

Jet Zero™





PRELIMINARY CONSTRUCTION MANAGEMENT PLAN – ENVIRONMENTAL SENSITIVE AREAS AND TRAFFIC

PROJECT ULYSSES
REV 0

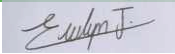
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ABBREVIATIONS, TERMS AND ACRONYMS

Abbreviation / Terms / Acronym	Description
AADT	Annual Average Daily Traffic
AMP	Activity Management Plans
ASS	Acid Sulfate Soils
ATJ	Alcohol to Jet
CEMP	Construction Environmental Management Plan
CBIP	Cleveland Bay Industrial Park
DP	Development Permit
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cth)
DETSI, DESI, DES	Department of Environment, Tourism, Science and Innovation (Qld) (and Department's previous denominations)
DSDIP, DSDILGP	Department of State Development, Infrastructure and Planning (Qld) (and Department's previous denomination)
DTMR	Department of Transport and Main Roads (Qld)
EA	Environmental Authority
EAR	Environmental Assessment Report
EP Act	<i>Environmental Protection Act 1994</i> (Qld)
EPC	Engineering, Procurement and Construction
EPP	Environmental Protection Policy
ESA	Equivalent Standard Axles
ESIA	Environmental and Social Impact Assessment
FEED	Front-End Engineering Design
HSE	Health, Safety, Environment
HSEQ-MS	Health, Safety, Environment and Quality Management System
HV	Heavy Vehicle
ISO	International Standards Organisation
MSES	Matters of State Environmental Significance
PCMP	Preliminary Construction Management Plan
PoTL	Port of Townsville
SDA	State Development Area
TIA	Traffic Impact Assessment

1. INTRODUCTION

In accordance with s 84 of the *State Development and Public Works Organisation Act 1971* (the SDPWO Act) Jet Zero Australia Pty Ltd (Jet Zero) is seeking approval to construct and operate a Sustainable Aviation Fuel (SAF) Facility located in Stuart, Townsville.

Jet Zero are proposing to construct Australia's first Alcohol-to-Jet (ATJ) plant converting ethanol feedstock into SAF in Townsville, Queensland, referred to as 'Project Ulysses' (the Project). The Project includes a plant to convert ethanol derived from feedstocks such as agricultural byproducts including waste wheat starch and sugar molasses, to SAF and Renewable Diesel (RD) using the LanzaJet process.

The purpose of this Preliminary Construction Management Plan (PCMP) is to support the Development Permit (DP) planning approval application under the SDPWO Act to the Office of Coordinator General (OCG). Following the DP application the OCG have requested a PCMP is completed to that addresses as a minimum:

- Impacts of construction traffic on state and local roads and how these will be managed or mitigated (Section 4).
- Impacts on environmentally sensitive areas from the use of the access handle by construction vehicles and how these will be managed or mitigated (Section 5).

The content for this PCMP has been adapted from the Environmental Assessment Report (EAR) submitted as part of the Environmental Authority (EA) application to the Department of Environment, Tourism, Science and Innovation (DETSI).

The PCMP includes a summary of the several key processes related to environmental management required to support the effective implementation of Health, Safety, Environment and Quality Management System (HSEQ-MS) compliance. These include:

- Identification of the environmental obligations, aspects, impacts, and risks associated with the works.
- Fulfilling the environmental requirements associated with the Project, the technical assessments and compliance with the EA, relevant permits and approvals.
- Providing a framework for compliance with all relevant and applicable environmental legislation.
- Supporting the prevention of environmental harm.
- Minimising the negative impacts on the receiving environment and the community.
- Identifying applicable mitigation controls to effectively address the key risks and issues associated with development of the Project.

Consideration of key environmental management guidelines has been utilised as the basis for this PCMP, including:

- The Department of Environment, Science and Innovation (DESI) Environmental Management Guideline: Activity Management Plans (AMP) (DETSI, version 2.03, 2024).
- The Department of Transport and Main Roads (DTMR) Functional Specification C7522 (DTMR, 2024a)¹.
- The Department of Climate Change, Energy, the Environment and Water (DCCEEW) Environmental Management Plan Guidelines (Version 1.2, 2024).

These guidelines provide an outline of the environmental requirements and obligations to demonstrate compliance with the general environmental duty (Section 319) under the *Environmental Protection Act 1994* (EP Act).

¹ This guideline contains broader information for consultants for engineering projects provided to DTMR. Only the content relevant to an Environmental Management Plan has been considered to prepare this PCMP.

Figure 1: Project Location



2. CONSTRUCTION METHODOLOGY

The Project is progressing through Front-End Engineering Design (FEED) to a Final Investment Decision by the Jet Zero Board. If the decision to proceed is given the Project will progress through:

- Engagement of Engineering, Procurement and Construction (EPC) Contractor to design, procure and construct the Project
- Procurement of equipment and materials with long-lead schedule
- Module (process plant unit) fabrication
- Site early works preparation
- Pre-construction planning
- Mobilisation of equipment to site for temporary site facilities establishment i.e. cribbing space, site offices, laydown areas, workshops, car parking and ablutions
- Site construction.

The 'access handle' road has recently been completed, linking Colinta Drive with the plant site. The road has been designed and built to accommodate all vehicle access during construction, including modules.

The process units of the Ethanol to Ethylene and ATJ plant, and Utility Unit will be constructed as modules and shipped to the Port of Townsville (PoTL) and transported by road to the plant site. The modules will be installed at the plant site, tested and commissioned for operation. The modularisation approach is a more cost-effective construction method than "stick build" where all the plant components would be constructed on site. In addition, modularisation significantly reduces on-site waste produced during construction. **Figure 2** shows a rendered image of module transport and module example.

2.1.1. Modularisation

Modularisation will improve overall onsite construction efficiency, with the modules (biorefinery process units), constructed offsite in a dedicated facility and transported to site for installation and commissioning. The plant equipment and facilities that are not able to be modularised will be procured for the plant site. There will be significant opportunities for local and regional businesses to supply and construct during this phase, therefore providing economic and business benefits in the region.

The alternative to modularisation is to 'stick build' all the process equipment on site, leading to a higher local workforce and subsequent negative social-economic effects to housing and employment, higher construction traffic movements, higher capital expenditure cost, and increased schedule to accommodate simultaneous construction tasks on site.

The modules are planned to arrive at the PoTL and be transported to site along the Ron McLean drive for installation and hook-up with other modules for the biorefinery plant. There will be approximately 8-10 modules sized ~ 400-2,000 tonnes each, typically 40 m long x 17.5 m wide x 30 m high. The modules will be moved using Self-Propelled Modular Transporters (SPMTs) to spread the weight therefore not impacting the road / pavement and allowing precise manoeuvring. Each module will be moved from the PoTL to site during one night's operation, that will require the road to be closed and traffic control management in place. Other infrastructure such as powerlines, signs and surface barriers may need to be temporarily displaced during each module movement event.

The modularisation of construction has significant Project, and workforce / community benefits, including:

- Modular plant design is refining industry is standard practice being the most cost-effective means of construction, and is common for major plant infrastructure in Australia.

- Module fabrication allows pretesting and pre-commissioning and hence significant schedule benefits.
- Offsite modularisation and transport significantly improve on-site construction costs, thus improving project economics significantly.
- Reduces delays and hence costs due to seasonal weather in Townsville region.
- Pre-fabricated modules reduce construction, and safety risks and mitigate delays.
- Offsite prefabrication and pre -commissioning major equipment greatly reduces on onsite site risk of delays and cost increases thus improving economic business case.
- Module movements conducted at night with traffic management, reducing traffic volume impacts to existing road users during the day time peaks.
- On site labour requirements reduced during installation and hookup thus alleviating pressure in the already overextended Townsville workforce and housing, leading to a manageable sized local workforce for all the axillary plant construction.

Figure 2: Module Transport to Site



Source: Project Ulysses flyover (Technip Energies 2024), examples of modularisation and transport to sites

2.1.2. Workforce, Housing and Transport During Construction

The projected workforce labour required for construction is estimating a peak of 1,000 people. Housing for the workforce will be assessed during FEED as part of the EPC Contractors approach, when a clearer view will be available as to final numbers required.

One of the main impacts of construction relates to the proportion of the workforce size (estimated to be a maximum of 1,000 direct workers), attracting local and broader labour force, and a proportion requiring accommodation for the duration of this activity (estimated to occur within an 18-month period)². The modularisation of the process units for the plant will be further assessed during FEED, with the aim of increasing the size of modules to potentially decrease the peak construction workforce required and therefore lessen the quantum of workforce-related impacts.

The rental vacancy rate for the Townsville Local Government Area has steadily decreased since 2016 from about 6.5 % to 1% or lower since September 2020, which is considered a tight rental market³. According to the TCC (2024b), Townsville has the largest population and economy in northern Australia, which is expected to continue growing along with its underpinning industry and is predicted to become one of Australia's fastest-growing cities. These factors, in addition to the relocation of defence personnel to the region and the influx of key industry workers, tend to exacerbate the current housing market stress.

The potential impact of an additional influx of direct workers to address the Project needs is considered low at this stage, depending on the choice of construction workers housing. In addition, the recent decision to build significant stadiums in Brisbane to support the 2032 Olympics needs to be considered as part of construction planning for the workforce employment, skills and housing. The impacts will be re-assessed or confirmed during FEED and detailed design as well as measures to diminish stress on housing due to Project impacts.

The mitigation controls to manage housing impacts during construction will include developing a workforce housing management plan to be included within CEMP/OEMP as part of the EPC Contractor's responsibility, considering TCC and local accommodation service providers guidelines. The plan may include measures such as:

- Construction camp or temporary housing (offsite from the plant area)
- Other accommodation alternatives.

2.1.3. Water Supply, Waste, Wastewater and Stormwater Management During Construction

During construction, solid wastes are generated, comprising various materials, typically such as concrete, bricks, wood, metals, plastics, and packaging materials. Commonly, concrete and masonry debris are among the largest contributors to solid waste, while timber and metal scraps also accumulate as materials are cut and shaped.

Construction activities generate various types of liquid waste, including wastewater from equipment cleaning, concrete mixing, and from temporary ablution blocks. Liquid streams include lubricating oils, machinery fuel, chemicals, and sediment. To manage both solid and liquid waste effectively during construction, standard temporary storage solutions and practices will be employed on-site.

The construction philosophy, including early works, civil works, waste and wastewater streams, volumes and stormwater management, will be assessed and developed during FEED and further refined during pre-construction planning.

Environmental management procedures and practices will be developed and linked to the EAR through a Construction Environmental Management Plan (CEMP), including mitigation controls for impacts and risks identified during the Environmental and Social Impact Assessment (ESIA) process and approval conditions. The CEMP will include specific sub-plans for environmental aspects, along with separate plans that supplement the engineering design, including an Erosion and Sediment Control Plan (ESCP), and Stormwater Management Plan (SMP).

² To be confirmed during/post FEED.

³ A rental market is considered tight when the vacancy rate falls below 2.5% (TCC, 2024a).

2.1.4. Construction Site Decommissioning and Rehabilitation

The laydown area (see **Figure 3**) will be used to facilitate construction and decommissioning. Construction, site decommissioning and rehabilitation involve the systematic removal and rehabilitation of the site to conditions similar to the previous land-use of the site itself.

This process includes the removal of temporary structures, equipment, and materials, as well as the restoration of the site to a safe and stable condition. Key activities during decommissioning include dismantling scaffolding, removing construction debris, and ensuring that all hazardous materials are properly disposed of in accordance with regulatory requirements.

The designated laydown area will be maintained throughout the decommissioning process. This will only be decommissioned once the site is in a suitable condition consistent with the requirements under the Best Practice in Erosion and Sediment Control Guideline (IECA, 2008).

PROJECT ULYSSES
Conceptual Overall Plot Plan

Legend

- Project Site
- Lot Parcel
- Road Parcel
- Easement

Jet Zero

Coordinate System: GDA2020
Units: Decimal Degrees
Scale 1:2300 @A3

50 100 150 m

145.859000 145.860000 145.861000 145.862000 145.863000 145.864000 145.865000 145.866000

-19.321000 -19.322000 -19.323000 -19.324000 -19.325000 -19.317000

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Disclaimer: Jet Zero gives no warranty to the data (including accuracy, reliability, completeness or suitability) and accepts no liability for any loss, damage or cost (including consequential damages) relating to any use of the data in this map.

Date:	22-10-2025	Map version:	RECEIVED
Drawn:	LG	Reviewed:	LG
		Approved:	LG

3. HEALTH, SAFETY, ENVIRONMENT AND QUALITY MANAGEMENT SYSTEM

The Jet Zero HSEQ-MS is being developed to comply with Jet Zero policies and relevant legislation. Specific activity-based procedures have been developed to manage the impacts and risks associated with the design (during FEED), with additional standards and procedures to be developed for construction and operation of the Project. The HSEQ-MS will be aligned but not gain certification with the relevant International Standards Organisation (ISO) and Australian Standard / New Zealand Standard (AS/NZS). The management system is intended to be integrated, aligning the structure across the relevant standards, including:

- ISO 14001: Environmental Management Systems.
- ISO 9001: Quality Management Systems.
- ISO 45001: Occupational Health and Safety Management Systems.
- ISO 50001: Energy Management Systems.

A summary of the Jet Zero HSEQ-MS is described below. The ESIA process is applicable across all levels of the HSEQ-MS, with Project specific management controls, monitoring and reporting plans to be developed as needed.

Figure 4: Overview of Jet Zero Health, Safety, Environmental and Quality Management System Framework



For the construction of the Project, Jet Zero will engage an EPC Contractor who will be responsible for construction of the Project plant site and associated infrastructure under a contractual agreement with Jet Zero. The EPC contractor will be appointed by Jet Zero as the 'Person Conducting a Business or Undertaking' and as the 'Principal Contractor', who authorises the EPC Contractor to have management responsibility for the Project development, control of the workplace, and the management of construction and its delivery.

The EPC Contractor will develop an HSEQ-MS 'Bridging Document' between the Jet Zero and EPC Contractor's management system to verify consistency during the Project. If needed, additional site-specific procedures may need to be developed to support the bridging and compliance with the CEMP.

As part of the CEMP development there are also environmental obligations and conditions that will apply to the Project related to Jet Zero. These are in addition to the mitigation controls that have been identified through the ESIA process and are included as part of this EMP Outline.

The environmental management system elements under the CEMP will be consistent with the Jet Zero HSEQ-MS. These documents are currently under development. Relevant environmental elements applicable to the EPC contractor and the development of the CEMP (consistent with AS 14001:2015 and ISO 45001:2018) are provided below and include:

- Planning
- Roles and Responsibilities
- Legal and Other Requirements
- Aspects and Impacts
- Risk and Opportunities
- Change Management
- Communication and Consultation
- Training and Competency
- Incident Management
- Emergency Planning and Response
- Document and Record Management
- Auditing, Review and Continuous Improvement.

Specific Jet Zero processes and procedures for the Project are provided in **Table 1**.

Table 1: Key Jet Zero Health, Safety, Environment (HSE) Documents Applicable to Project Ulysses

HSEQ-MS Document	Scope	Status
HSE Policy (JZ6000-HSE-POL-0001)	Establish commitments to incorporate EHS elements throughout relevant areas of Jet Zero.	Draft, unpublished
Environmental Policy (JZ6000-HSE-POL-0001)	Establish commitments to incorporate environmental elements throughout relevant areas of Jet Zero.	Signed
Sustainability Policy (JZ6000-HSE-POL-0006)	Establish commitments and incorporate the principles of sustainability throughout relevant areas of Jet Zero.	Draft, unpublished
HSE Management Standard (JZ6000-HSE-STD-0001)	- Sets high level requirements for the management of prevention of harm to people or the environment. Also define requirements for: - HSE strategy and planning. - HSE leadership and performance management. - HSE audit. - Control of Work. - Environment requirements. - HSE compliance. - HSE requirements for suppliers and contractors. - Sustainability.	In effect, Rev 0 (September 2024)

HSEQ-MS Document	Scope	Status
HSE Performance Management Procedure (JZ6000-HSE-PRC-0001)	• Define the framework for effective management of HSE performance within Jet Zero. Also define requirements for: • HSE Policies Leadership and Commitment and Resources. • HSE Roles Responsibilities, Accountabilities and Authorities • HSE Compliance. • HSE Communication and Community Involvement. • HSE Documented Information • HSE Monitoring, Measurement, Analysis and Evaluation. • HSE Audit and Assessment.	In effect, Rev 0 (August 2024)

3.1. Planning

Planning for the development of the CEMP will incorporate the key risks identified through the ESIA process, and the construction environmental risk workshops that will be held during FEED and post FID, to assess risks of credible unplanned events that could result in environmental harm. This will support the development of environmental management and mitigation to minimise environmental harm during the construction phase of the Project.

In developing the CEMP, the EPC Contractor will certify that construction personnel working on the Project, are aware of and implement the following general obligations:

- To minimise pollution of land, air and water by ensuring appropriate environmental management obligations and mitigation measures are implemented.
- To be aware of and have appropriate skills to effectively use pollution control equipment and keep it in proper working order.
- To preserve the natural and cultural heritage environment.
- To report to relevant authorities of any non-Aboriginal or Aboriginal heritage discovery during construction.
- Minimise the occurrence of offensive noise from the construction activities on the site.
- Be a guest in the community and a good neighbour to surrounding land users.
- Keep the community informed of construction milestones, upcoming activities and duration of relevant aspects of the works that may impact on them or their interests.
- Use equipment with noise control features where available and verify that it is properly maintained.
- Take all feasible and reasonable steps to secure compliance with the requirements of this PCMP.

All personnel from the EPC contractor, and the sub-contractors delivering construction of the Project have a responsibility for protecting the environment by ensuring that environmental protection measures are planned for, resourced, communicated, installed, maintained and reviewed.

3.2. Roles and Responsibilities

The key roles and responsibilities for the Project for the construction phase are outlined below in **Table 2**. The titles are illustrative and may change during the Construction phase. The plant site environmental compliance will be the responsibility of the EPC Contractor with oversight by Jet Zero.

Table 2: Roles and Responsibilities

Title	Responsibilities
Project Manager (Jet Zero)	• Overall responsibility for the implementation of environmental matters on the Project, and compliance with the EA approval. • Responsible for ensuring resources are made available to enable Project works to comply with the approval and other statutory requirements in all aspects of the Project Delivery. • Engage with relevant authorities and the Project team as required for delivery. • Audit to check compliance with EA conditions and CEMP. • Liaison with approval authorities as appropriate. • Notification to regulator in the event of a reportable environmental incident.
Construction Manager (EPC Contractor)	• Responsibility for the site based environmental matters and compliance with the EA conditions and CEMP. • Plan construction works in a manner that avoids or minimises negative environmental impact. • Instruct personnel to manage works in accordance with statutory and approval requirements. • Implement environmental management procedures and protection mitigation controls according to CEMP. • Provide adequate resources for implementation of the CEMP. • Inspect to verify compliance with EA conditions and CEMP.
HSE Manager (EPC Contractor)	• Development, implementation, monitoring and updating of the EPC Contractor CEMP consistent with this CEMP and the associated EA Conditions and obligations once approved. • Report to the Project Manager on the performance and implementation of the CEMP. • Review environmental impacts and risks of the Project from the EAR and update the CEMP with appropriate mitigation controls. • Inspect the plant site regularly to check compliance with the CEMP, EA, DP Conditions and associated controls and conditions. • Secure systems are in place and maintained for tracking and documenting compliance, record keeping and compliance verification. • Manage environmental document control, reporting, inductions and training records. • Oversee site monitoring, inspections and audits. • Manage the notification process to Jet Zero and relevant regulators in the event of an environmental incident. • Identify opportunities and lessons learnt applicable to the project, and update the management plans as appropriate • Receive and liaise with Construction Manager and construction personnel regarding complaints relating to environmental management (e.g. dust). • Support all subcontractors and consultants with regards to environmental awareness. • Facilitate management review of the implemented systems and processes on the project at least annually.
Environmental Officer (EPC Contractor)	• Monitor the implementation and effectiveness of CEMP. • Update site specific procedures to comply with the CEMP. • Conduct environmental inspections, auditing, monitoring and training according to the CEMP. • Provide advice on environmental matters and corrective actions as requested. • Review site compliance with the approval conditions. • Identify opportunities and lessons learnt applicable to the Project and update the management plans as appropriate. • Conduct environmental actions as indicated by the HSE Manager.
Supervisors / Foreman (EPC Contractor)	• Control field work and implement/maintain effective environmental controls. • Monitor that all site workers are site inducted prior to commencement of works. • Notify Environmental Manager and/or superintendent immediately in the event of an environmental incident.

Title	Responsibilities
	• Undertake response to incidents and undertake clean up immediately after any environmental incident consistent with the environmental duty to restore (section 319C of the EP Act) under direction of Environmental Manager or Officer. • Undertake regular checks of compliance with environmental requirements.
Site Personnel / Subcontractors	• Comply with all environmental requirements provided in inductions, and other provided documents. • Implement works as directed in accordance with relevant requirements, conditions and management system obligations. • Notify immediately in the event of an environmental issue. • Adequately rectify any environmental issue independently (if safe to do so) or at the direction of the supervisor.
Consultants / General / Visitors	• Comply with all environmental requirements provided in induction and other supplied documents. • Implement works as directed in accordance with environmental requirements. • Stop work at the direction of management, or if any non-conforming environmental impact or activity has occurred or is likely to occur. • Notify immediately to the supervisor in the event of an environmental issue. • Adequately rectify any environmental issue independently (if safe to do so) or at the direction of immediate.

C – Construction

3.2.1. Legal and other Requirements

A register of legal and other requirements for the Project will be developed and maintained for the Project by the EPC contractor, based on the Jet Zero Obligations Register. This register will include all environmental approval conditions, obligations and requirements under the planning (DP), environmental (EA), *Environment Protection Biodiversity and Conservation Act 1999* and secondary site approvals. The EPC Contractor will be responsible for gaining secondary site based environmental approvals for the construction of the Project.

This register will be maintained and regularly assessed as part of routine environmental monitoring, including during management reviews and updated with any applicable changes. Changes made to the legal requirements and obligations register will be communicated to the wider team through toolbox talks, specific training and other methods to provide awareness of the requirements on the project.

The register will incorporate a reference to where the legal and other requirements are addressed within the EPC Contractors CEMP. All necessary licences, permits and approvals required for the development of the Project will be obtained and maintained as required throughout the life of the Project and tracked within the register.

3.2.2. Risk and Opportunity Management

Prior to commencement of construction on site, an environmental risk assessment workshop shall be conducted by the EPC Contractor to identify the environmental constraints associated with the Project related to construction and address the environmental risks from the activities to be carried out. The results of this workshop will inform the development of the CEMP. This PCMP will be utilised to support the development of the environmental risks for assessment.

The environmental risk assessment workshop shall be used to further develop risk mitigation and management controls to eliminate or reduce risk exposure. These risk mitigation controls shall be consistent with the environmental management measures listed in this PCMP, the DP and the EA, and shall be incorporated into the CEMP by the EPC Contractor.

The risk assessment shall support general awareness of good environmental management practices among construction personnel and subcontractors. Participants shall include Jet Zero oversight

personnel, the EPC Project Manager, Contractor site management staff, and the contractor's environmental site representative. The risk workshop may include key subject matter experts as applicable, including a soil conservationist and ecologist. The risk workshop will also include key personnel, including subcontractors (if available), who will be performing the construction activities.

The objectives of the risk assessment workshop shall include:

- Identify activities, events or outcomes that have the potential to adversely affect the local environment and/or human health / property.
- Qualitatively evaluate and categorise each risk item.
- Assess environmental protection measures.
- Qualitatively evaluate residual risk and any additional management measures required to reduce the risk to SFAIRP.

3.2.3. Change Management

As the Project develops, a process for change management shall be implemented by the EPC Contractor to address any changes derived from the risk on the Project. This will include an assessment of the change and the associated risks resulting from the change.

A review and assessment of the applicable environmental risks through a risk management process consistent with the risk workshop completed by the EPC Contractor will be undertaken. Outcomes from the environmental risk assessment may require an update to the Project risk register, applicable controls, procedures and processes relevant to the proposed change within the CEMP.

Any update of the CEMP will require approval of the update or change by Jet Zero.

3.3. Training

The EPC Contractor will ensure that all project personnel and subcontractors receive training to verify that they are fully aware of their roles and responsibilities in the construction of the Project and in the event of an emergency. Training will be provided for all personnel working on the construction of the Project, including visitors and consultants.

This training and awareness will generally be provided to the construction teams through:

- **Site Inductions:** provided to all employees and subcontractors prior to commencement on site. Content includes awareness on relevant environmental aspects, environmental requirements and obligations, emergency procedures and incident reporting.
- **Daily Pre-starts:** Covers that day's scope of works, key activities for the day, changes to the workplace, lessons learnt, key safety messages and key potential impacts and risks associated with that day's work on site.
- **Toolbox talks:** covers both environmental and safety issues. Can also be used as refresher training on response procedures, dealing with the public, locations and use of response equipment. Important and relevant information will be communicated to the workforce to guarantee they are informed and can apply it to their duties and tasks. Topics addressed at Toolbox meetings may include:
 - Environmental constraints related to construction activity
 - Reinforcement of requirements under the general environmental duty
 - Discussion of relevant conditions, permits and approvals
 - A review of environmental monitoring results and performance.
- **Posters and messages:** placed at message boards on site this will include key safety and environmental information, first-aid staff and their contact details, mustering points for emergencies, and any other key staff requirements.

The EPC Contractor will also provide specific training related to emergency response, their roles and responsibilities in relation to site significant incidents and emergencies. The logistics, equipment

processes and procedures required for emergency response will have appropriate resources allocated by the EPC Contractor.

Identified training for the Project during construction is included in **Table 3**. Additional training will be refined through the Project development and may include additional obligations for contractors delivering the project (e.g. erosion and sediment control training, etc.).

Table 3: Training and Competency

Role	Incident Response	Training Requirements			Communication and Notification
		Storage and Handling of Chemicals	Spills clean up	Environmental Awareness	
Project/Construction Managers	✓			✓	✓
Environmental Representatives	✓		✓	✓	✓
Supervisors/Foreman	✓	✓	✓	✓	✓
Spill Response Team	✓		✓		✓
Site personnel	✓			✓	✓
Consultants/General/Visitors				✓	✓

3.4. Compliance

The EPC Contractor will implement appropriate verification of compliance requirements and obligations assessed through inspections, monitoring, and auditing. Records from these activities will be recorded and reported as necessary for the site.

Actions taken to address management of non-conformances, or maintenance and management on site, will be recorded and reported through the management system (where triggered). An **Obligations Register** will be kept tracking compliance with the obligations, relevant commitments and legal requirements, including the development permit and the EA (refer also to **Section 3.2.1**).

3.4.1. Inspections

Regular inspections (scheduled or unscheduled) will be undertaken during construction to assess the effectiveness of the implementation of measures described in the EPC Contractors CEMP. The inspections shall include:

- **Routine Site Inspections:** regular on-site checks, at least weekly, with a particular focus on activities and surrounding environments.
- **Targeted Inspections:** focused on specific areas or issues (e.g., sensitive areas, stormwater management, waste and spoil management) during specific stages of the Project.
- **Inspections following an incident or event:** This inspection is focused on an event or non-conformance relating to the site and the associated processes and procedures around the event to develop targeted management and mitigation measures. The inspection will incorporate a recognised investigation approach (e.g. Incident Cause Analysis Method, 'Five Whys' or equivalent).

Where an incident has been triggered and additional mitigation measures have been identified, these will be developed and incorporated into the management system to verify the change is captured, assessed and communicated (refer also to **Section 3.2.3** - Change Management).

3.4.2. Monitoring

Monitoring and analysis will be incorporated into the Project's development during the FEED phase, before the commencement of construction. This will establish baseline conditions that will support monitoring throughout the construction phase and be documented within the CEMP.

Monitoring through the construction by the EPC contractor will be developed further based on approval compliance and the risk assessment process described in **Section 3.2.2** above. The monitoring may include:

- **Baseline data collection:** commenced in 2024 and will continue prior to construction, baseline environmental data collected will support the characterisation of the existing environmental conditions and values.
- **Ongoing data collection:** continuous or periodic sampling and analysis of environmental aspects during construction will be undertaken by the EPC Contractor. This could involve potable, surface and groundwater monitoring, and air quality and noise monitoring, depending on approval compliance, potential community complaints, and if environmental site risk or conditions changes.
- **Environmental management:** monitoring to evaluate the effectiveness of mitigation controls may be completed as part of the Project to assess compliance. For example, surface water and erosion control review after any significant rain events.

Future monitoring associated with the Project will link to the environmental aspects from the assessment of baseline data, and the construction activities. The environmental monitoring to be incorporated into the facility and carried through construction by the EPC contractor are provided in **Table 4** below.

Table 4: Environmental Monitoring

Environmental Aspect	Type of Monitoring	Monitoring Frequency	Timing
Groundwater (MB 01 to 05)	Water quality	Monthly (12 months), then according to GWQMP	• During FEED to collect baseline data and inform/review pre-construction SWQMP and GWQMP. • Construction (targeted scope following one year collected data).
Surface water (Reference and Test sites)	Water Quality	Monthly (12 months), then according to SWQMP	• During FEED to collect baseline data and inform/review pre-construction SWQMP and GWQMP. • Construction: targeted scope following one year collected data.
Process and Trade Wastewater	Wastewater quality	According to CEMP	• Construction: trade wastewater to be included as part of construction procedures and related to CEMP.
Stormwater	Wastewater quality	According to CEMP	• Routine inspections to be included under CEMP and construction procedures.
Soil and erosion	Soil quality	According to CEMP	• Visual routine inspections to be included within CEMP.
Ecology	Migratory Shorebirds, Sheath-tailed bat and Biosecurity matters	According to approval conditions	• Visual observations on Project site and receiving environment as part of CEMP and OEMP as part of mitigation controls.
Air Quality	Air emissions	According to approval	• Construction: dust monitoring.

Environmental Aspect	Type of Monitoring	Monitoring Frequency	Timing
		conditions and CEMP	
Chemical Storage, Waste	Environmental management	According to compliance with CEMP	- Management process for handling of fuels, chemical and waste onsite during construction. - Routine inspections to be included as part of CEMP.
Traffic	Vehicle counts	According to approval conditions and CEMP	Routine inspections to be included as part of CEMP to verify the traffic modelling projections and EPC Contractors estimates.

3.4.3. Compliance Auditing

Environmental audits for the Project (internal and external) will be performed to determine compliance with the CEMP in achieving environmental objectives and performance targets. Audits will be undertaken by Jet Zero and the EPC Contractor as required, including:

- Providing an internal and independent review of the CEMP compliance
- Identify non-conformances and actions to comply with this PCMP
- Identify any amendments necessary to the current PCMP.
- Verify implementation of the environmental component of the HSEQ-MS and its implementation.

3.4.4. Management of non-conformances

Non-conformances are situations or events that do not comply with a legal requirement, a standard or procedure that is part of an Obligations Register, HSEQ-MS and/or CEMP. A procedure will be developed during FEED as part of the HSEQ-MS to include management of non-conformances.

This process will be incorporated into the EPC Contractors EMP related to management, investigation and assessment of an event, or incident leading to a non-compliance.

Where identified, non-conformances will be investigated, the causes verified, and corrective actions developed to address the non-conformance and implement mitigation measures to prevent a recurrence.

Non-compliances recorded over the year, will be assessed as part of the annual management review and continual improvement for the project.

4. TRAFFIC

4.1. State and Local Roads and Traffic Volumes

4.1.1. Roads

The Project site and surrounding road network are shown in **Figure 5**. The Road network surrounding the Project site is shown in **Table 5**, with the key road intersections shown in **Table 6**.

A review of the Townsville City Council's (TCC) Townsville City Plan, Local Government Infrastructure Plan (TCC, 2024a), and DTMR's Queensland Transport and Roads Investment Program (QTRIP) 2024-25 to 2027-28 (DTMR, 2024b), indicated there are no planned road network upgrades expected to impact the Project site.

Table 5: Road Network Surrounding Project Site

Road Name	Jurisdiction	Hierarchy	Cross-Section	Speed Limit
Bruce Highway	State	Highway	4 lane / divided	90 km/hr
Colinta Road	Council	Industrial Access	2 land / undivided	50 km/hr*
Flinders Highway	State	Highway	2 land / undivided	80 km/hr
Heleen Downs Road	Council	Industrial Access	2 land / undivided	50 km/hr*
Ron McClean Drive	State	Highway	2 land / undivided	80 km/hr

*Unposted speed limit – assumed default urban speed

Table 6: Key Road Intersections

Identity	Intersection Name	Jurisdiction	Configuration
1	Ron McClean Drive / Heleen Downs Road / Colinta Road	State	Signalised
2	Bruce Highway / Flinders Highway / Ron McLean Drive	Council	Signalised

4.1.2. Traffic Volumes and Composition

The traffic volumes and composition of the key roads surrounding the Project site are shown in **Table 7**. This has been derived from the DTMR 2024 Traffic and Analysis Reporting System data that provides the Annual Average Daily Traffic (AADT) and Heavy Vehicle (HV) percentage for the road sections of the truck haulage routes to the Project site. The Equivalent Standard Axles (ESA) describes the number of axles of a vehicle with applying a load of 80 kN to the payment, with SAR4 is a form of ESA, but for thin bituminous surfacing.

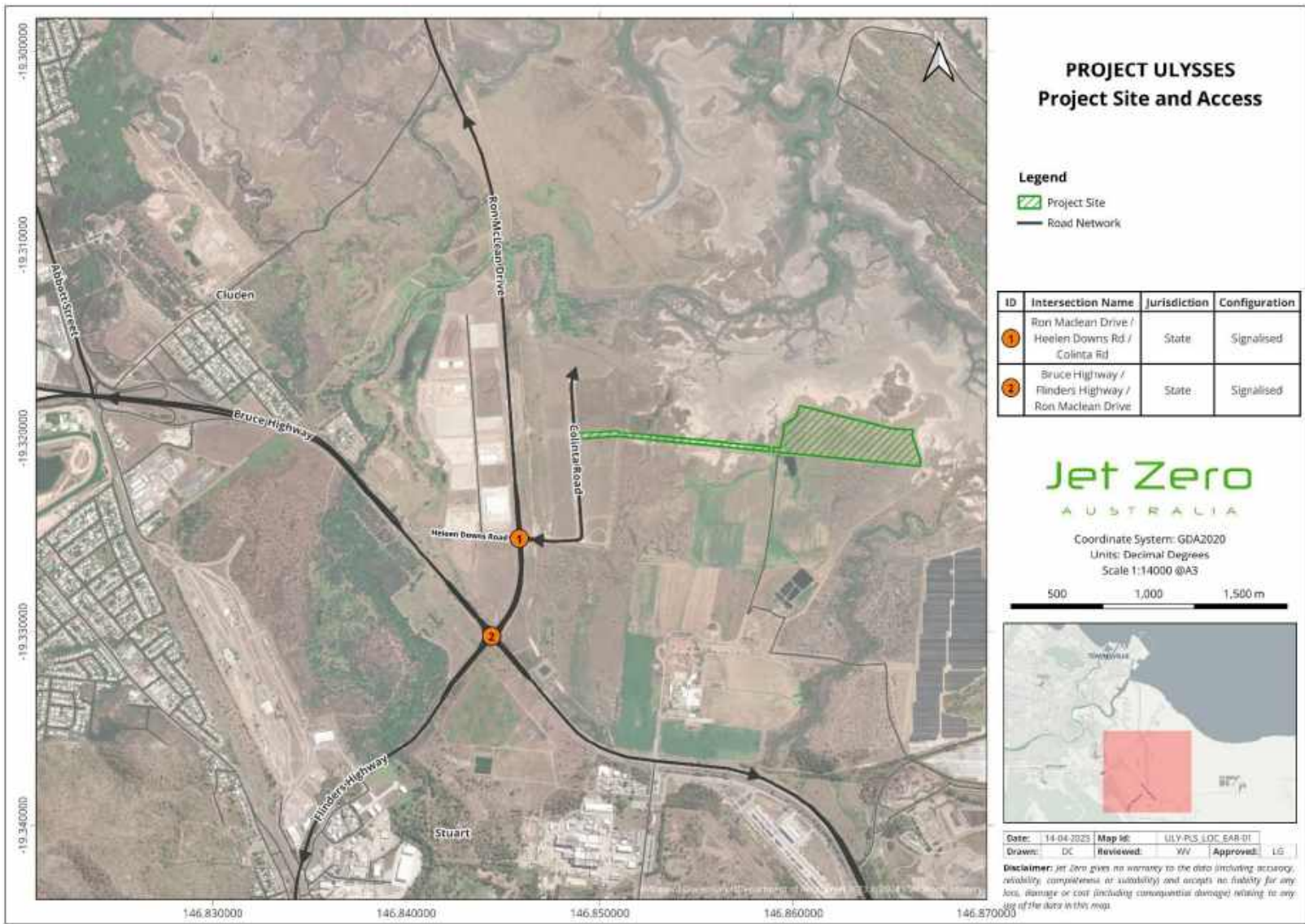
The Boundary Road section closer to the PoTL shows high AADT in comparison to the Ron McClean Drive that services the Townsville State Development Area (SDA) and linkage from the Bruce Highway. Bitzios (2025) prepared the Traffic Impact Assessment (TIA) in alignment with the Guide to Traffic Impact Assessment (DTMR, 2018).

Table 7: Background Traffic Volumes - 2023

Road	Section	Direction	AADT	% HV	AADT_HT	SAR4s / HV
Ron McClean Drive	0.00 - 0.77	Against	1,311	26.19	263	3.2
		Gazettal	1,436	18.29	343	3.2
	0.77 – 7.36	Against	1,311	26.19	263	3.2
		Gazettal	1,436	18.29	343	3.2
Boundary Road	16.51 – 16.63	Against	8,362	14.79	1,237	3.2
		Gazettal	8,482	14.64	1,242	3.2
	16.63 – 16.76	Against	1,381	22.15	306	3.2
		Gazettal	1,528	21.36	326	3.2
	16.76 – 18.84	Against	1,381	22.15	306	3.2
		Gazettal	1,528	21.36	326	3.2

The above-mentioned traffic volumes are based on the worse case construction scenario of ‘stick-build’ with all process plant, equipment and plant infrastructure being constructed on site. Modularisation will reduce the traffic volumes during construction significantly leading to less truck and vehicle movements during the peak day periods. The movement of modules (8-10) during the night with traffic management will minimise disruption to other road users, as the pre-fabricated modules will mean less equipment and machinery movements are needed on site over the period of construction, in comparison to the scenario of ‘stick build’.

Figure 5: Project Site Location and Existing Road Network



Modularisation also improves the overall onsite construction efficiency, with the modules constructed offsite in a dedicated facility and transported to site for installation and commissioning. The plant equipment and facilities that are not able to be modularised will be procured for the plant site. There will be significant opportunities for local and regional businesses to supply and construct during this phase, therefore providing economic and business benefits in the region.

The modules are planned to arrive at the PoTL and be transported to site along the Ron McLean drive for installation and hook-up with other modules for the biorefinery plant. There will be approximately 8-10 modules sized ~ 400-2,000 tonnes each, typically 40 m long x 17.5 m wide x 30 m high. The modules will be moved using Self-Propelled Modular Transporters (SPMTs) to spread the weight, therefore not impacting the road / pavement and allowing precise manoeuvring. Examples of the SPMT and module movements in Australia are shown in **Figure 6**.

Each module will be moved from the PoTL to site during one night's operation, that will require the road to be closed and traffic control management in place. Other infrastructure such as powerlines, signs and surface barriers may need to be temporarily displaced during each module movement event.

Figure 6: Module Transport Examples



Clockwise: Self-Propelled Modular Transporters, Example of module with SPMT, 900 tonne module Ammonium Nitrate Plant Pilbara (2016), Geelong Refinery Upgrade Victoria (2024/2025).

Table 8 provides a summary of road values and sensitivity for the roads surrounding the site.

Table 8: Summary of Road Values and Sensitivity

Road	Values and Description	Sensitivity
Ron McClean Drive	Local industry and public use	Low
Colinta Road	Local industry use	Low
Heleen Downs Road	Local industry use	Low
Boundary Road	Local public and industry use	Low
Bruce Highway/Flinders Highway	Regional public and industry use	Not sensitive

Bitzios (2025) have completed a TIA, including an impact assessment with the requirements of DTMR located in Section 5 of the EAR.

The surrounding road network to the Project site has been designed for industrial use for HVs to support the SDA and access to the PoTL for industry and connection to the Bruce Highway. The environmental value sensitivity / vulnerability is therefore considered to be low.

4.2. Potential Impacts of Construction to Traffic and Roads

A TIA conducted by Bitzios (2025) was used to determine impacts. This section discusses the potential impacts in terms of traffic generation and road values as a consequence of the Project construction.

During construction, the development is expected to generate up to 60 am peak-hour trips and up to 56 pm peak trips in the Road Network surrounding the Project site as a reason for Staff Related Vehicle Movements primarily, followed by Servicing / Delivery Vehicle Movements. At this stage, traffic distribution will be primarily directed south of Ron Mclean Drive (60 %) towards roads with direct access to nearby communities and roads, and the rest (40 %) to the north (see **Figure 7**).

The traffic analysis showed that the Degree of Saturation (DOS) for Intersection 1 during construction during am and pm peak hours ranges from 0.22 to 0.28, well below the typically adopted operational threshold for a signalised intersection ($DOS < 0.9$). For Intersection 2, DOS ranges from 0.40 to 0.58, below the < 0.9 threshold. These results mean that the intersections are functioning at an acceptable level of service, with less than 90 % of their capacity being used. Therefore, the impact is expected to be low before the implementation of mitigation measures.

In comparison to construction, during operation, the development is expected to generate up to 76 peak-hour trips (am and pm) in the Road Network surrounding the Project site primarily as a reason for Staff Related Vehicle Movements followed by Servicing / Delivery Vehicle Movements. At this stage, traffic distribution will be primarily directed north of Ron Mclean Drive (70 %) towards PoTL, and the rest (30 %) to the south (see **Figure 7**).

The traffic analysis showed that the Degree of Saturation (DOS) for Intersection 1 during construction during am and pm peak hours ranges from 0.23 to 0.30, well below the typically adopted operational threshold for a signalised intersection (< 0.9). For Intersection 2, DOS ranges from 0.42 to 0.63, below the < 0.9 threshold. These results mean that the intersections are functioning at an acceptable level of service, with less than 90 % of their capacity being used. Therefore, the impact is expected to be low before the implementation of mitigation measures.

Based on the intersection assessments, a net delay assessment was undertaken in accordance with DTMR's Guide to TIA to determine the expected impacts across the impacted assessment area. Background delay impacts resulting from development traffic will not exceed 5 %, consequently, no intersection upgrades are required by TMR's GTIA to offset development related traffic operation or safety impacts. Thus, the overall impact from operations is considered low.

The Pavement Impact Assessment results showed that Ron Mclean Drive is the only road identified where development volumes will have significant impacts (i.e. >5 %). Based on the marginal costs provided, the required pavement contribution is estimated to be \$10,271.76 per year.

4.3. Planning Considerations

The primary traffic objectives are:

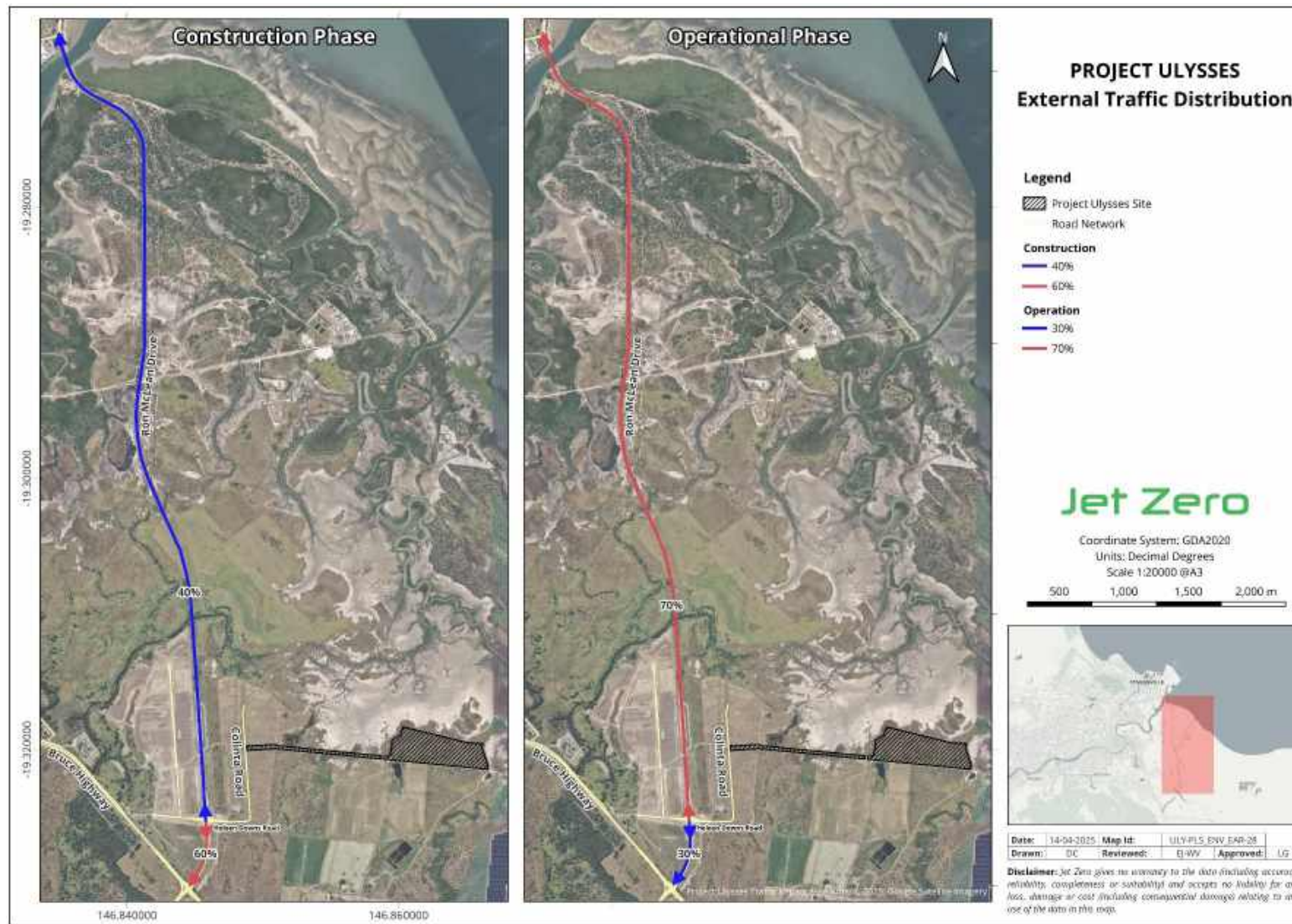
- To ensure the health and safety risk to the community from traffic is minimised to acceptable levels.
- To ensure the public access to road reserves is minimised to acceptable levels.
- To minimise the nuisance and disturbance to the community and residence sensitive receptors from air (dust) and noise impacts to acceptable levels and ensure that any complaints are responded to in a timely manner.

4.4. Mitigation and Management Controls

A CEMP will be developed to address the potential impacts on local traffic during construction, which will include a Construction Traffic Management Plan (CTMP) to address the management and mitigation of potential traffic-related impacts. During construction, the management of potential traffic impacts may include:

- Obtaining all necessary transport permits and approvals before starting construction, including plant site and module transfers (DTMR, PCC, POT).
- Incorporating any planning approval conditions within the engineering design, and construction phase.
- Information on transport routes and types of traffic for delivering project-related components and materials.
- Measures to mitigate traffic safety risks and minimise disruptions for local transport route users, including (but not limited to):
 - Temporary traffic controls such as detours and signage
 - Community notifications regarding project-related traffic impacts
 - Measures to limit Project-related traffic on public roads outside standard construction hours
 - Actions to prevent dirt from being tracked onto sealed public roads by Project vehicles
 - Ensuring all loaded vehicles entering or exiting the site have covered or contained loads
 - Providing adequate on-site parking for project-related vehicles.
- Personnel encouraged to be alert to wildlife, particularly during low-visibility conditions.
- The CTMP should also include:
 - A Drivers' Code of Conduct for EPC Contractors transport drivers / companies.
 - Consideration of shuttle bus service for construction staff, as required during periods of increased traffic volumes.
- All access points and roads will meet Austroads and DTMR requirements.
- Swept path assessments confirm safe manoeuvrability for design vehicles (including 19m semi-trailers).

Figure 7: External Traffic Distribution



5. ENVIRONMENTALLY SENSITIVE AREAS

5.1. Overview

The ecology sensitivity receptors and their environmental values are presented in **Table 9**. Note that the road access handle has now been constructed and the plant site earthworks and drainage completed according to the current OWP and EPBC approval. Therefore, no existing vegetation communities or habitat values remain within the road and plant site. The following vegetation communities and plants are identified to be potentially subject to unintentional clearing or disturbance in the following locations:

- Matters of National Environmental Significance (MNES) (*Environment Protection, Biodiversity and Conservation Act 1999*): The area to the north-east of the facility includes the Great Barrier Reef World Heritage Area (GBRWH) / Great Barrier Reef National Heritage Estate (GBRNHP) (2.5 km), and Great Barrier Reef Marine Park (GBRMP) (6.3 km) (**Figure 8**)
- Matters of State Environmental Significance (MSES) (*Vegetation Management Act 1999*): The area adjacent to the north-east of the facility site contains wetland values (see **Figure 9**), and did contain the REs 11.1.2b and the area adjacent to the north of the access road did contain 11.3.27x1a (**Figure 10**).
- MSES (*Fisheries Act 1994*): The areas containing marine plants adjacent to the northern boundary of the facility site and adjacent to the access road (**Figure 11**).
- Disturbance, release and spread of weed species listed under the National (as Weed of National Significance), State (as Restricted or Prohibited Matter) and/or local (as priority weed) government Biosecurity framework (**Figure 12**).

Table 9: Sensitive Receptors - Ecology

Sensitive receptor	Environmentally significant resource and context
Cleveland Bay Tidal areas associated with Sandfly Creek (receiving environment)	The project is located within the mid-to-lower reaches of the Sandfly Creek catchment in Cleveland Bay. Cleveland Bay is a significant fish habitat and supports migratory shorebirds, including 10 field-observed internationally and nationally recognised species. The site is on the southern margin of this important habitat, with Sharp-tailed Sandpiper, Eastern Curlew, and Whimbrel likely to occur within 500 m of the project footprint. The Sandfly Creek Reserve, managed by DETSI, is situated immediately south of the project site and includes the Sandfly Creek catchment.
Vegetation within project site	Mostly non-remnant within project site. A few MSES for marine plants are identified above HAT (small portion on extent North of project site) ¹ .
Fauna – Protected Species (MNES / MSES)	The project occurs on the southern margin of the 'Cleveland Bay' important migratory shorebird habitat. The species Eastern Curlew, Whimbrel and Caspian Tern were observed intersecting project area. The Bare-rumped Shearwater is likely to maintain a regular presence (foraging) over the project footprint. Other species were observed in the receiving environment north of the project site.
Fish habitat areas	The mapped fish habitat area is in the distal receiving environment, where no works are planned in this area.

Sensitive receptor	Environmentally significant resource and context
Stuart Creek Nature Refuge	Stuart Creek Nature Refugee It is located 2.2 km, south-west upstream of the project site (see Figure 8). A 9-ha area, with most of its area a managed resource protection, with estuarine wetland vegetation (riverine). Identified terrestrial GDE, whereas no habitats were identified to occur in this region (Queensland Government, 2013)
Wildlife essential habitat (MSES)	Located approximately 750 m north-west of the project site. MSES wildlife essential habitat.
GBRWHA / GBRNHP /GBRMP	2.5 km (GBRWHA/GBRNHP) and 6.3 km (GBRMP) downstream of project site. Site is in the Ross River catchment on the coastal plain, approximately 2 km from the coastline. Site surface waters report to Sandfly Creek and discharge to Cleveland Bay, which is part of the GBRWHA / GBRNHP. Sandfly Creek is also identified as an aquatic GDE.

¹ The Great Barrier Reef Marine Park (GBRMP) is part of the Great Barrier Reef World Heritage Area (GBRWHA), co-located with the Great Barrier Reef National Heritage Estate (GBRNHP).

Figure 8: Project Location in Relation to MNES and MSES

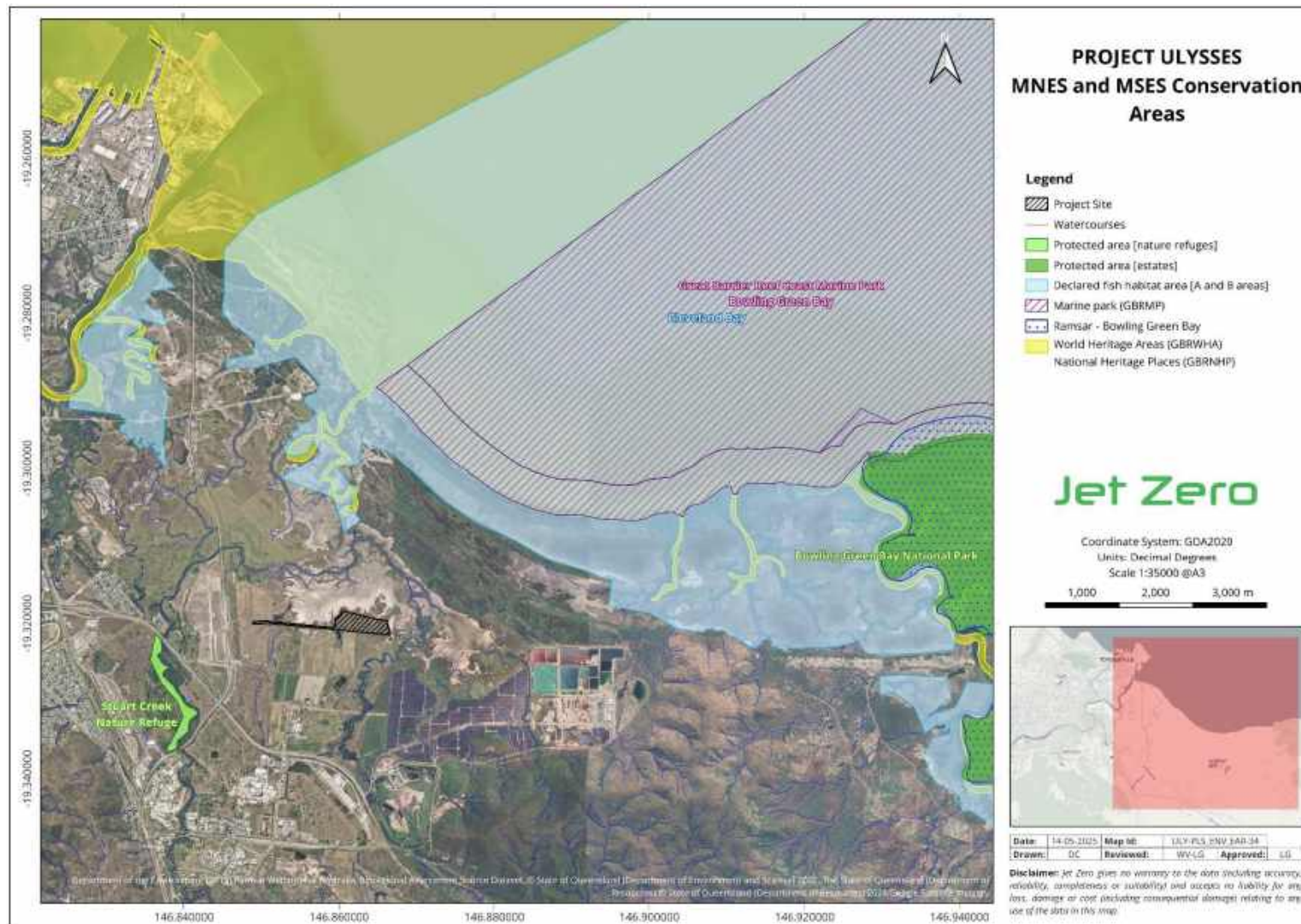


Figure 9: MSES Vegetation and Wetlands

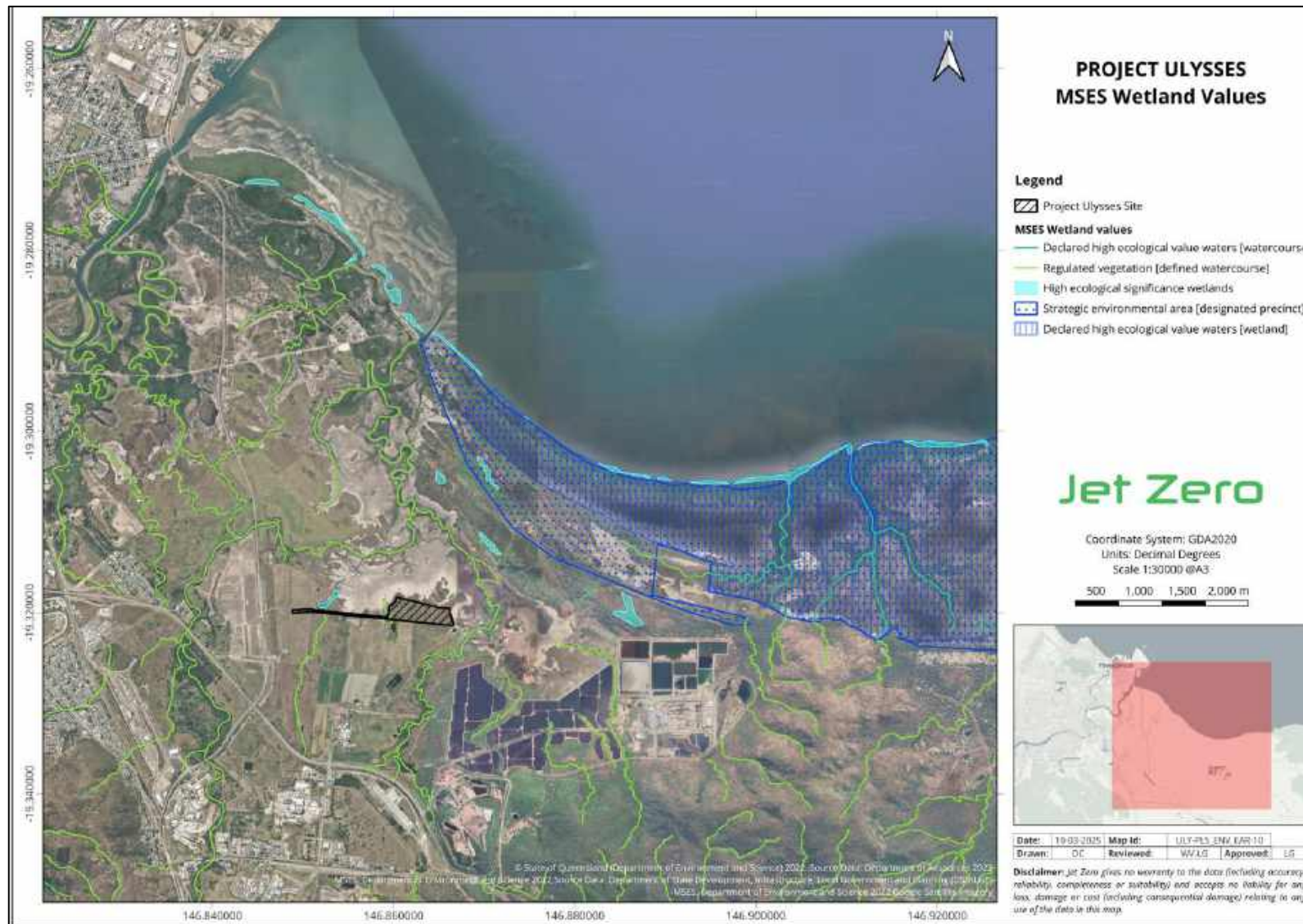


Figure 10: Mapped Versus Field-Verified RE

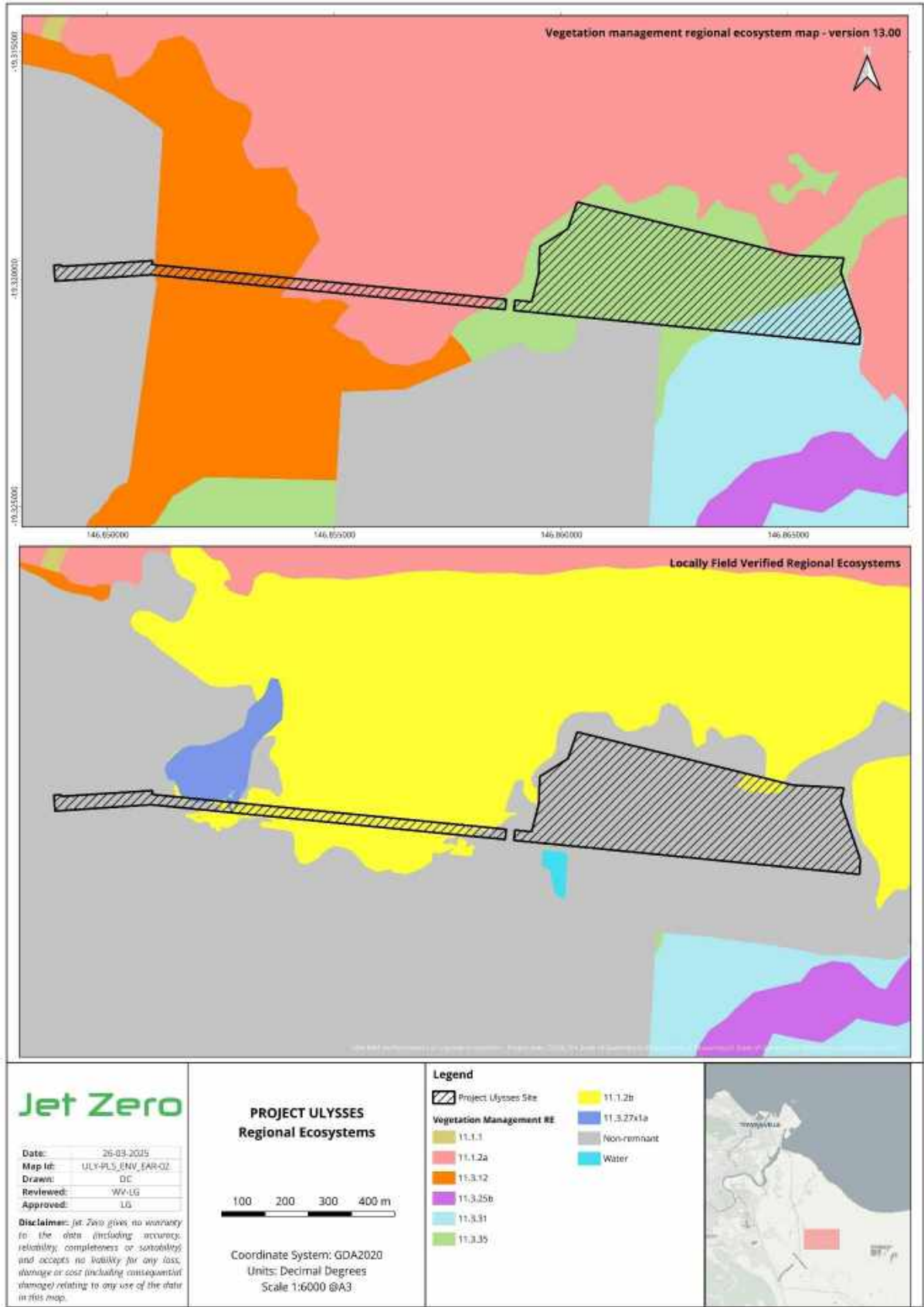


Figure 11: Field-Verified Marine Plants

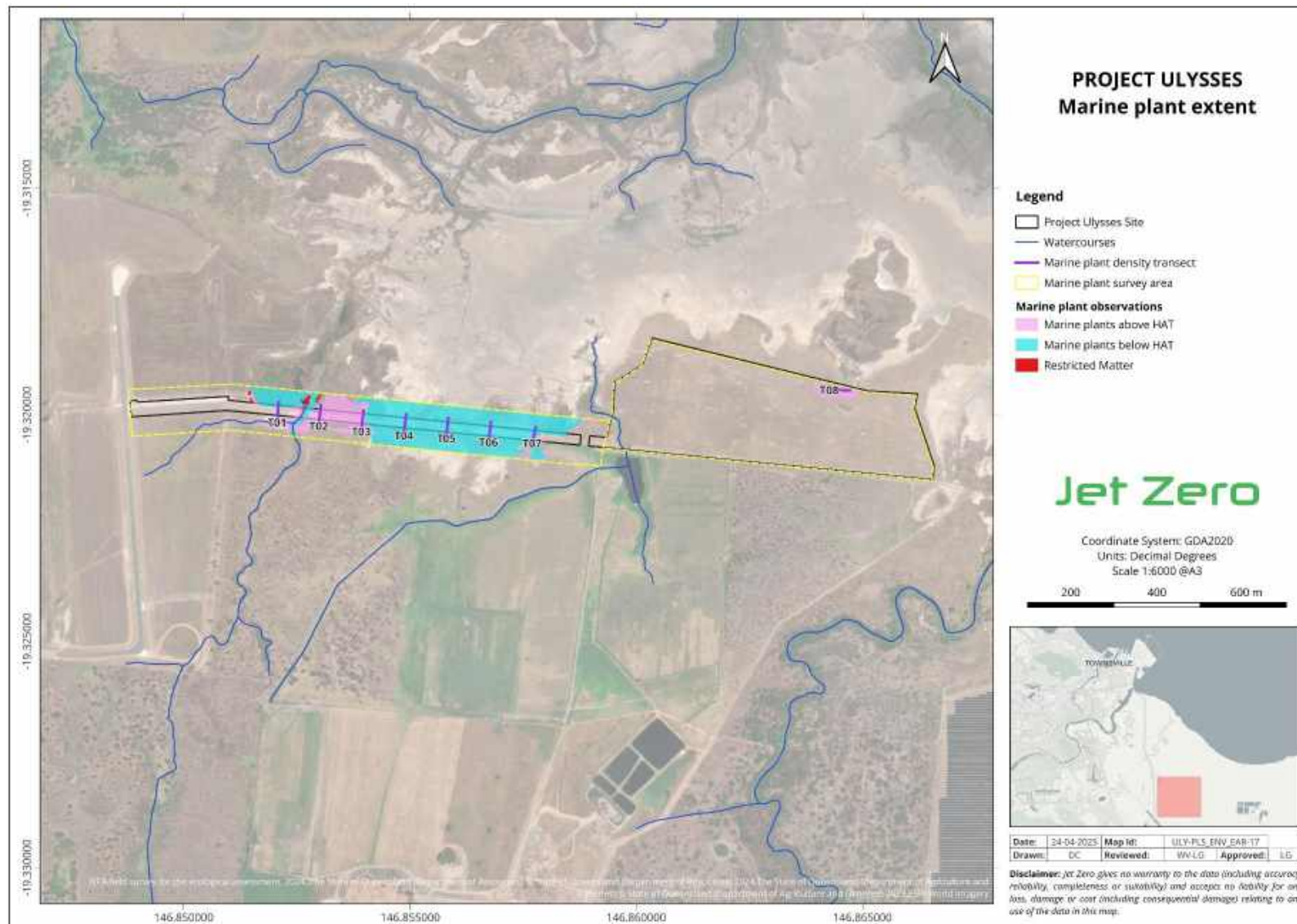
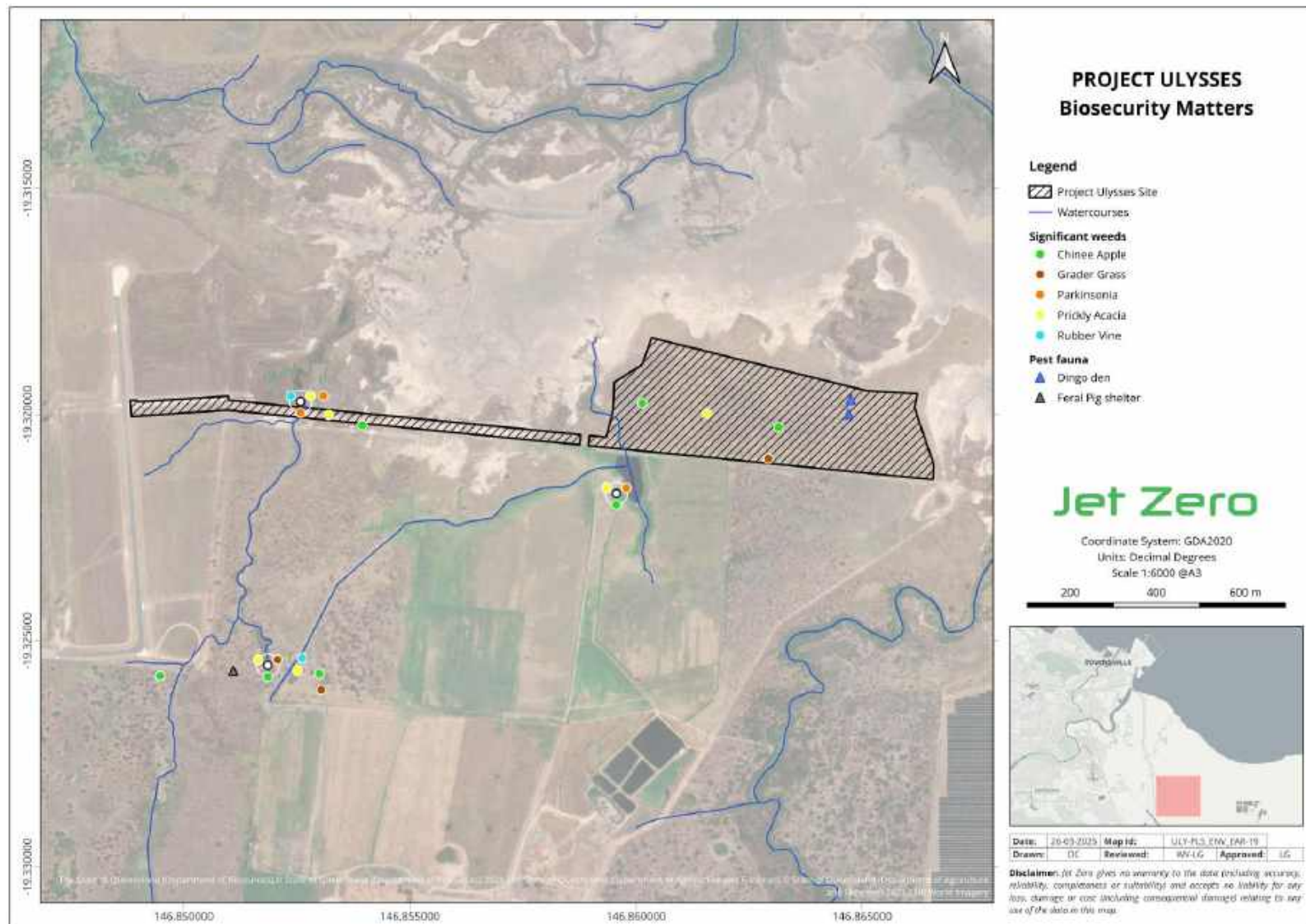


Figure 12: Biosecurity Matters



5.2. Potential Impacts of Construction to Environmentally Sensitive Areas

This section provides a discussion of the potential impacts to ecological values as a result of the construction of the Project site, and potential interactions with environmental values. NRA (2025) assessed the ecological values, with the impact assessment presented below.

The following Project-related threats to environmentally sensitive areas in the receiving environment were identified:

- Sensory disturbance to MSES
- Habitat loss and degradation.
- Direct mortality or harm to fauna.
- Altered hydrological regimes and potential impact to waterways providing fish habitat.
- Ingress and proliferation of biosecurity matters.

The potential impacts to ecology, including waterways supporting fish habitats, migratory shorebirds, and environmentally sensitive areas, are discussed individually in the assessment below.

5.2.1. Sensory Disturbance to MSES

Sensory disturbances such as noise, vibration, light, and odour, have the potential to affect various species. Sensory disturbances can result in reduced use, or complete avoidance, of affected areas by some species, or, in the case of artificial lighting at night, may attract and increase use of an area by some species. The reduced use or complete avoidance of affected areas can create movement barriers, or adverse effects to reproductive success, or increase stress, leading to increased predator-prey interactions (Gleeson and Gleeson, 2012). NRA (2025) identified that:

- Light pollution can alter the physiology and behaviour of many fauna species. With respect to behavioural changes, some species may avoid, while others may be attracted to (and benefit from), the artificially illuminated space. The physiological response of most Australian fauna to light pollution is poorly known. Nocturnal species are probably most sensitive, with impacts ranging from short-term (e.g. where lighting reduces the dark-adapted state of their sight) to longer-term and more complex changes (e.g. altered reproductive cycles). The influence of ambient light in the landscape from existing sources (e.g. Sun Metals refinery to the east and JBS Abattoir to the south) are relevant considerations.
- The threat of noise exposure varies according to species and noise characteristics. For susceptible fauna, anthropogenic noise may reduce their ability to hear predators (and alarm calls) and reduce their ability to communicate with members of the same species. These conditions can make individuals vulnerable to predation, increase their stress levels and reduce their fitness. Animals may either vacate an area or enter a state of vigilance in response to a disturbance source. Both responses reduce the time an animal devotes to life-sustaining behaviours such as feeding, resting and social interactions.

Light disturbances will result from most projects because facilities and other infrastructure must be lit at night to ensure minimum health and safety standards compliance. Interactions between nocturnal species, such as terrestrial invertebrates, birds and bats, and light disturbances are predicted to be most important at the perimeter of the footprint in the receiving environment where listed threatened and migratory species occur.

Likewise, the baseline noise measurements for the site are representative of a natural environment with low background levels. The highest levels of noise predicted to occur during construction will occur within, and immediately adjacent to, the actual footprint of the Project site, in a relatively undeveloped environment.

A ground vibration prediction during construction was calculated for the project site for the EAR. Based on experience from similar projects, ground-based vibration levels during construction are

predicted to be low/negligible. Ground vibration from heavy machinery during earthworks is not predicted to travel more than 100 m from the source (Chen et al., 2013).

Sky brightness is indicated in order of magnitude per square arc-second (i.e., the brightness in magnitudes is spread out over a square arcsecond of the sky), as indicated in **Table 10**, and shown in **Figure 13**.

Table 10: Sky Brightness and Visibility Conditions

Sky Brightness (mag/arcsec ²)	Sky Description	Visibility Conditions
17	Bright urban sky, severe light pollution	Few stars, planets visible, sky is washed out
18	Urban sky, only brightest stars visible	Only brightest stars and planets visible
19	Suburban sky, faint Milky Way, noticeable glow	Major constellations visible, but faint stars lost
20	Semi-rural sky, Milky Way visible but weak	Milky Way barely visible, moderate skyglow
21	Dark rural sky, Milky Way prominent	Milky Way easily visible, good for stargazing
22	Pristine dark sky, no visible light pollution	Perfect for astronomy, high contrast night sky

The project site is located at the edge of the greater Townsville area, where zenith sky brightness is approximately 20 mag/arcsec², indicating moderate light pollution. For reference, Townsville CBD has a zenith sky brightness of around 19 mag/arcsec², while truly dark skies (such as those in remote locations) are typically 21.5+ mag/arcsec².

Figure 13 presents an excerpt from the Lighting Pollution Map (2025), demonstrating the zenith sky brightness for 2015 within the project site and broader area, illustrating the existing lighting environment. Photos 01 to 04 in **Table 11** were taken from the project site perspective to present the existing environment, corroborating the lighting conditions as of 2015.

Figure 13: Zenith Sky Brightness Within Project Site and Surrounding Environment

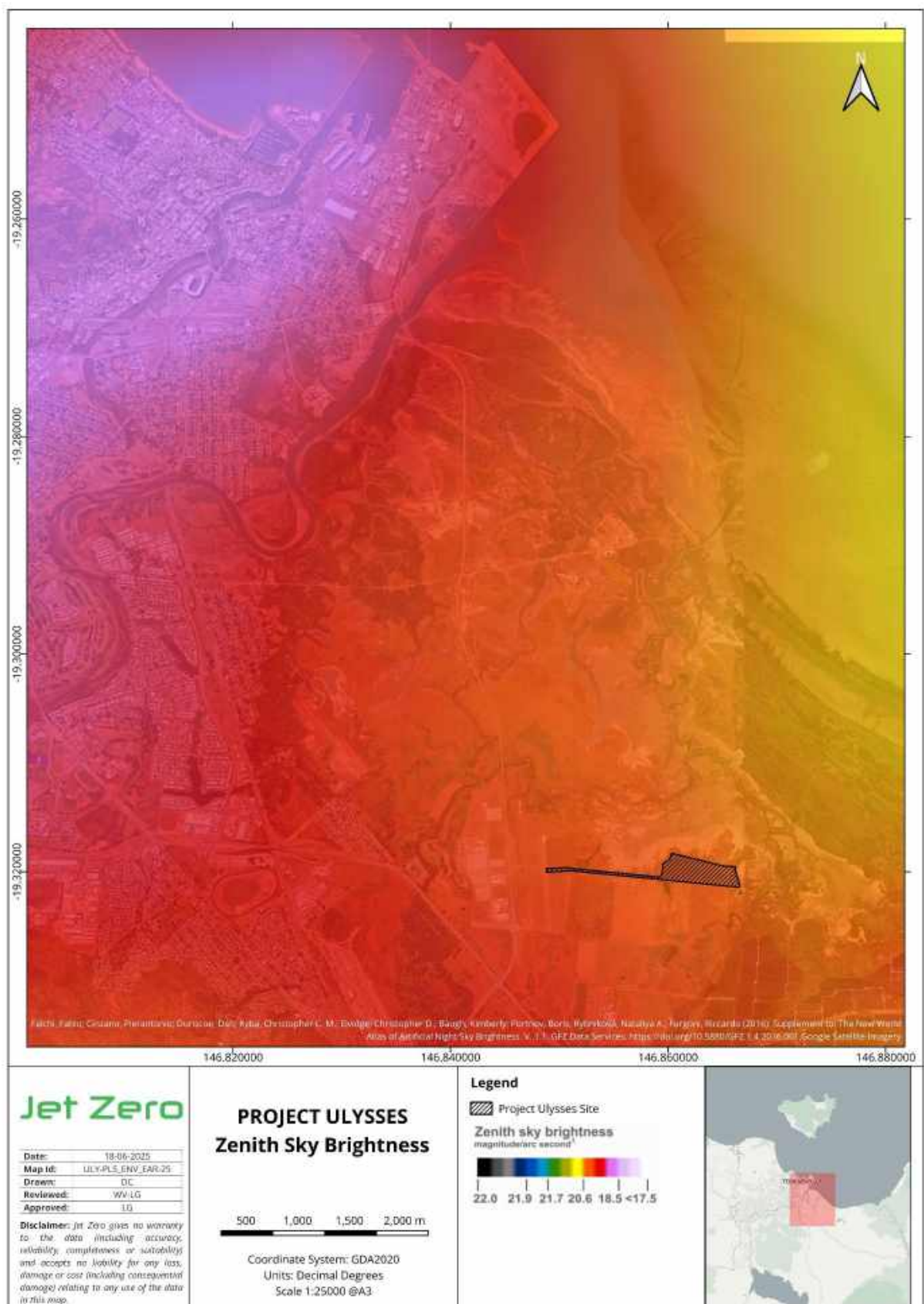


Table 11: Photos Taken During Lighting Assessment Within Project Site

	
Photo 01: Existing sky glow and direct light within Townsville CBD (facing North).	Photo 02: Existing sky glow and direct light within industrial facilities (facing West).
	
Photo 03: Existing sky glow and direct light within Sun Metals (facing South).	Photo 04: View during daylight to Sandfly Creek Reserve (facing North / NE).

Photos taken during site visit (both day and night on September 18, 2024) corroborate with the existing environment as of 2015 (Zenith sky brightness). At nighttime, the sky glow and direct light are noticeable originating in the Townsville CBD from diverse uncontrolled light sources, from north of the site. Light spill spreads over the horizon and gradually decreases towards the site.

Light spill from the west is lower than from the north, particularly sky glow, and it originates from scattered light sources from the industrial facilities. Down south, direct light is stronger than on the west side and originates from a very localised and compact area belonging to Sun Metals. It significantly increases the sky glow on this side. Light spill from the southeast is the lowest from all sides and originates at Sun Metals.

The visual light sensitivity of the receiving environment is considered low to ecologically sensitive receptors.

Air emissions and dust created from construction activities can affect habitat quantity and quality. Air emissions and dust sources include site clearing, preparation, and vehicle traffic. Dust deposition on vegetation, or in water, can reduce the quality of habitat, plant photosynthetic capacity, and food source availability and, in some cases, may degrade it to a point where the vegetation is no longer used as habitat by dependent species (Gleeson and Gleeson, 2012).

Although the Project site is surrounded by ecologically sensitive areas, direct impacts to flora and fauna (for closer receptors) are not expected to cause lasting harm and only short-term disturbance, as activities will be temporary. Indirect impacts (for farther) receptors are not expected to reach these areas due to their significant distance (> 2.5 km) and the nature of the construction activities of the Project.

5.2.1.1. Practices Applicable to Sensory Disturbance and Air Quality

The following practices were suggested by NRA (2025) and will be implemented to control potential light, noise and vibration pollution in relation to ecological values:

- Is in accordance with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023).
- Makes buildings visible; however, lighting that reflects on shiny surfaces should be avoided as this may attract or disorientate fauna and lead to injury or death (building strike).
- Minimises light proliferation into the surrounding environment.
- Achieve the acoustic objectives of the *Queensland Environmental Protection (Noise) Policy 2008*.
- Ensure plant and equipment are adequately maintained and serviced according to specifications.

The following practices were suggested by NRA (2025) and will be implemented to control potential air pollution in relation to ecological values:

- Apply water to exposed earth, including unsealed access, during construction.
- Achieve the air quality objectives of the Environmental Protection Policy (*EPP (Air) 2008*).
- Ensure equipment is appropriately maintained and serviced according to specifications.
- Ensure facility site and roads used for site access and egress are sealed and maintained.
- Obtain specialist advice at the design phase to ensure generation of nitrous oxide due to combustion of hydrogen is avoided or appropriately mitigated.

5.2.2. Habitat Loss or Degradation

During the construction phase, object strikes during vehicle operation and movements can cause direct mortality or harm to fauna. However, as most habitats in the Project area are non-remnant and of low value to fauna, the likelihood of mortality due to vehicle strikes is low (NRA, 2025).

Habitat loss and/or degradation can occur as a direct consequence of vegetation clearing and earthworks, and as an indirect consequence of accelerated erosion, pollution, wildfire, biosecurity incursions, fugitive dust and habitat fragmentation (caused by physical breaks in habitat continuity or fauna avoidance of areas due to human activity). Loss of core habitat poses the greatest direct threat to environmentally sensitive areas and their associated species.

Vegetation within the Project site and road access has now been cleared as part of the Operational Work (OPW24/0107) permit obtained by Cleveland Bay Industrial Park (CBIP).

As observed by NRA (2025), habitat loss/degradation has primarily occurred along the margins of remnant habitat that is generally in poor condition and mapped as auxiliary for some MSES. Core habitat will not be impacted. There will be no further direct habitat loss or degradation due to the Project; therefore is not a direct threat.

5.2.2.1. Practices Applicable to Habitat Loss or Degradation

The following practices suggested by NRA (2025), relevant to fauna and flora, will be implemented:

- Ensure further construction works needing any clearing of vegetation regrowth and disturbance are contained within the Project site. Ensure relevant statutory approvals are in place prior to any clearing.
- Place food waste into lined bins and cover to prevent attracting fauna to the site.

- The clearing of vegetation within 100 m of mapped HES wetland, regulated vegetation that is MSES and of remnant habitats are not predicted to occur.

5.2.3. Direct Mortality or Harm to Fauna

Vegetation clearing, excavation works or machinery or object strikes during vehicle operation and movements during construction can cause direct mortality or harm to fauna. Construction is likely to have an increased movement of vehicles and machinery at the plant site, compared to operations.

The traffic movements on site will increase during construction with heavy and light vehicle traffic to and from the site, causing some disturbance. Vehicle movements may cause temporary noise disturbance to fauna located near the site.

As observed by NRA (2025), most habitats in the project site area are non-remnant and of low value to fauna. The likelihood of mortality to fauna during vegetation clearing or due to vehicle strike is low.

During construction, the development is expected to generate up to 60 am peak-hour trips and up to 56 pm peak trips in the Road Network surrounding the Project site as a reason for Staff Related Vehicle Movements primarily, followed by Servicing / Delivery Vehicle Movements. At this stage, traffic distribution will be primarily directed south of Ron Mclean Drive (60 %) towards roads with direct access to nearby communities and roads, and the rest (40 %) to the north.

The traffic analysis showed that the Degree of Saturation (DOS) for Intersection 1 during construction during am and pm peak hours ranges from 0.22 to 0.28, well below the typically adopted operational threshold for a signalised intersection ($DOS < 0.9$). For Intersection 2, DOS ranges from 0.40 to 0.58, below the < 0.9 threshold. These results mean that the intersections are functioning at an acceptable level of service, with less than 90 % of their capacity being used. Therefore, the impact is expected to be low before the implementation of mitigation measures.

5.2.3.1. Practices Applicable to Direct Mortality or Harm to Fauna

The following practices suggested by NRA (2025), relevant to fauna, will be implemented:

- Enforce speed limits along the access road and plant site.
- Workforce training regarding the safe operation of a vehicle to avoid harm to fauna.
- Avoid interference/handling of native fauna. If an injured animal is found, a licenced wildlife carer should be contacted and the injured animal taken into care.

5.2.4. Altered Hydrological Regimes and Potential Impact to Waterways Providing for Fish Habitat

As observed by NRA (2025), the construction of physical structures (e.g. roads, hardstand areas) may alter (block, restrict and/or concentrate) the flow of water across the land and in waterways. These changes may impact the biota reliant on the pre-impact hydrological regimes and increase the possibility of secondary impact (e.g. accelerated erosion causing soil loss/degradation and sedimentation). Habitats in the project receiving environment occur in an interface zone between fresh and estuarine conditions.

These habitats are sensitive to changes in hydrological regimes. Water flow regimes in waterways directly influence the plant and animal assemblages that use an area (e.g. fish passage).

The Order 1 watercourse that intercepts the project site (**Figure 14**), mapped as of moderate risk is unlikely to provide fish passage due to the artificial stock dam preventing connectivity to the watercourse. As observed by Terra Solutions (2023), immediately upstream of the development footprint [access road], fish passage is inhibited by a small dam and therefore, the proposed driveway is unlikely to interrupt fish passage. This watercourse terminates a short distance downstream of the Project Area where the channel disappears onto the salt flat. This watercourse lacks significant fish

habitat and whilst it generally meets the criteria of a waterway there is no upstream connectivity due to the upstream dam wall.

The Project is on the periphery of the Burdekin–Townsville Coastal Aggregation Nationally Important Wetland (DCCEEW, 2019). The declared FHA is in the distal receiving environment, where no works are planned.

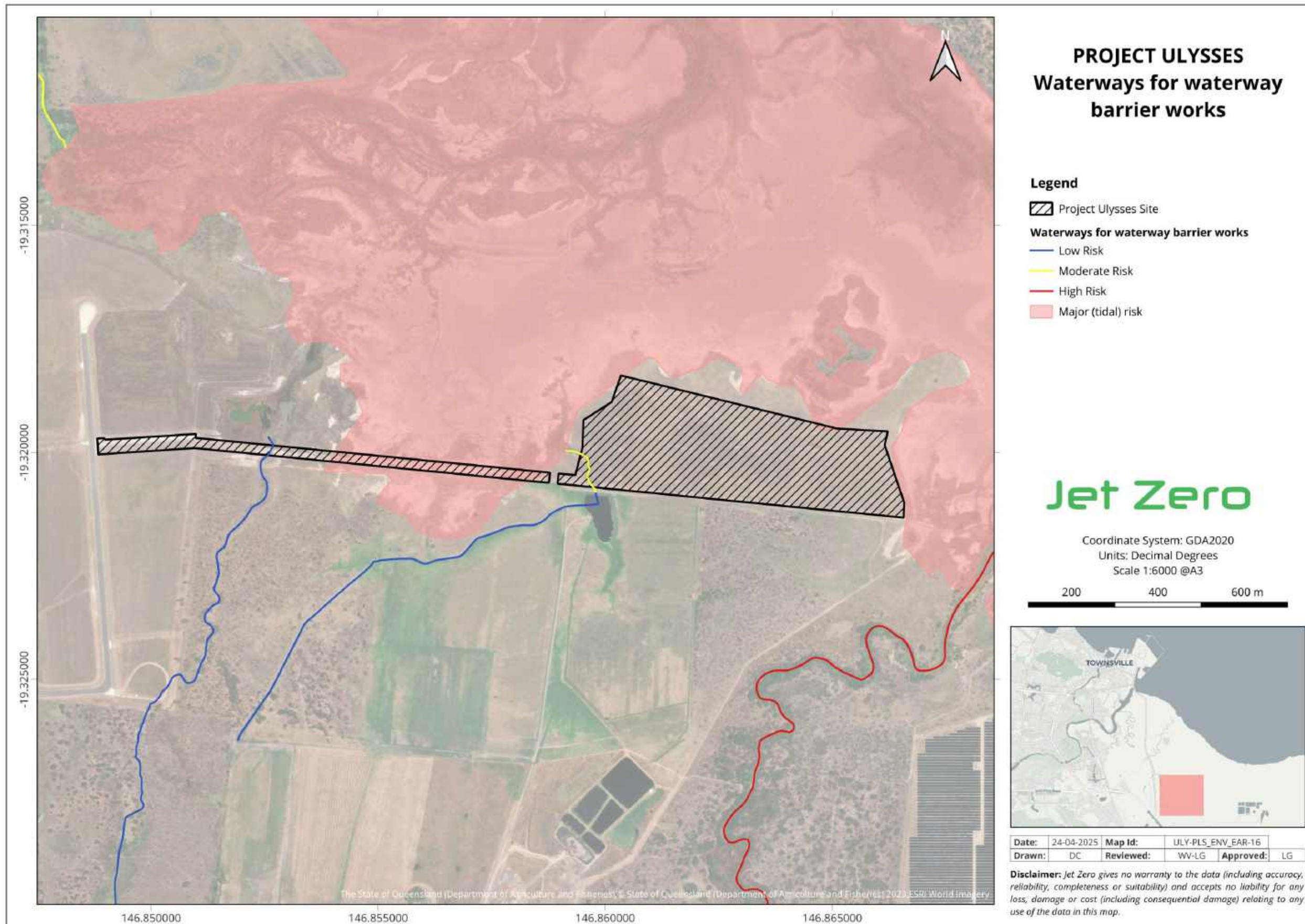
Sedimentation, contamination or litter can result in reduced quality of the receiving water. Contamination may occur when chemicals or hydrocarbons are released into the environment; sources may include spills, machinery/equipment failure, or vehicle collisions. It may also occur via the exposure (e.g. during ground disturbance or due to erosion) of Acid Sulfate Soils (ASS) or contaminants associated with prior land use. Sedimentation may occur when land surface disturbance and/or the concentration of water flows cause accelerated erosion. Contamination can also occur when appropriate waste management practices are not implemented (NRA, 2025).

5.2.4.1. Practices Applicable to Altered Waterways and Soil Management

The following practices were suggested by NRA (2025) and will be implemented to control water and soil potential harm to ecological values:

- During construction, ensure surface runoff management measures include:
 - Timing of construction to avoid wet season rainfall, if possible
 - Limiting the extent and duration of exposed soils within the construction area. Where rainfall events of >20 mm are forecast, cover stockpiles with tarps/plastic to minimise infiltration and runoff
 - Appropriate disposal of trade waste (and wastewater) generated during construction
 - Use of bunds or spoon drains to direct surface water sheet flow away from construction areas and stockpiles.
 - Undertake waterway barrier works (where required) in accordance with accepted development requirements (DAF, 2023). Works not able to comply with DAF (2023) will require statutory approval before proceeding.
 - Manage runoff to minimise the release of pollutants to waterways and achieve relevant State policy water quality objectives (*EPP (Water and Wetland Biodiversity) 2019*).
- During construction ensure soil management measures include:
 - Ensure studies are conducted prior to undertaking earthworks. These studies should consider salinity and acid sulfate soils. Should investigations reveal the presence (or potential presence) of acid sulfate soils, preparation of an Acid Sulfate Soils Management Plan within the CEMP will be required. Disturbance of acid sulfate soils should be avoided or managed to minimise the mobilisation and release of acid and metal contaminants.
 - Ensure erosion and sediment control measures are identified in Erosion and Sediment Control Plans (separate plans for construction, operation and decommissioning), and implemented. The measures should be prepared in accordance with IECA (2008).
 - Prepare a Rehabilitation Plan for the decommissioning phase.
 - Ensure tidal work is designed and located in accordance with the *Guideline: Building and engineering standards for tidal works, Department of Environment and Heritage Protection, 2017*.

Figure 14: Waterways for Waterway Barrier Works



5.2.5. Ingress and Proliferation of Biosecurity Matters

The presence of waste may attract pest fauna species. Invasive and pest species can rapidly establish in disturbed areas, posing a threat to native flora and fauna by competing for resources and disrupting ecosystems.

Vegetation clearing has the potential to introduce or spread species through the mobilisation of equipment, which has not been properly cleaned, and by creating soil disturbance, including:

- Reduction in extent of habitat for threatened fauna species.
- Fragmentation of habitats, and reduction of connectivity in remnant vegetation patches.
- Reduction in habitat quality associated with impacts from dust, erosion, changes to habitat suitability and quality, etc.
- Direct mortality of threatened fauna and flora.

Introduction or proliferation of biosecurity items (weeds, pest fauna and pathogens) can cause habitat degradation and/or directly impact the health of biota (e.g. pathogens reducing animal or plant health, or tramp ants harming fauna) (NRA, 2025).

Weeds can impact vegetation communities directly via competitive displacement and indirectly via alteration of ecological processes (e.g. changing fire and hydrological regimes). The project site and broader area contain significant weeds species listed as Restricted Matter under the *Queensland Biosecurity Act 2014*:

- Rubber Vine (*Cryptostegia grandiflora*)
- Chinee Apple (*Ziziphus mauritiana*)
- Grader Grass (*Themeda quadrivalvis*)
- Parkinsonia (*Parkinsonia aculeata*)
- Prickly Acacia (*Acacia nilotica*).

With respect to pest fauna, tramp ants pose the greatest risk. Tramp ants are present in the region and are readily transported between locations on equipment, machinery and building supplies. The risks posed by pathogens are more difficult to assess due to the complex manifestation of their impacts, and a paucity of information; however, pathogens are a known threat to aquatic and terrestrial systems and could be transported to the project receiving environment on equipment, machinery and building supplies.

The spread and proliferation of weeds and pest species are more likely during construction due to vegetation clearing, soil exposure and disturbance if not properly managed. During operations, appropriate controls should be implemented to prevent the ingress of biosecurity risks, including pest fauna, from the surrounding environment to the Project site. Measures to reduce or prevent the proliferation of these species should also be maintained.

The shipping movements of modules and plant equipment that has been shipped from a port outside of Australia will be subject to the *Biosecurity Act 2015* (Biosecurity Act) (Commonwealth), and the Australian Government's Biosecurity import conditions database (BICON), administered by the Department of Agriculture, Fisheries and Forestry. The EPC Contractor will be responsible for identifying the potential biosecurity risks of the goods and cargo being transported to Townsville, in consultation with the PoTL, while assessing the high-risk pathways such as Country Action List (CAL).

5.2.5.1. Practices Applicable to Biosecurity

The following practices were suggested by NRA (2025) and will be implemented to control biosecurity matters in relation to ecological values:

- Undertake works in accordance with the General Biosecurity Obligation under the Biosecurity Act and *Queensland Biosecurity Regulation 2016*.

- Ensure equipment and vehicles are washed down and inspected to be free of weed, seed, soil, pests and pathogens prior to being brought to site.

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