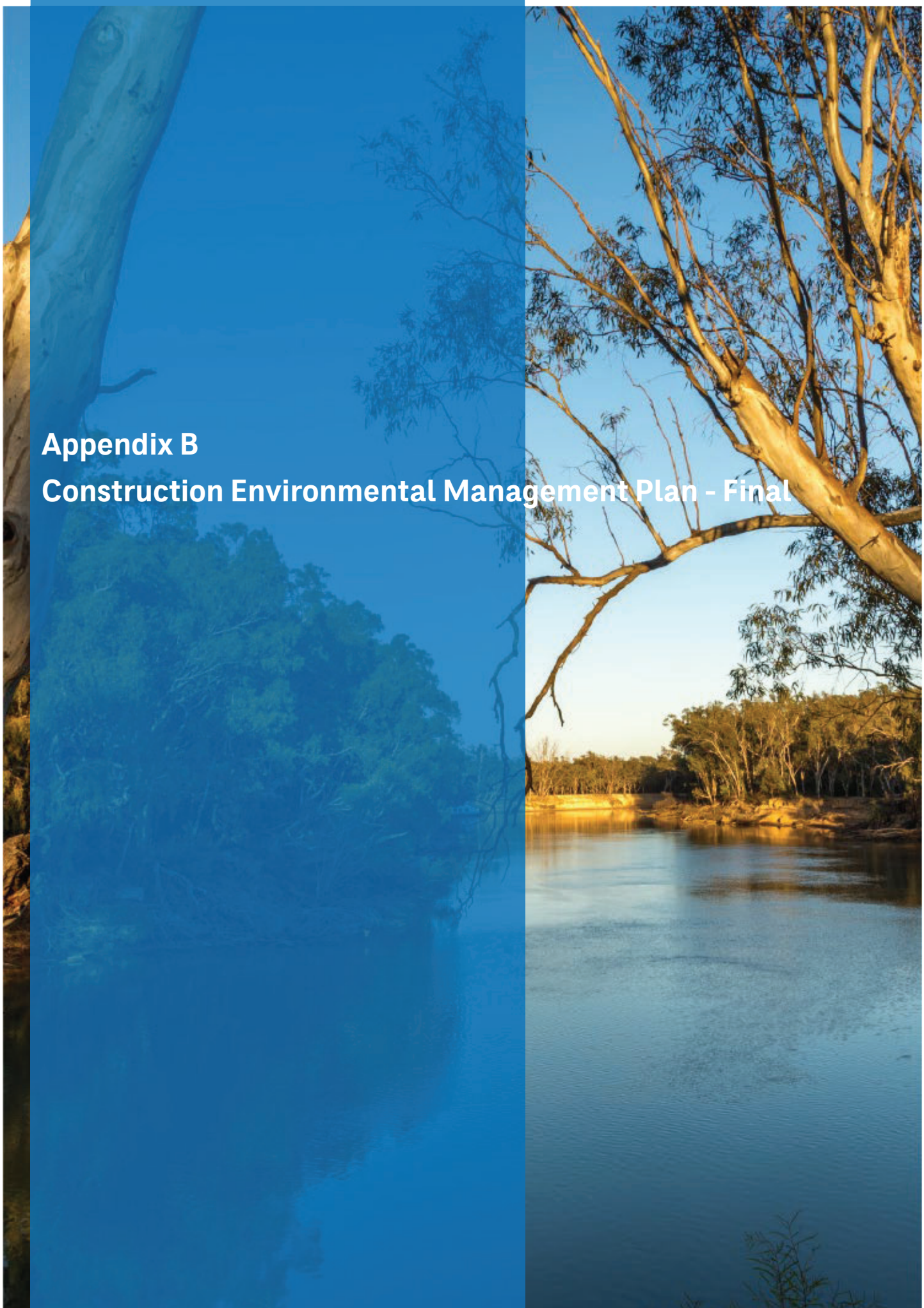

Appendix B
Construction Environmental Management Plan - Final

Townsville City Council

Lansdown Eco-Industrial Precinct – Enabling Infrastructure: Construction Environmental Management Plan

2 May 2025

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Document history & status

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Acronyms and Abbreviations

Abbreviation	Definition
ACHA	*Aboriginal Cultural Heritage Act 2003*
AHD	Australian Height Datum
Biosecurity Act	*Biosecurity Act 2014*
BMP	Bushfire Management Plan
BPESC	Best Practice Erosion and Sediment Control
CEMP	Construction Environmental Management Plan
CHMA	Cultural Heritage Management Agreement
DAF	Department of Agriculture and Fisheries
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EO Act	*Environmental Offsets Act 2014*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERP	Emergency Response Plan
EP Act	*Environmental Protection Act 1994* (QLD)
ESCP	Erosion and Sediment Control Plan
Fisheries Act	*Fisheries Act 1994*
Ha	Hectare
HSE	Health, Safety and Environment
IECA	International Erosion Control Association
LAA	Land Access Activity
LEIP	Lansdown Eco-Industrial Precinct
MNES	Matters of National Environmental Significance
MNES MP	Matters of National Environmental Significance Management Plan
NC Act	*Nature Conservation Act 1992* (QLD)
NOHSC	National Occupational Health and Safety Commission
PASS	Potential Acid Sulfate Soils
Planning Act	*Planning Act 2016*
QFES	Queensland Fire and Emergency Services
QLD Heritage Act	*Queensland Heritage Act 1992*
RCP	Reinforced Concrete Pipe
RE	Regional Ecosystem
SDS	Safety Data Sheet
SPP	State Planning Policy
TCC	Townsville City Council
VM Act	*Vegetation Management Act 1999* (QLD)
WPMP	Weed and Pest Management Plan

Section 1 Introduction

1.1 Background

Townsville City Council (TCC) is delivering the Lansdown Eco-Industrial Precinct (LEIP) Project, Northern Australia's first environmentally sustainable advanced manufacturing, technology, and processing hub. The LEIP will realise the objectives of the Townsville City Deal (a tri-partisan agreement spanning 15 years and all levels of government) to activate industry and export growth for Townsville and its regional partners as the Industry Powerhouse of the North.

The LEIP is located on approximately 2,200 hectares (ha) of freehold land owned by TCC.

Five initial proponents have been conditionally allocated land in the precinct following tender processes conducted by TCC. These proponents are:

- Queensland Pacific Metals;
- Edify Energy;
- Origin Energy Future Fuels Pty Ltd;
- Solquartz Pty Ltd; and
- North Queensland Gas Pipeline.

A tract of Sport & Recreation zoned land directly adjacent the LEIP was leased to DriveIT NQ in 2016 for the creation of a multi-use motorsport facility. Construction commenced in 2021 with the main track recently completed.

On 25 March 2022, TCC formally endorsed the infrastructure masterplan for the LEIP. Under the masterplan, over the next 15 – 20 years the LEIP will be developed in the following stages:

- Stage 0 Enabling Infrastructure (2022-2025) – essential early enabling infrastructure works to service the LEIP that primarily involves road access at the northern and southern section of the LEIP and a raw water network (including external pipeline, storage reservoir, internal pump station and internal pipeline) to service the initial proponents;
- Stage 1 (2022 – 2025) – Initial proponents obtain all various approvals and commence construction of their facilities;
- Stage 2 (2026-2030) – Initial proponents move into full and expanded operations. Expansion to the south, with provision of necessary infrastructure to service other proponents; and
- Stages 3 & 4 (2031-2041) – Final expansion and infill of infrastructure to service those areas remaining. Proponents' operations continue to grow. Enhancement of infrastructure as the LEIP continues to be further developed.

Stage 0 (Enabling Infrastructure) is the action that is the subject of the EPBC referral (2022/09383) and this Preliminary Documentation. Therefore, only the water infrastructure network and access roads shown in Figure 1-1 are considered under this Preliminary Documentation. Further information on the Project's enabling infrastructure is detailed in Section 1.3.

Development of the various land parcels within the LEIP (i.e., Stages 1 to 4) will be undertaken by the various proponents, with separate EPBC Act processes where applicable. Other future infrastructure to support future proponents would also be subject to separate EPBC Act processes.

While future projects within the LEIP project boundary will be subject to future EPBC Act processes, an overarching constraints analysis assessment was undertaken as part of the Master Planning process which included identifying environmentally sensitive areas (refer to the TCC LEIP Master Plan 2022). As a result of this assessment, mapped regional ecosystems (up to 308 ha), which have the potential to provide suitable habitat for EPBC listed species, have

been classified as moderate to highly constrained areas. Therefore, of the total LEIP Project area of 2,056.5 ha, it is considered that only 1,627.6 ha is developable land.

Future projects will need to carry out detailed assessment before development can proceed. The mapped regional ecosystems and environmentally sensitive areas require ground truthing to understand the condition and suitability of habitat for EPBC listed species. Two proponents (Drive-it NQ and QPM) have carried site specific environmental investigations, including EPBC referrals/self-assessment, for sections of the developable land within the precinct, therefore a total of 1,459.8 ha of land remains, of which 1,161.6 ha is considered developable.

1.2 Purpose and Scope

This Construction Environmental Management Plan (CEMP) captures the overarching environmental management processes and measures that will be implemented during construction of the Project.

The purpose of this CEMP is to guide environmental management actions for the construction phase of the Project. This CEMP identifies the level of environmental performance, mitigation measures and recommended controls required to manage and mitigate the anticipated environmental impacts. The CEMP scope is limited to the works to be undertaken at the Project site.

1.3 Project Description

The LEIP has been formed to foster Australia's first environmentally sustainable, advanced manufacturing, technology, and processing hub which will result in significant economic benefit to the local, regional and State economy. The LEIP is located approximately 38 km south of Townsville, adjacent and west of Flinders Highway. The enabling infrastructure is contained within the LEIP site and numerous existing road reserves including Flinders Highway, Woodstock Giru Road, Major Creek Road, Jones Road, Woodstock Avenue, Old Flinders Highway, No Name Road, Unnamed Road, Ghost Gum Road and Bidwilli Road. The LEIP location and its components are provided in Figure 1-1, refer to Appendix C of the Preliminary Documentation for a copy of detailed design plans. To facilitate the development of the LEIP, enabling infrastructure is required and a summary of project components is outlined in Table 1-1.

Table 1-1 Summary of project components forming LEIP enabling infrastructure

Project Component	Description Summary
Water Infrastructure	
External Pipeline	▪ Extends from Ross River Dam Pipeline, connecting existing water supply network to LEIP; ▪ Connection occurs adjacent to three intersection junctions at Majors Creek; ▪ Total length of 16.25 km, within a 20 m construction corridor; ▪ 4.5 m from the nearest property boundary; ▪ Constructed using DN900 glass reinforced polymer (GRP) pipe; and ▪ Pipeline protection, erosion control and scour prevention materials used.
Internal Pipeline	▪ Installed within the No Name Road existing and new road reserve from Ghost Gum Rd to Manton Quarry Rd; ▪ 3.8 km Ductile Iron Cement Lined (DICL) pipeline; and ▪ Various diameters including DN250 to DN500 to suit water demand of each individual proponent.
Storage Reservoir	▪ Proposed immediately south of Bidwilli Road at the termination of the external pipeline; ▪ Occupies an area of approximately 26 ha; ▪ Storage capacity of approximately 437 ML; and ▪ Access via Bidwilli Road.
Internal Pump Station	▪ New pump station immediately east of the storage reservoir ; ▪ Connects storage reservoir and internal pipeline; and ▪ Access via Bidwilli Road.
Site Laydown Area	▪ Approximately 1.7 ha in area, north east of Flinders Highway and Woodstock Giru Road intersection.
Access Roads	
Jones Road to Flinders Highway Upgrade	▪ Modifications to existing roads and intersections required; and ▪ All roads are existing sealed roads within road reserves.

Project Component	Description Summary
Jones Road Intersection Upgrade	▪ Existing road; ▪ Connection to No Name Road (north) via an upgraded intersection; and ▪ Upgraded to 10 m wide pavement within the 30 m wide road reserve for approximately 900 m in length to connect to Old Flinders Highway.
Closure of Existing Level Crossings	▪ Two existing level crossings will be closed; and ▪ No change to land tenure, road reserves or road infrastructure.
No Name Road (north) Upgrade	▪ Extends 1.7 km from northern LEIP boundary to Jones Road; ▪ New road, new 10 m wide pavement within an existing 20 m road reserve; ▪ Designed to accommodate heavy vehicles; ▪ Road reserve will be expanded to 30 m in width with a 10 m wide land resumption on the western side of the road corridor; and ▪ Forecast for 2,340 vehicles per day, with 35% heavy vehicle usage.
No Name Road (south) Upgrade	▪ New, 10 m wide road pavement within a new 30 m road reserve; ▪ Designed to accommodate heavy vehicles; ▪ Extends approximately 2.2 km from Bidwilli Road to Manton Quarry Road; and ▪ Design is not yet complete but will adopt the same cross section as No Name Road (north)
Bidwilli Road	▪ Minor modifications required to connect to No Name Road (south) and provide access to internal pump station and storage reservoir ; ▪ Raw water pipeline to be installed within Bidwilli Road reserve on the southern side; and ▪ Northern side of the road reserve will allow for a 4.25 m service corridor for future resources.
Unnamed Road	▪ East-West road north of Manton Quarry Road. ▪ Existing road reserve is 20 m wide; ▪ Design is not yet complete, however will adopt the same cross section and details to No Name Road (north and south); ▪ New, 10 m wide road pavement designed to accommodate heavy vehicles; and ▪ New 10 m wide easement will be added to the northern boundary of Unnamed Road for drainage and future services.
Flinders Highway Upgrade	▪ Shoulder widening required. The shoulder widening works are contained within the existing Flinders Highway road reserve
Creation of Easements	▪ 45 m wide easement on western side of No Name Road (south); ▪ A 10m wide easement on the northern side of Unnamed Road; and ▪ A 20m wide easement within the southern side of the existing Ghost Gum road reserve.

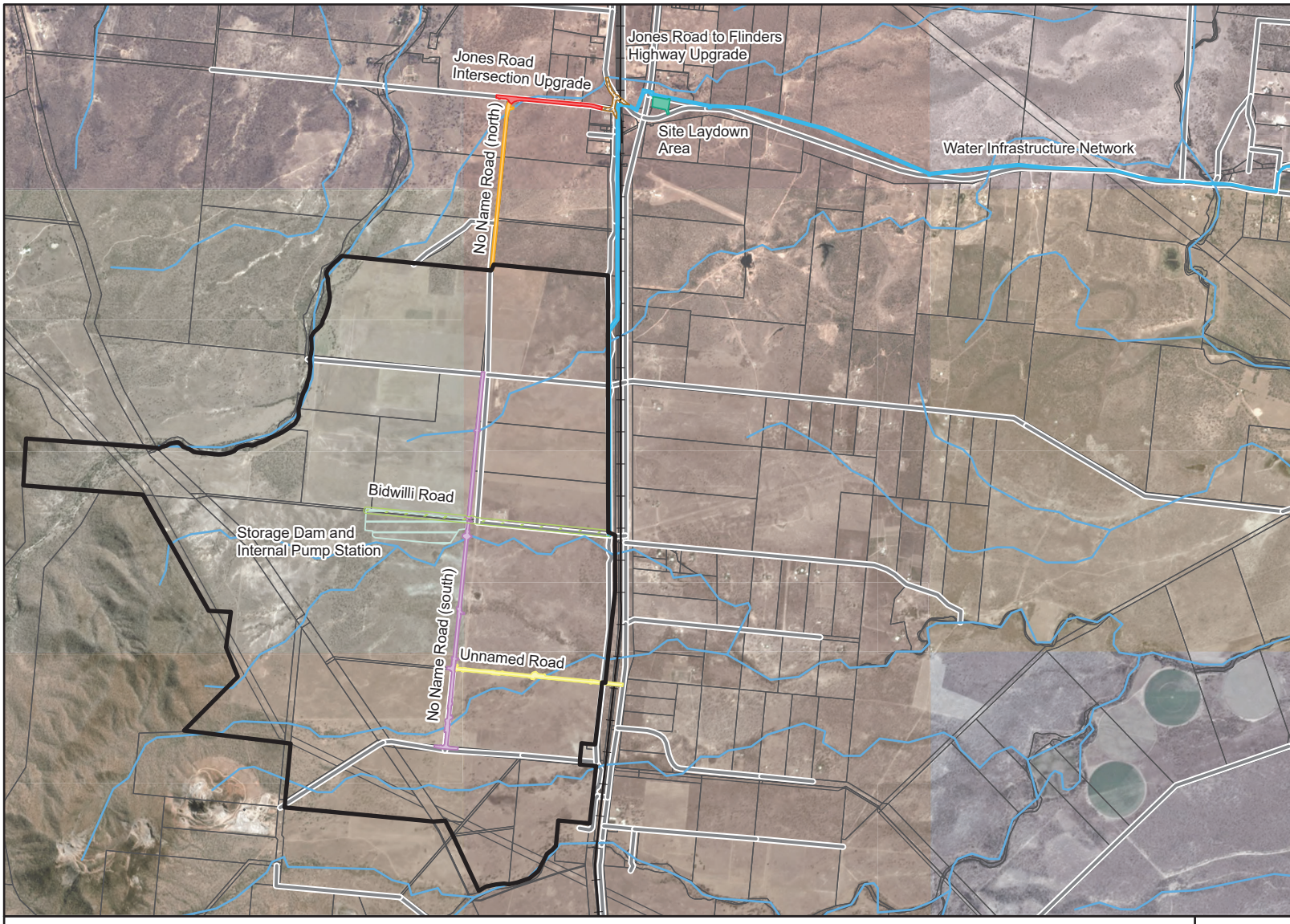

Figure 1 Project Location and Project Components

LEGEND

- LEIP Precinct Boundary
- Jones Road Intersection Upgrade
- Jones Road to Flinders Highway Upgrade
- No Name Road (north)
- No Name Road (south)
- Bidwilli Road
- Unamed Road
- Water Infrastructure Network
- Storage Dam and Internal Pump Station
- Site Laydown Area
- Rail Network
- Existing Roads
- Watercourse
- Cadastre (DCDB)

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1.4 Proponent Details

The proponent details are outlined in Table 1-2.

Table 1-2 Proponent Details

	Proponent Details
Organisation name (as registered for ABN/CAN)	Townsville City Council
ABN	44741992072
Business address	103 Walker Street, Townsville, QLD 4810
Postal address	PO Box 1268, Townsville, QLD 4810
Primary contact	Scott Muller
Job title	Program Manager – Lansdown Eco-Industrial Precinct Commercial & Project Services

1.5 Related Documents

The CEMP is one of several plans that outline management measures and controls for the Project. Other plans include the Weed and Pest Management Plan (WPMP), the Matters of National Environmental Significance Management Plan (MNES MP) and the Bushfire Management Plan (BMP).

1.6 Project Roles and Responsibilities

All personnel involved in the Project including the proponent's employees, contractors and sub-contractors are required to undertake work in accordance with this CEMP. Key roles and responsibilities are included in Table 1-3.

Table 1-3 Project Roles and Responsibilities

Position	Responsibilities
The Client (Principal)	▪ Obtaining state and Commonwealth statutory approvals; ▪ Reviewing contractors construction phase plans and submittals for executing works; ▪ Monitor and inspect Contractors construction activities for Health Safety and Environment (HSE) and Quality compliance; ▪ Monitor progress of site work to verify that the Contractors are executing works in accordance with their contract requirements; and ▪ Undertake environmental and cultural heritage audits to verify compliance with this CEMP.
Contractors	
Project Manager	▪ Preparation of construction specific management plans, quality plans and HSE plans; ▪ Ensuring that the project environmental performance meets client requirements; ▪ Responsible for the integrity of the work and commercial performance of the Project; ▪ Ensure all environmental requirements are implemented in accordance with the project approvals, client requirements, the specification, the contract requirements and legislative obligations; ▪ Reviewing and implementing this CEMP; ▪ Communicating requirements of this CEMP to the Project team, and ensuring compliance; ▪ Ensuring Project environmental documentation records are maintained and provided to the client and their representatives as necessary; ▪ Engage qualified and experienced staff and provide management support to ensure all activities relating to environmental performance are undertaken by trained and competent personnel and in accordance with the contract; and ▪ Select subcontractors and suppliers based on an evaluation of their ability to meet the specified requirements including those for environmental and ensure compliance.
Site Supervisor	▪ Ensure all environmental requirements are implemented in accordance with the project approvals, client requirements, the specification, the contract requirements and legislative obligations; ▪ Monitor the effectiveness of the environmental controls implementation and escalate issues for rectification to the Project manager; ▪ Monitor the subcontractors and suppliers based on an evaluation of their ability to meet the specified requirements including those for environmental and ensure compliance; ▪ Manage the development of construction methods, ensuring that complex of specific processes for safety, environment or quality aspects for the portion of the works are completed in accordance with construction codes of best practice, legislative requirements, client specifications and in coordination with the Project Manager and HSE Advisor; ▪ Ensure that all personnel are inducted in their roles and responsibilities; ▪ Establish and maintain a list of current contact names and telephone numbers for all personnel relevant to environmental matters. This list will include (but not limited to): - Principle's Representative; - Contractor's Site Supervisors; - HSE Manager; and - DES Pollution Hotline (PH 1300 130 372). ▪ Conduct daily visual inspections and weekly site checklists.
Contractor HSE Manager	▪ Ensure all workers are aware of the CEMP requirements related to their scope of work; ▪ Establish and plan the controls for environmental compliance for the Project; and ▪ Maintain the Project non-conformance system.

Position	Responsibilities
All Site Personnel	
All personnel	▪ Follow the requirements and carry out work in accordance with this CEMP and those of the Site Supervisor; ▪ Report any potential environmental issues to the site supervisor, including: - Dust generation; - Non-conformance to noise and vibration; - Non-conformance to air quality; - Uncontrolled waste storage. ▪ Exercise due care, skill and judgement when carrying out tasks; ▪ Implement corrective actions which have been approved by the appointed site supervisor; ▪ Comply with all relevant environmental laws associated with the delivery of the Project and undertake works in accordance with the BSC Environmental Policy (BSC, 2018).

1.7 Training, Awareness and Competence

Effective implementation of all management plans will require all Project personnel to receive appropriate training. The competency needs of all personnel performing activities affecting the environment during construction shall be identified and documented. All Project personnel will undergo a site induction covering the key environmental issues and measures relating to the Project. All records of training and competencies will be kept and maintained.

1.8 Communication

Environmental requirements and controls necessary at the site, shall be communicated through the following:

- Site environmental inductions;
- Daily pre-start meetings;
- Environmental toolbox talks;
- Incident bulletins;
- Sub-contractor kick-off meeting; and
- Contractor and client site kick-off meeting.

1.9 Monitoring and Inspections

The Project Manager and Environmental Representative must ensure that environmental protection measures are working effectively on-site through a system of self-checking. The self-check system should comprise inspections of:

- Localised status of the impact (e.g., has there been rain or events contributing to impacts?);
- Anticipating external factors which may increase the potential for environmental impacts (e.g., is inclement weather forecast?);
- Environmental protection measures (e.g., are appropriate measures in place?); and
- Receptors of the effects of the impact (e.g., residents, stormwater drains).

Daily and weekly inspections may include but are not limited to:

- Daily Measurement of turbidity, pH, EC and DO of waterway during active works or after a rain event;
- Daily inspection for sediment plumes in adjacent water bodies;

- Daily inspection of erosion and sediment control devices, and compliance with the approved ESCP to ensure they are in place and working efficiently;
- Daily checks of all monitoring devices are calibrated and maintained;
- Daily checks for the presence of fauna in operational areas;
- Daily checks that works aren't encroaching into no go areas;
- Daily checks of all flora and fauna protections/controls (e.g., TPZs, wildlife exclusion fencing and weed hygiene stations); and
- Weekly compliance check of all registers (i.e., weed hygiene register, complaints register, waste register etc.) to ensure up to date and actions have been allocated and are being followed up.

1.10 Records and Reporting

The proponent will be required to retain records sufficient to demonstrate compliance. These records will populate a compliance register. Documents may include flora and fauna investigations, surveys, inspection, emergency procedures, incident report forms, inspection test plans, work procedures, geotagged site photographs and induction checklists.

Incident reporting requirements are to be followed. Reporting requirements may involve weekly, monthly reporting. The proponent will prepare a compliance report annually in accordance with approval conditions.

1.11 Non-conformance, Near Miss, Complaints and Corrective Actions

A non-conformance, a near miss or an environmental complaint can be considered as an environmental incident and will be investigated and managed as such. A non-conformance, a near miss or an environmental incident is to be reviewed or investigated to determine the root cause and corrective or preventive actions implemented to prevent recurrence.

Incidents, non-conformances, and potential non-conformance with approval conditions are to be reported as required under relevant condition of the approval, permit or licence.

An independent audit of compliance with conditions will be conducted every five-year period.

Non-conformance

A non-conformance is realised when a requirement related to an approval condition or EMP requirement of ISO14001 EMS process has not been met. Identification of a non-conformance may be through an observation, monitoring or audits.

Near Miss

A near miss is when a process or procedure as described within this CEMP or the environmental management system has not been fully achieved (e.g., weekly toolbox not conducted), however a non-conformance was not realised.

Complaints

In the first instance, the Contractor is expected to manage any onsite complaints through the implanting corrective actions as necessary. Complaints and associated corrective actions must be recorded and reported in a monthly report. A nominated TCC Representative will have a review role regarding complaints management as required.

If the nature of the compliant is not construction related or requires TCC involvement the compliant is to be forwarded to TCC for resolution.

Corrective Actions

Corrective and or preventive actions will be taken to eliminate the actual or potential causes of a nonconformity, near miss or complaint and be appropriate to the risk or environmental impacts encountered.

A corrective actions register must be maintained on site by the Project Manager or delegate and shall, record all corrective actions identified and implemented including review of corrective actions and close out details. The close out details should include the date closed and the name of the person verifying completion of the required action.

The corrective actions register shall be kept up to date and reported to the TCC Representative weekly. Corrective actions shall also be entered into TCC software to enable close out of the incident.

1.12 Emergency Response Plan

A site Emergency Response Plan (ERP) for the Project will be developed by the Contractor(s). The ERP will reflect regulatory and proponent requirements for the Project. Management of the potential for environmental harm will be included in the ERP.

The ERP will have regard to the potential risks associated with the Project construction, identify emergency services, measures to undertake consultation with local emergency services and a protocol for notifying appropriate authorities following the occurrence of an incident or emergency, and detailed incident and emergency procedures.

All Project personnel will receive basic training, which will be incorporated into the Project induction, regarding the prevention, the communication activities and the escalation, planning, response to and recovery from incident or emergency.

Section 2 Statutory Consideration

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legal framework to protect and manage Matters of National Environmental Significance (MNES) including nationally and internationally important flora, fauna, ecological communities, heritage places and water resources. The EPBC Act implements obligations under international conventions and treaties, such as protection of migratory species (Migratory Bird Agreements and the Bonn Convention, 1979) and World Heritage Area values (UNESCO, 1972). The EPBC Act is administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW).

The EPBC Act establishes a process for assessment and approval of proposed actions that have, or are likely to have, a significant impact on MNES. Proponents may refer projects to the Australian Government Minister for the Environment and Water (the Minister) for a determination on whether their project is a controlled action or not a controlled action. If the referral is deemed to be a controlled action, then it is likely to have a significant impact on MNES and must be undertaken in accordance with the assessment decision from the Minister. Where significant impacts to MNES are deemed to occur and are unavoidable, a project proponent may be required to compensate through the acquiring of environmental offsets as set out in the EPBC Act Environmental Offsets Policy (DSEWPaC 2012).

The EPBC referral was submitted to DCCEEW on 23 November 2022. On 22 December 2022, a delegate of the Minister for the Environment determined the Project a controlled action under the EPBC Act and will be assessed by Preliminary Documentation (EPBC 2022/09383). The controlling previsions were determined to be listed threatened species and communities (sections 18 and 18A).

2.1.1.1 Matters of National Environmental Significance: Significant Impact Guidelines 1.1 – EPBC Act

The Significant Impact Guidelines 1.1 are provided under the EPBC Act and are required where an action has, will have, or is likely to have a significant impact on a matter of national environmental significance. The Significant Impact Guidelines 1.1 provide a 'self-assessment' process using detailed criteria for conservation categories (i.e., Endangered/Critically Endangered and Vulnerable species and Threatened Ecological Communities) to assist in determining whether a referral is required to be submitted to the Australian Government Department of the Environment (DoE) for a decision by the Minster on whether assessment and approval is required under the EPBC Act.

2.1.2 Native Title Act 1993

The Commonwealth *Native Title Act 1993* (NT Act) recognises the rights and interests of Indigenous peoples in respect of land on which they historically resided and regulates the conduct of 'future acts', including development. The Commonwealth NT Act includes requirements for native title party notification and consultation, where a proponent seeks to undertake a 'future act'.

Indigenous stakeholder engagement has been maintained with nine (9) Bindal Native Title Applicants. The LEIP project area is located within the external boundary of the Bindal People #2 Registered Native Title Determination Application (QC2016/005 and QUD503/2016).

2.2 Relevant State Legislation

2.2.1 Aboriginal Cultural Heritage Act 2003

The *Aboriginal Cultural Heritage Act 2003* (ACHA) is the primary piece of legislating governing the protection of Aboriginal Cultural Heritage in Queensland. The ACHA requires developers to identify reasonable and practicable measures for ensuring the activities are managed to avoid or minimise harm to Aboriginal cultural heritage in a way that meets the duty of care requirements under Section 23 of the ACHA.

The Cultural Heritage Duty of Care Guidelines (the Guidelines) provide guidance in determining whether a person or activity complies with the cultural heritage duty of care. The Guidelines recognise that it is unlikely that Aboriginal cultural heritage will be harmed where:

- The current or proposed activity in an area is in an areas previously subjected to significant ground disturbance and the activity will impact only on the area subject to the previous ground disturbance; or
- The impact of the current or proposed activity is unlikely to cause any additional harm to Aboriginal cultural heritage than has already occurred.

Stakeholder consultation with Indigenous peoples has been undertaken to engage and maintain a constructive relationship where a Cultural Heritage Management Agreement (CHMA) pursuant to Section 23 of the ACHA has been agreed on and executed. The CHMA covers the entire LEIP project area and is intended to guide and manage the undertaking of project development activities for the LEIP Project.

2.2.2 Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) provides legislative measures to manage pests and weeds, diseases and environmental contaminants, and to address the impacts they have on the economy, environment, agriculture, tourism and society.

The Act provides statutory powers to prohibit or restrict the introduction and spread of plant and animal pests to and within Queensland. Weeds and pests pose on of the most significant threats to environmental values and agriculture within the region.

Weeds and pests pose one of the most significant threats to environmental values and agriculture within the Project area and broader region. Accordingly, appropriate management measures will be implemented to restrict the introduction and/or spread of weeds, pests, and diseases as a means of protecting the values of the surrounding environment.

2.2.3 Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (EO Act) (QLD), Environmental Offsets Regulation 2014 and the Queensland Government Environmental Offsets Policy 2014 provides a streamlined framework for environmental offset requirements. Offsets are required where there is an unavoidable impact on significant Environmental Values (EVs). In addition, an environmental offset can only be required if impacts from a prescribed activity constitutes a significant residual impact as identified through the following guidelines:

- The State guideline that provides guidance on what constitutes a significant residual impact of Matters of State Environmental Significance (MSES);
- The Commonwealth Significant Impact Guidelines for what constitutes a significant residual impact on MNES; and
- Any relevant local government significant impact guidelines for Matters of Local Environment Significance (MLES).

To avoid duplication with offsets required under the Commonwealth's EPBC Act Environmental Offsets Policy 2012, the policy provides that the administering agency must consider other relevant offset conditions which apply for the same,

or substantially the same prescribed impact. If duplicate conditions are imposed, it allows the proponent to remove the duplication.

To determine whether the Project will result in a significant impact to flora and fauna species, residual impacts to MNES and MSES have been assessed.

2.2.4 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) provides the key legislative framework for environmental management and protection in Queensland. The objective of the EP Act is to: 'Protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends' (s 3). Under the EP Act, TCC must comply with the general environmental duty not to undertake an: 'Activity that causes, or is likely to cause, environmental harm unless…takes all reasonable and practicable measures to prevent or minimise the harm' (s 319).

Desktop and field assessments have validated the presence and extent of Regional Ecosystems (REs) present within the Project area, presence of listed threatened flora and fauna species under the *Nature Conservation Act 1999* and suitable habitats. The assessments identified numerous waterways for waterway barrier works (WWBW) that intersect the Project area, particularly along No Name Road (south) and the water infrastructure alignment. Management measures have been constructed to minimise the impacts to intersected WWBW and listed threatened species.

2.2.5 Fisheries Act 1994

The main purpose of the *Fisheries Act 1994* (Fisheries Act) is to provide for the use, conservation and enhancement of the fish resources and habitats to apply and promote the principles of Ecologically Sustainable Development. It regulates the taking and possession of specific fish, removal of marine vegetation, the control of development in areas of fish habitat and listed noxious fish species. Approvals for waterway barrier works within waterways are required under the Planning Act (through which the Fisheries Act is administered for development within a waterway).

All waters of the state are protected against degradation by direct or indirect impact under s125 of the Fisheries Act. If litter, soil, a noxious substance, refuse or other polluting matter is on land, in waters or in a fish habitat and the polluting adversely affects fisheries resources or habitat then penalties apply. There are no mapped fish habitat area within the Study area.

Final Project designs are being reviewed to consider potential approvals required under the *Fisheries Act 1994* including an Operational Works development approval for waterway barrier works. This will be required where wetland and waterway crossings occur.

2.2.6 Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) provides for the protection and management of native wildlife and habitat that supports native species with particular regard to:

- The clearing of plants protected under the NC Act;
- A clearing permit or an exemption under the NC Act;
- Activities that may cause disturbance (that is tamper, damage, destroy, mark, move or dig up) to animal breeding places; and
- The taking of native flora and fauna.

Subordinate legislation lists protected species and areas to which the regulatory provisions of the NC Act apply, namely the *Nature Conservation (Wildlife) Regulation 2006*: this regulation lists terrestrial and aquatic plant and animal species

presumed extinct, endangered, vulnerable, near threatened, least concern, international or prohibited. It recommends management objectives for the protection and maintenance of these species in Queensland, as appropriate.

The field surveys conducted for the Project have included habitat assessments and identification of flora and fauna. Information gathered during the surveys has been used to determine species likelihood of occurrences within the Project area and habitat mapping assessments have been prepared to understand the potential impact to fauna foraging, breeding and roosting habitat within the Project area.

2.2.7 Planning Act 2016

The *Planning Act 2016* (Planning Act) is Queensland's principal planning legislation and comprises three main elements: plan making, development assessment and dispute resolution. The aim of the Planning Act is to provide a planning system that enables responsible development and delivers prosperity, sustainability and liveability.

The State Planning Policy (SPP) is a statutory instrument prepared under the Planning Act that relates to matters of State interest. The SPP applies to a range of circumstances under the Planning Act, including for development assessment and when proposed new planning schemes are made or amended. The SPP is applicable to assessable development within Queensland. The provisions of the SPP may also be considered under the standard criteria of the EP Act which includes ecological MSES including Biodiversity – Matters of State Environmental Significance (MSES) - Regulated vegetation and Regulated vegetation (intersecting a watercourse) and waterway barriers.

Final Project designs are being reviewed to consider potential approvals required under the Planning Act or Planning Regulation 2017, including Operational Works for the Taking or Interfering with Water (Water Licence), Operational Work in a Wetland Protection Area and Operational Work that is the Construction of a Dam.

2.2.8 Queensland Heritage Act 1992

The *Queensland Heritage Act 1992* (QLD Heritage Act) provides for the identification, protection and conservation of places and objects of cultural significance in Queensland. The QLD Heritage Act aims to ensure that Queensland's cultural heritage resources are preserved for future generations including the protection and management of heritage places and objects. Under the QLD Heritage Act, approval is required when alteration or demolition of a heritage place is proposed.

Desktop and field assessments have been undertaken to identify the potential presence of QLD heritage places within the Project area.

2.2.9 Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) regulates the conservation and management of woody vegetation communities, providing protection for the following:

- Regional Ecosystems (REs) classified as 'endangered' or 'of concern' (including remnant and high-value regrowth);
- REs classified as 'least concern' associated with mapped waterways;
- Mapped 'essential habitat' for threatened flora and fauna species listed under the NC Act; and
- Specific wetlands as mapped under the VM Act.

A Relevant Purpose determination under Section 22A of the *Vegetation Management Act 1999* has been submitted by TCC for the clearing of native vegetation associated with the water pipeline alignment, pump station, raw water storage dam and onsite storage area.

2.2.10 Water Act 2000

The *Water Act 2000* provides a framework for the planning and regulation of the use and control of water in Queensland, including regulating both major water impoundments (i.e., dams, weirs, and barrages) and extraction by pumping for irrigation and other uses. This Act provides a wide range of tools for the regulation of in-stream (i.e., watercourses, lakes, and springs) and overland water flow and groundwater within the context of "sustainable management and efficient use" of water. The Act provides for Water Resource Plans, generally on a catchment-by-catchment basis, to be prepared through a consultative process. These plans are meant to balance water allocations (i.e., human use) with environmental flows (i.e., leaving water in a watercourse to maintain natural processes) (s46).

Water Use Plans may be prepared for areas at risk of land or water degradation, e.g., due to rising underground water levels, salinisation, deteriorating water quality, water logging of soils, destabilisation of the bed and banks of watercourses, damage to the riverine environment, or increasing soil erosion (s60). Land and Water Management Plans may also be submitted by individual landowners applying to irrigate their land (s73).

Final Project designs are being reviewed to consider potential approvals required under the *Water Act 2000*, including Operational Works for the Taking or Interfering with Water (Water Licence).

2.3 Local Planning Scheme

The Townsville City Plan version 2022/02 (planning scheme) has been prepared in accordance with the *Planning Act 2016* (Planning Act) as a framework for managing development in a way that advances the purpose of the Planning Act with a 25 year planning horizon. The planning scheme applies to the planning scheme area of Townsville City Council with the inclusion of all premises, roads, internal waterways and surrounding local government areas.

Section 3 Construction Environmental Management Plan

3.1 Summary of Impacts

The Project has the potential to impact the following during either clearing, construction and/or operation:

- Vegetation clearing;
- Direct fauna mortality;
- Introduction of invasive flora;
- Introduction of invasive fauna;
- Noise and vibration impacts to fauna;
- Artificial lighting impacts to fauna;
- Air quality and dust resulting in the reduction of vegetative growth, reduction in habitat quality, respiratory problems for fauna, and increased sedimentation in waterways.; and
- Increased frequency and/or intensity of fires.

A summary of the above listed impacts which pose potential to impact MNES as a result of the project are summarised in Table 3-1.

Table 3-1 Summary of Potential Impacts to MNES

Impacts	Potential Impacts to MNES	Impacted Listed Threatened Species and communities, including flora and fauna.	Applicable Project Phase
Vegetation clearing	Removal of vegetation that provides foraging and/or breeding habitat for threatened species likely or known to occur within the area.	All	During Vegetation Clearing
Direct fauna mortality	Vehicle strike may result in direct mortality of fauna species traversing the Project area and surrounds. As a result of the Project, an increase of vehicle and machinery traffic is expected, particularly during clearing and construction phases.	All	All Project phases, particularly during clearing and construction.
Invasive flora	Weed invasion within and surrounding the Project area has the potential to be facilitated numerous activities including vegetation clearing and soil disturbance. Invasive flora generally spread within disturbed environments and have the potential to degrade fauna habitats and wetland habitats (aquatic weeds), increase intensity of bushfires and compete with native flora.	All	All Project phases, particularly during clearing and construction.
Invasive fauna	The impacts of pest fauna have the potential to be increased during the construction of the Project due to clearing of vegetation resulting in reduced refuges for prey species and increased visibility for feral predators.	All	All Project phases, particularly during clearing and construction.

Impacts	Potential Impacts to MNES	Impacted Listed Threatened Species and communities, including flora and fauna.	Applicable Project Phase
Noise and vibration	Noise can have adverse impacts on fauna by interfering with communication for mating, territory maintenance, and alarm calls when threats are detected. Noise may also cause stress and avoidance of the area during and after construction activities, masking of predator and prey sounds. These impacts can potentially lead to changes in the mating and other reproductive behaviours, threat avoidance behaviours and prey detection behaviours.	All	All Project phases, particularly during clearing and construction.
Artificial lighting	Artificial light during night works has the potential to impact habitat occupation within the Project area and on adjacent land.	Bare-rumped sheathtail bat	Construction and operation.
Air quality and dust	Increased dust can result in reduction of vegetative growth, reduction in habitat quality, respiratory problems for fauna, and increased sedimentation in waterways.	All	Construction
Fire	Uncontrolled bushfire has the potential to threaten the lives of people and fauna, contribute to habitat loss, increased erosion and sedimentation of waterways, food availability, change species composition and increase the likelihood of weed invasion and spread.	All	All Project phases, particularly during clearing and construction.

3.2 General

A summary of the general management and mitigation measures for the Project are presented in Table 3-2, which may apply to various aspects of construction and operational works/phases.

Table 3-2 General Management Measures

Objectives					
▪ Compliance with legal and other requirements (i.e., permits, licences and approval conditions); ▪ Environmental performance and compliance are monitored; ▪ Ensure all staff are aware of the environmentally friendly sensitive features on-site.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
G1	Environmental awareness training aimed at ecological issues as part of site induction	Site Supervisor	Prior to clearing and construction	NA	Staff induction records and incident register
G2	Vehicle washdown procedures. Wash-down areas will be clearly marked to prevent contaminated water from leaching into soils or flowing into nearby watercourses.	All Personnel	During clearing and construction	NA	Environmental Representative records

Objectives					
G3	Ensure all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	All Personnel	During all Project phases	NA	Photos of site boundary flagging and incident records
G4	Ensure all vehicles comply with designated speed limits whilst traversing site.	All Personnel	During all Project phases	NA	Environmental Representative records
G5	Minimise the occurrence of off-road vehicle movements	All Personnel	During all Project phases	NA	Environmental Representative records
G6	Provide timely, ongoing communication and consultation with all directly impacted landowners and other stakeholders	Site Supervisor	During all Project phases	NA	Stakeholder communications register

3.3 Land

Construction works will involve clearing and earthworks for the preparation of the land for the construction of the Project. The Project area is generally flat with elevation ranging from 45 m Australian Height Datum (AHD) to the northeast to 89 m AHD at its highest point to the southwest. Construction works can lead to physical degradation of the soil, soil contamination, and erosion. No Acid Sulphate Soils have been mapped in the area. Based on preliminary geotechnical investigations, the indication is that the 2 to 3m deep excavations for the pipeline are likely to predominantly comprise sands to the east of Serpentine Lagoon and predominantly clays to the west and south of this point. The shallowest bedrock was encountered at 5.2m depth and therefore considered unlikely in the trench excavations. A Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-3.

Table 3-3 Land Objectives and Management Measures

Objective					
▪ Reduce accumulation of contaminants leading to land and water contamination; ▪ Ensure soil and sediment transport do not significantly impact on the receiving environment; ▪ Prevent spill or leakage of chemicals and fuel; and ▪ Prevent infiltration of chemicals to groundwater as a result of spills and leaks.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
L1	Earthworks, landscaping and drainage are to be in accordance with AS2870-2011.	Site Supervisor	During construction	In accordance with AS2870-2011	Environmental Representative records
L2	Erosion and sediment control devices are to be installed and monitored as per the certified Erosion and Sediment Control Plan (ESCP).	Project Manager / Site Supervisor	During construction	In accordance with ESCP	Environmental Representative records

L3	Sediment and erosion control measures to prevent soil loss will be developed consistent with the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control (BPESC) documents. ▪ Minimising the area and duration of soil disturbance; ▪ Progressively rehabilitating disturbed areas; ▪ Maintaining sheet flow conditions to the maximum extent possible; ▪ Water velocity reduction measures and redirection of runoff to stable ground; ▪ Diversion banks at the crest of steep areas such as stream banks to divert flow away from backfilled trenches or disturbed areas; ▪ Trench blocks (i.e., trench/sack breakers) and compaction of backfilled soils to be used to prevent subsurface erosion and subsidence along backfilled trenches.	Project Manager / Site Supervisor	During Project design	In accordance with IECA, BPESC and ESCP documents.	Environmental Representative records
L4	Inspect erosion and sediment control devices during construction and immediately after rainfall events to ensure good working order. Remove any visible debris during inspections.	Site Supervisor	During construction	Visual inspection after rainfall	Environmental Representative records
L5	Management of runoff will be of particular focus to limit environmental impact to watercourses.	Site Supervisor	During clearing, construction and operation	NA	Environmental Representative records
L6	Dust suppression is to be managed using water when and where necessary.	All Personnel	During all Project phases	NA	Environmental Representative records
L7	Roads and access tracks are to be appropriately maintained to limit environmental harm to immediate and surrounding areas.	Site Supervisor	During all Project phases	NA	Environmental Representative records
L8	Spill kit(s) are to be located at the construction site.	Site Supervisor	During all Project phases	NA	Environmental Representative records and photos
L9	Handling and storage of combustible and flammable liquids is to be done in accordance with AS1940:2017.	Site Supervisor	During all Project phases	In accordance with AS1940:2017	Environmental Representative records
L10	Construction vehicles are to be visually monitored during construction works to ensure movements are compliant with management measures.	All Personnel	During construction	Visually monitored	Environmental Representative records and photos
L11	Any spills are to be immediately cleaned using appropriate spill kit equipment and methods.	All Personnel	During all Project phases	Visually monitored during spillages	Incident register

L12	Staff are to be made aware of spill response procedure and reporting requirements.	Project Manager / Site Supervisor	Prior to clearing and construction	NA	Staff induction records
L13	Construction and plant equipment is to be regularly monitored and checked for spills and breakages.	All Personnel	During construction	Visually monitored	Photos and incident register
L14	Fuel, oil and chemical storage and handling are to be in accordance with Australian Standards.	Project Manager / Site Supervisor	During all Project phases	In accordance with Australian Standards	Environmental Representative records
L15	Land clearance and disturbance to the project area and slope angles is to be limited.	All Personnel	During Project design and clearing	NA	Environmental Representative records
L16	Appropriately designed laydown areas are to be used.	Site Supervisor	During Project design	NA	Environmental Representative records
L17	The following measures will be implemented to manage topsoil: ▪ Soil management measures will be appropriate to the soil type at each location; ▪ Vegetation will be cleared prior to stripping of soil; ▪ Topsoil will not be stripped when saturated; ▪ Topsoil will be stripped across the Project construction footprint, typically to maximum depths determined during pre-construction surveys. In soil types with topsoil depth of 30 cm or greater, the stripping depth may be reduced to ensure stockpiles can be accommodated within the construction corridor width; ▪ Stripped topsoil will be stockpiled separately from woody material and subsoil stockpiles; ▪ Topsoil stockpiles will not exceed 2 m and will be clearly signposted; ▪ Gaps in any linear topsoil stockpiles will be left at appropriate intervals for drainage and movement of vehicles and fauna through the site; ▪ Stockpiled topsoil will be respread over the construction footprint to a minimum depth of 100 mm, or to the depth that topsoil was stripped if this was less than 100 mm; and ▪ Topsoil will not be respread for rehabilitation when saturated.	Site Supervisor	During clearing, construction and rehabilitation	NA	Environmental Representative records

L18	The following measures will be implemented to manage subsoils: ▪ Subsoil will be excavated and stockpiled separately from topsoils; ▪ Pipeline trenches will be compacted to an appropriate density following backfilling with subsoil; ▪ Excess subsoil will be prevented from mixing with topsoil; and ▪ Excess subsoil will be stockpiled separately for disposal by appropriate methods.	Site Supervisor	During clearing, construction and rehabilitation	NA	Environmental Representative records
L19	In the event that contaminated sites are uncovered during construction the following measures will be undertaken: ▪ Cessation of ground disturbance at the location and within the immediate vicinity; and ▪ Assessment of the site contamination and determination of appropriate remedial action in consultation with relevant authorities where required.	Project Manager / Site Supervisor	During construction	NA	Environmental Representative records
L20	Spills of hazardous materials will be rendered safe (unable to further contaminate) and, where required, collected for treatment and disposal at a designated site, including cleaning materials, absorbents and contaminated soils.	Site Supervisor	During all Project phases	NA	Environmental Representative records / Inspection checklist and incident register
L21	No equipment or materials will be stored across flow paths.	All personnel	During all Project phases	Visually monitored daily	Photos
L22	The extent of the area required to carry out the permitted activity must be limited to the minimum area necessary to reasonably carry out the works.	Site Supervisor	During Project design, clearing and construction	NA	Environmental Representative records
L23	All temporary erosion and sediment control structures are to be removed post-construction.	Site Supervisor	Post construction, during rehabilitation	Visually monitored	Environmental Representative records and photos
L24	Disturbed areas are to be progressively rehabilitated during and post construction.	Project Manager / Site Supervisor	Post construction, during rehabilitation	Visually monitored	Photos and plans

3.4 Water

The specific activities with the most potential to impact on surface waterbodies and groundwater include:

- Excavation and stockpiling of material (including Potential Acid Sulfate Soils (PASS));
- Stormwater and runoff from disturbed areas causing contamination such as suspended solids, coal dust, oils and fuel (from washdown areas) and water used for dust suppression during construction;
- Changes to surface water flow;

- Storage of chemicals on-site (e.g., hydrocarbons, detergents and degreasers);
- Contamination of groundwater through uncontrolled release of contaminants from onsite chemicals (e.g., accidental spillage of fuels), waste and machinery;
- Small scale structures and drainage installed that may modify shallow aquifer flow characteristics;
- Unplanned discharge events; and
- Clearing of riparian vegetation.

Relevant objectives and management measures for the construction phase of the Project within waterbodies and the wetland (Serpentine Lagoon) are outlined in Table 3-4.

Table 3-4 Water Objectives and Management Measures

Objective					
▪ To prevent the degradation or contamination of water quality in the area surrounding the Project; ▪ Environmental harm is minimised; ▪ Construction of the Project in accordance with planning, environmental and other approvals; ▪ Sediment and erosion control measures are installed and maintained and perform to the designed levels for the duration of the construction works; and ▪ No exceedances of the following parameters: - pH – 6.5 – 8.5 - Total Suspended Solids – TBA* - Electrical Conductivity – TBA* ▪ Dissolved Oxygen – TBA*					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
W1	All major watercourse earthworks will commence during the dry season and ensure bed and banks are stabilised before the onset of the wet season	Project Manager / Site Supervisor	During clearing and construction	Visually monitored	Environmental Representative records
W2	Impacts to aquatic habitat will be minimised by locating ancillary works (i.e., all piping and piping components) outside the waterway where possible and restoring original bed and banks conditions following construction.	Project Manager / Site Supervisor	During Project design, clearing, construction and rehabilitation	Visually monitored	Environmental Representative records and photos
W3	Watercourse crossings have been located at established crossing points on existing access tracks.	Site Supervisor	During Project design	NA	Environmental Representative records
W4	Duration of in-stream works will be minimised to reduce the potential for sedimentation.	Project Manager / Site Supervisor	During clearing and construction	NA	Environmental Representative records
W5	Weather conditions will be monitored during the construction stage and temporary controls will be established during extreme weather events.	Site Supervisor	During construction	Visually monitored	Environmental Representative records
W6	Construction equipment is to be maintained to minimise risk of spill or leakage.	All personnel	During construction	Visually monitored	Construction maintenance records

W7	All refuelling facilities, or storage facilities for hydrocarbons and chemicals will be in appropriately designed sites and comply with Australian Standards (e.g., AS 1940: The storage and handling of flammable and combustible liquids).	Site Supervisor	During Project design, clearing and construction	In accordance with AS 1940	Environmental Representative records
W8	Materials will be stored within bunded areas with a storage capacity of 110% of the storage vessel. Bunding will have floors and walls lined with impermeable material. These areas must be adequately protected from rainfall and stormwater.	Site Supervisor	During Project design, clearing and construction	NA	Environmental Representative records and photos
W9	Refuelling will not take place within 50 m of a watercourse.	All personnel	During clearing and construction	Visually monitored	Environmental Representative records
W10	Refuelling and major maintenance work will be undertaken at predetermined locations away from watercourses and in a manner that prevents spillages.	All personnel	During Project design, clearing and construction	Visually monitored	Environmental Representative records
W11	Appropriate spill control materials including booms and absorbent materials will be onsite at refuelling facilities at all times. These will be used for mitigating and managing events where a substance is spilled into surrounding waters.	Site Supervisor	During clearing and construction	NA	Environmental Representative records
W12	Ensure pipeline trenching near watercourses/waterways is sufficient to avoid exposure of the pipeline as a result of river bed erosion and interference with the flow of water.	Site Supervisor	During Project design and construction	NA	Environmental Representative records
W13	Store waste prior to transport and disposal off-site (including general waste and hazardous waste) in designated areas away of waterways/watercourses as per the relevant Australian Standards, as required.	All personnel	During clearing and construction	As per Australian Standards	Environmental Representative records and photos
W14	Ancillary works (i.e., all piping and piping components) will be located outside waterways and wetlands.	All personnel	During Project design and construction	Visually monitored	Environmental Representative records and photos
W15	Duration of instream works will be minimised to reduce the potential for sedimentation.	All personnel	During clearing and construction	NA	Environmental Representative records
W16	Should groundwater be encountered during construction works, works will cease until further examination occurs.	All personnel	During construction	NA	Environmental Representative records and incident register
W17	Develop and implement a certified ESCP and associated monitoring to mitigate the potential impacts.	Project Manager	Prior to construction	NA	Developed ESCP

W18	Where required to undertake works within drainage channels, works should not commence during times of elevated flows. Where possible schedule works in low or no flow periods and ensure that all bed and banks are stabilised prior to the onset of the wet season.	Project Manager / Site Supervisor	During clearing and construction	Visually monitored	Environmental Representative records
W19	Construction methodology to avoid prolonged open excavations, i.e., suction intake and drainage channel areas, which may accumulate groundwater or surface water	Site Supervisor	During Project design and construction	NA	Environmental Representative records
W20	Earthworks, particularly within the wetland and or drainage paths are to be conducted to maintain the hydraulic capacity and minimise potential impacts to upstream or downstream.	Site Supervisor	During clearing and construction	NA	Environmental Representative records
W21	Potentially hazardous and flammable substances/ liquids will be stored in accordance with relevant Australian standards (AS1940), *Work Health and Safety Act 2011* and National Occupational Health and Safety Commission (NOHSC) 'Approved Criteria for the Storage and Handling of Flammable and Combustible Liquids' and in predetermined locations away from watercourses.	Site Supervisor	During clearing and construction	In accordance with relevant Australian standards (AS1940) and NOHSC.	Environmental Representative records and photos
W22	Structures and realignments have been designed to minimise changes to flow velocities.	Site Supervisor	During Project design	NA	Environmental Representative records
W23	Clearing areas to be minimised to only the extent required.	Site Supervisor	During Project design and clearing	NA	Photos of site boundary flagging
W24	The construction of culverts and structures will be programmed during periods of low flow, where possible.	Site Supervisor	During construction	NA	Environmental Representative records
W25	Where dry beds are required for the construction of culverts, salvage of fish and aquatic fauna will be undertaken in accordance with the DAF Fish Salvage Guidelines.	Site Supervisor	During construction	In accordance with DAF Fish Salvage Guidelines.	Photos
W26	Site construction personnel will complete inductions and spill kits will be available to all personnel in the event of a spill or leak.	Site Supervisor	Prior to clearing and construction	NA	Staff induction records and incident register

W27	During any works around waterways/water courses, water quality will need to be monitored. Downstream turbidity will need to be maintained at comparable levels to upstream turbidity. Water samples are to be tested onsite by a calibrated water quality meter.	Site Supervisor	During clearing and construction	No exceedances of the following parameters: pH – 6.5 – 8.5 Total Suspended Solids – TBA* Electrical Conductivity – TBA* Dissolved Oxygen – TBA*	Environmental Representative records
W28	All temporary erosion and sediment control structures are to be removed post-construction works.	Site Supervisor	Post construction, during rehabilitation	Visually monitored	Photos
W29	Rehabilitation of any disturbed ground due to temporary construction infrastructure will be conducted progressively as soon as construction activities are complete.	Site Supervisor	During rehabilitation	NA	Photos
W30	Bunding of chemical storage facilities and appropriate storage of chemicals according to AS 1940 'The storage and handling of flammable and combustible liquids'.	Site Supervisor	During Project design	In accordance with AS1940	Environmental Representative records
W31	Drainage design that allows for the retention of mine affected water prior to any discharge into the aquatic environment	Project Manager	During Project design	NA	Environmental Representative records
W32	Excavation within the Serpentine Lagoon are to be minimised to only the extent required.	All personnel	During Project design and clearing	Visually monitored	Photos of site boundary flagging
W33	Excavated land for the underground infrastructure within the Serpentine Lagoon are to be restore, as far as practicable, to its original contours after the infrastructure is established.	Site Supervisor	During rehabilitation	Visually monitored	Photos
W34	Pipe jacking methods will be used to remove requirement for drainage and/or diversion works.	Site Supervisor	During Project design and clearing	NA	Environmental Representative records
W35	All construction works around waterways will be designated and undertaken in accordance with the IECA Guidelines.	Project Manager / Site Supervisor	During Project design and construction	In accordance with the IECA Guidelines.	Environmental Representative records
W36	Waterways/watercourses with no flow which are mapped shall have controls designed from the relevant arrangement with P3.3 of IECA, 2008 regardless of if there is water present or they are dry.	Project Manager / Site Supervisor	During Project design and construction	In accordance with P3.3 of IECA 2008	Environmental Representative records

*Subject to further studies.

3.5 Terrestrial Flora

The flora survey confirmed the Project area does not contain any Threatened Ecological Communities protected under the EPBC Act. None of the recorded flora species were listed under the EPBC Act or NC Act. Sections of the pipeline and road alignment fall within areas of agricultural grazing use as reflected by a high proportion of pastural grass and legume species such as *Stylosanthes scabra* (shrubby stylo). Road reserves within the survey area contain species reflective of the agricultural use of the wider region and weed species typical of disturbed sites such as *Themeda quadrivalvis* (grader grass) and *Leucaena leucocephala* (Leucaena). The majority of this area is mapped as Category X, non-remnant vegetation.

Throughout the construction, the Project has the potential to impact on these ecological values through the following activities:

- Vegetation clearing;
- Topsoil stripping;
- Construction of above ground buildings and facilities;
- Construction of road infrastructure; and
- General transportation movements.

Relevant flora objectives and management measures for the construction phase of the Project are outlined in Table 3-5 and further discussed in detail in the WPMP.

Table 3-5 Flora Objectives and Management Measures

Objective					
▪ Ensure impacts to vegetation as a result of the Project are minimised; ▪ No clearing of vegetation outside of approved areas ▪ No harm or injury to fauna as a result of the works; and ▪ No transport of pest species into/out of the Site.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
TF1	Vegetation clearing will be strictly limited to those areas required for earthworks and construction of the Project.	Project Manager / Site Supervisor	During Project design and clearing	Visually monitored	Photos of site boundary flagging
TF2	Access roads, parking, laydown, stockpiling areas, etc. should occur (where possible) in previously cleared areas to avoid the need to clear additional vegetation in the Project area.	Project Manager / Site Supervisor	During Project design	Visually monitored	Environmental Representative records and photos
TF3	Obtain operational works permit for clearing native vegetation (VM Act) for applicable areas.	Client	Prior to clearing	NA	Environmental Representative records

TF4	A Weed and Pest Management Plan has been developed for the Project with specific advice for key identified species. The plan includes management of weed spread, management of pest infestations and monitoring effectiveness of control measures. The Project area is currently subject to high levels of weed infestation in areas.	Project Manager	During all Project phases	NA	Weed and Pest Management Plan
TF5	Weed management actions will include hygiene protocols, washdown procedures, monitoring and management of weeds, and vehicle access restrictions.	Project Manager	During all Project phases	NA	Environmental Representative records and WPMP
TF6	Where clearing activities involve disturbing topsoil from known weed infestation areas, this soil material should be quarantined and not used in rehabilitation. The soil contaminated with weed seeds can be buried to a depth of at least 1 m below ground surface.	Site Supervisor	During clearing	NA	Environmental Representative records
TF7	Conserve and stockpile topsoil containing native seed-bearing vegetation for use in rehabilitation.	Site Supervisor	During clearing and rehabilitation	NA	Environmental Representative records
TF8	Any materials brought onto site (such as gravel and soil) will be certified as weed and disease free.	Site Supervisor	During construction and rehabilitation	Daily monitoring	Certified documents
TF9	Vegetation located adjacent to the Project construction works to be appropriately marked to avoid unnecessary clearing/vegetation damage.	Site Supervisor	Prior to clearing and construction	Visually monitored	Photos of site boundary flagging
TF10	The pre-construction environment should be reinstated, and vegetation re-established where it does not affect the Project operation and integrity. Regular monitoring of revegetation works will be undertaken to ensure effectiveness. Where and/or if revegetation does not take, another layer of hydro-mulching will be applied and revegetation methods will be re-considered.	Site Supervisor	During rehabilitation and monitoring	Visually monitored	Environmental Representative records and photos
TF11	Visual inspection of progressively rehabilitated areas.	Site Supervisor	During rehabilitation and monitoring	Visually monitored	Photos
TF12	Monitoring and weed inspections particularly in response to reported outbreaks or complaints from adjacent property owners.	Site Supervisor	During all Project phases	Quarterly	Inspection checklist / photos

TF13	Implementation of sediment control mechanisms to minimise the risk of weed seed washing into drainage channels.	Project Manager / Site Supervisor	During Project design, clearing and construction	NA	ESPC / Inspection checklist
TF14	Formal weed mapping will be undertaken as part of pre-construction activities to confirm weed presences along the Project corridor and form the basis of a Project Weed and Pest Management Plan. The Plan must include management direction taken from the *Biosecurity Act 2014* and regional biosecurity and pest management plans.	Project Manager	Prior to construction	NA	Baseline weed map
TF15	Implement control strategies outlined in the Department of Agriculture and Fisheries (DAF) weed and pest animal fact sheets and other relevant government biosecurity management strategies.	Project Manager	Prior to clearing and construction	NA	Inspection checklist
TF16	Weed management during and following rehabilitation to prevent habitat degradation and potential increased fire risk.	Site Supervisor	Post rehabilitation and during monitoring	Quarterly Visually monitored	Inspection checklist / photos
TF17	Disturbed areas will be rehabilitated using appropriate plant species from locally sourced seed.	Site Supervisor	During rehabilitation	NA	Environmental Representative records
TF18	Revegetation works to be undertaken where land has been disturbed for construction where land is not required for operations.	Site Supervisor	During rehabilitation	Visually monitored	Environmental Representative records / photos
TF19	Areas stripped of topsoil for Project construction to be rehabilitated as soon as practicable where not required during operations.	Site Supervisor	During construction and rehabilitation	NA	Environmental Representative records
TF20	Refine location of work areas where it overlaps with ground-truthed remnant vegetation to avoid disturbance as far as possible.	Site Supervisor	During Project design, clearing and construction	NA	Environmental Representative records
TF21	Survey and pegged disturbance footprint, prior to clearing to avoid unnecessary clearing of vegetation beyond that detailed during the design phase.	Site Supervisor	During Project design and prior to clearing	Visually monitored	Photos of site boundary flagging and incident records
WPMP4	Annual weed mapping to understand nature of the spread of weeds and plan weed control activities for the following 12 months.	Project Manager / Site Supervisor	During monitoring	Undertake annual monitoring (after the wet season) to map any spread of weeds within the Project area.	Yearly weed map

WPMP5	Undertake routine inspections within the Project area to identify potential new weed species and to determine success of controlling existing species	Site Supervisor	During monitoring	Visually monitored	Inspection checklist
WPMP11	Flora and fauna (native and pest species) will be managed in accordance with the requirements of the: ▪ *Environmental Protection and Biodiversity Conservation Act 1999*; and ▪ *Biosecurity Act 2014*.	Project Manager / Site Supervisor	During all Project phases	NA	Environmental Representative records

3.6 Fauna

The potential impacts to ecological values during the construction of the Project have been considered based on the existing environmental values and the activities to be undertaken, these include:

- Potential habitat for threatened flora and fauna; and
- Ecological functioning (e.g., habitat connectivity).

Three (3) conservation significant species were detected by the ecology surveys:

- Black-throated finch (southern) (*Poephila cincta cincta*) – listed as endangered under the EPBC Act and NC Act;
- Squatter pigeon (southern) (*Geophaps scripta scripta*) – listed as vulnerable under the EPBC Act and NC Act; and
- Bare-rumped sheathtail bat (*Saccolaimus saccolaimus nudicluniatus*) – listed as vulnerable under the EPBC Act and endangered under the NC Act.

Potential habitat for Star finches (*Neochmia ruficauda*) is present within the Project area. Koala traces were found on trees within the Project area; however, no individuals were sighted.

Three (3) migratory species were recorded during the ecology surveys:

- Barn swallow (*Hirundo rustica*);
- Glossy ibis (*Plegadis falcinellus*);
- Fork-tailed swift (*Apus pacificus*);
- Black-faced monarch (*Monarcha melanopsis*); and
- Oriental cuckoo (*Cuculus optatus*).

No native fish were observed during the ecology survey, and should fish occur in the wetland system they would be small, bodied fish suited to zero-low-flow / pool conditions. Additionally, given the hydrology and lack of high flows in the system, culverts under the road are not expected to impact fish movement. Given the width of the road, the culverts are expected to let in sufficient light to also not inhibit fish movements through the culverts.

Construction through the wetland has the potential to impact fauna movement, including fish, amphibians, reptiles and mammals. Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-6, with weed and pest management measures related to fauna, further outlined in the WPMP. MNES species specific management measures are outlined in Section 6 of the MNES MP.

Table 3-6 Fauna Species Objectives and Management Measures

Objectives					
▪ Compliance with legal and other requirements e.g., permits, licences and approval condition; ▪ Environmental harm is minimised; ▪ Environmental performance and compliance are monitored; ▪ To prevent the introduction or spread of new declared weeds into construction area and control existing pest species within construction work areas during construction; ▪ Ensure all staff are aware of the environmentally sensitive features on site; ▪ No clearing of vegetation outside of approved areas; and ▪ No harm or injury to fauna as a result of the works.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
FS1	Clearing of woody vegetation will be undertaken with a suitably qualified wildlife handler to: ▪ Inspect habitat in advance of clearing and relocate fauna, ▪ Advise on clearing techniques that will minimise fauna impact, and ▪ Records of fauna interactions will be retained. The fauna spotter/catcher will inspect hollow-bearing limbs 48 hours prior to removal using a cherry picker. Alternatively, hollows may be checked following plugging of hollow entrances and controlled lowering. In circumstances where access of an elevated work platform is not possible and/or the hollow is in the main trunk, an excavator with a vertical tree-grab attachment may be used to lower a tree to the ground for inspection by the fauna spotter/catcher (Hanger & Nottidge 2021).	Project Manager / Site Supervisor	During clearing	NA	Environmental representative records

FS2	48 hours prior to clearing, pre-clearance surveys will identify any breeding places for threatened species, and should breeding places be encountered, a response which is consistent with the requirements of any approved Species Management Program under which the fauna spotter catcher(s) will be working	Site Supervisor	Prior to clearing	NA	Environmental representative records
FS3	Native fauna that are to be relocated must be handled by suitably qualified and authorised fauna handlers , who have the authority to cease clearance for sufficient relocation time, only. Records of all relocations must be retained in accordance with requirements of the CEMP.	Project Manager	During clearing and construction	NA	Environmental representative records
FS4	Cleared vegetation, which may be mulched or stored as is, depending on the rehabilitation requirements for specific areas, will be: ▪ Stockpiled separately from topsoil in windrows in a manner which facilitates respreading or salvaging, avoids damage to adjacent live vegetation and does not unreasonably impede landholder access, stock or wildlife; ▪ Stockpiled away from watercourses and not stored or felled so as to land in a watercourse, where practicable; ▪ Stockpiles will have breaks as required by the landholder for access; and ▪ Where stockpiles are stored for more than 12 hours the fauna spotter catcher(s) will clear and relocate fauna that may have sheltered within the stockpile prior to removal and/or mulching.	Site Supervisor	During clearing, construction and rehabilitation	NA	Environmental representative records
FS5	Welded pipe strings will be end capped to prevent fauna entry.	Site Supervisor	During construction	NA	Photos

FS6	Potential for fauna entrapment within the pipeline trenches will be minimised by: ▪ Minimising to the extent practicable for the period of time the trench is open. ▪ Provide opportunities for fauna to exit the trench such as trench plugs or other appropriate measures, at a minimum of every 500 m. ▪ Installation of fauna shelter devices, such as sawdust filled bags, at 250 m intervals along the trench. ▪ Daily pre-start inspections of the open trench, and removal of trapped fauna by suitably qualified personnel as required.	Site Supervisor	During Project design and construction	NA	Inspection checklist and photos
FS7	In the event that Koala or Bare-rumped sheathtail bat are discovered within the construction footprint, all mobile construction equipment in the surrounding area will cease work, excluding use of light vehicles to move staff to and from the area. Mobile construction equipment will not recommence work until a wildlife handler has removed the individual (if permitted to do so) or it has been confirmed that the individual has left the workspace. Any captured individuals will be removed and relocated to nearby adjacent habitat away from the construction area.	All personnel	During clearing and construction	NA	Environmental representative records / fauna register
FS8	All vehicles associated with construction will travel at slow speeds to minimise the chance of any fauna strikes occurring. Speed limit signage will be placed at the entrance to the site and other key points. This will also minimise dust fall onto surrounding vegetation and habitat areas and vehicular noise.	All personnel	During all Project phases	NA	Environmental representative records

FS9	All contractors will be educated on the presence of native fauna including threatened species and need to travel slowly and look out for fauna when driving (especially Squatter pigeon (southern)). This training will form part of mandatory induction.	Project Manager / Site Supervisor	Prior to clearing and construction	NA	Staff induction records and incident register
FS10	All fauna encountered (e.g., vehicle strike or during clearing activities) will be recorded in a central register by the Project Environment Manager. Any injured fauna will be reported as required in the MP that will be in place for the Project.	Project Manager / All personnel	During all Project phases	NA	Incident register / fauna register
FS11	Trenches will be inspected daily for entrapped fauna.	All personnel	During clearing and construction	Visually monitored daily	Incident register / fauna register / photos
FS12	Once operational, appropriate signage will be installed on roads to warn of potential fauna crossing if deemed necessary.	Project Manager / Site Supervisor	During operations	NA	Photos
FS13	Woody debris, logs, tree hollows and rocks will be retained for use in rehabilitation.	Site Supervisor	During clearing, construction and rehabilitation	NA	Environmental representative records
FS14	Disturbed areas will be rehabilitated using appropriate plant species from locally sourced seed.	Site Supervisor	During rehabilitation	NA	Environmental representative records
FS15	All construction personnel will be instructed on their responsibilities relating to avoiding and minimising the introduction/attraction to the construction site of feral animals.	Site Supervisor	Prior to construction	NA	Staff induction records and incident register
FS16	A Weed and Pest Management Plan has been developed for the Project with specific advice for key identified species. The plan will include management of weed and pest infestations and monitoring effectiveness of control measures.	Project Manager	During all Project Phases	NA	Environmental representative records
FS17	Onsite waste storage and disposal (especially food wastes) will be managed to discourage presence of pest fauna (i.e., covered bins/skips to prevent fauna access).	Site Supervisor	During all Project Phases	Visually monitored	Environmental representative records / incident register

FS18	To reduce the risk of mortality to native wildlife, no domestic animals are permitted onsite.	All personnel	During all Project Phases	NA	Staff induction records and incident register
FS19	Avoid impact on fauna habitat, including mature trees and root systems, where possible.	All personnel	During all Project Phases	Visually monitored	Environmental representative records
FS20	Prior to any vegetation disturbance, a trained ecologist or other qualified environmental specialist to be onsite to inspect and remove fauna (if required). All fauna recorded during pre-clearing surveys will be recorded on a dedicated fauna register. Construction areas that pose a risk to fauna to be fenced off where practical.	Project Manager	Prior to clearing	NA	Fauna register
FS21	To ensure minimal impact on fish and all minimal requirements for different fish species are achieved, construction of culverts should be generally in accordance with the Fauna Sensitive Road Design Manual, Volume 2 (Department of Transport and Main Roads) (Special attention to Section 6.6, Chapter 6 and Section 7.1, Chapter 7), where practical. The proposed reinforced concrete pipe (RCP) culverts are expected to provide sufficient fish passage for the type and frequency of any potential events.	Project Manager / Site Supervisor	During Project design and construction	NA	Environmental representative records In accordance with the Fauna Sensitive Road Design Manual, Volume 2
FS22	To ensure minimal impact on amphibian species and all minimal requirements for different amphibian species are achieved, construction of culverts should be generally in accordance with the Fauna Sensitive Road Design Manual, Volume 2 (Department of Transport and Main Roads) (Special attention to Section 6.6, Chapter 6 and Section 7.2, Chapter 7), where practical. The proposed reinforced RCPs are expected to provide connectivity at key habitat areas.	Project Manager / Site Supervisor	During Project design and construction	NA	Environmental representative records In accordance with the Fauna Sensitive Road Design Manual, Volume 2

FS23	During construction of the Project, if construction during dry periods is not possible, an amphibian expert will design and implement a temporary frog fencing appropriate for the species found in the area. Design and implementation should be in accordance with the Fauna Sensitive Road Design Manual, Volume 2 (Department of Transport and Main Roads), where practical.	Project Manager	During construction	NA	Environmental representative records In accordance with the Fauna Sensitive Road Design Manual, Volume 2
FS24	Construction of culverts in accordance with the Fauna Sensitive Road Design Manual, Volume 2 (Department of Transport and Main Roads) to ensure all minimal requirements for different species are met.	Project Manager	During Project design and construction	NA	Environmental representative records In accordance with the Fauna Sensitive Road Design Manual, Volume 2
FS25	If required, design and construction of fencing/infrastructure to direct fauna towards culverts providing safe passage and around construction area.	Project Manager / Site Supervisor	During Project design and construction	NA	Environmental representative records / incident register
FS26	Implement control strategies outlined in the DAF weed and pest animal fact sheets and other relevant government biosecurity management strategies.	Project Manager / Site Supervisor	During all Project phases	NA	Inspection checklist and incident register
FS27	Regular onsite inspections of site infrastructure / equipment for resident pest fauna and establishment of a register for pest sightings.	Site Supervisor	During all Project phases	Daily visual monitoring	Inspection checklist and incident register
FS28	Minimise the time that trenches remain open. Where open for more than 24-hours trench ramps are to be placed every 50 m (ramps to provide an escape option for fauna).	Site Supervisor	During clearing and construction	Daily visual monitoring	Inspection checklist and incident register

FS29	Avoid clearing trees with obvious hollows. If trees are required to be removed the proponent shall engage the services of a licensed, qualified Spotter Catcher to complete preclearing checks and be present during removal. They should also inspect the "no go" zone and clearing limits prior to clearing. If hollow bearing trees do require removal, they should first be inspected using an elevated work platform to determine if fauna are present. If fauna are detected, they would be safely removed prior to tree felling.	All Personnel / Project Manager / Site Supervisor	During Project design and clearing	Visually monitored	Inspection checklist and incident register
FS30	Design and construction of fencing/infrastructure to direct fauna towards safe passage and around construction area.	Project Manager / Site Supervisor	During Project design and construction	NA	Inspection checklist and incident register
FS31	Artificial light use and design will be consistent with appropriate guidelines. All lighting beams near Bare-rumped sheathtail bat habitat will be directed downwards or use shields and baffles to limit light spill	Project Manager / Site Supervisor	During all Project phases	Visually Monitored	Inspection checklist and incident register
FS32	Avoid undertaking any activities including making loud noise, shining lights into a roost or causing harm to a tree or on the ground, to encourage any resident Bare-rumped sheathtail bat to vacate the roost	Project Manager / Site Supervisor	During all Project phases	NA	Inspection checklist and incident register

3.7 Landscape and Visual Amenity

Temporary visual impacts may arise as a result of construction and vehicle movements. The majority of the construction activities will be within the allocated construction corridors and include:

- Vegetation clearing;
- Road infrastructure and facilities;
- Temporary construction infrastructure; and
- Vehicle movements.
- Potential impact caused by the construction activities listed above are:
- Increased visual permeability;
- Change in landscape from native vegetation to cleared land;
- Increase in presence of built infrastructure in the landscape; and
- Operational periods will result in localised and temporary light pollution, including direct glare, periodic increased illumination and temporary unexpected fluctuations in lighting associated with potential increased passing cars.

Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-7.

Table 3-7 Landscape and Visual Amenity Objectives and Management Measures

Objective				
▪ Minimal change to visual amenity from residential viewpoints and sensitive receptors.				
Management Measures				
No.	**Action**	**Responsibility**	**Monitoring**	**Compliance Evidence**
LV1	Site inductions for all staff are to include education sessions regarding Visual Amenity. Induction and training sessions should also include information / discussion on waste management behaviour such as roadside littering from vehicles.	Site Supervisor	NA	Staff induction records and incident register
LV2	Locate mobile plant as far as practicable away from the nearest sensitive receptors.	Site Supervisor	Visually monitored	Inspection checklist and incident register
LV3	All service roads, loading areas, turning circles and other manoeuvring areas must be located away from and/or screened from nuisance sensitive places to avoid lighting, noise and air quality impacts.	Site Supervisor	Visually monitored	Inspection checklist and incident register
LV4	Temporary hoardings, barriers, traffic management and signage will be removed when no longer required.	Site Supervisor	Visually monitored	Photos
LV5	Construction areas to be operated in a neat and tidy manner to minimise visual impact on neighbouring landholders.	All personnel	Visually monitored	Staff induction records and incident register

LV6	In the event of a complaint or incident, an assessment or investigation will be undertaken to determine the cause of the problem, through which processes or activities will be modified if required.	Site Supervisor	NA	Incident / complaint register
LV7	Use of material/paint colours that blend with the environment.	All personnel	NA	Photos

3.8 Cultural Heritage

In accordance with the *Aboriginal Heritage Act 2003* Duty of Care Guidelines the works are proposed to occur in a Category 3 (Developed) area. Stakeholder consultation with Indigenous peoples has been undertaken to engage and maintain a constructive relationship where a Cultural Heritage Management Agreement (CHMA) pursuant to Section 23 of the ACHA has been agreed on and executed. The CHMA covers the entire LEIP project area and is intended to guide and manage the undertaking of project development activities for the LEIP Project (refer to Section 9.5 of the Preliminary Documentation for further details).

Where an activity is proposed in a Developed Area it is generally unlikely that the activity will harm Aboriginal cultural heritage and the activity will comply with the guidelines. In these circumstances, subject to the measures set out in Table 3-8, it is reasonable and practicable that the activity proceeds without further cultural heritage assessment. However, in the unlikely event where a cultural heritage site or object is identified during work activities, management measures will be implemented. Relevant objectives and management measures for the upgrades works of the Project are outlined in Table 3-8.

Table 3-8 Cultural Heritage Objectives and Management Measures

Objectives					
▪ To minimise adverse impacts on Indigenous and European archaeology and heritage items during construction; and ▪ No destruction or damage of sites or objects of indigenous and non-indigenous cultural heritage value.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
CH1	Undertake works in accordance with the CHMA.	All personnel Project Manager (for notification) Client (audits)	During all Project phases	NA	Environmental Representative records
CH2	In the event that any items of cultural heritage are uncovered during the course of the upgrade works, work in the immediate area will cease and the find reported to the Project Manager immediately. The relevant Aboriginal Party for the area must be notified immediately and their advice sought and agreement as to how best this may be managed to avoid or minimise harm to the Aboriginal cultural heritage.	All personnel Project Manager (for notification)	During clearing and construction	NA	Environmental Representative records / incident register / photos

Objectives					
CH3	Visual observations will be conducted during bulk earthworks to identify any potential indigenous and non-indigenous cultural heritage sites and artefacts.	All personnel	During clearing and construction	NA	Inspection checklist and incident register / photos
CH4	Site inductions for all staff are to include education sessions regarding Cultural Heritage.	Project Manager / Site Supervisor	Prior to clearing and construction	NA	Staff induction records and incident register

3.9 Social and Economic

The Project is not expected to have significant adverse social and economic impacts. The Project has the potential to provide direct and indirect employment opportunities for the region. The construction phase of the works will see a temporary increase in construction personnel and support services. Potential impacts include:

- A potential positive impact of increased expenditure by the temporary workforce and/or suppliers utilising businesses in the region;
- Increased direct employment opportunities within the region;
- A potential positive impact through the provision of employment opportunities for local and/or indigenous people;
- Increase in traffic on local roads, which can increase safety risks and dust on unsealed roads in the area, refer to Section 3.10; and
- Impacts to landholder property management and access.

Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-9.

Table 3-9 Social and Economic Objectives and Management Measures

Objective					
▪ To minimise adverse impacts on socio-economic environment during construction.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
SE1	No site access permitted without a permit to work issued by the construction contractors in charge. Conditions and evidence of compliance will be required to be complied with LAAs.	HSE Manager	During all Project phases	NA	Staff induction records and incident register
SE2	The site induction will contain a section relevant Code of Conduct for workforce, environmental obligations and contractor behaviour.	HSE Manager	Prior to construction and clearing	NA	Staff induction records and incident register
SE3	A Workplace Health and Safety Plan to address worker health and safety.	HSE Manager	During all Project phases	NA	Staff induction records and incident register

SE4	In the event of a complaint or incident, an assessment or investigation will be undertaken to determine the cause of the problem, through which processes or activities will be modified if required.	HSE Manager	During all Project phases	NA	Incident register

3.10 Traffic

The Project will result in increased vehicle use on the surrounding road network. This may result in disruption to flow and delays as well minor impacts to the overall road condition. Additionally, increased traffic movement has the potential to increase direct mortality of native fauna through vehicle collision. During construction and operation, vehicles traversing the Project area may increase the potential risk of injury or depth of wildlife. The specific activities with the most potential to cause impact include:

- General movement of heavy plant and equipment to and from site, mobilisation, demobilisation;
- Movement of plant and vehicles on, around or entering or exiting public or private roads;
- Material deliveries or waste collection from site;
- Movement of workforce between accommodation and work fronts;
- Road crossing the wetland; and
- Light vehicle movements to different project components.

Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-10.

Table 3-10 Traffic Objectives and Management Measures

Objective					
▪ To minimise adverse impacts on socio economic environment during construction.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
T1	Appropriate speed limits should be in place throughout the site and all contractors will be educated on the risks to local fauna to minimise impacts when driving.	Site Supervisor	During all Project phases	NA	Staff induction records and incident register
T2	The onsite protocols to include measures for monitoring and recording wildlife road collision incidents throughout construction to help remediate 'high risk' collision areas and set conditions for attending to injured native wildlife.	All personnel	During all Project phases	NA	Staff induction records and incident register
T3	Awareness of access arrangements and potential traffic conflicts at the intersection will be provided to all drivers who will access the Project area.	Site Supervisor	During all Project phases	NA	Staff induction records and incident register

T4	Heavy vehicles accessing the Project will be staggered during the day to minimise traffic impacts.	Site Supervisor	During clearing and construction	NA	Environmental Representative records and incident register
T5	Additional signage, traffic control and cautionary 'road safety' marking will be used during the construction, where deemed necessary through the ongoing evaluation of site risks.	Site Supervisor	During construction	NA	Environmental Representative records and photos
T6	In the event of a complaint or incident, an assessment or investigation will be undertaken to determine the cause of the problem, through which processes or activities will be modified if required.	HSE Manager	During all Project phases	NA	Incident register

3.11 Air

Air pollution has the potential to impair human health and the health of flora and fauna. Air quality impacts may result from dust, particulate and gaseous emissions and odour during construction. The potential impacts to the local air environment are listed below:

- Deposition of dust on surfaces where it may cause damage and/or lead to a need for increased cleaning or repair;
- Aesthetic effects that arise from visible airborne dust plumes and from deposits of dust on surfaces;
- Need for increased maintenance of air filtering systems (e.g., air conditioners etc.);
- Potential adverse health effects including eye, nose and throat irritation from excessive inhalation of fine particles;
- Impacts on water quality and/or vegetation health from dust deposition;
- Impacts on residential sensitive receivers, including impacts on living areas, swimming pools and general amenities; and
- Complaints from the public relating to dust or odours.

Dust generated from construction activities is anticipated to be temporary in nature and associated primarily with earthworks activities. Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-11.

Table 3-11 Air Objectives and Management Measures

Objective					
▪ No adverse impacts from air pollution and dust during construction; ▪ Compliance with EP (Air Quality) Policy 2019; and ▪ No complaints of Air quality issues are received.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
A1	Implementation of dust suppression measures, if dust is visible or when wind conditions become adverse, including: ▪ Watering of exposed areas; and ▪ Physical barriers (e.g., covering of exposed soil piles). The aim of measures is to prevent an increase of particulates (PM10 and PM2.5) above the current baseline conditions.	Site Supervisor	During clearing and construction	Visual monitoring	Environmental Representative records and photos
A2	Trigger points for management decisions based on any or all of the following: ▪ Real-time measurements of wind conditions; ▪ Wind conditions as forecast by predictive numerical weather systems; and ▪ Dust monitoring at sensitive receptors when complaints are received.	Site Supervisor	During clearing and construction	NA	Environmental Representative records
A3	Soil stockpiles to be <2 m height and revegetated if they are to remain for > 4 weeks (in the interim apply mulch, or appropriate soil binder to prevent wind erosion).	Site Supervisor	During clearing, construction and rehabilitation	Visual monitoring	Environmental Representative records / photos
A4	Monitor dust control measures regularly for effectiveness.	Site Supervisor	During clearing, construction and rehabilitation	Visual monitoring	Environmental Representative records / photos
A5	Change in operations during worst-case conditions (e.g., implementation of stricter dust controls).	Site Supervisor	During clearing and construction	NA	Environmental Representative records
A6	If required, vehicles carrying loads with the potential to produce dust will be covered when moving within or outside the construction site.	All personnel	During clearing and construction	Visual monitoring	Environmental Representative records

A7	Maintain vehicles and machinery according to manufacturer specifications to minimise exhaust emissions	All personnel	During clearing and construction	Weekly monitoring	Vehicle maintenance register
A8	Minimise extended engine idling and queuing adjacent to sensitive receptors.	All personnel	During clearing and construction	NA	Staff induction records and incident register
A9	Onsite burning of any material will not be undertaken without a valid permit from the relevant QFES Fire Warden.	Site Supervisor / All personnel	During all Project phases	NA	Environmental Representative records
A10	Fire management measures for the Project to be developed and implemented.	Site Supervisor	Prior to clearing and construction	NA	Environmental Representative records
A11	Ensure onsite fire-fighting equipment is regularly maintained and adequate staff training is implemented.	Site Supervisor	Prior to and during clearing and construction	Quarterly	Staff induction records and equipment register
A12	Weed management during and following rehabilitation to prevent habitat degradation and potential increased fire risk.	Site Supervisor	During rehabilitation and monitoring	NA	Environmental Representative records / photos
A13	Rehabilitate disturbed areas as soon as practicable to restore ground cover and minimise wind erosion.	Site Supervisor	Post clearing and construction, during rehabilitation	NA	Environmental Representative records
A14	Suspension of earthworks during high wind conditions and change in operations during worst-case conditions (e.g., implementation of stricter dust controls).	All personnel	During clearing and construction	NA	Environmental Representative records
A15	Regular cleaning of machinery and vehicle tyres to prevent wheel entrained dust emissions.	All personnel	During clearing and construction	Weekly monitoring	Vehicle maintenance register / photos
A16	Locate and design roads and other built infrastructure so that minimal runoff to waterways occurs.	Site Supervisor	During Project design	NA	Environmental Representative records

3.12 Bushfire

Bushfire has the potential to threaten people and fauna, through incineration or smoke suffocation. Additionally, fire can cause short term impacts including loss of habitat, increased erosion and sedimentation of waterways. Changes in the natural fire regime may result in changes in the species composition and/or structure of the vegetation including an increase in weed species.

Through the development and implementation of relevant bushfire management measures, it is considered that potential bushfire risk associated with the Project can be appropriately managed. Measures outlined in Table 3-12 will be implemented to manage and mitigate bushfire risk. Bushfire management measures are further discussed in the Bushfire Management Plan.

Table 3-12 Bushfire Risk Objectives and Management Measures

Objective					
▪ No adverse impacts from fire during construction and operation.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
B1	A qualified person will be appointed as Site Safety Advisor during construction and will have on-site a set of safety data sheets (SDS) for hazardous and dangerous materials.	Project Manager	Prior to clearing and construction	NA	Environmental Representative records
B2	A Bushfire Management Plan will be prepared for Project construction and operations, informed by consultation with the Queensland Fire and Emergency Service (QFES).	Project Manager	Prior to clearing and construction	NA	Environmental Representative records
B3	The BMP will consider the requirements of the Southern Black-throated Finch in its development. In the Townsville region, cool burns between June and September, no more than one every three years, are most suitable for the Black-throated finch (southern) (DEWHA, 2009). Biomass reduction (for example mowing, slashing, fire etc.) will be avoided during the early wet season resource bottleneck if practicable and safe to do so (e.g., unless required for firebreak maintenance etc).	Environmental Representative	Prior to clearing and construction	NA	Environmental Representative records
B4	If works are undertaken during the bushfire season, the fire danger rating will be monitored daily through the QFES website.	Project Manager / Site Supervisor	During clearing and construction	NA	Environmental Representative records
B5	Open fires, including open barbeques, billy fires and brush burning will not be permitted on site.	All personnel	During all Project Phases	NA	Staff induction records and incident register

B6	Hot works activities will only be undertaken during a declared Total Fire Ban where an exemption has been issued by QFES.	Site Supervisor	During clearing and construction	NA	Staff induction records and incident register
B7	The following precautions will be taken to minimise the possibility of fire due to hot work activities: ▪ The area over which hot work will take place will be maintained free of combustible material; ▪ Firefighting equipment, including a validated portable fire extinguisher, and trained personnel will be available during all hot work operations; and ▪ Water trucks will be available to respond to fire.	Site Supervisor	During clearing and construction	NA	Environmental Representative records
B8	Vehicles may not idle or be parked in areas of long grass.	All personnel	During all Project phases	NA	Staff induction records and incident register
B9	Smoking is not permitted on site aside from in a designated safe zone.	All personnel	During all Project phases	NA	Staff induction records and incident register
B10	Protocols outlining the fire management measures for the Project will be developed and implemented prior to the Commencement of Project operations.	Site Supervisor	Prior to clearing and construction	NA	Environmental Representative records
B11	Vegetation within the site will be regularly inspected and managed for fuel loads.	Site Supervisor	During all Project phases	Weekly / visual monitoring	Inspection checklist and incident register

3.13 Noise

Proposed construction activities and methods may be the source of noise and vibration impacts for receptors located in proximity of the works. Noise sources may include:

- Vehicles and equipment, primarily the dozer and excavator;
- Construction of infrastructure including culverts and stormwater drainage (trenching);
- Generator sets to supply power;
- Light trucks/utility vehicles;
- Excavation and stockpiling of construction and clearing material;
- Haulage of excavation material; and
- Reversing alarms on vehicles and equipment.
- Management and mitigation measures engaged during construction are considered to minimise the likelihood of environmental nuisance related to potential impacts.
- Noise generated from construction activities is anticipated to be temporary in nature and associated primarily with earthworks activities.
- The introduction of new noise sources has the potential to:
- Impact humans including sleep disturbance;
- Create an annoyance or loss of acoustic amenity;
- Impact on migratory birds; and
- Impact fauna behaviours.

Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-13.

Table 3-13 Noise Objectives and Management Measures

Objective					
▪ Minimise any potential nuisance or loss of amenity due to construction activities of the Project in accordance with planning, environmental and other approvals; ▪ Compliance with EP (Noise) Policy 2019; ▪ Works are conducted within specific operating hours (as per local law requirements); ▪ Construction Noise will not exceed the nominated noise management level (TBA)* at any of the receptor locations; and ▪ No complaints of noise are received.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
N1	Undertake works during approved operating hours and notify landholders of works that have the potential to cause nuisance (e.g., excavation works, compaction activities, drilling). If work required outside of normal hours consultation to be undertaken with Environmental Representative.	All personnel / Site Supervisor	During clearing and construction	NA	Staff induction records and incident register

N2	Use of horns, bells, beepers and other audible signals will be minimised as much as practicable.	All personnel	During all Project phases	NA	Staff induction records and incident register
N3	Plant and equipment will be switched off when not required.	All personnel	During all Project phases	Daily monitoring	Staff induction records and incident register
N4	In cases where noise or vibration levels are identified as being too high, modification or substitution of work methods will be considered and undertaken where possible.	Site Supervisor	During all Project phases	NA	Incident register
N5	Noise to be mitigated by properly maintaining all equipment used onsite in accordance with manufacturers specifications.	Site Supervisor	During all Project phases	NA	Environmental Representative records
N6	Ensure that all operators of construction plant and haul trucks adhere to speed limits enforced onsite.	All personnel	During all Project phases	NA	Staff induction records and incident register
N7	Fit and maintain appropriate noise control devices (e.g., mufflers) on machinery and vehicles used on-site.	Site Supervisor / HSE Manager	During all Project phases	Visually monitored	Photos
N8	Use designated access routes, unloading areas and parking areas.	All personnel	During all Project phases	NA	Photos of site boundary flagging. Staff induction records and incident register
N9	Sensitive receptors located in proximity to the proposed works will be consulted with and given advance warning of any out of hours or high noise work activities.	Site Supervisor	During clearing and construction	NA	Environmental Representative records
N10	Fit equipment with noise suppression equipment.	Site Supervisor / HSE Manager	During all Project phases	NA	Photos
N11	Minimise the drop heights of materials.	All personnel	During Project design and construction	NA	Staff induction records and incident register

*Subject to further studies

3.14 Waste

Inappropriate handling of waste from construction activities has the potential to negatively impact the environment and cause health risks. Potential impacts may include:

- Land contamination caused by spills or inappropriate waste disposal to soil;
- Groundwater contamination caused by spills of solid or liquid waste;
- Litter due to unsuitable storage and containment measures for general waste;
- Odour and potential spread of disease due to inappropriate storage of waste;
- Pests and diseases; and
- Risks to human health and safety through poor management of hazardous materials.

Waste management during construction will be undertaken using the services of a specialist and appropriately licensed waste management sub-contractor(s). Waste materials will be collected, segregated and appropriately stored prior to removal from site. The waste management processes will comply with the requirements of the relevant statutory legislation. Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-14.

Table 3-14 Waste Objectives and Management Measures

Objective					
▪ No adverse impacts from waste management during construction.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
WS1	Housekeeping in site work areas will be regularly undertaken to ensure no waste materials are present on site for longer than reasonably acceptable.	All personnel	During all Project phases	Weekly	Environmental Representative records
WS2	Waste is not to be stored in a manner that poses a fire risk or attracts vermin.	All personnel	During all Project phases	NA	Staff induction records and incident register
WS3	Hazardous or regulated waste to be appropriately contained and stored on-site in approved hazardous or regulated waste bins. Hazardous or regulated waste to be removed from site by a licensed waste transporter to approved disposal facility in accordance with the relevant legislation.	Site Supervisor	During all Project phases	NA	Environmental Representative records
WS4	All waste will be removed on an as-needed basis, by a licensed waste transporter.	Site Supervisor	During all Project phases	NA	Environmental Representative records
WS5	All waste bins will be clearly labelled for intended contents.	Site Supervisor	During all Project phases	NA	Environmental Representative records / photos

WS6	Spill kits will be provided in hazardous material storage areas.	Site Supervisor / HSE Manager	During all Project phases	NA	Environmental Representative records / photos
WS7	Any regulated wastes are transported and disposed of by and at an appropriately licenced facility.	Site Supervisor	During all Project phases	NA	Environmental Representative records

3.15 Health and Safety

The Contractor shall develop all safety documentation to the Senior Project Manager for Approval.

The Contractor shall be responsible for the development and implementation of a Contractor Health, Safety and Environment (HSE) Management Plan, which shall be submitted to the Senior Project Manager for approval.

The Contractor shall take the necessary precautions and actions to ensure the safety of employees, equipment, existing services, nearby buildings, structures and infrastructure. Relevant objectives and management measures for the construction phase of the Project are outlined in Table 3-15.

Table 3-15 Health and Safety Objectives and Management Measures

Objective					
▪ Ensure human health and safety of the workforce and public is not adversely affected.					
Management Measures					
No.	**Action**	**Responsibility**	**Applicable Phase**	**Monitoring**	**Compliance Evidence**
HSE1	Instruction in occupational health and accident prevention for all employees.	HSE Manager / Site Supervisor	Prior to clearing and construction	NA	Staff induction records
HSE2	Instruction in handling hazardous materials and implementation of a Contractor Hazardous Material.	HSE Manager / Site Supervisor	Prior to clearing and construction	NA	Staff induction records
HSE3	Provision of adequate personal protective equipment and life-saving equipment.	HSE Manager	During all Project phases	NA	Staff induction records
HSE4	Implementation of safety controls for Workers on Foot to ensure the appropriate separation of people and plant during roadworks.	HSE Manager / Site Supervisor	During all Project phases	NA	Staff induction records and incident register
HSE5	Adequate traffic control and implementation of a Contractor Traffic Management Plan.	HSE Manager	Prior to clearing and construction	NA	Contractor Traffic Management Plan
HSE6	Adequate dust suppression and implementation of a Contractor Dust Management Plan.	HSE Manager	Prior to clearing and construction	NA	Contractor Dust Management Plan

HSE7	Provision of safety devices, equipment and apparel as are necessary to prevent accidents or injury during construction.	HSE Manager	During construction	NA	Staff induction records and incident register
HSE8	Undertaking job hazard analyses and preparing safe work procedures for hazardous operations.	HSE Manager	During all Project phases	NA	Staff induction records and incident register

Section 4 References

Department of the Environment, Water, Heritage and the Arts (DEWHA) 2009. *Significant impact guidelines for the endangered black-throated finch (southern) (*Poephila cincta cincta*) - Background paper to the EPBC Act policy statement 3.13.* Commonwealth of Australia, Canberra. Available from : https://www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-endangered-black-throated-finch-southern-poephila-cincta

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Hanger, J. & Nottidge, B. 2021. Queensland code of practice for the welfare of wild animals affected by land-clearing and other habitat impacts and fauna spotter/catchers. Australia Zoo Wildlife Warriors Worldwide and Endeavour Veterinary Ecology.