the Flora Survey Trigger Map identified that a portion of the Project Area is located within a High-Risk Area for Protected Plants (refer to Appendix F).Therefore, a detailed flora investigation in accordance with Flora Survey Guidelines – Protected Plants was undertaken by AECOM in 2024 (refer to Appendix B).

The NC Act also regulates the tampering with or removal of protected species breeding places. If a protected species breeding place is impacted, a High-Risk Species Management Plan is required to be prepared and approved by the Department of Environment, Science and Innovation (DESI) prior to any impacts taking place. Due to the potential for breeding places to occur within the Project Area, a breeding place survey was undertaken by AECOM in 2024 (see Section 3.3), and a high-risk SMP has been prepared, (Base, 2024) and will be submitted for approval. Species considered under the NC Act are discussed in greater detail in sections 4.1.

2.2.2 *Vegetation Management Act 1999*

The *Vegetation Management Act 1999* (VM Act), through the *Planning Act 2016* (Planning Act) regulates the clearing of Native Vegetation in Queensland in a way that conserves remnant vegetation (i.e. regulated vegetation that is endangered, of concern or least concern regional ecosystem (RE). The VM Act conserves vegetation in declared areas, ensures that vegetation clearing does not cause land degradation and prevents loss of biodiversity and maintains ecological processes. The VM Act categorises the status of native vegetation as remnant (Category B), high value regrowth (HVR) (Category C), reef regrowth watercourse vegetation (Category R) and non-remnant (Category X). Remnant vegetation is further classified into a RE based on bioregion, landform and dominant canopy species. Regional ecosystems are designated a Biodiversity Status under the VM Act based on an assessment of vegetation condition. The VM Act is administered and enforced by the Department of Resources (DoR). A vegetation management report was obtained for the Project Area with the results included in Appendix G. The proposed Project Area requires some clearing of native vegetation.

2.2.3 *Biosecurity Act 2014*

The *Biosecurity Act 2014* commenced on 1 July 2016. It ensures a consistent, modern, risk-based and less prescriptive approach to biosecurity in Queensland.

The Act provides comprehensive biosecurity measures to safeguard our economy, agricultural and tourism industries, environment and way of life, from:

- Diseases, viruses or parasites
- Invasive animals or plants (e.g., pest animals or weeds)
- Noxious fish
- Insect pests.

Restricted matter is biosecurity matter found in Queensland and has a significant impact on human health, social amenity, the economy or the environment. Specific actions are required to limit the spread and impact of this matter by reducing, controlling or containing it. There are 7 categories of restricted matter. Category 1 and 2 restricted matter must be reported.

- Category 1 restricted matter must be reported to an inspector within 24 hours.
- Category 2 restricted matter must be reported to an inspector or authorised person within 24 hours.

Sections 4.2.1.2, 4.2.2.2, and 5.0 outline the introduced species and potential biosecurity impacts within the Project Area.

3.0 Methodology

3.1 Approach

Ecological assessments were undertaken in 2024 as part of the broader EEPL project (AECOM, 2024a; 2024b) which includes the Project Area relevant to the scope of this EAR. The primary objectives of the ecological assessments were to field verify the vegetation communities and fauna habitat characteristics, to confirm the presence of protected fauna and flora under the NC Act and EPBC Act, and to confirm the weeds, pests and to describe relevant ecological values within the Project Area. The methods, survey effort and results as described in AECOM (2024a, and 2024b) have been summarised in this report.

The following stages of assessment were undertaken by AECOM (2024):

- Desktop assessment (refer to Section 3.2)
- Field assessment (refer to Section 3.3).

Base reviewed AECOM (2024a; 2024b), and the Base high risk SMP for EEPL (Base, 2024) and extracted spatially relevant information for the Project Area in order to describe the ecological values within the Project Area to support the material change of use approval.

3.2 Desktop Assessment

3.2.1 Online searches and reports

A desktop analysis was conducted by AECOM to identify the habitat types and any potential conservation significant flora and fauna occurring within the Project Area. These searches were used to guide the field assessment and included a review of the following information and databases:

- Protected Plants Flora Survey Trigger Map V.10. (Department of Environment and Science, 2024a).
- EPBC Act Online (PMST) (Department of Climate Change Energy the Environment and Water, 2024).
- WildNet database (Department of Environment and Science, 2024b).
- Atlas of Living Australia database (ALA) (Atlas of Living Australia, 2024).
- Regional Ecosystem Description Database (REDD) and mapping (Queensland Herbarium, 2024).
- Regulated Vegetation Management Map (Department of Resources, 2024).
- Aerial imagery to investigate the nature and extent of habitat types within the CIA (Q Imagery, 2024).
- Vegetation Management regional ecosystems (REs) map version 13 including essential habitat, watercourse and wetland mapping (Department of Resources, 2024b).
- Wetland environmental values to identify high ecological significance wetlands and general ecological significance wetlands (DESI, 2024).
- Species distribution maps from various current field guide.

For the purpose of this report and ensure the most up to date data is included, new searches including PMST, WildNet and a Protected Plants Flora Survey Trigger Map were undertaken. The AECOM searches encompassed a broader project scope, whereas this report encompasses only a small portion. These new searches provide spatially accurate data specific to the Projects scope of works.

3.3 Field Assessments

Two ecologists conducted field surveys between the 12th – 13th of August and 9th and 14th November 2024 within the Study Area (AECOM, 2024a; 2024b). The purpose of the AECOM field assessments was to investigate the potential occurrence of MNES / MSES and identify RE communities (see Section 3.3.3) within the approved land parcels.

Survey locations are outlined in Appendix H, and a summary of and survey effort is listed below:

- 377 flora observations.
- 78 RE observation.
- 14 quaternary observations.
- Four (4) RE tertiary observations.
- 35 fauna observations.
- Three (3) general habitat survey.

3.3.1 Flora Survey

Flora survey methodology was based off '*Methodology for Surveying and Mapping Regional Ecosystem and Vegetation Communities in Queensland*' (Neldner et al., 2023) and *The Flora Survey Guidelines – Protected Plants Version 2.01* (*Flora Survey Guidelines*) (Department of Environment and Science, 2020). Flora surveys involved:

- RE verification and condition, including the collection of quaternary site information in accordance with Neldner et al. (2023)
- Vegetation structure, which included identifying different strata (i.e. emergent, tree, shrub and ground layers and the height and cover values of each stratum)
- Timed meander survey.

3.3.2 Fauna Survey

The types of fauna surveys undertaken are outlined in Table 1.

Table 1 Fauna survey methods

Assessment	Survey methods
Habitat assessments	Habitat assessments were undertaken to characterise the fauna habitat values within the Study Area. These assessments provide an indication of habitat suitability and likely utilisation for fauna species, particularly listed conservation significant fauna. Habitat attributes recorded during the assessment included:

Assessment	Survey methods
	• vegetation structure and dominant species, including a description of canopy, shrub and ground layer structure and composition • presence and abundance of tree hollows and stags • presence and abundance of woody debris such as habitat logs and ground timber • presence, abundance and depth of leaf litter • rocky habitat such as surface rocks, boulders, crevices, overhangs and caves • proximity to water (both permanent and ephemeral) • disturbance from invasive weeds/pests • other disturbances such as grazing pressure, clearing, thinning or fire • any other significant habitat features or values present
Bird surveys	Surveys for birds were undertaken using the standard methodologies for the *Terrestrial Vertebrate Fauna Survey Guidelines* (Eyre et al., 2018).
Active searches and incidental observations	Active searches were undertaken at each habitat assessment site for signs of reptiles, amphibians, small mammals and bird species. This included scanning the trees and ground, searching beneath microhabitat such as rocks, fallen timber and peeling bark, digging through leaf litter and soil at tree bases and flushing birds from areas with a dense or grassy ground cover. Signs of fauna utilisation may include diggings, scats, tracks, bird feathers, and latrine sites, which were attributed to the appropriate species where possible.
Anabat detectors	An unattended Anabat (Swift) recorder was placed at two locations (central and west of the alignment), in potential species habitat, for three consecutive nights (11, 12, and 13 November 2023). At least 11 species were detected by bat call analysis. Data recorded was analysed by a qualified specialist, Greg Ford of Balance! Environmental. The format and content of the analysis summary reports comply with nationally accepted standards for the interpretation and reporting of Anabat data (Reardon, 2003).
Nocturnal searches and spotlighting	Walking and driving transects were completed across the Study Area in habitat suitable for nocturnal species including koala, greater glider, yellow-bellied glider, and for birds and reptiles using headtorches and hand-held spotlights. Spotlighting from the passenger window of a slow-moving vehicle was also undertaken, targeting larger ground and arboreal mammals, nocturnal birds and pest fauna. During spotlighting events,

Assessment	Survey methods
	threatened species calls were played for koala, with ecologists listening for at least 10 minutes for a return call from nearby individuals.

3.3.3 Survey Limitations and Assumptions

As outlined in Section 3.2 and Section 3.3, this EAR relies on spatially relevant desktop and field assessments undertaken by AECOM as part of the full EEPL component. This EAR has been prepared using the field verified data collected by AECOM and provided to Base. Some limitations for this EAR therefore include:

- Base cannot reliably verify the accuracy of survey data undertaken that has been utilised within this document.
- The species list provided in Appendix I was prepared by AECOM is for the EEPL broader study area, and therefore may contain species not likely to be present within the Study Area for this EAR.

Limitations for the surveys undertaken by AECOM are listed below (AECOM, 2024a; AECOM, 2024b):

- While the timing of the survey was optimum, it should be recognised that a single field study cannot confirm that every species was detected.
- This assessment does not consider laydown areas, access tracks or additional clearing requirements outside the Project Area.
- The location and linear nature of the Study Area provided access limitations for field survey techniques. The pipeline consisted of many landholders and access agreements, and as such access was largely restricted to the pipeline easement. Ecological values in the Study Area were inferred based on an understanding of the pipeline easement and other available access.
- Field survey data collection to inform mapping was conducted using a hand-held electronic device with aerial imagery. The accuracy of the device is generally <5 m and considered appropriate for the purpose of this assessment.
- Information gained from online flora databases have caveats attached regarding the robustness or completeness of the information. Data is based on a combination of records (from various sources) combined with modelled distributions of species according to their ecological characteristics. The presence or absence of species identified from these databases is an indication of potential presence only, and not a definitive list.
- Data acquisition during flora surveys generally has inherent limitations associated with variability of vegetation communities across any given site, as well as the changes to the ease of detectability and presence of species with time (i.e., because of a species ‘life-strategy’, and the flowering and /or fruiting period).

4.0 Results

4.1 Desktop Assessment Results

4.1.1 PMST

An updated PMST was conducted over the Project Area with a 10 km buffer to identify the potential for MNES to occur within the Project Area (Appendix C). This PMST search was updated in order to include only the relevant spatial extent of this Project's scope.

This PMST identified 10 threatened ecological communities, 13 EVNT flora species, 56 EVNT fauna species and 61 migratory fauna species (two of which are dual listed as migratory and EVNT) (Appendix C). Table 2 provides a summary of the PMST search results.

Table 2 Protected Matters Search Tool (PMST) Summary

Matters of National Environmental Significance	
World Heritage Properties	Great Barrier Reef
National Heritage Places	Great Barrier Reef
Wetlands of International Importance	No matters identified
Great Barrier Reef Marine Park	No matters identified
Commonwealth Marine Area	No matters identified
Listed Threatened Ecological Communities	10
Listed Threatened Species	69 (13 plants)
Listed Migratory Species	61

4.1.2 WildNet

An updated WildNet search was conducted over the Project Area with a 10 km buffer. Results from the updated Queensland WildNet database identified 48 fauna and 67 flora species listed under the EPBC and/or NC Act. Under the NC Act 23 fauna, and 11 flora listed as EVNT have been recorded within a 10 km radius of the Project Area (Appendix D).

4.1.3 Protected Plants Flora Survey Trigger Map

The desktop assessment indicated two sections of the Project Area were shown as high-risk on the flora trigger map (Appendix E). A small patch is located near the centre of the Project Area east of Targinnie Road. The second larger patch is in the far western portion and crosses into the Project Area at the Aldoga Road turn off from Gladstone- Mt Larcom Road. Results from the Protected Plants survey and relevant data from the AECOM report are discussed in Section 4.2.1.

4.1.4 Desktop mapped Regional Ecosystems

The Project Area was predominantly classified as Category X, which is generally exempt from requirements under the vegetation management regulations. As the Project Area aligns with the previously cleared easement, the majority of impacts are confined to non-remnant vegetation (refer to Section 4.2.1.1). Patches of Category R vegetation, identified as regrowth watercourse vegetation, were present in the desktop mapping in the central and western sections of the Project Area, corresponding to the identified waterways (refer to Section 4.1.6). Additionally, scattered occurrences of Category C high-value regrowth vegetation were mapped throughout the Project Area, indicative of vegetation encroachment onto the previously cleared easement. A vegetation management report covering all properties intersecting the Project Area is provided in Appendix G, and desktop-mapped Regional Ecosystems (REs) are summarized in Table 3.

Table 3 Mapped regional ecosystems within the Project Area

Regional ecosystem	Description	VM Act Status
12.11.6	Corymbia citriodora subsp. variegata, Eucalyptus crebra woodland on metamorphics +/- interbedded volcanics.	Least Concern
12.3.3	*Eucalyptus tereticornis* woodland on Quaternary alluvium.	Endangered
12.11.7	Eucalyptus crebra woodland on metamorphics +/- interbedded volcanics.	Least Concern
12.11.4	Semi-evergreen vine thicket on metamorphics +/- interbedded volcanics.	Of Concern
11.3.29	Eucalyptus crebra, E. exserta, Melaleuca spp. woodland on alluvial plains.	Least Concern
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus spp*. woodland on alluvial plains.	Of Concern
11.3.26	*Eucalyptus moluccana or E. microcarpa woodland to open forest on margins of alluvial plains.*	Least Concern
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	Least Concern
11.11.15	*Eucalyptus crebra* woodland to open woodland on deformed and metamorphosed sediments and interbedded volcanics.	Least Concern
11.11.18	Semi-evergreen vine thicket on old sedimentary rocks with varying degrees of metamorphism and folding.	Endangered
11.11.4, 11.11.4c	*Eucalyptus crebra woodland on old sedimentary rocks with varying degrees of metamorphism and folding.*	Least Concern

4.1.5 Essential Habitat

The Vegetation Management report indicated that MSES Regulated Vegetation – Essential Habitat for the yellow-bellied glider (*Petaurus australis australis*), southern squatter pigeon (*Geohaps scripta scripta*), and Greater glider (*Petauroides volans volans*) are mapped as occurring within the western portion of the Project Area (see Appendix G).

4.1.6 Waterways

The desktop assessment identified that the Project Area intersects mapped watercourses of the following categories (see Appendix G).

- VM Act Stream Order 1 – these are minor watercourses intersecting the easement in multiple locations. Six (6) Stream Order 1 waterways pass through the Project Area. These watercourses are mapped as MSES Regulated Vegetation (defined watercourse).
- VM Act Stream Order 2 – Three (3) Stream Order 2 watercourses were mapped as (MSES) and are classified as Regulated Vegetation (defined watercourse).
- VM Act Stream Order 3 – One (1) Stream Order 3 watercourse intersects the centre of the Project Area. These watercourses are mapped as MSES Regulated Vegetation (defined watercourse).
- VM Act Stream Order 4 – One (1) Stream Order 4 watercourse intersects towards the eastern end of the Project Area. These watercourses are mapped as MSES Regulated Vegetation (defined watercourse).

The Project Area does not contain any mapped or field verified wetlands.

Under the *Queensland Fisheries Act 1994*, waterways are classified based on their ecological and hydrological significance, which determines the level of protection and requirements for waterway barrier works. Waterways occurring in the Project Area are listed below:

- Low Ecological Significant Waterways are typically small drainage features or ephemeral streams with minimal aquatic habitat value. These may support only a limited range of hardy or tolerant fish species during wet seasons. Six (6) low waterways intersect the Project Area.
- Moderate Ecological Significant Waterways are typically intermittent or seasonally flowing, providing moderate fish habitat and supporting local fish movement. These may include small streams with some diversity of native aquatic species. Four (4) moderate waterways intersect the Project Area.
- High Ecological Significant Waterways are perennial or significant seasonal waterways that support high biodiversity and fish movement. These waterways provide key habitat and migration routes for various fish species, including diadromous species (those that migrate between freshwater and saltwater). One (1) high waterway intersects the Project Area, namely, Sandy Creek.
- Major Ecological Significant Waterways are large, permanent waterways with high ecological importance, serving as critical migration pathways for fish and other aquatic species. These support diverse fish populations, including species that are sensitive to changes in flow or habitat. One (1) major waterway, namely Spring Creek, intersects the Project Area.

Field assessment of aquatic values, potential impacts and mitigation measures are beyond the scope of this EAR.

4.2 Field Assessment Results

4.2.1 Flora

Field surveys (AECOM, 2024a; 2024b) verified the presence of two REs (12.3.3 and 12.3.3a) in the eastern section of the Project Area that are classified as endangered. The majority of these REs occur outside the Project Area with only 0.002 ha occurring within the Project Area. These REs are consistent with the EPBC listed subtropical eucalypt floodplain forest and woodland of the New South Wales north coast and southeast Queensland bioregion Threatened Ecological Community (TEC).

No protected plants were identified within the broader EEPL Study Area, therefore a protected plants clearing permit is not required (AECOM, 2024b). Five (5) Special Least Concern plants were identified from the field surveys and are listed below:

- Broad-leaved bottle tree (*Brachychiton australis)*
- Little kurrajong *(Brachychiton bidwillii)*
- Cabbage tree palm *(Livistona australis)*
- Queensland black orchid (*Cymbidium canaliculatum)*
- White root *(lobelia concolor)*

However, the flora species were recorded for the broader EEPL project and are not specific to the scope of this reports Project Area, therefore some species included may not be present.

4.2.1.1 Field Verified Vegetation Communities

Field surveys confirmed the Project Area consisted predominantly of non-remnant vegetation (Appendix I) (Table 4). Eleven REs were field verified within the Project Area, two of these being endangered. Vegetation communities within the Project Area are dominated by eucalypt woodland, and the specific clearing extent for each RE is shown in Table 4. Clearing of the 0.002 ha of endangered RE will be avoided.

Table 4 Field verified REs and extent of clearing in the Project Area

Description and related RE code	Status	Extent in Project Area (ha) 15m easement	
		Remnant	Regrowth
Eucalyptus crebra, E. tereticornis, Corymbia intermedia woodland on metamorphics +/- interbedded volcanics. RE: 12.11.14	Of concern	0.34	-
Eucalyptus tereticornis, Casuarina cunninghamiana subsp. cunninghamiana +/- Melaleuca spp. fringing woodland RE: 12.3.7	Least concern	0.46	-

Description and related RE code	Status	Extent in Project Area (ha) 15m easement	
		Remnant	Regrowth
Eucalyptus tereticornis woodland on Quaternary alluvium. *Eucalyptus crebra, C. tessellaris* woodland to open forest. RE: 12.3.3, 12.3.3a	Endangered	0.002	-
Eucalyptus tereticornis or *E. camaldulensis* woodland fringing drainage lines. RE: 11.3.25	Of Concern	0.05	-
Eucalyptus moluccana or E. microcarpa woodland to open forest on margins of alluvial plains *RE: 11.3.26*	Least concern	0.003	0.005
Eucalyptus tereticornis and/or *Eucalyptus spp*. woodland on alluvial plains. RE: 11.3.4	Of concern	0.05	-
Eucalyptus crebra woodland on old sedimentary rocks with varying degrees of metamorphism and folding. RE: 11.11.4, 11.11.4a, 11.11.4c	Least Concern	0.11	0.0003
Eucalyptus crebra woodland to open woodland on deformed and metamorphosed sediments and interbedded volcanics. RE: 11.11.15	Least Concern	0.13	0.01
Total		Remnant	Regrowth
Remnant	-	1.145	0.015
Non-remnant	-	12.43	

A full flora species list is provided in Appendix H; however, the full species list provided includes species confirmed within the broader EEPL Study Area and is likely to overestimate species within the Project Area.

4.2.1.2 Introduced Flora

Field surveys of the broader EEPL Study Area identified 56 flora species that are considered non-native (Appendix H). Eleven species are listed under the *Biosecurity Act 2014* as Category 3, and six (6) listed WoNS. Table 5 Introduced flora species shows the introduced flora species recorded within the broader Study Area during AECOM field surveys. The introduced flora list provided in Appendix H are all species confirmed in the broader EEPL Study Area and is likely to overestimate species within the Project Area.

Table 5 Introduced flora species

Introduced Flora Species	Category under *Biosecurity Act 2014*	WoNS
Mother of millions (*Bryophyllum delagoense)*	Category 3	-
Balloon vine (*Cardiospermum grandiflorum)*	Category 3	-
Yellow oleander (*Cascabela thevetia)*	Category 3	-
Rubber vine (*Cryptostegia grandiflora)*	Category 3	Yes
Cat's claw (*Dolichandra unguis-cati)*	Category 3	Yes
Lantana (*Lantana camara)*	Category 3	Yes
Creeping lantana (*Lantana montevidensis)*	Category 3	-
Prickly pear (*Opuntia stricta)*	Category 3	Yes
Prickly tree pear (*Opuntia tomentosa)*	Category 3	Yes
Parthenium weed (*Pathenium hysterophoru)*	Category 3	Yes
Rat's tail *(Sporobolus pyramidalis)*	Category 3	-

4.2.2 Fauna

The field assessments conducted within the broader EEPL Study Area (AECOM, 2024a) detected a total of 96 native fauna species including 72 birds, 23 mammals, five (5) amphibians and three (3) reptiles (Appendix I). Two species listed under both the NC Act and EPBC Act were confirmed as present (either from direct observation or from signs of presence) were recorded during field surveys and include:

- Koala (*Phascolarctos cinereus)* (scratches observed).
- Squatter pigeon (southern) (*Geophaps scripta scripta*).

A full fauna species list for the broader EEPL study area is provided in Appendix I.

4.2.2.1 Fauna Habitat

Field assessments (AECOM, 2024a; 2024b) identified three (3) habitat types as occurring within the Project Area including:

- Non-remnant grasslands.
- Eucalypt woodland.

- Eucalypt forests to woodlands.

The habitat types identified as occurring within the Project Area are outlined in Table 6.

Of the three habitat types outlined in Table 6, two were field verified as containing REs that are essential habitat for several MSES species including

- Squatter pigeon (southern) (*Geophaps scripta scripta*).
- Yellow-bellied glider (south-eastern) (*Petaurus australis australis).*
- Greater glider (southern) (*Petauroides volans volans).*

Based on the habitat types identified, a further four (4) species were identified as likely to occur based on the likelihood of occurrence outlined in Appendix E and the potential habitat that is available within the Project area. These species are shown below and include:

- Black-faced monarch *(Monarcha melanopsis*).
- Satin flycatcher *(Myiagra cyanoleuca).*
- Eastern osprey *(Pandion haliaetus cristatus).*
- Short-beaked echidna *(Tachyglossus aculeatus).*

Table 6 Fauna habitat types

Fauna Habitat Type	Location	Description	Extent in Project Area (ha) 15m easement
Non-remnant grasslands	Project Area	Pre-disturbed land occupied by grasslands. Potential habitat for echidna, and squatter pigeon (southern).	12.43
Eucalypt woodlands	Project Area	Eucalyptus spp. *woodlands on alluvial plains and drainage lines.* Corresponds to RE 12.3.3, 12.3.3a, 12.3.7, 11.3.4, 11.3.25 and 11.3.26. Potential habitat for koala, squatter pigeon (southern), yellow-bellied glider, greater glider, black-faced monarch, satin flycatcher, eastern osprey, and short-beaked echidna.	0.57
Eucalypt forests to woodlands	Project Area	Eucalyptus forests to woodland, on metamorphic soil / interbedded volcanics. Corresponds to RE 12.11.14, 11.11.4, 11.11.4a, 11.11.4c, and 11.11.15. Potential habitat for koala, squatter pigeon (southern), yellow-bellied	0.59

		glider, greater glider, black-faced monarch, satin flycatcher, eastern osprey, and short-beaked echidna.	

4.2.2.2 Introduced Fauna

Field surveys recorded seven (7) introduced species (AECOM, 2024a). Four (4) of which are restricted under the *Biosecurity Act 2014.* These records are from the broader EEPL field surveys and therefore are not specific to the smaller scope of this Project (Table 7).

Table 7 Introduced fauna species

Introduced Flora Species	Common name	Category under *Biosecurity Act 2014*
Canis lupus familiaris	Domestic dog	Category 3, 4, 6
Lepus europaeus	European brown hare	-
Rusa sp	Deer	Category 3, 4, 6
Sus scrofa	Wild boar	Category 3, 4, 6
Vulpes vulpes	Red fox	Category 3, 4, 5, 6
Hemidactylus frenatus	Asian house gecko	-
Rhinella marina	Cane toad	-

Under the *Biosecurity Act 2014*, the above categories have the following requirements:

- Category 3 – Not to be distributed or disposed, given as a gift, sold, traded or released into the environment while still alive, unless provided for in a regulation or under a permit.
- Category 4 – Not to be moved from their site of origin, to ensure they are not spread into other areas of the state.
- Category 5 – You must not possess or keep this restricted matter under your control. You may only keep this restricted matter under a permit of the Biosecurity Act 2014 or another Act.
- Category 6 – Not to be fed, unless held under a restricted matter permit or for the purposes of poison baiting, to discourage population growth.

5.0 Impacts and Mitigation Measures

Information on the potential impacts associated with Project activities are summarised below with more detail provided in AECOM (2024a) in Appendix A. Proposed mitigation measures to minimise the potential impacts are outlined in Section 5.3.

5.1 Construction Phase

The most significant impacts on ecological values will occur from disturbance of vegetation and microhabitat features during construction. Further information on the potential impacts associated with the Project are outlined below, as well as mitigation measures to minimise the potential impacts on flora and fauna values. Direct and indirect impacts potentially associated with this are described below.

5.1.1 Direct Impacts

5.1.1.1 Vegetation Clearing and Habitat Loss

Vegetation clearing is a direct impact that can result in the loss of vegetation values and habitat, with the severity of impacts more pronounced in habitats that provide values for conservation significant species and communities. Potential impacts resulting from clearing native vegetation can include:

- Reduced patch size of vegetation communities potentially compromising the viability of the community and associated fauna habitat
- Fragmentation of habitats resulting in reduced dispersal opportunities for fauna
- Loss of habitat causing a reduction of biological diversity or loss of local populations
- Loss of microhabitat features such as tree hollows, leaf litter, logs, rocks etc.
- Loss of floristic diversity and food resources

The Project design has been developed to avoid and minimise vegetation clearing wherever possible. However, removal of native vegetation cannot be completely avoided. The maximum areas of vegetation clearing by vegetation community is described in Section 4.2.1.1 and Section 4.2.2.1.

5.1.1.2 Habitat Fragmentation

Fragmentation of habitat can impact on species' populations through increasing edge effects, isolating populations, reducing the potential for species to adapt to environmental change and loss or altering interactions between species. The removal of vegetation for the Project largely follows the existing pipeline corridor which was already cleared in the past during construction of the original pipeline. This already presents a barrier for some species. As such, vegetation removal will not result in a change to the shape or scale of remaining habitat fragments to the extent that it would reduce the carrying capacity or ecological function of the habitat for native species.

Activity during construction may temporarily affect movement of some species. However, significant habitat fragmentation already exists in the Project Area from current road and powerline infrastructure, which may already act as barriers to movement for species sensitive to disturbance.

5.1.1.3 Disturbance, Injury and Mortality of Fauna

Clearing of vegetation can result in injury or mortality of fauna, particularly ground dwelling fauna and arboreal mammals and reptiles as well as nesting birds. However, given the size of the Project Area,

presence of disturbance and the sparseness of the vegetation and its habitat value, the impact on fauna populations is considered minimal.

Trenching may cause direct impacts to fauna species, with animals trapped within the trench confines. This may result in exposure to predation, drowning in tidally inundated areas, exhaustion and starvation.

Clearing of the pipeline corridor may cause indirect impacts to fauna species, such as an elevated risk of predation and altered dispersal behaviours (i.e., avoidance given the increased distance to cross). However, this is temporary as the pipeline will be buried and rehabilitated post construction.

5.1.2 Indirect Impacts

All fauna species are susceptible to indirect impacts to some degree; however, some are known to be more susceptible than others or have been identified as key threatening processes. Although the assessment of indirect impacts is important, it is noted that many of these impacts are already present in the Project Area.

5.1.2.1 Impacts to Waterways

Several waterways intersect the Project Area along the alignment (generally in the form of ephemeral drainage lines). To reduce impact to these during construction, the general construction method adopted for the Preliminary Design is to be reviewed and confirmed by the Contractor. It is recommended that optimisation of the open trenched and trenchless construction methodology is undertaken considering the construction timeframes (and likely associated weather patterns). Where possible, the Contractor is to optimise the construction methodology to reduce clearing requirements.

5.1.2.2 Weed Species

Activities that may increase the risk of establishment of new weed infestations and increased abundance of existing weeds include the following:

- Soil disturbance through vegetation clearance and construction activities.
- Areas of ground remaining bare for extended periods will establish weed species where there is little competition from other species.
- Increased vehicle traffic through the area during construction.
- Importation of construction materials to the site which may harbour introduced species.
- Weed infestations can degrade vegetation communities by increasing competition with native species, increasing fuel loads, reducing floristic diversity and habitat for native fauna species.

5.1.2.3 Pests and Feral Fauna

Seven pest fauna species were identified during ecological surveys (Table 7) and the Study Area may support populations of a range of other species including the feral cat, black rat, house mouse and European rabbit.

Given the limited extent of clearing and the ability of most of the potentially present feral species to persist in highly diverse habitats, it is unlikely that Project activities will result in an increase in abundance of these species.

Trenching in the construction phase of the Project may enhance conditions which are favourable for the establishment and or proliferation of cane toad. Where trenches are inundated by rainfall, this may increase artificial aquatic habitat and provide additional opportunities for cane toad breeding. Lethal

toxic poisoning through ingestion of the cane toad has been identified as the cause of local extinctions of northern quoll.

5.1.2.4 Activity and Noise

During the construction phase, there will be an increase in noise and activity in the Project Area as machinery undertakes clearing and other activities. When activity and noise is occurring in areas adjoining retained habitat, potential impacts may include:

- 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.

Existing noise and lighting conditions in the Project Area are typical of land adjacent to a high-speed motorway environment and are restricted to that created by passing vehicles. Construction and earthmoving associated with the Project may potentially cause disturbance to some fauna which may result in the temporary avoidance of the area for the duration of these activities. However, these impacts, if they occur, are likely to be transitory.

5.1.2.5 Increased Dust

Deposition of dust, sand and soil resulting from construction may have potential impacts on vegetation if excessive levels are sustained over extended periods. When dust settles on plant foliage it can reduce the amount of light penetration on the leaf surface and alter plant physiology. Reduction in the ability to photosynthesise due to physical effects may result in reduced growth rates of vegetation and decreases in floral vigour and overall community health. Given the level of works proposed and its duration, extensive dust impacts are considered unlikely.

5.2 Operation Phase

Potential impacts associated with the operation phase of the Project are considered to be very low as activities will be limited to periodic maintenance which is already occurring for the existing pipeline. Traversing maintenance vehicles may inadvertently introduce weeds and potentially collide with ground dwelling species resulting in injury or mortality. Any impacts would be mitigated through implementation of the Construction Environmental Management Plan (CEMP) and specific controls like weed hygiene procedures and site speed limits.

5.3 Mitigation Measures

The Project has been designed to minimise clearing of remnant and native vegetation as far as practicable to reduce potential impacts to fauna habitat values. Where clearing is unavoidable, mitigation measures, including fauna management measures and vegetation selection for landscaping, will be implemented to negate potential impacts from clearing. The mitigation measures proposed will be included in the CEMP.

General mitigation measures as they relate to ecological values, are outlined in Table 8 with additional mitigation measures outlined in Appendix A.

Table 8 Mitigation and management measures to be implemented in the Project Area

Mitigation Measures
Implement ecologically sensitive design which minimises removal of native vegetation and impacts to fauna habitat.
Clearly demarcate clearing areas before works commence to prevent unnecessary clearing of vegetation and minimise accidental damage.
Demarcate areas containing remnant vegetation as Exclusion Zones and ensure all workers are aware of restrictions associated with these areas.
Engage a suitably qualified person (e.g. ecologist, fauna spotter-catcher) to undertake pre-clearance surveys in areas where habitat removal is required to identify fauna habitat values and potential breeding sites. Pre-clearance surveys will mark areas to avoid or manage such as potential breeding places for wildlife and / or conservation significant species.
Weed mapping will be undertaken during the pre-construction phase to allow for targeted weed management during construction and limit the likelihood of colonisation by invasive species post construction. Weed control will be undertaken where WoNS or restricted invasive species under the *Biosecurity Act 2014* are known to occur.
All construction personnel shall attend environmental training as part of the site induction process prior to entering the work site. As part of this training, all personnel will be instructed on their obligations regarding vegetation clearing protocols. Areas identified for vegetation clearance are to be clearly defined and detailed in site inductions.
Clearing extents will be communicated to construction supervisors and all workers will be aware of restrictions associated with clearing boundaries and exclusion zones.
Where possible, suitable habitat features for fauna (e.g. hollow logs) encountered during clearing will be placed outside the Project Area, so they can be used for habitat.
All clearing will be supervised by suitably qualified and experienced fauna spotter-catchers. This will involve searching and clearing all trees and logs prior to clearing and relocating any resident fauna to the nearest suitable, safe habitat outside the Project Area.
For all activities where potential fauna habitat and breeding sites are to be removed or disturbed, a fauna spotter catcher will be present to manage and relocate fauna, and if required, take eggs, young and injured animals to a qualified carer (in accordance with an approved Species Management Program)
A CEMP will be prepared and implemented for standards such as weed hygiene, erosion, sediment control, fuels and hazardous substances, fire, etc.
Construction activities will be prioritised to daylight hours to reduce the need for lighting and resultant light spill into adjacent habitat and to reduce noise and vibration impacts on nocturnal fauna species.
Light during the operational phase will be directed away from known fauna habitats where possible.
Avoid interference to waterways/drainage features including the bed and bank structure and stream continuity.
Waste management procedures will be prepared as part of the CEMP. These will detail the location and specifications for the disposal and removal of waste from the construction site.

Mitigation Measures
All construction vehicles / equipment travelling from declared weed areas will undertake a wash down and possess a current weed hygiene inspection certificate from an accredited inspection station that is required to carry as evidence of quarantine clearance.
Material sought from outside the Project Area (e.g. fill for access tracks) will be required to hold weed free declarations.
The wastewater treatment plant and irrigation area will be designed and operated in accordance with an approved design that meets the requirements of the EP Act that ensures no environmental harm is caused.

6.0 Conclusion

Using a combination of field-validated data, desktop information and interpolated field survey results, the potential presence of ecological MNES values within the Project Area was assessed. Eleven regional ecosystems were confirmed as present in the Project Area including two that are endangered and are consistent with REs that are included in the description for the subtropical eucalypt floodplain forest and woodland of the New South Wales north coast and southeast Queensland bioregion Threatened Ecological Community (TEC).

Two fauna species were confirmed as present within the Project Area including the koala and squatter pigeon. The field assessments also identified three habitat types as occurring within the Project Area that are known to provide habitat values for a range of species that were classified as likely to occur in the likelihood of occurrence assessment and/or essential habitat was present. These species include:

- yellow-bellied glider (south-eastern)
- greater glider (southern)
- black-faced monarch
- satin flycatcher
- eastern osprey
- short-beaked echidna.

However, given the limited extent of clearing required within the already disturbed Project Area (1.145 ha of remnant vegetation and 0.015 ha of regrowth) and the limited habitat values surrounding the Project Area as outlined in AECOM (2024a; 2024b), significant impacts to these species is not expected to occur.

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