Jet Zero

RESPONSE TO COORDINATOR-GENERAL REQUEST FOR ADDITIONAL INFORMATION

PROJECT ULYSSES
RFI NUMBER: OUT25/61522

Role	Name	Date	Document Control Only
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TQ/RFI number:	OUT25/6152	**Project title:**	Project Ulysses
Requestor	Cameron McLeod, OCG	**Response by:**	Jet Zero – Approvals
Date of request:	9/12/2025	**Date of response:**	27/03/2026

1. DESCRIPTION OF TECHNICAL QUERY / INFORMATION REQUEST

Jet Zero Australia Pty Ltd has lodged a development application for Material Change of Use – Special Industry (Sustainable aviation fuel) within the Townsville State Development Area (Townsville SDA). The application is currently under assessment by the Coordinator General in accordance with the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

On 9 December 2025, the Coordinator-General issued a request for further information (reference OUT25/6152), seeking clarification and additional technical detail to support the comprehensive assessment of the proposed development (refer **Appendix A**). The requested items are summarised and addressed in the table below.

2. RESPONSE TO COORDINATOR-GENERAL REQUEST FOR ADDITIONAL INFORMATION

The following section provides Jet Zero's formal response to the requested information. Each item has been addressed with the aim of providing the necessary technical clarification to inform the ongoing assessment of the application and is provided as the Applicant's full response.

In preparing this response, Jet Zero has engaged with the Office of the Coordinator-General, including a formal meeting held on 15 December 2025 and subsequent discussions to confirm the intent and scope of items raised. These discussions have informed and guided the responses provided in this document, and accordingly all matters raised are considered to be appropriately addressed through the supporting material enclosed.

Hazardous Substances

Item 1 – State Code 21 – flood risk

In accordance with section 2.5.9 of the Townsville State Development Area (SDA) Development Scheme (SDA wide assessment criteria), development is required to demonstrate consistency with all relevant legislative requirements for the development to proceed and operate. It is necessary to confirm consistency with State Code 21 requirements with regard to flood risk, particularly as it is noted that that within the Flood Impact Assessment, report reference MJ2601-FIA, revision B, prepared by Northern Consulting Engineers (NCE), dated 25 March 2025 (FIA) the "exposed site" defined storm tide level of 4.5m AHD appears to be above most of the site finished ground level of 4.0m to 4.6m.

The proponent is requested to:

1. Provide a detailed response to State Code 21 PO10 for flood risk, including, but not limited to, how hazardous chemical storage, and critical systems relating to their safe storage, are affected and/or protected from storm tide inundation. The response should consider to the following:

a) How the statements from the FIA (pages 23 and 24) relate to the requirements specified in section 3.7.2.1 of State Code 21 (https://www.worksafe.qld.gov.au/data/assets/pdf_file/0021/19452/planning-guide-state-code-21.pdf):

i. Whilst the planning scheme does not nominate freeboard above flood levels in industrial areas, consideration should be given to any critical infrastructure and hazardous storages areas to be located at a suitable freeboard above the nominated event in accordance with SC6.7 flood hazard and / or above the natural ground level. NCE recommend a minimum freeboard of 300mm (above the relevant flood level and above the natural ground level).

ii. Additionally, whilst the development is well outside the 100m setback from the shoreline

mapped as part of the TCC coastal hazard overlay, the site is in the vicinity of relatively open tidal salt flats at a low level and as such is relatively exposed to storm surge and coastal wave runup actions. Therefore, consideration should be given to locating any regional fuel storage facilities or other sensitive elements of the development at the higher, exposed site defined storm tide event level of 4.5m AHD.

In response to Item 1, Jet Zero cofirms at this stage of project development, detailed design has not been undertaken. The current planning assessment is based on early Front-End Engineering (FEED) level plans and supported by environmental studies and reporting. Notwithstanding, the project has been scoped and sited to ensure that storm tide resilience, including the safe storage of hazardous chemicals and protection of critical systems, can achieve compliance with the nominated benchmarks of State Code 21.

The Flood Impact Assessment (FIA) identifies a design storm tide level of 4.5 m AHD, derived in accordance with State Code 21, which reflects an exposed coastal context. The majority of the developable area of the site has been filled to between 4.0m and 5.0m AHD. While some peripheral areas will sit below the nominated design level, key infrastructure (including hazardous chemical storage) will be designed and located in a manner that ensures protection against storm tide inundation.

Accordingly, Jet Zero confirms that hazardous chemical storage areas will be designed and constructed to achieve compliance with PO10. In particular, detail design will incorporate:

- Elevation of storage tanks and vessels above 4.5m AHD.
- Secondary containment, such as bunding, in accrodance with Australian Standards and State Code 21.
- Flood and inundation-resilient design features for any storage infrastructure situated below 4.5m AHD, including impermeable bunds and overtopping protection.

Additionally, critical operational infrastructure will be located above the flood and storm tide design level or enclosed within flood-resiliant structures designed to withstand inundation.

Item 2 – State Code 21 – bushfire risk

In accordance with section 2.5.9 of the Townsville SDA Development Scheme (SDA wide assessment criteria), development is required to demonstrate consistency with all relevant legislative requirements for the development to proceed and operate. It is necessary to confirm consistency with State Code 21 requirements with regard to bushfire risk. Consideration of bushfire hazard in the Planning Report (reference 28011007-HSE-REP-00007, revision 0, dated 17 June 2025, Section 9.6) is generic for an industrial use and does not consider additional risks/hazards relating to the storage and processing of large quantities of flammable liquids.

While the development site itself may be cleared of vegetation and bushfire risk, the land immediately south will remain vegetated and will therefore be a bushfire risk to the facility, particularly the risk of flying embers igniting storage tanks or a bushfire emergency requiring site evacuation.

The proponent is requested to:

1. Provide a detailed response to State Code 21 PO10 for bushfire risk, including, but not limited to, how hazardous chemical storage, and critical systems relating to their safe storage, are affected and/or protected from bushfire risk. The response must address the bushfire risk to the facility from the vegetated land immediately south of the facility site, particularly the risk of flying embers igniting storage tanks or a bushfire emergency requiring site evacuation.

In response to Item 2, Jet Zero cofirms at this stage of project development, detailed design has not been undertaken. The current planning assessment is based on early-FEED level plans and supported by environmental studies and reporting. Notwithstanding, the Project has been scoped and sited to ensure that bushfire risk, including the safe storage of hazardous chemicals and protection of critical systems, can achieve compliance with the nominated benchmarks of State Code 21 PO10 for bushfire risk.

During detailed engineering design, Jet Zero and the EPC contractor will conduct risk assessments, Hazard Identification (HAZID) and Hazard and Operability Studies (HAZOP) workshops, and a Quantitative Risk Assessments (QRA), as part of the Project Safety Case. Bushfire and hazardous chemical storage risk will be

considered as part of these assessments, with the mitigation controls and emergency response planning to comply with State Code 21 being part of the scope of work. Outputs will contribute to the detailed design to manage the bushfire risk in accordance with provisions of State Code 21, including the Safety Management System (SMS), Safety Case, Emergency Response Plan (ERP), and Safety Management Plan (SMP).

Item 3 – Schedule 15 Chemicals

In accordance with section 2.5.9 of the Townsville SDA Development Scheme (SDA wide assessment criteria), development is required to demonstrate consistency with all relevant legislative requirements for the development to proceed and operate. It is necessary to accurately disclose the quantity of Work Health and Safety Regulation 2011, Schedule 15 Chemicals to determine if the major hazard threshold has been exceeded.

In addition to the Chemical Storage Plan, Technical Reference Document 2811007-PI-PLA-00001_0, prepared by Jet Zero, dated 15 October 2024 (CSP), Table 1 below, provides a list of other possible Schedule 15 Chemicals that may not have been disclosed because storage/operation at high temperatures means they meet the criteria of Schedule 15 categories with lower thresholds than the same liquids at ambient temperature or contain light ends making them category 1 flammable liquids.

Table 1: Quantities of additional Schedule 15 chemicals indicated to be on the facility site, in process equipment.

Description	Temperature ºC	Volume, m³
Ethanol Pre Treatment Column Reboiler C-1100 (vapour) and Pre Treatment Column Condenser HE-1110	74	162
Ethanol Pre Treatment Column Reboiler C-1100 bottom and Side Draw Condenser HE-1103 including Pre Treatment Column Base Bleed Pump P 1120A/B	100	3.7
Pre Treatment Side Draw Condenser and Drum, HE 1130 and V-1131	95	2.2
Pre Treatment Column Base Pump P-1132A/B and Cation Guard Bed Package Z-1150	72	19.5
Vaporiser Feed Drum V-1250 (Vapour) and Feed Vaporiser HE-1251 (shell side) to HE 1330	153	22.9
Vaporiser Feed Drum V-1250 (liquid side)	114	4.2
Reactor 1 R-1260	216	51.5
Reactor R 1270/80/90/1300/1310/1320	241	16
Reactor Product Separator V-1332 (vapour)	135	8.1
OLIG 1 Reactors R-2130A/B to HE-2100, HE-2200 to V 2210 inlet	145	66.4
OLIG 2 Reactors R-2350A/B	205	24.5
Stabiliser Column C-2400 (vap) and Overhead Cooler HE-2411 (shell side)	250	36
Hydrogenation Reactor R 2460	149	22
Hydrogenation HP Separator V-2470 (liquid) and R-2460 outlet line	149	14.9
Fractionator C-2600, Side Draw pump P-2711A/B, Cooler HE-2710 to Jet storage	99	46.4
V-6100 Olefins Processing Vessels (NNF)	6	909

The proponent is requested to:

1. Include in the list of Schedule 15 Chemicals contained within the CSP:
   a) Quantities of *liquids that meet the criteria for class 3 packing group I materials* – these may be present in process vessels such as fractionators, reactors, overheads drums and condensers.
   b) Quantities of *liquids with flash points <61°C kept above their boiling points at ambient conditions [use initial boiling point for mixtures]* - these may be present in process vessels such as fractionators, reactors, overheads drums and condensers.
   c) Quantities of catalysts and reagents that may be toxic according to Schedule 15.1, Table 15.3 – for example some vanadium-based catalysts.

d) All quantities in tonnes, based on the normal liquid operating levels in process vessels and H alarm level for storage tanks.

2. Provide mass balance or material flow diagrams or process flow diagrams or any other document(s) that provide material stream properties including initial boiling point, flash point, vapour pressure, density, composition, temperature, pressure.
3. Provide process area general arrangement drawings showing major plant and vessels and any other documents listing the liquid volumes contained.

In response to Item 3, Jet Zero confirms that the identification and disclosure of Schedule 15 chemicals provided to date has been undertaken based on the Pre-FEED engineering design. The Fire and Explosion Risk Assessment (Appendix M of the application package) include a conservative identification of hazardous substances and indicative inventories consistent with early design development. The quantities disclosed are derived from the Fire and Explosion Risk Assessment submitted with the development application and represent the best available information at this stage of Project definition and is currently being assessed and will be updated during FEED (current engineering design phase).

A Chemical Storage Plan (CSP) has also been provided with the application (Appendix N of the application package), which identifies the indicative locations and general categories of hazardous chemicals proposed to be stored and handled on site. At this stage, the CSP and supporting Schedule 15 disclosures are necessarily indicative, as detailed process design, final equipment sizing and operating inventories have not yet been finalised.

Jet Zero acknowledges that, during detail engineering design, further refinement will be required to confirm the final classification, quantities and characteristics of Schedule 15 chemicals. These matters will be assessed and designed as part of the Project Safety Case during the detailed design phase, including through HAZID, HAZOP workshops, QRA processes, firefighting systems design, EMP and SMP. The outcomes of these assessments will inform the final CSP, mass balance and process flow documentation.

In addition, Jet Zero notes that an Environmental Authority (EA) for the Project was approved under section 172(2)(a) of the *Environmental Protection Act 1994* on 19 December 2025 (EA No. P-EA-100896474). The approved EA authorises the chemical manufacturing activity (ERA 7) associated with the Project and includes conditions relating to the storage, handling and containment of chemicals, including requirements for secondary containment and implementation of environmental risk management procedures.

It is considered a reasonable and relevant condition of approval can be implemented to provide a CSP with exact quantities, toxicity, mass balance, and documentation of the chemicals and liquids that will be stored on site, prior to commencement of site works.

Traffic and transport operations

Item 4 – Route assessment

A route assessment was not included as part of the SDA application. A route assessment is required to demonstrate that the haulage of modular units and construction materials during the construction stage can be undertaken safely, without adversely affecting the state-controlled road network, and that all movements can comply with dimension, load, safety and operating requirements. This is considered a relevant matter for consideration in the SDA application in accordance with section 2.5.6 (transport) and section 2.5.9 (other government matters) of the Townsville SDA Development Scheme.

It is acknowledged that Jet Zero has previously provided a route assessment to the Department of Transport and Main Roads (TMR) for review outside of the SDA application assessment process. However, confirmation is required that the route assessment previously submitted to TMR forms part of the SDA application, represents the final haulage methodology, and remains accurate.

The proponent is requested to:

1. Provide TMR with confirmation that the previously submitted route assessment represents the final haulage methodology and remains accurate for the current development proposal (include confirmation of the version of the report that is being referenced).

Alternatively, the proponent is requested to:

2. Provide an updated route assessment, prepared by a suitably qualified Registered Professional Engineer of Queensland (RPEQ) traffic engineer that includes at a minimum:

a) Confirmation of the intended haulage route for oversized over mass load (OSOM) movements to and from the subject site.
b) The expected vehicle and component combinations, sizes, masses, and configurations required to access the subject site via the State-controlled Road network.
c) Confirmation of the number of expected OSOM movements required to access the subject site via the State-controlled Road network.
d) The expected haulage timeframes and commencement periods.
e) A swept path analysis of the haulage route to confirm that OSOM components can be safely transported to and from the subject site without impacting upon users of the State transport network.
f) Appropriate mitigation measures and/or road upgrades (where required) to safely and efficiently transport OSOM components to the subject site.
g) Proposed layover areas, stopping bays, and passing opportunities to be relied upon by the project.

In response to Item 4, Jet Zero acknowledges the requirement to demonstrate that the haulage of oversized over mass (OSOM) components during the construction phase can be undertaken safely and without unacceptable impacts on the State-controlled road network.

The final route assessment and haulage methodology cannot be conclusively determined at this stage of the Project, as the detailed size, weight and configuration of modular components will not be finalised until completion of the FEED phase. The current application is supported by early engineering and concept-level information, which does not provide sufficient certainty to define a final haulage methodology or to undertake detailed structural and swept-path assessments.

Following direct feedback and discussion with Department of Transport and Main Roads (DTMR), a comprehensive Module Transport Assessment (MTA) has been scoped, with AECOM engaged to commence this work in February 2026. The MTA will be undertaken in a staged manner and will include detailed assessment of the proposed haulage route from the Port of Townsville to the subject site. This will include consideration of OSOM movements, swept path analysis, traffic and safety impacts and identification of any required mitigation measures or operational constraints.

The initial phases of the MTA will focus on a structural and geotechnical assessment of the Ross River Bridge, which represents a key constraint along the proposed route. This assessment will determine the maximum gross vehicle mass (GVM) that the bridge can safely support, having regard to its current condition, deterioration profile, and structural and geotechnical capacity. The assessment will also evaluate feasible Self-Propelled Modular Transporter (SPMT) configurations, including the number of axle lines, spacing, overall length and load distribution, and whether loads must be distributed across multiple girders, piers or spans to remain within allowable limits.

Preliminary advice from AECOM indicates that the self-weight of the SPMT is expected to represent approximately 30% of the GVM. As a result, the assessment will refine SPMT geometry and configuration, determine a feasible overall GVM and allocate the remaining allowable load to the transported modules. Additionally, the assessment will identify any bridge strengthening works, temporary works or operational constraints that may be necessary to support the proposed transport movements.

The deliverables of this phase of the MTA are expected to include a Geometry and Condition Assessment Report, Structural and Geotechnical Assessment Report, Iterative Load Distribution and Maximum GVM Determination Report, and Strengthening/Temporary Works Options Report.

The MTA will also confirm the haulage route. At this stage, the only feasible route for SPMT delivery of modules to the subject site is via the Port of Townsville, across the Ross River Bridge and south on Ron McLean Drive.

The MTA will be prepared by suitably qualified engineers and will be developed in consultation with the Department of Transport and Main Roads (DTMR). The final route assessment and haulage methodology will

be agreed with DTMR prior to construction and will form the basis for all OSOM transport approvals required under the Heavy Vehicle National Law and associated legislation.

Given the current level of project design, the detailed route assessment and final haulage methodology cannot yet be conclusively defined and are not necessary for determination of the MCU application. It is considered reasonable and appropriate that the requirement to submit a final route assessment and haulage methodology be secured via a condition of development approval, with the assessment to be provided following completion of FEED and prior to commencement of construction.

Item 5 – Structural impacts to State Transport Infrastructure

In accordance with section 2.5.6 (transport) and section 2.5.9 (other government matters) of the Townsville SDA Development Scheme, it is necessary to ensure the plant components can physically arrive at the Port of Townsville and travel from the port to the development site during the construction stage. TMR has concerns that structures along this route are likely to be impacted by the proposed OSOM. Specifically, the proposed transport route for the heavy components will require the crossing of several of TMR's road structures, which are likely to be impacted by the substantial weight should these components not be further broken down.

To date TMR has received and reviewed the following documentation outside of the SDA application:

a) Desktop route assessment: The route assessed bypasses Ross River Bridge – barging onto the southern side of the bridge to Southern Port Road. The report indicates that two power lines will need to be buried. There are 9 culverts, and 3 bridges identified - which require structural assessment. One bridge – a fourth, is not listed in the route summary and will also need to be assessed.

b) Ross River girder analysis (AECOM): Noting this bridge was not part of the abovementioned route desktop assessment, the report indicates that a self-propelled modular transporter (SPMT) load of 1750 tonnes might be feasible and further structural, geometric, geotechnical assessment would be required.

To ensure transport of the OSOM plant equipment across the State-controlled road network does not create unacceptable structural risks or adverse structural impacts to TMR's transport infrastructure, a revised proposal and additional analysis is required to be provided for review. This must include a risk-managed approach that aligns with the recognised hierarchy of controls, being i) Elimination, ii) Elimination/Substitution, iii) Engineering controls. The proponent must demonstrate that the highest order controls (as outlined below) have been thoroughly evaluated and, where reasonable and practicable, adopted.

The proponent is requested to:

1. Provide the following information detailing the arrival of the plant equipment into the Port of Townsville, with all engineering components having appropriate RPEQ certification:
    a) Type of vessel ('mother ship') bringing the cargo.
    b) Maximum weight of the largest unit if discharging by ship's gear.
    c) Specifications of the barges (length, beam, draft, including module) if the float is on or float off.
    d) Proposed transfer point (ramp) offloading facility at the port if the float is off.
    e) Depth required to submerge and float off the barge(s).
    f) If considering an alternative offloading facility:
        i. Location of the facility.
        ii. Access channel survey results.
        iii. Specifications of barges and prime mover ('tug').
        iv. Simulations for access channel and vessel size/channel width.

2. Provide a revised proposal for transporting the plant equipment to the site during the construction stage, with all engineering components having appropriate RPEQ certification, specifically addressing:
    a) Consideration of on-site construction/assembly to reduce the requirement for OSOM movements of large components (Elimination).
    b) Reduction to the smallest practicable indivisible units (Elimination/Substitution). Proponents are required to eliminate or minimise oversized transport loads by breaking components down

to the smallest practicable unit. This step must be fully exhausted before any engineered transport solution is proposed.

c) Engineering controls apply only after reduction is demonstrated. Structural assessments, swept paths, capacity assessments and other engineering solutions apply only after loads are broken down and still exceed allowable limits. For this step, provide justification that all structures on the route impacted by the transportation of the module are assessed and analysed for Ultimate Limit State (ULS) and Serviceability Limit State (SLS) assessments. This includes all structural elements, connections, and geotechnical

Jet Zero acknowledges the transport of major plant equipment during the construction phase will require further technical consideration in relation to State-controlled transport infrastructure, and that these matters are subject to detailed engineering design and regulatory approval processes.

At the current phase, the Project is supported by early engineering and concept-level design that informs the overall construction approach. This does not extend to final confirmation of plant component sizes, weights, transport configurations or associated infrastructure responses. As mentioned, the Project is currently on early FEED; and, accordingly, the detailed assessment of structural interactions with State transport infrastructure, including Port interfaces and road assets is not capable of being conclusively determined until the Project advances to detailed engineering design.

Consistent with this approach, the assessment of structural impacts to State transport infrastructure forms part of the broader MTA that has been scoped and commissioned, with AECOM engaged to undertake this work commencing in February 2026. As outlined in the response to Item 4 above, the MTA will be undertaken in a staged manner and will provide a structured, risk-based framework for resolving detailed transport, structural and operational matters through the FEED and detailed design phases.

The later phases of the MTA will address detailed route planning, ship unloading interfaces at the Port of Townsville, transport of plant equipment to the site, and associated traffic and safety management requirements. These matters will be progressed through detailed engineering and in consultation with DTMR, ensuring that the final transport methodology is compliant with all relevant technical, safety and regulatory requirements prior to construction.

Given the current level of project design, the detailed vessel, offloading and transport methodology for major plant equipment cannot yet be conclusively defined and is not necessary for determination of the MCU application. It is considered that refinement of ship loading arrangements and plant equipment transport methodologies is appropriately addressed through post-approval detailed design processes and ongoing engagement with DTMR and Port of Townsville within the FEED phase. This can be secured via a condition of approval for compliance prior to commencement of construction.

Item 6 – Traffic network impacts

TMR has undertaken a review of the Traffic Impact Assessment, report reference P6680.004R, prepared by Bitzios Consulting, Version 004, dated 19 September 2025 (TIA), which provides an assessment of the construction and operational impacts of the development on the transport network. TMR note several deficiencies within the report that are listed below:

a) The TIA assumes that during the construction stage, 90% of staff arrive by bus from the housed locations in Townsville and ships at the port. It is expected that construction staff will be staying in accommodation/ships at the port. However, there is no further detail provided with regard to the private bus operations.

b) The TIA assumes distribution of 60% south and 40% north on Ron McLean Drive for operational phase based on proximity to nearby suburbs. This 60/40 distribution may be too heavily weighted towards the north as far more of the suburban areas nearby are access from the south.

c) Assessment results indicate minor increases in delay and queue length with both intersections operating below capacity. There are no detailed outputs from the net delay assessment provided making this difficult to check.

d) All staff travel movements within the TIA have been considered on the basis of the modular

build of the proposed use and there has been no consideration for alternatives such as on-site construction.

e) No information has been provided in relation to the travel movements associated with the source materials/inputs during the operation of the use. This information is required to understand the ongoing freight demands generated by the development, including the type and frequency of deliveries, expected vehicle classes, likely haulage routes, hours of operation and any oversized or over-mass requirements. Without this detail, the operational impacts on the State-controlled road network, including road safety, capacity, pavement loading and maintenance implications, cannot be appropriately assessed.

As the duration of OSOM traffic movements, including preparation and rectifications, will cause disruption to the use of the road, including freight transport on the primary, and only road train accessible route to the Port of Townsville, the truck decoupling facility, the weigh bridge, and other facilities, details of how road users will be notified and compensated is required.

The proponent is requested to:

1. Provide clarification or commitment for the use of private bus operations which are relied on to get 90% of staff to and from the site. If the planned bus operations do not eventuate, the impacts could be far more significant than reported for the construction phase.
2. Assess the scenario where private bus services are not implemented and all staff travel via private vehicle. This assessment must quantify the likely traffic and safety impacts to the State-controlled road network and demonstrate how these would be mitigated.
3. Assess the alternative scenario involving full on-site construction in lieu of the currently proposed modular delivery method. Further justification for the staff distribution during the operational phase or an updated distribution based on a higher proportion of vehicles travelling south. This distribution is considered more representative based on surrounding residential catchments.
4. Provide a detailed operational transport profile outlining all material/input delivery movements, including vehicle types and frequencies, haulage routes and any OSOM requirements proposed for the life of the development.
5. Provide a detailed plan of how road users will be notified of disruptions and how compensation, as required, will be managed.

Traffic network impacts associated with the construction and operational phases of the Project are being addressed through a staged assessment framework that aligns with the level of design certainty available at each stage of Project development.

The development application is supported by early engineering and concept-level traffic assessment, which establishes the overall traffic characteristics of the Project and its interaction with the surrounding road network. As the Project progresses through FEED and detail design, further refinement of traffic assumptions, risk identification and mitigation measures will be required to reflect final construction staging, workforce numbers, shift arrangements, access arrangements and operational logistics.

An amended TIA prepared by Bitzios Consulting (refer **Appendix B**) clarifies a number of the matters raised in Item 6, including construction and operational traffic generation, workforce travel assumptions, assessment methodology and interpretation of results. However, it is acknowledged that certain traffic-related risks and mitigation measures cannot be fully resolved until FEED and detail design are completed, when construction methodologies are confirmed.

Construction phase traffic impacts will be further developed once FEED is completed and construction planning is finalised by the EPC contractor. Operational traffic impacts will similarly be refined once operational planning is completed.

The outcomes of the TIA and subsequent design phases will inform the preparation of supporting documentation, including a Traffic Management Plan, Safety Management Plan and Stakeholder Engagement Plan, which will be developed in consultation with DTMR.

In particular, the detailed personnel logistics, construction traffic generation and road use management measures will be dependent on the procurement of the construction contractor and the final construction methodology adopted. Accordingly, these matters will be developed and confirmed by the appointed contractor following the construction contract award, including preparation of a detailed personnel logistics proposal, an updated construction traffic assessment informed by labour and material quantities, and a road use management plan prior to commencement of the relevant works.

It is considered that the above can be managed through the application of reasonable and relevant conditions of approval.

Item 7 – Construction stage pavement impact

The Pavement Impact Assessment (PIA) contained within the TIA assesses the operational phase of the development to the exclusion of construction traffic. Specifically, the assessment is based on 10 loaded and 6 unloaded Class 10 (B-Double) vehicle movements per day across the network. This assessment does not consider the likely impacts of OSOM movements across the network during the construction phase.

The proponent is requested to:

Undertake an assessment, with all engineering components having appropriate RPEQ certification, that describes how pavement impacts/wear/damage resulting from the movement of these loads will be assessed, what measures can be employed to mitigate impacts and explain why any impacts are not considered excessive. This includes:

a) The proponent supplying to TMR a proposed methodology to use for this purpose, with the proposed methodology certified by a suitably qualified RPEQ.
b) The proposed methodology being discussed and agreed with TMR upfront and before the actual assessment is commenced. The proponent and the RPEQ engaged will need to be involved in the discussion, etc.
c) The assessment considering the impacts due to vertical loads as well as horizontal loads (e.g. impacts on pavement structures and surfacings).
d) The proposed methodology must detail procedures for collecting and validating data on the current pavements (e.g. condition of the road section).

2. As part of the assessment listed in item 7.1 above, consider at a minimum the following items:
   a) The different existing materials and pavement types along the route(s) and the impacts on them (e.g. impact on flexible unbound granular and/or lightly bound pavements with sealed surface, impact on asphalt layers, impacts on any concrete floodways/pavements, if any).
   b) If high temperatures are possible when the loads are moved and if so if high temperatures exacerbate some impacts (e.g. rutting of asphalt or impact on seals).
   c) The capacity (e.g. structural capacity) of road shoulders where encroachment is possible. (Note: It appears there will be at least partial encroachment along the entire route due to the width of the unit).
   d) Impact on surfacings where there are steeper grades on the route (slow moving heavy vehicles/loads may impact surfacings like seals).
   e) The number of trips/movements for each load/scenario, with detailed consideration of vertical and horizontal loads.
   f) The potential for deformation, shear, bearing capacity and/or slip failures of the pavements, including shoulders, and/or embankments, including if the materials are wet (e.g. should the pavement be exposed to storm surge/flooding shortly before the move takes place).
   g) Any limitations that will apply (e.g. timing if there has been recent extreme weather).
   h) How verification that the pavement is in suitable condition shortly before the loads are moved will be achieved (e.g. if there has been a recent cyclone).
   i) If alternative routes/options are possible to minimise impacts on the existing road (e.g. construct temporary pavement to eastern shore).
   j) Tyre sizes and pressures and tyre contact stresses.
   k) Any limits or constraints that need to be imposed to safely move the load (e.g. maximum axles loads, limits needed to avoid slip failures if this is a risk).

3. In providing a response to items 7.1 and 7.2, note:
   a) The methodology and assessment are to be documented in a report and certified by a suitably qualified RPEQ.
   b) The assessment should assess the risks/impacts of potential differential (longitudinal and/or traverse) movements/settlement and impacts in the event there is an unexpected failure (e.g. culvert unexpectedly fails or there is a slip failure in the embankment meaning part of the unit sinks lower than the rest of the unit).
   j) The methodology and assessment are to explain how Jet Zero will assure TMR that the maximum loads and any conditions placed on the move (by TMR and the suitably qualified RPEQ who undertakes the assessment) are adhered to during the construction stage.

In response to Item 7, Jet Zero confirms that a Construction Stage Pavement Impact Assessment (PIA) is unable to be finalised as at this stage of the Project, as it is dependent on the completion of FEED and the resolution of key transport parameters through detailed engineering.

The PIA forms Phase 3 of the MTA being undertaken by AECOM. The MTA is being completed in a staged manner, with the earlier phases focussed on determining the structural and geotechnical capacity of critical infrastructure along the proposed transport route, particularly the Ross River Bridge. These earlier phases will establish the maximum allowable GVM, feasible Self-Propelled Modular Transporter (SPMT) configurations and load distribution requirements, which are prerequisites to undertaking a meaningful pavement impact assessment. The deliverables of this phase will include a Pavement Assessment Methodology Document and a PIA.

The PIA will assess potential pavement impacts along the likely transport route in principle, being from the Port of Townsville wharf berth, through port land to Ron McLean Drive, across the Ross River Bridge, and onward to the site via Colinta Drive. The assessment will consider matters including multi-layer elastic pavement response, rutting, shear, deformation and slip-critical conditions, shoulder and edge failure modes, ambient and seasonal temperature envelopes, number of module movements, and pre- and post-movement inspection and monitoring protocols. The assessment will be supported by pavement testing, modelling and risk assessment commensurate with the final transport configuration.

During FEED and subsequent detailed engineering design, Jet Zero and the EPC contractor will assess the outcomes of the PIA and refine the transport methodology and mitigation measures as required. These matters will be progressed in consultation with DTMR and resolved prior to the commencement of construction involving OSOM movements.

Sufficient information is available to identify that a detailed construction stage PIA will be required, but the assessment itself cannot yet be meaningfully completed until detailed transport planning for construction has resolved the key load and route parameters. Accordingly, the methodology and subsequent RPEQ certified PIA are appropriately addressed as post-approval requirements, to be undertaken in consultation with DTMR and finalised, together with any necessary mitigation or operational constraints, prior to approval and commencement of OSOM movements.

It is considered that the above can be managed through the application of reasonable and relevant conditions of approval.

Item 8 – Operational pavement impact

Within the submitted PIA, there appears to be errors in the calculation or application of the Background SAR4's, for example:

a) Ron McLean Drive section 0.00-0.77 has an AADT of 263 HV's in the against gazettal direction and 343 in the gazettal direction (refer to Table 7.1).
b) With the conversion factor of 3.2 SAR4's per HV this should be 841 SAR4's in the against gazettal direction and 1,099 in the gazettal direction. However, Table 7.3 shows the opposite – 1,099 in the against gazettal direction and 841 in the gazettal direction.
c) There is an error in Table 7.6 with the loaded SAR4/day – this should be 101 based on 16 x 6.3 – this may be a typo as the total is correct.

d) Calculation of the Development generated SAR5's in the report body does not align with the appendix.

The proponent is requested to:

1. Provide a revised operational PIA which amends the noted errors in calculating the Background SAR4's and revise the PIA accordingly.
2. Provide detailed net delay outputs and/or SIDRA files to enable thorough review of the net delay assessment.
3. Provide clarification of the Development SAR5's and what has been used in the assessment.

In response to Item 8, an amended TIA prepared by Bitzios Consulting is provided at **Appendix B**, with this clarifying the noted discrepancies identified in relation to operational traffic loading and pavement impact. The amended TIA confirms that operational traffic associated with the Project, including staff vehicles and routine heavy vehicle movements, is consistent with the function and design capacity of the surrounding road network and is not expected to result in adverse pavement impacts beyond those ordinarily accommodated by existing pavement standards.

Item 9 – Impacts on Colinta Road

The TIA notes potential accelerated pavement damage to Colinta Road caused by heavy vehicle loading associated with the development. TCC requires quantification of costs and mitigation measures for its asset management obligations.

The proponent is requested to:

Provide an RPEQ certified PIA quantifying life reduction and cost implications for Colinta Road, using Austroads methodology, and recommend mitigation or contributions.

The amended TIA provided at **Appendix B** includes an updated pavement impact assessment. This assessment considers the potential pavement effects of the development heavy vehicle movements and concludes that Colinta Road is expected to experience negligible life reduction.

It is considered that the cost of any contribution associated with pavement impacts be calculated and submitted to OCG and Townsville City Council (TCC) prior to the commencement of site works, to ensure it reflects actual costs at time of commencement. It is proposed this be secured through an appropriate condition of approval prior to commencement of construction.

Construction Management Plan

Item 10 – Construction impacts

The Preliminary Construction Management Plan, prepared by Jet Zero, Revision 0, dated 22 October 2025 (CMP) is required to be updated and provided for review to understand the construction related impacts of the development and alignment with TCC requirements. This is considered a relevant matter for consideration in the SDA application in accordance with section 2.5.6 (transport) and section 2.5.9 (other government matters) of the Townsville SDA Development Scheme.

The proponent is requested to:

1. Submit an updated CMP that specifically demonstrates alignment with TCC requirements for construction-phase management, such as:
   a) Erosion and sediment control.
   b) Stormwater quality.
   c) Traffic and haulage management for local roads (Colinta Road), consistent with the TIA and PIA and any updates to these reports required from this information request.

An updated CMP will be prepared following detail design phase to reflect the final development layout and construction methodology. The CMP will address construction phase impacts in accordance with relevant provisions of the Townsville SDA Development Scheme and relevant TCC requirements. Specifically, the CMP will include measures for erosion and sediment control, stormwater quality management, and traffic and haulage management for local roads, including Colinta Road.

These matters will be further resolved through the FEED process, during which the proponent and the EPC contractor will assess the relevant requirements in detail and update site-based management plans accordingly.

It is considered that the preparation and submission of an updated CMP can be managed via a reasonable and relevant condition of approval, with this to be submitted to OCG and TCC prior to commencement of construction site works.

Ecological Assessment

Item 11 – Ecological assessment against TCC framework

In accordance with section 2.5.7 of the Townsville SDA Development Scheme (SDA wide assessment criteria), the environmental values of the premises on which the development is undertaken, and immediate surrounds, are to be identified and managed, consistent with current best practice. The ecological assessment provided focuses on State and Commonwealth matters (MSES, MNES) but does not demonstrate compliance with the Townsville City Plan, Natural Assets Overlay Code (PO1–PO4). Local overlay requirements ensure protection of mapped wetlands, waterways, riparian zones, and ecological corridors within the City Plan framework.

The proponent is requested to:

1. Provide a statement of compliance with the Townsville City Plan, Natural Assets Overlay Code, including:
   a) Identification of mapped overlay features (wetlands, waterways, riparian zones) within or adjacent to the site.
   b) Demonstration of compliance with PO1–PO4, including avoidance, buffers, and mitigation measures.
   c) Updated plans showing buffer distances to mapped natural assets and any fauna movement strategies.
   d) Confirmation that stormwater design (bio-retention basins, contaminated water basins) will not compromise ecological values or hydrological connectivity.
   e) Ensure the response reconciles ecological findings with stormwater and drainage design and addresses construction-phase risks (erosion, sedimentation, ASS disturbance) consistent with Council's environmental standards.

The Natural Assets Overlay Code of the Townsville City Plan has been considered in the context of the proposed development as addressed within the development application submitted. It is noted that *Planning Scheme Policy 6.9*, being the relevant policy in response to compliance with PO1-PO4, references State mapping datasets from 2014, which have since been superseded.

As part of the development application, assessment has been undertaken against the current State overlay mapping, including identification of waterways, wetlands, ecological corridors and core habitats. Accordingly, assessment against the following has been provided:

- State Planning Policy, including Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES).
- State Code 8 – Coastal development and tidal works.
- State Code 9 – Great Barrier Reef wetland protection area.
- State Code 11 – Removal and destruction of marine plants.
- State Code 6 – Native vegetation clearing.

The above instruments rely on current spatial data that more accurately reflect existing environmental conditions at the locality and are considered the appropriate basis for impact assessment and management planning.

An amended Ecological Assessment Report was submitted as part of the response to the initial request for further information from OCG (APP-002/2025). A copy of this report is provided at **Appendix C**.

The amended Ecological Assessment Report confirms that the development footprint has been designed to avoid direct impacts on mapped ecological features, including the waterway and associated riparian corridor

located along the southern boundary of the site. No wetlands are located within the site, and areas of ecological value have been verified through both desktop and field assessment. A suitable buffer will be maintained to the waterway.

In the context of Performance Outcomes PO1-PO4 of the Natural Assets Overlay Code, the amended Ecological Assessment Report confirms:

- No MNES or MSES are directly impacted by the proposed development footprint. Areas of ecological value, including the mapped waterway and riparian corridor within proximity to the development site, have been avoided through the design and siting of the development.
- All infrastructure is sited away from mapped ecological features, thereby avoiding clearing, filling or construction within those areas.
- The ecological corridor and riparian area are retained and buffered, with a 25m separation maintained between development activities and the mapped waterway.
- Potential construction-phase impacts, such as erosion, dust, noise and water quality degradation, and proposed standard mitigation measures including:
    - Erosion and sediment control;
    - Retention of vegetation along the waterway; and
    - Avoidance of unnecessary clearing.

Given the above, no further impacts are anticipated under the Natural Asset Overlay beyond those previously identified and addressed as part of the application material and response to State environmental mapping and corresponding instruments.

A Stormwater Management Plan has been prepared in support of the development application and confirms that stormwater quantity and quality can be managed to ensure no adverse impact on downstream ecological values or hydrological connectivity. Bio-retention basins and containment infrastructure have been sited outside mapped environmental features and designed to support pre-development flow regimes.

To confirm detailed performance outcomes and integration with final site layout and infrastructure, an updated Stormwater Management Plan will be prepared during the detail design phase. This updated plan would reconcile ecological values with final drainage design and confirm construction-phase controls, including management of erosion, sedimentation and potential acid sulfate soil disturbance. It is considered that submission of an amended Stormwater Management Plan to OCG and TCC be secured via a reasonable and relevant condition of approval, prior to the commencement of site works.

Utilities

Item 12 – Water supply and sewerage capacity

In accordance with section 2.5.1 and section 2.5.8 of the Townsville SDA Development Scheme (SDA wide assessment criteria) development is to be adequately serviced by water and wastewater infrastructure and designed in accordance with relevant engineering standards. The proponent has not provided a water supply and sewerage capacity assessment to confirm servicing feasibility and identify any required upgrades to maintain network performance standards.

The proponent is requested to:

1. Submit an RPEQ certified report providing:
    a) Details of the water supply and sewerage capacity of the development site.
    b) Details of the anticipated demand for water and sewerage services.
    c) An assessment against TCC network capacity, and any required augmentation works.

Discussions have commenced and remain ongoing with TCC regarding potable water supply and wastewater servicing arrangements for the Project. These discussions have included consideration of anticipated demand, available capacity within the existing reticulated networks, and appropriate servicing and treatment pathways consistent with Council requirements.

Based on engagement to date, Council have indicated that potable water supply and wastewater servicing can be accommodated within the existing reticulated networks, subject to appropriate detailed design, treatment standards and operational controls being implemented. In relation to wastewater, discussions have focused

on a range of servicing options, including a preferred hybrid approach involving onsite pretreatment of liquid trade waste to agreed acceptance criteria, with subsequent discharge to Council's wastewater network for final treatment.

Confirmation of servicing arrangements, treatment requirements and any associated infrastructure works will occur through the FEED and detailed engineering design phases. Jet Zero will continue to engage with TCC throughout this process to further refine servicing strategies, confirm compliance with Council standards, and resolve any detailed technical requirements.

Accordingly, it is considered a condition of approval require the submission of a detailed Water and Sewerage Servicing Report, prepared by a suitably qualified person, be submitted to TCC and OCG prior to commencement of site works, if required.

Item 13 – Stormwater management plan

In accordance with section 2.5.17 of the Townsville SDA Development Scheme (SDA wide assessment criteria) development is to be located, designed, constructed and operated to avoid or minimise adverse impacts on environmental values of receiving waters. The Stormwater Management Plan, project no. 12679528, revision 0, prepared by GHD Pty Ltd, dated 23 October 2025 (SMP) shows a conflict at the western boundary. Figure 13 shows a bio-retention basin overlapping the existing watercourse and contaminated water basin, while the development plans and FIA suggest the watercourse remains in natural form. The SMP also needs to provide clarity on the lawful point of discharge, construction stage drainage, and integration with contaminated water management. These are essential for TCC's stormwater network performance and compliance with local standards.

The proponent is requested to:

1. Provide an updated SMP, including:
    a) Confirmation of treatment at the western boundary, specifically whether the watercourse in this area will remain in its natural form or comprise a bio-retention basin. As part of the response, reconcile the SMP, FIA, and development plans and include hydraulic details and implications for waterway barrier works.
    b) Confirmation of the lawful point of discharge for the development site.
    c) Details of how drainage will be managed during construction.
    d) Details of how drainage will be integrated with the site's contaminated water management.

Jet Zero confirms the existing watercourse located along the western boundary of the facility site will be retained, and that proposed stormwater management infrastructure, including the bioretention basin, will be designed so as not to intersect or modify the watercourse.

Stormwater runoff generated on site will be managed through appropriate on-site quality treatment measures prior to discharge. The detailed configuration of stormwater infrastructure, including treatment, conveyance and discharge arrangements, will be confirmed through detailed design to ensure stormwater is managed in a manner that protects downstream environments achieves relevant quality requirements.

An Environmental Authority (EA) for the Project was approved under section 172(2)(a) of the *Environmental Protection Act 1994* on 19 December 2025 (EA No. P-EA-100896474). The EA includes conditions of approval that require stormwater discharge to be appropriately treated, with no contaminants released to any waters.

Accordingly, wastewater generated by the biorefinery process will be pre-treated on site and will be discharged to the reticulated network consistent with discussions undertaken with TCC outlined in item 12 above.

The Stormwater Management Plan provided with the application has been prepared at a level appropriate to the current stage of Project development. As the Project progresses through FEED and detailed design, stormwater quality and quantity controls will be further refined to reflect the final site layout, levels, infrastructure design and construction methodology. Any necessary updates to the Stormwater Management Plan will be informed by this detailed design process.

It is considered suitable that, where required, a condition of approval require the submission of an updated Stormwater Management Plan, prepared by a suitably qualified person, prior to the commencement of on-site works.

Planning instruments – Priority Port Master Plan and Port Overlay

Item 14 – Port Master Plan

The SDA application does not reference the Priority Port of Townsville Master Plan or the Port Overlay, notwithstanding that the subject land is within the broader infrastructure and supply chain corridors and port industry and commerce precincts associated with the priority Port. These instruments identify strategic directions, land-use outcomes and environmental management objectives relevant to Port-related development and associated corridors. An assessment against Priority Port of Townsville Master Plan and Port Overlay is considered necessary to demonstrate compliance with the overall objectives for the Townsville SDA, as stated in the Development Scheme.

The proponent is requested to:

1. Demonstrate how the proposed development addresses and is consistent with the Priority Port of Townsville Master Plan and Port Overlay, including relevant outcomes for:
   a) Infrastructure and supply chain corridors precinct.
   b) Port industry and commerce precinct.

The subject site is located within the Priority Port of Townsville Master Plan and Port Overlay area, specifically within the Port Industry and Commerce Precinct and the Environmental Management Precinct. These precincts guide land use planning, infrastructure coordination and environmental management in support of the long-term operation and development of the Port of Townsville and its associated supply chain corridors. Additionally, Item 14 seeks assessment against the Infrastructure and Supply Chain Corridors Precinct.

Port Industry and Commerce Precinct

The proposed development is consistent with the intent of the Port Industry and Commerce Precinct, which seeks to accommodate port-related and port-dependent industrial activities that support supply chain efficiency and regional economic development.

The development involves the establishment of a Sustainable Aviation Fuel (SAF) production facility, aligning with the strategic objective of the precinct as follows:

- The development supports the intensification of port-related industrial activity within the Townsville SDA, which is identified in the Port of Townsville Master Plan as a location suitable for heavy and specialist industry that contributes to the regional and State economy.
- The facility is strategically positioned to leverage proximity to key freight infrastructure, including the Port of Townsville, Townsville Port Access Road, and potential future connections via the Eastern Access Rail Corridor (TEARC). This reinforces the site's logistical advantage for import/export supply chains and underpins long-term freight efficiency.
- Feedstock and product movements will be transported via road haulage, primarily via the Port of Townsville, directly supporting the port's freight and logistics role.
- The site is well connected to strategic freight infrastructure, including the Townsville Port Access Road, facility efficient vehicle movements between the site and the Port of Townsville.
- The proposal contributes to the efficient use of existing infrastructure corridors and supports regional supply chains linked to the Port, aligning with the Master Plan's objectives for integrated port and industrial development.
- The development aligns with the precinct's aim to attract industries that add value to traded goods and support the long-term growth of the Port of Townsville, while being located outside sensitive interface areas.

Environmental Management Precinct

With regard to the Environmental Management Precinct, it is acknowledged that part of the site falls within this overlay. The purpose of this precinct is to protect environmental values and manage development to

ensure no adverse impact on areas of ecological significance. In this context, the proposed development does not result in any unacceptable impact to areas of ecological significance, as outlined in the submitted environmental reports.

Infrastructure and Supply Chain Corridors Precinct

The proposed development is strategically located within the Townsville SDA, adjacent to key infrastructure elements of the Infrastructure and Supply Chain Corridors Precinct. The development will rely exclusively on road-based freight transport, with all feedstock and product movements to occur via the state-controlled Townsville Port Access Road. This route forms a critical connection between the site and the Port of Townsville and supports the precinct's intent to facilitate efficient, high-capacity freight movements. The development represents a logistics-compatible land use that benefits from direct access to the Port's transport corridor, without placing pressure on urban traffic networks.

The location and operational model ensure that heavy vehicle traffic is concentrated within designated industrial and freight corridors, consistent with the objectives of the Priority Port of Townsville Master Plan. The development does not encroach upon any future infrastructure alignments, such as TEARC, as avoids land identified for future infrastructure expansion.

The proposal therefore supports the efficient operation of regional freight infrastructure and aligns with the long-term strategic function of the Infrastructure and Supply chain Corridors Precinct.

Advice Notes

Any referral agency comments do not replace the need to apply for other approvals that may be required for the development to proceed, particularly approvals required for land owned and/or controlled by the Port of Townsville Limited (POTL) or approval for oversize, overmass loads from HVNL.

All relevant approvals will be obtained from the appropriate authorities, including any permits required under the Heavy Vehicle National Law (HVNL) for oversize or overmass vehicle movements. Where future development is proposed on land owned or controlled by POTL, the necessary approvals will be sought at the appropriate stage.

Any proposed development on Port land will be subject to separate development applications and landowner's consent processes directly with POTL. Any on-Port components will be assessed under the applicable planning framework and operational requirements at that time.

Any future development located within strategic port land will be assessed under the applicable planning framework and POTL's operational requirements in effect at that time.

Any changes or rectification within the state corridor to facilitate the required traffic movements will require approval in accordance with the *Transport Infrastructure Act 1994*.

Any works, modifications or rectification within the State-controlled road corridor required to facilitate site access or traffic movements will be undertaken in accordance with relevant legislative requirements.

Jet Zero™

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DELIVERING FOR QUEENSLAND | Queensland Government

Office of the
Coordinator-General

Our ref: OUT25/6152

9 December 2025

Ulysses Bioenergy Operator Pty Ltd
c/- Northpoint Planning
Attention: Ms Meredith Hutton, Director
hello@northpointplanning.com.au

Dear Ms Hutton

AP2025/005 – SDA application for a material change of use for a special industry (sustainable aviation fuel facility) in the Townsville State Development Area (SDA)

Reference is made to your SDA application for a material change of use for a special industry (sustainable aviation fuel facility) in the Townsville SDA.

As stated in the properly made letter of 16 July 2025, the SDA application was referred to the following referral entities:

- Department of Environment, Tourism, Science and Innovation
- Department of Primary Industries
- Department of Transport and Main Roads
- Office of Industrial Relations
- Ergon Energy
- Townsville City Council
- Port of Townsville.

Please find enclosed a coordinated request for additional information required by referral entities in order to properly assess your SDA application.

In accordance with Schedule 2, Section 2.2 of the Townsville SDA Development Scheme (May 2019), you have until 11 June 2026 to provide a response to the information request (noting that the response may be provided sooner) to the Office of the Coordinator-General. The application will lapse if you do not provide, to the satisfaction of the Coordinator-General, the requested information by the required date.

Once the Coordinator-General has received your response, any additional information will be provided to the referral entities for their assessment. On completion of the referral stage, you will be notified of the next stage in the development assessment process.

1 William Street
Brisbane Queensland 4000
PO Box 15517
City East Queensland 4002
Telephone 13 QGOV (13 74 68)
Website www.statedevelopment.qld.gov.au
ABN 29 230 178 530

If you require any further information, please contact Ms Rachel Ritchie, Senior Planner, Office of the Coordinator-General at rachel.ritchie@coordinatorgeneral.qld.gov.au or on (07) 3522 8586, who will be pleased to assist.

Yours sincerely

Cameron McLeod
Assistant Coordinator-General
Industry and Infrastructure Development
(as delegate of the Coordinator-General)

Enc.

The proponent is required to provide the Coordinator-General with a response to the information requested below.

The requested additional information seeks to clarify inadequacies in the scope of the proposed development and the impacts of the proposed development.

Responding comprehensively to this request is required to assist in streamlining the assessment process.

No.	Issue	Information Requested
Hazardous substances		
1	State Code 21 – flood risk	In accordance with section 2.5.9 of the Townsville State Development Area (SDA) Development Scheme (SDA wide assessment criteria), development is required to demonstrate consistency with all relevant legislative requirements for the development to proceed and operate. It is necessary to confirm consistency with State Code 21 requirements with regard to flood risk, particularly as it is noted that that within the Flood Impact Assessment, report reference MJ2601-FIA, revision B, prepared by Northern Consulting Engineers (NCE), dated 25 March 2025 (FIA) the "exposed site" defined storm tide level of 4.5m AHD appears to be above most of the site finished ground level of 4.0m to 4.6m. **The proponent is requested to:** 1. Provide a detailed response to State Code 21 PO10 for flood risk, including, but not limited to, how hazardous chemical storage, and critical systems relating to their safe storage, are affected and/or protected from storm tide inundation. The response should consider to the following: a) How the statements from the FIA (pages 23 and 24) relate to the requirements specified in section 3.7.2.1 of State Code 21 (https://www.worksafe.qld.gov.au/__data/assets/pdf_file/0021/19452/planning-guide-state-code-21.pdf): *i. Whilst the planning scheme does not nominate freeboard above flood levels in industrial areas, consideration should be given to any critical infrastructure and hazardous storages areas to be located at a suitable freeboard above the nominated event in accordance with SC6.7 flood hazard and / or above the natural ground level. NCE recommend a minimum freeboard of 300mm (above*

No.	Issue	Information Requested
		the relevant flood level and above the natural ground level). *ii. Additionally, whilst the development is well outside the 100m setback from the shoreline mapped as part of the TCC coastal hazard overlay, the site is in the vicinity of relatively open tidal salt flats at a low level and as such is relatively exposed to storm surge and coastal wave runup actions. Therefore, consideration should be given to locating any regional fuel storage facilities or other sensitive elements of the development at the higher, exposed site defined storm tide event level of 4.5m AHD.*
2	State Code 21 – bushfire risk	In accordance with section 2.5.9 of the Townsville SDA Development Scheme (SDA wide assessment criteria), development is required to demonstrate consistency with all relevant legislative requirements for the development to proceed and operate. It is necessary to confirm consistency with State Code 21 requirements with regard to bushfire risk. Consideration of bushfire hazard in the Planning Report (reference 28011007-HSE-REP-00007, revision 0, dated 17 June 2025, Section 9.6) is generic for an industrial use and does not consider additional risks/hazards relating to the storage and processing of large quantities of flammable liquids. While the development site itself may be cleared of vegetation and bushfire risk, the land immediately south will remain vegetated and will therefore be a bushfire risk to the facility, particularly the risk of flying embers igniting storage tanks or a bushfire emergency requiring site evacuation. **The proponent is requested to:** 1. Provide a detailed response to State Code 21 PO10 for bushfire risk, including, but not limited to, how hazardous chemical storage, and critical systems relating to their safe storage, are affected and/or protected from bushfire risk. The response must address the bushfire risk to the facility from the vegetated land immediately south of the facility site, particularly the risk of flying embers igniting storage tanks or a bushfire emergency requiring site evacuation.
3	Schedule 15 Chemicals	In accordance with section 2.5.9 of the Townsville SDA Development Scheme (SDA wide assessment criteria), development is required to demonstrate consistency with all relevant legislative requirements for the development to proceed and operate. It is necessary to accurately disclose the quantity of Work Health and Safety Regulation 2011,

<table>
<tr><th>No.</th><th>Issue</th><th>Information Requested</th></tr>
<tr><td></td><td></td><td>
Schedule 15 Chemicals to determine if the major hazard threshold has been exceeded.

In addition to the Chemical Storage Plan, Technical Reference Document 2811007-PI-PLA-00001_0, prepared by Jet Zero, dated 15 October 2024 (CSP), Table 1 below, provides a list of other possible Schedule 15 Chemicals that may not have been disclosed because storage/operation at high temperatures means they meet the criteria of Schedule 15 categories with lower thresholds than the same liquids at ambient temperature or contain light ends making them category 1 flammable liquids.

Table 1: Quantities of additional Schedule 15 chemicals indicated to be on the facility site, in process equipment.
<table>
<tr><th>Description</th><th>Temperature ºC</th><th>Volume, m^3</th></tr>
<tr><td>Ethanol Pre Treatment Column Reboiler C-1100 (vapour) and Pre Treatment Column Condenser HE-1110</td><td>74</td><td>162</td></tr>
<tr><td>Ethanol Pre Treatment Column Reboiler C-1100 bottom and Side Draw Condenser HE-1103 including Pre Treatment Column Base Bleed Pump P 1120A/B</td><td>100</td><td>3.7</td></tr>
<tr><td>Pre Treatment Side Draw Condenser and Drum, HE 1130 and V-1131</td><td>95</td><td>2.2</td></tr>
<tr><td>Pre Treatment Column Base Pump P-1132A/B and Cation Guard Bed Package Z-1150</td><td>72</td><td>19.5</td></tr>
<tr><td>Vaporiser Feed Drum V-1250 (Vapour) and Feed Vaporiser HE-1251 (shell side) to HE 1330</td><td>153</td><td>22.9</td></tr>
<tr><td>Vaporiser Feed Drum V-1250 (liquid side)</td><td>114</td><td>4.2</td></tr>
<tr><td>Reactor 1 R-1260</td><td>216</td><td>51.5</td></tr>
<tr><td>Reactor R 1270/80/90/1300/1310/1320</td><td>241</td><td>16</td></tr>
</table>
</td></tr>
</table>

No.	Issue	Information Requested

Reactor Product Separator V-1332 (vapour)	135	8.1
OLIG 1 Reactors R-2130A/B to HE-2100, HE-2200 to V 2210 inlet	145	66.4
OLIG 2 Reactors R-2350A/B	205	24.5
Stabiliser Column C-2400 (vap) and Overhead Cooler HE-2411 (shell side)	250	36
Hydrogenation Reactor R 2460	149	22
Hydrogenation HP Separator V-2470 (liquid) and R-2460 outlet line	149	14.9
Fractionator C-2600, Side Draw pump P-2711A/B, Cooler HE-2710 to Jet storage	99	46.4
V-6100 Olefins Processing Vessels (NNF)	6	909

The proponent is requested to:

1. Include in the list of Schedule 15 Chemicals contained within the CSP:
   a) Quantities of *liquids that meet the criteria for class 3 packing group I materials* – these may be present in process vessels such as fractionators, reactors, overheads drums and condensers.
   b) Quantities of *liquids with flash points <61°C kept above their boiling points at ambient conditions [use initial boiling point for mixtures]* - these may be present in process vessels such as fractionators, reactors, overheads drums and condensers.
   c) Quantities of catalysts and reagents that may be toxic according to Schedule 15.1, Table 15.3 – for example some vanadium-based catalysts.
   d) All quantities in tonnes, based on the normal liquid operating levels in process vessels and H alarm level for storage tanks.
2. Provide mass balance or material flow diagrams or process flow diagrams or any other document(s) that provide material stream properties including initial boiling point, flash point, vapour pressure, density, composition, temperature, pressure.
3. Provide process area general arrangement drawings showing major plant and vessels and any other documents

No.	Issue	Information Requested
		listing the liquid volumes contained.
Traffic and transport operations		
4	Route assessment	A route assessment was not included as part of the SDA application. A route assessment is required to demonstrate that the haulage of modular units and construction materials during the construction stage can be undertaken safely, without adversely affecting the state-controlled road network, and that all movements can comply with dimension, load, safety and operating requirements. This is considered a relevant matter for consideration in the SDA application in accordance with section 2.5.6 (transport) and section 2.5.9 (other government matters) of the Townsville SDA Development Scheme. It is acknowledged that Jet Zero has previously provided a route assessment to the Department of Transport and Main Roads (TMR) for review outside of the SDA application assessment process. However, confirmation is required that the route assessment previously submitted to TMR forms part of the SDA application, represents the final haulage methodology, and remains accurate. **The proponent is requested to:** 1. Provide TMR with confirmation that the previously submitted route assessment represents the final haulage methodology and remains accurate for the current development proposal (include confirmation of the version of the report that is being referenced). **Alternatively, the proponent is requested to:** 2. Provide an updated route assessment, prepared by a suitably qualified Registered Professional Engineer of Queensland (RPEQ) traffic engineer that includes at a minimum: a) Confirmation of the intended haulage route for oversized over mass load (OSOM) movements to and from the subject site. b) The expected vehicle and component combinations, sizes, masses, and configurations required to access the subject site via the State-controlled Road network.

No.	Issue	Information Requested
		c) Confirmation of the number of expected OSOM movements required to access the subject site via the State-controlled Road network. d) The expected haulage timeframes and commencement periods. e) A swept path analysis of the haulage route to confirm that OSOM components can be safely transported to and from the subject site without impacting upon users of the State transport network. f) Appropriate mitigation measures and/or road upgrades (where required) to safely and efficiently transport OSOM components to the subject site. g) Proposed layover areas, stopping bays, and passing opportunities to be relied upon by the project.
5	Structural impacts to State Transport Infrastructure	In accordance with section 2.5.6 (transport) and section 2.5.9 (other government matters) of the Townsville SDA Development Scheme, it is necessary to ensure the plant components can physically arrive at the Port of Townsville and travel from the port to the development site during the construction stage. TMR has concerns that structures along this route are likely to be impacted by the proposed OSOM. Specifically, the proposed transport route for the heavy components will require the crossing of several of TMR's road structures, which are likely to be impacted by the substantial weight should these components not be further broken down. To date TMR has received and reviewed the following documentation outside of the SDA application: a) Desktop route assessment: The route assessed bypasses Ross River Bridge – barging onto the southern side of the bridge to Southern Port Road. The report indicates that two power lines will need to be buried. There are 9 culverts, and 3 bridges identified - which require structural assessment. One bridge – a fourth, is not listed in the route summary and will also need to be assessed. b) Ross River girder analysis (AECOM): Noting this bridge was not part of the abovementioned route desktop assessment, the report indicates that a self-propelled modular transporter (SPMT) load of 1750 tonnes might be feasible and further structural, geometric, geotechnical assessment would be required. To ensure transport of the OSOM plant equipment across the State-controlled road network does not create unacceptable structural risks or adverse structural impacts to TMR's transport infrastructure, a revised proposal and additional analysis is required to be provided for review. This must include a risk-managed approach that aligns with the recognised hierarchy of controls, being i) Elimination, ii) Elimination/Substitution, iii) Engineering controls. The

No.	Issue	Information Requested
		proponent must demonstrate that the highest order controls (as outlined below) have been thoroughly evaluated and, where reasonable and practicable, adopted. **The proponent is requested to:** 1. Provide the following information detailing the arrival of the plant equipment into the Port of Townsville, with all engineering components having appropriate RPEQ certification: a) Type of vessel ('mother ship') bringing the cargo. b) Maximum weight of the largest unit if discharging by ship's gear. c) Specifications of the barges (length, beam, draft, including module) if the float is on or float off. d) Proposed transfer point (ramp) offloading facility at the port if the float is off. e) Depth required to submerge and float off the barge(s). f) If considering an alternative offloading facility: i. Location of the facility. ii. Access channel survey results. iii. Specifications of barges and prime mover ('tug'). iv. Simulations for access channel and vessel size/channel width. 2. Provide a revised proposal for transporting the plant equipment to the site during the construction stage, with all engineering components having appropriate RPEQ certification, specifically addressing: a) Consideration of on-site construction/assembly to reduce the requirement for OSOM movements of large components (Elimination). b) Reduction to the smallest practicable indivisible units (Elimination/Substitution). Proponents are required to eliminate or minimise oversized transport loads by breaking components down to the smallest practicable unit. This step must be fully exhausted before any engineered transport solution is proposed. c) Engineering controls apply only after reduction is demonstrated. Structural assessments, swept paths, capacity assessments and other engineering solutions apply only after loads are broken down and still exceed allowable limits. For this step, provide justification that all structures on the route impacted by the transportation of the module are assessed and analysed for Ultimate Limit State (ULS) and Serviceability Limit State (SLS) assessments. This includes all structural elements, connections, and geotechnical

No.	Issue	Information Requested
		capacities, ensuring that all components of the existing structures have adequate ULS and SLS capacity for the proposed loading, taking into consideration the current condition of the bridges and the impact of repeated loadings. TMR's understanding is there are 12 movements. Provide all models, calculations, and reports that are required to justify the assessment, and all engineering components must have appropriate RPEQ certification.
6	Traffic network impacts	TMR has undertaken a review of the Traffic Impact Assessment, report reference P6680.004R, prepared by Bitzios Consulting, Version 004, dated 19 September 2025 (TIA), which provides an assessment of the construction and operational impacts of the development on the transport network. TMR note several deficiencies within the report that are listed below: a) The TIA assumes that during the construction stage, 90% of staff arrive by bus from the housed locations in Townsville and ships at the port. It is expected that construction staff will be staying in accommodation /ships at the port. However, there is no further detail provided with regard to the private bus operations. b) The TIA assumes distribution of 60% south and 40% north on Ron McLean Drive for operational phase based on proximity to nearby suburbs. This 60/40 distribution may be too heavily weighted towards the north as far more of the suburban areas nearby are access from the south. c) Assessment results indicate minor increases in delay and queue length with both intersections operating below capacity. There are no detailed outputs from the net delay assessment provided making this difficult to check. d) All staff travel movements within the TIA have been considered on the basis of the modular build of the proposed use and there has been no consideration for alternatives such as on-site construction. e) No information has been provided in relation to the travel movements associated with the source materials/inputs during the operation of the use. This information is required to understand the ongoing freight demands generated by the development, including the type and frequency of deliveries, expected vehicle classes, likely haulage routes, hours of operation and any oversized or over-mass requirements. Without this detail, the operational impacts on the State-controlled road network, including road safety, capacity, pavement loading and maintenance implications, cannot be appropriately assessed. f) As the duration of OSOM traffic movements, including preparation and rectifications, will cause disruption to the use of the road, including freight transport on the primary, and only road train accessible route to

No.	Issue	Information Requested
		the Port of Townsville, the truck decoupling facility, the weigh bridge, and other facilities, details of how road users will be notified and compensated is required. **The proponent is requested to:** 1. Provide clarification or commitment for the use of private bus operations which are relied on to get 90% of staff to and from the site. If the planned bus operations do not eventuate, the impacts could be far more significant than reported for the construction phase. 2. Assess the scenario where private bus services are not implemented and all staff travel via private vehicle. This assessment must quantify the likely traffic and safety impacts to the State-controlled road network and demonstrate how these would be mitigated. 3. Assess the alternative scenario involving full on-site construction in lieu of the currently proposed modular delivery method. Further justification for the staff distribution during the operational phase or an updated distribution based on a higher proportion of vehicles travelling south. This distribution is considered more representative based on surrounding residential catchments. 4. Provide a detailed operational transport profile outlining all material/input delivery movements, including vehicle types and frequencies, haulage routes and any OSOM requirements proposed for the life of the development. 5. Provide a detailed plan of how road users will be notified of disruptions and how compensation, as required, will be managed.
7	Construction stage pavement impact	The Pavement Impact Assessment (PIA) contained within the TIA assesses the operational phase of the development to the exclusion of construction traffic. Specifically, the assessment is based on 10 loaded and 6 unloaded Class 10 (B-Double) vehicle movements per day across the network. This assessment does not consider the likely impacts of OSOM movements across the network during the construction phase. **The proponent is requested to:** 1. Undertake an assessment, with all engineering components having appropriate RPEQ certification, that describes how pavement impacts/wear/damage resulting from the movement of these loads will be assessed, what measures can be employed to mitigate impacts and explain why any impacts are not considered excessive. This includes:

No.	Issue	Information Requested
		a) The proponent supplying to TMR a proposed methodology to use for this purpose, with the proposed methodology certified by a suitably qualified RPEQ. b) The proposed methodology being discussed and agreed with TMR upfront and before the actual assessment is commenced. The proponent and the RPEQ engaged will need to be involved in the discussion, etc. c) The assessment considering the impacts due to vertical loads as well as horizontal loads (e.g. impacts on pavement structures and surfacings). d) The proposed methodology must detail procedures for collecting and validating data on the current pavements (e.g. condition of the road section). 2. As part of the assessment listed in item 7.1 above, consider at a minimum the following items: a) The different existing materials and pavement types along the route(s) and the impacts on them (e.g. impact on flexible unbound granular and/or lightly bound pavements with sealed surface, impact on asphalt layers, impacts on any concrete floodways/pavements, if any). b) If high temperatures are possible when the loads are moved and if so if high temperatures exacerbate some impacts (e.g. rutting of asphalt or impact on seals). c) The capacity (e.g. structural capacity) of road shoulders where encroachment is possible. (Note: It appears there will be at least partial encroachment along the entire route due to the width of the unit). d) Impact on surfacings where there are steeper grades on the route (slow moving heavy vehicles/loads may impact surfacings like seals). e) The number of trips/movements for each load/scenario, with detailed consideration of vertical and horizontal loads. f) The potential for deformation, shear, bearing capacity and/or slip failures of the pavements, including shoulders, and/or embankments, including if the materials are wet (e.g. should the pavement be exposed to storm surge/flooding shortly before the move takes place). g) Any limitations that will apply (e.g. timing if there has been recent extreme weather). h) How verification that the pavement is in suitable condition shortly before the loads are moved will be achieved (e.g. if there has been a recent cyclone). i) If alternative routes/options are possible to minimise impacts on the existing road (e.g. construct temporary

No.	Issue	Information Requested
		pavement to eastern shore). j) Tyre sizes and pressures and tyre contact stresses. k) Any limits or constraints that need to be imposed to safely move the load (e.g. maximum axles loads, limits needed to avoid slip failures if this is a risk). 3. In providing a response to items 7.1 and 7.2, note: a) The methodology and assessment are to be documented in a report and certified by a suitably qualified RPEQ. b) The assessment should assess the risks/impacts of potential differential (longitudinal and/or traverse) movements/settlement and impacts in the event there is an unexpected failure (e.g. culvert unexpectedly fails or there is a slip failure in the embankment meaning part of the unit sinks lower than the rest of the unit). c) The methodology and assessment are to explain how Jet Zero will assure TMR that the maximum loads and any conditions placed on the move (by TMR and the suitably qualified RPEQ who undertakes the assessment) are adhered to during the construction stage.
8	Operational pavement impact	Within the submitted PIA, there appears to be errors in the calculation or application of the Background SAR4's, for example: a) Ron McLean Drive section 0.00-0.77 has an AADT of 263 HV's in the against gazettal direction and 343 in the gazettal direction (refer to Table 7.1). b) With the conversion factor of 3.2 SAR4's per HV this should be 841 SAR4's in the against gazettal direction and 1,099 in the gazettal direction. However, Table 7.3 shows the opposite – 1,099 in the against gazettal direction and 841 in the gazettal direction. c) There is an error in Table 7.6 with the loaded SAR4/day – this should be 101 based on 16 x 6.3 – this may be a typo as the total is correct. d) Calculation of the Development generated SAR5's in the report body does not align with the appendix. **The proponent is requested to:** 1. Provide a revised operational PIA which amends the noted errors in calculating the Background SAR4's and

No.	Issue	Information Requested
		revise the PIA accordingly. 2. Provide detailed net delay outputs and/or SIDRA files to enable thorough review of the net delay assessment. 3. Provide clarification of the Development SAR5's and what has been used in the assessment.
9	Impacts on Colinta Road	The TIA notes potential accelerated pavement damage to Colinta Road caused by heavy vehicle loading associated with the development. TCC requires quantification of costs and mitigation measures for its asset management obligations. **The proponent is requested to:** 1. Provide an RPEQ certified PIA quantifying life reduction and cost implications for Colinta Road, using Austroads methodology, and recommend mitigation or contributions.
Construction management plan		
10	Construction impacts	The Preliminary Construction Management Plan, prepared by Jet Zero, Revision 0, dated 22 October 2025 (CMP) is required to be updated and provided for review to understand the construction related impacts of the development and alignment with TCC requirements. This is considered a relevant matter for consideration in the SDA application in accordance with section 2.5.6 (transport) and section 2.5.9 (other government matters) of the Townsville SDA Development Scheme. **The proponent is requested to:** 1. Submit an updated CMP that specifically demonstrates alignment with TCC requirements for construction-phase management, such as: a) Erosion and sediment control. b) Stormwater quality. c) Traffic and haulage management for local roads (Colinta Road), consistent with the TIA and PIA and any updates to these reports required from this information request.

No.	Issue	Information Requested
Ecological assessment		
11	Ecological assessment against TCC framework	In accordance with section 2.5.7 of the Townsville SDA Development Scheme (SDA wide assessment criteria), the environmental values of the premises on which the development is undertaken, and immediate surrounds, are to be identified and managed, consistent with current best practice. The ecological assessment provided focuses on State and Commonwealth matters (MSES, MNES) but does not demonstrate compliance with the Townsville City Plan, Natural Assets Overlay Code (PO1–PO4). Local overlay requirements ensure protection of mapped wetlands, waterways, riparian zones, and ecological corridors within the City Plan framework. **The proponent is requested to:** 1. Provide a statement of compliance with the Townsville City Plan, Natural Assets Overlay Code, including: a) Identification of mapped overlay features (wetlands, waterways, riparian zones) within or adjacent to the site. b) Demonstration of compliance with PO1–PO4, including avoidance, buffers, and mitigation measures. c) Updated plans showing buffer distances to mapped natural assets and any fauna movement strategies. d) Confirmation that stormwater design (bio-retention basins, contaminated water basins) will not compromise ecological values or hydrological connectivity. e) Ensure the response reconciles ecological findings with stormwater and drainage design and addresses construction-phase risks (erosion, sedimentation, ASS disturbance) consistent with Council's environmental standards.
Utilities		
12	Water supply and sewerage capacity	In accordance with section 2.5.1 and section 2.5.8 of the Townsville SDA Development Scheme (SDA wide assessment criteria) development is to be adequately serviced by water and wastewater infrastructure and designed in accordance with relevant engineering standards. The proponent has not provided a water supply and sewerage capacity assessment to confirm servicing feasibility and identify any required upgrades to maintain network performance standards.

No.	Issue	Information Requested
		The proponent is requested to: 1. Submit an RPEQ certified report providing: a) Details of the water supply and sewerage capacity of the development site. b) Details of the anticipated demand for water and sewerage services. c) An assessment against TCC network capacity, and any required augmentation works.
13	Stormwater management plan	In accordance with section 2.5.17 of the Townsville SDA Development Scheme (SDA wide assessment criteria) development is to be located, designed, constructed and operated to avoid or minimise adverse impacts on environmental values of receiving waters. The Stormwater Management Plan, project no. 12679528, revision 0, prepared by GHD Pty Ltd, dated 23 October 2025 (SMP) shows a conflict at the western boundary. Figure 13 shows a bio-retention basin overlapping the existing watercourse and contaminated water basin, while the development plans and FIA suggest the watercourse remains in natural form. The SMP also needs to provide clarity on the lawful point of discharge, construction stage drainage, and integration with contaminated water management. These are essential for TCC's stormwater network performance and compliance with local standards. **The proponent is requested to:** 1. Provide an updated SMP, including: a) Confirmation of treatment at the western boundary, specifically whether the watercourse in this area will remain in its natural form or comprise a bio-retention basin. As part of the response, reconcile the SMP, FIA, and development plans and include hydraulic details and implications for waterway barrier works. b) Confirmation of the lawful point of discharge for the development site. c) Details of how drainage will be managed during construction. d) Details of how drainage will be integrated with the site's contaminated water management.

Planning instruments – Priority Port Master Plan and Port Overlay		
14	Port Master Plan	The SDA application does not reference the Priority Port of Townsville Master Plan or the Port Overlay, notwithstanding that the subject land is within the broader infrastructure and supply chain corridors and port industry and commerce precincts associated with the priority Port. These instruments identify strategic directions, land-use outcomes and environmental management objectives relevant to Port-related development and associated corridors. An assessment against Priority Port of Townsville Master Plan and Port Overlay is considered necessary to demonstrate compliance with the overall objectives for the Townsville SDA, as stated in the Development Scheme. **The proponent is requested to:** 1. Demonstrate how the proposed development addresses and is consistent with the Priority Port of Townsville Master Plan and Port Overlay, including relevant outcomes for: a) Infrastructure and supply chain corridors precinct. b) Port industry and commerce precinct.

Advice note:

Any referral agency comments do not replace the need to apply for other approvals that may be required for the development to proceed, particularly approvals required for land owned and/or controlled by the Port of Townsville Limited (POTL) or approval for oversize, overmass loads from HVNL.

Any proposed development on Port land will be subject to separate development applications and landowner's consent processes directly with POTL. Any on-Port components will be assessed under the applicable planning framework and operational requirements at that time.

Any changes or rectification within the state corridor to facilitate the required traffic movements will require approval in accordance with the *Transport Infrastructure Act 1994*.

Jet Zero™

B

Jet Zero Townsville

Traffic Impact Assessment

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traffic engineering transport planning

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26th February 2026



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ADDENDUM: IR RESPONSE COVER LETTER

This Traffic Impact Assessment (TIA) has been revised with the inclusion of this cover letter; prepared in response to the Further Advice Information Request (IR) issued by the Office of the Coordinator-General (OCG) in relation to a proposed sustainable aviation fuel facility development to be located at Lot 35 on SP341877. Specifically, this letter responds to Operational Pavement Impact Item 8.

Updates to this report are exclusively limited to this cover letter, the Pavement Impact Assessment in **Section 7** and the corresponding **Appendix I**.

Ref.	IR Item	Response Summary	Section
Operational Pavement Impact			
5	*Within the submitted TIA, there appears to be errors in the calculation or application of the Background SAR4's, for example:* 1. *Ron McLean Drive section 0.00-0.77 has an AADT of 263 HV's in the against gazettal direction and 343 in the gazettal direction (refer to Table 7.1).* 2. *With the conversion factor of 3.2 SAR4's per HV this should be 841 SAR4's in the against gazettal direction and 1,099 in the gazettal direction. However, Table 7.3 shows the opposite – 1,099 in the against gazettal direction and 841 in the gazettal direction.* 3. *There is an error in Table 7.6 with the loaded SAR4/day – this should be 101 based on 16 x 6.3 – this may be a typo as the total is correct.* 4. *Calculation of the Development generated SAR5's in the report body does not align with the appendix.* ***The proponent is requested to:*** 1. *Provide a revised operational TIA which amends the noted errors in calculating the Background SAR4's and revise the TIA accordingly.* 2. *Provide detailed net delay outputs and/or SIDRA files to enable thorough review of the net delay assessment.* 3. *Provide clarification of the Development SAR5's and what has been used in the assessment.*	1. Section 7 and the corresponding Pavement Impact Assessment in **Appendix I** have been updated to address OCG's comments, and remove typographical errors or inconsistencies. 2. Net Delay assessment and SIDRA files have been provided as part of this response 3. SAR5's have been detailed in Section 7.4.3 and used consistently in the Pavement Impact Assessment.	Section 7 **Appendix I** Section 7.4.3
Additional Commentary			
	The TIA notes potential accelerated pavement damage to Colinta Road caused by heavy vehicle loading associated with the development. TCC requires quantification of costs and mitigation measures for its asset management obligations. ***The proponent is requested to:*** *Provide an RPEQ certified PIA quantifying life reduction and cost implications for Colinta Road, using Austroads methodology, and recommend mitigation or contributions.*	The report does not identify any potential damage to Colinta Road, with North McLean Drive the only identified section of significant pavement damage. Colinta Road is a masterplanned road to service the eastern precinct of the Cleveland Bay Industrial Park. The design of the road included allowance for the subject site, and it is expected that this road has been suitably designed to accommodate the low levels of heavy vehicle traffic generated by the proposed development (i.e. 16 trucks per day), with negligible impact to life reduction.	

EXECUTIVE SUMMARY

Bitzios Consulting (Bitzios) has been commissioned by Jet Zero Australia Pty Ltd (Jet Zero) to provide traffic engineering advice and prepare a traffic impact assessment (TIA) in relation to a proposed sustainable aviation fuel (SAF) facility development on part of Lot 35 on SP341877 (subject site).

The subject site is located within the Townsville State Development Area (SDA) which is under the jurisdiction of the Queensland Coordinator-General. The subject site is also located in the Townsville City Council (Council) local government area.

The Special Industry – Sustainable Aviation Fuel Facility development will operate 24 hours per day, with approximately 100 staff per day working at the facility across three (3) shifts.

It is noted that the development is currently in the pre-front end engineering (pre-FEED) design stage, therefore proposed plans, construction and operation methodologies etc. are subject to change.

Access to the development is proposed via a driveway crossover on Colinta Road. The driveway crossover will connect to a ~14m wide private access road. A review of the proposed development's access configuration, location and sight lines found all are expected to comply with relevant standards / guidelines.

It is recommended that site / car parking layout elements comply with AS2890 requirements. Importantly, it is expected that compliance with AS2890 will be easily achievable given the large size of the subject site.

The current development plans identify potentially 60 car parking spaces being provided. This will be further assessed during FEED. At this stage it is recommended that 70 car parking spaces are provided on site to support development operations. However, car parking requirements could change during FEED.

Development construction and operation phases traffic generation has been estimated and the likely impacts of this traffic on the surrounding road network assessed. No upgrade works are required at the Ron Maclean Drive / Heleen Drive intersection (Intersection 1) or Bruce Highway / Flinders Highway / Ron Maclean Drive intersection (Intersection 2) to offset development related traffic operation or safety impacts.

A pavement impact assessment has also been undertaken to determine whether the bulk haulage traffic movements will significantly impact the State-controlled Road network. The assessment determined that some sections of Ron Mclean Drive will be significantly impacted and as such contributions towards pavement maintenance will be required.

It is concluded that there are no traffic engineering related matters to preclude approval of the development subject to reasonable and relevant conditions.

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1. INTRODUCTION

1.1 Overview

Bitzios Consulting (Bitzios) has been commissioned by Jet Zero Australia Pty Ltd (Jet Zero) to provide traffic engineering advice in relation to a proposed Sustainable Aviation Fuel (SAF) facility development on part of what are currently identified as Lot 35 on SP341877 and Lot 31 on SP341877 (subject site).

The subject site forms part of an approved Reconfiguring A Lot (ROL) application (Application Ref: AP2023/013). The subject site is identified as Lot 35 on the approved plans and is made up of two (2) separate land areas, including one (1) that is 25-35m wide and connects to Colinta Road. The subject site / Lot 35 totals 19.556 hectares (ha). A copy of the approved ROL plan is included at **Appendix A** and reproduced below for ease of reference.

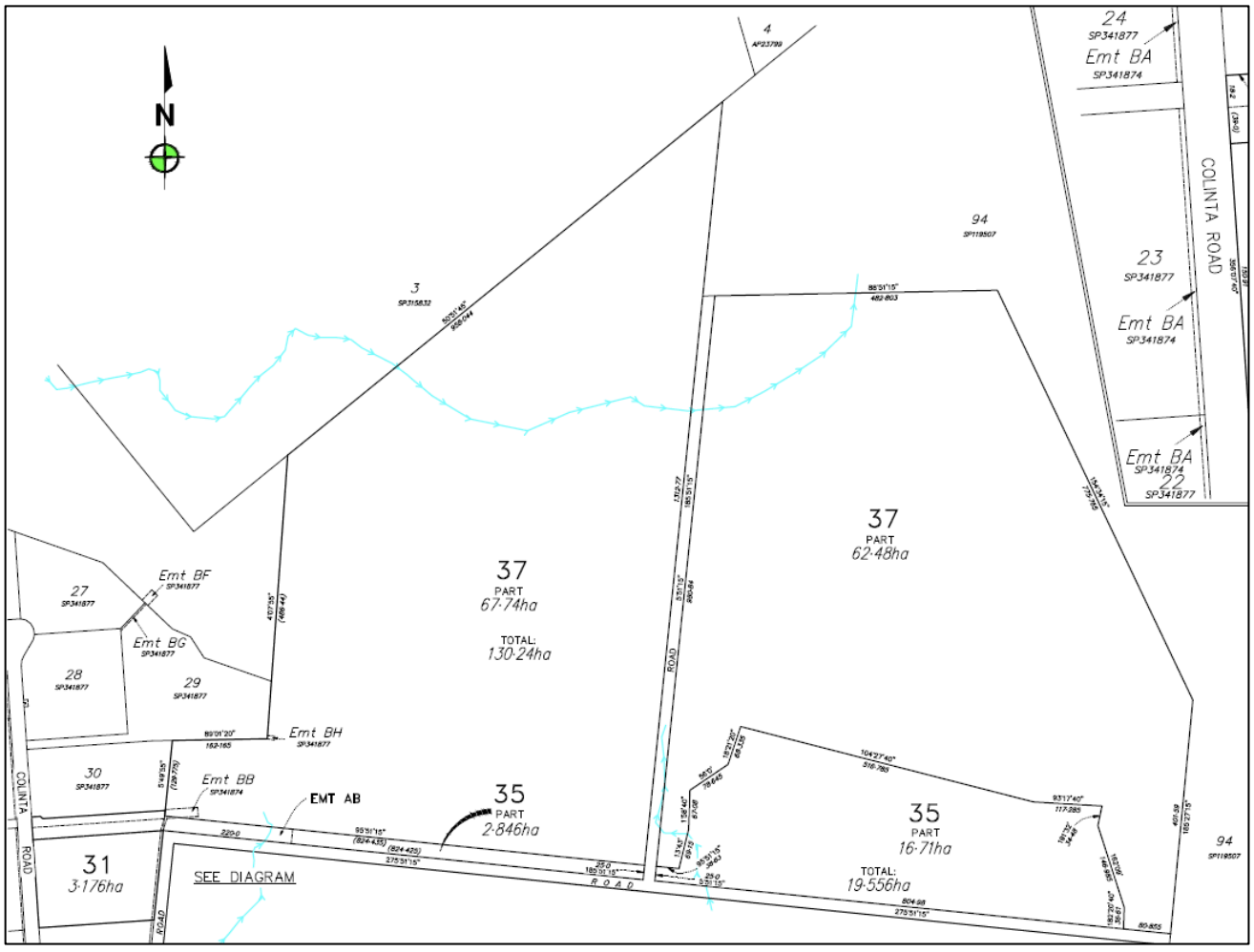


Figure 1.1: ROL Application Plans

The subject site is located within the Townsville State Development Area (SDA) which is under the jurisdiction of the Queensland Coordinator-General. The subject site is also located in the Townsville City Council (Council) local government area.

The development is within the Townsville SDA's Cleveland Bay Industrial Park stage 3 area. The SDA zoning of the subject site is High Impact Industry and Environmental Management.

1.2 Development Overview

Key development details are summarised below:

- **Use:** Special Industry – Sustainable Aviation Fuel Facility

- **Yield:** 1x SAF facility
- **Operating Time:** 24 hours per day
- **Staff:** Assumed 100 employees per day across three (3) shifts
- **Access:** Via a private roadway / driveway partly within an access easement which links to a crossover on Colinta Road
- **Regular Servicing:** Up to B-Double sized vehicles

A copy of the current development plans is included at **Appendix B**. However, it is understood that the project is currently at the pre-Front End Engineering Design stage (pre-FEED) and is bridging to the Front End Engineering Design stage (FEED). Accordingly, the plans could change somewhat in the future.

1.3 Scope of Works

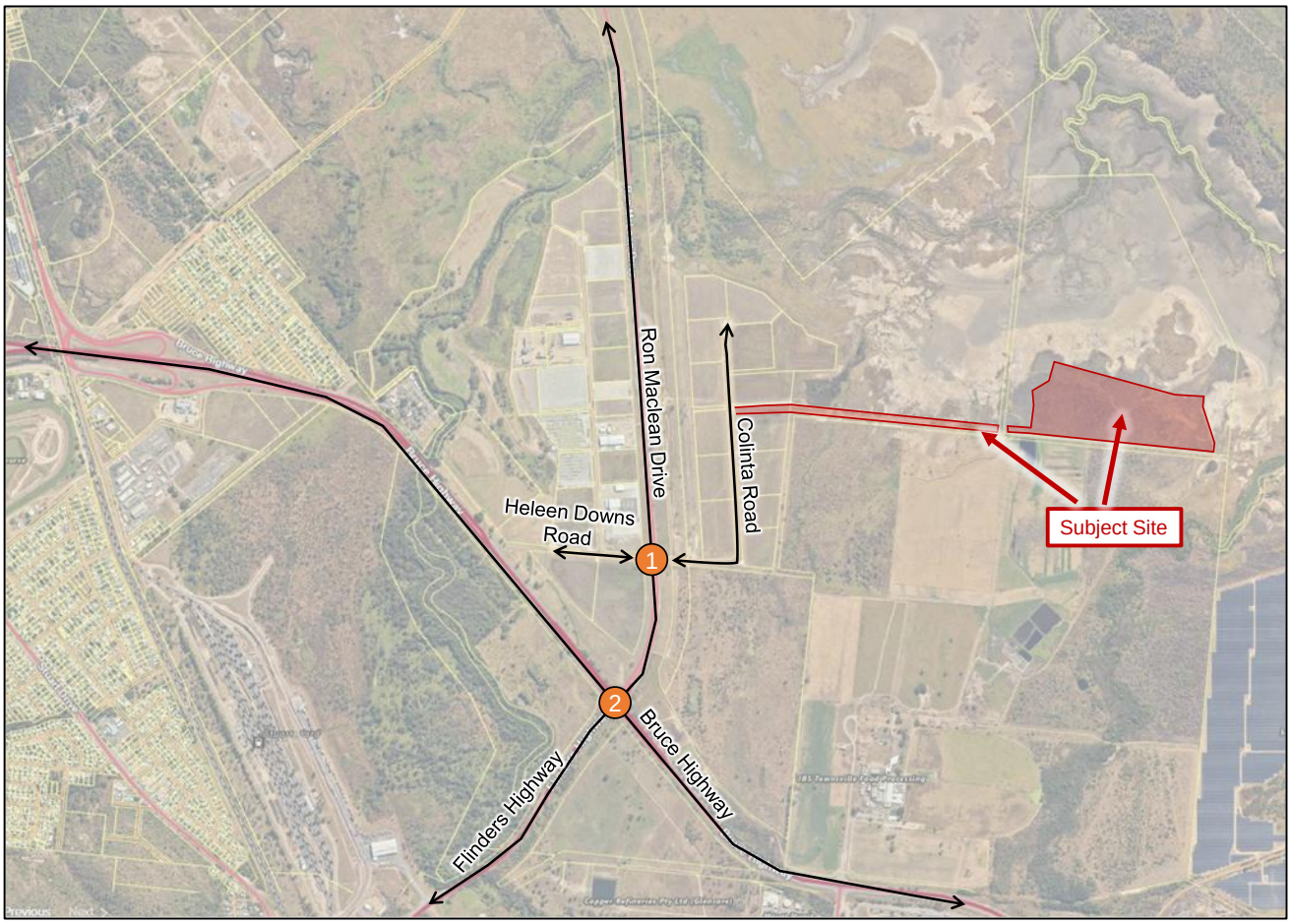
The scope of this TIA included the following tasks:

- Reviewing the proposed development site access arrangements (e.g. locations and configurations) for the construction and operational phases against the QLD Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP), SDA Development Scheme and/or relevant Australian Standard (AS2890.1) (Australian / New Zealand Standard Joint Technical Committee CE-001, Parking Facilities, 2004) requirements
- Reviewing the car parking provisions (e.g. general car spaces and People with Disability (PWD) car spaces) during the construction and operational phases considering SDA Development Scheme (DSDMIP, 2019) requirements and development information provided by Jet Zero
- Reviewing the internal car park layout arrangements (e.g. car parking bay dimensions and aisle widths) against Council planning scheme and/or AS2890.1 (Australian / New Zealand Standard Joint Technical Committee CE-001, Parking Facilities, 2004) requirements
- Reviewing the ability for design vehicles to access and manoeuvre within the site, including preparing swept paths using AutoTURN software
- Estimating future background traffic volumes at the study intersections
- Estimating potential peak hour traffic demands generated by the development during the construction and operation periods, based data provided by the project team
- Estimating development traffic volumes at the study intersections
- Estimating design (background + development traffic) volumes at the study intersections at the development's year of opening
- Undertaking analysis at the study intersections based on background and design scenario traffic volumes, using Signalised Intersection Design and Research Aid (SIDRA) software
- Undertaking a delay impact assessment at the study intersections in accordance with the Department of Transport and Main Roads' (TMR's) Guide to Traffic Impact Assessments (GTIA) (State of Queensland (Department of Transport and Main Roads), 2018)
- If required, identifying what upgrades are required at the study intersections to support the development
- Estimating development traffic (daily and annual) based on information provided by the client. This includes vehicle type, axle configuration and loading status (i.e. loaded or unloaded)
- Determining the existing Standard Axle Repetitions (SARs) for relevant sections of the State controlled network, based on data provided by TMR
- Determining the number and types of vehicles that will be generated by the development, and sections of the State controlled network where pavement assessment is required (i.e. based on the guidance outlined in TMR's GTIA)
- If required, undertaking 'marginal cost analysis' for all impacted sections of the State controlled network to determine the required contributions as a result of the development.

2. EXISTING CONDITIONS

2.1 Road Network

Figure 2.1 illustrates the location of the subject site in the context of the surrounding road network.



Source: QLD Globe, 2025

Figure 2.1: Subject Site Location & Existing Road Network

Table 2.1 identifies key roads surrounding the subject site and their relevant characteristics.

Table 2.1: Road Network

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

**Unposted speed limit – assumed default urban speed*

Table 2.2 identifies key intersections surrounding the subject site and their relevant characteristics.

Table 2.2: Key Intersections

ID	Intersection Name	Jurisdiction	Configuration
1	Ron Maclean Drive / Heleen Downs Road / Colinta Road	State	Signalised
2	Bruce Highway / Flinders Highway / Ron Maclean Drive	State	Signalised

2.2 Transport Network Planning

A review of Council's Townsville City Plan, Local Government Infrastructure Plan (LGIP) (Council, 2024) indicated that there are no planned road network upgrades expected to impact the subject site.

A review of TMR's Queensland Transport and Roads Investment Program (QTRIP) 2024-25 to 2027-28 (TMR, 2024) indicated that there are no planned road network upgrades expected to impact the subject site.

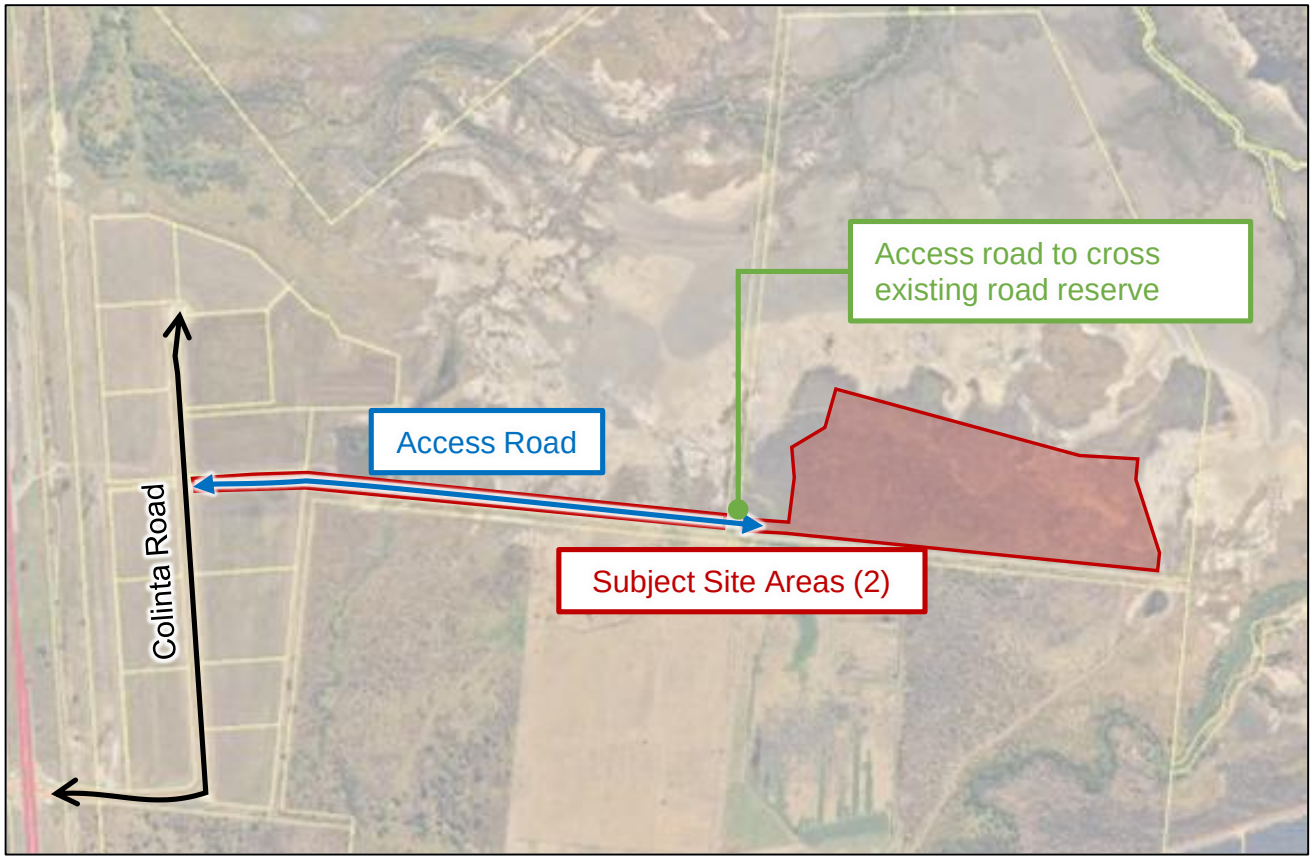
3. TRAFFIC DESIGN REVIEW

3.1 Site Access

3.1.1 Overview

Access to the development is proposed via a driveway crossover on Colinta Road. The driveway crossover will connect to a ~14m wide private access road constructed within the new access handle. This road will traverse the area of the subject site closest to Colinta Road, before crossing an existing section of road reserve to provide access to the main area of the subject site.

Figure 3.1 provides an overview of the proposed site access.



Source: QLD Globe, 2025

Figure 3.1: Site Access Overview

A copy of plans illustrating the site access arrangement is included at **Appendix C.**

A review of the proposed driveway crossover has been undertaken as detailed herein.

3.1.1 Driveway Crossover Configuration

The SDA Development Scheme (DSDMIP, 2019) refers to Council's Townsville City Plan (Council, 2024) requirements in relation to site access.

It is noted that the current site access plans include limited details regarding the proposed driveway crossover configuration. Accordingly, the subject site frontage width has been reviewed against the crossover width required by Council.

Table 3.1 summarises our review of the subject site frontage width against the crossover width required by Council.

Table 3.1: Review – Subject Site Frontage Vs Driveway Crossover Width

Design Vehicle	Subject Site Width	Required Driveway Crossover Configuration
B-Double	~25m with a 14m wide access road	7-15m wide access at the property boundary (10-18m wide at the kerb) in accordance with Council Standard Drawing 'SD-031'

Based on the above, it is expected that a driveway crossover configured generally in accordance with Council requirements can be provided.

3.1.2 Location

Table 3.2 summarises our review of the proposed driveway crossover location against AS2890.1 (Australian / New Zealand Standard Joint Technical Committee CE-001, Parking Facilities, 2004), as referenced by Council's Planning Scheme.

Table 3.2: Access Location Review -

Adjacent Feature	Required Separation	Expected Separation	Expected to be Compliant (AS2890.1)
Adjacent Intersection	6m along kerb	>6m	Yes

In summary, the proposed driveway crossover location is expected to comply with AS2890.1 requirements.

3.1.3 Sight Distance

Limited details of the topography near the proposed driveway crossover were available. However, it is understood that the topography is relatively flat.

Considering the above, a review of expected driveway sight distances has not been completed. However, it is considered likely that sufficient sight distances will be achieved at the driveway crossover.

It is recommended that as site planning progresses, driveway sight distances be reviewed to confirm that they will comply with AS2890.1 requirements.

3.2 Site / Car Park Layout

As previously identified, ongoing project planning could result in reasonably significant changes to the plans. Accordingly, a detailed review of the site / car park layout arrangements has not been undertaken.

It is recommended that site / car parking layout elements comply with AS2890 requirements. Importantly, it is expected that compliance with AS2890 will be easily achievable given the large size of the subject site.

Table 3.3 identifies AS2890.1 (Australian / New Zealand Standard Joint Technical Committee CE-001, Parking Facilities, 2004) and AS2890.2 (Australian Standard Technical Committee CE-001, Parking Facilities, 2018) requirements for key site / car parking layout elements.

Table 3.3: Car Park Layout Review

Design Element	Required
Visitor Parking Spaces (Class 2)	2.5m x 5.4m
Staff Parking Spaces (Class 2)	2.5m x 5.4m
Car Parking Spaces (PWD)	2.4m x 5.4m with 2.4m x 5.4m shared zone
Car Parking Aisle Width	5.8m min
Service Vehicle Aisle Width	6.5m min
HRV Service Bays	3.5m x 12.5m

3.3 Car Parking Provision

3.3.1 Construction Stage

Temporary on-site car parking is proposed to be provided during the construction phase. As the subject site is very large, it is expected that construction period car parking demands could be easily accommodated.

3.3.2 Operational Stage

3.3.2.1 Council Requirements

The number of on-site car parking spaces will be assessed as the development plans progress through FEED. Nonetheless a review has been undertaken on the currently proposed development concept.

Table 3.4 identifies Council's car parking provision rate for the proposed development land use.

Table 3.4: Car Parking Provision Rate

Land Use	Required Provision Rate
Industrial	One (1) space per 100m^2 of GFA

The project site design will consider the GFA to determine the appropriate number of car parks based on the plant site requirements and considering the application of Council's car parking provision rate. The application of Council's car parking provision rate is not considered appropriate in this case due to the specialised nature of the proposed development. Therefore, development car parking requirements have been estimated based on a first principles assessment using information provided by Jet Zero. The level of staffing rates may be adjusted during FEED.

3.3.2.2 First Principles Assessment

The proposed development's car parking requirements have been estimated based on expected development staff and visitor numbers provided by the Jet Zero.

Table 3.5 summarises expected staff per shift and the expected number of daily visitors.

Table 3.5: Development Staffing Requirements & Visitor Demands

User Type	Timing	Yield
Staff	Morning Shift (6AM – 2PM)	34 staff
	Afternoon Shift (2PM – 10PM)	34 staff
	Night Shift (10PM – 6AM)	34 staff
Visitors	Anytime During Operating Hours	1-2 visitors

Based on the above, car parking demands are expected to peak around the start and end of each shift.

Assuming all staff drive and do not carpool, there will be approximately 34 starting staff and 34 finishing staff parked on site at these times. Therefore, approximately 68 car parking spaces are expected to be required to accommodate staff demands. However, this will be further assessed during FEED.

At these times, it is expected that there may also be up to two (2) visitors parked on site.

Based on the above, the development is expected to generate demand for approximately 70 car parking spaces during peak periods.

3.3.2.3 Summary

In summary, at this stage it is recommended that 70 car parking spaces are provided on site to support development operations. However, this will be further assessed during FEED.

The current development plans identify 60 car parking spaces. A concept plan identifying how 70 car parking spaces could be provided on site has been prepared and is included at **Appendix D**.

3.4 Servicing

The proposed development proposes to import ethanol which will be transported to the facility via B-Double sized vehicles. Once the ethanol has been processed onsite / converted to SAF, it will be exported via B-Double sized vehicles to local airports or ports.

Given the above, provisions have been made to allow B-Double vehicles to manoeuvre and service the subject site where ethanol imports and SAF exports will be undertaken.

It is understood that the service vehicle requirements of all other areas are pending further investigations from the project team, which will confirm internal service vehicle flows and requirements throughout the other service areas.

Swept path diagrams have been prepared which demonstrate that the relevant service vehicles can enter the ethanol offloading and SAF loading area in a forward gear, access the weighbridge / loading area and exit the area in a forward gear via. Heavy Rigid Vehicle (HRV) swept paths for other servicing areas across the site have also been prepared.

A copy of the swept paths diagrams is provided at **Appendix E**.

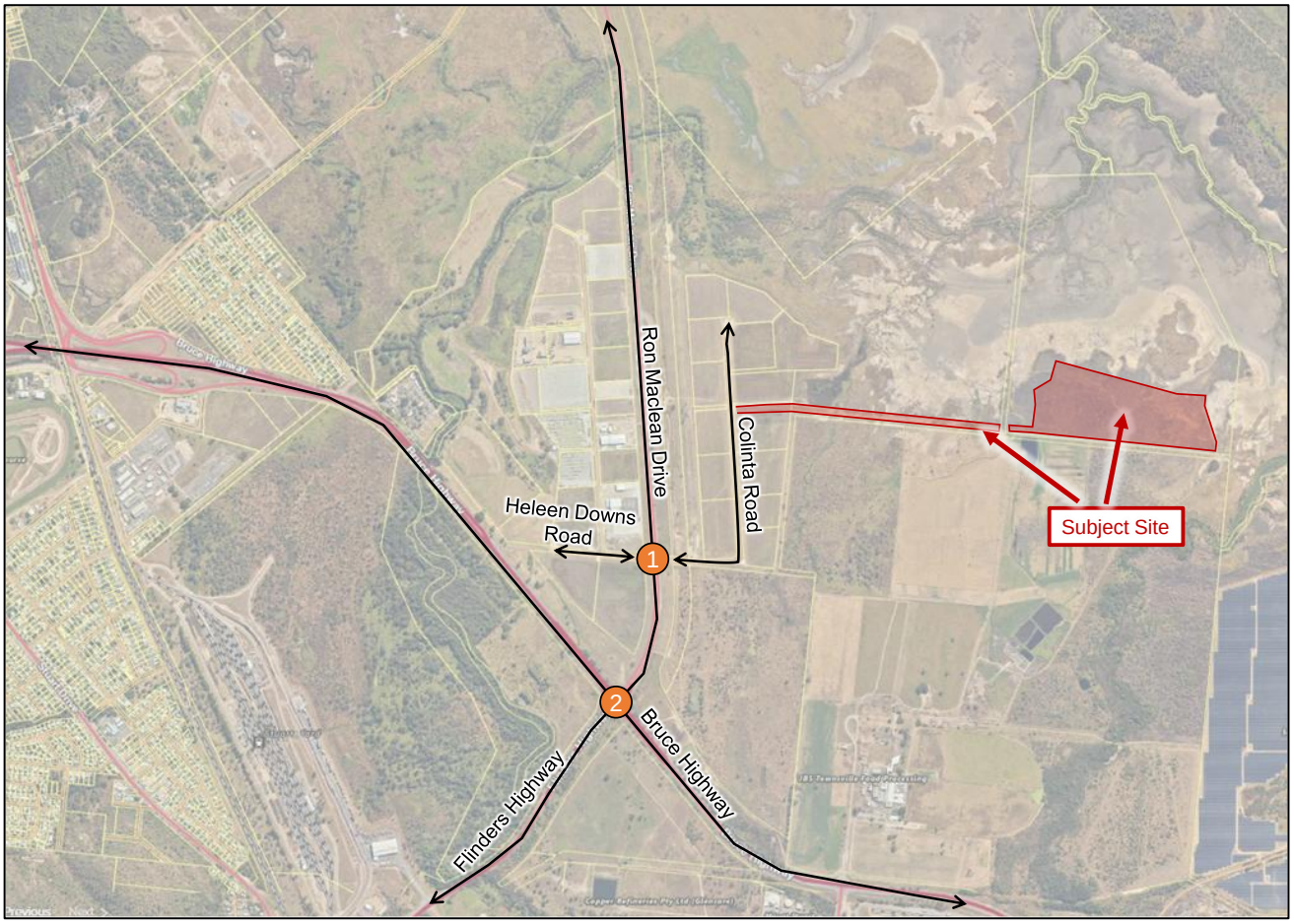
In summary, currently proposed ethanol / SAF loading areas are considered appropriate from traffic engineering perspective. However, it is recommended that additional swept path analysis be completed to confirm servicing arrangements are suitable as planning progresses. Servicing arrangements shall also comply with AS2890.2 (Australian Standard Technical Committee CE-001, Parking Facilities, 2018) requirements.

4. TRAFFIC ASSESSMENT - INPUTS

4.1 Overview

An assessment of potential development traffic impacts has been undertaken.

Figure 4.1 identifies the intersections (study intersections) that has been assessed herein.



Source: Google Maps

Figure 4.1: Study Intersections

Table 4.1 identifies the study intersections that have been assessed herein.

Table 4.1: Study Intersections

Intersection ID	Intersection Name
1	Ron Maclean Drive / Heleen Downs Road
2	Bruce Highway / Flinders Highway / Ron Maclean Drive

4.2 Background Traffic Volumes

4.2.1 Traffic Survey Data

The surveys were completed at the study intersections on Wednesday 23rd October 2024. The following peak hour periods were recorded across the network:

- Weekday AM Peak Period: 7:30am – 8:30am
- Weekday PM Peak Period: 3:30pm – 4:30pm.

A copy of the traffic survey data is included at **Appendix F**.

4.2.2 Traffic Growth Rate

A 2.5% p.a. linear growth rate has been applied to survey volumes on Ron Mclean Drive and a 3.5% growth rate has been applied to the Bruce Highway to estimate future background traffic volumes. Importantly, these adopted growth rates are consistent with 5-year growth rates informed by TMR traffic census data.

4.2.3 Cleveland Bay Industrial Park Traffic

The subject site is within the Cleveland Bay Industrial Park area. As part of the planning for this industrial area, a traffic impact assessment was prepared by Langtree Consulting (Langtree TIA), dated 23rd October 2020 (Ngoo, 2020).

The report estimated the traffic demands likely to be generated by development within the industrial area. The reporting split the area into two (2) precincts being the 'eastern precinct' and the 'western precinct', split based on the respective side of Ron Maclean Drive.

The subject site was considered as part of the 'eastern precinct'. We have adopted the traffic identified within the report for each precinct to be considered as background traffic. To appropriately reflect the changes proposed at the subject site we have removed the trips that were attributed to the subject site (~83 trips) from the background scenario using the traffic generation rates and distributions adopted in the Langtreet TIA (Ngoo, 2020).

Adopted background traffic volume diagrams are included at **Appendix G.**

4.3 Development Traffic

4.3.1 Traffic Generation – Construction Phase

Due to the relatively unique nature of the proposed development, no 'typical' / 'reference' trip generation rates are considered applicable. Accordingly, a 'first principles' approach has been adopted to estimate development traffic demands.

Based on input from the project team, the following key details informed our first principles traffic generation assumptions and estimates for the development's construction phase:

- Staff Related Vehicle Movements:
  - Staff per shift (1 x 12hr shift per day): 1,000 persons maximum, shifts are expected to start at 6am and end at 6pm. The shift start and finish times are outside of road peak hours therefore, we have assumed that 50% of staff will arrive/depart within the road peak time which is expected to be conservative.
  - Journey to Work Mode Share:
    - 90% of staff via 53 seat coaches and 20 seat minibuses, assuming a 50/50 split between the modes results in an average capacity of 36.5. Resulting in 12.5 coaches carrying ~650 staff and 12.5 minibuses transporting ~250 staff
    - 10% of staff (100 staff) via private vehicle with an average vehicle occupancy of 1.5 persons per vehicle
  - Staff trips
    - 13 buses (25 x 50% peak factor)
    - 34 cars (67 x 50% peak factor)
    - Total: 47 vehicles
  - Arrival / departure arrangements: Staff arrive during the hour of the start of their shift and depart during the hour at the end of their shift. Since the shifts start and finish outside of surrounding road peaks, we have conservatively assumed that 50% of peak staff trips will occur during the road peak periods. Minibuses and cars are parked on-site for the duration of the shift while coaches will depart site once dropping staff off at site
  - AM peak hour movements: 47 vehicles arrive (i.e. 47 trips in) 7 vehicles depart (i.e. 7 trips out)
  - PM peak hour movements: 7 vehicles arrive (i.e. 7 trips in) 47 vehicles depart (i.e. 47 trips out)
  - It is expected that construction staff will be staying in accommodation camps or on ships at the port, therefore a traffic distribution of 70% north and 30% south has been adopted.

- Servicing / Delivery Vehicle Movements:
  - Daily: Not expected to exceed 30 vehicles per day on average (or 60 trips, 30 in and 30 out)
  - Hourly: It is expected that deliveries will primarily occur within the first nine (9) hours of a shift (which is 12 hours long). It has been assumed that 90% of deliveries or 3 deliveries per hour will occur within the nine (9) hour period. In the remaining three (3) hours there will be 1 delivery per hour.
  - AM peak hour movements: Three (3) deliveries (3 trips in and 3 trips out)
  - PM peak hour movements: One (1) delivery (1 trip in and 1 trip out)

4.3.2 Traffic Generation – Operational Phase

Based on input from the project team, the following key details informed our first principles traffic generation assumptions and estimates for the development's operational phase:

- Staff Related Vehicle Movements:
  - Staff per shift (3 shifts per day): 34 persons
  - Journey to Work Mode Share: 100% of staff via private vehicle with occupancy of 1 person per vehicle.
  - Staff trips: 34 cars per shift
  - Arrival / departure arrangements: Staff arrive during the AM peak and depart during the PM peak. Staff park on-site for the duration of their shift
  - AM peak hour movements: 34 vehicles arrive for start of morning shift (i.e. 34 trips in) and 34 vehicles depart (i.e. 34 trips out) for end of night shift
  - PM peak hour movements: 34 vehicles depart (i.e. 34 trips out) at the end of the morning shift and 34 vehicles arrive for start of the evening shift (i.e. 34 trips in)
  - It is expected that operational staff will live in nearby suburbs, therefore the majority of staff will access the site via the Bruce Highway. Subsequently a traffic distribution of 60% south and 40% north has been adopted.
- Servicing / Delivery Vehicle Movements:
  - Daily: Typically, 16 vehicles per day delivering to Townsville Airport, Townsville Port or to Cairns. It is understood that there will be 10 deliveries per day from the Port and six (6) deliveries per day to Townsville / Cairns Airport. It has been assumed that there is an equal split between the delivery to Townsville Airport and Cairns Airport.
  - AM peak hour movements: On average 1 delivery per hour is expected. However, for the purposes of assessment it has been assumed that four (4) deliveries will occur (i.e. 4 trips in and 4 trips out) during the AM peak
  - PM peak hour movements: On average 1 delivery per hour is expected. However, for the purposes of assessment it has been assumed that four (4) deliveries will occur (i.e. 4 trips in and 4 trips out) during the PM peak

Table 4.2 summarises the construction and operational phase traffic demand estimates detailed above.

Table 4.2: Development Traffic Generation

Trip Type	AM Peak (Trips)			PM Peak (Trips)		
	Inbound	Outbound	Total	Inbound	Outbound	Total
Construction Phase						
Staff	47	7	54	7	47	54
Servicing / Deliveries	3	3	6	1	1	2
Total	**50**	**10**	**60**	**8**	**48**	**56**
Operational Phase						
Staff	34	34	68	34	34	68
Servicing / Deliveries	4	4	8	4	4	8
Total	**38**	**38**	**76**	**38**	**38**	**76**

As identified above, the proposed development is typically expected to generate up to 60 peak hour trips during the construction phase and 76 peak hour trips during the operational phase.

Table 4.3 summarises the adopted external development traffic distribution based on a review of surrounding development, trip attractors / generators etc.

Table 4.3: Development Traffic Distribution – External

Phase	Direction	Via	Distribution
Construction	North	Ron Mclean Drive	70%
	South	Ron Mclean Drive	30%
	Total	**-**	**100%**
Operational	North	Ron Mclean Drive	40%
	South	Ron Mclean Drive	60%
	Total	**-**	**100%**

4.4 Assessed Traffic Volume Scenarios

For the purposes of the traffic assessment, we have assumed the following:

- Development year of construction commencement: 2025
- Development year of opening: 2027

Traffic volumes have been derived and assessed for the following scenarios:

- **2024 Survey**: 2024 surveyed volumes
- **2025 Background**: 2024 Survey factored up by 2.5%-3.5% per annum (as discussed above in Section 4.2.2) through to 2025 construction commencement year
- **2025 With Development**: 2025 Background + Development construction traffic volumes
- **2027 Background**: 2024 Survey factored up by 2.5%-3.5% per annum (as discussed above in Section 4.2.2) through to 2027 development year of opening
- **2027 With Development**: 2027 Background + Development operation traffic volumes

It is noted that traffic volume scenarios have been assessed as applicable, noting that TMR's GTIA only requires consideration of 10 year post opening design horizon impacts at accesses, and year of opening impacts at external (non-access) intersections.

Figures identifying traffic volume calculations and assessed traffic volumes are included at **Appendix G**.

5. TRAFFIC ANALYSIS - RESULTS

5.1 Intersection 1: Ron Maclean Drive / Heleen Downs Road / Colinta Road

Figure 5.1 includes an aerial image of Intersection 1 and the intersection layout as assessed in SIDRA.

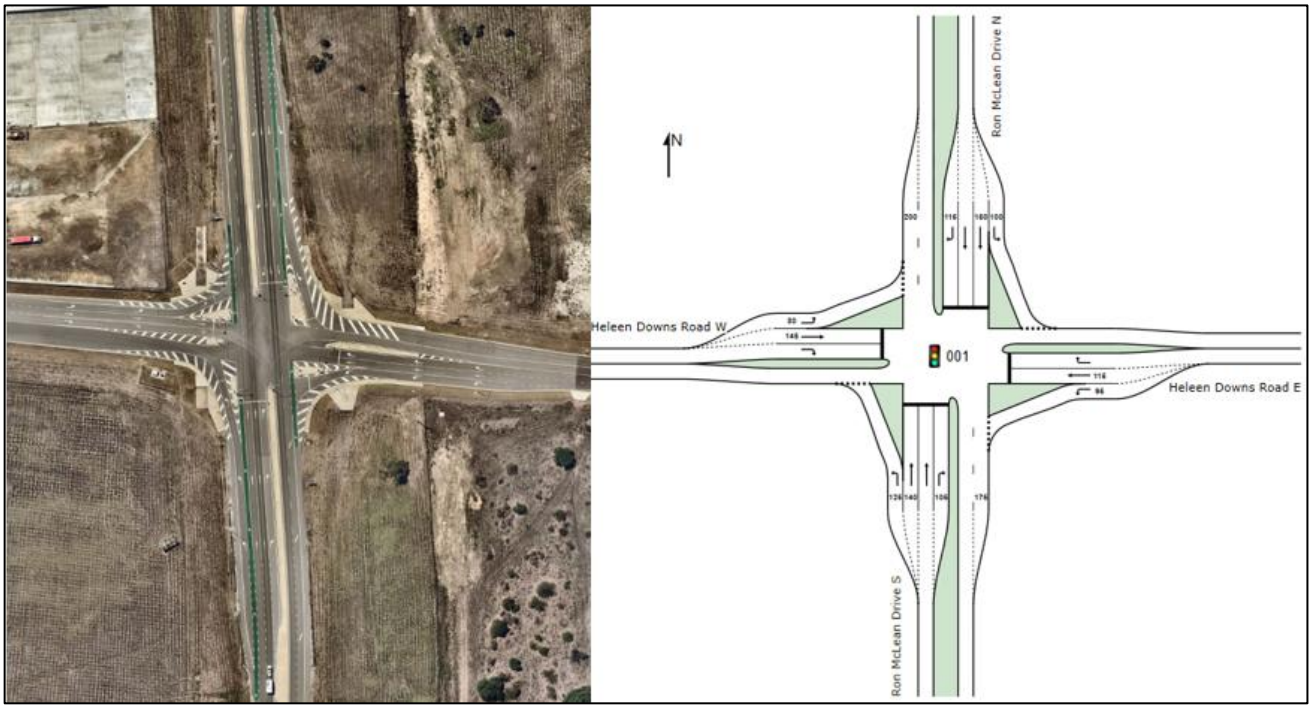


Figure 5.1: Intersection 1 – Aerial & Modelled SIDRA Layout

The SIDRA results are summarised in Table 5.1 with detailed outputs provided at **Appendix H**.

Table 5.1: Intersection 1 – SIDRA Results

Year	Peak	Scenario	Total Vehicles	Degree of Saturation (DOS)	Average Delay (s)	Level of Service	95th Percentile Queue (m)
2024	AM	Survey	466	0.14	13.1	A	24
	PM		353	0.12	17.4	B	19
2025 (Construction)	AM	BG	916	0.28	23.5	B	38
	PM		801	0.22	24.4	B	33
	AM	BG + DEV	982	0.28	23.8	B	39
	PM		863	0.26	24.8	B	41
2027 (Operations)	AM	BG	938	0.29	23.5	B	40
	PM		805	0.23	24.0	B	33
	AM	BG + DEV	1,019	0.30	24.4	B	41
	PM		898	0.26	24.9	B	38

As identified above, Intersection 1 will operate within the typically adopted operational threshold for a signalised intersection (DOS < 0.9) in all assessed scenarios.

5.2 Intersection 2: Bruce Highway / Flinders Highway / Ron Maclean Drive

Figure 5.2 includes an aerial image of Intersection 2 and the intersection layout as assessed in SIDRA.

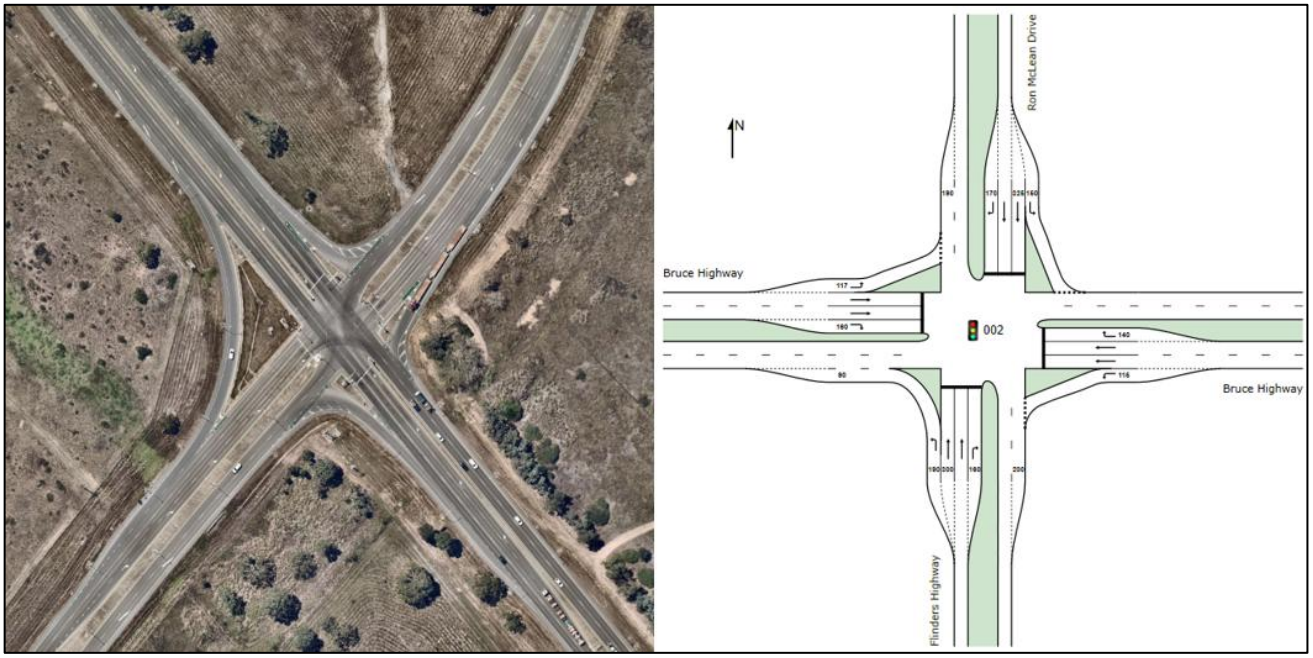


Figure 5.2: Intersection 2 – Aerial & Modelled SIDRA Layout

The SIDRA results are summarised in Table 5.2 with detailed outputs provided at **Appendix H**.

Table 5.2: Intersection 2 – SIDRA Results

Year	Peak	Scenario	Total Vehicles	Degree of Saturation (DOS)	Average Delay (s)	Level of Service	95th Percentile Queue (m)
2024	AM	Survey	2,322	0.52	19.2	B	84
	PM		1,772	0.37	20.1	B	69
2025 (Construction)	AM	BG	2,535	0.57	22.3	B	97
	PM		1,978	0.40	22.0	B	72
	AM	BG + DEV	2,557	0.58	22.5	B	99
	PM		1,997	0.41	22.5	B	74
2027 (Operations)	AM	BG	2,699	0.61	22.8	B	104
	PM		2,101	0.42	22.2	B	78
	AM	BG + DEV	2,746	0.63	23.1	B	104
	PM		2,146	0.45	23.1	B	82

As identified above, Intersection 2 will operate within the typically adopted operational threshold for a signalised intersection (DOS < 0.9) in all assessed scenarios.

5.3 Delay Assessment

Based on the above individual intersection assessments of the operational stage, a net delay assessment has been undertaken in accordance with TMR's GTIA to determine the expected impacts across the impacted assessment area. Table 5.3 summarises the delay assessment.

Table 5.3: Network Delay Assessment

Intersection ID	Background			Background + Development		Impact	
	Demand	Delay (sec/veh)	Delay (veh-mins)	Delay (sec/veh)	Delay (veh-mins)	Delay (veh-mins)	%
AM Peak							
1	916	23.5	358.4	24.1	367.7	9.3	2.59%
2	2,535	22.3	940.9	22.4	947.8	6.9	0.74%
Subtotal	**3,451**	**22.6**	**1,299**	**22.9**	**1,315.5**	**16.2**	**1.25%**
PM Peak							
1	801	24.4	326.0	25.2	336.1	10.1	3.09%
2	1,978	22.0	725.3	22.4	738.1	12.8	1.77%
Subtotal	**2,779**	**22.7**	**1,051.3**	**23.2**	**1,074.2**	**22.9**	**2.18%**
Total	**6,230**	**22.6**	**2,350.6**	**23.0**	**2,389.7**	**39.1**	**1.66%**

The network delay assessment indicates that background delay impacts resulting from development traffic will not exceed 5%. Accordingly, no intersection upgrades are required by TMR's GTIA to offset development traffic impacts.

6. SAFETY RISK ASSESSMENT

6.1 Overview

A review of the proposed expansion's potential safety impacts on the State-controlled transport network near the subject site has been undertaken in accordance with TMR's GTIA.

In terms of road safety, TMR's GTIA states that:

"Development should ensure that a road's safety is not significantly worsened as a result of development and that any pre-existing or development-introduced unacceptable safety risk is addressed. 'Significantly worsened' is defined in terms of the change in the safety risk rating (for example, from low to medium or from medium to high)."

Figure 6.1 illustrates the safety risk score matrix included in the GTIA.

		Potential consequence				
		Property only (1)	Minor injury (2)	Medical treatment (3)	Hospitalisation (4)	Fatality (5)
Potential likelihood	Almost certain (5)	M	M	H	H	H
	Likely (4)	M	M	M	H	H
	Moderate (3)	L	M	M	M	H
	Unlikely (2)	L	L	M	M	M
	Rare (1)	L	L	L	M	M

Figure 6.1: Safety Risk Score Matrix

6.1.1 Potential Risks

The following potential risks which could result from the development have been identified:

- **Risk 1:** The development will result in a greater number of motorists turning at Intersection 1. More specifically from Ron Mclean Drive into Colinta Road. This will increase the potential for vehicles from opposing direction type crashes (e.g. T-bone crashes), vehicles from one direction type crashes (e.g. rear-end crashes) etc.
- **Risk 2:** The development will result in a greater number of motorists turning at Intersection 1. More specifically from Colinta Road into Ron Mclean Drive. This will increase the potential for vehicles from opposing direction type crashes (e.g. T-bone crashes), vehicles from one direction type crashes (e.g. rear-end crashes) etc.
- **Risk 3:** The development will result in a greater number of motorists turning at Intersection 2. More specifically from Ron Mclean Drive into the Bruce Highway. This will increase the potential for vehicles from opposing direction type crashes (e.g. T-bone crashes), vehicles from one direction type crashes (e.g. rear-end crashes) etc.
- **Risk 4:** The development will result in a greater number of motorists turning at Intersection 2. More specifically from the Bruce Highway into Ron Mclean Drive. This will increase the potential for vehicles from opposing direction type crashes (e.g. T-bone crashes), vehicles from one direction type crashes (e.g. rear-end crashes) etc.

The above risks have been assessed below in accordance with TMR's GTIA.

6.1.2 Risk 1: Increased Motorists Turning Right & Left from Ron Mclean Drive into Colinta Road (Intersection 1)

An assessment of Risk 1 has been undertaken in accordance with TMR's GTIA. The results are summarised in Table 6.1.

Table 6.1: Safety Risk Assessment – Risk 1

Risk Item	Without Development			With Development			Comments
	Likelihood	Consequence	Risk Score	Likelihood	Consequence	Risk Score	
1	2	4	M	3	4	M	The likelihood of the risk without the development has been identified as 'unlikely' for the following key reasons: ▪ A review of publicly available crash data indicates that there have been no crashes recorded at the intersection in the last five (5) years. ▪ The assessed intersection operates well with low average delays, queues and DOS ▪ Sight distances are good. The likelihood of the risk with the development is expected to increase slightly and has therefore been identified as 'moderate'. The key reasons for this are as follows: ▪ The development is expected to minorly increase traffic volumes at the intersection ▪ Notwithstanding traffic increases resulting from the development, the intersection is still expected to operate with a low DOS. Average delays and queues are also expected to be low. The severity of the risk has been identified as 'Hospitalisation' for the following key reasons: ▪ Ron Mclean Drive has a speed limit of 80km/h and Colinta Road has a 50km/h speed limit ▪ T-bone crashes may result in impacts close to where motorists are sitting. It is worth noting that we expect rear-end crashes to be less severe than T-bone crashes. Further, as sight distances are good, it is likely that approaching motorists would be able to brake / slow prior to colliding with another vehicle. This could result in lower crash severity.

In summary, the Risk 1 score has been determined to be 'medium' both with and without the development. Accordingly, no works are required at Intersection 1 to offset development induced safety impacts related to Risk 1.

6.1.3 Risk 2: Increased Motorists Turning Right & Left from Colinta Road into Ron Mclean Drive (Intersection 1)

An assessment of Risk 2 has been undertaken in accordance with TMR's GTIA. The results are summarised in Table 6.2.

Table 6.2: Safety Risk Assessment – Risk 2

Risk Item	Without Development			With Development			Comments
	Likelihood	Consequence	Risk Score	Likelihood	Consequence	Risk Score	
2	2	4	M	3	4	M	The likelihood of the risk without the development has been identified as 'unlikely' for the following key reasons: ▪ A review of publicly available crash data indicates that there have been no crashes recorded at the intersection in the last five (5) years. ▪ The assessed intersection operates well with low average delays, queues and DOS ▪ Sight distances are good. The likelihood of the risk with the development is expected to increase slightly and has therefore been identified as 'moderate'. The key reasons for this are as follows: ▪ The development is expected to minorly increase traffic volumes at the intersection ▪ Notwithstanding traffic increases resulting from the development, the intersection is still expected to operate with a low DOS. Average delays and queues are also expected to be low. The severity of the risk has been identified as 'Hospitalisation' for the following key reasons: ▪ Ron Mclean Drive has a speed limit of 80km/h and Colinta Road has a 50km/h speed limit ▪ T-bone crashes may result in impacts close to where motorists are sitting. It is worth noting that we expect rear-end crashes to be less severe than T-bone crashes. Further, as sight distances are good, it is likely that approaching motorists would be able to brake / slow prior to colliding with another vehicle. This could result in lower crash severity.

In summary, the Risk 2 score has been determined to be 'medium' both with and without the development. Accordingly, no works are required at Intersection 1 to offset development induced safety impacts related to Risk 2.

6.1.4 Risk 3: Increased Motorists Turning Right & Left from Ron Mclean Drive into The Bruce Highway (Intersection 2)

An assessment of Risk 3 has been undertaken in accordance with TMR's GTIA. The results are summarised in Table 6.3.

Table 6.3: Safety Risk Assessment – Risk 3

Risk Item	Without Development			With Development			Comments
	Likelihood	Consequence	Risk Score	Likelihood	Consequence	Risk Score	
3	2	4	M	3	4	M	The likelihood of the risk without the development has been identified as 'unlikely' for the following key reasons: ▪ A review of publicly available crash data indicates that there has been one (1) crash recorded at the intersection in the last five (5) years. It is noted that this crash was a rear end crash. ▪ The assessed intersection operates well with low average delays, queues and DOS ▪ Sight distances are good. The likelihood of the risk with the development is expected to increase slightly and has therefore been identified as 'moderate'. The key reasons for this are as follows: ▪ The development is expected to minorly increase traffic volumes at the intersection ▪ Notwithstanding traffic increases resulting from the development, the intersection is still expected to operate with a low DOS. Average delays and queues are also expected to be low. The severity of the risk has been identified as 'Hospitalisation' for the following key reasons: ▪ Ron Maclean Drive and the Bruce Highway have 80km/h speed limits ▪ T-bone crashes may result in impacts close to where motorists are sitting. It is worth noting that we expect rear-end crashes to be less severe than T-bone crashes. Further, as sight distances are good, it is likely that approaching motorists would be able to brake / slow prior to colliding with another vehicle. This could result in lower crash severity.

In summary, the Risk 3 score has been determined to be 'medium' both with and without the development. Accordingly, no works are required at Intersection 2 to offset development induced safety impacts related to Risk 3.

6.1.5 Risk 4: Increased Motorists Turning Right & Left from The Bruce Highway into Ron Mclean Drive (Intersection 2)

An assessment of Risk 4 has been undertaken in accordance with TMR's GTIA. The results are summarised in Table 6.4.

Table 6.4: Safety Risk Assessment – Risk 4

Risk Item	Without Development			With Development			Comments
	Likelihood	Consequence	Risk Score	Likelihood	Consequence	Risk Score	
4	2	4	M	3	4	M	The likelihood of the risk without the development has been identified as 'unlikely' for the following key reasons: ▪ A review of publicly available crash data indicates that there has been one (1) crash recorded at the intersection in the last five (5) years. It is noted that this crash was a rear end crash. ▪ The assessed intersection operates well with low average delays, queues and DOS ▪ Sight distances are good. The likelihood of the risk with the development is expected to increase slightly and has therefore been identified as 'moderate'. The key reasons for this are as follows: ▪ The development is expected to minorly increase traffic volumes at the intersection ▪ Notwithstanding traffic increases resulting from the development, the intersection is still expected to operate with a low DOS. Average delays and queues are also expected to be low. The severity of the risk has been identified as 'Hospitalisation' for the following key reasons: ▪ Ron Maclean Drive and the Bruce Highway have 80km/h speed limits ▪ T-bone crashes may result in impacts close to where motorists are sitting. It is worth noting that we expect rear-end crashes to be less severe than T-bone crashes. Further, as sight distances are good, it is likely that approaching motorists would be able to brake / slow prior to colliding with another vehicle. This could result in lower crash severity.

In summary, the Risk 4 score has been determined to be 'medium' both with and without the development. Accordingly, no works are required at Intersection 2 to offset development induced safety impacts related to Risk 4.

7. PAVEMENT IMPACT ASSESSMENT

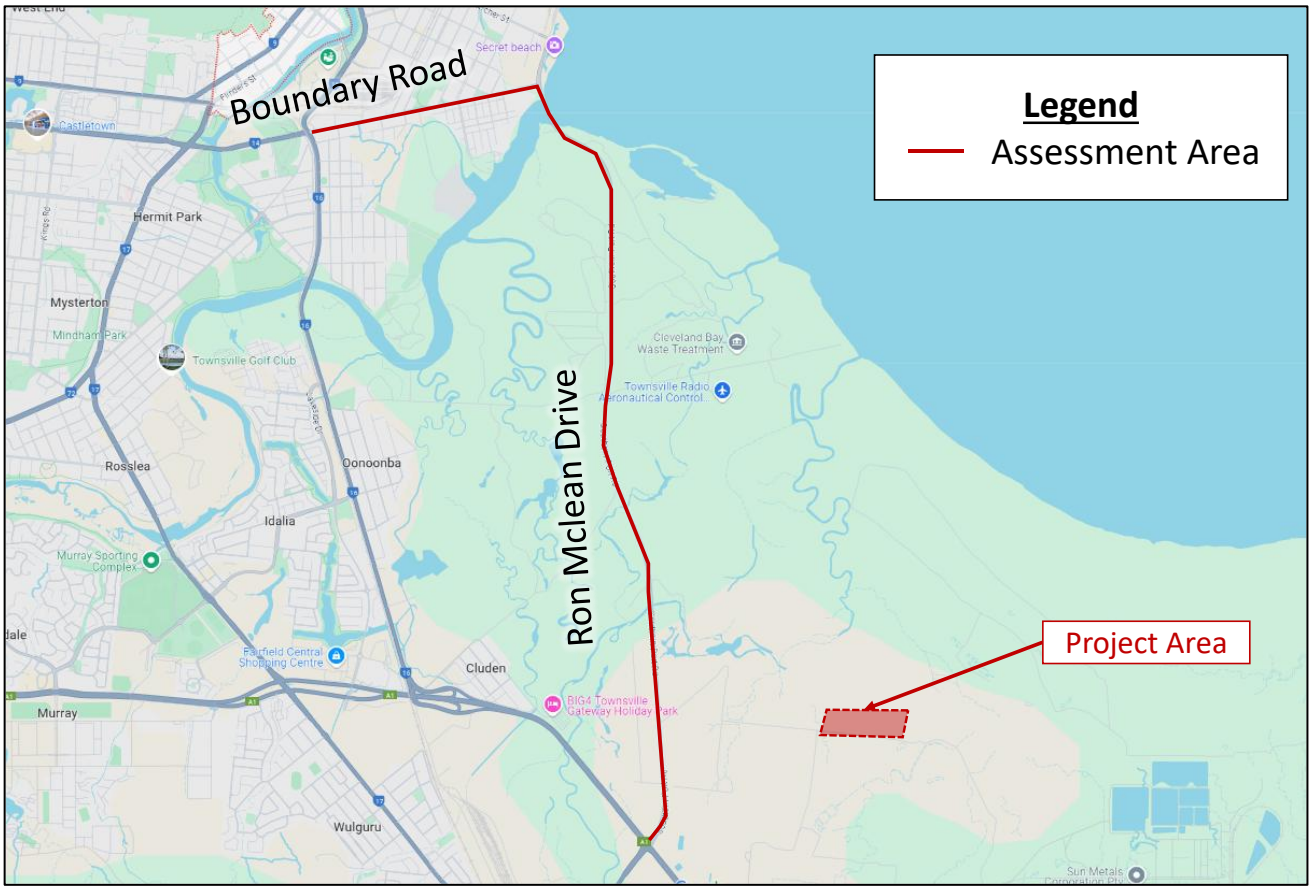
7.1 Context

In December 2018, TMR released the 'Guide to Traffic Impact Assessment Practice Note: Pavement Impact Assessment' (Practice Note). The Practice Note provides a step-by-step guide on how to prepare a PIA in accordance with the GTIA. The Practice Note was prepared by Bitzios Consulting.

7.2 Impact Assessment Area

The adopted impact assessment area is illustrated below in Figure 7.1 and includes:

- Ron Mclean Drive (Southern Port Road) Road ID: 841 TDIST:0.00-7.36.
- Boundary Road (North Townsville Road) Road ID: 832 TDIST:16.51-18.84



Source: Google Maps

Figure 7.1: Pavement Impact Assessment Area

7.3 Background Traffic

Table 7.1 provides a summary of background heavy vehicle volumes and SAR4s along the subject road. SAR4s have been estimated utilising the standard conversion rate of 3.2 SAR4's / HV.

Table 7.1: Background Traffic Volumes - 2023

Road	Section	Direction	AADT	%HV	AADT_HV	SAR4s / HV
Ron Mclean Drive	0.00-0.77	Against	1,311	26.19	343	3.2
		Gazettal	1,436	18.29	263	3.2
	0.77-7.36	Against	1,311	26.19	343	3.2
		Gazettal	1,436	18.29	263	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

SAR4s volumes are applied at a carriageway level based on a directional factor as per Table 7.2.

Table 7.2: Carriageway Level Directional Factor

Road	Section	Direction	Carriageway Description	Carriageway Code	Directional Factor
Ron Mclean Drive	0.00-0.77	Against (Northbound)	Divided	3	100%
		Gazettal (Southbound)	Divided	2	100%
	0.77-7.36	Against (Northbound)	Undivided	1	100%
		Gazettal (Southbound)	Undivided	1	100%
Boundary Road	16.51-16.63	Against (Westbound)	Divided	3	100%
		Gazettal (Eastbound)	Divided	2	100%
	16.63-16.76	Against (Westbound)	Undivided	1	100%
		Gazettal (Eastbound)	Undivided	1	100%
	16.76-18.84	Against (Westbound)	Undivided	1	100%
		Gazettal (Eastbound)	Undivided	1	100%

Table 7.3 calculates the background SAR4 volumes for Ron Mclean Drive and Boundary Road.

Table 7.3: Background SAR4s

Road	Section	Direction	SAR4 / HV	SAR4 / Day (2023)	SAR4 / Year (2023)	Growth Rate (p.a.)	SAR4 / Year (2027)
Ron Mclean Drive	0.00-0.77	Against	3.2	1,099	401,034	0.48%	408,734
		Gazettal		841	306,769	0.00%	306,769
	0.77-7.36	Against		1,099	401,034	0.48%	408,734
		Gazettal		841	306,769	0.00%	306,769
Boundary Road	16.51-16.63	Against		3,958	1,444,512	5.18%	1,743,815
		Gazettal		3,974	1,450,381	7.02%	1,857,648
	16.63-16.76	Against		979	357,281	1.14%	373,573
		Gazettal		1,044	381,213	1.51%	404,238
	16.76-18.84	Against		979	357,281	1.14%	373,573
		Gazettal		1,044	381,213	1.51%	404,238

7.4 Development Traffic

7.4.1 Heavy Vehicle Assumptions

As per the traffic generation assumptions, 16 vehicles per day deliver to Townsville Airport, Townsville Port or to Cairns. It is understood that there will be 10 deliveries per day from the Port and six (6) deliveries per day to Townsville / Cairns Airport. It has been assumed that there is an equal split between the delivery to Townsville Airport and Cairns Airport.

Importantly, it has been assumed that each delivery will return to the point of origin with an inversed loading status. For example, if a delivery of ethanol comes from the Port of Townsville to the site, then the empty truck will return to the Port.

Table 7.4 summarises the key operational information for the proposed development.

Table 7.4: Heavy Vehicle Traffic Assumptions

Vehicle	Inbound Trips (Daily)		Outbound Trips (Daily)	
	Loaded	Unloaded	Loaded	Unloaded
Class 10 (B-Double)	10	6	6	10

Table 7.5 presents the SAR values for the relevant vehicle classes.

Table 7.5: Design Vehicle SAR Generation Rate

Vehicle Class	Load	SAR4	SAR5	SAR12
Class 10 (B-Double)	Loaded	6.30	7.09	17.17
	Unloaded	0.53	0.42	0.11

7.4.2 Development SAR4 Generation

Table 7.6 summarises development generated SAR4s.

Table 7.6: Heavy Vehicle SAR4 Generation

Vehicle Class	Loaded			Unloaded			Total	
	Demand	SAR4 / Veh	SAR4 / Day	Demand	SAR4 / Veh	SAR4 / Day	SAR4 / Day	SAR4 / Year
10	16	6.30	100.8	16	0.53	8.48	109.28	36,390

7.4.3 Development SAR5 Generation

Table 7.7 summarises development generated SAR5s.

Table 7.7: Heavy Vehicle SAR5 Generation

Vehicle Class	Loaded			Unloaded			Total	
	Demand	SAR5 / Veh	SAR5 / Day	Demand	SAR5 / Veh	SAR5 / Day	SAR5 / Day	SAR5 / Year
10	16	7.09	113.44	16	0.42	6.72	120.16	40,013

7.4.4 Development Heavy Vehicle Distributions

Figure 7.2 shows assumed development heavy vehicle traffic distributions.

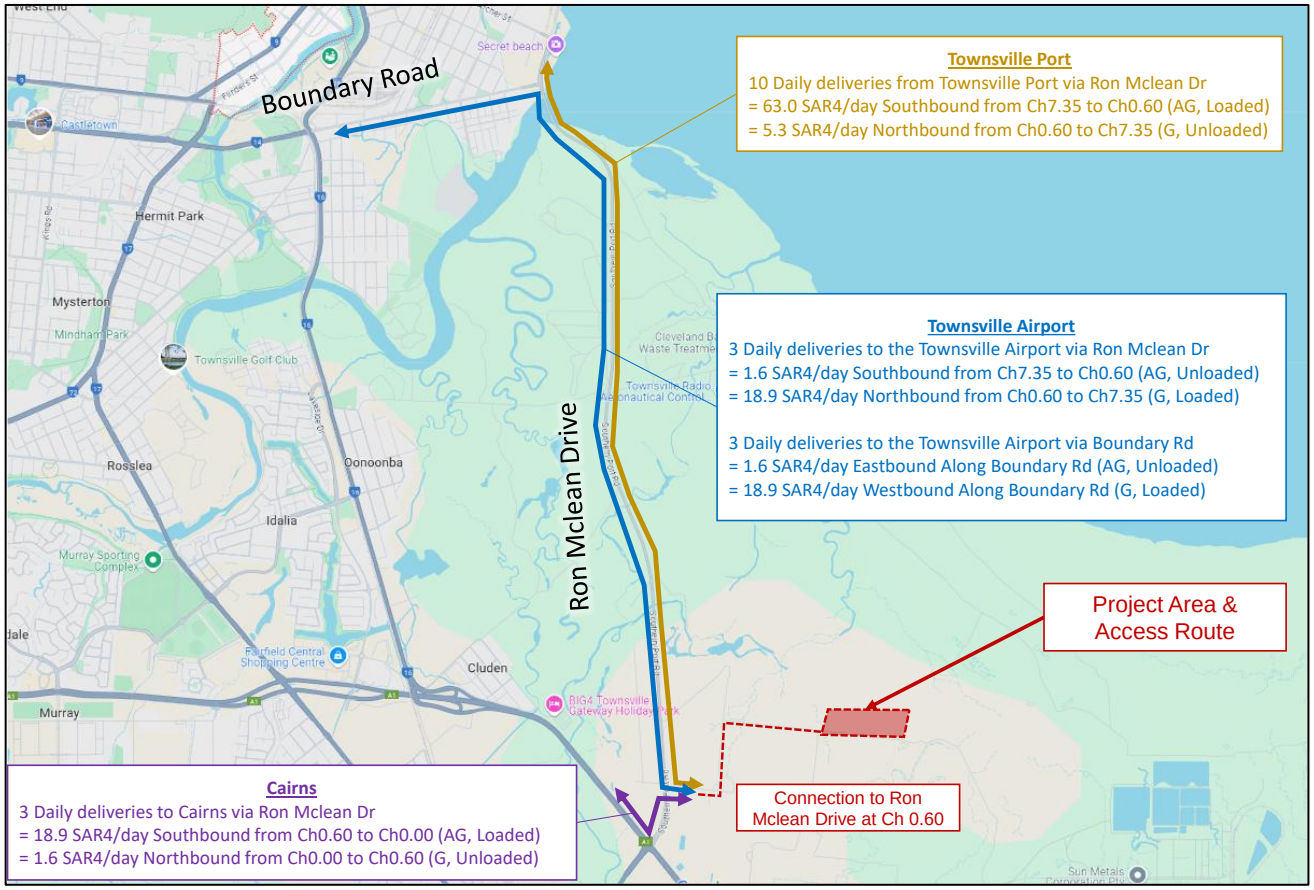


Figure 7.2: Development Heavy Vehicle Traffic Distributions

7.5 Development Pavement Impacts & Contributions

Table 7.8 summarises the pavement impacts on each segment of the impact assessment area.

A detailed scoping assessment and contribution calculations are included at **Appendix H**.

Table 7.8: Development Pavement Impacts

Road Name	Section	Direction	Background SAR4 / Year	Development SAR4 / Year	Development SAR5 / Year	Impact
Ron Mclean Drive	0.00-0.77	Against	408,734	6,294	7,083	1.54%
		Gazettal	306,769	529	420	0.17%
	0.77-7.36	Against	408,734	21,508	24,029	5.26%
		Gazettal	306,769	8,059	8,482	2.63%
Boundary Road	16.51-16.63	Against	1,743,815	6,294	7,083	0.36%
		Gazettal	1,857,648	529	420	0.03%
	16.63-16.76	Against	373,573	6,294	7,083	1.68%
		Gazettal	404,238	529	420	0.13%
	16.76-18.84	Against	373,573	6,294	7,083	1.68%
		Gazettal	404,238	529	420	0.13%

As shown above, one (1) road link has been identified where development volumes will have significant impacts (i.e. >5%). Based on the marginal costs provided, the required pavement contribution is determined to be $10,271.76 per year.

A copy of the pavement impact assessment outputs is included at **Appendix I.**

8. CODE RESPONSES

Responses have been prepared to State Code 6: Protection of State Transport Networks. A copy of our responses is included at **Appendix J**.

9. CONCLUSIONS & RECOMMENDATIONS

Key findings and recommendations are summarised below:

- Access to the development is proposed via a driveway crossover on Colinta Road. The driveway crossover will connect to a ~14m wide private access road
- Ample space is available to accommodate a driveway crossover configured generally in accordance with Council requirements
- The proposed driveway crossover location and form are expected to comply with AS2890.1 requirements
- It is recommended that as site planning progresses, driveway sight distances be reviewed to confirm that they will comply with AS2890.1 requirements. However, it is considered likely that sufficient sight distances will be achieved.
- It is recommended that site / car parking layout elements comply with AS2890 requirements. Concept plans have been prepared to demonstrate how an additional 10 parking spaces can be achieved. Importantly, it is expected that compliance with AS2890 will be easily achievable given the large size of the subject site
- The current development plans identify potentially 60 car parking spaces being provided. This will be further assessed during FEED. At this stage it is recommended that 70 car parking spaces are provided on site to support development operations. However, car parking requirements could change during FEED
- Currently proposed ethanol / SAF loading areas are considered appropriate from traffic engineering perspective. However, it is recommended that additional swept path analysis be completed to confirm servicing arrangements are suitable as planning progresses. Servicing arrangements shall also comply with AS2890 requirements.
- No upgrade works are required at the Ron Maclean Drive / Heleen Drive intersection (Intersection 1) or Bruce Highway / Flinders Highway / Ron Maclean Drive intersection (Intersection 2) to offset development related operational or safety impacts.
- A pavement impact assessment has determined that road links on Ron Maclean Drive (Ch 0.77-7.36 in the southbound direction only) will be significantly impacted by development traffic. Accordingly, contributions to offset pavement impacts are required, which have been determined at $10,271.76 per year based on the marginal cost rates provided by TMR.

Based on the above, there are no traffic engineering related matters to preclude approval of the development subject to reasonable and relevant conditions.

10. REFERENCES

State of Queensland, The Department of State Development, Manufacturing, Infrastructure and Planning (2019). *Townsville State Development Area Development Scheme* . [online] Available at: https://www.statedevelopment.qld.gov.au/__data/assets/pdf_file/0024/33684/townsville-development-scheme-2019.pdf.

Australian / New Zealand Standard Joint Technical Committee CE-001, Parking Facilities (2004). *AS2890.1:2004 Parking Facilities Part 1: Off-street car parking*. Standards Australia and Standards New Zealand.

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Department of Transport and Main Roads (2024). *Queensland Transport and Roads Investment Program (QTRIP) 2024-25 to 2027-28 - Queensland Transport and Roads Investment Program (QTRIP) 2024-25 to 2027-28 - Publications | Queensland Government*. [online] https://www.tmr.qld.gov.au/qtriponline. Available at: https://www.publications.qld.gov.au/dataset/queensland-transport-and-roads-investment-program-qtrip-2024-25-to-2027-28/resource/e2f11e9c-f59c-4292-a5cf-f35716d083dc.

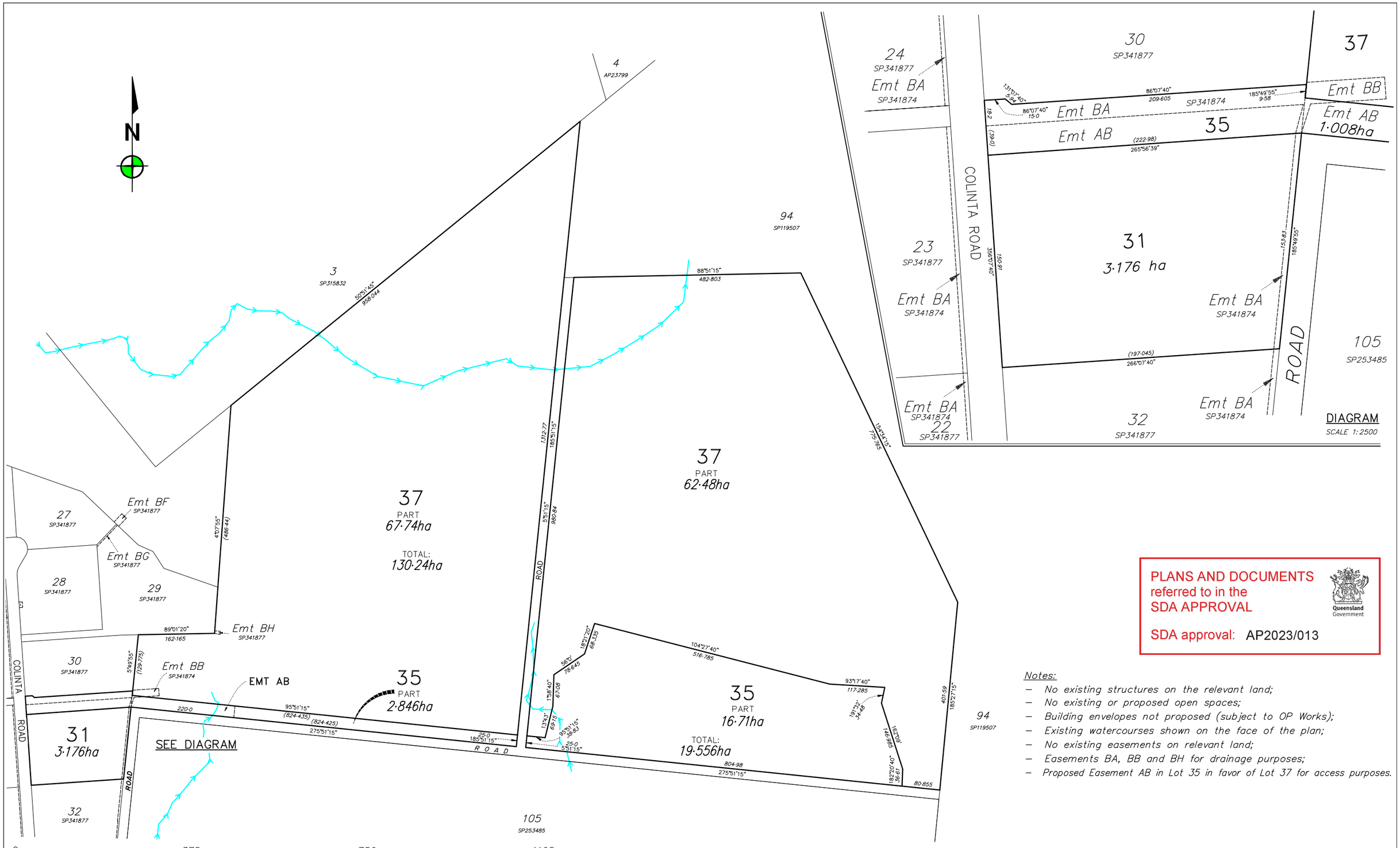
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Townsville City Council (2024). *Townsville City Plan - Version 2024/01*. [online] Available at: https://planningscheme.townsville.qld.gov.au/planningscheme/current.

Appendix A: Approved ROL Plan





PLANS AND DOCUMENTS referred to in the SDA APPROVAL

Queensland Government

SDA approval: AP2023/013

Notes:

- *No existing structures on the relevant land;*
- *No existing or proposed open spaces;*
- *Building envelopes not proposed (subject to OP Works);*
- *Existing watercourses shown on the face of the plan;*
- *No existing easements on relevant land;*
- *Easements BA, BB and BH for drainage purposes;*
- *Proposed Easement AB in Lot 35 in favor of Lot 37 for access purposes.*

Plotted 19/12/2023 2:22 PM

REVISIONS

REV	BY	DATE	DESCRIPTION
B	BC	19/12/2023	*Amendments after registration of St 2*
A	RG	21/08/2023	*Easement AB added.*
0	RG	17/08/2023	*Original Issue*

NOTES

Property boundaries, areas and dimensions are approximate only and are subject to survey.

ACAD REF F:\43800\43811\Cd90\43811_83B.dwg

cleveland bay industrial park TOWNSVILLE

LEVEL DATUM: AHD(Der)
REF BM No: PM53476
REDUCED LEVEL: 7·945
LOCATION: Lot 5 on SP273456

AZIMUTH: MGA'94
SURVEYOR: RSPL
DRAWN: Romy Ghebosu
SIGNED BY: Ben Cook

ROWLANDS SURVEYS
22 Gorden Street Garbutt, Townsville.
Ph:(07) 47755077 surveyors@rowlands.net.au

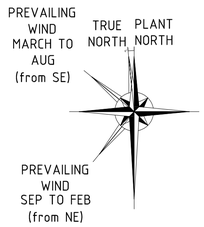
Cleveland Bay Industrial Park Pty Ltd

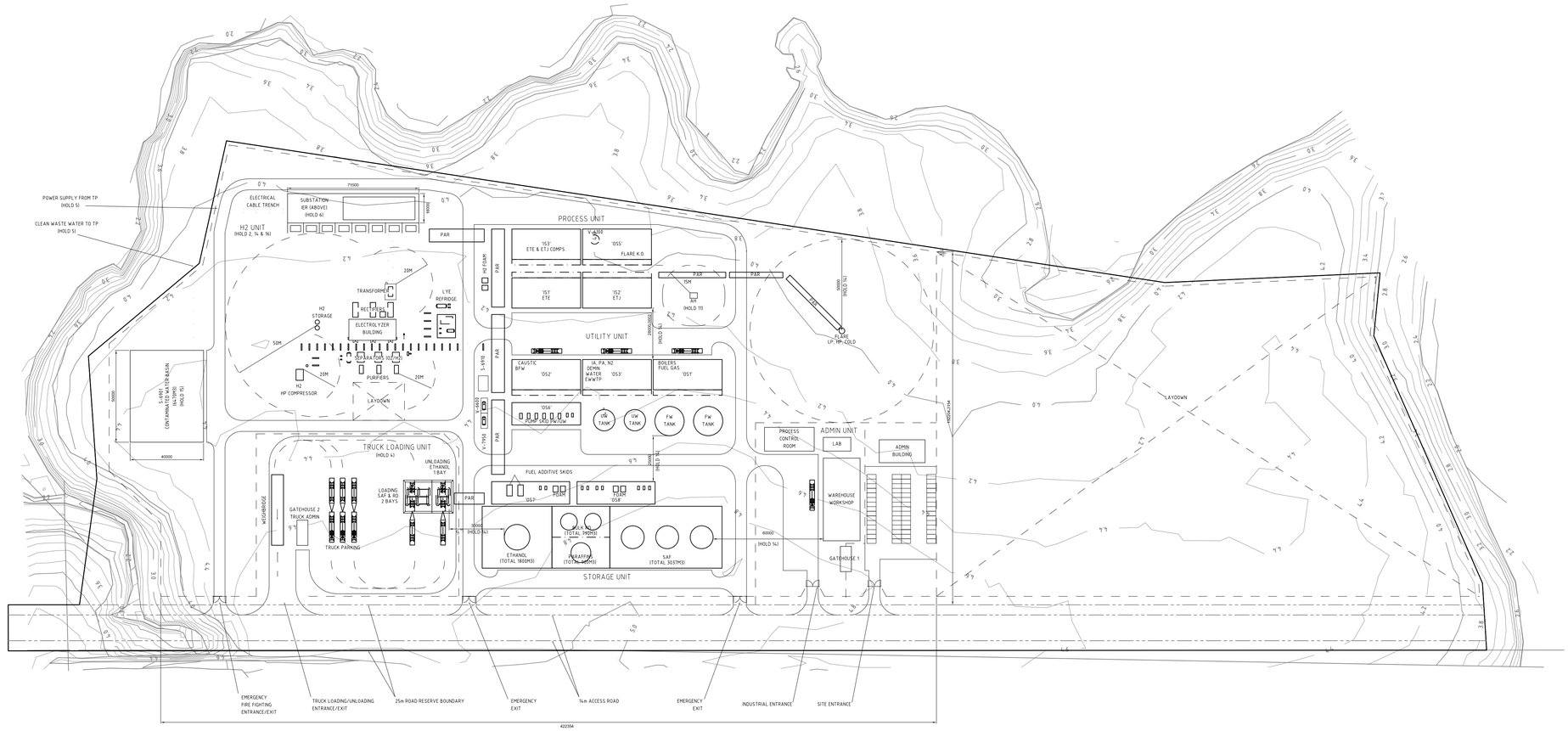
Colinta Road, Stuart
Proposed Reconfiguration Lots 31, 35 and 37
cancelling future Lots 31 and 35

SCALE	PASSED	DATE	SHEET		
1:7500@A3	BJ	19/12/2023	1 OF 1	43811/83	B

Appendix B: Proposed Development Plans







SCALE METRES
1:1000

NOTES

1. GOOGLE EARTH SITE IMAGE IS APPROXIMATELY SCALED.
2. ALL COORDINATES IN METERS, ALL DIMENSIONS IN MILLIMETERS.
3. THIS LAYOUT IS BASED ON REV A4 PROCESS DATA.

HOLDS

1. SITE CO-ORDINATES AND BOUNDARY LINE.
2. EQUIPMENT SIZE AND LOCATION.
3. MODULE SIZE AND LOCATION.
4. TRUCK LOADING/UNLOADING.
5. THIRD PARTY TIE-IN LOCATIONS.
6. ADMIN, SUBSTATION & BUILDINGS SIZE AND LOCATION.
7. REQUIREMENT FOR COOLING WATER (NOT SHOWN IN LAYOUT).
8. REQUIREMENT FOR SULPHURIC ACID STORAGE TANK.
9. REQUIREMENT FOR H2 STORAGE BULLETS.
10. FLARE STERLIE RADIUS.
11. ANALYSER HOUSE REQUIREMENT, QUANTITY AND LOCATION.
12. REQUIREMENT FOR CAUSTIC BASIN AND SIZE.
13. FOAM SYSTEM DESIGN.
14. SAFETY DISTANCES ARE BASED UPON EXPERIENCE ON HAZARDOUS AREA CLASSIFICATION & CONSEQUENCE/RISK MODELLING STUDIES. TO BE RE-VALIDATED BY FEED CONTRACTOR AND JUSTIFIED IF CHANGED (MINIMIZED).
15. BASIN SIZE.
16. H2 UNIT LAYOUT IS BASED ON A RECENT HYDROGEN PROJECT.

KEY

- UNDERGROUND
- FENCE
- LAYDOWN/ACCESS
- EQUIPMENT
- MODULE/PIPERACK/STRUCTURE
- ROADS/CIVIL
- PROPOSED SAF PLOT LIMIT

PAR	PRE-ASSEMBLED RACK
PAU	PRE-ASSEMBLED UNIT
TP	THIRD PARTY
AH	ANALYSER HOUSE
IER	INSTRUMENT ELECTRICAL ROOM
SS	SUBSTATION

REFERENCE DRAWINGS

Rev	Date	Revision Object	Written	Checked	Approved Technical	Approved Project
0A	19/08/2025	ISSUED FOR INFORMATION	KRA	RTU	LG	RV
0	15/10/2024	ISSUED FOR INFORMATION	NM	RM	RM	GN

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PROJECT ULYSSES PRE-FEED
QUEENSLAND, AUSTRALIA

CONCEPTUAL OVERALL PLOT PLAN

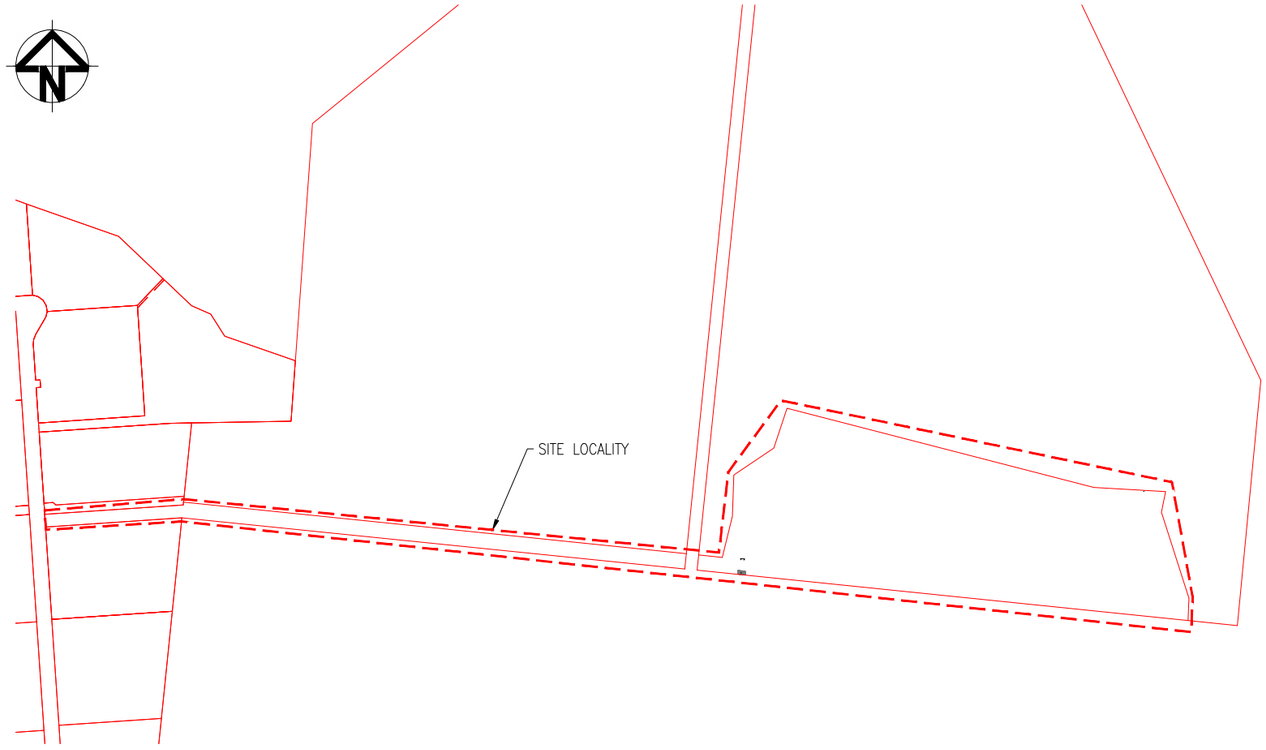
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T.EN. Doc. Ref.	216651C-000-DW-0051-0001		

SatUpr, 07 July 2024

Appendix C: Access Concept



CLEVELAND BAY INDUSTRIAL PARK
FAR EAST DEVLOPMENT



SITE PLAN
NOT TO SCALE

DRAWING INDEX

DRAWING NUMBER	DRAWING NAME	REVISION
1241–001	TITLE PAGE, DRAWING SCHEDULE AND LOCALITY PLAN	2
1241–002	NOTES AND TYPICAL CROSS SECTION PLAN	1
1241–010	ROAD LAYOUT AND LONG SECTION – SHEET 1 OF 4	1
1241–011	ROAD LAYOUT AND LONG SECTION – SHEET 2 OF 4	1
1241–012	ROAD LAYOUT AND LONG SECTION – SHEET 3 OF 4	1
1241–013	ROAD LAYOUT AND LONG SECTION – SHEET 4 OF 4	2
1241–014	CROSS SECTION – SHEET 1 OF 6	1
1241–015	CROSS SECTION – SHEET 2 OF 6	1
1241–016	CROSS SECTION – SHEET 3 OF 6	1
1241–017	CROSS SECTION – SHEET 4 OF 6	1
1241–018	CROSS SECTION – SHEET 5 OF 6	1
1241–019	CROSS SECTION – SHEET 6 OF 6	1
1241–020	ROAD CUT/FILL PLAN	1
1241–021	EARTHWORKS LAYOUT PLAN	1
1241–022	PIPE OUTLET – SHEET 1 OF 2	1
1241–023	PIPE OUTLET – SHEET 2 OF 2	1
1241–024	EARTHWORKS CUT/FILL PLAN	1
1241–025	STORMWATER PIT DETAILS	0
1241–030	SESC PLAN – SHEET 1 OF 2	0
1241–031	SESC PLAN – SHEET 2 OF 2	0
1241–032	SESC NOTES PLAN	0

REVISIONS

No.	BY	DATE	DESCRIPTION
2	A.R	19.09.24	RESPONSE TO CONDITIONS
1	A.R	27.08.24	DRAWINGS AMENDED
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION
B.LANGTREE RPEQ 11932

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e brett@langtreeconsulting.com.au

CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
TITLE PAGE, DRAWING SCHEDULE AND LOCALITY PLAN

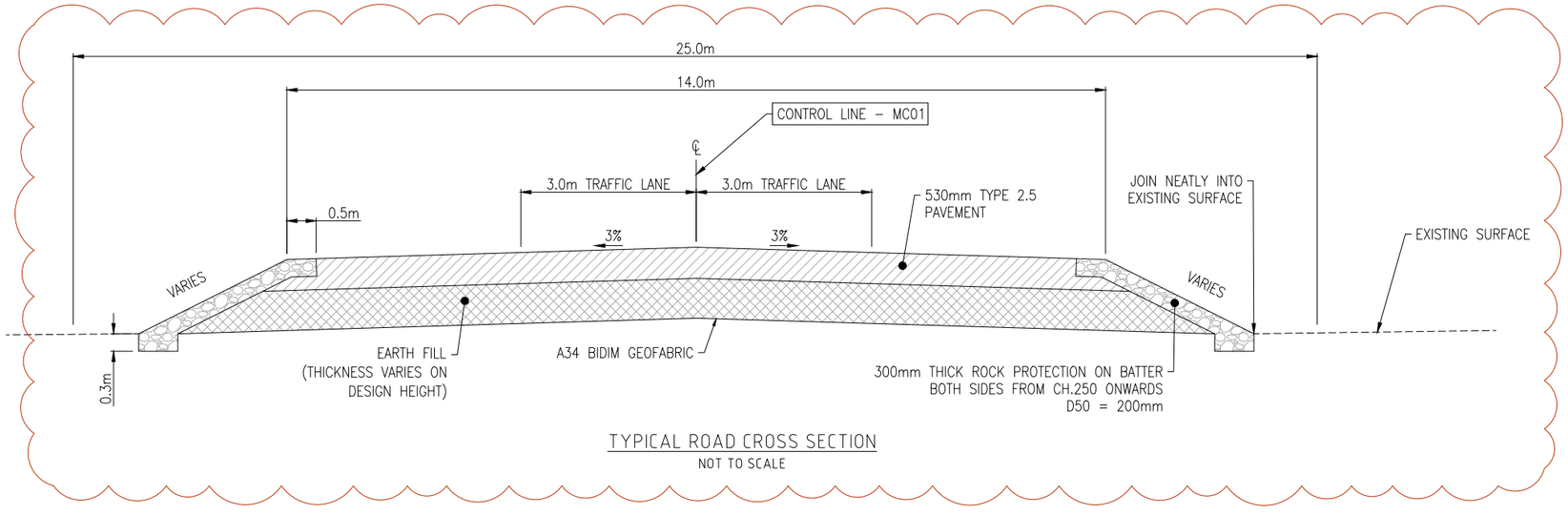
SCALE	AS SHOWN
SHEET	1 OF 21
REVISION	0 1 2
DRG No.	1241–001

CONSTRUCTION NOTES:
GENERAL:

1. ALL WORKS AND MATERIALS MUST BE IN ACCORDANCE WITH CURRENT LOCAL AUTHORITY POLICIES, SPECIFICATIONS, STANDARD DRAWINGS AND AUSTRALIAN STANDARDS.
2. THE CONTRACTOR MUST TAKE ALL NECESSARY MEASURES TO PROTECT NEARBY PROPERTY OWNERS FROM DUST POLLUTION DURING ALL PHASES OF WORKS. FINISHED AREAS OF EARTHWORKS MUST BE KEPT WATERED WHERE NECESSARY UNTIL A SATISFACTORY GRASS COVER IS ACHIEVED.
3. ALL CONSTRUCTION WORKS ARE TO BE JOINED NEATLY TO EXISTING SURFACE.
4. PUBLIC UTILITIES - DESPITE THE POSITION OF PUBLIC UTILITIES, FITTINGS, PIPES, POLES, MANHOLES, ETC MAY BE INDICATED ON THE DRAWINGS, NO RESPONSIBILITY WILL BE ACCEPTED BY THE PRINCIPLE FOR THE ACCURACY OF HE REPRESENTATION OR THE OMISSION THEREOF.
5. LOCATION AND LEVEL OF EXISTING SERVICES AND STRUCTURES HAS BEEN PLOTTED FROM AVAILABLE RECORDS AND IS TO BE CONSIDERED INDICATIVE ONLY. THE CONTRACTOR MUST ACCURATELY LOCATE THESE ON SITE PRIOR TO COMMENCING WORKS AND MUST PROTECT ALL EXISTING SERVICES DURING CONSTRUCTION. ANY DAMAGE TO EXISTING SERVICES MUST BE REPAIRED AT THE CONTRACTORS EXPENSE.
6. VEGETATION OUTSIDE WORKS AREAS MUST NOT BE DISTURBED UNLESS SPECIFICALLY AUTHORISED BY THE SUPERINTENDENT.
7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN THE STABILITY OF ANY TEMPORARY WORKS ON THE SITE.
8. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN THE STABILITY OF ANY TEMPORARY WORKS ON THE SITE.
9. THE CONTRACTOR MUST CONFIRM THE ACCURACY OF ALL SET OUT AND CONFIRM ALL LEVELS WITH THE SUPERINTENDENT PRIOR TO COMMENCING CONSTRUCTION.
10. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE LOCAL AUTHORITY SPECIFICATIONS AND THE PROJECT SPECIFICATIONS. IN THE EVENT OF A DISCREPANCY, REFER TO THE SUPERINTENDENTS FOR CLARIFICATION.
11. THESE DRAWINGS MUST BE READ IN CONJUNCTION WITH DRAWINGS PREPARED BY OTHER RELATED CONSULTANTS, ALL PROJECT SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE WORK. ALL THE DISCREPANCIES MUST BE REFERRED TO THE SUPERINTENDENT FOR HE DECISION BEFORE PROCEEDING WITH THE WORKS.
12. ALL DIMENSIONS RELEVANT TO THE SETTING OUT AND OFF-SITE WORK MUST BE AS INDICATED ON THESE DRAWINGS AND MUST BE VERIFIED BY THE CONTRACTOR BEFORE CONSTRUCTION AND/OR FABRICATION IS COMMENCED. THE ENGINEERS DRAWINGS MUST NOT BE SCALED, UNLESS SPECIFICALLY NOTED OTHERWISE.
13. DURING CONSTRUCTION THE CONTRACTOR MUST BE RESPONSIBLE FOR MAINTAINING PROPOSED AND EXISTING WORKS IN A STABLE CONDITION AND ENSURING NO PART MUST BE OVER STRESSED UNDER CONSTRUCTION ACTIVITIES.
14. SAFETY REQUIREMENTS MUST BE IN ACCORDANCE WITH WITH THE REQUIREMENTS OF THE WORKPLACE, HEALTH AND SAFETY ACT.
15. THE APPROVAL FOR SUBSTITUTION MAY BE SOUGHT FROM THE SUPERINTENDENT BUT IS NOT AN AUTHORISATION FOR A VARIATION. ANY VARIATION MUST BE APPROVED BY THE SUPERINTENDENT BEFORE WORK COMMENCES.
16. THE ACCESS FOR THE SITE MUST BE AS INDICATED ON THE CONTRACT OR AS APPROVED BY THE SUPERINTENDENT AND THE LOCAL AUTHORITIES. THE CONTRACTOR MUST OBTAIN ALL NECESSARY AND RELEVANT PERMITS. IT IS THE CONTRACTORS RESPONSIBILITY TO CONSTRUCT AND MAINTAIN THE ACCESS AS REQUIRED TO ALL PARTS OF THE CONTRACTORS WORK AREA.
17. THE CONTRACTORS COMPOUND MUST BE LOCATED AS APPROVED BY THE SUPERINTENDENT.
18. ANY WORKS WITHIN A STATE CONTROLLED ROAD RESERVE MUST BE CARRIED OUT IN ACCORDANCE WITH DTMR CURRENT SPECIFICATIONS AND STANDARD DRAWINGS.
19. THE CONTRACTOR MUST UNDERTAKE ALL WORKS IN PROXIMITY TO EXISTING SERVICES AND INFRASTRUCTURE IN ACCORDANCE WITH THE RELEVANT UTILITY / AUTHORITY POLICIES AND PROCEDURES.

VEGETATION PROTECTION:

1. PRIOR TO CLEARANCE WORKS COMMENCING ON SITE. A JOINT INSPECTION MUST BE UNDERTAKEN TO IDENTIFY SELECTED TREES AND / OR SHRUBS WHICH ARE TO REMAIN UNDISTURBED. THESE MUST BE MARKED BY THE SUPERINTENDENT WITH COLOURED TAPE OR SIMILAR MARKS. THE CONTRACTOR MUST TAKE CARE NOT TO DAMAGE OR REMOVE ANY OF THESE TREES AND SHRUBS IN CARRYING OUT THE WORKS OF THE CONTRACT.
2. UNLESS DIRECTED BY A PROJECT ARBORIST / ECOLOGIST, WHEN WORKING WITHIN 4m OF TREES, RUBBER OR HARDWOOD GIRDLES SHOULD BE CONSTRUCTED WITH 1.8m BATTENS CLOSELY SPACED AND ARRANGED VERTICALLY FROM GROUND LEVEL. GIRDLES MUST BE STRAPPED TO TREES PRIOR TO CONSTRUCTION AND REMAIN UNTIL COMPLETION.
3. ANY TREE LOPPING REQUIRED SHOULD BE UNDERTAKEN BY A PROFESSIONAL ARBORIST.
4. THE CONTRACTOR IS NOT TO DISTURB OR CUT VEGETATION WITHOUT THE SUPERINTENDENTS APPROVAL.
5. THE CONTRACTOR MUST EMPLOY A PROFESSIONAL ARBORIST WHO MUST ASSIST WITH THE WORK TO PROTECT TREES (IF NECESSARY).



TYPICAL ROAD CROSS SECTION
NOT TO SCALE

Set Out Table for Road Alignment							
TAG		CHAINAGE	EASTING	NORTHING	LENGTH	RADIUS	BEARING
L26	BP EP	0.000 231.952	84119.896 84351.318	863761.688 863777.352	231.952		086° 07' 40"
C5	TP IP TP	231.952 240.462 248.931	84351.318 84359.809 84368.275	863777.352 863777.927 863777.059	16.979	100.0	090° 59' 30.91"
L27	BP EP	248.931 1184.467	84368.275 85298.928	863777.059 863681.607	935.535		095° 51' 22"

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	UPDATED SETOUT TABLE
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION
B.LANGTREE RPEQ 11932

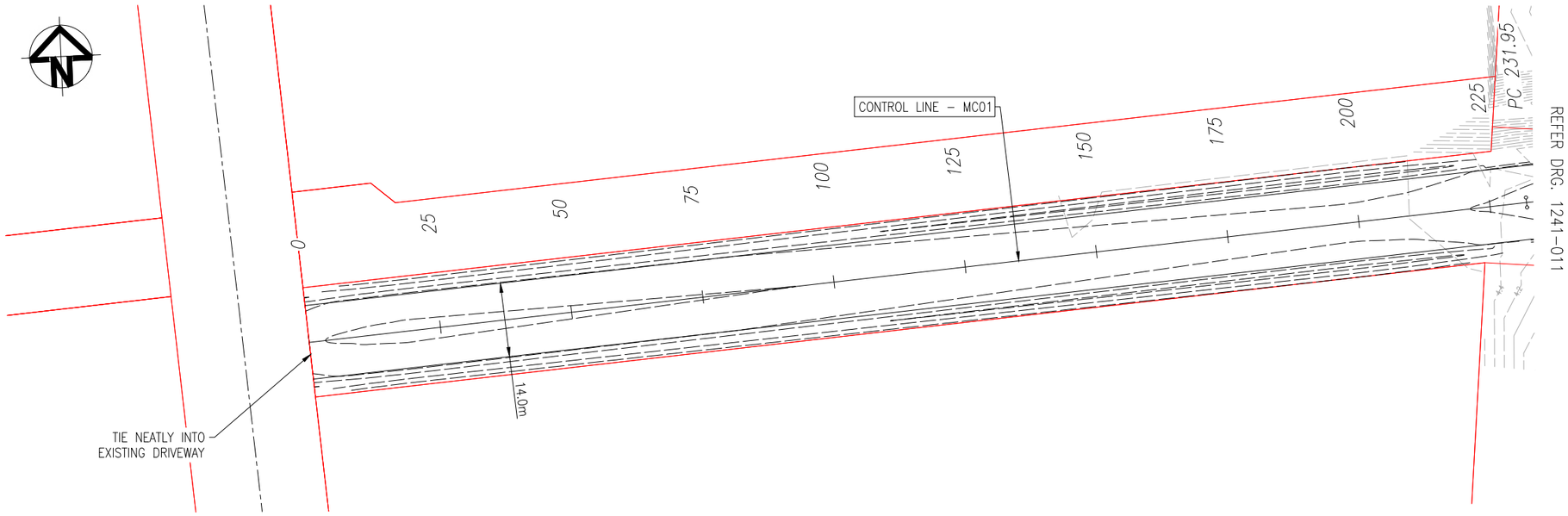
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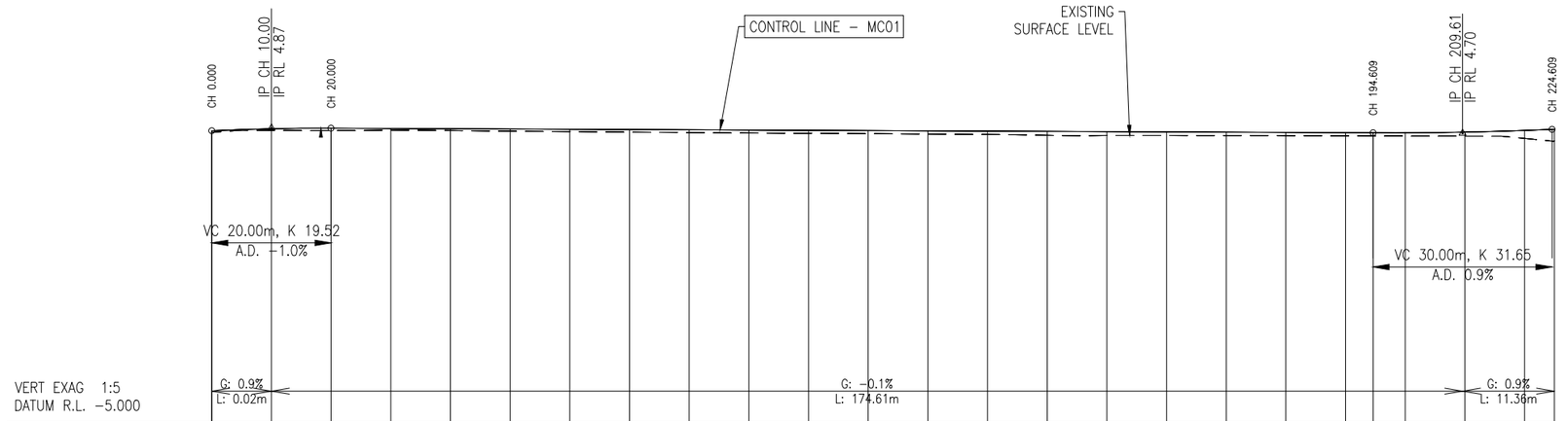
CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
NOTES AND TYPICAL CROSS SECTION PLAN

SCALE	AS SHOWN
SHEET	2 OF 21
REVISION	0 1
DRG No.	1241–002



ROAD LAYOUT PLAN
SCALE: 1:500



DESIGN LEVELS	4.779	4.847	4.864	4.855	4.846	4.837	4.829	4.820	4.811	4.802	4.794	4.785	4.776	4.767	4.758	4.750	4.741	4.732	4.723	4.715	4.711	4.710	4.735	4.790	4.826	4.830
EXISTING LEVELS		4.792	4.786	4.800	4.785	4.767	4.751	4.735	4.720	4.705	4.694	4.683	4.669	4.655	4.626	4.623	4.621	4.620	4.617	4.610	4.604	4.600	4.522	4.442	
DEPTH		–0.055	–0.078	–0.055	–0.062	–0.071	–0.078	–0.085	–0.091	–0.097	–0.099	–0.102	–0.107	–0.113	–0.133	–0.127	–0.120	–0.112	–0.107	–0.104	–0.106	–0.135	–0.268	–0.387	
CHAINAGE		10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	225.000	
HEIGHT ABOVE Q100 FLOOD LEVEL																									
Q100 LEVEL TO NATURAL SURFACE																									

NOTES
1. REFER TO DRG. 1241-002 FOR THE TYPICAL CROSS SECTION.

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	LAYOUT AND LONGSECTION AMENDMENTS
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION
B.LANGTREE RPEQ 11932

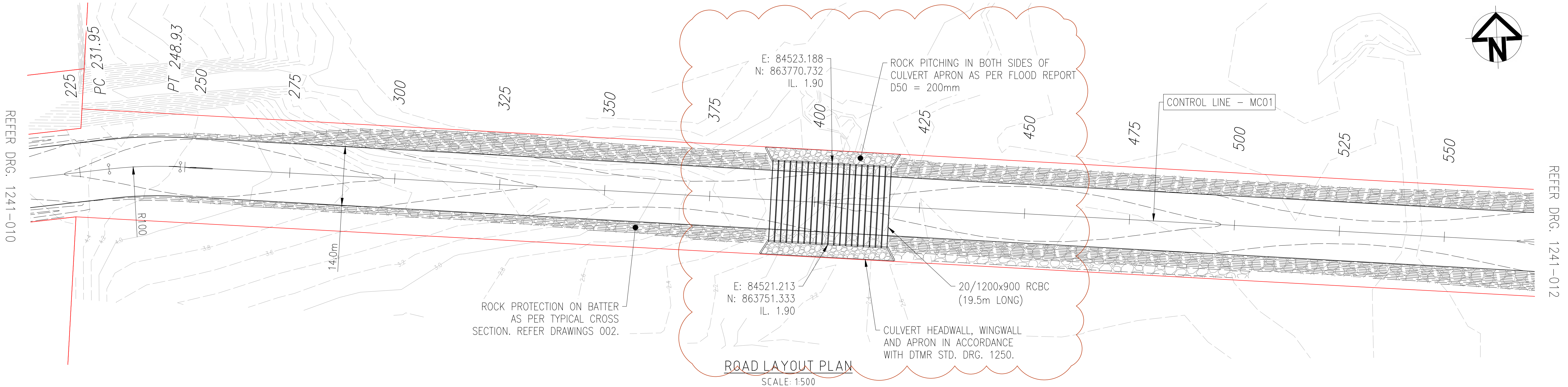
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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
ROAD LAYOUT AND LONG SECTION – SHEET 1 OF 3

SCALE	AS SHOWN
SHEET	3 OF 21
REVISION	0 1
DRG No.	1241–010

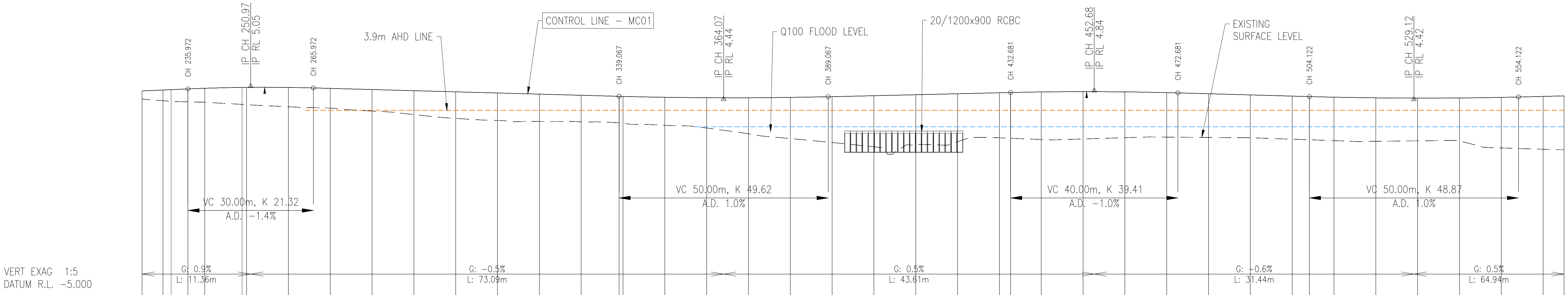


ROAD LAYOUT PLAN

SCALE: 1:500

NOTES

1. REFER TO DRG. 1241-002 FOR THE TYPICAL CROSS SECTION.



CHAINAGE	DESIGN LEVELS	EXISTING LEVELS	DEPTH	HEIGHT ABOVE Q100 FLOOD LEVEL	Q100 LEVEL TO NATURAL SURFACE
225.000	4.830	4.442	–0.387		
230.000	4.873	4.360	–0.513		
231.952	4.889	4.327	–0.562		
	4.924				
240.000	4.955	4.288	–0.667		
248.931	4.996	4.183	–0.813		
250.000	4.999	4.171	–0.828		
260.000	4.996	4.070	–0.925		
	4.971				
270.000	4.949	4.004	–0.945		
280.000	4.895	3.865	–1.030		
290.000	4.840	3.696	–1.144		
300.000	4.785	3.513	–1.272		
310.000	4.731	3.415	–1.316		
320.000	4.676	3.363	–1.313		
330.000	4.621	3.349	–1.273		
	4.572				
340.000	4.567	3.283	–1.284		
350.000	4.524	3.178	–1.346		
360.000	4.502	3.050	–1.452		
370.000	4.499	2.773	–1.726		
380.000	4.517	2.546	–1.971		
	4.551				
390.000	4.555	2.356	–2.199		
400.000	4.601	2.149	–2.452	1.480	0.971
410.000	4.647	2.277	–2.370	1.527	0.843
420.000	4.693	2.393	–2.300	1.573	0.719
430.000	4.739	2.581	–2.158		
	4.752				
440.000	4.779	2.501	–2.278		
450.000	4.794	2.526	–2.268		
460.000	4.783	2.587	–2.196		
470.000	4.747	2.615	–2.132		
	4.733				
480.000	4.693	2.599	–2.094		
490.000	4.637	2.585	–2.053		
500.000	4.582	2.515	–2.067		
	4.559				
510.000	4.530	2.445	–2.085		
520.000	4.497	2.414	–2.083		
530.000	4.484	2.438	–2.047		
540.000	4.492	2.438	–2.054		
550.000	4.520	2.096	–2.424		
	4.538				
560.000	4.566	2.033	–2.533		
565.000	4.589	2.010	–2.579		

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	LAYOUT AND LONGSECTION AMENDMENTS
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION

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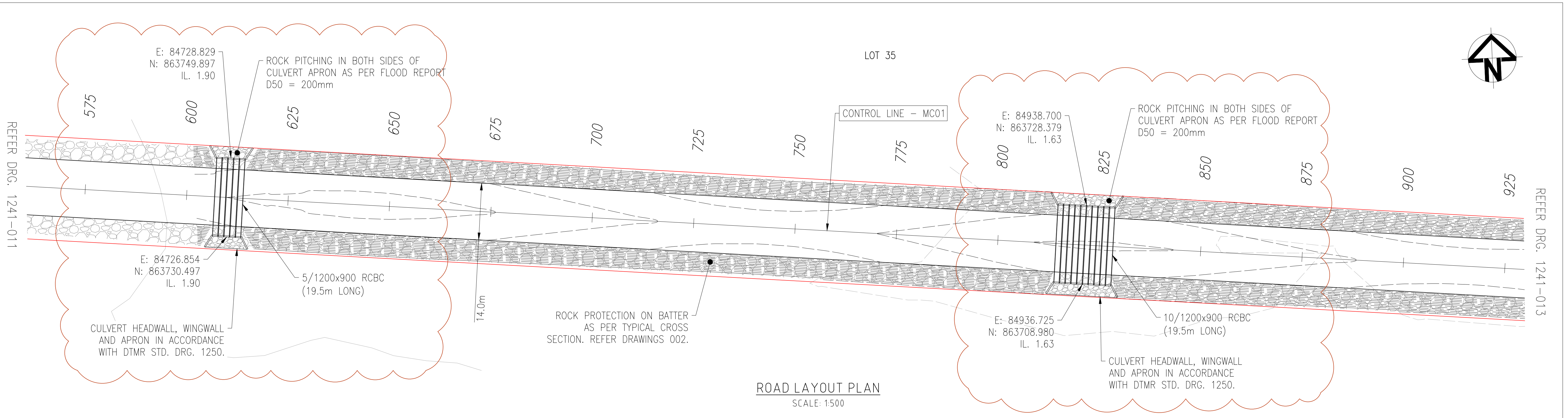
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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
ROAD LAYOUT AND LONG SECTION – SHEET 1 OF 3

SCALE	AS SHOWN
SHEET	4 OF 21
REVISION	0 1
DRG No.	1241–011

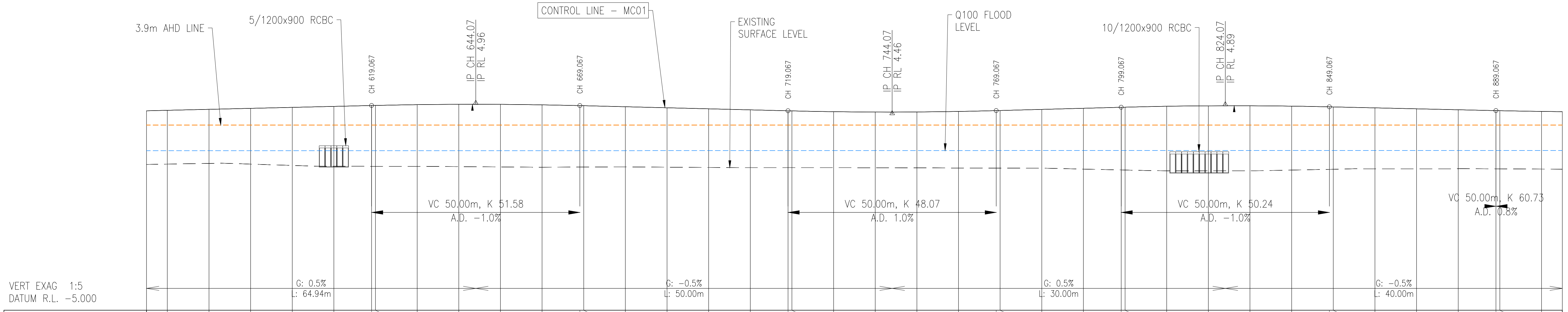


ROAD LAYOUT PLAN

SCALE: 1:500

NOTES

1. REFER TO DRG. 1241-002 FOR THE TYPICAL CROSS SECTION.



DESIGN LEVELS	4.589	4.613	4.660	4.706	4.753	4.800	4.843 4.847	4.883	4.899	4.895	4.873	4.835 4.831	4.781	4.731	4.681	4.631	4.585 4.581	4.543
EXISTING LEVELS	2.010	2.025	2.058	2.024	1.960	1.920	1.918	1.915	1.902	1.887	1.875	1.883	1.890	1.877	1.863	1.852	1.852	1.851
DEPTH	–2.579	–2.588	–2.602	–2.682	–2.794	–2.880	–2.930	–2.967	–2.996	–3.008	–2.998	–2.947	–2.891	–2.854	–2.818	–2.779	–2.729	–2.692
CHAINAGE	565.000	570.000	580.000	590.000	600.000	610.000	620.000	630.000	640.000	650.000	660.000	670.000	680.000	690.000	700.000	710.000	720.000	730.000
HEIGHT ABOVE Q100 FLOOD LEVEL						2.120												
Q100 LEVEL TO NATURAL SURFACE						0.760												

DESIGN LEVELS	4.526	4.530	4.555	4.595 4.600	4.654	4.708	4.757 4.762	4.805	4.827	4.829	4.812	4.779 4.775	4.729	4.684	4.638	4.597 4.593	4.557	4.545
EXISTING LEVELS	1.849	1.845	1.837	1.832	1.826	1.785	1.740	1.703	1.702	1.702	1.736	1.776	1.799	1.798	1.803	1.795	1.786	1.781
DEPTH	–2.678	–2.685	–2.718	–2.769	–2.828	–2.924	–3.023	–3.101	–3.125	–3.127	–3.075	–2.998	–2.930	–2.886	–2.835	–2.797	–2.771	–2.764
CHAINAGE	740.000	750.000	760.000	770.000	780.000	790.000	800.000	810.000	820.000	830.000	840.000	850.000	860.000	870.000	880.000	890.000	900.000	905.000
HEIGHT ABOVE Q100 FLOOD LEVEL									2.134									
Q100 LEVEL TO NATURAL SURFACE									0.988									

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	LAYOUT AND LONGSECTION AMENDMENTS
0	A.R	27.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION

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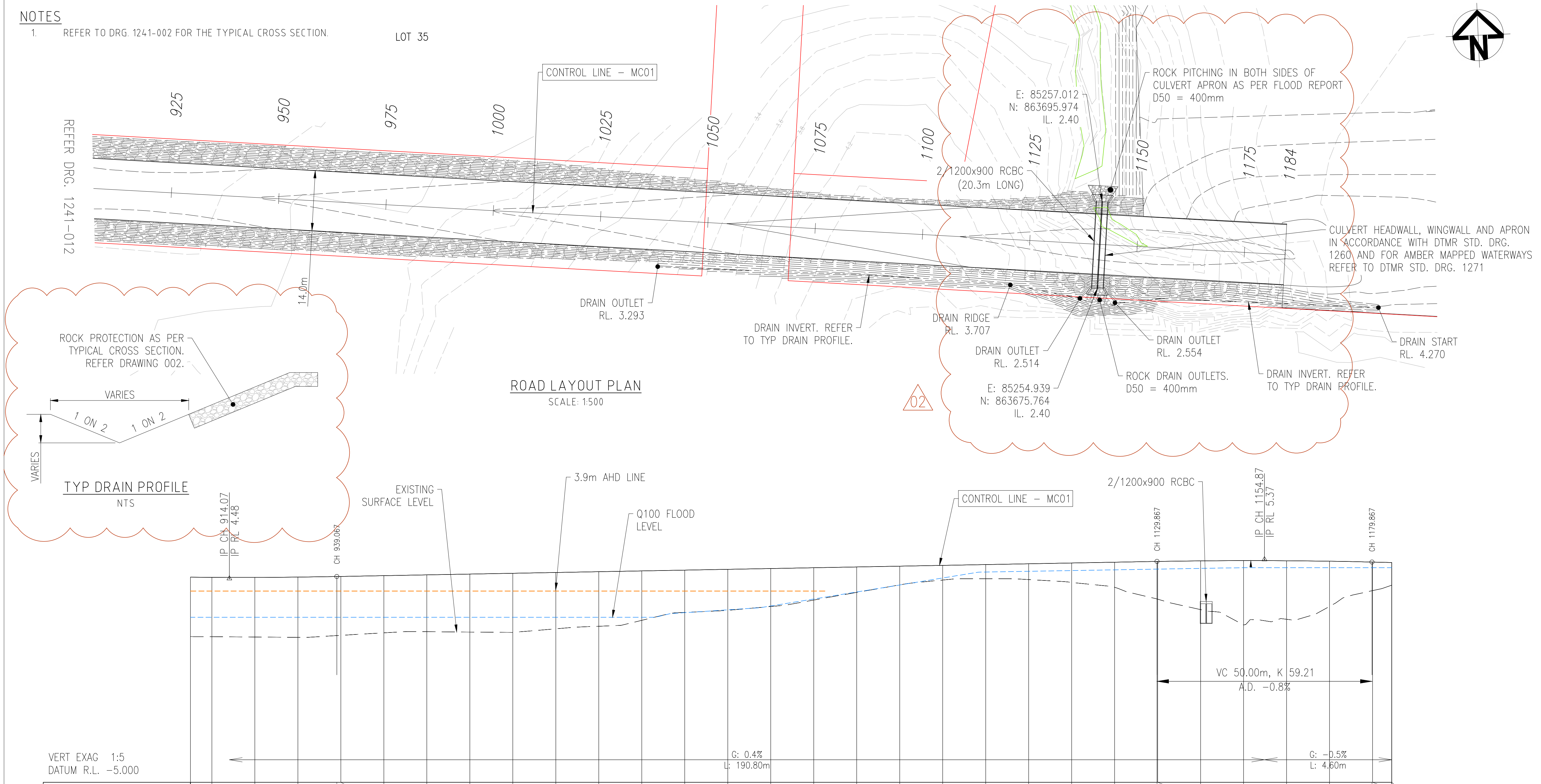
CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
ROAD LAYOUT AND LONG SECTION – SHEET 2 OF 3

SCALE	AS SHOWN
SHEET	5 OF 21
REVISION	0 1
DRG No.	1241 – 012

NOTES

1. REFER TO DRG. 1241-002 FOR THE TYPICAL CROSS SECTION.



ROAD LAYOUT PLAN

SCALE: 1:500

TYP DRAIN PROFILE

NTS

VERT EXAG 1:5
DATUM R.L. –5.000

DESIGN LEVELS	4.545	4.538	4.535	4.549	4.575 4.579	4.615	4.652	4.689	4.726	4.763	4.800	4.836	4.873	4.910
EXISTING LEVELS	1.781	1.778	1.762	1.746	1.839	1.957	2.010	1.993	1.977	2.144	2.263	2.538	2.908	3.003
DEPTH	–2.764	–2.760	–2.773	–2.803	–2.739	–2.658	–2.643	–2.696	–2.749	–2.619	–2.536	–2.298	–1.965	–1.907
CHAINAGE	905.000	910.000	920.000	930.000	940.000	950.000	960.000	970.000	980.000	990.000	1000.000	1010.000	1020.000	1030.000
HEIGHT ABOVE Q100 FLOOD LEVEL														
Q100 LEVEL TO NATURAL SURFACE														

DESIGN LEVELS	4.947	4.984	5.021	5.057	5.094	5.131	5.168	5.205	5.242	5.278 5.278	5.307	5.318	5.312	5.290	5.251 5.250	5.229
EXISTING LEVELS	3.182	3.481	3.838	4.188	4.414	4.474	4.435	4.299	4.075	3.521	3.036	2.324	2.587	3.186	3.920	4.175
DEPTH	–1.765	–1.503	–1.183	–0.869	–0.680	–0.657	–0.733	–0.906	–1.166	–1.757	–2.271	–2.994	–2.725	–2.104	–1.330	–1.054
CHAINAGE	1040.000	1050.000	1060.000	1070.000	1080.000	1090.000	1100.000	1110.000	1120.000	1130.000	1140.000	1150.000	1160.000	1170.000	1180.000	1184.467
HEIGHT ABOVE Q100 FLOOD LEVEL												0.315				
Q100 LEVEL TO NATURAL SURFACE												2.676				

REVISIONS

No.	BY	DATE	DESCRIPTION
2	A.R	19.09.24	RESPONSE TO CONDITIONS
1	A.R	27.08.24	LAYOUT AND LONGSECTION AMENDMENTS
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION

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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
ROAD LAYOUT AND LONG SECTION – SHEET 3 OF 3

SCALE	AS SHOWN
SHEET	6 OF 21
REVISION	0 1 2
DRG No.	1241 – 013



DATUM: 0.000

PROPOSED LEVELS	4.758	4.252	4.627	4.837	4.627	4.252	4.782
EXISTING LEVELS	4.757	4.765	4.767	4.786			
LEVEL DIFFERENCE	0.000	−0.507	−0.133	0.071	−0.149	−0.527	0.000
OFFSETS	−10.523	−8.500	−7.000	0.000	7.000	8.500	10.619

CHAINAGE 50.000



DATUM: 0.000

PROPOSED LEVELS	4.633	4.408	4.187	4.374	4.562	4.667	4.772	4.667	4.562	4.374	4.187	4.437	4.692
EXISTING LEVELS	4.630	4.638	4.662	4.696	4.700								
LEVEL DIFFERENCE	0.000	−0.227	−0.450	−0.264	−0.078	0.016	0.110	−0.006	−0.121	−0.311	−0.501	−0.253	−0.002
OFFSETS	−10.284	−9.385	−8.500	−7.750	−7.000	−3.500	0.000	3.500	7.000	7.750	8.500	9.502	10.520

CHAINAGE 125.000



DATUM: 0.000

PROPOSED LEVELS	4.601	4.125	4.500	4.710	4.500	4.125	4.624
EXISTING LEVELS	4.600	4.603	4.602	4.604	4.616	4.627	
LEVEL DIFFERENCE	0.000	−0.477	−0.102	0.106	−0.119	−0.496	0.000
OFFSETS	−10.403	−8.500	−7.000	0.000	7.000	8.500	10.493

CHAINAGE 200.000



DATUM: 0.000

PROPOSED LEVELS	4.796	4.534	4.274	4.462	4.649	4.754	4.859	4.754	4.649	4.462	4.274	4.527	4.792
EXISTING LEVELS	4.800	4.799	4.796	4.789	4.788	4.795	4.794	4.794					
LEVEL DIFFERENCE	−0.002	−0.263	−0.522	−0.334	−0.145	−0.038	0.070	−0.035	−0.142	−0.331	−0.519	−0.267	−0.003
OFFSETS	−10.588	−9.538	−8.500	−7.750	−7.000	−3.500	0.000	3.500	7.000	7.750	8.500	9.511	10.570

CHAINAGE 25.000



DATUM: 0.000

PROPOSED LEVELS	4.672	4.209	4.584	4.794	4.584	4.209	4.719
EXISTING LEVELS	4.670	4.688	4.694	4.694	4.699	4.715	4.724 4.727
LEVEL DIFFERENCE	0.000	−0.467	−0.095	0.099	−0.124	−0.504	0.000
OFFSETS	−10.355	−8.500	−7.000	0.000	7.000	8.500	10.543

CHAINAGE 100.000



DATUM: 0.000

PROPOSED LEVELS	4.601	4.370	4.143	4.330	4.518	4.623	4.728	4.623	4.518	4.330	4.143	4.397	4.652
EXISTING LEVELS	4.600	4.606	4.607	4.607	4.619	4.622	4.657	4.658					
LEVEL DIFFERENCE	0.000	−0.232	−0.461	−0.274	−0.087	0.016	0.109	−0.008	−0.124	−0.314	−0.504	−0.252	0.000
OFFSETS	−10.333	−9.408	−8.500	−7.750	−7.000	−3.500	0.000	3.500	7.000	7.750	8.500	9.517	10.538

CHAINAGE 175.000



DATUM: 0.000

PROPOSED LEVELS	4.194	4.569	4.779	4.569	4.194
EXISTING LEVELS	4.700	4.718	4.729	4.752	4.700
LEVEL DIFFERENCE			0.050		
OFFSETS	−8.500	−7.000	0.000	7.000	8.500

CHAINAGE 00.000



DATUM: 0.000

PROPOSED LEVELS	4.712	4.469	4.231	4.418	4.606	4.711	4.816	4.711	4.606	4.418	4.231	4.487	4.745
EXISTING LEVELS	4.711	4.713	4.717	4.727	4.744	4.752							
LEVEL DIFFERENCE	0.000	−0.244	−0.484	−0.297	−0.111	−0.011	0.088	−0.022	−0.133	−0.322	−0.510	−0.255	0.001
OFFSETS	−10.427	−9.455	−8.500	−7.750	−7.000	−3.500	0.000	3.500	7.000	7.750	8.500	9.526	10.559

CHAINAGE 75.000



DATUM: 0.000

PROPOSED LEVELS	4.600	4.165	4.540	4.750	4.540	4.165	4.663
EXISTING LEVELS	4.600	4.600	4.623	4.672			
LEVEL DIFFERENCE	0.000	−0.435	−0.060	0.127	−0.110	−0.490	0.000
OFFSETS	−10.241	−8.500	−7.000	0.000	7.000	8.500	10.491

CHAINAGE 150.000

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	CROSS SECTIONS ADDED
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION

B.Langtree B.LANGTREE RPEQ 11932

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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
CROSS SECTION – SHEET 1 OF 6

SCALE	AS SHOWN				
SHEET	7 OF 21				
REVISION	0	1			
DRG No.	1241 – 014				



DATUM: 0.000

PROPOSED LEVELS		3.352	3.425	4.262	4.712	4.817	4.922	4.817	4.712	4.317	3.891			
EXISTING LEVELS	2.931				3.589	3.789		3.917	3.966		3.926	3.905		3.755
LEVEL DIFFERENCE		−0.043	0.009	0.604	0.921	0.964	1.005	0.863	0.785	0.404	−0.002			
OFFSETS		−9.719	−9.575	−7.900	−7.000	−3.500	0.000	3.500	7.000	7.789	8.642			

CHAINAGE 275.000



DATUM: 0.000

PROPOSED LEVELS		2.066		4.314			4.524			4.314		2.910		
EXISTING LEVELS	1.952				2.362	2.606		3.128	3.178		3.216	3.218	3.033	2.769
LEVEL DIFFERENCE		0.000		1.862			1.346			1.278		0.000		
OFFSETS		−11.497		−7.000			0.000			7.000		9.808		

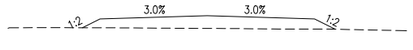
CHAINAGE 350.000



DATUM: 0.000

PROPOSED LEVELS		2.342	2.367	3.509	4.506	4.611		4.716		4.611	4.589	4.549	4.517	3.075	2.567	2.567	2.592
EXISTING LEVELS	2.380					2.592	2.594	2.600	2.599						2.592	2.597	
LEVEL DIFFERENCE		−0.080	−0.057	1.028	1.975	2.018		2.118		2.015	1.993	1.953	1.922	0.482	−0.026	−0.025	0.000
OFFSETS		−11.328	−11.279	−8.995	−7.000	−3.500		0.000		3.500	4.236	5.589	6.651	9.822	10.821	11.930	12.420

CHAINAGE 425.000



DATUM: 0.000

PROPOSED LEVELS				4.215	4.789		4.999			4.789	4.117			
EXISTING LEVELS	4.176	4.216	4.218		4.212		4.185	4.171	4.160	4.130		4.126		4.024	4.018
LEVEL DIFFERENCE			0.000	0.576			0.828			0.662	0.000			
OFFSETS			−8.147	−7.000			0.000			7.000	8.343			

CHAINAGE 250.000



DATUM: 0.000

PROPOSED LEVELS	1.776	3.110		4.439		4.544		4.649		4.544		4.439	3.923	3.382		
EXISTING LEVELS	1.732	1.759	2.286	2.431	3.081	3.292	3.362	3.409	3.428		3.449		3.240	3.148		
LEVEL DIFFERENCE		0.026	1.026	1.945		1.491		1.286		1.119		0.995	0.474	−0.004		
OFFSETS		−12.325	−9.657	−7.000		−3.500		0.000		3.500		7.000	8.031	9.113		

CHAINAGE 325.000



DATUM: 0.000

PROPOSED LEVELS				4.391			4.601			4.391				
EXISTING LEVELS	2.155		2.214		2.197	2.149		2.086	1.978		1.840		1.836	
LEVEL DIFFERENCE		2.189			2.452			2.557						
OFFSETS		−7.000			0.000			7.000						

CHAINAGE 400.000



DATUM: 0.000

PROPOSED LEVELS		4.375	4.245	4.620		4.830			4.620	4.245	4.434			
EXISTING LEVELS	3.660	4.366				4.425	4.442	4.437	4.432			4.435		4.425
LEVEL DIFFERENCE			0.000	−0.133	0.233		0.387			0.187	−0.189	0.000		
OFFSETS			−9.019	−8.500	−7.000		0.000			7.000	8.500	9.257		

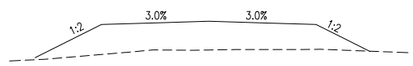
CHAINAGE 225.000



DATUM: 0.000

PROPOSED LEVELS	2.171		4.575			4.785			4.575		3.625			
EXISTING LEVELS	2.072	2.256		2.586	2.740		3.443	3.513		3.612	3.663	3.634	3.612		3.480
LEVEL DIFFERENCE		0.000		1.858			1.272				0.935	0.000		
OFFSETS		−11.809		−7.000			0.000				7.000	8.901		

CHAINAGE 300.000



DATUM: 0.000

PROPOSED LEVELS		2.132	3.222	4.298	4.403	4.508		4.403		4.298	3.467	2.538		
EXISTING LEVELS	1.918	2.032			2.488	2.640	2.617	2.636	2.662		2.668	2.682		2.463
LEVEL DIFFERENCE		0.132	1.061	1.956	1.764		1.872		1.738		1.619	0.839	−0.019	
OFFSETS		−11.333	−9.152	−7.000	−3.500		0.000		3.500		7.000	8.662	10.520	

CHAINAGE 375.000

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	CROSS SECTIONS ADDED
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA		
VERT. DATUM	AHD		
DRG. FILE			DATE
DESIGN	A.REINAUDO		28.05.24
DRAWN	A.REINAUDO		28.05.24

CERTIFICATION

B.LANGTREE RPEQ 11932

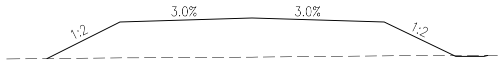
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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
CROSS SECTION – SHEET 2 OF 6

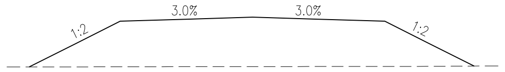
SCALE	AS SHOWN
SHEET	8 OF 21
REVISION	0 1
DRG No.	1241 – 015



DATUM: 0.000

PROPOSED LEVELS	2.439	4.372	4.582	4.372	2.554	2.554	2.602
EXISTING LEVELS	2.416	2.472	2.506	2.515	2.584	2.604	
LEVEL DIFFERENCE	0.000	1.896	2.067	1.792	−0.042	−0.048	0.000
OFFSETS	−10.867	−7.000	0.000	7.000	10.794	12.294	12.488

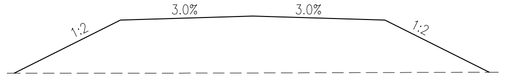
CHAINAGE 500.000



DATUM: 0.000

PROPOSED LEVELS	2.026	3.234	4.426	4.531	4.636	4.531	4.426	3.261	2.067
EXISTING LEVELS	2.019	2.017	2.041	2.041	2.043	2.075			
LEVEL DIFFERENCE	0.009	1.211	2.398	2.495	2.595	2.489	2.383	1.208	0.000
OFFSETS	−11.799	−9.384	−7.000	−3.500	0.000	3.500	7.000	9.330	11.717

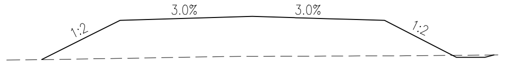
CHAINAGE 575.000



DATUM: 0.000

PROPOSED LEVELS	1.877	4.685	4.895	4.685	1.927
EXISTING LEVELS	1.877	1.882	1.887	1.921	1.928
LEVEL DIFFERENCE	0.000	2.806	3.008	2.773	0.000
OFFSETS	−12.617	−7.000	0.000	7.000	12.516

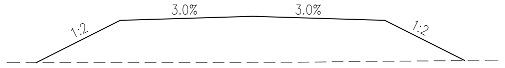
CHAINAGE 650.000



DATUM: 0.000

PROPOSED LEVELS	2.437	3.865	4.510	4.577	4.720	4.654	4.624	4.600	4.561	4.510	3.068	2.558	2.558	2.648	2.680
EXISTING LEVELS	2.411	2.434	2.603	2.607	2.638	2.682									
LEVEL DIFFERENCE	0.006	1.387	2.010	2.038	2.113	2.038	2.005	1.978	1.934	1.877	0.415	−0.104	−0.114	−0.031	0.000
OFFSETS	−11.147	−8.291	−7.000	−4.782	0.000	2.218	3.211	4.002	5.311	7.000	9.809	10.803	11.912	12.662	12.790

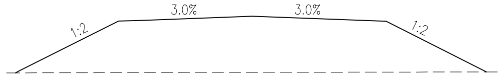
CHAINAGE 475.000



DATUM: 0.000

PROPOSED LEVELS	2.084	4.310	4.520	4.310	2.198	
EXISTING LEVELS	2.081	2.093	2.089	2.096	2.108	2.215
LEVEL DIFFERENCE	0.000	2.220	2.424	2.154	0.000	
OFFSETS	−11.454	−7.000	0.000	7.000	11.226	

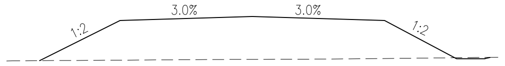
CHAINAGE 550.000



DATUM: 0.000

PROPOSED LEVELS	1.891	2.236	4.613	4.649	4.865	4.620	4.411	1.941
EXISTING LEVELS	1.890	1.915	1.916	1.920	1.942			
LEVEL DIFFERENCE	0.000	0.344	2.711	2.745	2.949	2.691	2.480	0.000
OFFSETS	−12.528	−11.846	−7.068	−5.845	0.000	6.607	7.492	12.428

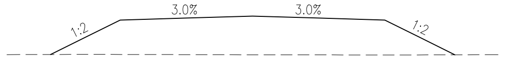
CHAINAGE 625.000



DATUM: 0.000

PROPOSED LEVELS	2.457	4.584	4.794	4.584	2.563	2.563	2.630
EXISTING LEVELS	2.442	2.448	2.522	2.526	2.540	2.634	
LEVEL DIFFERENCE	0.000	2.099	2.268	2.011	−0.048	−0.064	0.000
OFFSETS	−11.254	−7.000	0.000	7.000	10.812	12.301	12.579

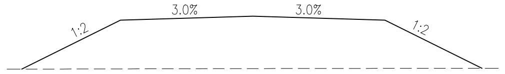
CHAINAGE 450.000



DATUM: 0.000

PROPOSED LEVELS	2.437	3.377	4.281	4.386	4.491	4.386	4.281	3.354	2.427
EXISTING LEVELS	2.435	2.450	2.428	2.426	2.414	2.431			
LEVEL DIFFERENCE	−0.005	0.928	1.836	1.951	2.065	1.965	1.866	0.936	0.003
OFFSETS	−10.687	−8.808	−7.000	−3.500	0.000	3.500	7.000	8.854	10.708

CHAINAGE 525.000



DATUM: 0.000

PROPOSED LEVELS	1.930	4.543	4.753	4.543	1.976
EXISTING LEVELS	1.928	1.958	1.960	1.976	1.976
LEVEL DIFFERENCE	0.000	2.600	2.794	2.572	0.000
OFFSETS	−12.226	−7.000	0.000	7.000	12.134

CHAINAGE 600.000

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	CROSS SECTIONS ADDED
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION

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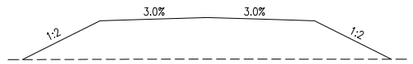
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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
CROSS SECTION – SHEET 3 OF 6

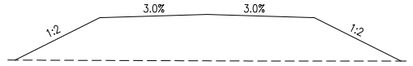
SCALE	AS SHOWN				
SHEET	9 OF 21				
REVISION	0	1			
DRG No.	1241 – 016				



DATUM: 0.000

PROPOSED LEVELS	1.823	3.095	4.352	4.457	4.562	4.457	4.352	3.108	1.846
EXISTING LEVELS	1.817	1.817			1.852	1.851		1.846	1.846
LEVEL DIFFERENCE	0.003	1.267	2.516	2.610	2.711	2.607	2.504	1.261	0.000
OFFSETS	-12.058	-9.513	-7.000	-3.500	0.000	3.500	7.000	9.488	12.012

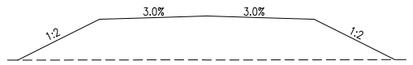
CHAINAGE 725.000



DATUM: 0.000

PROPOSED LEVELS	1.788	4.552	4.762	4.552	1.723
EXISTING LEVELS	1.790		1.746 1.740	1.730	1.722
LEVEL DIFFERENCE	0.000	2.786	3.023	2.826	0.000
OFFSETS	-12.528	-7.000	0.000	7.000	12.659

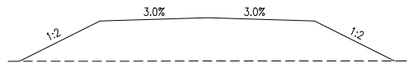
CHAINAGE 800.000



DATUM: 0.000

PROPOSED LEVELS	1.783	3.128	4.451	4.556	4.661	4.556	4.451	3.153	1.817
EXISTING LEVELS	1.782			1.803	1.797	1.792		1.819	1.820
LEVEL DIFFERENCE	0.000	1.340	2.658	2.756	2.864	2.759	2.646	1.342	0.000
OFFSETS	-12.336	-9.646	-7.000	-3.500	0.000	3.500	7.000	9.596	12.267

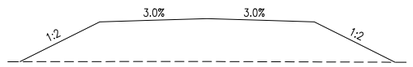
CHAINAGE 875.000



DATUM: 0.000

PROPOSED LEVELS	1.844	4.471		4.681		4.471		1.864	
EXISTING LEVELS	1.844		1.848	1.862	1.863	1.865		1.863	
LEVEL DIFFERENCE	0.000	2.623		2.818		2.607		0.000	
OFFSETS	-12.253	-7.000		0.000		7.000		12.214	

CHAINAGE 700.000



DATUM: 0.000

PROPOSED LEVELS	1.819	3.133	4.417	4.522	4.627	4.522	4.417	3.116	1.782
EXISTING LEVELS	1.817				1.835	1.829	1.823		1.779
LEVEL DIFFERENCE	0.001	1.311	2.591	2.691	2.798	2.706	2.614	1.323	0.000
OFFSETS	-12.197	-9.568	-7.000	-3.500	0.000	3.500	7.000	9.603	12.270

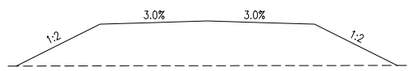
CHAINAGE 775.000



DATUM: 0.000

PROPOSED LEVELS	1.786	4.565		4.775		4.565		1.733	
EXISTING LEVELS	1.765			1.785	1.776	1.769		1.732	1.733
LEVEL DIFFERENCE	0.000	2.789		2.998		2.814		0.000	
OFFSETS	-12.597	-7.000		0.000		7.000		12.664	

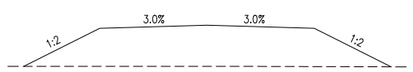
CHAINAGE 850.000



DATUM: 0.000

PROPOSED LEVELS	1.861	3.238	4.596	4.701	4.806	4.701	4.596	3.258	1.901
EXISTING LEVELS	1.859			1.884	1.885	1.887	1.897		1.901
LEVEL DIFFERENCE	0.000	1.369	2.718	2.817	2.918	2.807	2.698	1.359	0.000
OFFSETS	-12.470	-9.715	-7.000	-3.500	0.000	3.500	7.000	9.674	12.390

CHAINAGE 675.000



DATUM: 0.000

PROPOSED LEVELS	1.842	4.320	4.530	4.320	1.812
EXISTING LEVELS	1.842		1.846 1.845	1.844	1.809
LEVEL DIFFERENCE	0.000	2.476	2.685	2.492	0.000
OFFSETS	-11.956	-7.000	0.000	7.000	12.016

CHAINAGE 750.000



DATUM: 0.000

PROPOSED LEVELS	4.620	4.789	4.830	4.661	4.620
EXISTING LEVELS	1.756		1.711 1.702	1.654	1.652
LEVEL DIFFERENCE	2.888	3.080	3.128	2.988	2.955
OFFSETS	-7.000	-1.364	0.000	5.636	7.000

CHAINAGE 825.000

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	CROSS SECTIONS ADDED
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

CERTIFICATION

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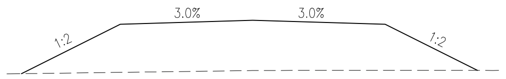
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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
CROSS SECTION – SHEET 4 OF 6

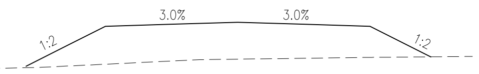
SCALE	AS SHOWN
SHEET	10 OF 21
REVISION	0 1
DRG No.	1241 – 017



DATUM: 0.000

PROPOSED LEVELS	1.793	4.405	4.615	4.405	1.965		
EXISTING LEVELS	1.782	1.957	1.973	1.965	1.966		
LEVEL DIFFERENCE	0.000	2.542	2.658	2.436	0.000		
OFFSETS	−12.225	−7.000	0.000	7.000	11.880		

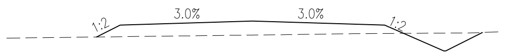
CHAINAGE 950.000



DATUM: 0.000

PROPOSED LEVELS	2.580	3.711	4.682	4.787	4.892	4.787	4.682	3.899	3.071
EXISTING LEVELS	2.458	2.524	2.925	2.952	3.048	3.095			
LEVEL DIFFERENCE	0.076	1.117	1.995	1.933	1.940	1.787	1.635	0.838	−0.005
OFFSETS	−11.203	−8.941	−7.000	−3.500	0.000	3.500	7.000	8.566	10.222

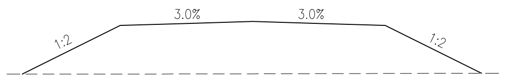
CHAINAGE 1025.000



DATUM: 0.000

PROPOSED LEVELS	4.334	4.958	5.168	4.958	3.601	4.568	
EXISTING LEVELS	4.274	4.299	4.435	4.458	4.507	4.548	4.599
LEVEL DIFFERENCE	0.000	0.609	0.733	0.440	−0.937	0.000	
OFFSETS	−8.248	−7.000	0.000	7.000	10.134	12.168	

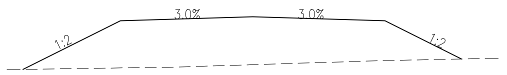
CHAINAGE 1100.000



DATUM: 0.000

PROPOSED LEVELS	1.739	3.043	4.332	4.437	4.542	4.437	4.332	3.062	1.782
EXISTING LEVELS	1.738	1.748	1.754	1.781	1.783	1.786			
LEVEL DIFFERENCE	0.000	1.302	2.588	2.690	2.788	2.673	2.558	1.281	0.000
OFFSETS	−12.186	−9.578	−7.000	−3.500	0.000	3.500	7.000	9.540	12.099

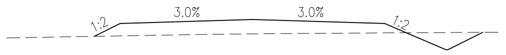
CHAINAGE 925.000



DATUM: 0.000

PROPOSED LEVELS	2.013	4.590	4.800	4.590	2.566		
EXISTING LEVELS	1.999	2.139	2.263	2.432	2.477	2.599	2.609
LEVEL DIFFERENCE	0.000	2.497	2.536	2.109	0.000		
OFFSETS	−12.154	−7.000	0.000	7.000	11.048		

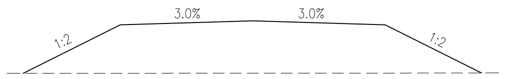
CHAINAGE 1000.000



DATUM: 0.000

PROPOSED LEVELS	4.185	4.866	5.076	4.866	3.475	4.335	4.398
EXISTING LEVELS	4.102	4.293	4.316	4.331	4.376	4.400	4.403
LEVEL DIFFERENCE	0.000	0.656	0.759	0.498	−0.912	−0.062	0.000
OFFSETS	−8.361	−7.000	0.000	7.000	10.240	12.061	12.186

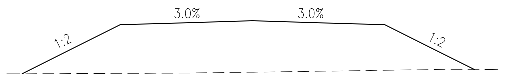
CHAINAGE 1075.000



DATUM: 0.000

PROPOSED LEVELS	1.781	4.347	4.557	4.347	1.799	
EXISTING LEVELS	1.781	1.784	1.786	1.793	1.801	1.802
LEVEL DIFFERENCE	0.000	2.564	2.771	2.555	0.000	
OFFSETS	−12.131	−7.000	0.000	7.000	12.095	

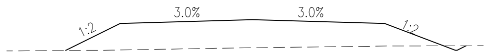
CHAINAGE 900.000



DATUM: 0.000

PROPOSED LEVELS	1.901	3.203	4.497	4.602	4.707	4.602	4.497	3.313	2.124
EXISTING LEVELS	1.897	1.933	1.985	2.132	2.130	2.131			
LEVEL DIFFERENCE	0.000	1.291	2.576	2.661	2.723	2.567	2.412	1.193	−0.007
OFFSETS	−12.193	−9.590	−7.000	−3.500	0.000	3.500	7.000	9.369	11.746

CHAINAGE 975.000



DATUM: 0.000

PROPOSED LEVELS	3.333	4.774	4.984	4.774	3.349	3.586
EXISTING LEVELS	3.308	3.353	3.467	3.481	3.573	3.589
LEVEL DIFFERENCE	0.000	1.413	1.503	1.204	−0.235	0.000
OFFSETS	−9.881	−7.000	0.000	7.000	10.738	11.311

CHAINAGE 1050.000

REVISIONS

No.	BY	DATE	DESCRIPTION
1	A.R	27.08.24	CROSS SECTIONS ADDED
0	A.R	28.05.24	FOR OPW APPLICATION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

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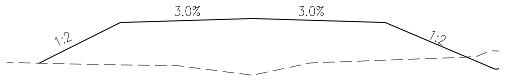
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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
CROSS SECTION – SHEET 5 OF 6

SCALE	AS SHOWN
SHEET	11 OF 21
REVISION	0 1
DRG No.	1241 – 018



DATUM: 0.000

PROPOSED LEVELS	2.953	5.108	5.318	5.108	2.643	2.670				
EXISTING LEVELS	3.001	2.956	2.870	2.830	2.324	2.964	3.008	3.031	3.271	3.330	3.599
LEVEL DIFFERENCE	0.000	2.241	2.994	1.991	−0.966	−0.929				
OFFSETS	−11.309	−7.000	0.000	7.000	12.796	13.000				

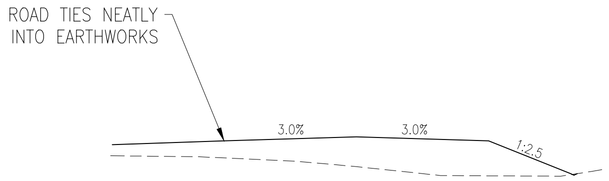
CHAINAGE 1150.000



DATUM: 0.000

PROPOSED LEVELS	3.490	5.050	5.260	5.050	4.609	4.266	3.852	3.497	3.769	4.219	4.246
EXISTING LEVELS	3.506	3.505	3.292	3.284	3.560	3.762	3.873	3.949	3.964	4.268	
LEVEL DIFFERENCE	0.000	1.765	1.498	1.092	0.648	0.302	−0.178	−0.599	−0.400	−0.023	0.000
OFFSETS	−10.120	−7.000	0.000	7.000	8.110	8.955	9.937	10.780	11.728	12.655	12.713

CHAINAGE 1125.000



DATUM: 0.000

PROPOSED LEVELS	5.062	5.272	5.062	3.324	3.327			
EXISTING LEVELS	4.270	4.219	3.983	3.694	3.227	3.191	3.438	3.537
LEVEL DIFFERENCE	0.906	1.578	1.853	0.051	0.000			
OFFSETS	−7.000	0.000	7.000	11.346	11.697			

CHAINAGE 1175.000

REVISIONS			
1	A.R	27.08.24	CROSS SECTIONS ADDED
0	A.R	28.05.24	FOR OPW APPLICATION
No.	BY	DATE	DESCRIPTION

HORIZ. DATUM	MGA	
VERT. DATUM	AHD	
DRG. FILE		DATE
DESIGN	A.REINAUDO	28.05.24
DRAWN	A.REINAUDO	28.05.24

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CLEVELAND BAY INDUSTRIAL PARK

TOWNSVILLE PORT ROAD, STUART
FAR EAST DEVELOPMENT
CROSS SECTION – SHEET 6 OF 6

SCALE	AS SHOWN
SHEET	12 OF 21
REVISION	0 1
DRG No.	1241 – 019

Appendix D: Car Parking Provision Concept

BITZIOS consulting
traffic engineering transport planning





Gold Coast
Suite 26, 58 Riverwalk Avenue, Robina QLD 4226
P: (07) 5562-5377
W: www.bitziosconsulting.com.au
Brisbane
Level 2, 428 Upper Edward Street, Spring Hill 4000
P: (07) 3831-4442
E: admin@bitziosconsulting.com.au
Sydney
Studio 203, 3 Gladstone Street, Newtown NSW 2042
P: (02) 9557 6202

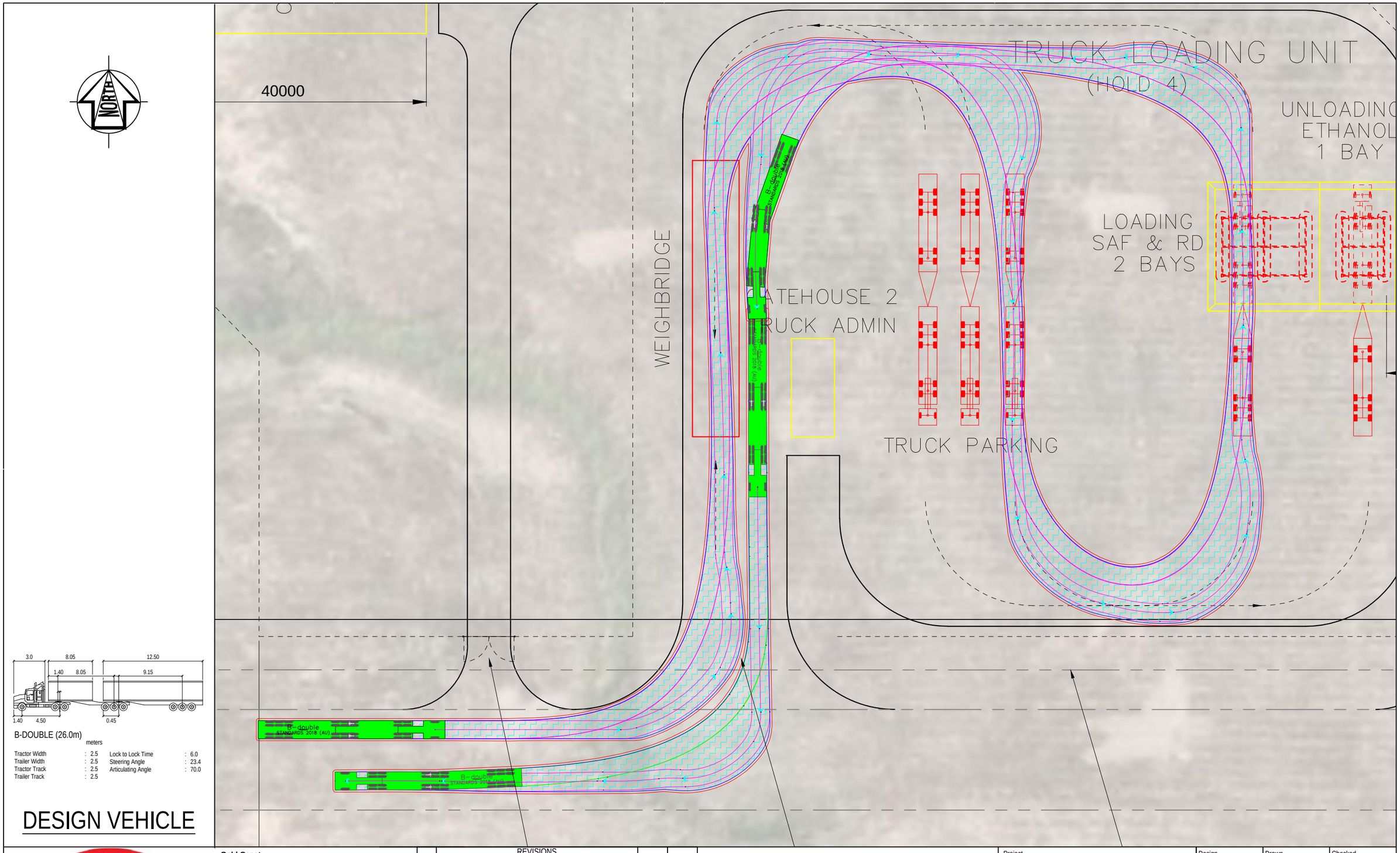
Issue	REVISIONS Revisions/Descriptions	Drawn	Date
001	**Review**	**M.E**	**16.12.2024**
002	Review	T.R	19.09.2025

Scale @ A3 0 5 10 15 20 25 1:500

Project: Jet Zero SAF Facility Townsville	Design: T.R	Drawn: T.R	Checked: T.R
Title: Parking Concept	CONCEPT ONLY	Date: 19.09.2025
	Project Number: P6680	Sheet Number: 1	Issue: 002

Appendix E: Swept Path Diagrams





B-DOUBLE (26.0m)

meters

Tractor Width	: 2.5	Lock to Lock Time	: 6.0
Trailer Width	: 2.5	Steering Angle	: 23.4
Tractor Track	: 2.5	Articulating Angle	: 70.0
Trailer Track	: 2.5		

DESIGN VEHICLE

Gold Coast
Suite 26, 58 Riverwalk Avenue, Robina QLD 4226
P: (07) 5562-5377
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Brisbane
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Sydney
Studio 203, 3 Gladstone Street, Newtown NSW 2042
P: (02) 9557 6202

REVISIONS

Issue	Revisions/Descriptions	Drawn	Date
001	Review	M.E	16.12.2024
002	Review (Swept Paths)	S.L	19.09.2025

Scale @ A3 0 5 10 15 20 25 1:500

Project: Jet Zero SAF Facility Townsville

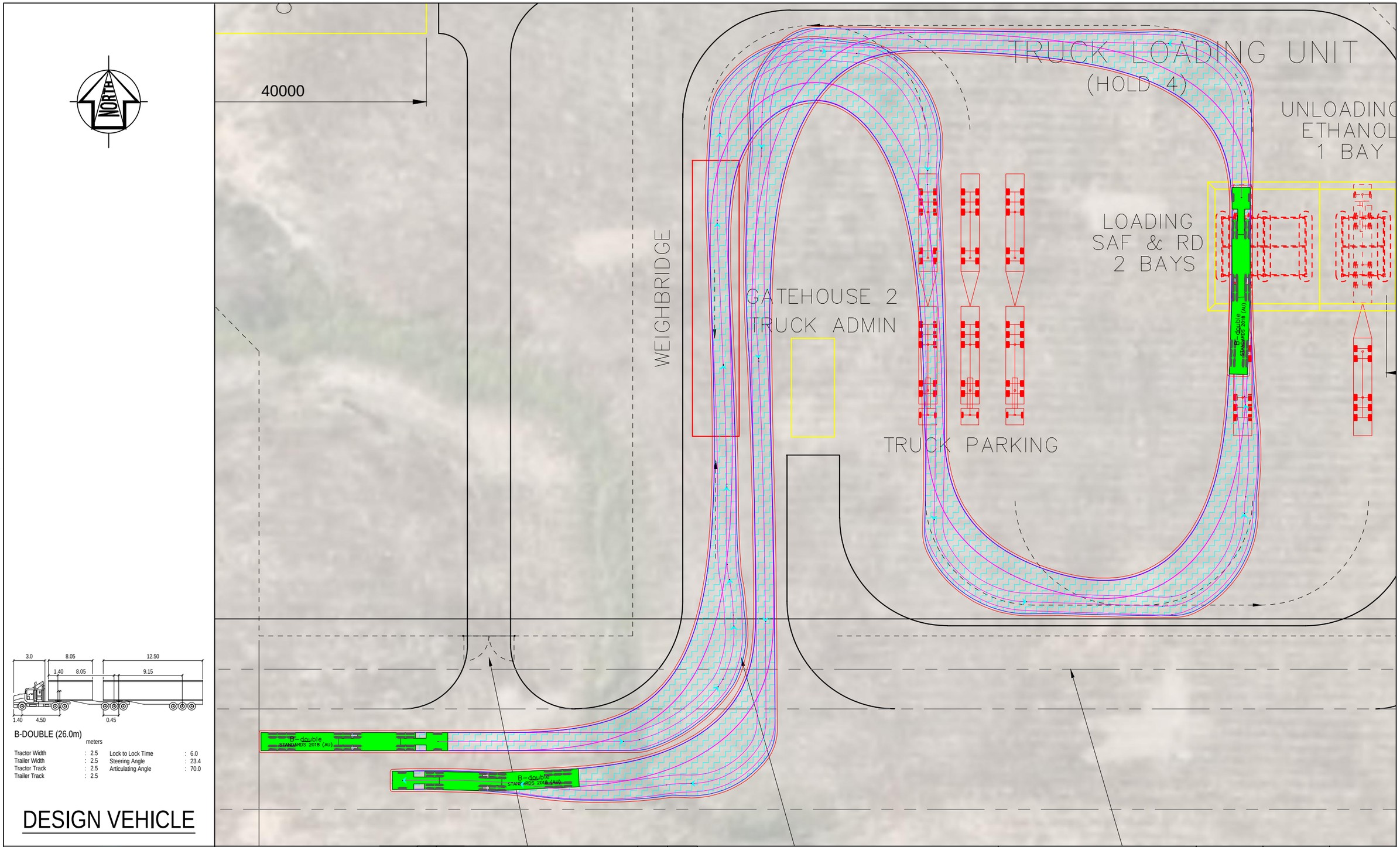
Title: SERVICE VEHICLE
B Double Swept Paths

Design	Drawn	Checked
S.L	S.L	T.R

CONCEPT ONLY

Date: 19.09.2025

Project Number	Sheet Number	Issue
P6680	1	002



B-DOUBLE (26.0m)

meters

Tractor Width	: 2.5	Lock to Lock Time	: 6.0
Trailer Width	: 2.5	Steering Angle	: 23.4
Tractor Track	: 2.5	Articulating Angle	: 70.0
Trailer Track	: 2.5		

DESIGN VEHICLE

Gold Coast
Suite 26, 58 Riverwalk Avenue, Robina QLD 4226
P: (07) 5562-5377
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Sydney
Studio 203, 3 Gladstone Street, Newtown NSW 2042
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Issue	REVISIONS Revisions/Descriptions	Drawn	Date
001	Review	M.E	16.12.2024
002	Review (Swept Paths)	S.L	19.09.2025

Scale @ A3 0 5 10 15 20 25 1:500

Project: Jet Zero SAF Facility Townsville

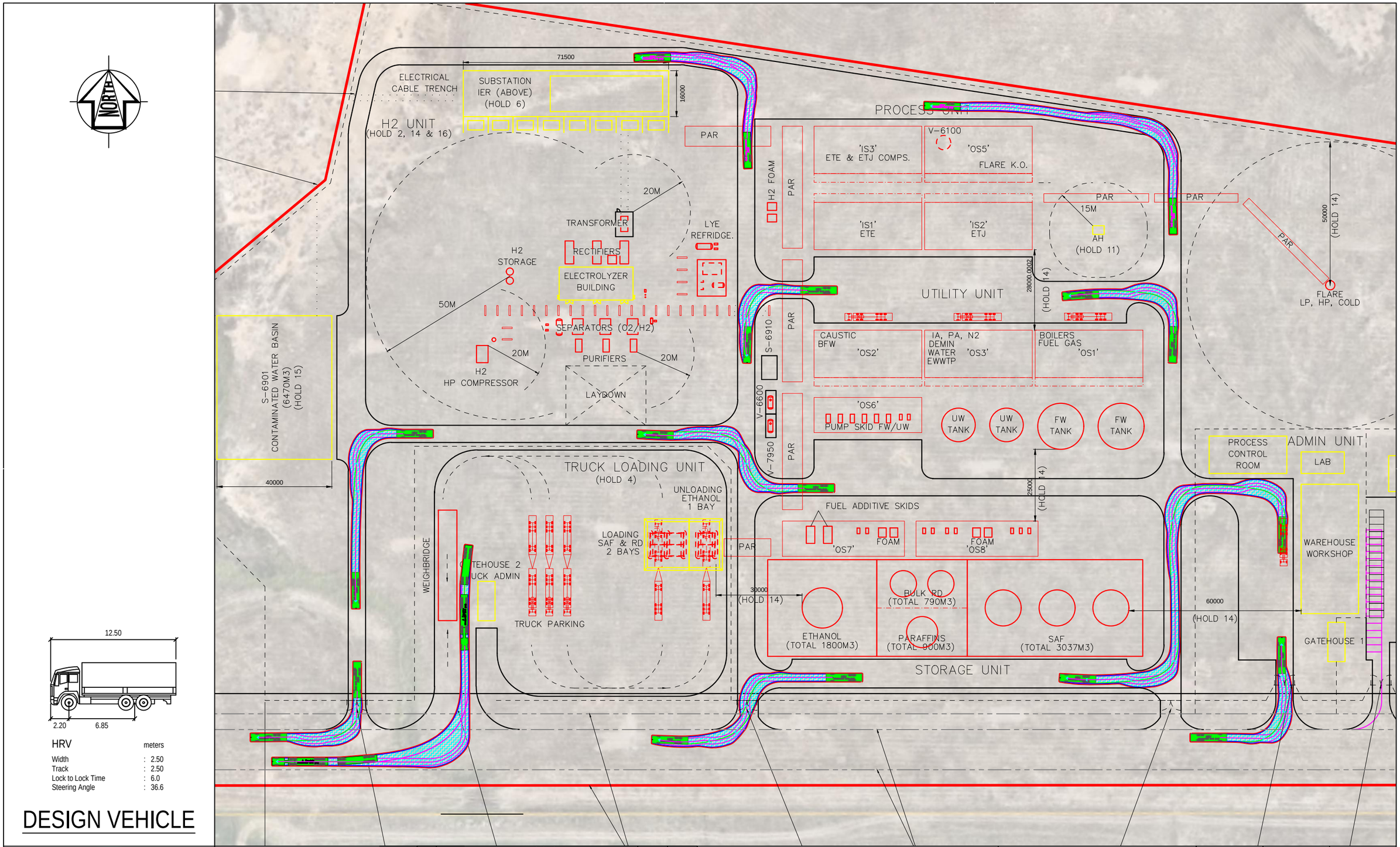
Title: SERVICE VEHICLE
B Double Swept Paths

Design	Drawn	Checked
S.L	S.L	T.R

CONCEPT ONLY

Date: 19.09.2025

Project Number	Sheet Number	Issue
P6680	2	002



HRV	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6

DESIGN VEHICLE

Gold Coast
Suite 26, 58 Riverwalk Avenue, Robina QLD 4226
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Sydney
Studio 203, 3 Gladstone Street, Newtown NSW 2042
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Issue	REVISIONS Revisions/Descriptions	Drawn	Date
001	Review	M.E	16.12.2024
002	Review (Swept Paths)	S.L	19.09.2025

Scale @ A3 — 0 10 20 30 40 50 60 — 1:1250

Project: Jet Zero SAF Facility Townsville

Title: SERVICE VEHICLE HRV Swept Paths

Design	Drawn	Checked
S.L	S.L	T.R

CONCEPT ONLY

Date: 19.09.2025

Project Number	Sheet Number	Issue
P6680	3	002

Appendix F: Traffic Survey Data



Site ID: 2

Location: Bruce Hwy & Flinders Hwy, Cluden

Date: 23/10/2024

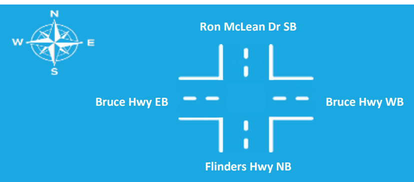
Surveyed Time: 4:00 AM to 7:00 PM (15 hours)

Weather: Fine

Observed AM Peak Hour: 7:30 AM to 8:30 AM

Observed PM Peak Hour: 3:45 PM to 4:45 PM

Observered Overall Peak Hour: 7:30 AM to 8:30 AM



TOTALS AND PEAKS

	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB	Ron McLean Dr SB
	Left	Left	Left	Through	Through	Through	Right	Right	Right	U-turn	U-turn	U-turn	Cross 1
Time Starting	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Pedestrians
15 Hour Totals	831	37	133	251	13	189	251	35	54	1	0	0	3
AM Total	389	18	85	136	8	112	73	18	34	1	0	0	3
PM Total	442	19	48	115	5	77	178	17	20	0	0	0	0
AM Peak 1 hr	73	4	13	33	1	19	11	2	5	0	0	0	1
PM Peak 1 hr	106	2	5	25	1	9	48	2	3	0	0	0	0
04:00	0	0	0	1	0	2	0	0	1	0	0	0	0
04:15	0	0	2	1	0	2	0	0	1	0	0	0	0
04:30	0	0	0	1	0	0	0	0	0	0	0	0	0
04:45	5	0	0	1	0	1	1	0	0	0	0	0	0
05:00	5	0	3	1	0	4	1	0	1	0	0	0	0
05:15	10	1	3	3	0	3	0	0	1	0	0	0	0
05:30	21	1	3	0	0	0	0	0	1	0	0	0	0
05:45	12	0	1	7	0	2	1	0	0	0	0	0	1
06:00	8	0	2	2	1	2	2	0	1	0	0	0	0
06:15	20	0	3	3	0	1	0	1	2	0	0	0	0
06:30	9	2	8	8	0	1	0	0	2	0	0	0	0
06:45	8	1	4	9	0	0	0	0	0	0	0	0	0
07:00	22	1	3	7	0	5	1	1	1	0	0	0	0
07:15	21	0	1	7	0	1	1	1	1	0	0	0	0
07:30	28	1	4	10	1	3	3	0	0	0	0	0	0
07:45	21	0	4	14	0	5	1	0	0	0	0	0	0
08:00	9	3	1	7	0	4	5	0	3	0	0	0	0
08:15	15	0	4	2	0	7	2	2	2	0	0	0	1
08:30	11	1	1	10	2	1	2	2	0	0	0	0	0
08:45	15	1	4	3	0	7	4	1	0	1	0	0	0
09:00	14	0	4	6	0	4	1	0	2	0	0	0	0
09:15	11	0	3	6	1	5	1	0	3	0	0	0	0
09:30	14	3	1	2	0	8	6	0	2	0	0	0	1
09:45	15	0	2	4	0	7	5	0	0	0	0	0	0
10:00	6	0	2	3	0	5	5	0	0	0	0	0	0
10:15	13	0	4	3	0	2	2	0	2	0	0	0	0
10:30	15	2	6	4	0	7	2	0	3	0	0	0	0
10:45	15	0	2	1	2	3	8	0	1	0	0	0	0
11:00	9	0	3	4	0	3	8	2	0	0	0	0	0
11:15	12	0	0	3	0	8	2	2	2	0	0	0	0
11:30	14	1	5	1	0	4	5	4	1	0	0	0	0
11:45	11	0	2	2	1	5	4	2	1	0	0	0	0
12:00	12	1	4	1	0	5	4	1	0	0	0	0	0
12:15	13	0	3	2	0	4	7	0	0	0	0	0	0
12:30	17	0	0	4	1	4	5	4	0	0	0	0	0
12:45	19	0	3	4	1	2	6	1	1	0	0	0	0
13:00	7	3	0	1	0	3	0	0	1	0	0	0	0
13:15	6	0	2	4	0	7	5	1	2	0	0	0	0
13:30	7	4	5	1	0	5	4	0	0	0	0	0	0
13:45	10	1	2	6	0	6	5	0	0	0	0	0	0
14:00	5	2	5	3	1	6	5	0	0	0	0	0	0
14:15	13	2	2	4	0	3	3	1	1	0	0	0	0
14:30	8	2	2	4	0	5	7	1	2	0	0	0	0
14:45	13	0	5	2	0	3	9	0	0	0	0	0	0
15:00	14	0	2	6	0	3	11	2	0	0	0	0	0
15:15	11	1	1	4	0	2	8	2	0	0	0	0	0
15:30	19	0	2	10	0	6	17	2	0	0	0	0	0
15:45	23	0	1	8	0	1	14	0	0	0	0	0	0
16:00	24	0	2	3	1	2	13	0	3	0	0	0	0
16:15	29	2	0	7	0	3	6	0	0	0	0	0	0
16:30	30	0	2	7	0	3	15	2	0	0	0	0	0
16:45	35	0	4	2	0	0	4	0	1	0	0	0	0
17:00	23	1	1	7	0	1	10	0	2	0	0	0	0
17:15	31	0	0	4	0	1	5	0	2	0	0	0	0
17:30	16	0	0	4	0	1	5	0	0	0	0	0	0
17:45	10	0	0	4	0	0	4	0	0	0	0	0	0
18:00	18	0	0	3	1	1	0	0	1	0	0	0	0
18:15	6	0	0	6	0	0	3	0	0	0	0	0	0
18:30	11	0	0	3	0	0	2	0	3	0	0	0	0
18:45	12	0	0	1	0	0	1	0	1	0	0	0	0

	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB	Bruce Hwy WB
	Left	Left	Left	Through	Through	Through	Right	Right	Right	U-turn	U-turn	U-turn	Cross 1
Time Starting	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Pedestrians
15 Hour Totals	116	8	97	6093	356	539	877	37	139	0	0	0	0
AM Total	59	3	56	2833	190	260	483	22	84	0	0	0	0
PM Total	57	5	41	3260	166	279	394	15	55	0	0	0	0
AM Peak 1 hr	5	0	15	625	20	43	148	7	12	0	0	0	0
PM Peak 1 hr	14	0	4	588	20	38	59	1	8	0	0	0	0
04:00	0	0	0	5	0	2	1	0	0	0	0	0	0
04:15	1	1	0	12	1	2	2	0	1	0	0	0	0
04:30	3	0	0	30	0	1	6	0	1	0	0	0	0
04:45	2	0	0	21	0	3	2	0	1	0	0	0	0
05:00	1	0	0	20	2	1	4	0	3	0	0	0	0
05:15	0	0	0	38	0	3	10	0	3	0	0	0	0
05:30	5	0	0	57	1	1	12	0	0	0	0	0	0
05:45	3	0	1	71	3	6	5	0	2	0	0	0	0
06:00	2	0	2	81	2	12	11	0	1	0	0	0	0
06:15	7	0	2	98	2	9	14	0	2	0	0	0	0
06:30	2	0	4	100	2	3	14	1	1	0	0	0	0
06:45	3	0	1	81	5	8	27	0	1	0	0	0	0
07:00	1	0	1	128	13	7	26	3	3	0	0	0	0
07:15	3	0	1	122	7	11	32	0	4	0	0	0	0
07:30	0	0	6	172	7	12	34	0	3	0	0	0	0
07:45	2	0	3	168	3	9	42	2	5	0	0	0	0
08:00	2	0	4	132	6	10	46	2	1	0	0	0	0
08:15	1	0	2	153	4	12	26	3	3	0	0	0	0
08:30	1	0	2	126	10	14	20	2	6	0	0	0	0
08:45	1	0	3	106	5	9	13	1	2	0	0	0	0
09:00	1	1	2	108	6	8	14	0	2	0	0	0	0
09:15	3	0	1	88	9	12	13	1	4	0	0	0	0
09:30	3	0	3	100	5	4	16	0	2	0	0	0	0
09:45	1	0	1	92	7	17	12	1	7	0	0	0	0
10:00	1	0	1	94	13	9	15	0	1	0	0	0	0
10:15	4	1	1	85	7	10	4	0	7	0	0	0	0
10:30	0	0	4	80	8	11	11	1	2	0	0	0	0
10:45	0	0	3	99	19	24	6	0	2	0	0	0	0
11:00	1	0	1	74	11	5	11	2	8	0	0	0	0
11:15	2	0	3	103	5	8	13	2	3	0	0	0	0
11:30	2	0	3	93	11	1	8	0	2	0	0	0	0
11:45	1	0	1	96	16	16	13	1	1	0	0	0	0
12:00	3	1	3	87	5	12	8	0	0	0	0	0	0
12:15	3	0	2	77	9	17	15	2	3	0	0	0	0
12:30	1	0	2	92	6	7	8	2	1	0	0	0	0
12:45	2	0	1	97	5	16	10	0	6	0	0	0	0
13:00	0	0	1	81	4	14	13	0	3	0	0	0	0
13:15	0	1	5	94	6	11	12	1	2	0	0	0	0
13:30	1	0	3	89	9	20	15	0	2	0	0	0	0
13:45	1	0	3	104	16	17	11	0	3	0	0	0	0
14:00	1	0	4	118	9	10	11	0	4	0	0	0	0
14:15	2	0	2	116	6	11	13	2	3	0	0	0	0
14:30	3	0	2	156	9	10	18	0	1	0	0	0	0
14:45	1	0	0	156	6	10	15	0	3	0	0	0	0
15:00	6	0	1	186	13	15	15	3	3	0	0	0	0
15:15	2	1	1	144	12	12	15	3	3	0	0	0	0
15:30	0	1	1	129	5	8	9	0	4	0	0	0	0
15:45	4	0	3	124	4	13	13	1	1	0	0	0	0
16:00	5	0	0	151	4	17	13	0	1	0	0	0	0
16:15	4	0	0	160	7	2	21	0	2	0	0	0	0
16:30	1	0	1	153	5	6	12	0	4	0	0	0	0
16:45	3	0	0	114	5	7	14	1	1	0	0	0	0
17:00	5	1	0	145	5	1	34	0	2	0	0	0	0
17:15	5	0	1	139	5	8	20	0	1	0	0	0	0
17:30	2	0	2	84	7	8	18	0	0	0	0	0	0
17:45	2	0	2	147	0	3	17	0	2	0	0	0	0
18:00	0	0	1	116	0	8	14	0	0	0	0	0	0
18:15	0	0	0	90	1	5	10	0	0	0	0	0	0
18:30	0	0	0	60	2	4	12	0	0	0	0	0	0
18:45	0	0	0	51	1	7	8	0	0	0	0	0	0

	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB	Flinders Hwy NB
	Left	Left	Left	Through	Through	Through	Right	Right	Right	U-turn	U-turn	U-turn	Cross 1
Time Starting	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Pedestrians
15 Hour Totals	444	43	163	287	20	177	159	6	75	0	0	0	0
AM Total	159	28	100	142	16	107	61	5	45	0	0	0	0
PM Total	285	15	63	145	4	70	98	1	30	0	0	0	0
AM Peak 1 hr	25	2	12	37	4	11	7	0	12	0	0	0	0
PM Peak 1 hr	70	3	9	23	0	7	20	0	6	0	0	0	0
04:00	0	0	0	0	0	1	1	0	0	0	0	0	0
04:15	0	0	0	0	0	1	0	0	0	0	0	0	0
04:30	0	0	2	1	0	1	3	0	0	0	0	0	0
04:45	0	1	3	1	0	0	1	0	0	0	0	0	0
05:00	0	0	1	0	0	0	2	0	0	0	0	0	0
05:15	1	0	1	2	0	2	2	0	2	0	0	0	0
05:30	1	0	1	3	0	0	2	0	0	0	0	0	0
05:45	1	0	2	4	1	1	5	0	1	0	0	0	0
06:00	3	0	4	3	1	1	0	0	0	0	0	0	0
06:15	3	0	4	8	0	1	0	0	1	0	0	0	0
06:30	5	0	5	5	1	5	1	0	2	0	0	0	0
06:45	8	2	6	9	0	4	0	0	0	0	0	0	0
07:00	10	2	2	5	0	3	0	0	0	0	0	0	0
07:15	9	0	6	8	1	3	1	0	0	0	0	0	0
07:30	7	0	1	8	1	4	3	0	4	0	0	0	0
07:45	8	0	1	10	1	4	2	0	2	0	0	0	0
08:00	4	2	4	10	0	3	1	0	3	0	0	0	0
08:15	6	0	6	9	2	0	1	0	3	0	0	0	0
08:30	8	2	2	7	0	8	1	2	3	0	0	0	0
08:45	4	2	5	5	1	11	5	0	1	0	0	0	0
09:00	10	1	4	5	1	1	2	1	1	0	0	0	0
09:15	6	1	5	5	1	4	1	0	1	0	0	0	0
09:30	8	1	3	1	1	10	4	0	0	0	0	0	0
09:45	5	0	4	2	2	5	2	0	1	0	0	0	0
10:00	4	1	5	2	0	3	1	0	3	0	0	0	0
10:15	5	1	5	8	1	8	2	0	1	0	0	0	0
10:30	15	2	2	2	0	4	4	0	4	0	0	0	0
10:45	4	2	4	2	0	6	3	1	2	0	0	0	0
11:00	8	1	4	3	0	3	8	0	3	0	0	0	0
11:15	6	1	1	11	1	2	0	0	3	0	0	0	0
11:30	5	2	1	0	0	6	2	0	2	0	0	0	0
11:45	5	4	6	3	0	2	1	1	2	0	0	0	0
12:00	11	1	3	10	1	4	3	0	1	0	0	0	0
12:15	8	0	4	3	1	2	4	0	4	0	0	0	0
12:30	5	2	7	2	0	6	3	0	4	0	0	0	0
12:45	11	0	2	6	1	2	1	1	1	0	0	0	0
13:00	9	2	3	4	0	6	5	0	3	0	0	0	0
13:15	9	1	2	6	0	5	4	0	0	0	0	0	0
13:30	8	1	4	4	0	2	4	0	0	0	0	0	0
13:45	5	1	2	4	0	5	0	0	2	0	0	0	0
14:00	18	0	5	2	0	4	3	0	0	0	0	0	0
14:15	22	0	2	7	1	6	1	0	2	0	0	0	0
14:30	12	1	3	2	0	3	1	0	0	0	0	0	0
14:45	6	1	2	5	0	3	3	0	1	0	0	0	0
15:00	10	0	1	6	0	3	2	0	1	0	0	0	0
15:15	9	0	2	11	0	2	2	0	1	0	0	0	0
15:30	12	1	4	10	0	2	2	0	1	0	0	0	0
15:45	8	1	5	9	0	2	2	0	1	0	0	0	0
16:00	30	1	1	7	0	3	8	0	2	0	0	0	0
16:15	12	1	0	4	0	1	2	0	0	0	0	0	0
16:30	20	0	3	3	0	1	8	0	3	0	0	0	0
16:45	8	0	2	4	0	2	4	0	0	0	0	0	0
17:00	12	1	3	14	0	1	3	0	2	0	0	0	0
17:15	12	0	1	9	0	3	5	0	0	0	0	0	0
17:30	12	0	2	4	0	1	2	0	1	0	0	0	0
17:45	3	0	0	1	0	1	2	0	0	0	0	0	0
18:00	2	0	0	2	0	0	5	0	0	0	0	0	0
18:15	2	0	0	2	0	0	2	0	0	0	0	0	0
18:30	4	0	0	2	0	0	11	0	0	0	0	0	0
18:45	5	0	0	2	0	0	6	0	0	0	0	0	0

	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB	Bruce Hwy EB
	Left	Left	Left	Through	Through	Through	Right	Right	Right	U-turn	U-turn	U-turn	Cross 1
Time Starting	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Light Vehicles (1-2)	Light Trucks (3-5)	Heavy Trucks (6-12)	Pedestrians
15 Hour Totals	308	33	47	5901	369	561	426	44	149	7	0	0	0
AM Total	229	25	28	3027	223	339	230	23	87	3	0	0	0
PM Total	79	8	19	2874	146	222	196	21	62	4	0	0	0
AM Peak 1 hr	42	8	4	391	27	42	30	1	14	1	0	0	0
PM Peak 1 hr	6	3	2	529	16	22	30	3	8	0	0	0	0
04:00	0	0	1	29	0	0	1	0	0	0	0	0	0
04:15	3	0	0	44	7	3	3	0	0	0	0	0	0
04:30	2	0	0	84	1	5	4	0	1	0	0	0	0
04:45	1	0	0	84	4	4	7	0	0	0	0	0	0
05:00	1	1	1	94	2	10	2	0	1	0	0	0	0
05:15	3	0	0	141	7	11	5	1	0	0	0	0	0
05:30	9	1	0	179	2	13	8	0	1	0	0	0	0
05:45	15	0	0	121	6	9	9	0	2	0	0	0	0
06:00	13	1	1	89	5	11	15	1	0	0	0	0	0
06:15	22	1	1	99	4	17	20	0	2	0	0	0	0
06:30	18	2	0	108	13	5	16	1	4	0	0	0	0
06:45	9	0	1	106	14	13	12	0	3	0	0	0	0
07:00	7	2	1	93	5	7	8	1	9	0	0	0	0
07:15	8	0	0	116	9	15	7	1	1	0	0	0	0
07:30	10	0	2	101	3	13	5	0	4	0	0	0	0
07:45	18	6	0	93	8	9	6	0	2	1	0	0	0
08:00	4	1	1	104	10	10	10	0	3	0	0	0	0
08:15	10	1	1	93	6	10	9	1	5	0	0	0	0
08:30	12	1	0	90	15	7	5	0	1	0	0	0	0
08:45	12	0	0	81	8	15	7	1	3	0	0	0	0
09:00	5	1	4	122	10	10	3	2	3	1	0	0	0
09:15	2	1	1	88	9	10	5	0	5	0	0	0	0
09:30	2	0	0	98	5	12	6	2	4	0	0	0	0
09:45	1	1	5	89	7	16	6	2	5	0	0	0	0
10:00	5	0	0	61	6	13	3	1	5	0	0	0	0
10:15	10	0	0	91	6	13	6	1	3	1	0	0	0
10:30	5	0	5	83	11	8	8	3	4	0	0	0	0
10:45	2	0	3	93	8	13	3	2	3	0	0	0	0
11:00	7	4	0	93	11	11	7	1	6	0	0	0	0
11:15	7	1	0	82	6	15	7	1	2	0	0	0	0
11:30	3	0	0	90	9	20	7	0	2	0	0	0	0
11:45	3	0	0	88	6	11	10	1	3	0	0	0	0
12:00	5	0	0	69	11	15	4	0	1	0	0	0	0
12:15	2	0	0	93	10	8	8	1	5	1	0	0	0
12:30	4	0	1	109	5	13	8	1	3	0	0	0	0
12:45	4	1	3	90	7	12	8	0	4	1	0	0	0
13:00	1	1	0	95	14	17	13	3	2	0	0	0	0
13:15	5	1	1	105	6	12	10	2	5	0	0	0	0
13:30	2	0	0	96	14	11	4	1	5	0	0	0	0
13:45	3	0	2	95	9	11	12	1	2	0	0	0	0
14:00	2	1	2	92	9	8	5	2	5	0	0	0	0
14:15	10	0	0	79	6	10	4	1	2	0	0	0	0
14:30	5	1	0	97	3	10	7	1	2	0	0	0	0
14:45	5	0	2	80	8	8	8	2	5	0	0	0	0
15:00	2	0	0	105	4	11	6	2	5	0	0	0	0
15:15	6	0	1	114	6	4	9	0	0	0	0	0	0
15:30	0	0	1	165	5	9	8	1	2	0	0	0	0
15:45	2	1	0	136	3	7	8	0	1	0	0	0	0
16:00	2	1	1	115	5	8	5	2	4	0	0	0	0
16:15	1	0	1	130	5	3	13	0	1	0	0	0	0
16:30	1	1	0	148	3	4	4	1	2	0	0	0	0
16:45	2	0	0	145	4	5	10	0	0	0	0	0	0
17:00	0	0	1	153	1	3	9	0	1	0	0	0	0
17:15	1	0	2	121	1	3	8	0	1	0	0	0	0
17:30	4	0	0	122	2	7	8	0	2	0	0	0	0
17:45	7	0	1	80	1	6	5	0	1	0	0	0	0
18:00	2	0	0	74	1	4	2	0	1	0	0	0	0
18:15	0	0	0	66	2	3	2	0	0	2	0	0	0
18:30	1	0	0	50	0	3	4	0	0	0	0	0	0
18:45	0	0	0	50	1	7	4	0	0	0	0	0	0

	GRAND TOTAL	Ron McLean Dr SB	Bruce Hwy WB	Flinders Hwy NB	Bruce Hwy EB
		TOTAL	TOTAL	TOTAL	TOTAL
Time Starting	TOTALS	All Classes	All Classes	All Classes	All Classes
15 Hour Totals	19276	1795	8262	1374	7845
AM Total	9741	874	3990	663	4214
PM Total	9535	921	4272	711	3631
AM Peak 1 hr	1706	161	875	110	560
PM Peak 1 hr	1690	201	732	138	619
04:00	**45**	4	8	2	31
04:15	**87**	6	20	1	60
04:30	**146**	1	41	7	97
04:45	**143**	8	29	6	100
05:00	**161**	15	31	3	112
05:15	**253**	21	54	10	168
05:30	**322**	26	76	7	213
05:45	**291**	23	91	15	162
06:00	**277**	18	111	12	136
06:15	**347**	30	134	17	166
06:30	**348**	30	127	24	167
06:45	**335**	22	126	29	158
07:00	**378**	41	182	22	133
07:15	**398**	33	180	28	157
07:30	**450**	50	234	28	138
07:45	**450**	45	234	28	143
08:00	**405**	32	203	27	143
08:15	**401**	34	204	27	136
08:30	**375**	30	181	33	131
08:45	**337**	36	140	34	127
09:00	**360**	31	142	26	161
09:15	**306**	30	131	24	121
09:30	**326**	36	133	28	129
09:45	**324**	33	138	21	132
10:00	**268**	21	134	19	94
10:15	**307**	26	119	31	131
10:30	**316**	39	117	33	127
10:45	**336**	32	153	24	127
11:00	**312**	29	113	30	140
11:15	**314**	29	139	25	121
11:30	**304**	35	120	18	131
11:45	**319**	28	145	24	122
12:00	**286**	28	119	34	105
12:15	**311**	29	128	26	128
12:30	**327**	35	119	29	144
12:45	**329**	37	137	25	130
13:00	**309**	15	116	32	146
13:15	**333**	27	132	27	147
13:30	**321**	26	139	23	133
13:45	**339**	30	155	19	135
14:00	**342**	27	157	32	126
14:15	**337**	29	155	41	112
14:30	**378**	31	199	22	126
14:45	**362**	32	191	21	118
15:00	**438**	38	242	23	135
15:15	**389**	29	193	27	140
15:30	**436**	56	157	32	191
15:45	**396**	47	163	28	158
16:00	**434**	48	191	52	143
16:15	**417**	47	196	20	154
16:30	**443**	59	182	38	164
16:45	**377**	46	145	20	166
17:00	**442**	45	193	36	168
17:15	**389**	43	179	30	137
17:30	**314**	26	121	22	145
17:45	**299**	18	173	7	101
18:00	**256**	24	139	9	84
18:15	**202**	15	106	6	75
18:30	**172**	19	78	17	58
18:45	**157**	15	67	13	62

Site ID: 1

Location: Ron McLean Dr & Heleen Downs Rd, Cluden

Date: 23/10/2024

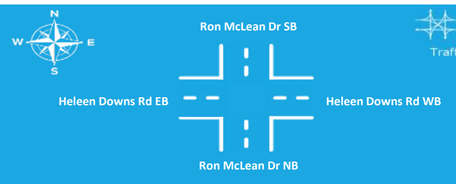
Surveyed Time: 4:00 AM to 7:00 PM (15 hours)

Weather: Fine

Observed AM Peak Hour: 7:30 AM to 8:30 AM

Observed PM Peak Hour: 4:15 PM to 5:15 PM

Observerved Overall Peak Hour: 7:30 AM to 8:30 AM



TOTALS AND PEAKS

15 Hour Totals	7	0	1	1223	52	308	32	2	9	1	0	0	0	4	0	0	5	0	0	4	0	0	0	0	0	0
AM Total	5	0	1	559	26	186	21	2	3	0	0	0	0	3	0	0	3	0	0	2	0	0	0	0	0	0
PM Total	2	0	0	664	26	122	11	0	6	1	0	0	0	1	0	0	2	0	0	2	0	0	0	0	0	0
AM Peak 1 hr	0	0	0	114	4	30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
PM Peak 1 hr	0	0	0	161	3	15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Ron McLean Dr SB	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Ron McLean Dr SB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**	**Heleen Downs Rd WB**
	Left	**Left**	**Left**	**Through**	**Through**	**Through**	**Right**	**Right**	**Right**	**U-turn**	**U-turn**	**U-turn**	**Cross 1**	**Left**	**Left**	**Left**	**Through**	**Through**	**Through**	**Right**	**Right**	**Right**	**U-turn**	**U-turn**	**U-turn**	**Cross 1**
Time Starting	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Pedestrians**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Pedestrians**
04:00	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	1	8	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	14	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	18	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	19	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	10	1	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:15	1	0	0	22	0	6	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	19	1	11	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	16	1	3	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
07:00	0	0	0	34	1	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	27	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	40	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	33	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	20	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	21	1	11	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
08:30	0	0	0	19	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	22	0	8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	24	1	10	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	15	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	16	1	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	21	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	1	0	0	13	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	12	0	7	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	17	2	13	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	3	0	0	21	1	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	20	1	5	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
11:15	0	0	0	14	1	6	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0
11:30	0	0	0	17	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	17	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	15	2	9	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	15	0	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	24	3	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	28	2	4	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
13:00	0	0	0	13	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	14	2	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	11	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	18	0	8	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	1	0	0	10	1	11	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
14:15	0	0	0	21	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	12	2	7	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	22	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	23	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	17	1	2	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
15:30	0	0	0	40	1	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	39	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	39	1	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	45	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
16:30	0	0	0	38	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	41	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	37	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	38	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	25	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	16	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	22	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	1	0	0	12	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	16	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	13	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

15 Hour Totals	165	25	70	1312	61	289	2	0	0	4	0	0	0	37	4	9	7	0	0	146	25	78	1	0	0	0	3883	1635	13	1928	307
AM Total	121	19	49	739	44	166	2	0	0	1	0	0	0	19	1	6	2	0	0	50	13	51	1	0	0	0	2095	803	8	1141	143
PM Total	44	6	21	573	17	123	0	0	0	3	0	0	0	18	3	3	5	0	0	96	12	27	0	0	0	0	1788	832	5	787	164
AM Peak 1 hr	8	7	7	220	11	20	0	0	0	0	0	0	0	1	0	0	1	0	0	6	1	7	0	0	0	0	438	148	1	273	16
PM Peak 1 hr	2	0	1	110	2	15	0	0	0	0	0	0	0	1	0	0	1	0	0	20	1	2	0	0	0	0	335	179	1	130	25
	Ron McLean Dr NB	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Ron McLean Dr NB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**Heleen Downs Rd EB**	**GRAND TOTAL**	**Ron McLean Dr SB**	**Heleen Downs Rd WB**	**Ron McLean Dr NB**	**Heleen Downs Rd EB**
	Left	**Left**	**Left**	**Through**	**Through**	**Through**	**Right**	**Right**	**Right**	**U-turn**	**U-turn**	**U-turn**	**Cross 1**	**Left**	**Left**	**Left**	**Through**	**Through**	**Through**	**Right**	**Right**	**Right**	**U-turn**	**U-turn**	**U-turn**	**Cross 1**		**TOTAL**	**TOTAL**	**TOTAL**	**TOTAL**
Time Starting	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Pedestrians**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Light Vehicles (1-2)**	**Light Trucks (3-5)**	**Heavy Trucks (6-12)**	**Pedestrians**	**TOTALS**	**All Classes**	**All Classes**	**All Classes**	**All Classes**
04:00	0	0	1	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	**9**	1	0	6	2
04:15	1	0	1	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	**14**	4	0	8	2
04:30	0	0	0	9	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**12**	1	0	11	0
04:45	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**14**	8	0	5	1
05:00	1	1	0	4	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	**28**	16	0	9	3
05:15	2	0	0	13	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**42**	20	0	21	1
05:30	2	1	0	22	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**51**	23	0	28	0
05:45	9	0	0	13	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**47**	23	0	23	1
06:00	6	0	1	23	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**53**	18	0	34	1
06:15	19	1	1	23	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	**83**	32	1	47	3
06:30	12	2	1	27	2	5	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	**86**	34	0	50	2
06:45	7	0	0	38	1	4	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	1	0	0	0	0	**77**	21	1	50	5
07:00	6	2	1	32	3	7	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	**99**	45	0	51	3
07:15	1	0	2	46	2	5	0	0	0	0	0	0	0	1	0	0	0	0	0	2	1	2	0	0	0	0	**92**	30	0	56	6
07:30	3	0	3	43	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**104**	48	0	55	1
07:45	2	5	3	73	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	**139**	41	0	94	4
08:00	1	0	1	60	2	4	0	0	0	0	0	0	0	1	0	0	1	0	0	2	0	2	0	0	0	0	**100**	26	0	68	6
08:15	2	2	0	44	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	2	0	0	0	0	**95**	33	1	56	5
08:30	4	1	3	33	1	11	0	0	0	0	0	0	0	1	0	0	0	0	0	2	2	1	0	0	0	0	**86**	27	0	53	6
08:45	3	0	3	32	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	0	0	0	0	**87**	31	0	50	6
09:00	3	0	2	20	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	**74**	38	0	32	4
09:15	1	1	3	20	2	6	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	2	0	0	0	0	**63**	24	0	33	6
09:30	2	0	3	18	1	9	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	**66**	26	0	33	7
09:45	3	0	5	13	3	12	0	0	0	0	0	0	0	2	0	0	0	0	0	4	0	5	0	0	0	0	**73**	26	0	36	11
10:00	3	0	0	17	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	2	0	0	0	0	**47**	18	0	23	6
10:15	7	0	3	15	0	13	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	**63**	19	1	40	3
10:30	5	1	2	13	1	9	0	0	0	0	0	0	0	3	0	1	0	0	0	2	0	4	0	0	0	0	**77**	36	0	31	10
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12:00	8	0	0	16	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	**62**	29	0	28	5
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12:45	3	0	1	18	1	10	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	3	0	0	0	0	**76**	36	1	33	6
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16:15	0	0	1	27	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	1	0	0	0	0	**86**	50	1	30	5
16:30	0	0	0	16	1	6	0	0	0	0	0	0	0	1	0	0	0	0	0	9	1	1	0	0	0	0	**76**	41	0	23	12
16:45	1	0	0	20	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**73**	47	0	25	1
17:00	1	0	0	47	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	**100**	41	0	52	7
17:15	0	0	1	30	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**77**	41	0	35	1
17:30	0	0	0	25	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	**55**	26	0	26	3
17:45	0	0	0	26	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	**50**	17	0	30	3
18:00	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**41**	24	0	17	0
18:15	1	0	0	11	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**27**	13	1	13	0
18:30	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**34**	19	0	15	0
18:45	0	0	0	9	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**24**	14	0	10	0

Appendix G: Traffic Volume Diagrams



Project Information	
Project Name:	Jet Zero Townsville TIA
Project Number:	P6680
Prepared By:	John Kirkham
Reviewed By:	Nathan Edwards
Prepared Date:	4/03/2025
Reviewed Date:	4/03/2025

Table 1: Development Traffic Generation Assumptions - Refer TIA for Details

Land Use	AM Peak			PM Peak		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Construction Phase						
Staff	47.0	7.0	54.0	7.0	47.0	54.0
Servicing / Deliverables	3.0	3.0	6.0	1.0	1.0	2.0
Total	**50**	**10**	**60**	**8**	**48**	**56**
Operational Phase						
Staff	34.0	34.0	68.0	34.0	34.0	68.0
Servicing / Deliverables	4.0	4.0	8.0	4.0	4.0	8.0
Total	**38**	**38**	**76**	**38**	**38**	**76**

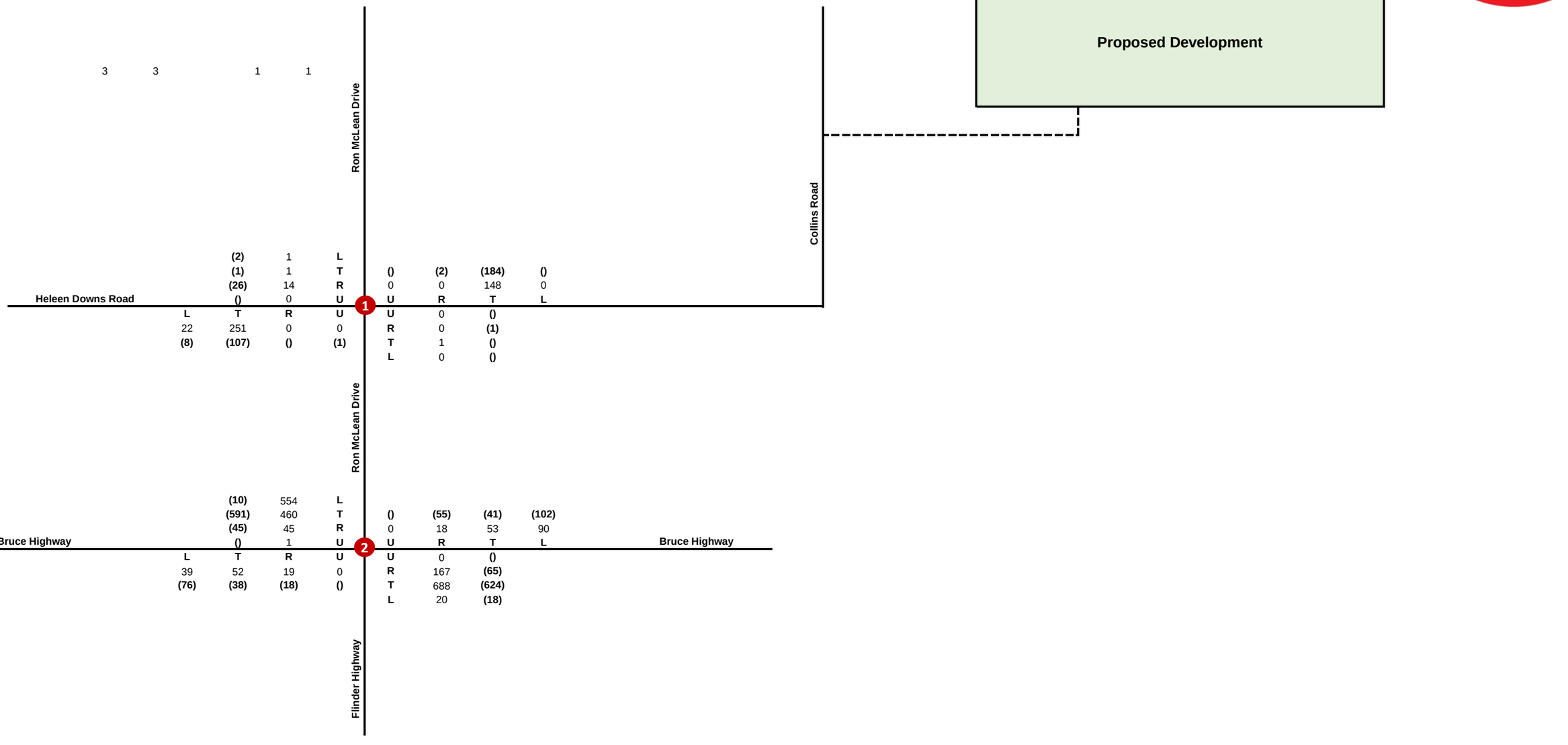
Table 2: External Traffic Distribution

To / From	Construction	Operational
	%	%
North via Ron Mclean Drive	70%	40%
South via Ron Mclean Drive	30%	60%
Total	***100%***	***100%***

Table 3: Background Traffic Growth

Road	Growth Rate	Survey Year	Future Year	Factor
Ron Mclean Drive	2.50%	2024	2025	1.03
Bruce Highway	3.50%	2024	2025	1.04
Ron Mclean Drive	2.50%	2024	2027	1.08
Bruce Highway	3.50%	2024	2027	1.11

RAW Traffic Survey Volumes



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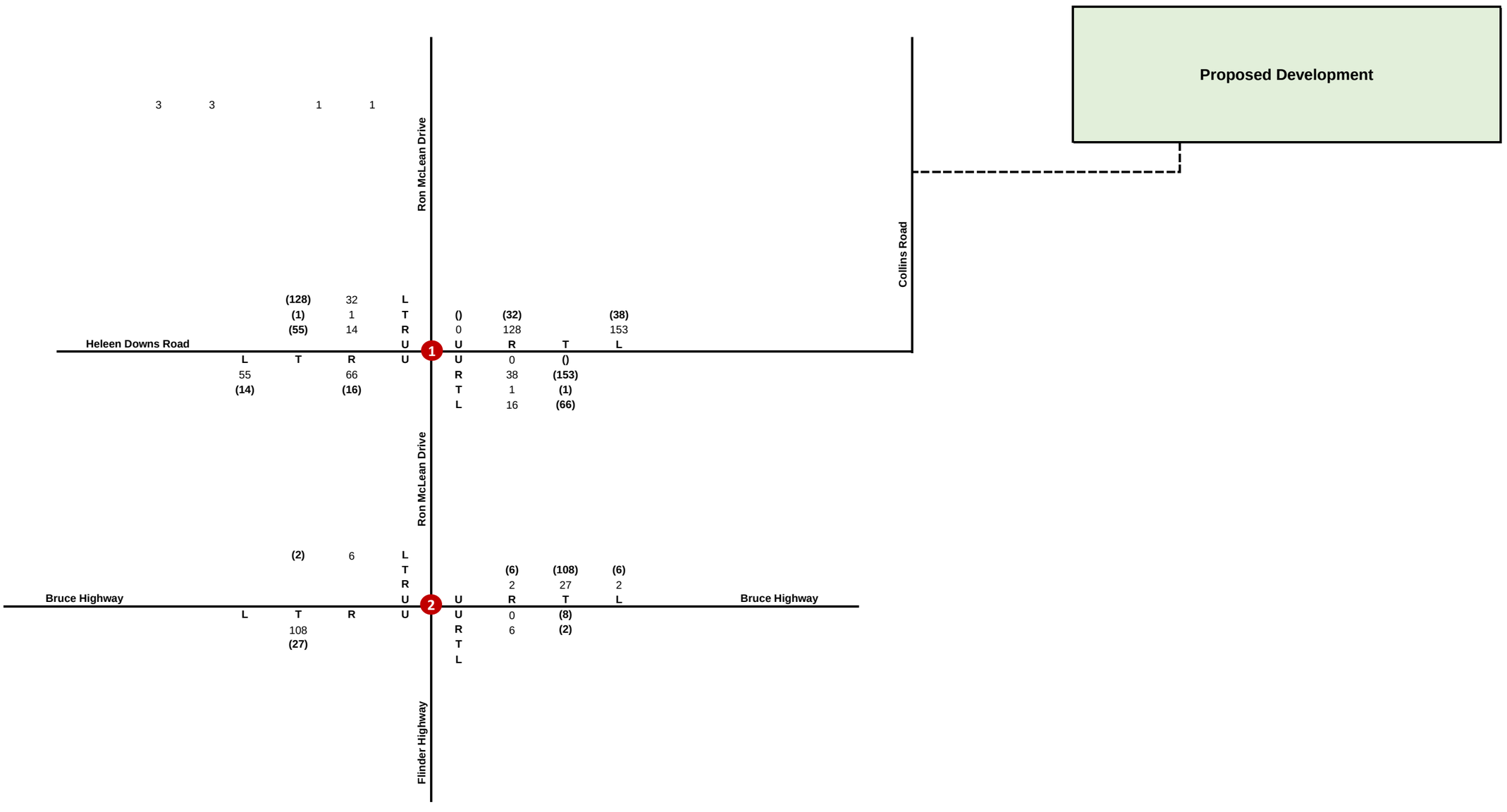
Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

BG Cleveland Industrial Area Eastern + West Precinct Volumes



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Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
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LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

BG Cleveland Industrial Area Subject Site Trip Reduction

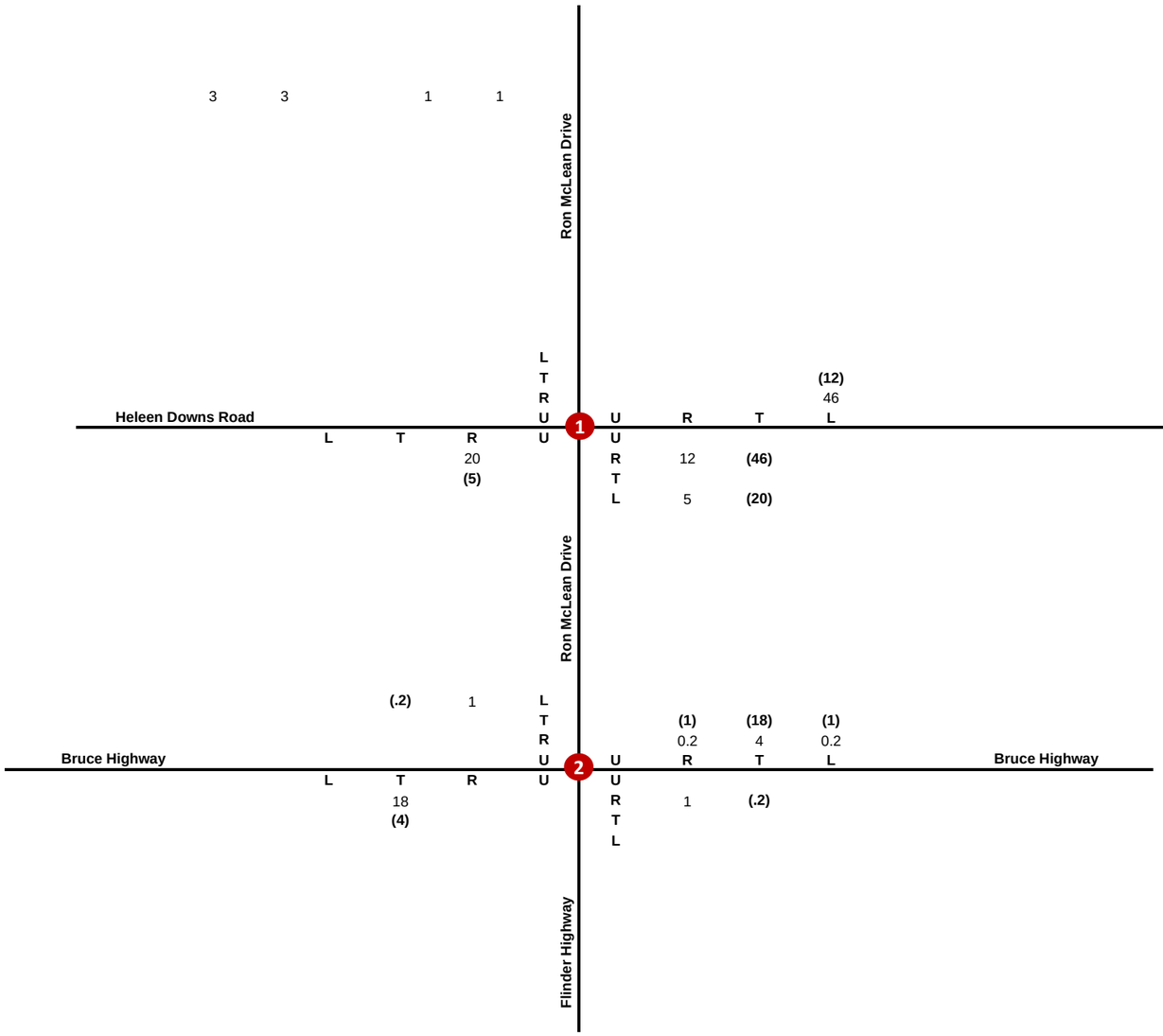


Table 1: Developable Area of Subject Site Within Previous Report

Land Use	Yield	Unit
Industrial	165,000	m2

Table 2: Plot Ratio Adopted from Previous Report

Plot Ratio	Yield	Unit
10%	16,500	m2 GFA

Table 3: Adopted Trip Genreation Rates

Land Use	Peak Rate	Unit	Peak Hour Trips
Industrial	0.5	Trips /100m2 GFA	82.5

Table 4: Directional Traffic Distribution

Land Use	AM PEAK			PM PEAK		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Industrial	80%	20%	100%	20%	80%	100%

Table 5: Traffic Generation

Land Use	AM PEAK			PM PEAK		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Industrial	66	17	83	17	66	83

Table 6: External Traffic Distribution From Previous Report

To / From	Construction %
North via Ron Mclean Drive	70%
South via Ron Mclean Drive	30%
Total	***100%***

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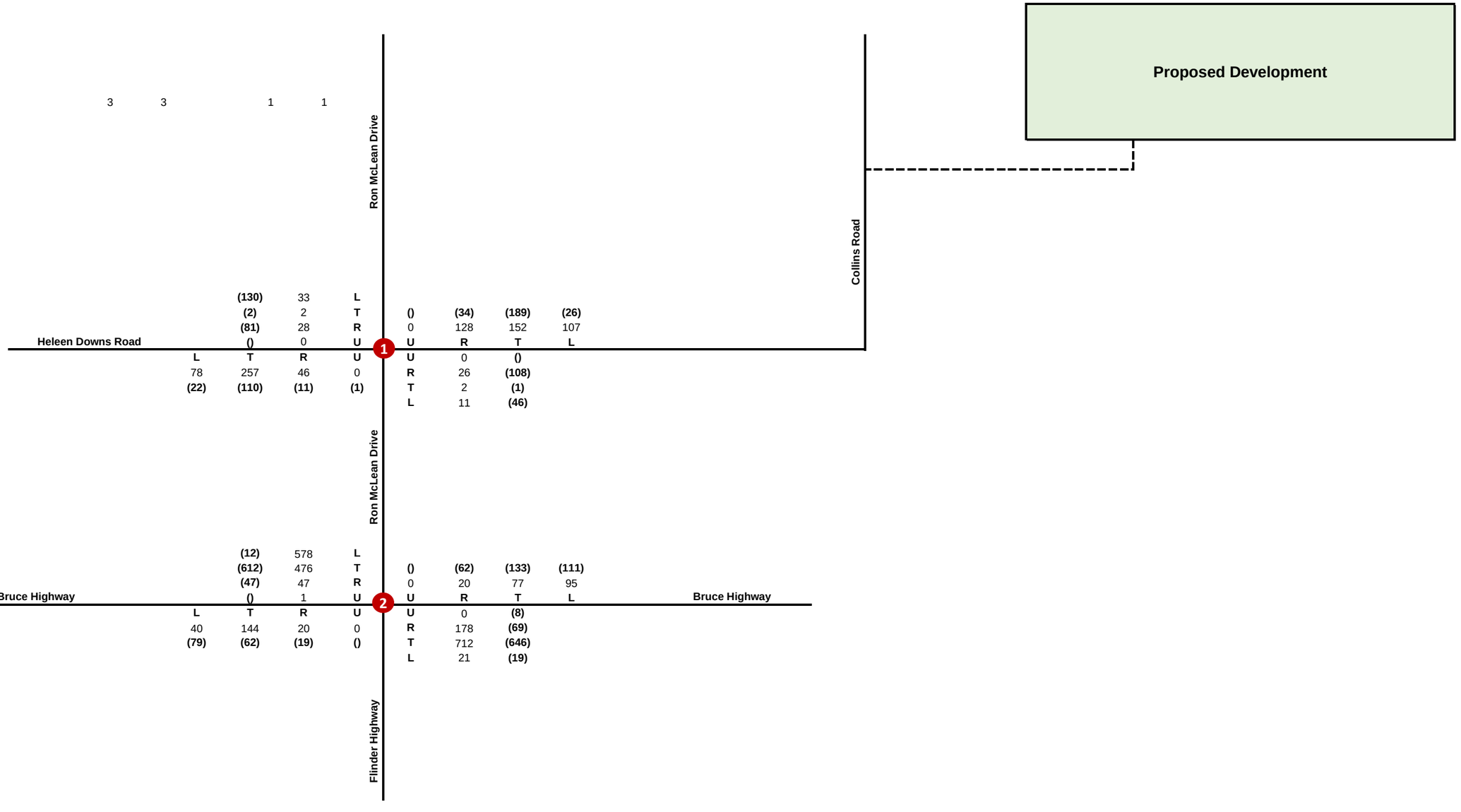
Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

2025 Background Volumes - Construction



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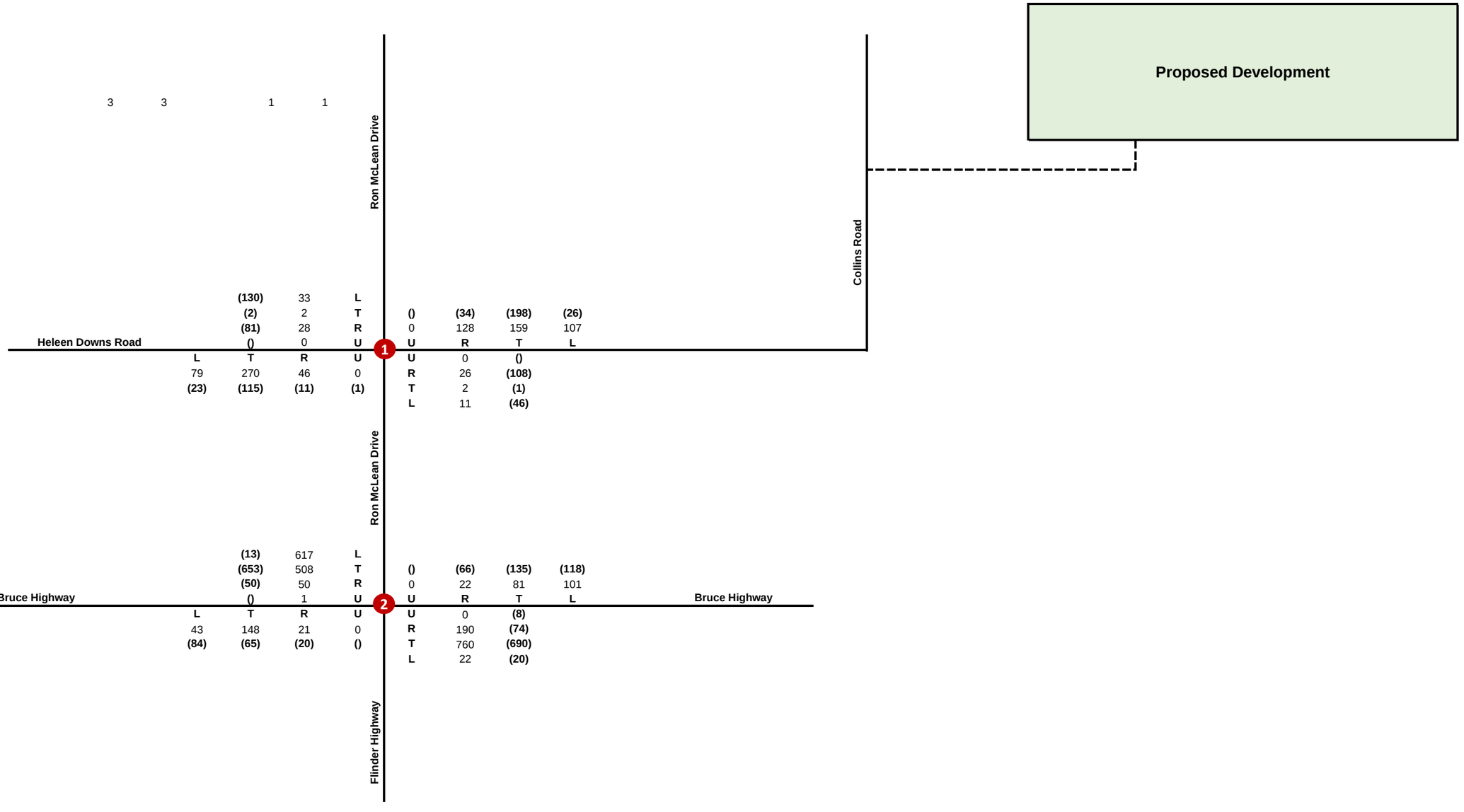
Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

2027 Background Volumes - Operations



DOCUMENT CONTROL

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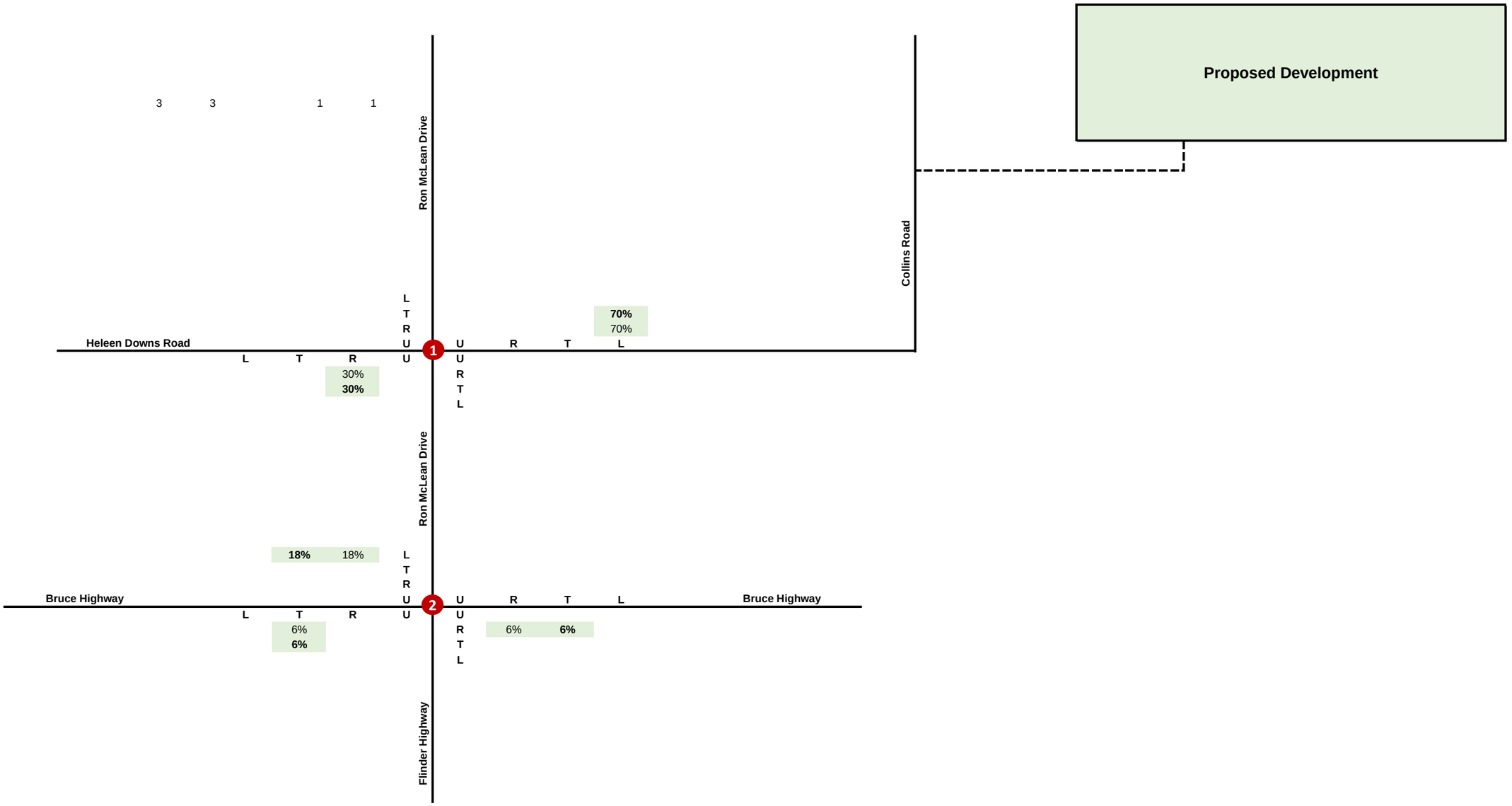
Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

Development Traffic Distribution | Inbound | Construction



DOCUMENT CONTROL

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Job Name: Jet Zero Townsville TIA
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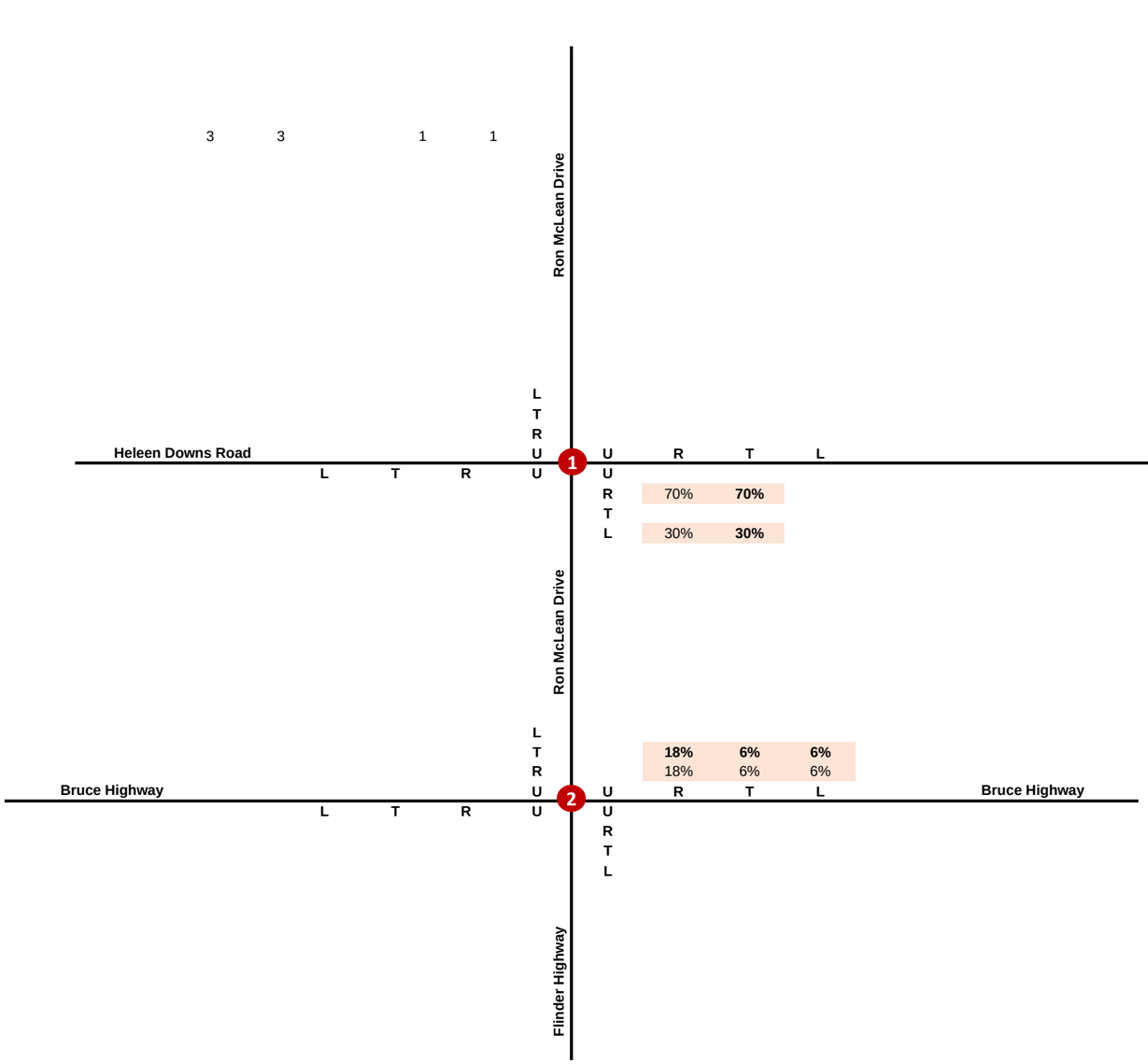
Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement
1	Intersection ID	**L**	Left Turn Movement
		U	U-Turn Movement

Development Traffic Distribution | Outbound | Construction



DOCUMENT CONTROL

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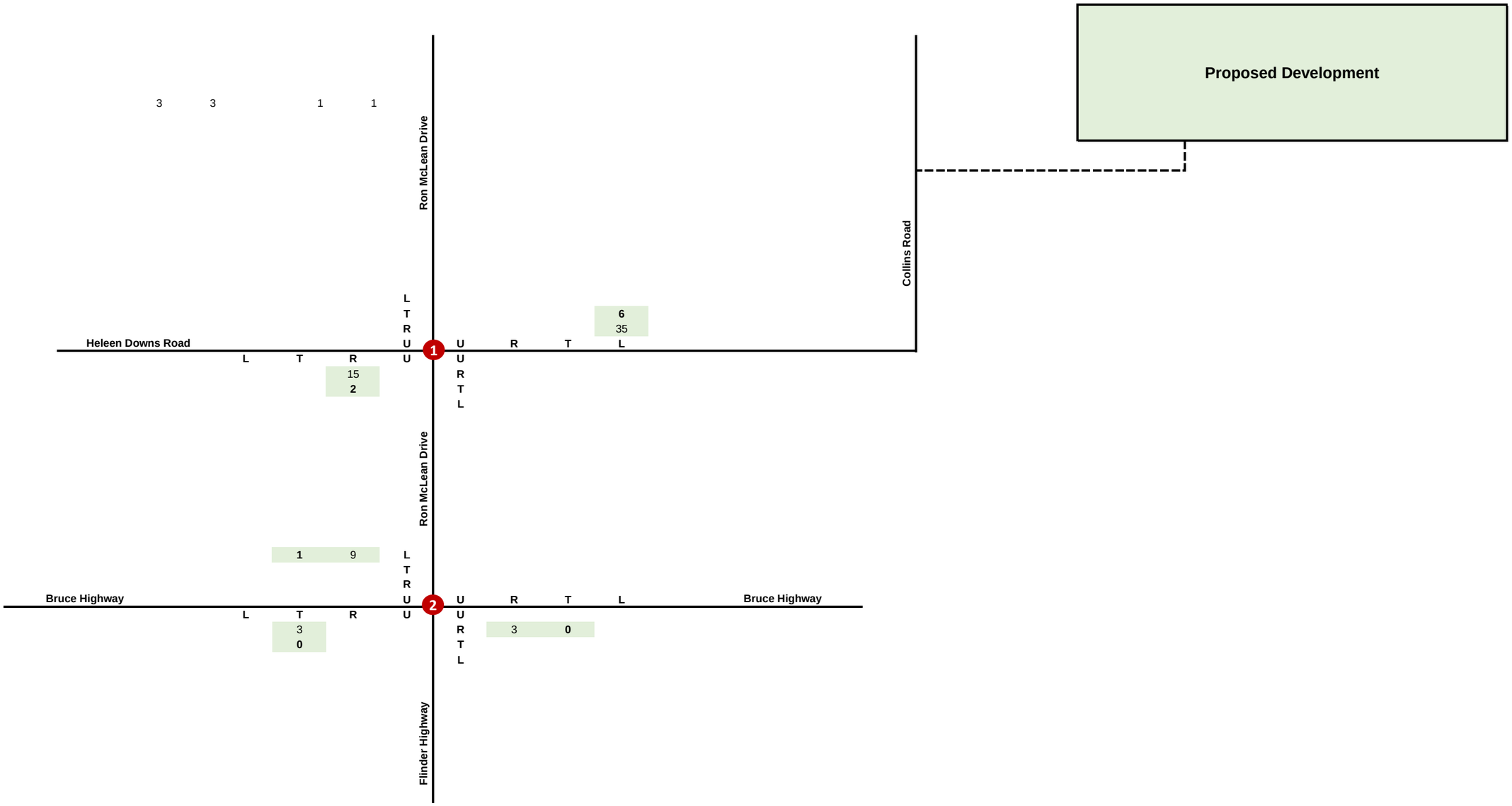
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LEGEND

##	Weekday AM Peak Hour Volumes	T	Through Movement
(##)	Weekday PM Peak Hour Volumes	R	Right Turn Movement
1	Intersection ID	L	Left Turn Movement
		U	U-Turn Movement

Development Traffic Volumes | Inbound | Construction



DOCUMENT CONTROL

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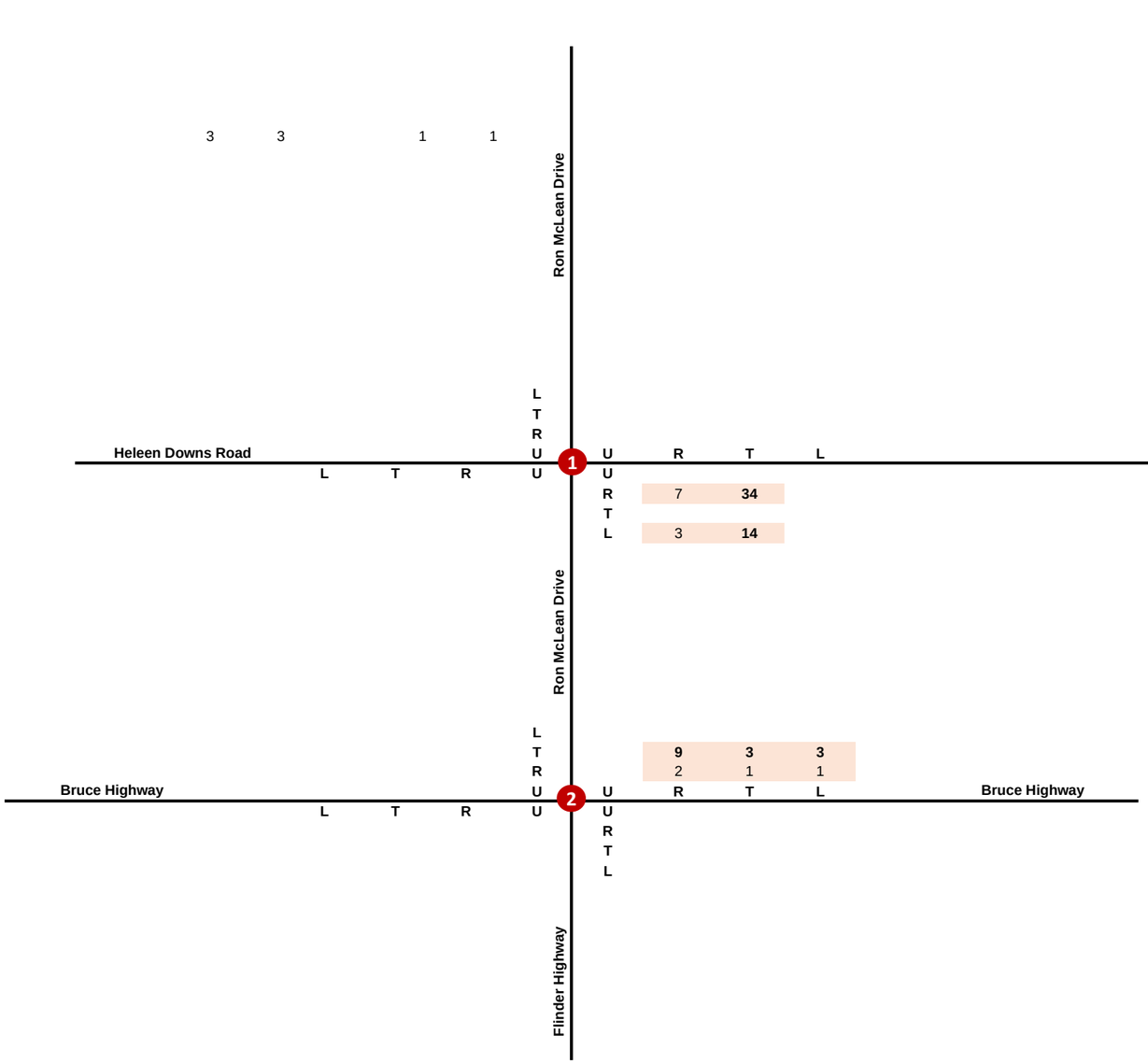
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LEGEND

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(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

Development Traffic Volumes | Outbound | Construction



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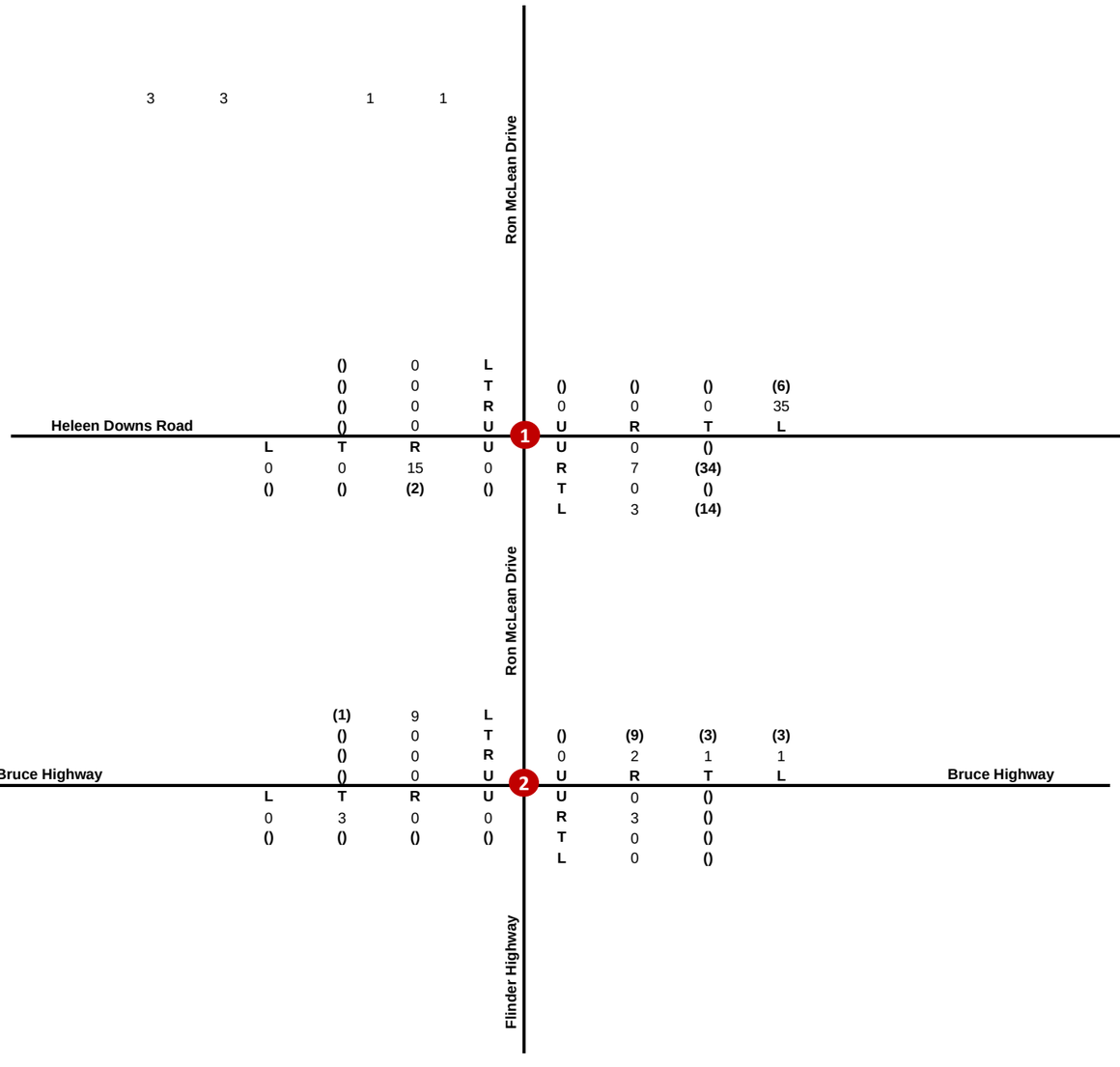
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LEGEND

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(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

Development Traffic Volumes | Total | Construction



DOCUMENT CONTROL

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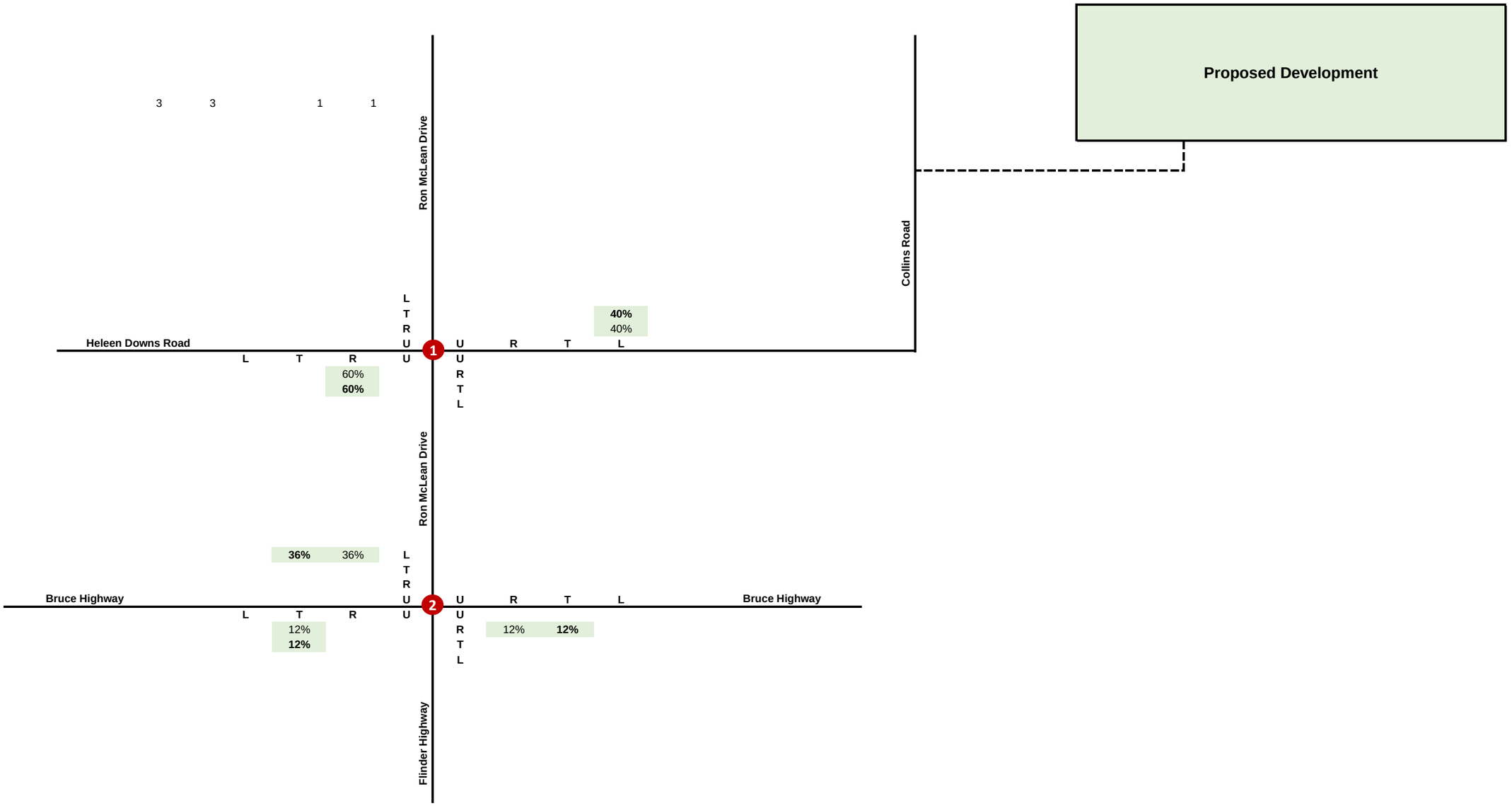
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LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

Development Traffic Distribution | Inbound | Operation



DOCUMENT CONTROL

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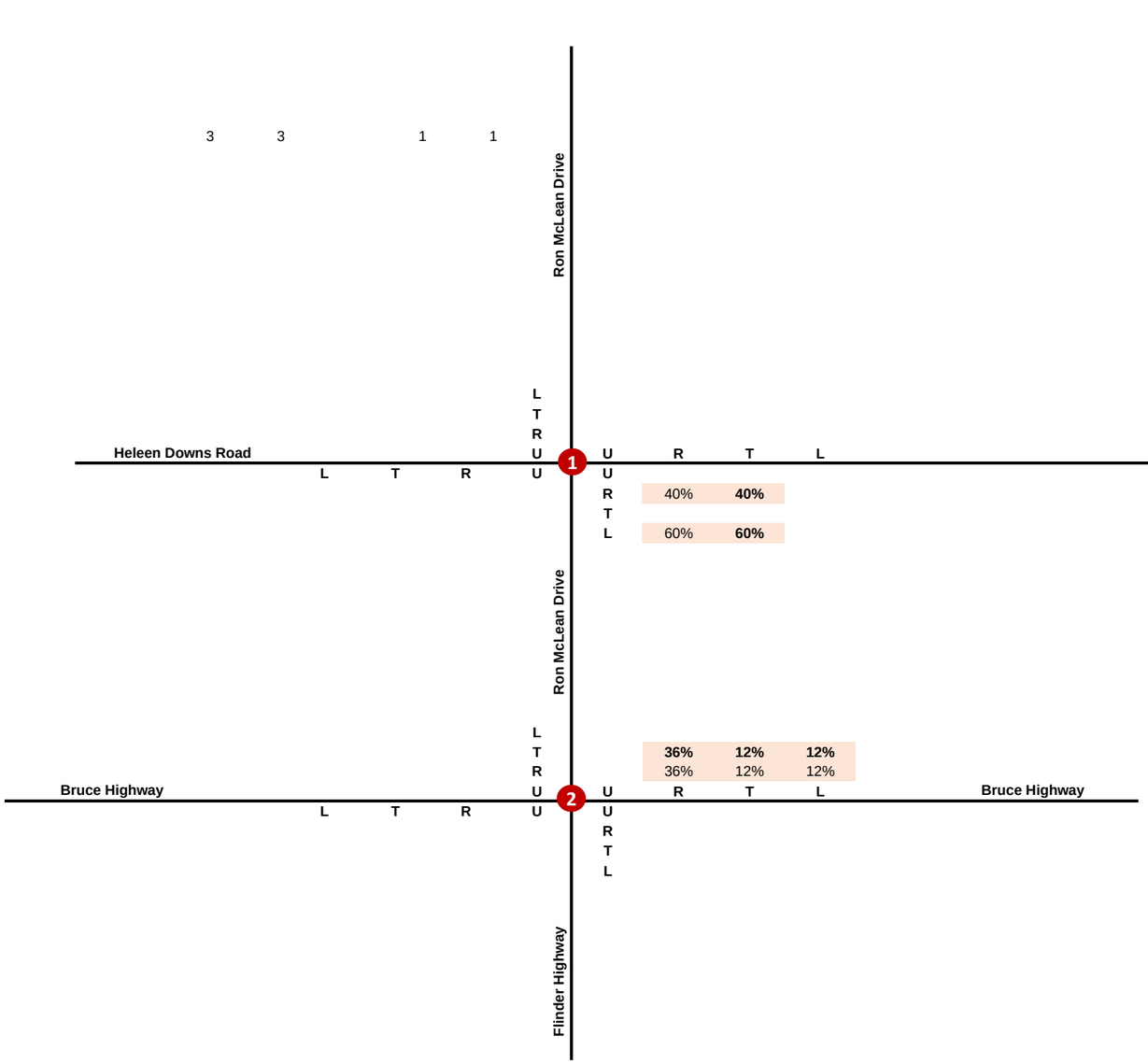
Prepared By: John Kirkham
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Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	T	Through Movement
(##)	Weekday PM Peak Hour Volumes	R	Right Turn Movement
1	Intersection ID	L	Left Turn Movement
		U	U-Turn Movement

Development Traffic Distribution | Outbound | Operation



DOCUMENT CONTROL

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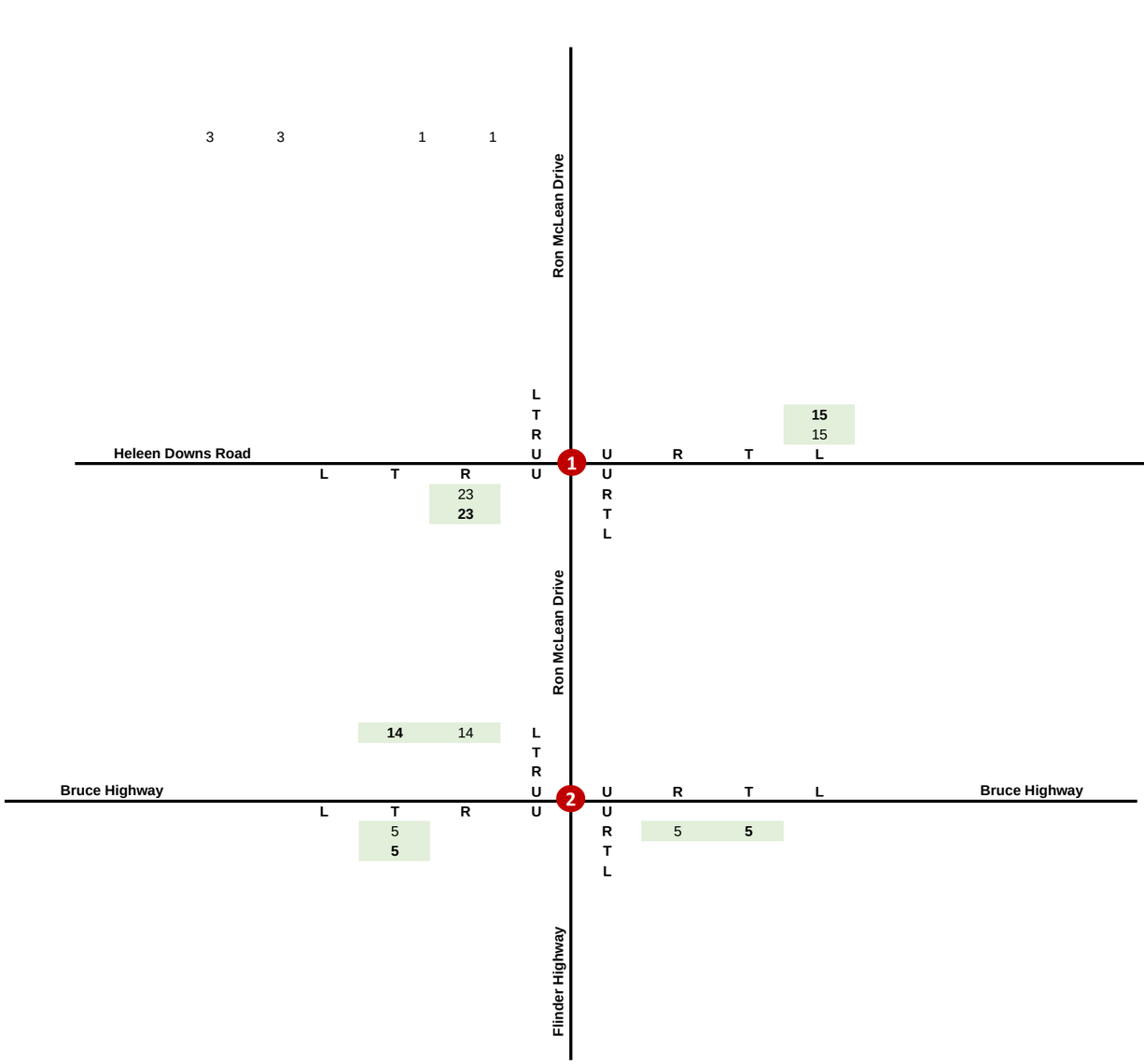
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(##)	Weekday PM Peak Hour Volumes	R	Right Turn Movement
1	Intersection ID	L	Left Turn Movement
		U	U-Turn Movement

Development Traffic Volumes | Inbound | Operation



DOCUMENT CONTROL

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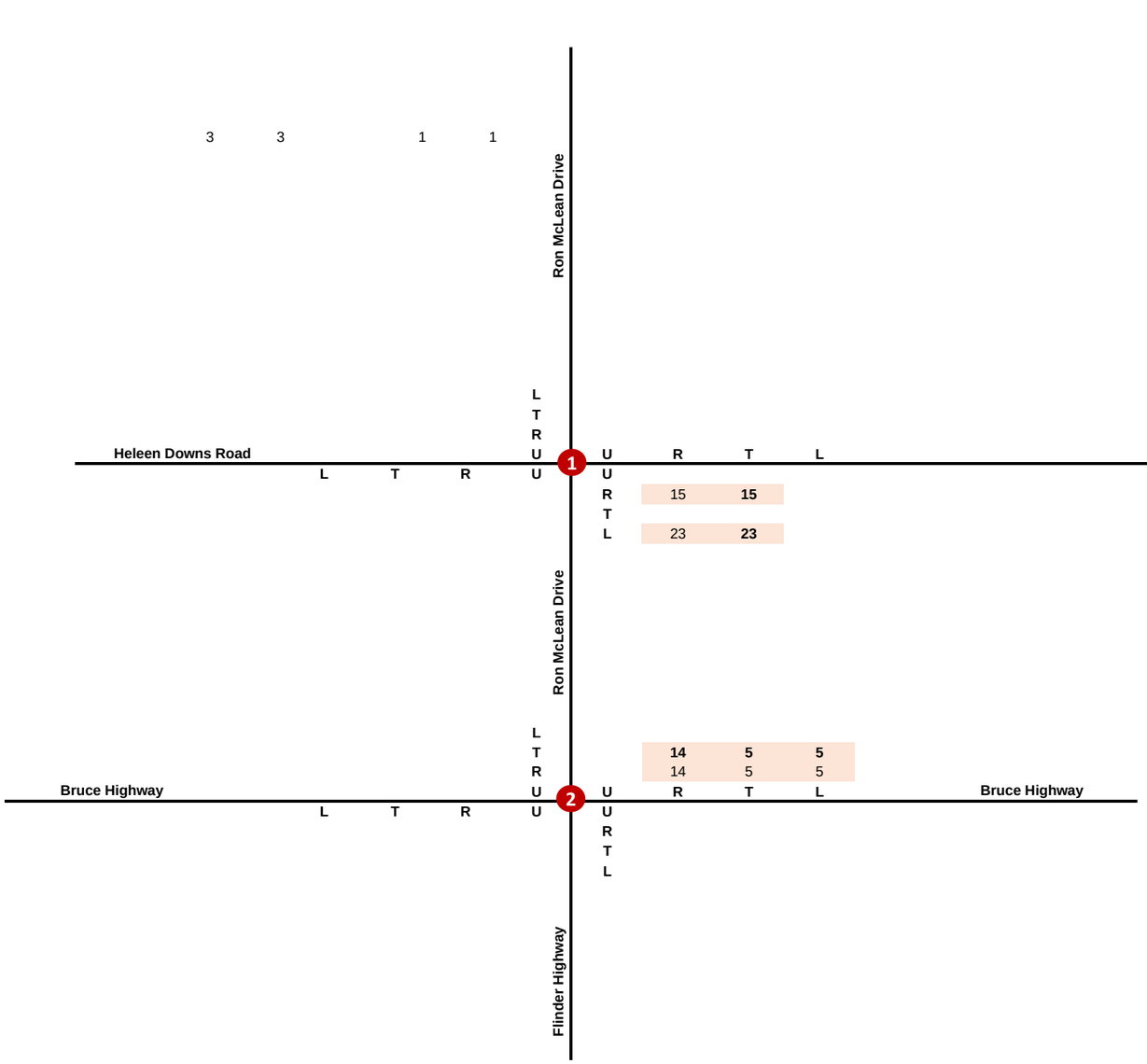
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(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

Development Traffic Volumes | Outbound | Operation



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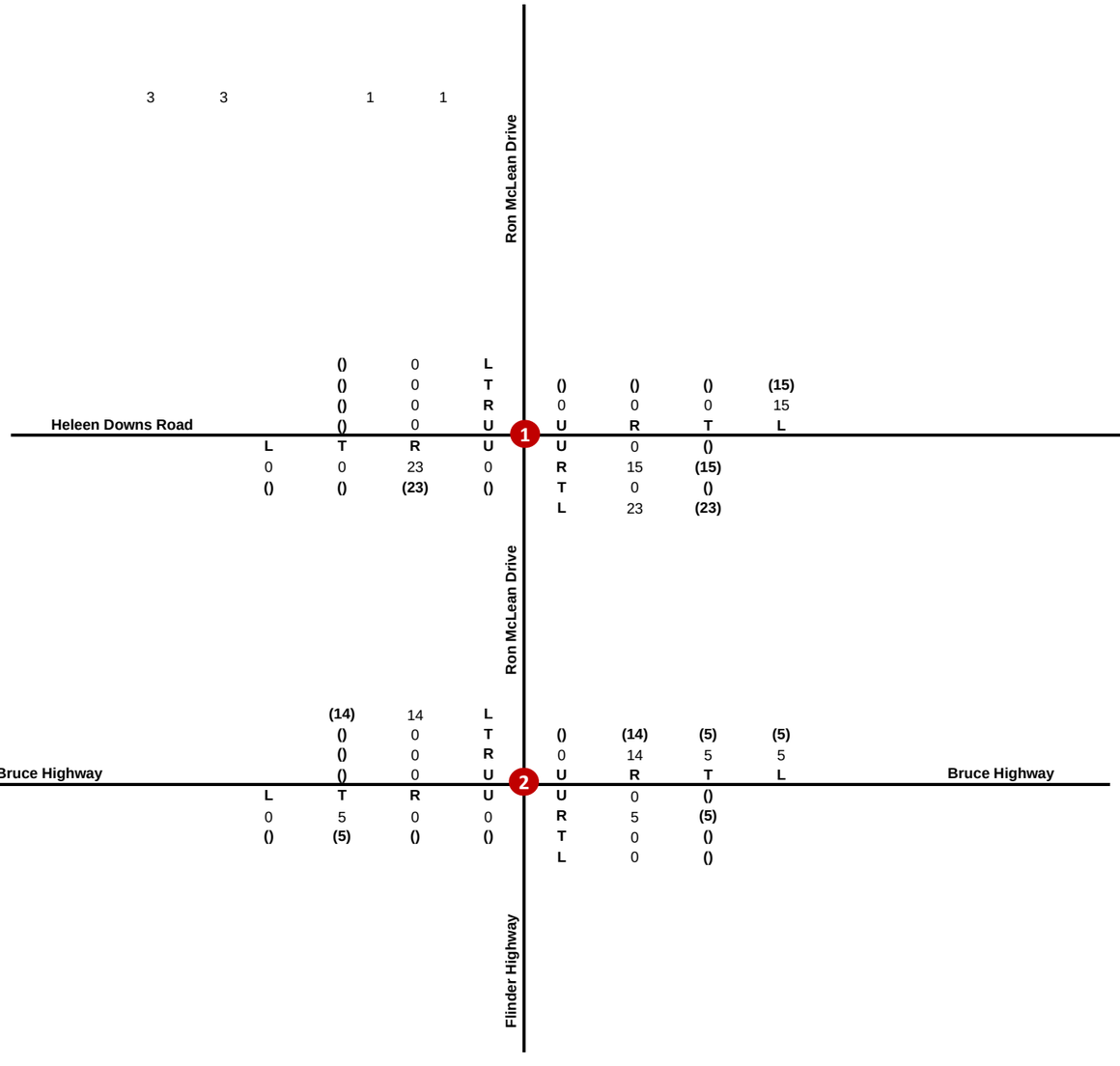
Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	T	Through Movement
(##)	Weekday PM Peak Hour Volumes	R	Right Turn Movement
1	Intersection ID	L	Left Turn Movement
		U	U-Turn Movement

Development Traffic Volumes | Total | Operation



DOCUMENT CONTROL

Job Number: P6680
Job Name: Jet Zero Townsville TIA
File Path: \\BITZIOS-FS1.bitzios.local\Projects\P6680 Jet Zero Townsville TIA\Technical\Traffic Generation\

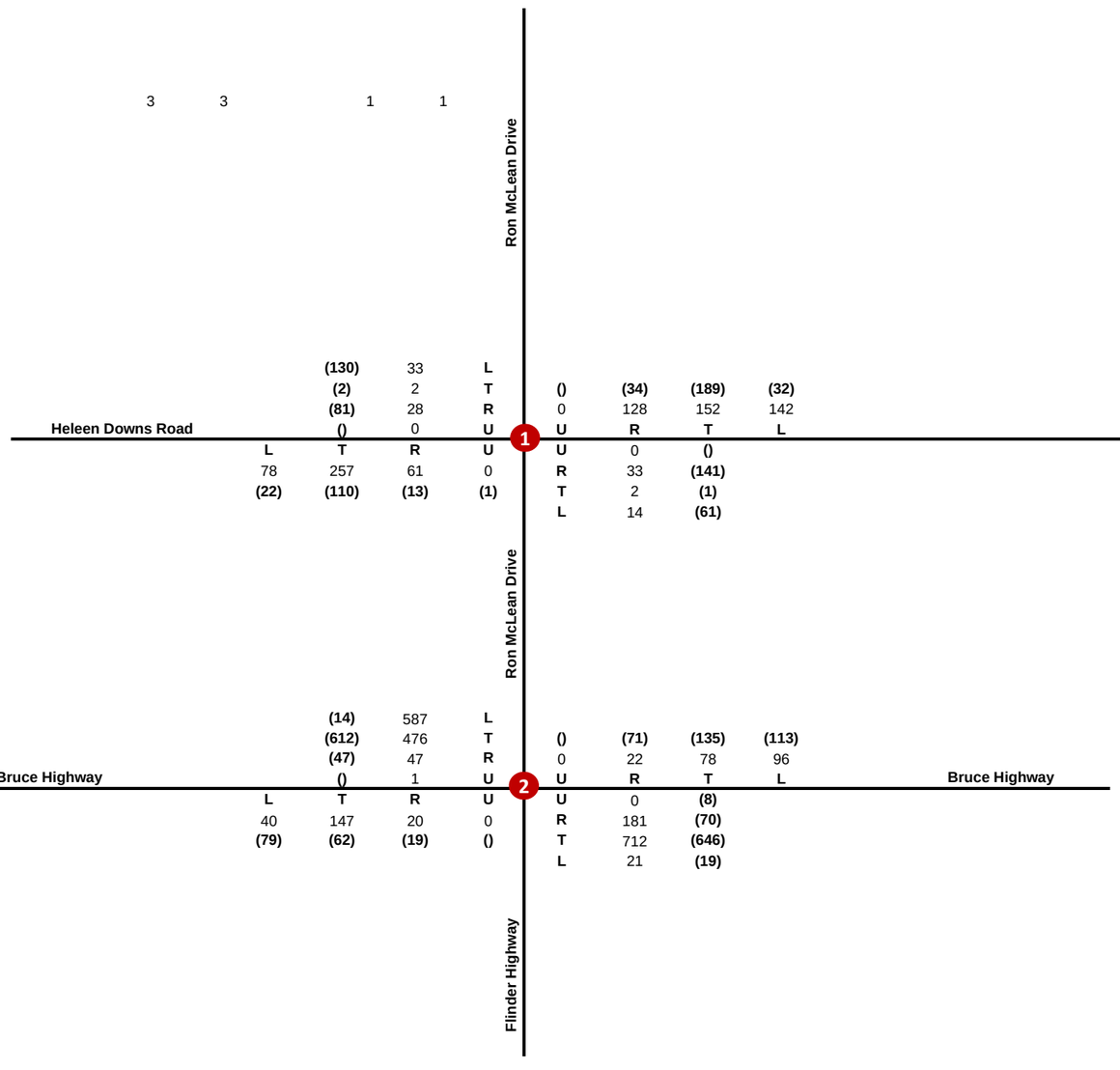
Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

2025 Background Volumes + Development Volumes



DOCUMENT CONTROL

Job Number: P6680
Job Name: Jet Zero Townsville TIA
File Path: \\BITZIOS-FS1.bitzios.local\Projects\P6680 Jet Zero Townsville TIA\Technical\Traffic Generation\

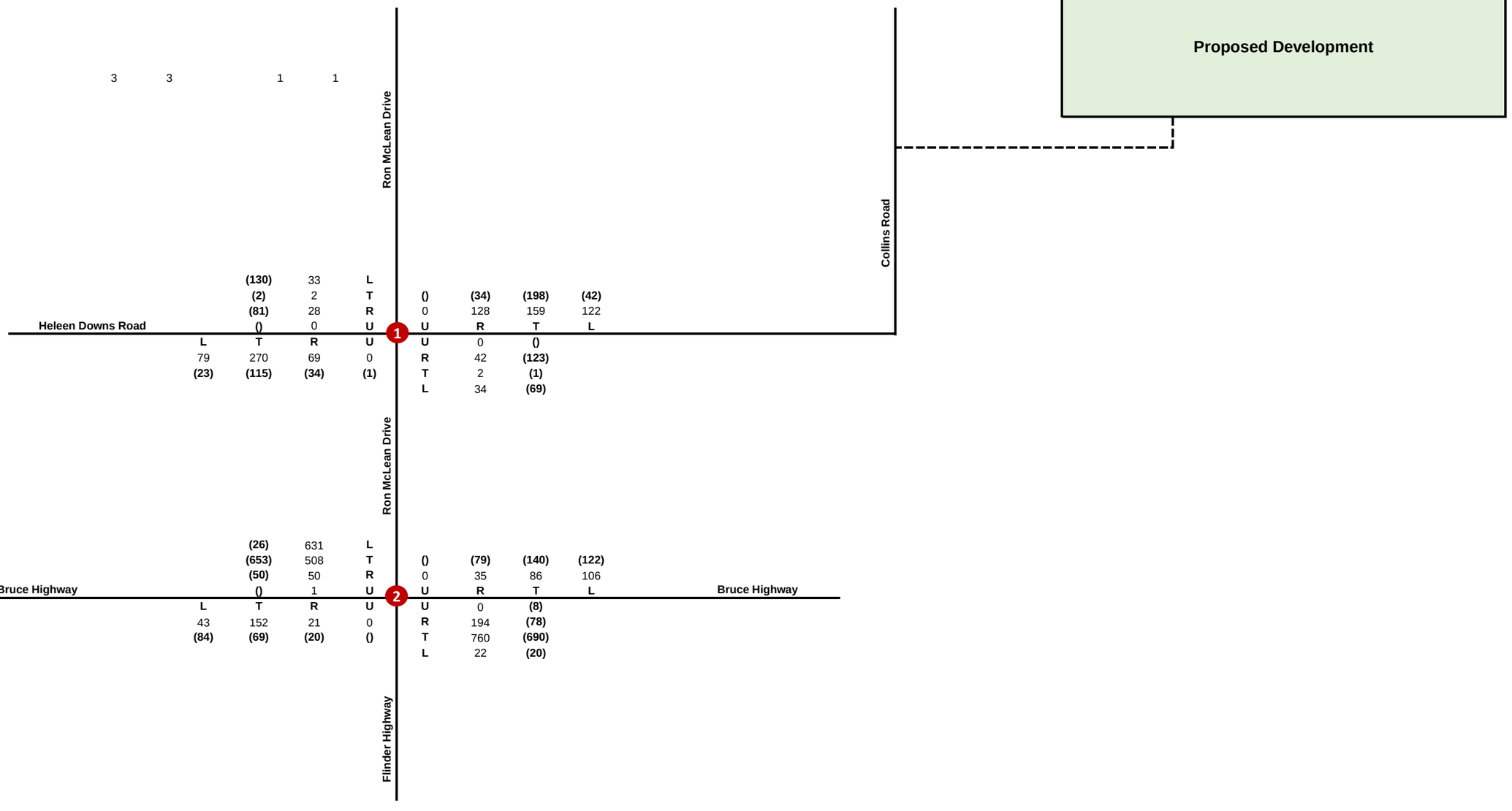
Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

2035 Background Volumes + Development Volumes



DOCUMENT CONTROL

Job Number: P6680
Job Name: Jet Zero Townsville TIA
File Path: \\BITZIOS-FS1.bitzios.local\Projects\P6680 Jet Zero Townsville TIA\Technical\Traffic Generation\

Prepared By: John Kirkham
Reviewed By: Nathan Edwards

Prepared Date: 4/03/2025
Reviewed Date: 4/03/2025

LEGEND

##	Weekday AM Peak Hour Volumes	**T**	Through Movement	**L**	Left Turn Movement
(##)	Weekday PM Peak Hour Volumes	**R**	Right Turn Movement	**U**	U-Turn Movement
1	Intersection ID				

Appendix H: Detailed SIDRA Outputs

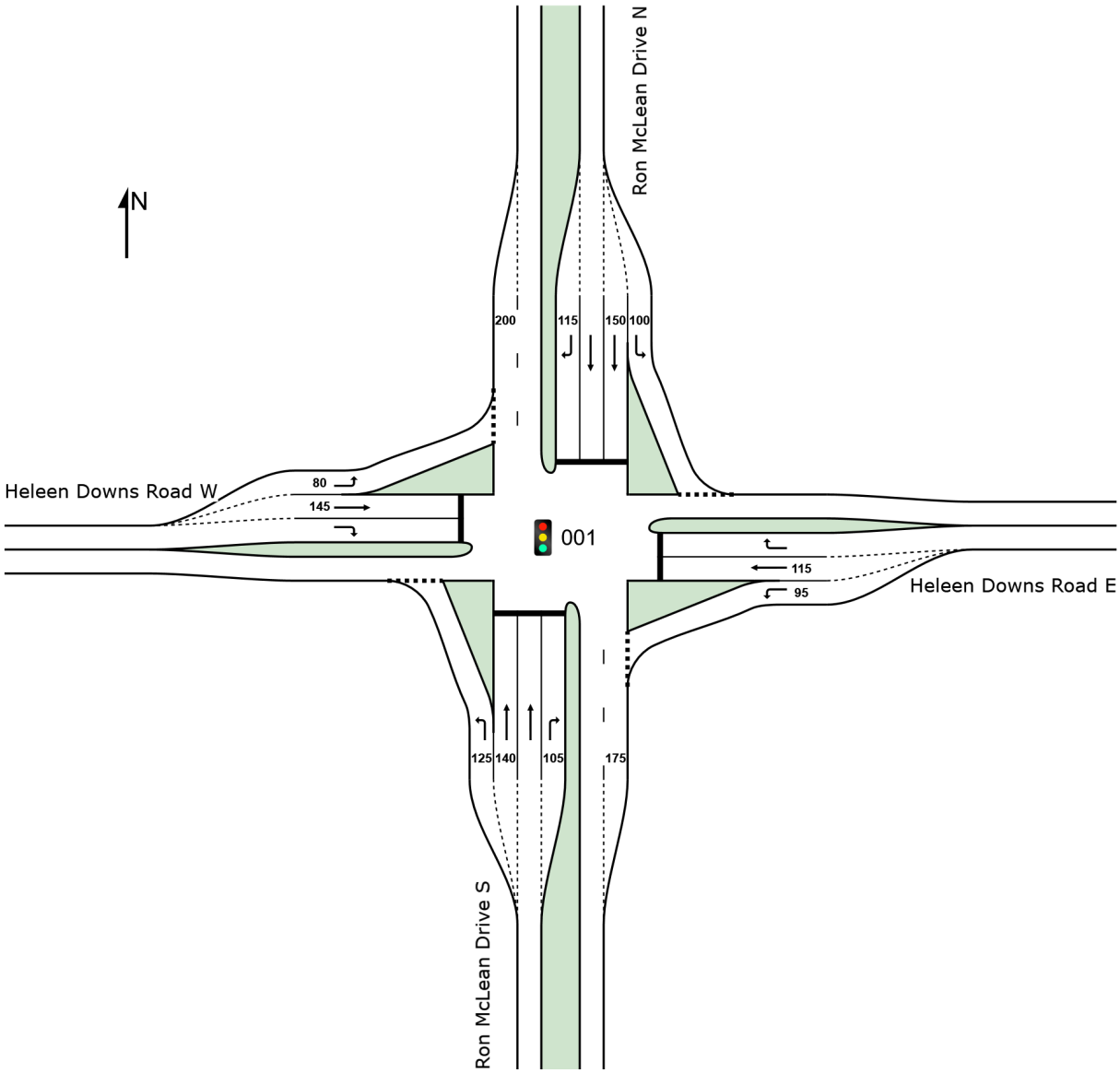


SITE LAYOUT

Site: 001 [2024 AM_Survey (Site Folder: General)]

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 001 [2024 AM_Survey (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	23	16.0	23	16.0	0.016	6.2	LOS A	0.1	0.6	0.14	0.57	0.14	52.1
2	T1	All MCs	264	16.0	264	16.0	* 0.143	12.0	LOS A	3.0	23.6	0.55	0.45	0.55	50.3
3	R2	All MCs	1	16.0	1	16.0	0.009	49.5	LOS D	0.0	0.4	0.95	0.59	0.95	32.3
Approach			288	16.0	288	16.0	0.143	11.6	LOS A	3.0	23.6	0.51	0.46	0.51	50.3
East: Heleen Downs Road E															
4	L2	All MCs	1	0.0	1	0.0	0.001	7.2	LOS A	0.0	0.0	0.23	0.56	0.23	52.1
5	T1	All MCs	1	0.0	1	0.0	* 0.008	43.3	LOS D	0.0	0.3	0.95	0.56	0.95	35.2
6	R2	All MCs	1	0.0	1	0.0	0.009	49.0	LOS D	0.0	0.3	0.95	0.59	0.95	32.7
Approach			3	0.0	3	0.0	0.009	33.2	LOS C	0.0	0.3	0.71	0.57	0.71	38.4
North: Ron McLean Drive N															
7	L2	All MCs	1	23.0	1	23.0	0.001	6.3	LOS A	0.0	0.0	0.14	0.55	0.14	51.9
8	T1	All MCs	156	23.0	156	23.0	0.090	11.5	LOS A	1.7	14.4	0.53	0.42	0.53	50.5
9	R2	All MCs	1	23.0	1	23.0	* 0.010	49.7	LOS D	0.0	0.4	0.95	0.59	0.95	32.2
Approach			158	23.0	158	23.0	0.090	11.8	LOS A	1.7	14.4	0.53	0.42	0.53	50.4
West: Heleen Downs Road W															
10	L2	All MCs	1	50.0	1	50.0	0.001	8.0	LOS A	0.0	0.1	0.24	0.55	0.24	50.2
11	T1	All MCs	1	50.0	1	50.0	0.009	42.7	LOS D	0.0	0.4	0.94	0.56	0.94	35.4
12	R2	All MCs	15	50.0	15	50.0	* 0.138	50.9	LOS D	0.6	6.5	0.96	0.69	0.96	31.6
Approach			17	50.0	17	50.0	0.138	47.7	LOS D	0.6	6.5	0.91	0.68	0.91	32.6
All Vehicles			466	19.5	466	19.5	0.143	13.1	LOS A	3.0	23.6	0.53	0.45	0.53	49.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2024 PM_Survey (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	8	20.0	8	20.0	0.006	6.2	LOS A	0.0	0.2	0.14	0.56	0.14	52.0
2	T1	All MCs	113	20.0	113	20.0	0.072	14.7	LOS B	1.4	11.3	0.59	0.46	0.59	48.4
3	R2	All MCs	1	20.0	1	20.0	0.010	49.6	LOS D	0.0	0.4	0.95	0.59	0.95	32.2
Approach			122	20.0	122	20.0	0.072	14.4	LOS A	1.4	11.3	0.56	0.47	0.56	48.4
East: Heleen Downs Road E															
4	L2	All MCs	1	35.0	1	35.0	0.001	7.9	LOS A	0.0	0.1	0.25	0.56	0.25	50.6
5	T1	All MCs	1	35.0	1	35.0	*0.010	43.9	LOS D	0.0	0.4	0.95	0.56	0.95	35.0
6	R2	All MCs	1	35.0	1	35.0	0.006	45.0	LOS D	0.0	0.4	0.91	0.59	0.91	33.5
Approach			3	35.0	3	35.0	0.010	32.3	LOS C	0.0	0.4	0.70	0.57	0.70	38.4
North: Ron McLean Drive N															
7	L2	All MCs	1	11.0	1	11.0	0.001	6.1	LOS A	0.0	0.0	0.14	0.55	0.14	52.3
8	T1	All MCs	194	11.0	194	11.0	*0.119	15.1	LOS B	2.5	18.9	0.61	0.49	0.61	48.2
9	R2	All MCs	2	11.0	2	11.0	*0.018	49.7	LOS D	0.1	0.7	0.95	0.61	0.95	32.3
Approach			197	11.0	197	11.0	0.119	15.5	LOS B	2.5	18.9	0.61	0.49	0.61	47.9
West: Heleen Downs Road W															
10	L2	All MCs	2	24.0	2	24.0	0.002	7.2	LOS A	0.0	0.1	0.22	0.56	0.22	51.3
11	T1	All MCs	1	24.0	1	24.0	0.006	39.9	LOS C	0.0	0.4	0.92	0.55	0.92	36.4
12	R2	All MCs	27	24.0	27	24.0	*0.119	43.1	LOS D	1.1	9.1	0.90	0.71	0.90	34.2
Approach			31	24.0	31	24.0	0.119	40.5	LOS C	1.1	9.1	0.86	0.70	0.86	35.1
All Vehicles			353	15.5	353	15.5	0.119	17.4	LOS B	2.5	18.9	0.61	0.50	0.61	46.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2025 AM_BG_CON (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	82	20.0	82	20.0	0.066	6.8	LOS A	0.5	3.9	0.21	0.60	0.21	51.6
2	T1	All MCs	271	20.0	271	20.0	* 0.271	27.1	LOS B	4.6	38.0	0.81	0.66	0.81	41.7
3	R2	All MCs	48	20.0	48	20.0	0.128	35.6	LOS C	1.7	14.0	0.82	0.72	0.82	36.8
Approach			401	20.0	401	20.0	0.271	24.0	LOS B	4.6	38.0	0.69	0.66	0.69	42.7
East: Heleen Downs Road E															
4	L2	All MCs	12	35.0	12	35.0	0.011	8.0	LOS A	0.1	0.8	0.26	0.58	0.26	50.6
5	T1	All MCs	2	35.0	2	35.0	* 0.020	44.2	LOS D	0.1	0.8	0.95	0.59	0.95	34.9
6	R2	All MCs	27	35.0	27	35.0	0.237	51.1	LOS D	1.2	11.1	0.97	0.72	0.97	31.7
Approach			41	35.0	41	35.0	0.237	38.6	LOS C	1.2	11.1	0.77	0.67	0.77	35.6
North: Ron McLean Drive N															
7	L2	All MCs	113	20.0	113	20.0	0.085	6.5	LOS A	0.5	3.9	0.18	0.59	0.18	51.8
8	T1	All MCs	160	20.0	160	20.0	0.133	21.2	LOS B	2.4	19.8	0.71	0.56	0.71	44.6
9	R2	All MCs	135	20.0	135	20.0	* 0.276	32.0	LOS C	4.6	37.5	0.80	0.76	0.80	38.1
Approach			407	20.0	407	20.0	0.276	20.7	LOS B	4.6	37.5	0.59	0.64	0.59	43.8
West: Heleen Downs Road W															
10	L2	All MCs	35	35.0	35	35.0	0.034	8.9	LOS A	0.3	3.0	0.30	0.60	0.30	50.1
11	T1	All MCs	2	35.0	2	35.0	0.020	44.2	LOS D	0.1	0.8	0.95	0.59	0.95	34.9
12	R2	All MCs	29	35.0	29	35.0	* 0.255	51.2	LOS D	1.3	11.9	0.97	0.72	0.97	31.7
Approach			66	35.0	66	35.0	0.255	28.8	LOS C	1.3	11.9	0.62	0.65	0.62	39.4
All Vehicles			916	21.8	916	21.8	0.276	23.5	LOS B	4.6	38.0	0.65	0.65	0.65	42.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2025 PM_BG_CON (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	23	20.0	23	20.0	0.017	6.3	LOS A	0.1	0.7	0.15	0.57	0.15	51.9
2	T1	All MCs	116	20.0	116	20.0	* 0.159	32.0	LOS C	2.1	17.3	0.85	0.65	0.85	39.5
3	R2	All MCs	13	20.0	13	20.0	0.117	51.2	LOS D	0.6	4.6	0.97	0.68	0.97	31.8
Approach			152	20.0	152	20.0	0.159	29.6	LOS C	2.1	17.3	0.76	0.64	0.76	40.2
East: Heleen Downs Road E															
4	L2	All MCs	48	35.0	48	35.0	0.051	8.9	LOS A	0.5	4.2	0.30	0.61	0.30	50.1
5	T1	All MCs	1	35.0	1	35.0	0.010	43.9	LOS D	0.0	0.4	0.95	0.56	0.95	35.0
6	R2	All MCs	114	35.0	114	35.0	* 0.222	28.7	LOS C	3.6	32.6	0.75	0.74	0.75	39.3
Approach			163	35.0	163	35.0	0.222	22.9	LOS B	3.6	32.6	0.62	0.70	0.62	41.9
North: Ron McLean Drive N															
7	L2	All MCs	27	11.0	27	11.0	0.018	6.2	LOS A	0.1	0.6	0.14	0.57	0.14	52.3
8	T1	All MCs	199	11.0	199	11.0	0.218	28.9	LOS C	3.5	27.2	0.83	0.66	0.83	40.8
9	R2	All MCs	36	11.0	36	11.0	* 0.187	46.5	LOS D	1.5	11.4	0.94	0.73	0.94	33.2
Approach			262	11.0	262	11.0	0.218	28.9	LOS C	3.5	27.2	0.77	0.66	0.77	40.5
West: Heleen Downs Road W															
10	L2	All MCs	137	24.0	137	24.0	0.135	9.0	LOS A	1.4	12.0	0.33	0.63	0.33	50.3
11	T1	All MCs	2	24.0	2	24.0	* 0.019	44.0	LOS D	0.1	0.8	0.95	0.59	0.95	35.0
12	R2	All MCs	85	24.0	85	24.0	0.156	28.0	LOS B	2.6	22.0	0.73	0.73	0.73	39.8
Approach			224	24.0	224	24.0	0.156	16.5	LOS B	2.6	22.0	0.48	0.67	0.48	45.5
All Vehicles			801	21.2	801	21.2	0.222	24.4	LOS B	3.6	32.6	0.66	0.67	0.66	42.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2027 AM_BG_OP (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	83	20.0	83	20.0	0.067	6.8	LOS A	0.5	3.9	0.21	0.60	0.21	51.6
2	T1	All MCs	284	20.0	284	20.0	* 0.285	27.2	LOS B	4.9	40.1	0.82	0.67	0.82	41.6
3	R2	All MCs	48	20.0	48	20.0	0.134	36.5	LOS C	1.7	14.2	0.84	0.73	0.84	36.4
Approach			416	20.0	416	20.0	0.285	24.2	LOS B	4.9	40.1	0.70	0.66	0.70	42.6
East: Heleen Downs Road E															
4	L2	All MCs	12	35.0	12	35.0	0.011	8.0	LOS A	0.1	0.8	0.26	0.58	0.26	50.6
5	T1	All MCs	2	35.0	2	35.0	* 0.020	44.2	LOS D	0.1	0.8	0.95	0.59	0.95	34.9
6	R2	All MCs	27	35.0	27	35.0	0.237	51.1	LOS D	1.2	11.1	0.97	0.72	0.97	31.7
Approach			41	35.0	41	35.0	0.237	38.6	LOS C	1.2	11.1	0.77	0.67	0.77	35.6
North: Ron McLean Drive N															
7	L2	All MCs	113	20.0	113	20.0	0.084	6.5	LOS A	0.5	3.9	0.18	0.59	0.18	51.8
8	T1	All MCs	167	20.0	167	20.0	0.135	20.5	LOS B	2.5	20.4	0.70	0.55	0.70	45.0
9	R2	All MCs	135	20.0	135	20.0	* 0.276	32.0	LOS C	4.6	37.5	0.80	0.76	0.80	38.1
Approach			415	20.0	415	20.0	0.276	20.4	LOS B	4.6	37.5	0.59	0.63	0.59	44.0
West: Heleen Downs Road W															
10	L2	All MCs	35	35.0	35	35.0	0.034	8.9	LOS A	0.3	3.1	0.30	0.60	0.30	50.1
11	T1	All MCs	2	35.0	2	35.0	0.020	44.2	LOS D	0.1	0.8	0.95	0.59	0.95	34.9
12	R2	All MCs	29	35.0	29	35.0	* 0.255	51.2	LOS D	1.3	11.9	0.97	0.72	0.97	31.7
Approach			66	35.0	66	35.0	0.255	28.8	LOS C	1.3	11.9	0.62	0.65	0.62	39.4
All Vehicles			938	21.7	938	21.7	0.285	23.5	LOS B	4.9	40.1	0.65	0.65	0.65	42.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2027 PM_BG_OP (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	24	20.0	24	20.0	0.017	6.3	LOS A	0.1	0.7	0.15	0.57	0.15	51.9
2	T1	All MCs	121	20.0	121	20.0	* 0.158	31.1	LOS C	2.2	17.8	0.84	0.65	0.84	39.9
3	R2	All MCs	1	20.0	1	20.0	0.010	49.6	LOS D	0.0	0.4	0.95	0.59	0.95	32.2
Approach			146	20.0	146	20.0	0.158	27.1	LOS B	2.2	17.8	0.73	0.64	0.73	41.4
East: Heleen Downs Road E															
4	L2	All MCs	48	35.0	48	35.0	0.051	8.9	LOS A	0.5	4.2	0.30	0.61	0.30	50.1
5	T1	All MCs	1	35.0	1	35.0	0.010	43.9	LOS D	0.0	0.4	0.95	0.56	0.95	35.0
6	R2	All MCs	114	35.0	114	35.0	* 0.222	28.7	LOS C	3.6	32.6	0.75	0.74	0.75	39.3
Approach			163	35.0	163	35.0	0.222	22.9	LOS B	3.6	32.6	0.62	0.70	0.62	41.9
North: Ron McLean Drive N															
7	L2	All MCs	27	11.0	27	11.0	0.018	6.2	LOS A	0.1	0.6	0.14	0.57	0.14	52.3
8	T1	All MCs	208	11.0	208	11.0	0.228	29.0	LOS C	3.7	28.5	0.83	0.66	0.83	40.8
9	R2	All MCs	36	11.0	36	11.0	* 0.208	47.8	LOS D	1.5	11.6	0.95	0.73	0.95	32.9
Approach			272	11.0	272	11.0	0.228	29.2	LOS C	3.7	28.5	0.78	0.66	0.78	40.4
West: Heleen Downs Road W															
10	L2	All MCs	137	24.0	137	24.0	0.135	9.0	LOS A	1.4	12.0	0.33	0.63	0.33	50.3
11	T1	All MCs	2	24.0	2	24.0	* 0.019	44.0	LOS D	0.1	0.8	0.95	0.59	0.95	35.0
12	R2	All MCs	85	24.0	85	24.0	0.156	28.0	LOS B	2.6	22.0	0.73	0.73	0.73	39.8
Approach			224	24.0	224	24.0	0.156	16.5	LOS B	2.6	22.0	0.49	0.67	0.49	45.5
All Vehicles			805	21.1	805	21.1	0.228	24.0	LOS B	3.7	32.6	0.65	0.67	0.65	42.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2025 AM_BG+DEV_CON (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	82	20.0	82	20.0	0.066	6.8	LOS A	0.5	3.9	0.21	0.60	0.21	51.6
2	T1	All MCs	271	20.0	271	20.0	* 0.282	28.0	LOS B	4.7	38.6	0.83	0.67	0.83	41.3
3	R2	All MCs	65	20.0	65	20.0	0.151	33.2	LOS C	2.2	18.2	0.80	0.73	0.80	37.6
Approach			418	20.0	418	20.0	0.282	24.6	LOS B	4.7	38.6	0.70	0.67	0.70	42.3
East: Heleen Downs Road E															
4	L2	All MCs	15	35.0	15	35.0	0.014	8.0	LOS A	0.1	1.1	0.26	0.58	0.26	50.6
5	T1	All MCs	2	35.0	2	35.0	* 0.020	44.2	LOS D	0.1	0.8	0.95	0.59	0.95	34.9
6	R2	All MCs	36	35.0	36	35.0	* 0.271	50.1	LOS D	1.6	14.3	0.97	0.73	0.97	32.0
Approach			53	35.0	53	35.0	0.271	38.1	LOS C	1.6	14.3	0.77	0.68	0.77	35.8
North: Ron McLean Drive N															
7	L2	All MCs	151	20.0	151	20.0	0.115	6.5	LOS A	0.7	5.4	0.18	0.59	0.18	51.8
8	T1	All MCs	160	20.0	160	20.0	0.152	24.3	LOS B	2.6	21.3	0.76	0.60	0.76	43.0
9	R2	All MCs	135	20.0	135	20.0	* 0.276	32.0	LOS C	4.6	37.5	0.80	0.76	0.80	38.1
Approach			445	20.0	445	20.0	0.276	20.6	LOS B	4.6	37.5	0.58	0.65	0.58	43.8
West: Heleen Downs Road W															
10	L2	All MCs	35	35.0	35	35.0	0.034	8.9	LOS A	0.3	3.1	0.30	0.60	0.30	50.1
11	T1	All MCs	2	35.0	2	35.0	0.020	44.2	LOS D	0.1	0.8	0.95	0.59	0.95	34.9
12	R2	All MCs	29	35.0	29	35.0	0.223	49.8	LOS D	1.3	11.7	0.96	0.72	0.96	32.1
Approach			66	35.0	66	35.0	0.223	28.2	LOS B	1.3	11.7	0.61	0.65	0.61	39.6
All Vehicles			982	21.8	982	21.8	0.282	23.8	LOS B	4.7	38.6	0.64	0.66	0.64	42.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2025 PM_BG+DEV_CON (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	23	20.0	23	20.0	0.017	6.3	LOS A	0.1	0.7	0.15	0.57	0.15	51.9
2	T1	All MCs	116	20.0	116	20.0	* 0.178	34.0	LOS C	2.2	17.9	0.88	0.67	0.88	38.7
3	R2	All MCs	16	20.0	16	20.0	0.146	51.5	LOS D	0.7	5.7	0.97	0.69	0.97	31.7
Approach			155	20.0	155	20.0	0.178	31.6	LOS C	2.2	17.9	0.78	0.66	0.78	39.3
East: Heleen Downs Road E															
4	L2	All MCs	64	35.0	64	35.0	0.067	8.9	LOS A	0.6	5.7	0.31	0.61	0.31	50.1
5	T1	All MCs	1	35.0	1	35.0	0.010	43.9	LOS D	0.0	0.4	0.95	0.56	0.95	35.0
6	R2	All MCs	149	35.0	149	35.0	* 0.259	26.2	LOS B	4.5	40.9	0.72	0.75	0.72	40.3
Approach			215	35.0	215	35.0	0.259	21.1	LOS B	4.5	40.9	0.60	0.71	0.60	42.8
North: Ron McLean Drive N															
7	L2	All MCs	35	11.0	35	11.0	0.023	6.2	LOS A	0.1	0.8	0.14	0.57	0.14	52.3
8	T1	All MCs	199	11.0	199	11.0	0.264	32.7	LOS C	3.8	29.0	0.88	0.69	0.88	39.2
9	R2	All MCs	36	11.0	36	11.0	* 0.234	49.2	LOS D	1.5	11.9	0.96	0.73	0.96	32.5
Approach			269	11.0	269	11.0	0.264	31.5	LOS C	3.8	29.0	0.79	0.68	0.79	39.4
West: Heleen Downs Road W															
10	L2	All MCs	137	24.0	137	24.0	0.141	9.4	LOS A	1.5	12.7	0.34	0.64	0.34	50.1
11	T1	All MCs	2	24.0	2	24.0	* 0.019	44.0	LOS D	0.1	0.8	0.95	0.59	0.95	35.0
12	R2	All MCs	85	24.0	85	24.0	0.138	25.0	LOS B	2.4	20.4	0.68	0.72	0.68	41.1
Approach			224	24.0	224	24.0	0.141	15.6	LOS B	2.4	20.4	0.48	0.67	0.48	46.1
All Vehicles			863	22.0	863	22.0	0.264	24.8	LOS B	4.5	40.9	0.66	0.68	0.66	41.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2027 AM_BG+DEV_OP (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	83	20.0	83	20.0	0.067	6.8	LOS A	0.5	3.9	0.21	0.60	0.21	51.6
2	T1	All MCs	284	20.0	284	20.0	* 0.296	28.1	LOS B	5.0	40.8	0.83	0.68	0.83	41.2
3	R2	All MCs	73	20.0	73	20.0	0.168	33.4	LOS C	2.5	20.3	0.80	0.74	0.80	37.6
Approach			440	20.0	440	20.0	0.296	25.0	LOS B	5.0	40.8	0.71	0.67	0.71	42.1
East: Heleen Downs Road E															
4	L2	All MCs	36	35.0	36	35.0	0.034	8.1	LOS A	0.3	2.6	0.26	0.59	0.26	50.5
5	T1	All MCs	2	35.0	2	35.0	* 0.020	44.2	LOS D	0.1	0.8	0.95	0.59	0.95	34.9
6	R2	All MCs	44	35.0	44	35.0	* 0.297	49.0	LOS D	1.9	17.4	0.96	0.74	0.96	32.3
Approach			82	35.0	82	35.0	0.297	31.1	LOS C	1.9	17.4	0.66	0.67	0.66	38.4
North: Ron McLean Drive N															
7	L2	All MCs	128	20.0	128	20.0	0.099	6.6	LOS A	0.6	5.1	0.19	0.59	0.19	51.8
8	T1	All MCs	167	20.0	167	20.0	0.165	25.2	LOS B	2.8	22.7	0.77	0.61	0.77	42.5
9	R2	All MCs	135	20.0	135	20.0	* 0.287	32.9	LOS C	4.7	38.1	0.82	0.77	0.82	37.8
Approach			431	20.0	431	20.0	0.287	22.1	LOS B	4.7	38.1	0.61	0.65	0.61	43.1
West: Heleen Downs Road W															
10	L2	All MCs	35	35.0	35	35.0	0.035	9.2	LOS A	0.4	3.2	0.31	0.60	0.31	49.9
11	T1	All MCs	2	35.0	2	35.0	0.020	44.2	LOS D	0.1	0.8	0.95	0.59	0.95	34.9
12	R2	All MCs	29	35.0	29	35.0	0.198	48.4	LOS D	1.3	11.5	0.95	0.72	0.95	32.5
Approach			66	35.0	66	35.0	0.198	27.7	LOS B	1.3	11.5	0.62	0.66	0.62	39.8
All Vehicles			1019	22.2	1019	22.2	0.297	24.4	LOS B	5.0	40.8	0.66	0.66	0.66	42.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [2027 PM_BG+DEV_OP (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Ron McLean Drive / Heleen Downs Road
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Ron McLean Drive S															
1	L2	All MCs	24	20.0	24	20.0	0.017	6.3	LOS A	0.1	0.7	0.15	0.57	0.15	51.9
2	T1	All MCs	121	20.0	121	20.0	0.150	30.2	LOS C	2.1	17.5	0.83	0.64	0.83	40.3
3	R2	All MCs	37	20.0	37	20.0	* 0.255	49.5	LOS D	1.6	13.1	0.97	0.73	0.97	32.3
Approach			182	20.0	182	20.0	0.255	30.9	LOS C	2.1	17.5	0.77	0.65	0.77	39.5
East: Heleen Downs Road E															
4	L2	All MCs	73	35.0	73	35.0	0.076	9.0	LOS A	0.7	6.5	0.31	0.62	0.31	50.0
5	T1	All MCs	1	35.0	1	35.0	0.010	43.9	LOS D	0.0	0.4	0.95	0.56	0.95	35.0
6	R2	All MCs	129	35.0	129	35.0	* 0.253	29.0	LOS C	4.1	37.5	0.76	0.75	0.76	39.1
Approach			203	35.0	203	35.0	0.253	21.9	LOS B	4.1	37.5	0.60	0.70	0.60	42.4
North: Ron McLean Drive N															
7	L2	All MCs	44	11.0	44	11.0	0.030	6.3	LOS A	0.2	1.4	0.17	0.58	0.17	52.2
8	T1	All MCs	208	11.0	208	11.0	* 0.250	30.9	LOS C	3.9	29.5	0.85	0.68	0.85	40.0
9	R2	All MCs	36	11.0	36	11.0	0.234	49.2	LOS D	1.5	11.9	0.96	0.73	0.96	32.5
Approach			288	11.0	288	11.0	0.250	29.4	LOS C	3.9	29.5	0.76	0.67	0.76	40.3
West: Heleen Downs Road W															
10	L2	All MCs	137	24.0	137	24.0	0.138	9.3	LOS A	1.5	12.6	0.34	0.64	0.34	50.1
11	T1	All MCs	2	24.0	2	24.0	* 0.019	44.0	LOS D	0.1	0.8	0.95	0.59	0.95	35.0
12	R2	All MCs	85	24.0	85	24.0	0.156	28.0	LOS B	2.6	22.0	0.73	0.73	0.73	39.8
Approach			224	24.0	224	24.0	0.156	16.7	LOS B	2.6	22.0	0.49	0.67	0.49	45.4
All Vehicles			898	21.5	898	21.5	0.255	24.9	LOS B	4.1	37.5	0.66	0.67	0.66	41.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

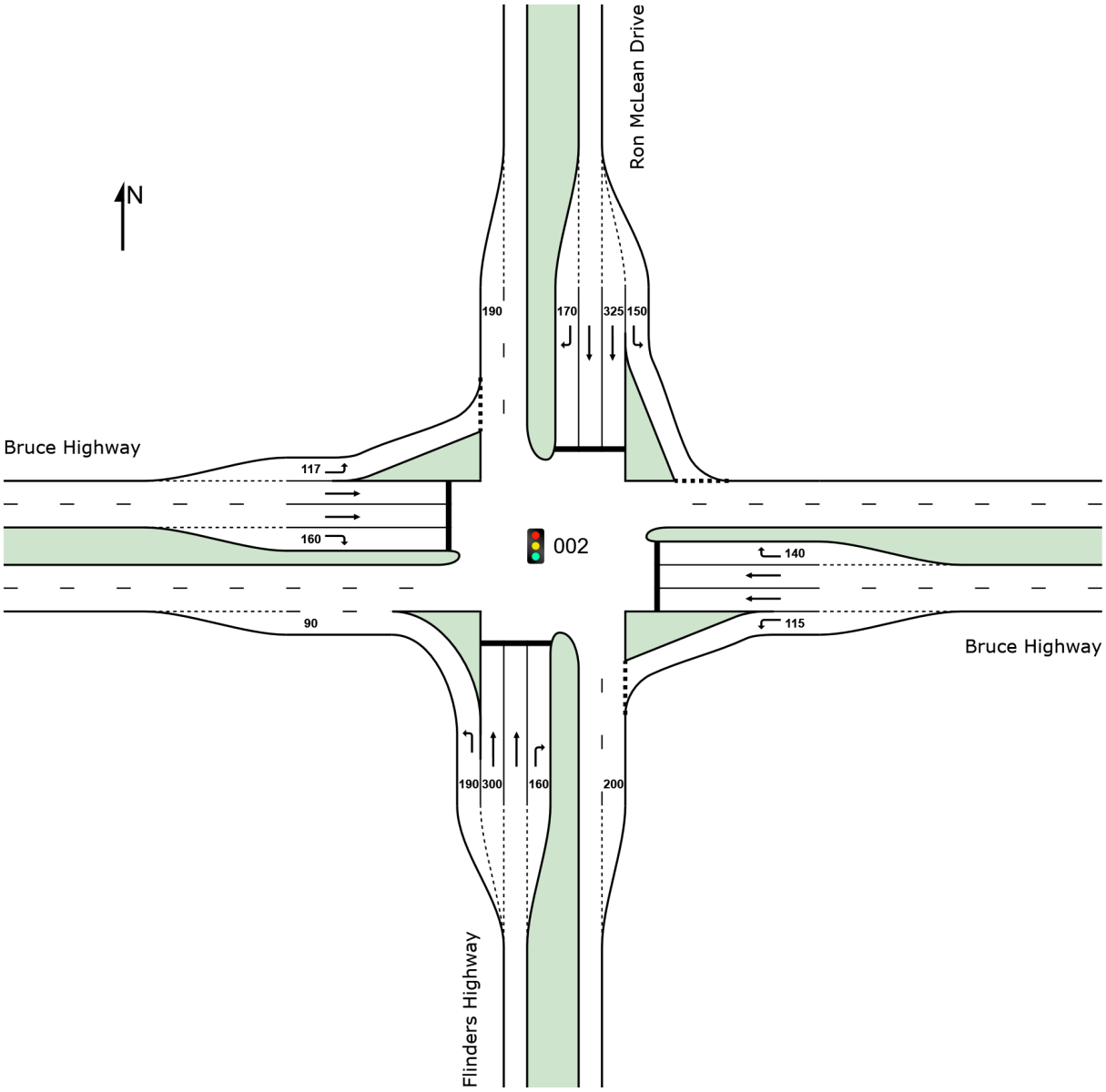
* Critical Movement (Signal Timing)

SITE LAYOUT

Site: 002 [2024 AM_Survey (Site Folder: General)]

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 002 [2024 AM_Survey (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	41	37.0	41	37.0	0.028	7.0	LOS A	0.0	0.0	0.00	0.51	0.00	52.2
2	T1	All MCs	55	37.0	55	37.0	* 0.261	46.8	LOS D	1.2	11.4	0.98	0.71	0.98	34.2
3	R2	All MCs	20	37.0	20	37.0	* 0.204	52.4	LOS D	0.9	8.3	0.98	0.70	0.98	31.4
Approach			116	37.0	116	37.0	0.261	33.7	LOS C	1.2	11.4	0.63	0.64	0.63	38.3
East: Bruce Highway															
4	L2	All MCs	21	11.0	21	11.0	0.016	7.5	LOS A	0.2	1.2	0.24	0.59	0.24	51.5
5	T1	All MCs	724	11.0	724	11.0	* 0.381	13.7	LOS A	9.4	72.2	0.64	0.56	0.64	49.1
6	R2	All MCs	176	11.0	176	11.0	0.510	41.3	LOS C	7.1	54.3	0.94	0.80	0.94	35.0
Approach			921	11.0	921	11.0	0.510	18.8	LOS B	9.4	72.2	0.69	0.60	0.69	45.6
North: Ron McLean Drive															
7	L2	All MCs	95	27.0	95	27.0	0.096	7.6	LOS A	0.8	6.6	0.27	0.61	0.27	50.9
8	T1	All MCs	56	27.0	56	27.0	0.252	46.3	LOS D	1.3	10.8	0.98	0.71	0.98	34.3
9	R2	All MCs	19	27.0	19	27.0	0.182	51.9	LOS D	0.8	7.3	0.97	0.70	0.97	31.7
Approach			169	27.0	169	27.0	0.252	25.3	LOS B	1.3	10.8	0.58	0.65	0.58	41.4
West: Bruce Highway															
10	L2	All MCs	583	17.0	583	17.0	0.515	11.5	LOS A	10.5	83.9	0.52	0.72	0.52	49.0
11	T1	All MCs	484	17.0	484	17.0	0.345	20.3	LOS B	7.4	59.4	0.74	0.63	0.74	45.2
12	R2	All MCs	48	17.0	48	17.0	* 0.376	51.4	LOS D	2.2	17.4	0.99	0.74	0.99	32.0
Approach			1116	17.0	1116	17.0	0.515	17.0	LOS B	10.5	83.9	0.64	0.68	0.64	46.2
All Vehicles			2322	16.3	2322	16.3	0.515	19.2	LOS B	10.5	83.9	0.65	0.64	0.65	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2024 PM_Survey (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	80	20.0	80	20.0	0.049	6.6	LOS A	0.0	0.0	0.00	0.52	0.00	52.8
2	T1	All MCs	40	20.0	40	20.0	* 0.174	45.7	LOS D	0.9	7.3	0.97	0.69	0.97	34.5
3	R2	All MCs	19	20.0	19	20.0	0.131	48.7	LOS D	0.8	6.6	0.95	0.70	0.95	32.6
Approach			139	20.0	139	20.0	0.174	23.6	LOS B	0.9	7.3	0.41	0.59	0.41	42.7
East: Bruce Highway															
4	L2	All MCs	19	11.0	19	11.0	0.014	7.5	LOS A	0.1	1.1	0.24	0.59	0.24	51.5
5	T1	All MCs	657	11.0	657	11.0	* 0.369	15.4	LOS B	9.0	68.6	0.67	0.58	0.67	48.0
6	R2	All MCs	68	11.0	68	11.0	0.358	47.7	LOS D	2.9	22.4	0.97	0.76	0.97	33.0
Approach			744	11.0	744	11.0	0.369	18.1	LOS B	9.0	68.6	0.68	0.59	0.68	46.2
North: Ron McLean Drive															
7	L2	All MCs	107	13.0	107	13.0	0.111	7.7	LOS A	0.9	7.3	0.28	0.62	0.28	51.2
8	T1	All MCs	43	13.0	43	13.0	0.154	44.1	LOS D	0.9	7.3	0.96	0.68	0.96	35.0
9	R2	All MCs	58	13.0	58	13.0	* 0.341	48.7	LOS D	2.5	19.5	0.97	0.75	0.97	32.7
Approach			208	13.0	208	13.0	0.341	26.6	LOS B	2.5	19.5	0.62	0.67	0.62	40.8
West: Bruce Highway															
10	L2	All MCs	11	10.0	11	10.0	0.008	7.7	LOS A	0.1	0.6	0.25	0.58	0.25	51.4
11	T1	All MCs	622	10.0	622	10.0	0.373	17.2	LOS B	8.9	67.9	0.70	0.60	0.70	46.9
12	R2	All MCs	47	10.0	47	10.0	* 0.351	51.0	LOS D	2.1	16.0	0.98	0.74	0.98	32.1
Approach			680	10.0	680	10.0	0.373	19.5	LOS B	8.9	67.9	0.71	0.61	0.71	45.5
All Vehicles			1772	11.6	1772	11.6	0.373	20.1	LOS B	9.0	68.6	0.66	0.61	0.66	44.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2025 AM_BG_CON (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	42	37.0	42	37.0	0.029	7.1	LOS A	0.0	0.0	0.00	0.51	0.00	52.2
2	T1	All MCs	152	37.0	152	37.0	* 0.542	46.3	LOS D	3.4	31.7	1.00	0.78	1.02	34.5
3	R2	All MCs	21	37.0	21	37.0	* 0.184	50.8	LOS D	0.9	8.6	0.97	0.71	0.97	31.8
Approach			215	37.0	215	37.0	0.542	39.1	LOS C	3.4	31.7	0.80	0.72	0.82	36.7
East: Bruce Highway															
4	L2	All MCs	22	11.0	22	11.0	0.017	7.7	LOS A	0.2	1.4	0.26	0.59	0.26	51.4
5	T1	All MCs	749	11.0	749	11.0	* 0.421	15.9	LOS B	10.6	80.8	0.69	0.60	0.69	47.7
6	R2	All MCs	187	11.0	187	11.0	0.544	41.6	LOS C	7.6	58.3	0.95	0.81	0.95	35.0
Approach			959	11.0	959	11.0	0.544	20.7	LOS B	10.6	80.8	0.73	0.64	0.73	44.6
North: Ron McLean Drive															
7	L2	All MCs	99	27.0	99	27.0	0.099	7.8	LOS A	0.9	7.4	0.28	0.62	0.28	50.7
8	T1	All MCs	81	27.0	81	27.0	0.275	43.9	LOS D	1.8	15.2	0.97	0.72	0.97	35.1
9	R2	All MCs	21	27.0	21	27.0	0.174	50.5	LOS D	0.9	8.0	0.97	0.70	0.97	32.0
Approach			201	27.0	201	27.0	0.275	26.8	LOS B	1.8	15.2	0.63	0.67	0.63	40.9
West: Bruce Highway															
10	L2	All MCs	608	17.0	608	17.0	0.567	14.4	LOS A	12.1	97.0	0.60	0.77	0.60	47.7
11	T1	All MCs	501	17.0	501	17.0	0.389	22.8	LOS B	8.2	65.5	0.78	0.66	0.78	43.8
12	R2	All MCs	51	17.0	51	17.0	* 0.392	51.5	LOS D	2.3	18.2	0.99	0.74	0.99	32.0
Approach			1160	17.0	1160	17.0	0.567	19.7	LOS B	12.1	97.0	0.69	0.72	0.69	45.0
All Vehicles			2535	17.2	2535	17.2	0.567	22.3	LOS B	12.1	97.0	0.71	0.69	0.71	43.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2025 PM_BG_CON (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	83	20.0	83	20.0	0.051	6.7	LOS A	0.0	0.0	0.00	0.52	0.00	52.8
2	T1	All MCs	65	20.0	65	20.0	* 0.284	46.4	LOS D	1.5	12.0	0.98	0.71	0.98	34.3
3	R2	All MCs	20	20.0	20	20.0	0.185	51.7	LOS D	0.9	7.3	0.98	0.70	0.98	31.8
Approach			168	20.0	168	20.0	0.284	27.4	LOS B	1.5	12.0	0.50	0.61	0.50	41.0
East: Bruce Highway															
4	L2	All MCs	20	11.0	20	11.0	0.016	8.0	LOS A	0.2	1.3	0.27	0.59	0.27	51.2
5	T1	All MCs	680	11.0	680	11.0	* 0.382	15.5	LOS B	9.3	71.6	0.67	0.58	0.67	47.9
6	R2	All MCs	81	11.0	81	11.0	0.385	46.8	LOS D	3.4	26.3	0.96	0.77	0.96	33.3
Approach			781	11.0	781	11.0	0.385	18.5	LOS B	9.3	71.6	0.69	0.60	0.69	45.9
North: Ron McLean Drive															
7	L2	All MCs	117	13.0	117	13.0	0.120	7.9	LOS A	1.1	8.6	0.30	0.63	0.30	51.0
8	T1	All MCs	140	13.0	140	13.0	0.389	43.2	LOS D	3.0	23.6	0.98	0.75	0.98	35.3
9	R2	All MCs	65	13.0	65	13.0	* 0.384	49.0	LOS D	2.8	22.1	0.98	0.76	0.98	32.6
Approach			322	13.0	322	13.0	0.389	31.6	LOS C	3.0	23.6	0.73	0.70	0.73	39.0
West: Bruce Highway															
10	L2	All MCs	13	10.0	13	10.0	0.010	7.9	LOS A	0.1	0.8	0.27	0.59	0.27	51.3
11	T1	All MCs	644	10.0	644	10.0	0.396	18.1	LOS B	9.5	72.4	0.72	0.62	0.72	46.4
12	R2	All MCs	49	10.0	49	10.0	* 0.367	51.1	LOS D	2.2	16.8	0.99	0.74	0.99	32.1
Approach			706	10.0	706	10.0	0.396	20.2	LOS B	9.5	72.4	0.73	0.63	0.73	45.0
All Vehicles			1978	11.7	1978	11.7	0.396	22.0	LOS B	9.5	72.4	0.69	0.63	0.69	43.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2027 AM_BG_OP (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	45	37.0	45	37.0	0.031	7.2	LOS A	0.0	0.0	0.00	0.51	0.00	52.2
2	T1	All MCs	156	37.0	156	37.0	* 0.557	46.6	LOS D	3.5	32.7	1.00	0.79	1.03	34.5
3	R2	All MCs	22	37.0	22	37.0	* 0.193	50.9	LOS D	1.0	9.0	0.97	0.71	0.97	31.8
Approach			223	37.0	223	37.0	0.557	39.0	LOS C	3.5	32.7	0.79	0.72	0.82	36.7
East: Bruce Highway															
4	L2	All MCs	23	11.0	23	11.0	0.018	7.8	LOS A	0.2	1.5	0.26	0.59	0.26	51.4
5	T1	All MCs	800	11.0	800	11.0	* 0.450	16.2	LOS B	11.5	87.9	0.70	0.61	0.70	47.5
6	R2	All MCs	200	11.0	200	11.0	0.581	41.9	LOS C	8.2	62.8	0.96	0.81	0.96	34.8
Approach			1023	11.0	1023	11.0	0.581	21.0	LOS B	11.5	87.9	0.74	0.65	0.74	44.4
North: Ron McLean Drive															
7	L2	All MCs	106	27.0	106	27.0	0.108	8.1	LOS A	1.0	8.6	0.30	0.62	0.30	50.5
8	T1	All MCs	85	27.0	85	27.0	0.289	44.0	LOS D	1.9	16.0	0.97	0.72	0.97	35.1
9	R2	All MCs	23	27.0	23	27.0	0.191	50.6	LOS D	1.0	8.8	0.97	0.71	0.97	32.0
Approach			215	27.0	215	27.0	0.289	26.9	LOS B	1.9	16.0	0.64	0.67	0.64	40.8
West: Bruce Highway															
10	L2	All MCs	649	17.0	649	17.0	0.611	15.9	LOS B	13.0	104.0	0.63	0.81	0.63	46.9
11	T1	All MCs	535	17.0	535	17.0	0.415	23.1	LOS B	8.8	70.8	0.79	0.68	0.79	43.7
12	R2	All MCs	54	17.0	54	17.0	* 0.417	51.6	LOS D	2.4	19.4	0.99	0.75	0.99	31.9
Approach			1238	17.0	1238	17.0	0.611	20.6	LOS B	13.0	104.0	0.72	0.75	0.72	44.6
All Vehicles			2699	17.2	2699	17.2	0.611	22.8	LOS B	13.0	104.0	0.73	0.70	0.73	43.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2027 PM_BG_OP (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	88	20.0	88	20.0	0.054	6.8	LOS A	0.0	0.0	0.00	0.52	0.00	52.8
2	T1	All MCs	68	20.0	68	20.0	* 0.297	46.5	LOS D	1.5	12.6	0.99	0.72	0.99	34.3
3	R2	All MCs	21	20.0	21	20.0	0.194	51.8	LOS D	0.9	7.7	0.98	0.70	0.98	31.8
Approach			178	20.0	178	20.0	0.297	27.4	LOS B	1.5	12.6	0.49	0.62	0.49	41.0
East: Bruce Highway															
4	L2	All MCs	21	11.0	21	11.0	0.017	8.0	LOS A	0.2	1.4	0.27	0.59	0.27	51.2
5	T1	All MCs	726	11.0	726	11.0	* 0.408	15.7	LOS B	10.1	77.7	0.68	0.59	0.68	47.8
6	R2	All MCs	86	11.0	86	11.0	0.410	46.9	LOS D	3.7	28.2	0.97	0.77	0.97	33.3
Approach			834	11.0	834	11.0	0.410	18.8	LOS B	10.1	77.7	0.70	0.61	0.70	45.8
North: Ron McLean Drive															
7	L2	All MCs	124	13.0	124	13.0	0.130	8.2	LOS A	1.3	9.8	0.32	0.63	0.32	50.8
8	T1	All MCs	142	13.0	142	13.0	0.395	43.3	LOS D	3.1	24.0	0.98	0.75	0.98	35.3
9	R2	All MCs	69	13.0	69	13.0	* 0.409	49.1	LOS D	3.0	23.6	0.98	0.76	0.98	32.6
Approach			336	13.0	336	13.0	0.409	31.5	LOS C	3.1	24.0	0.73	0.71	0.73	39.0
West: Bruce Highway															
10	L2	All MCs	14	10.0	14	10.0	0.011	8.0	LOS A	0.1	0.9	0.27	0.59	0.27	51.3
11	T1	All MCs	687	10.0	687	10.0	0.422	18.4	LOS B	10.3	78.4	0.73	0.63	0.73	46.2
12	R2	All MCs	53	10.0	53	10.0	* 0.390	51.3	LOS D	2.4	17.9	0.99	0.75	0.99	32.1
Approach			754	10.0	754	10.0	0.422	20.5	LOS B	10.3	78.4	0.74	0.64	0.74	44.9
All Vehicles			2101	11.7	2101	11.7	0.422	22.2	LOS B	10.3	78.4	0.70	0.64	0.70	43.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2025 AM_BG+DEV_CON (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	42	37.0	42	37.0	0.029	7.1	LOS A	0.0	0.0	0.00	0.51	0.00	52.2
2	T1	All MCs	155	37.0	155	37.0	* 0.554	46.5	LOS D	3.5	32.4	1.00	0.78	1.03	34.5
3	R2	All MCs	21	37.0	21	37.0	0.184	50.8	LOS D	0.9	8.6	0.97	0.71	0.97	31.8
Approach			218	37.0	218	37.0	0.554	39.3	LOS C	3.5	32.4	0.80	0.72	0.83	36.6
East: Bruce Highway															
4	L2	All MCs	22	11.0	22	11.0	0.017	7.7	LOS A	0.2	1.4	0.26	0.59	0.26	51.4
5	T1	All MCs	749	11.0	749	11.0	* 0.421	15.9	LOS B	10.6	80.8	0.69	0.60	0.69	47.7
6	R2	All MCs	191	11.0	191	11.0	0.553	41.7	LOS C	7.8	59.4	0.95	0.81	0.95	34.9
Approach			962	11.0	962	11.0	0.553	20.8	LOS B	10.6	80.8	0.73	0.64	0.73	44.6
North: Ron McLean Drive															
7	L2	All MCs	101	27.0	101	27.0	0.101	7.8	LOS A	0.9	7.6	0.28	0.62	0.28	50.7
8	T1	All MCs	82	27.0	82	27.0	0.278	43.9	LOS D	1.8	15.4	0.97	0.72	0.97	35.1
9	R2	All MCs	23	27.0	23	27.0	* 0.191	50.6	LOS D	1.0	8.8	0.97	0.71	0.97	32.0
Approach			206	27.0	206	27.0	0.278	27.0	LOS B	1.8	15.4	0.63	0.67	0.63	40.8
West: Bruce Highway															
10	L2	All MCs	619	17.0	619	17.0	0.579	15.0	LOS B	12.3	98.7	0.61	0.78	0.61	47.4
11	T1	All MCs	501	17.0	501	17.0	0.389	22.8	LOS B	8.2	65.5	0.78	0.66	0.78	43.8
12	R2	All MCs	51	17.0	51	17.0	* 0.392	51.5	LOS D	2.3	18.2	0.99	0.74	0.99	32.0
Approach			1171	17.0	1171	17.0	0.579	19.9	LOS B	12.3	98.7	0.70	0.73	0.70	44.9
All Vehicles			2557	17.3	2557	17.3	0.579	22.5	LOS B	12.3	98.7	0.71	0.69	0.72	43.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2025 PM_BG+DEV_CON (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	83	20.0	83	20.0	0.051	6.7	LOS A	0.0	0.0	0.00	0.52	0.00	52.8
2	T1	All MCs	65	20.0	65	20.0	* 0.284	46.4	LOS D	1.5	12.0	0.98	0.71	0.98	34.3
3	R2	All MCs	20	20.0	20	20.0	0.185	51.7	LOS D	0.9	7.3	0.98	0.70	0.98	31.8
Approach			168	20.0	168	20.0	0.284	27.4	LOS B	1.5	12.0	0.50	0.61	0.50	41.0
East: Bruce Highway															
4	L2	All MCs	20	11.0	20	11.0	0.016	8.0	LOS A	0.2	1.3	0.27	0.59	0.27	51.2
5	T1	All MCs	680	11.0	680	11.0	* 0.391	16.2	LOS B	9.6	73.2	0.69	0.59	0.69	47.5
6	R2	All MCs	82	11.0	82	11.0	0.390	46.8	LOS D	3.5	26.7	0.96	0.77	0.96	33.3
Approach			782	11.0	782	11.0	0.391	19.2	LOS B	9.6	73.2	0.70	0.61	0.70	45.6
North: Ron McLean Drive															
7	L2	All MCs	120	13.0	120	13.0	0.122	8.0	LOS A	1.1	8.9	0.30	0.63	0.30	51.0
8	T1	All MCs	143	13.0	143	13.0	0.358	42.0	LOS C	3.1	23.8	0.97	0.74	0.97	35.8
9	R2	All MCs	75	13.0	75	13.0	* 0.396	48.0	LOS D	3.2	25.0	0.97	0.76	0.97	32.9
Approach			338	13.0	338	13.0	0.396	31.2	LOS C	3.2	25.0	0.73	0.71	0.73	39.2
West: Bruce Highway															
10	L2	All MCs	15	10.0	15	10.0	0.011	7.9	LOS A	0.1	1.0	0.27	0.59	0.27	51.3
11	T1	All MCs	644	10.0	644	10.0	0.406	18.9	LOS B	9.7	73.9	0.73	0.63	0.73	45.9
12	R2	All MCs	49	10.0	49	10.0	* 0.367	51.1	LOS D	2.2	16.8	0.99	0.74	0.99	32.1
Approach			708	10.0	708	10.0	0.406	20.9	LOS B	9.7	73.9	0.74	0.64	0.74	44.7
All Vehicles			1997	11.7	1997	11.7	0.406	22.5	LOS B	9.7	73.9	0.70	0.64	0.70	43.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2027 AM_BG+DEV_OP (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	45	37.0	45	37.0	0.031	7.2	LOS A	0.0	0.0	0.00	0.51	0.00	52.2
2	T1	All MCs	160	37.0	160	37.0	* 0.573	46.8	LOS D	3.7	33.7	1.00	0.79	1.05	34.4
3	R2	All MCs	22	37.0	22	37.0	0.193	50.9	LOS D	1.0	9.0	0.97	0.71	0.97	31.8
Approach			227	37.0	227	37.0	0.573	39.3	LOS C	3.7	33.7	0.80	0.73	0.83	36.6
East: Bruce Highway															
4	L2	All MCs	23	11.0	23	11.0	0.018	8.0	LOS A	0.2	1.5	0.27	0.59	0.27	51.2
5	T1	All MCs	800	11.0	800	11.0	* 0.450	16.2	LOS B	11.5	87.9	0.70	0.61	0.70	47.5
6	R2	All MCs	204	11.0	204	11.0	0.628	43.3	LOS D	8.6	65.7	0.97	0.82	0.99	34.4
Approach			1027	11.0	1027	11.0	0.628	21.4	LOS B	11.5	87.9	0.75	0.65	0.75	44.2
North: Ron McLean Drive															
7	L2	All MCs	112	27.0	112	27.0	0.115	8.1	LOS A	1.0	9.1	0.30	0.62	0.30	50.5
8	T1	All MCs	91	27.0	91	27.0	0.307	44.1	LOS D	2.0	17.1	0.97	0.72	0.97	35.0
9	R2	All MCs	37	27.0	37	27.0	* 0.304	51.3	LOS D	1.6	14.2	0.98	0.73	0.98	31.8
Approach			239	27.0	239	27.0	0.307	28.4	LOS B	2.0	17.1	0.66	0.68	0.66	40.1
West: Bruce Highway															
10	L2	All MCs	664	17.0	664	17.0	0.626	16.7	LOS B	13.0	104.1	0.64	0.82	0.64	46.6
11	T1	All MCs	535	17.0	535	17.0	0.403	22.2	LOS B	8.7	69.4	0.78	0.66	0.78	44.1
12	R2	All MCs	54	17.0	54	17.0	* 0.417	51.6	LOS D	2.4	19.4	0.99	0.75	0.99	31.9
Approach			1253	17.0	1253	17.0	0.626	20.6	LOS B	13.0	104.1	0.72	0.75	0.72	44.6
All Vehicles			2746	17.3	2746	17.3	0.628	23.1	LOS B	13.0	104.1	0.73	0.71	0.73	43.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 002 [2027 PM_BG+DEV_OP (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Poject No.: P6680
Project: Jet Zero Townsville TIA
Intersection: Bruce Highway / Flinders Highway / Ron McLean Drive
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Flinders Highway															
1	L2	All MCs	88	20.0	88	20.0	0.054	6.8	LOS A	0.0	0.0	0.00	0.52	0.00	52.8
2	T1	All MCs	73	20.0	73	20.0	* 0.316	46.6	LOS D	1.6	13.4	0.99	0.72	0.99	34.2
3	R2	All MCs	21	20.0	21	20.0	0.194	51.8	LOS D	0.9	7.7	0.98	0.70	0.98	31.8
Approach			182	20.0	182	20.0	0.316	27.8	LOS B	1.6	13.4	0.51	0.62	0.51	40.8
East: Bruce Highway															
4	L2	All MCs	21	11.0	21	11.0	0.017	8.0	LOS A	0.2	1.4	0.27	0.59	0.27	51.2
5	T1	All MCs	726	11.0	726	11.0	* 0.428	17.2	LOS B	10.6	81.2	0.71	0.62	0.71	46.9
6	R2	All MCs	91	11.0	91	11.0	0.430	47.1	LOS D	3.9	29.6	0.97	0.77	0.97	33.2
Approach			838	11.0	838	11.0	0.430	20.2	LOS B	10.6	81.2	0.73	0.63	0.73	45.0
North: Ron McLean Drive															
7	L2	All MCs	128	13.0	128	13.0	0.132	8.5	LOS A	1.4	10.7	0.33	0.64	0.33	50.6
8	T1	All MCs	147	13.0	147	13.0	0.335	40.8	LOS C	3.1	24.1	0.96	0.73	0.96	36.2
9	R2	All MCs	83	13.0	83	13.0	* 0.400	46.9	LOS D	3.5	27.5	0.96	0.77	0.96	33.2
Approach			359	13.0	359	13.0	0.400	30.6	LOS C	3.5	27.5	0.73	0.71	0.73	39.4
West: Bruce Highway															
10	L2	All MCs	27	10.0	27	10.0	0.022	8.2	LOS A	0.3	1.9	0.28	0.60	0.28	51.1
11	T1	All MCs	687	10.0	687	10.0	0.445	19.9	LOS B	10.7	81.6	0.76	0.66	0.76	45.3
12	R2	All MCs	53	10.0	53	10.0	* 0.390	51.3	LOS D	2.4	17.9	0.99	0.75	0.99	32.1
Approach			767	10.0	767	10.0	0.445	21.6	LOS B	10.7	81.6	0.76	0.66	0.76	44.3
All Vehicles			2146	11.7	2146	11.7	0.445	23.1	LOS B	10.7	81.6	0.72	0.65	0.72	43.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Appendix I: Pavement Impact Assessment

BITZIOS consulting
traffic engineering transport planning



Extracted data details and disclaimer

The extracted data in the adjacent worksheets contains the following information:

- **Marginal** Cost - Marginal Cost for the selected sections of road 832 (SOUTH TOWNSVILLE ROAD) and road 841 (TOWNSVILLE PORT ROAD)).
  The details of the selected road sections are provided in the worksheet **Road sections**.
- **AADT** - Annual Average Daily Traffic along the selected sections.

Additional notes:

AADT - Annual Average Dailty Traffic
PERCENT_LV - The percentage of the Annual Average Daily Traffic represented by Light Vehicles
PERCENT_HV - The percentage of the Annual Average Daily Traffic represented by Heavy Vehicles
AADT_LV - The Annual Average Daily Traffic vehicles of Light Vehicles
AADT_HV - The Annual Average Daily Traffic of Heavy Vehicles

- The data extracted from the Roadlink on 11 November 2024 and were current at that date.
- Data request reference number: DR3355.

Disclaimer: *While every care is taken to ensure the accuracy of this data, Transport Systems Asset Management (TSAM), Department of Transport and Main Roads makes no representation or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses (including indirect or consequential damage) and costs which you might incur as a result of the data being inaccurate or incomplete in any way and for any reason.*

Data ranges extracted to the closest reference point based on the customer's file

ROAD_SECTION_ID	CARRIAGEV	ThroughDistance	ROAD_SECTIO	RPDescription	TO_RP_IDENTIFIER	TDIST_END
841	2	0	841/1	Start 841 Townsville Port Road (Cway 2) Int with 10L Bruce Hwy (Ary - Tsv) 10M Bruce Hwy (Tsv - Ing) & 14A Flinders Hwy (Tsv - Chrts Tv		
841	3	0	841/1Q	Start 841 Townsville Port Road (Cway 3) Int with 10L Bruce Hwy (Ayr - Tsv) 10M Bruce Hwy (Tsv - Ing) & 14A Flinders Hwy (Tsv - Chrts Tw		
841	1	4.249	841/2	Int 841 Townsville Port Road with Racecourse Road (Local)		
841	1	7.336	841/3	Int 841 Townsville Port Road with 832 North Townsville Road		
832	3	16.635	832/11Q	Int. 832 with South Townsville Road also North Ward Road (833). Cway 3		
832	2	16.635	832/11	Int. 832 with South Townsville Road (831) also North Ward Road (833). Cway 2		
832	1	18.841	832/12	End of 832 North Townsville Road. Int. with 841 Townsville Port Road.		

Marginal Cost along the selected sections of roads 841

ID	ROADNAME	ROAD_SECTION_ID	DIRECTION	SUPERSET_CWAY	RRIAGEWAY_C	TDIST_STAI	TDIST_E	LENGTH	MC_COSTING_PAVEMENT_TYPE	MARGINA
31	TOWNSVILLE PORT ROAD	841	G	1	1	2.3	2.4	0.1	MC	
39	TOWNSVILLE PORT ROAD	841	G	1	1	3.1	3.2	0.1	MC	
78	TOWNSVILLE PORT ROAD	841	G	1	1	7	7.1	0.1	MC	
79	TOWNSVILLE PORT ROAD	841	G	1	1	7.1	7.2	0.1	MC	
102	TOWNSVILLE PORT ROAD	841	AG	1	1	2.3	2.4	0.1	MC	
110	TOWNSVILLE PORT ROAD	841	AG	1	1	3.1	3.2	0.1	MC	

149	TOWNSVILLE PORT ROAD	841	AG	1	1	7	7.1	0.1	MC	
150	TOWNSVILLE PORT ROAD	841	AG	1	1	7.1	7.2	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	2	16.506	16.6	0.094	MC	
	NORTH TOWNSVILLE ROAD	832	AG	3	3	16.506	16.6	0.094	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	2	16.6	16.7	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	3	3	16.6	16.7	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	2	16.7	16.765	0.065	MC	
	NORTH TOWNSVILLE ROAD	832	AG	3	3	16.7	16.765	0.065	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	16.765	16.8	0.035	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	16.8	16.9	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	16.9	17	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17	17.1	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.1	17.2	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.2	17.3	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.3	17.4	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.4	17.5	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.5	17.6	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.6	17.7	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.7	17.8	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.8	17.9	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	17.9	18	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18	18.1	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18.1	18.2	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18.2	18.3	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18.3	18.4	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18.4	18.5	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18.5	18.6	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18.6	18.7	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18.7	18.8	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	G	1	1	18.8	18.841	0.041	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	16.765	16.8	0.035	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	16.8	16.9	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	16.9	17	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17	17.1	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.1	17.2	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.2	17.3	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.3	17.4	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.4	17.5	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.5	17.6	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.6	17.7	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.7	17.8	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.8	17.9	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	17.9	18	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18	18.1	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18.1	18.2	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18.2	18.3	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18.3	18.4	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18.4	18.5	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18.5	18.6	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18.6	18.7	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18.7	18.8	0.1	MC	
	NORTH TOWNSVILLE ROAD	832	AG	1	1	18.8	18.841	0.041	MC	

Annual Average Daily Traffic along the selected sections of roads 18A and 3042

ROADNAME	DIRECTION	ROAD SECTION	TDIST STAR	TDIST END	AADT	AADT YEAR	GROWTH PC SYR	DESIGN YEAR	PERCENT NONHV	PERCENT HV	ADT NONH	AADT HV	SAR4/HV	SAR4/DAY	
TOWNSVILLE PORT ROAD	G	841	0	0.772	1436	2023	0	2027	81.71	18.29	1173	263	3.2	**840**	306769
TOWNSVILLE PORT ROAD	A	841	0	0.772	1311	2023	0.48	2027	73.81	26.19	968	343	3.2	**1099**	401034
TOWNSVILLE PORT ROAD	G	841	0.772	7.336	1436	2023	0	2027	81.71	18.29	1173	263	3.2	**840**	306769
TOWNSVILLE PORT ROAD	A	841	0.772	7.336	1311	2023	0.48	2027	73.81	26.19	968	343	3.2	**1099**	401034
															0
NORTH TOWNSVILLE ROAD	A	832	16.506	16.635	8362	2023	5.18	2027	85.21	14.79	7125	1237	3.2	**3958**	1444512
NORTH TOWNSVILLE ROAD	G	832	16.506	16.635	8482	2023	7.02	2027	85.36	14.64	7240	1242	3.2	**3974**	1450381
NORTH TOWNSVILLE ROAD	A	832	16.635	16.765	1381	2023	1.14	2027	77.85	22.15	1075	306	3.2	**979**	357281
NORTH TOWNSVILLE ROAD	G	832	16.635	16.765	1528	2023	1.51	2027	78.64	21.36	1202	326	3.2	**1044**	381213
NORTH TOWNSVILLE ROAD	A	832	16.765	18.841	1381	2023	1.14	2027	77.85	22.15	1075	306	3.2	**979**	357281
NORTH TOWNSVILLE ROAD	G	832	16.765	18.841	1528	2023	1.51	2027	78.64	21.36	1202	326	3.2	**1044**	381213

Pavement type description

ARMIS-derived TMR pavement type	FAMLIT pavement type	Load damage exponent
Sprayed seal over flexible pavement, including cement modified and lime stabilised layer types C4 and C5	GN	4
Sprayed seal or Asphalt over flexible pavement with bitumen stabilised pavement	AC	5
Asphalt over flexible pavement, including cement modified and lime stabilised layer types C4 and C5	AC	5
Sprayed seal over semi rigid/semi rigid composite pavement	CS	12
Asphalt over semi rigid/semi rigid composite pavement	CS	12
	MC	1

Carriageway code description

The following table lists the codes used to describe the position of carriageways on the road section.
All carriageways are labelled based on the gazettal direction.

CARRIAGEWAY_CODE	SUPERSET_CWAY	CARRIAGEWAY_CODE_LABEL
1	1	Primary through undivided
2	1	Primary through divided in gazettal
3	3	Primary through divided against gazettal

Truck Details								
			SAR4 / Trip (ESAs)		SAR5 / Trip		SAR12 / Trip	
Truck Type	Austroads	Payload	Loaded	Unloaded	Loaded	Unloaded	Loaded	Unloaded
Two Axle Truck	3	6.5	2.98	0.54	3.29	0.43	6.60	0.11
Three Axle Truck	4	13	3.57	0.50	4.14	0.41	12.08	0.11
Four Axle Truck	5	15	4.09	0.46	4.89	0.37	17.07	0.09
Three Axle Articulated	6	11.5	4.43	0.60	4.88	0.46	9.65	0.11
Four Axle Articulated	7	18	5.02	0.56	5.73	0.44	15.13	0.11
Five Axle Articulated	8	24.5	5.61	0.52	6.58	0.41	20.61	0.11
Six Axle Articulated	9	26.5	4.93	0.51	5.61	0.41	14.63	0.11
B Double	10	40	6.30	0.53	7.09	0.42	17.17	0.11
Double Road Train	11	51.5	8.34	0.55	9.53	0.43	25.71	0.11
Triple Road Train	12	76.5	11.75	0.58	13.45	0.44	36.79	0.11
Truck and Dog	13	29.5	7.06	0.57	8.17	0.44	23.67	0.11

Table 1: Operational Details

Peak Year Production:		
Number of Days	333	Days
Life of Project	20	Years

Table 2: Site Traffic Generation

ID	Vehicle	Inbound Trips (veh/day)	% Loaded	Outbound Trips (veh/day)	% Loaded	Daily Trips	Quantity Per Year
1	AV	0.00	0%	0.00	100%	0.00	0
2	B-Double (Ethanol)	10.00	100%	10.00	0%	20.00	6660
3	B-Double (SAF)	6.00	0%	6.00	100%	12.00	3996
4							
5							
6							
TOTAL						**32.00**	**10656.0**

If new row, add in SAR5 / SAR12 as well.

Table 3: Development Generated Truck Details

Truck Details			Trips					DISTRIBUTION							
			INBOUND (PER DAY)		OUTBOUND (PER DAY)		TOTAL	North TV Port		East		South to Cairns		West to TV Airport	
ID	Vehicle	Truck Type	LOADED	UNLOADED	LOADED	UNLOADED		IB	OB	IB	OB	IB	OB	IB	OB
1	AV	9	0.00	0.00	0.00	0.00	0.00								
2	B-Double (Ethanol)	10	10.00	0.00	0.00	10.00	20.00	100%	100%			0%	0%	0%	0%
3	B-Double (SAF)	10	0.00	6.00	6.00	0.00	12.00	50%	50%			50%	50%	50%	50%
4	0														
5	0														
6	0														

Table 4: Development Generated ESA/DAY Details

Truck Details			North		East		South		West		TOTAL			
ID	Vehicle	Truck Type	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	TOTAL	Yearly
1	AV	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	B-Double (Ethanol)	10	63.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	63.0	5.3	68.3	22,743.9
3	B-Double (SAF)	10	1.6	18.9	0.0	0.0	1.6	18.9	1.6	18.9	4.8	56.7	61.5	20,469.5
4	0													
5	0													
6	0													
TOTAL			**64.6**	**24.2**	**0.0**	**0.0**	**1.6**	**18.9**	**1.6**	**18.9**	**67.8**	**62.0**	**129.8**	**43,213.4**
TOTAL			**88.8**		**0.0**		**20.5**		**20.5**		**129.8**			

Table 5: Section Distributions

Section	Direction	Gazettle	ESA/Day
North	Outbound	G	24.20
	Inbound	A	64.59
East	Outbound	G	0.00
	Inbound	A	0.00
South	Inbound	G	1.59
	Outbound	A	18.90
West	Inbound	G	1.59
	Outbound	A	18.90

Table 1: Operational Details

Peak Year Production:		
Number of Days	333	Days
Life of Project	20	Years

Table 2: Site Traffic Generation

ID	Vehicle	ound Trips (veh/da	% Loaded	ound Trips (veh	% Loaded	Daily Trips	Quantity Per Year
1	AV	0.00	0%	0.00	100%	0.00	0
2	B-Double (Ethanol)	10.00	100%	10.00	0%	20.00	6660
3	B-Double (SAF)	6.00	0%	6.00	100%	12.00	3996
4	0	0.00	0%	0.00	0%	0.00	0
5	0	0.00	0%	0.00	0%	0.00	0
6	0	0.00	0%	0.00	0%	0.00	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**32.00**	**10656.0**

Table 3: Development Generated Truck Details

Truck Details			Trips					DISTRIBUTION							
			INBOUND (PER DAY)		OUTBOUND (PER DAY)		TOTAL	North		East		South		West	
ID	Vehicle	Truck Type	LOADED	UNLOADED	LOADED	UNLOADED		IB	OB	IB	OB	IB	OB	IB	OB
1	AV	9	0.00	0.00	0.00	0.00	0.00	0%	0%	0%	0%	0%	0%	0%	0%
2	B-Double (Ethanol)	10	10.00	0.00	0.00	10.00	20.00	100%	100%	0%	0%	0%	0%	0%	0%
3	B-Double (SAF)	10	0.00	6.00	6.00	0.00	12.00	50%	50%	0%	0%	50%	50%	50%	50%
4	0	0	0.00	0.00	0.00	0.00	0.00	0%	0%	0%	0%	0%	0%	0%	0%
5	0	0	0.00	0.00	0.00	0.00	0.00	0%	0%	0%	0%	0%	0%	0%	0%
6	0	0	0.00	0.00	0.00	0.00	0.00	0%	0%	0%	0%	0%	0%	0%	0%

Table 4: Development Generated ESA/DAY Details

Truck Details			North		East		South		West		TOTAL			
ID	Vehicle	Truck Type	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	TOTAL	Yearly
1	AV	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	B-Double (Ethanol)	10	70.9	4.2	0.0	0.0	0.0	0.0	0.0	0.0	70.9	4.2	75.1	25,008.3
3	B-Double (SAF)	10	1.3	21.3	0.0	0.0	1.3	21.3	1.3	21.3	1.3	21.3	22.5	7,502.5
4	0	0												
5	0	0												
6	0	0												
TOTAL			**72.2**	**25.5**	**0.0**	**0.0**	**1.3**	**21.3**	**1.3**	**21.3**	**72.2**	**25.5**	**97.6**	**32,510.8**
TOTAL			**97.6**		**0.0**		**22.5**		**22.5**		**97.6**			

Table 5: Section Distributions

Section	Direction	Gazettle	ESA/Day
North	Outbound	G	25.47
	Inbound	A	72.16
East	Outbound	G	0.00
	Inbound	A	0.00
South	Inbound	G	1.26
	Outbound	A	21.27
West	Inbound	G	1.26
	Outbound	A	21.27

Table 1: Operational Details

Peak Year Production:		
Number of Days	333	Days
Life of Project	20	Years

Table 2: Site Traffic Generation

ID	Vehicle	ɔound Trips (veh/da	% Loaded	ɔund Trips (veh	% Loaded	Daily Trips	Quantity Per Year
1	AV	0.00	0%	0.00	100%	0.00	0
2	B-Double (Ethanol)	10.00	100%	10.00	0%	20.00	6660
3	B-Double (SAF)	6.00	0%	6.00	100%	12.00	3996
4	0	0.00	0%	0.00	0%	0.00	0
5	0	0.00	0%	0.00	0%	0.00	0
6	0	0.00	0%	0.00	0%	0.00	0
TOTAL	**0**	**0**	**0**	**0**	**0**	**32.00**	**10656.0**

Table 3: Development Generated Truck Details

Truck Details			Trips					DISTRIBUTION							
			INBOUND (PER DAY)		OUTBOUND (PER DAY)		TOTAL	North		East		South		West	
ID	Vehicle	Truck Type	LOADED	UNLOADED	LOADED	UNLOADED		IB	OB	IB	OB	IB	OB	IB	OB
1	AV	9	0.00	0.00	0.00	0.00	0.00	0%	0%	0%	0%	0%	0%	0%	0%
2	B-Double (Ethanol)	10	10.00	0.00	0.00	10.00	20.00	100%	100%	0%	0%	0%	0%	0%	0%
3	B-Double (SAF)	10	0.00	6.00	6.00	0.00	12.00	50%	50%	0%	0%	50%	50%	50%	50%
4	0	0	0.00	0.00	0.00	0.00	0.00	0%	0%	0%	0%	0%	0%	0%	0%
5	0	0	0.00	0.00	0.00	0.00	0.00	0%	0%	0%	0%	0%	0%	0%	0%
6	0	0	0.00	0.00	0.00	0.00	0.00	0%	0%	0%	0%	0%	0%	0%	0%

Table 4: Development Generated ESA/DAY Details

Truck Details			North		East		South		West		TOTAL			
ID	Vehicle	Truck Type	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	INBOUND	OUTBOUND	TOTAL	Yearly
1	AV	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	B-Double (Ethanol)	10	171.7	1.1	0.0	0.0	0.0	0.0	0.0	0.0	171.7	1.1	172.8	57,542.4
3	B-Double (SAF)	10	0.3	51.5	0.0	0.0	0.3	51.5	0.3	51.5	0.3	51.5	51.8	17,262.7
4	0	0												
5	0	0												
6	0	0												
TOTAL			**172.0**	**52.6**	**0.0**	**0.0**	**0.3**	**51.5**	**0.3**	**51.5**	**172.0**	**52.6**	**224.6**	**74,805.1**
TOTAL			**224.6**		**0.0**		**51.8**		**51.8**		**224.6**			

Table 5: Section Distributions

Section	Direction	Gazettle	ESA/Day
North	Outbound	G	52.61
	Inbound	A	172.03
East	Outbound	G	0.00
	Inbound	A	0.00
South	Inbound	G	0.33
	Outbound	A	51.51
West	Inbound	G	0.33
	Outbound	A	51.51

ROAD DATA																							2023 SITE DATA				SAR4		SAR5		SAR12	
SEGMENT ID	ROAD SECTION ID	DIRECTION	SEGMENT DESCRIPTION	CARRIAGEWAY CODE	CARRIAGEWAY	NO. OF LANES	TDIST_START	TDIST_END	LENGTH	PAVEMENT TYPE	MC (cents/SAR-km)	SEGMENT AADT (1-WAY)	% HV	DIRECTIONAL FACTOR	TRUCK MVTS / DAY	ESAs / HV (ALL OTHER ROADS)	SAR4s / DAY	BASE YEAR	SAR4s / BASE YEAR	ANNUAL GROWTH RATE	DESIGN YEAR	SAR4s / DESIGN YEAR	SAR4's / DAY	SAR4's / YEAR	% IMPACT (YEAR)	>5% IMPACT (ESAs/YEAR)	SAR4's / YEAR	SAR4 DEVELOPMENT CONTRIBUTION	SAR5's / YEAR	SAR5 DEVELOPMENT CONTRIBUTION	SAR12's / DAY	SAR 12 DEVELOPMENT CONTRIBUTIO
1	841	G	Ron Mclean Drive	2	Divided	2	0.0	0.1	0.1	GN	7.57	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	2	529	0.17%	NO	529	$0.00	420	$0.00	110	$0.00
2	841	AG		3	Divided	2	0.0	0.1	0.1	GN	7.57	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	19	6,294	1.54%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
3	841	G		2	Divided	2	0.1	0.2	0.1	GN	5.18	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	2	529	0.17%	NO	529	$0.00	420	$0.00	110	$0.00
4	841	AG		3	Divided	2	0.1	0.2	0.1	GN	5.18	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	19	6,294	1.54%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
5	841	G		2	Divided	2	0.2	0.3	0.1	GN	4.29	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	2	529	0.17%	NO	529	$0.00	420	$0.00	110	$0.00
6	841	AG		3	Divided	2	0.2	0.3	0.1	GN	4.29	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	19	6,294	1.54%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
7	841	G		2	Divided	2	0.3	0.4	0.1	GN	3.22	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	2	529	0.17%	NO	529	$0.00	420	$0.00	110	$0.00
8	841	AG		3	Divided	2	0.3	0.4	0.1	GN	3.22	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	19	6,294	1.54%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
9	841	G		2	Divided	2	0.4	0.4	0.0	GN	6.89	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	2	529	0.17%	NO	529	$0.00	420	$0.00	110	$0.00
10	841	AG		3	Divided	2	0.4	0.4	0.0	GN	6.89	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	19	6,294	1.54%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
11	841	G		2	Divided	2	0.4	0.5	0.1	GN	6.89	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	2	529	0.17%	NO	529	$0.00	420	$0.00	110	$0.00
12	841	G		2	Divided	2	0.5	0.6	0.1	GN	6.68	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	2	529	0.17%	NO	529	$0.00	420	$0.00	110	$0.00
13	841	G		2	Divided	2	0.6	0.7	0.1	GN	7.04	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	420	$0.00	110	$0.00
14	841	G		2	Divided	2	0.7	0.8	0.1	GN	6.89	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	420	$0.00	110	$0.00
15	841	G		1	Undivided	2	0.8	0.8	0.0	GN	6.89	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	420	$0.00	110	$0.00
16	841	G		1	Undivided	2	0.8	0.9	0.1	GN	6.49	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
17	841	G		1	Undivided	2	0.9	1.0	0.1	GN	6.49	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
18	841	G		1	Undivided	2	1.0	1.1	0.1	AC	5.05	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
19	841	G		1	Undivided	2	1.1	1.2	0.1	AC	10.1	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
20	841	G		1	Undivided	2	1.2	1.3	0.1	AC	14.5	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
21	841	G		1	Undivided	2	1.3	1.4	0.1	AC	21.3	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
22	841	G		1	Undivided	2	1.4	1.5	0.1	AC	18.1	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
23	841	G		1	Undivided	2	1.5	1.6	0.1	AC	11.7	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
24	841	G		1	Undivided	2	1.6	1.7	0.1	GN	9.27	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
25	841	G		1	Undivided	2	1.7	1.8	0.1	GN	6.49	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
26	841	G		1	Undivided	2	1.8	1.9	0.1	GN	6.67	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
27	841	G		1	Undivided	2	1.9	2.0	0.1	GN	6.9	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
28	841	G		1	Undivided	2	2.0	2.1	0.1	GN	7.33	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
29	841	G		1	Undivided	2	2.1	2.2	0.1	GN	7.8	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
30	841	G		1	Undivided	2	2.2	2.3	0.1	GN	7.7	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
31	841	G		1	Undivided	2	2.3	2.4	0.1	MC	0	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
32	841	G		1	Undivided	2	2.4	2.5	0.1	GN	6.59	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
33	841	G		1	Undivided	2	2.5	2.6	0.1	GN	6.84	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
34	841	G		1	Undivided	2	2.6	2.7	0.1	GN	6.84	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
35	841	G		1	Undivided	2	2.7	2.8	0.1	GN	6.6	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
36	841	G		1	Undivided	2	2.8	2.9	0.1	GN	6.84	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
37	841	G		1	Undivided	2	2.9	3.0	0.1	GN	6.41	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
38	841	G		1	Undivided	2	3.0	3.1	0.1	GN	7.12	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
39	841	G		1	Undivided	2	3.1	3.2	0.1	MC	0	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
40	841	G		1	Undivided	2	3.2	3.3	0.1	AC	5.11	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
41	841	G		1	Undivided	2	3.3	3.4	0.1	AC	4.59	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
42	841	G		1	Undivided	2	3.4	3.5	0.1	AC	4.49	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
43	841	G		1	Undivided	2	3.5	3.6	0.1	GN	6.41	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
44	841	G		1	Undivided	2	3.6	3.7	0.1	GN	7.12	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
45	841	G		1	Undivided	2	3.7	3.8	0.1	GN	7	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
46	841	G		1	Undivided	2	3.8	3.9	0.1	GN	6.87	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
47	841	G		1	Undivided	2	3.9	4.0	0.1	GN	6.6	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
48	841	G		1	Undivided	2	4.0	4.1	0.1	GN	7.94	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
49	841	G		1	Undivided	2	4.1	4.2	0.1	GN	7.09	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
50	841	G		1	Undivided	2	4.2	4.3	0.1	GN	7.3	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
51	841	G		1	Undivided	2	4.3	4.4	0.1	GN	6.9	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
52	841	G		1	Undivided	2	4.4	4.5	0.1	GN	6.37	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
53	841	G		1	Undivided	2	4.5	4.6	0.1	GN	6.07	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
54	841	G		1	Undivided	2	4.6	4.7	0.1	GN	6.05	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
55	841	G		1	Undivided	2	4.7	4.8	0.1	GN	6.84	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
56	841	G		1	Undivided	2	4.8	4.9	0.1	GN	7	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
57	841	G		1	Undivided	2	4.9	5.0	0.1	GN	6.89	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
58	841	G		1	Undivided	2	5.0	5.1	0.1	GN	6.88	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
59	841	G		1	Undivided	2	5.1	5.2	0.1	GN	6.72	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
60	841	G		1	Undivided	2	5.2	5.3	0.1	AC	4.46	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
61	841	G		1	Undivided	2	5.3	5.4	0.1	AC	4.36	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
62	841	G		1	Undivided	2	5.4	5.5	0.1	AC	4.46	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
63	841	G		1	Undivided	2	5.5	5.6	0.1	GN	6.68	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
64	841	G		1	Undivided	2	5.6	5.7	0.1	GN	6.69	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
65	841	G		1	Undivided	2	5.7	5.8	0.1	GN	6.47	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
66	841	G		1	Undivided	2	5.8	5.9	0.1	GN	7.07	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
67	841	G		1	Undivided	2	5.9	6.0	0.1	GN	6.65	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
68	841	G		1	Undivided	2	6.0	6.1	0.1	GN	7.07	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
69	841	G		1	Undivided	2	6.1	6.2	0.1	GN	6.99	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
70	841	G		1	Undivided	2	6.2	6.3	0.1	GN	6.99	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
71	841	G		1	Undivided	2	6.3	6.4	0.1	GN	6.99	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
72	841	G		1	Undivided	2	6.4	6.5	0.1	GN	6.85	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
73	841	G		1	Undivided	2	6.5	6.6	0.1	GN	6.84	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
74	841	G		1	Undivided	2	6.6	6.7	0.1	GN	6.4	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
75	841	G		1	Undivided	2	6.7	6.8	0.1	GN	6.36	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
76	841	G		1	Undivided	2	6.8	6.9	0.1	GN	6.32	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
77	841	G		1	Undivided	2	6.9	7.0	0.1	GN	6.83	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
78	841	G		1	Undivided	2	7.0	7.1	0.1	MC	0	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
79	841	G		1	Undivided	2	7.1	7.2	0.1	MC	0	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
80	841	G		1	Undivided	2	7.2	7.3	0.1	AC	4.94	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
81	841	G		1	Undivided	2	7.3	7.4	0.1	AC	6.82	1,436	18%	100%	263	3.2	840	2023	306,769	0.00%	2027	306,769	24	8,059	2.63%	NO	8,059	$0.00	8,482	$0.00	17,519	$0.00
82	841	AG		2	Divided	2	0.4	0.5	0.1	GN	6.89	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	19	6,294	1.54%	NO	6,294	$0.00	24,029	$0.00	57,286	$0.00
83	841	AG		2	Divided	2	0.5	0.6	0.1	GN	6.68	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	19	6,294	1.54%	NO	6,294	$0.00	24,029	$0.00	57,286	$0.00
84	841	AG		2	Divided	2	0.6	0.7	0.1	GN	7.04	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$151.42	24,029	$0.00	57,286	$0.00
85	841	AG		2	Divided	2	0.7	0.8	0.1	GN	6.89	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$106.70	24,029	$0.00	57,286	$0.00
86	841	AG		1	Undivided	2	0.8	0.8	0.0	GN	6.89	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$41.49	24,029	$0.00	57,286	$0.00
87	841	AG		1	Undivided	2	0.8	0.9	0.1	GN	6.49	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$139.59	24,029	$0.00	57,286	$0.00
88	841	AG		1	Undivided	2	0.9	1.0	0.1	GN	6.49	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$139.59	24,029	$0.00	57,286	$0.00
89	841	AG		1	Undivided	2	1.0	1.1	0.1	AC	5.05	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$121.35	57,286	$0.00
90	841	AG		1	Undivided	2	1.1	1.2	0.1	AC	10.1	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$242.70	57,286	$0.00
91	841	AG		1	Undivided	2	1.2	1.3	0.1	AC	14.5	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$347.46	57,286	$0.00
92	841	AG		1	Undivided	2	1.3	1.4	0.1	AC	21.3	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$512.06	57,286	$0.00
93	841	AG		1	Undivided	2	1.4	1.5	0.1	AC	18.1	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$433.97	57,286	$0.00
94	841	AG		1	Undivided	2	1.5	1.6	0.1	AC	11.7	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$282.10	57,286	$0.00
95	841	AG		1	Undivided	2	1.6	1.7	0.1	GN	9.27	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$199.38	24,029	$0.00	57,286	$0.00
96	841	AG		1	Undivided	2	1.7	1.8	0.1	GN	6.49	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$139.59	24,029	$0.00	57,286	$0.00
97	841	AG		1	Undivided	2	1.8	1.9	0.1	GN	6.67	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$143.46	24,029	$0.00	57,286	$0.00
98	841	AG		1	Undivided	2	1.9	2.0	0.1	GN	6.9	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$148.41	24,029	$0.00	57,286	$0.00
99	841	AG		1	Undivided	2	2.0	2.1	0.1	GN	7.33	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$157.66	24,029	$0.00	57,286	$0.00
100	841	AG		1	Undivided	2	2.1	2.2	0.1	GN	7.8	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$167.77	24,029	$0.00	57,286	$0.00
101	841	AG		1	Undivided	2	2.2	2.3	0.1	GN	7.7	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$165.62	24,029	$0.00	57,286	$0.00
102	841	AG		1	Undivided	2	2.3	2.4	0.1	MC	0	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$0.00	57,286	$0.00
103	841	AG		1	Undivided	2	2.4	2.5	0.1	GN	6.59	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$141.74	24,029	$0.00	57,286	$0.00
104	841	AG		1	Undivided	2	2.5	2.6	0.1	GN	6.84	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$147.12	24,029	$0.00	57,286	$0.00
105	841	AG		1	Undivided	2	2.6	2.7	0.1	GN	6.84	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$147.12	24,029	$0.00	57,286	$0.00
106	841	AG		1	Undivided	2	2.7	2.8	0.1	GN	6.6	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$141.96	24,029	$0.00	57,286	$0.00
107	841	AG		1	Undivided	2	2.8	2.9	0.1	GN	6.84	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$147.12	24,029	$0.00	57,286	$0.00
108	841	AG		1	Undivided	2	2.9	3.0	0.1	GN	6.41	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$137.87	24,029	$0.00	57,286	$0.00
109	841	AG		1	Undivided	2	3.0	3.1	0.1	GN	7.12	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$153.14	24,029	$0.00	57,286	$0.00
110	841	AG		1	Undivided	2	3.1	3.2	0.1	MC	0	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$0.00	57,286	$0.00
111	841	AG		1	Undivided	2	3.2	3.3	0.1	AC	5.11	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$122.79	57,286	$0.00
112	841	AG		1	Undivided	2	3.3	3.4	0.1	AC	4.59	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$110.29	57,286	$0.00
113	841	AG		1	Undivided	2	3.4	3.5	0.1	AC	4.49	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$107.89	57,286	$0.00
114	841	AG		1	Undivided	2	3.5	3.6	0.1	GN	6.41	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$137.87	24,029	$0.00	57,286	$0.00
115	841	AG		1	Undivided	2	3.6	3.7	0.1	GN	7.12	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$153.14	24,029	$0.00	57,286	$0.00
116	841	AG		1	Undivided	2	3.7	3.8	0.1	GN	7	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$150.56	24,029	$0.00	57,286	$0.00
117	841	AG		1	Undivided	2	3.8	3.9	0.1	GN	6.87	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$147.76	24,029	$0.00	57,286	$0.00
118	841	AG		1	Undivided	2	3.9	4.0	0.1	GN	6.6	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$141.96	24,029	$0.00	57,286	$0.00
119	841	AG		1	Undivided	2	4.0	4.1	0.1	GN	7.94	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$170.78	24,029	$0.00	57,286	$0.00
120	841	AG		1	Undivided	2	4.1	4.2	0.1	GN	7.09	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$152.50	24,029	$0.00	57,286	$0.00
121	841	AG		1	Undivided	2	4.2	4.3	0.1	GN	7.3	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$157.01	24,029	$0.00	57,286	$0.00
122	841	AG		1	Undivided	2	4.3	4.4	0.1	GN	6.9	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$148.41	24,029	$0.00	57,286	$0.00
123	841	AG		1	Undivided	2	4.4	4.5	0.1	GN	6.37	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$137.01	24,029	$0.00	57,286	$0.00
124	841	AG		1	Undivided	2	4.5	4.6	0.1	GN	6.07	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$130.56	24,029	$0.00	57,286	$0.00
125	841	AG		1	Undivided	2	4.6	4.7	0.1	GN	6.05	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$130.13	24,029	$0.00	57,286	$0.00
126	841	AG		1	Undivided	2	4.7	4.8	0.1	GN	6.84	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$147.12	24,029	$0.00	57,286	$0.00
127	841	AG		1	Undivided	2	4.8	4.9	0.1	GN	7	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$150.56	24,029	$0.00	57,286	$0.00
128	841	AG		1	Undivided	2	4.9	5.0	0.1	GN	6.89	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$148.19	24,029	$0.00	57,286	$0.00
129	841	AG		1	Undivided	2	5.0	5.1	0.1	GN	6.88	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$147.98	24,029	$0.00	57,286	$0.00
130	841	AG		1	Undivided	2	5.1	5.2	0.1	GN	6.72	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$144.54	24,029	$0.00	57,286	$0.00
131	841	AG		1	Undivided	2	5.2	5.3	0.1	AC	4.46	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$107.17	57,286	$0.00
132	841	AG		1	Undivided	2	5.3	5.4	0.1	AC	4.36	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$104.77	57,286	$0.00
133	841	AG		1	Undivided	2	5.4	5.5	0.1	AC	4.46	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$107.17	57,286	$0.00
134	841	AG		1	Undivided	2	5.5	5.6	0.1	GN	6.68	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$143.68	24,029	$0.00	57,286	$0.00
135	841	AG		1	Undivided	2	5.6	5.7	0.1	GN	6.69	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$143.89	24,029	$0.00	57,286	$0.00
136	841	AG		1	Undivided	2	5.7	5.8	0.1	GN	6.47	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$139.16	24,029	$0.00	57,286	$0.00
137	841	AG		1	Undivided	2	5.8	5.9	0.1	GN	7.07	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$152.06	24,029	$0.00	57,286	$0.00
138	841	AG		1	Undivided	2	5.9	6.0	0.1	GN	6.65	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$143.03	24,029	$0.00	57,286	$0.00
139	841	AG		1	Undivided	2	6.0	6.1	0.1	GN	7.07	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$152.06	24,029	$0.00	57,286	$0.00
140	841	AG		1	Undivided	2	6.1	6.2	0.1	GN	6.99	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$150.34	24,029	$0.00	57,286	$0.00
141	841	AG		1	Undivided	2	6.2	6.3	0.1	GN	6.99	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$150.34	24,029	$0.00	57,286	$0.00
142	841	AG		1	Undivided	2	6.3	6.4	0.1	GN	6.99	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$150.34	24,029	$0.00	57,286	$0.00
143	841	AG		1	Undivided	2	6.4	6.5	0.1	GN	6.85	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$147.33	24,029	$0.00	57,286	$0.00
144	841	AG		1	Undivided	2	6.5	6.6	0.1	GN	6.84	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$147.12	24,029	$0.00	57,286	$0.00
145	841	AG		1	Undivided	2	6.6	6.7	0.1	GN	6.4	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$137.65	24,029	$0.00	57,286	$0.00
146	841	AG		1	Undivided	2	6.7	6.8	0.1	GN	6.36	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$136.79	24,029	$0.00	57,286	$0.00
147	841	AG		1	Undivided	2	6.8	6.9	0.1	GN	6.32	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$135.93	24,029	$0.00	57,286	$0.00
148	841	AG		1	Undivided	2	6.9	7.0	0.1	GN	6.83	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$146.90	24,029	$0.00	57,286	$0.00
149	841	AG		1	Undivided	2	7.0	7.1	0.1	MC	0	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$0.00	57,286	$0.00
150	841	AG		1	Undivided	2	7.1	7.2	0.1	MC	0	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$0.00	57,286	$0.00
151	841	AG		1	Undivided	2	7.2	7.3	0.1	AC	4.94	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$118.70	57,286	$0.00
152	841	AG		1	Undivided	2	7.3	7.4	0.1	AC	6.82	1,311	26%	100%	343	3.2	1,099	2023	401,034	0.48%	2027	408,734	65	21,508	5.26%	YES	21,508	$0.00	24,029	$163.88	57,286	$0.00
153	0	0																									0	$0.00				$0.00
154	0	0																									0	$0.00				$0.00
155	832	G		2	Divided	2	16.5	16.6	0.1	MC	0	8,482	15%	100%	1,242	3.2	3,974	2023	1,450,381	7.02%	2027	1,857,648	2	529	0.03%	NO	529	$0.00	420	$0.00	110	$0.00
156	832	AG		3	Divided	2	16.5	16.6	0.1	MC	0	8,362	15%	100%	1,237	3.2	3,958	2023	1,444,512	5.18%	2027	1,743,815	19	6,294	0.36%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
157	832	G		2	Divided	2	16.6	16.7	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
158	832	AG		3	Divided	2	16.6	16.7	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
159	832	G		2	Divided	2	16.7	16.8	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
160	832	AG		3	Divided	2	16.7	16.8	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
161	832	G		1	Undivided	2	16.8	16.8	0.0	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
162	832	G		1	Undivided	2	16.8	16.9	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
163	832	G		1	Undivided	2	16.9	17.0	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00

ROAD DATA																						2023 SITE DATA				SAR4		SAR5		SAR12	
SEGMENT ID	ROAD SECTION ID	DIRECTION	SEGMENT DESCRIPTION	CARRIAGEWAY CODE	CARRIAGEWAY	NO. OF LANES	TDIST_START	TDIST_END	LENGTH	PAVEMENT TYPE	MC (cents/SAR-km)	SEGMENT AADT (1-WAY)	% HV	DIRECTIONAL FACTOR	TRUCK MVTS / DAY	ESAs / HV (ALL OTHER ROADS)	SAR4s / DAY	BASE YEAR	SAR4s / BASE YEAR	ANNUAL GROWTH RATE	DESIGN YEAR	SAR4s / DESIGN YEAR	SAR4's / DAY	SAR4's / YEAR	% IMPACT (YEAR)	>5% IMPACT (ESAs/YEAR)	SAR4's / YEAR	SAR4 DEVELOPMENT CONTRIBUTION	SAR5's / YEAR	SAR5 DEVELOPMENT CONTRIBUTION	SAR12's / DAY	SAR 12 DEVELOPMENT CONTRIBUTION
164	832	G	Boundary Road	1	Undivided	2	17.0	17.1	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
165	832	G		1	Undivided	2	17.1	17.2	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
166	832	G		1	Undivided	2	17.2	17.3	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
167	832	G		1	Undivided	2	17.3	17.4	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
168	832	G		1	Undivided	2	17.4	17.5	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
169	832	G		1	Undivided	2	17.5	17.6	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
170	832	G		1	Undivided	2	17.6	17.7	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
171	832	G		1	Undivided	2	17.7	17.8	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
172	832	G		1	Undivided	2	17.8	17.9	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
173	832	G		1	Undivided	2	17.9	18.0	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
174	832	G		1	Undivided	2	18.0	18.1	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
175	832	G		1	Undivided	2	18.1	18.2	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
176	832	G		1	Undivided	2	18.2	18.3	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
177	832	G		1	Undivided	2	18.3	18.4	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
178	832	G		1	Undivided	2	18.4	18.5	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
179	832	G		1	Undivided	2	18.5	18.6	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
180	832	G		1	Undivided	2	18.6	18.7	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
181	832	G		1	Undivided	2	18.7	18.8	0.1	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
182	832	G		1	Undivided	2	18.8	18.8	0.0	MC	0	1,528	21%	100%	326	3.2	1,044	2023	381,213	1.51%	2027	404,238	2	529	0.13%	NO	529	$0.00	420	$0.00	110	$0.00
183	0	0																									0	$0.00		$0.00		$0.00
184	832	AG		1	Undivided	2	16.8	16.8	0.0	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
185	832	AG		1	Undivided	2	16.8	16.9	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
186	832	AG		1	Undivided	2	16.9	17.0	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
187	832	AG		1	Undivided	2	17.0	17.1	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
188	832	AG		1	Undivided	2	17.1	17.2	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
189	832	AG		1	Undivided	2	17.2	17.3	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
190	832	AG		1	Undivided	2	17.3	17.4	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
191	832	AG		1	Undivided	2	17.4	17.5	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
192	832	AG		1	Undivided	2	17.5	17.6	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
193	832	AG		1	Undivided	2	17.6	17.7	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
194	832	AG		1	Undivided	2	17.7	17.8	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
195	832	AG		1	Undivided	2	17.8	17.9	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
196	832	AG		1	Undivided	2	17.9	18.0	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
197	832	AG		1	Undivided	2	18.0	18.1	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
198	832	AG		1	Undivided	2	18.1	18.2	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
199	832	AG		1	Undivided	2	18.2	18.3	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
200	832	AG		1	Undivided	2	18.3	18.4	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
201	832	AG		1	Undivided	2	18.4	18.5	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
202	832	AG		1	Undivided	2	18.5	18.6	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
203	832	AG		1	Undivided	2	18.6	18.7	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
204	832	AG		1	Undivided	2	18.7	18.8	0.1	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
205	832	AG		1	Undivided	2	18.8	18.8	0.0	MC	0	1,381	22%	100%	306	3.2	979	2023	357,281	1.14%	2027	373,573	19	6,294	1.68%	NO	6,294	$0.00	7,083	$0.00	17,153	$0.00
206	0	0																									TOTAL	$10,271.76				

Appendix J: SDAP Code Responses



State code 6: Protection of state transport networks

Table 6.2 Development in general

Performance outcomes	Acceptable outcomes	Response
Network impacts		
PO1 Development does not compromise the safety of users of the **state-controlled road** network.	No acceptable outcome is prescribed.	**Complies with PO1** The proposed development does not compromise the safety of users of the state-controlled road network. Refer to Section 6 of the TIA for further details.
PO2 Development does not adversely impact the structural integrity or physical condition of a **state-controlled road** or **road transport infrastructure**.	No acceptable outcome is prescribed.	**Complies with PO2** The proposed development does not adversely impact the structural integrity or physical condition of a state-controlled road or road transport infrastructure.
PO3 Development ensures **no net worsening** of the operating performance the **state-controlled road** network.	No acceptable outcome is prescribed.	**Complies with PO3** The proposed development does not significantly impact the operating performance of the state-controlled road network. Refer to Section 5 of the TIA for further details.
PO4 Traffic movements are not directed onto a **state-controlled road** where they can be accommodated on the **local road** network.	No acceptable outcome is prescribed.	**Complies with PO4** The traffic movements are not directed onto the state-controlled network where possible.
PO5 Development involving haulage exceeding 10,000 tonnes per year does not damage the pavement of a **state-controlled road**.	No acceptable outcome is prescribed.	**Complies with PO5** A pavement impact assessment has been undertaken in accordance with the GTIA. Contributions have been identified for road links that are impacted. Refer to Section 7 of the TIA for further details.
PO6 Development does not require a new **railway** level crossing.	No acceptable outcome is prescribed.	**Complies with PO6** The proposed development does not require a new railway level crossing
PO7 Development does not adversely impact the operating performance of an existing **railway crossing**.	No acceptable outcome is prescribed.	**Complies with PO7** The proposed development does not adversely impact the operating performance of an existing railway crossing.

Performance outcomes	Acceptable outcomes	Response
PO8 Development does not adversely impact on the safety of an existing **railway crossing**.	No acceptable outcome is prescribed.	**Complies with PO8** The proposed development does not adversely impact the safety of an existing railway crossing.
PO9 Development is designed and constructed to allow for on-site circulation to ensure vehicles do not queue in a **railway crossing**.	No acceptable outcome is prescribed.	**Complies with PO9** The proposed development is not expected to cause queuing at railway crossings
PO10 Development does not create a safety hazard within the **railway corridor**.	No acceptable outcome is prescribed.	**Complies with PO10** The proposed development is not expected to create a safety hazard within the railway corridor.
PO11 Development does not adversely impact the operating performance of the **railway corridor**.	No acceptable outcome is prescribed.	**Complies with PO11** The proposed development is not expected to adversely impact the operating performance of the railway corridor.
PO12 Development does not interfere with or obstruct the **railway transport infrastructure** or **other rail infrastructure**.	No acceptable outcome is prescribed.	**Complies with PO12** The proposed development does not interfere with or obstruct the railway transport infrastructure or other rail infrastructure.
PO13 Development does not adversely impact the structural integrity or physical condition of a **railway corridor** or **rail transport infrastructure**.	No acceptable outcome is prescribed.	**Complies with PO13** The proposed development does not adversely impact the structural integrity or physical condition of a railway corridor or rail transport infrastructure.
Stormwater and overland flow		
PO14 Stormwater run-off or overland flow from the development site does not create or exacerbate a safety hazard for users of a **state transport corridor** or **state transport infrastructure**.	No acceptable outcome is prescribed.	Not Traffic Engineering Related
PO15 Stormwater run-off or overland flow from the development site does not result in a material worsening of operating performance of a **state transport corridor** or **state transport infrastructure**.	No acceptable outcome is prescribed.	Not Traffic Engineering Related
PO16 Stormwater run-off or overland flow from the development site does not interfere with the structural integrity or physical condition of the	No acceptable outcome is prescribed.	Not Traffic Engineering Related

Performance outcomes	Acceptable outcomes	Response
state transport corridor or **state transport infrastructure**.		
PO17 Development associated with a **state-controlled road** or **road transport infrastructure** ensures that stormwater is lawfully discharged.	**AO17.1** Development does not create any new points of discharge to a **state transport corridor** or **state transport infrastructure**. AND **AO17.2** Development does not concentrate flows to a **state transport corridor**. AND **AO17.3** Stormwater run-off is discharged to a **lawful point of discharge**. AND **AO17.4** Development does not worsen the condition of an existing **lawful point of discharge** to a **state transport corridor** or **state transport infrastructure**.	Not Traffic Engineering Related
Flooding		
PO18 Development does not result in a material worsening of flooding impacts within a **state transport corridor** or **state transport infrastructure**	*For a **state-controlled road** or **road transport infrastructure**, all of the following apply:* **AO18.1** For all flood events up to 1% **annual exceedance probability**, development ensures there are negligible impacts (within +/- 10mm) to existing flood levels within a **state transport corridor**. AND **AO18.2** For all flood events up to 1% **annual exceedance probability**, development ensures there are negligible impacts (up to a 10% increase) to existing peak velocities within a **state transport corridor**.	Not Traffic Engineering Related

Performance outcomes	Acceptable outcomes	Response
	AND **AO18.3** For all flood events up to 1% annual exceedance probability, development ensures there are negligible impacts (up to a 10% increase) to existing time of submergence of a **state transport corridor**. *No acceptable outcome is prescribed for a **railway corridor** or **rail transport infrastructure**.*	
Drainage infrastructure		
PO19 Drainage infrastructure does not create a safety hazard in a **state transport corridor**.	*For a **state-controlled road** environment, both of the following apply:* **AO19.1** Drainage infrastructure associated with, or in a **state-controlled road** is wholly contained within the development site, except at the **lawful point of discharge**. AND **AO19.2** Drainage infrastructure can be maintained without requiring access to a **state transport corridor**. *For a **railway** environment both of the following apply:* **AO19.3** Drainage infrastructure associated with a **railway corridor** or **rail transport infrastructure** is wholly contained within the development site. AND	Not Traffic Engineering Related

Performance outcomes	Acceptable outcomes	Response
	AO19.4 Drainage infrastructure can be maintained without requiring access to a **state transport corridor**.	
PO20 Drainage infrastructure associated with, or in a **state-controlled road** or **road transport infrastructure** is constructed and designed to ensure the structural integrity and physical condition of existing drainage infrastructure and the surrounding drainage network is maintained.	No acceptable outcome is prescribed.	Not Traffic Engineering Related
Planned upgrades		
PO21 Development does not impede delivery of **planned upgrades** of **state transport infrastructure**.	No acceptable outcome is prescribed.	**Complies with PO21** The proposed development is not expected to impede delivery of planned upgrades to state transport infrastructure

Table 6.3 Public passenger transport infrastructure and active transport

Performance outcomes	Acceptable outcomes	Response
PO22 Development does not damage or interfere with **public passenger transport infrastructure**, **active transport infrastructure** or **public passenger services**.	No acceptable outcome is prescribed.	**Complies with PO22** The proposed development is not expected to damage or interfere with public passenger transport infrastructure, active transport infrastructure or public passenger services.
PO23 Development does not compromise the safety of **public passenger transport infrastructure**, **public passenger services** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Complies with PO23** The proposed development is not expected to compromise the safety of public passenger transport infrastructure, public passenger services and active transport infrastructure.
PO24 Development does not adversely impact the operating performance of **public passenger transport infrastructure, public passenger services** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Complies with PO24** The proposed development is not expected to adversely impact the operating performance of public passenger transport infrastructure, public passenger services and active transport infrastructure

Performance outcomes	Acceptable outcomes	Response
PO25 Development does not adversely impact the structural integrity or physical condition of **public passenger transport infrastructure** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Complies with PO25** The proposed development is not expected to adversely impact the structural integrity or physical condition of public passenger transport infrastructure and active transport infrastructure.
PO26 Upgraded or new **public passenger transport infrastructure** and **active transport infrastructure** is provided to accommodate the demand for **public passenger transport** and **active transport** generated by the development.	No acceptable outcome is prescribed.	**Complies with PO26** There is no upgraded or new public transport or active transport required to accommodate the demand for public passenger transport and active transport generated by the development.
PO27 Development is designed to ensure the location of **public passenger transport infrastructure** prioritises and enables efficient **public passenger services**.	No acceptable outcome is prescribed.	**Complies with PO27** The proposed development is not expected to impact locations of future public transport or active transport infrastructure.
PO28 Development enables the provision or extension of **public passenger services**, **public passenger transport infrastructure** and **active transport infrastructure** to the development and avoids creating indirect or inefficient routes for **public passenger services**.	No acceptable outcome is prescribed.	**Complies with PO28** The proposed development enables the provision or extension of public passenger services, public passenger transport infrastructure and active transport infrastructure to the development and avoids creating indirect or inefficient routes for public passenger services.
PO29 New or modified road networks are designed to enable development to be serviced by **public passenger services**.	**AO29.1** Roads catering for buses are arterial or **sub-arterial roads**, collector or their equivalent. AND **AO29.2** Roads intended to accommodate buses are designed and constructed in accordance with: 1. Road Planning and Design Manual, 2nd Edition, Volume 3 – Guide to Road Design; Department of Transport and Main Roads; 2. Supplement to Austroads Guide to Road Design (Parts 3, 4-4C and 6), Department of Transport and Main Roads; 3. Austroads Guide to Road Design (Parts 3, 4-4C and 6);	**Complies with PO29** No road networks are proposed to be modified and the development is not expected to generate significant public transport demands.

Performance outcomes	Acceptable outcomes	Response
	4. Austroads Design Vehicles and Turning Path Templates; 5. Queensland Manual of Uniform Traffic Control Devices, Part 13: Local Area Traffic Management and AS 1742.13-2009 Manual of Uniform Traffic Control Devices – Local Area Traffic Management; AND **AO29.3** Traffic calming devices are not installed on roads used for buses in accordance with section 2.3.2 Bus Route Infrastructure, Public Transport Infrastructure Manual, Department of Transport and Main Roads, 2015.	
PO30 Development provides safe, direct and convenient access to existing and future **public passenger transport infrastructure** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Complies with PO30** The proposed development provides safe access to the wider road network and subsequently to existing and future public and active transport infrastructure.
PO31 On-site vehicular circulation ensures the safety of both **public passenger transport services** and pedestrians.	No acceptable outcome is prescribed.	**N/A** Public transport services are not required to access the site.
PO32 Taxi facilities are provided to accommodate the demand generated by the development.	No acceptable outcome is prescribed.	**N/A** The proposed development is not expected to generate taxi demands.
PO33 Facilities are provided to accommodate the demand generated by the development for community transport services, courtesy transport services, and **booked hire services** other than taxis.	No acceptable outcome is prescribed.	**N/A** The proposed development is not expected to generate taxi demands.

Performance outcomes	Acceptable outcomes	Response
PO34 Taxi facilities are located and designed to provide convenient, safe and equitable access for passengers.	**AO34.1** A **taxi facility** is provided parallel to the kerb and adjacent to the main entrance. AND **AO34.2 Taxi facilities** are designed in accordance with: 1. AS2890.5–1993 Parking facilities – on-street parking and AS1428.1–2009 Design for access and mobility – general requirements for access – new building work; 2. AS1742.11–1999 Parking controls – manual of uniform traffic control devices 3. AS/NZS 2890.6–2009 Parking facilities –off street parking for people with disabilities; 4. Disability standards for accessible public 5. transport 2002 made under section 31(1) of the Disability Discrimination Act 1992; 6. AS/NZS 1158.3.1 – Lighting for roads and public spaces, Part 3.1: Pedestrian area (category P) lighting – Performance and design requirements; 7. Chapter 7 Taxi Facilities, Public Transport Infrastructure Manual, Department of Transport and Main Roads, 2015.	**N/A** The proposed development is not expected to generate taxi demands.
PO35 Educational establishments are designed to ensure the safe and efficient operation of **public passenger services**, pedestrian and cyclist access and **active transport infrastructure**.	**AO35.1** Educational establishments are designed in accordance with the provisions of the Planning for Safe Transport Infrastructure at Schools, Department of Transport and Main Roads, 2011.	**N/A** The proposed development is not an educational establishment,

Jet Zero™

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PROJECT ULYSSES

ECOLOGICAL ASSESSMENT REPORT

PLANNING AND ENVIRONMENT
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REV 1

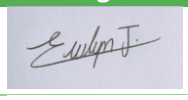
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1. INTRODUCTION

Jet Zero Australia Pty Ltd (Jet Zero) is a leading Australian bio-energy company focussed on delivering Sustainable Aviation Fuel (SAF), via a certified technology known as the Alcohol-To-Jet (ATJ) pathway. Jet Zero are proposing to construct Australia's first ATJ plant converting ethanol feedstock into SAF at Townsville, Queensland, referred to as 'Project Ulysses' (in this report as 'Project'). The Project location is within the Townsville State Development Area (TSDA), approximately 8 km from the Port of Townsville (PoTL), and surrounded by existing and planned industrial facilities as shown in **Figure 1**.

1.1. Objectives

The purpose of this Ecological Assessment Report (EAR) is to inform the statutory planning process and support the Development Permit for Material Change of Use (MCU) – Special Industry required prior to construction of Project (SAF Facility).

The objectives of this EAR are to:

- Review the background information related to ecological constraints in the local, regional, State and National context of the Project.
- Review the statutory requirements relating to ecological values and constraints.
- Describe the ecological values of the Project site area.
- Assess the potential ecological constraints, impacts and mitigation controls of the proposed Project.

1.2. Scope of Works

The scope of this EAR is to:

- Describe the ecological values and legislative framework related to the Project.
- Conduct an ecological field survey to verify and expand the understanding of values.
- Assess the ecological impacts of the Project, with mitigation controls to minimise the impacts.
- Complete a report explaining the methodology, results and conclusions of the assessment.

1.3. Site Description

The Project site comprises a 19.556 hectare (ha) total, which includes 16.71 ha of developable area and 2.85 ha of access handle, comprising a 1,050 m road access from Colinta Road to the plant site (see **Figure 2**). The Project site is within the TSDA that is designated for industrial purposes strategically positioned at the intersection of the Bruce and Flinders Highways, with direct access to major rail networks and the port, facilitate industrial developments of regional, state, and national significance. It offers a streamlined assessment process under the *State Development and Public Works Organisation Act 1971*, providing a coordinated approach to planning and development. The Project site Cleveland Bay Industrial Park (CBIP) developer has existing Reconfiguring a lot (RAL) and Operational Works (OpWorks), that have been implemented for clearing native vegetation of the road access and plant site areas (AP2022/001, OPW22/0014, AP2023/013, OPW24/0107).

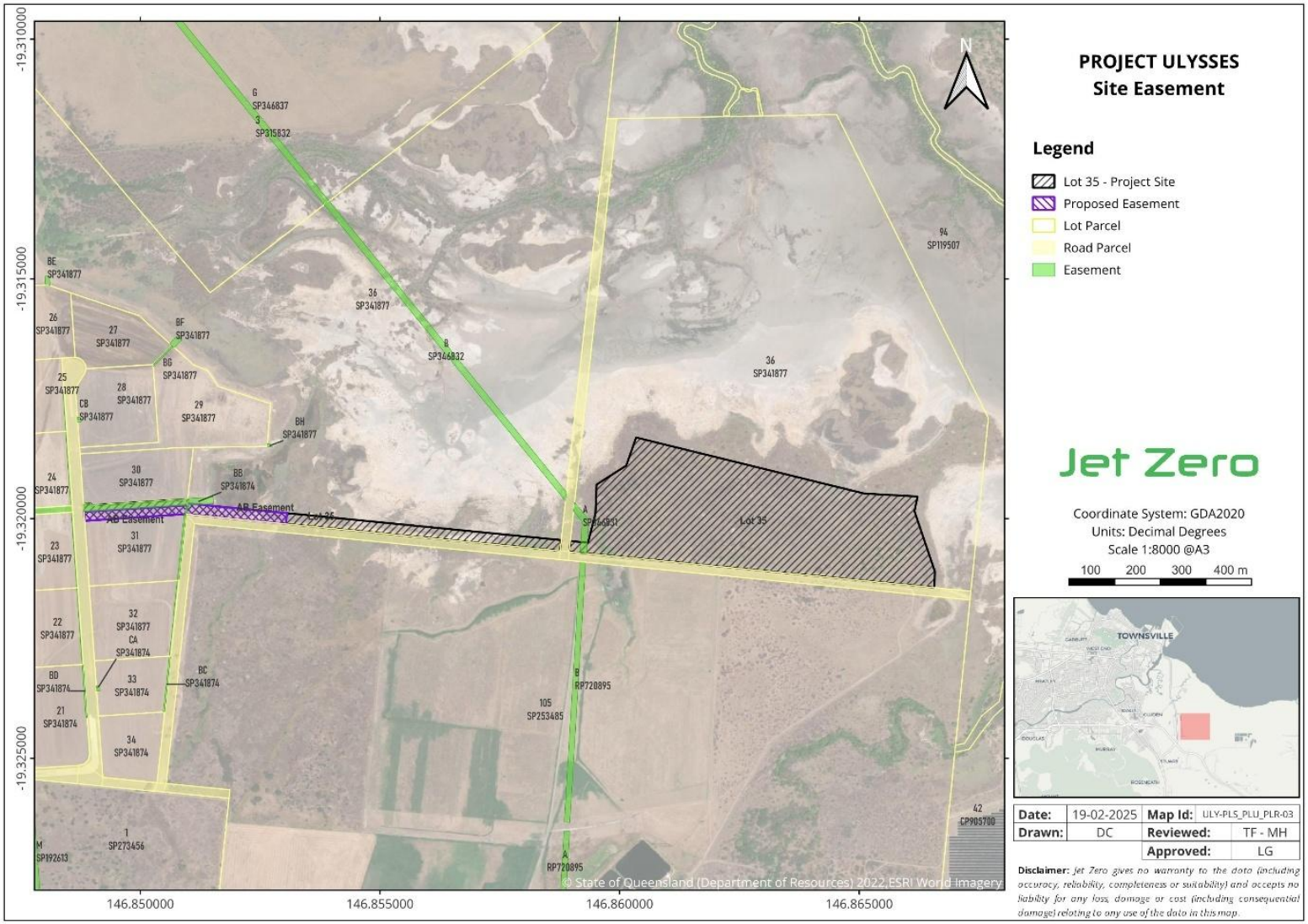
The Project site is a stable flat area with elevation of between 3 and 4 km (Australian Height Datum), on the edge of an intertidal zone with the Highest Astronomical Tide (HAT) surrounding the development extent to the north, east and west. The site has sensitive environments surrounding the area with a wetland protection area 0.5 km to the west (State Development Assessment Code (SDAC) Code 9: Great Barrier Reef protection area), the Great Barrier Reef Marine Park (GBRMP) 2 km to the north and Ramsar Convention listed wetlands and Bowling Green National Park approximately 7 km to the east.

The site has historically operated as a vacant allotment, accommodating cattle grazing with no built form constructed on the site.

Figure 1: Site Location



Figure 2: Site Location and Easement



1.4. Statutory Consideration

Table 1 summaries relevant environmental legislation relevant to the assessment of ecological constraints of the Project, showing section references to this report.

Table 1: Relevant Environmental Statutory Considerations

Legislation	Description	Relevance to Assessment
Commonwealth		
***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)**	EPBC Act establishes a process for environmental assessment and approval of proposed actions that have, or are likely to have, a significant impact on Matters of National Environmental Significance (MNES) or the environment on Commonwealth land. Such an action is considered a 'controlled action'.	Project approval under EPBC Act (Decision 3/9/2021) – see **Section 1.5.1**
State		
***Nature Conservation Act 1992* (NC Act)**	The NC Act provides for the conservation of Queensland's biodiversity, including declaration and management of protected areas, protection of wildlife and habitat, and the sustainable use of native wildlife and areas. Under the NC Act, an activity must not interfere with a breeding place of protected animals. Breeding places can include bird's nests, tree hollows, hollow logs and ponds. A Species Management Programme (SMP) authorises activities that will impact on breeding places of protected animals. A SMP is only required where an animal breeding place has been identified within the proposed disturbance footprint.	**Section 1.5.2**
***Vegetation Management Act 1999* (VM Act)**	The VM Act is the planning initiative underlying regional management of vegetation in Queensland, including clearing of vegetation types, termed Regional Ecosystems (RE). • The RE classification is a hierarchical system formed by a three-part code with the primary subdivision being bioregion, followed by land zone, and then vegetation. The biogeographic region or bioregion is the primary level of classification for biodiversity values in Queensland describing where the RE is found on a state-wide basis; • The status of REs is based on their pre-clearing and remnant extent, is gazetted under the Act and listed in the RE Description Database (REDD) maintained by the Queensland Department of Environment and Heritage Protection (DEHP); and • The Act aims to conserve remnant endangered and of concern REs, prevent land degradation and further loss of biodiversity, manage the environmental impacts of clearing vegetation and reduce the emissions of greenhouse gases.	**Section 1.5.2**
Water Act 2000	*The Water Act 2000* (Water Act) provides for the sustainable management of water and other resources, a regulatory framework for water sewerage services, and the establishment and operation of water authorities. The Water Act governs the construction, control and management of works with respect to water conservation and protection, irrigation, drainage, water supply, flood control and prevention. The Water Act regulates the destruction/ disturbance of freshwater riverine vegetation in the bed and banks of	**Section 4.1.4**

Legislation	Description	Relevance to Assessment
	Department of Natural Resources and Mines (DNRM) watercourses. Section 266 of the Water Act identifies that: A person may apply to the chief executive for a permit to do any or all of the following activities: • Destroy vegetation in a watercourse, lake or spring; • Excavate in a watercourse, lake or spring; and • Place fill in a watercourse, lake or spring. Destruction of vegetation in accordance with the Water Act is "…the removing, clearing, killing, cutting down, felling, ringbarking, digging up, pushing over, pulling over or poisoning of the vegetation". In accordance with the Water Act, watercourses are determined as watercourses by the DNRM through topographical mapping, aerial imagery and a possible onsite assessment.	
Queensland Fisheries Act 1994	The *Fisheries Act 1994* (Fisheries Act) provides for the use, conservation and enhancement of the community's fisheries resources and fish habitat by providing for, amongst other things, the protection of fish habitats. The Fisheries Act has been integrated into the *Sustainable Planning Act 2009* (SP Act) so that development permits under the SP Act are required for certain operational works that are assessable development under the act. Operational works that are assessable development under the SP Act include waterway barrier works and works in a declared fish habitat.	**Section 3.5**
***Environmental Offsets Act 2014* (EO Act)** ***Environmental Offsets Regulation 2014* (EO Reg)**	*Environmental Offsets Act 2014* coordinates the delivery of environmental offsets across jurisdictions and is the overarching legislation for offsets in Queensland. *Environmental Offsets Regulation 2014* provides details of the prescribed activities regulated under existing legislation and prescribed environmental matters to which the Act applies. Queensland Environmental Offsets Policy which provides a single, consistent, whole-of-government policy for the assessment of offset proposals provided by authority holders to satisfy offset conditions.	Not applicable. Offsets requirements for Essential Habitat buffer and marine plants are conditioned under OPW24/0107for CBIP developer (refer to **Section 1.6**)

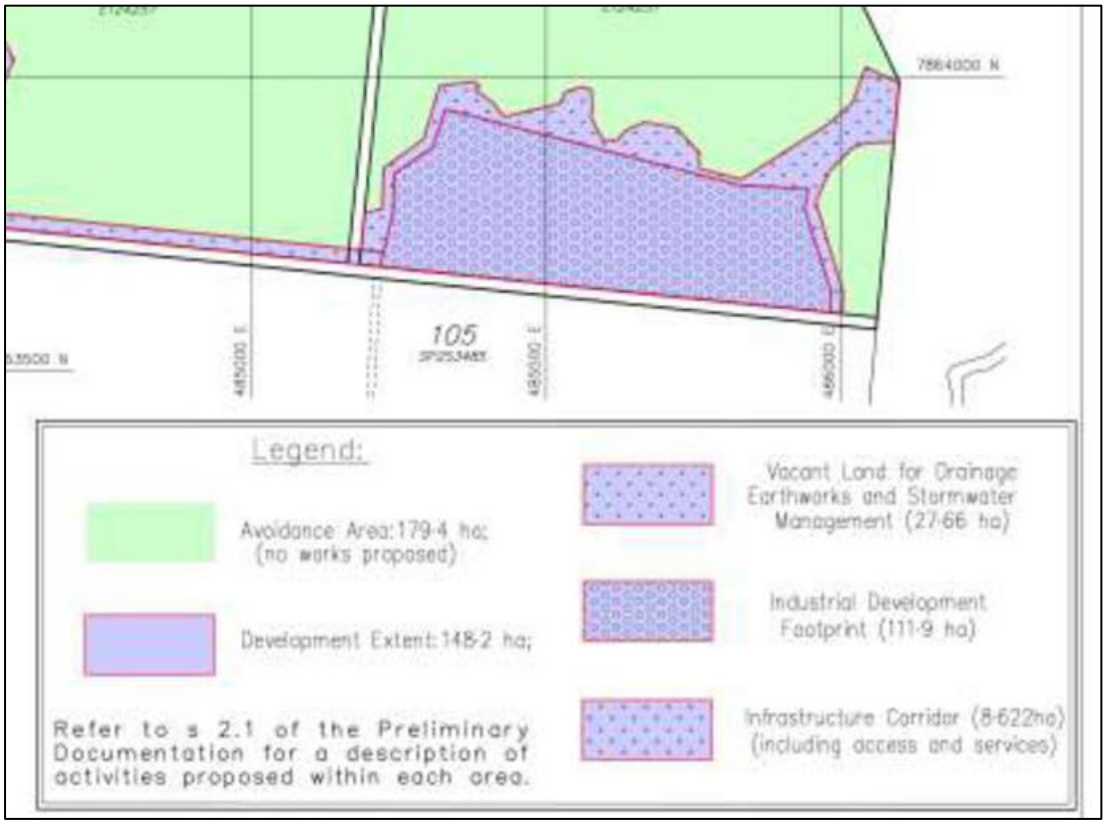
1.5. Existing Approvals

1.5.1. Commonwealth Approval

The Project has an existing approval under the *Environment Protection and Biodiversity Act 1999* (EPBC Act) (Commonwealth). The CBIP land developer submitted a Referral for the Project plant site to the Department of Climate Change, Environment, Energy and Water (DCCEEW), that was deemed a 'Controlled Action' with Preliminary Documentation (PD) (EPBC 2020/8810, application 24/6/2021). The PD was produced and submitted to DCCEEW with an approval gained under the EPBC Act with 'Conditions' (Decision 3/9/2021). This approval included the area boundary within the existing plant site as shown in **Figure 3**.

The approval conditions relate to the Bare-rumped Sheath Tailed Bat (EPBC listed species), with the conditions being added to the Project approvals register. This species and habitat were further field surveyed and assessed and is described in **Section 3.1** of this EAR. The Project road access handle has now been constructed and the plant site area cleared of vegetation, thereby the EPBC approval has been implemented.

Figure 3: EPBC Approval - Development Extent



1.5.2. State Approval

Current application AP2023/013 directly relates to the proposal, noting this approval is for the purpose of excising the proposed subject site as a separate freehold allotment from the current lot arrangement. It is noted the approved lot layout associated with AP2023/013, is yet to be formalised with the Titles Office given on-going works are being undertaken associated with demonstrating compliance with conditions of approval.

Refer to **Table 2** below for an associated development application summary, relevant to the bounds of this applications assessment.

Table 2: Relevant Development Applications

Application Reference and Status	Assessment Manager	Application Type	Description	Ecology
AP2022/001 OPW22/0014 (associated) Approved – 27 June 2022	Office of Coordinator-General	Combined Reconfiguring a Lot & Operational Works	Reconfiguring a lot (3 lots into 14 lots plus 2 balance lots and 1 service lot) and operational works for clearing native vegetation.	Essential habitat wetland buffer within the access road previously required an ecological offset (see **Section 1.6** and **4.1.10.1**).
AP2023/013 Approved – 11 September 2024	Office of Coordinator-General	Combined Reconfiguring a Lot & Operational Works	Reconfiguring a lot (2 into 3 lots) and operational work for native vegetation clearing.	-
OPW24/0107 Approved – 20th March 2025	Townsville City Council	Operational Works	Associated with Reconfiguring a Lot (SDA Approval AP2023/013) – Civil Works, Marine Plant Clearing, Waterway Barrier Works and Prescribed Tidal Works.	Marine plants within access road previously required ecological offset (see **Section 1.6** and **4.1.10.1**).

1.6. Potential Offset Requirements

The EO Act and Environmental Offsets Policy (EO Policy) are the primary pieces of legislation and policy for the delivery of offsets in Queensland. An environmental offset is an activity which is undertaken to counterbalance a significant residual impact (SRI) for a prescribed activity on a prescribed environmental matter.

Section 9 of the EO Act defines a prescribed activity as an activity that is:

(a) The subject of an authority under another Act; and

(b) For which an offset condition may be imposed under the other Act on the authority; and

(c) That is prescribed under a regulation.

An environmental offset condition may be imposed under various State's assessment frameworks for prescribed activities under the EO Act, if the activity will, or is likely to have a SRI on a prescribed environmental matter that is a Matters of State Environmental Significance (MSES). An SRI is defined under the EO Act, section 8 as:

> *"an adverse impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that:*
> *a) remains, or will or is likely to remain, (whether temporarily or permanently) despite on-site avoidance and mitigation measures for the prescribed activity; and*
> *b) is, or will or is likely to be, significant."*

The existing developer, CBIP has an Operational Works approval for the Project site with existing offset requirements as part of the prescribed activities, that have been implemented with the clearing of the plant and road access sites (see **Table 2**).

The proposed Project activity will not meet the criteria proposed as the plant site and road access has been previously cleared of vegetation, and therefore not require an offset granted by the

administering agency. The Project does not directly impact regulated vegetation and High Ecological Value (HEV) watercourses.

1.7. Project Construction, Operation and Decommissioning

1.7.1. Plant Construction

The Project will progress past FEED to a FID by the Jet Zero Board. If the decision to proceed is given the Project will progress through:

- Engagement of 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 process units of the ETE and ATJ plant, and Utility Unit will be constructed as modules and shipped to the PoTL, and transported by road to the plant site. At site the modules will be installed, 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 4** shows a rendered image of module transport and a module example.

1.7.1.1. Modularisation

Modularisation will improve 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 cannot be economically 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.

Figure 4: Module Transport to Site



Source: Project Ulysses flyover (Technip Energies 2024)

1.7.1.2. 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.

1.7.2. 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 also be refined during this process. This will include developing an Erosion and Sediment Control Plan (ESCP), update the Stormwater Management Plan (SMP), prepare a Construction Environmental Management Plan (CEMP) and associated ancillary plans for the facility.

1.7.2.1. Construction Site Decommissioning and Rehabilitation

The laydown area (eastern side of site, see **Figure 2**) will be used to facilitate construction and decommissioning, and store equipment and machinery during plant shutdown events. Construction site decommissioning and rehabilitation involves the systematic removal and rehabilitation of the site to conditions similar to the previous land-use of the site itself.

This process will include 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).

1.7.3. Plant Operation

The Project will work through construction to the operation phase with the Project and operations team, based on a full set of startup and commissioning criteria that will contribute to a handover plan. There may also be an independent review post pre-commissioning that confirms the plant is ready to accept feedstock and transition to operations. The Project will progress through the following stages:

- Commissioning and testing of plant units and associated infrastructure.
- First production of SAF and RD.
- Handover of operations to Jet Zero by the EPC Contractor post-commissioning.

The plant has a design life of 20 years with the option to extend if warranted. The plant operating period will be operating 24 hours per day / 365 days per year minus a major shutdown and maintenance period every 4 years of approximately 33 days.

The workforce labour will be anticipated to be approximately 100 people, with 50 Jet Zero employees and another 50 being made up of off-site services, working shifts of 3 x 8 hours per day, with around 34 staff for each shift.

1.7.4. Plant Site Decommissioning and Rehabilitation

At the end of life of the Project, the plant will need to be decommissioned and the site rehabilitated. The decommissioning of the plant site facilities is expected to be completed in four phases:

- Dismantling and removal of the above ground facilities;
- Destruction and removal of hardstand areas;
- Remediation of land (if contamination present); and
- Restoration and rehabilitation of the areas to return for future land-use.

When the project is planned for decommissioning any plant and associated infrastructure will be undertaken in accordance with the regulatory requirements, EA and DP conditions, accepted environmental best practice of the day, and in consultation with the future landowner regarding the intended land-use. Prior to decommissioning of the plant, an assessment of the potential environmental and social risks and impacts associated with the decommissioning will be completed and the results updated into a Project Site Decommissioning and Rehabilitation Plan (SDRP).

All applicable above ground structures shall be removed, with the site being left in a clean, stable and safe state. Consideration shall be given to alternate use of buildings and associated infrastructure as circumstances allow, and the sites restored accordingly. The SDRP shall consider the potential to recycle or re-use equipment and materials within the plant and site. The sites shall be assessed in regarding the potential for land contamination at the time of decommissioning.

The removal of below ground structures may cause unnecessary environmental disturbance. The suitability of underground piping being left in the ground will be assessed during the SDRP. If suitable, the abandoned pipe shall be purged of gas, both ends plugged, the pipe filled with an inert substance and the cathodic protection devices shall be disconnected. The pipeline steel will corrode, filling the void with rust that will prevent ground subsidence associated with the corrosion of the pipe which may result in surface water diversion, ponding, and erosion.

The plant site shall be re-contoured to a landform consistent with previous use and in consideration of the future planned use. Rehabilitation of the plant site will be determined from the future use, with consideration for vegetation cover, erosion control and pest management. Rehabilitation can be considered successful when the site can be managed for its designated land-use (either similar to that of surrounding undisturbed areas or as otherwise agreed in a written document with the landowner/holder and Administering Authority (DETSI and OCG) without any greater management input than other land in the area used for a similar purpose and there is evidence that the rehabilitation has been successful for at least three years

2. METHODOLOGY

2.1. Desktop and Field Survey

The ecology baseline and assessment were developed in three phases, phase one, a desktop baseline (NRA, 2024) aiming to identify the environmental planning considerations related to development of Project site, and a second phase covering field-survey (NRA, 2025a), with additional shorebird survey (summer) (NRA, 2025b), and ecological impact assessment (see **Section 2.2**).

The initial surveys were completed between the months of August and October 2024 (NRA, 2025a), within Project site and surrounding areas, with an additional February 2025 survey (NRA, 2025b). All field surveys used recognised methodologies for the relevant component, covering:

- Terrestrial ecology field surveys to:
    - Assess watercourses and wetlands in the project footprint (i.e. Project site and access road).

  - Improve the accuracy of Regional Ecosystem (RE) mapping and fauna habitat mapping via quaternary vegetation assessments and habitat observations.
  - Map the extent and density of marine plants over the core infrastructure footprint[1].
  - Conduct targeted searches for Threatened, Near Threatened (T/NT) and/or Migratory species (and their habitat) identified as potentially present.
  - Map the locations of Commonwealth and State listed weed species and pest fauna.
- Migratory shorebird surveys within 300 m of the core the infrastructure footprint.
- Search of publicly available databases and Queensland Government mapping of key findings and potential project-related threats to MNES and MSES.

Additional technical studies, supporting this assessment where relevant, were undertaken by pre-qualified consultants, and listed in **Table 3**. The technical studies included:

- The drafting of a scope of work
- The evaluation and selection of organisations as subject matter experts to conduct the studies
- The implementation of the technical studies included field studies, modelling, report writing, review and incorporation of review comments prior to report completion.

Table 3: Additional Technical Studies supporting the Ecological Assessment Report

Title	Company	Date and Version
Stormwater Management Plan	GHD	10/10/2025 (Rev 0)
Traffic Impact Assessment Report	Bitzios	24/3/2025 (Rev 3)
Air Quality Assessment Report	Vipac	3/3/2025 (Rev 1)
Noise and Vibration Assessment Report	Vipac	28/2/2025 (Rev 1)
Lighting Assessment Report	Rubidium Light	17/2/2025 (Rev 3)
Soils Assessment Report	C&R	24/2/2025 (Rev 1)
Surface Water Quality Report	Terra Solutions	5/3/2025 (Rev 2)
Groundwater Assessment Report and Management Plan (GWMP)	SubsurfXR	28/2/2025 (Rev 0)

2.2. Ecological Impact Assessment

2.2.1. Sensitivity of Values / Receptors

The third phase of the ecology assessment was to complete an ecological impact assessment, utilising the data and knowledge gained from the first two phases. The methodology for establishing the sensitivity of values is provided in **Table 4** as an integral part of the identified environmental values. The referred section also describes the baseline environment and the sensitivity of these values. This sensitivity has been incorporated into the impact assessment to evaluate the overall severity of the project's activities.

[1] The areas to the north, east and west of the project site was preliminary identified as most likely to support migratory shorebirds; hence, the buffer reflects the minimum reasonable observation distance for detection and identification at high tide.

Table 4: Sensitivity / Vulnerability Criteria of Potential Impacts

Sensitivity / Vulnerability	Description
Extreme	• Environmental or social / cultural value is listed on a statutory national or international register as being of conservation significance. • Value is entirely intact and wholly retains its intrinsic value. • Value is unique in area in which it occurs, and isolated to the affected system/area, which is poorly represented in the country or the world. • Value/receptor is unable to recover from, or adjust to, change or disturbance. • Project activities would have an extreme adverse effect on the value.
High	• Environmental or social / cultural value is listed on a statutory State, national or international register as being of conservation importance. • Value is highly conserved and wholly retains its intrinsic value. • Value is unique in area in which it occurs, complete or partially isolated to the affected system/area, which is poorly represented in the region, State country or the world. • Value/receptor is unlikely to recover from, or adjust to, change or disturbance. • Project activities would have a high adverse effect on the value.
Significant	• Environmental or social / cultural value is listed as being important at a regional level and may be listed on recognised or statutory registers. • Value is in a moderate to good condition despite being exposed to threatening processes, it retains many of intrinsic characteristics and structural elements. • Value is represented in systems/areas that it occurs, but abundance and distribution are exposed to threatening processes. • Threatening processes have reduced resilience to change, so changes resulting from project activities may lead to degradation of the prescribed value. • Project activities would have a significantly adverse effect on the value.
Moderate	• Environmental or social / cultural value is not listed on any statutory register and not recognised locally by relevant suitably qualified experts or organisation. • Environmental value/receptor is not sensitive to change or disturbance and is able to fully recover. • Project activities would have a moderate adverse effect on the value.
Low	• Value is not unique or rare and numerous representative examples exist throughout the system / area. • The environmental or social / cultural value / receptor is highly disturbed, and the natural recovery of the impacted area to a pre-project condition is expected within less than one year. • Project activities would have a low adverse effect on the value.

2.2.2. Intensity of Potential Impacts

The intensity, or magnitude, of impacts is described with consideration of the geographic extent of the potential impact, the duration of the effect, and reversibility of the impact. More information on the descriptors of intensity and magnitude of impact is provided in **Table 5**.

Table 5: Intensity / Magnitude Criteria of Potential Impacts

Sensitivity / Vulnerability	Description
Extreme	• Impact that is widespread, permanent and results in substantial irreversible change to the environment and/or social value. • Avoidance through significant design modification and or relocation are required to address the intensity of the impact.
High	• Impact that is widespread, long lasting and results in substantial and possibly irreversible change to the environment and/or social / cultural value. • Avoidance through appropriate design responses or the implementation of environmental or social / cultural site-specific management controls are required to address the impact. • If avoidance is not possible, mitigation and management practices must be comprehensive and adequate to guarantee no irreversible change to the environment and/or social value.
Significant	• Impact extends beyond the area of disturbance to the surrounding area but is contained within the region where the project is being developed. • The impacts are short to medium term and result in changes that can be ameliorated with specific environmental or social / cultural management controls.
Moderate	• Impact is localised, temporary or short term and either unlikely to be detectable or could be effectively mitigated through standard environmental or social / cultural management controls.
Low	• Impact is localised that is barely discernible and effectively mitigated through standard environmental and social / cultural management controls.

2.2.3. Overall Impact Severity

To determine the impact severity, classified as 'significance,' the impact assessment process employs a 5 x 5 matrix, resulting in four impact levels (i.e., impact significance) as presented in **Table 6**. The overall ranking of impact significance is derived for each identified potential impact event using the classifications contained in this matrix. For example, a high impact intensity scored against a moderately sensitive environmental value would result in a major overall impact classification.

The impact significance criteria presented in **Table 7**. The acceptable level of impacts for the project is determined to be within the 'Minor' or 'Medium' range (as indicated by the bold borders).

Table 6: Environmental and Social Impact Significance Matrix

Impact Assessment – Planned Activities					
Intensity / Magnitude of Impact	**Sensitivity / Magnitude of Value / Receptor**				
	Low Sensitivity	**Moderately Sensitive**	**Significantly Sensitive**	**Highly Sensitive**	**Extremely Sensitive**
Extreme Intensity	Major	Major	Extreme	Extreme	Extreme
High Intensity	Medium	Major	Major	Extreme	Extreme
Significant Intensity	Medium	Medium	Major	Major	Extreme
Moderate Intensity	Minor	Minor	Medium	Medium	Major
Low Intensity	Minor	Minor	Minor	Medium	Medium

Table 7: Impact Significance Criteria

Sensitivity / Vulnerability	Description
Extreme	• Impact that is widespread, permanent and results in substantial irreversible change to the environment and/or social value. • Avoidance through appropriate design responses or the implementation of environmental or social / cultural controls are required to address the impact.
Major	• Impact that is widespread, long lasting and results in substantial and possibly irreversible change to the environment and/or social / cultural value. • Avoidance through appropriate design responses or the implementation of environmental or social / cultural site-specific management controls are required to address the impact. • If avoidance is not possible, mitigation and management practices must be comprehensive and adequate to guarantee no irreversible change to the environment and/or social value.
Medium	• Impact extends beyond the area of disturbance to the surrounding area but is contained within the region where the project is being developed. • The impacts are medium to short term and result in changes that can be ameliorated with specific environmental or social / cultural management controls.
Low	• Impact is localised, temporary or short term and either unlikely to be detectable or could be effectively mitigated through standard environmental or social / cultural management controls.

3. ECOLOGICAL VALUES

The ecological environmental values for the Project site are described in subsections below.

3.1. Matters of National Environmental Significance

Matters of National Environmental Significance are defined under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in Australia. MNES are elements of the environment that have been identified as being of national importance and are therefore protected under the EPBC Act. The Act sets out the legal framework to protect and manage these significant aspects of the environment (DEWHA, 2013). The MNES identified intersecting or within the project area of influence, i.e., ecologically sensitive receptors located adjacent, in the vicinity, surrounding or distal surrounding areas are presented in **Table 8**.

Table 8: MNES and Corresponding Environmental Values

MNES	Relevant Values	Description of the Value	Intersects Project Footprint?
World heritage areas	GBR World Heritage Area (GBRWHA)	The project area is located on the periphery of the GBR World Heritage Area. Surface waters leaving the project site report to Sandfly Creek and discharge to Cleveland Bay, part of the GBRWHA. The area is critical for maintaining the ecological and heritage values of the GBRWHA, including its biodiversity, ecological processes, and aesthetic values (see **Figure 5**).	No. Within project area of influence (approx. 2.5 km downstream of project site).

MNES	Relevant Values	Description of the Value	Intersects Project Footprint?
National heritage places	GBR National Heritage Place (GBRNHP)	The GBRNHP is co-located with the GBRWHA and is protected for its significant natural and cultural heritage values (see **Figure 5**).	
Marine parks	GBR Marine Park (GBRMP)	Part of the GBRWHA, sharing the same environmental values (see **Figure 5**).	No. Within project area of influence (approx. 6.3 km from project site).
Listed Threatened species and ecological communities	Species observed or with expected intermittent presence: • Sharp-tailed Sandpiper[a] • Latham's Snipe[a, b] • Eastern Curlew[a] • Bare-rumped Sheathtail Bat • Black-tailed Godwit[a]	Species and ecological communities that are identified as being at risk of extinction or significant decline under the EPBC Act.	Partially. Bare-rumped Sheathtail Bat is likely to maintain a regular presence (foraging) over the Project footprint. However, no potential roosting habitat was detected in or near the Project area during the 2024 field survey. Habitat identified within 500 m of the Project area is auxiliary (poor quality and/or with limited resources). The presence of this habitat is not critical for maintaining the Townsville population of this species.) Other species observed in the receiving environment north of the project site.
Listed Migratory species	Species observed or with expected intermittent presence: • Common Sandpiper[a] • Sharp-tailed Sandpiper[a] • Latham's Snipe[a,b] • Eastern Curlew[a] • Whimbrel[a] • Pacific Golden Plover[a] • Caspian Tern[a, b] • Eastern Osprey[b] • Fork-tailed Swift[a, b] • Red-necked Stint[a] • Black-tailed Godwit[a] • Estuarine Crocodile[a, b] • Glossy Ibis[a, b]	Species that migrate to, from, or within Australia and are protected by international agreements, including under the EPBC Act. The Project occurs on the southern margin of the 'Cleveland Bay' important Migratory shorebird habitat (see **Figure** 5).	Partially. The species Black-tailed Godwit was observed intersecting Project site (incidental observation). The species is considered to be exceptionally rare in the receiving environment within 500 m of the Project footprint. Other species observed in the receiving environment north, east and west of the Project site: • Eastern Curlew • Whimbrel • Caspian Tern • Sharp-tailed Sandpiper • Latham's Snipe • Red-necked Stint Species with expected intermittent presence (not observed during the 2024 surveys) within 500 m of the Project footprint: • Common Sandpiper • Fork-tailed Swift • Sharp-tailed Sandpiper • Red-necked Stint • Latham's Snipe • Eastern Osprey • Glossy Ibis

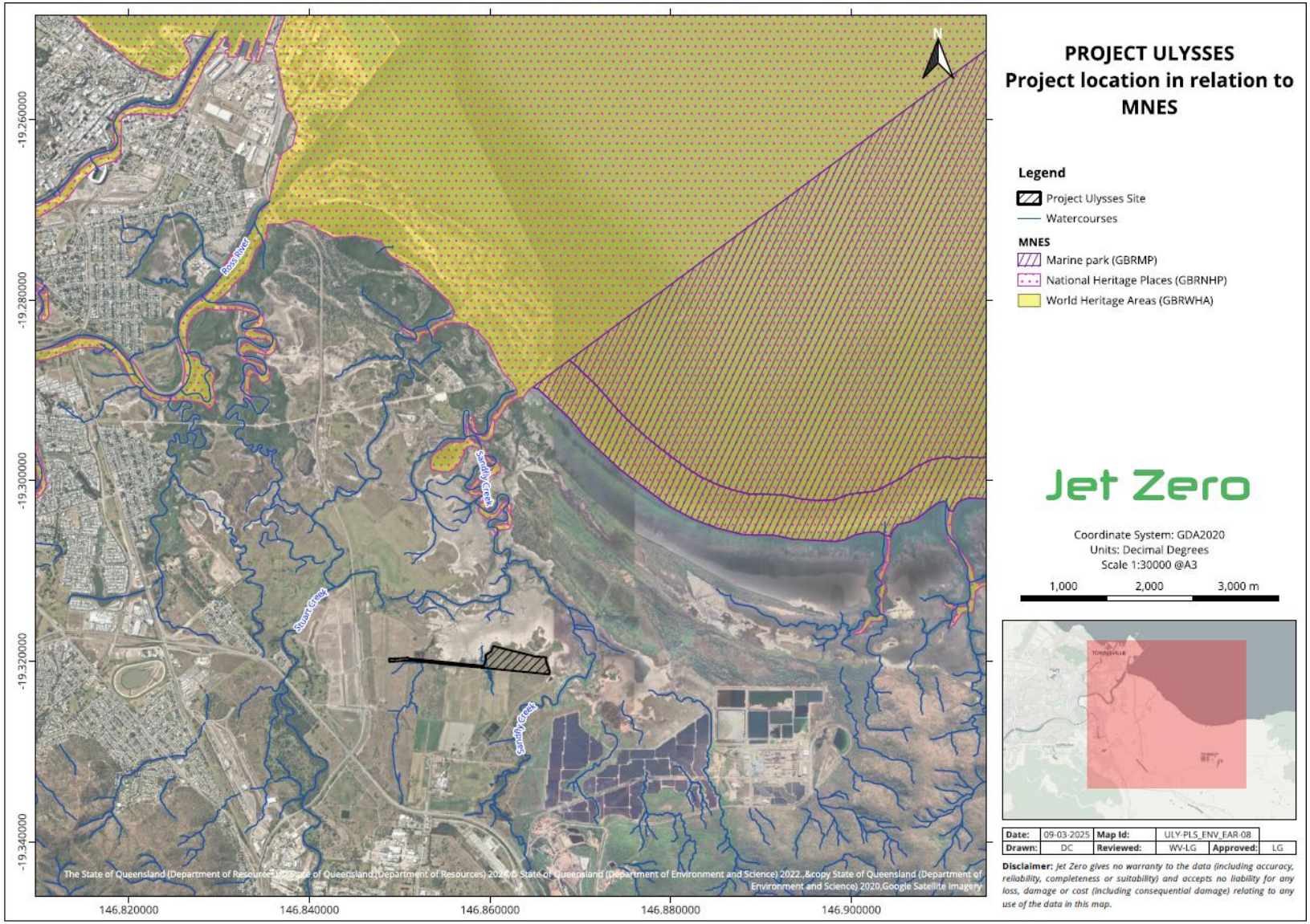
MNES	Relevant Values	Description of the Value	Intersects Project Footprint?
			• Pacific Golden Plover • Estuarine Crocodile
Wetland of international importance (Ramsar site)	Bowling Green Bay National Park	The park is known for its diverse and significant environmental values. A range of habitats, including wetlands, estuaries, mangroves, saltpans, and coastal dunes, which contribute to its ecological importance.	No. Distant from project site (7.8 km northeast).
Cleveland Bay – Magnetic Island	Dugong conservation area.	Cleveland Bay and Magnetic Island together form a critical part of the GBR ecosystem, holding an important conservation area.	No. Distant from project site.

a) Habitats within 500 m of the Project footprint are auxiliary for this species. Auxiliary habitat is used incidentally for foraging.

b) The receiving environment within 500 m of the Project footprint is not likely to support:

- *an ecologically significant proportion of the population species*
- *habitat of critical importance to the species at particular life-cycle stages*
- *habitat at the limit of the species range*
- *habitat within an area where the species is declining*

Figure 5: Project Location in Relation to Matters of National Environmental Significance



3.2. Matters of State Environmental Significance

Matters of State Environmental Significance are state-significant environmental values that are identified by the Queensland Government to aid in the protection of biodiversity through the planning system and environmental offsets framework (DETSI, 2024).

Where an MSES is triggered through activities administered through the *Planning Act 2016*, the 'Significant Residual Impact Guideline – For matters of state environmental significance and prescribed activities assessable under the *Planning Act 2016* (DSDIP, 2014) is used to determine the significance of the impact.

MSES are defined in Section 10 of the EO Act, being a 'prescribed environmental matter' by reference to a matter declared, defined, designated, established, listed, prescribed or otherwise described under this Act or another Act, with examples including:

- Protected areas (including all classes of protected area except coordinated conservation areas), Threatened, Vulnerable and special least concern wildlife prescribed under the *Natural Conservation Act 1992*
- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019
- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2
- Fish habitat area declared (Management A and B areas), under the *Fisheries Act 1994* / *Fisheries Regulation 2008*
- Marine plant within the meaning of the *Fisheries Act 1994*
- Regulated vegetation under the *Vegetation Management Act 1999*, including:
    - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems
    - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
    - Category R areas on the regulated vegetation management map;
    - Category X (an area in which clearing of vegetation has happened, which has not been allocated to another category, unless otherwise determined by the chief executive).
    - Water (shown on a regulated vegetation management map as 'water'; 'water' is not defined under the VM Act).
    - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
    - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map.

The MSES identified as adjacent or within the Project area of influence are presented in **Table 9**. **Figure 5** shows the MSES conservation areas that does not intersect Project site and are not directly impacted by the Project.

Soils and erosion prone areas are also considered relevant State values, described in **Section 4.1.3.** The existing environment on surface and groundwater bodies and its corresponding values are detailed in **Section 4.1.4**.

Table 9: MSES and Corresponding Environmental Values

MSES	Relevant values	Description of value	Relevant to Project Site?
Regulated vegetation	High conservation value regional ecosystems (REs) and connectivity areas	REs are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil under the VM Act (see **Section 1.4**).	No. Mostly non-remnant vegetation did exist[1]. No prescribed RE is within the plant site or access road as it has been cleared under the existing CBIP approval for clearing native vegetation.
Designated Precinct	Strategic Environmental Area	A designated precinct in a strategic environmental area is a MSES.	No. Project area does not intersect or contain a strategic environmental area and so does not trigger the relevant MSES.
Wetlands and watercourses	High ecological significance (HES) wetlands	Wetlands that are identified as being of high ecological value under the EP Act (see **Figure 7** and **Table 8**).	No[2]. Existing CBIP approval and offsets for wetland vegetation.
Protected wildlife habitat	Core habitats conservation	An area of habitat (foraging, roosting, nesting or breeding habitat) for an animal that is Endangered, Vulnerable or Special Least Concern (DEHP, 2014; DSDIP, 2014) (see **Figure 9**).	No areas of core habitat intersect the Project footprint, and none occur in the nearby receiving environment.
Declared Fish Habitat Areas (FHA)	Important and mapped fish habitats	A declared FHA is an area protected against physical disturbance from coastal development, while still allowing legal fishing. The project is on the periphery of the Burdekin–Townsville Coastal Aggregation Nationally Important Wetland (DCCEEW, 2019) (see **Table 9**).	No. The mapped fish habitat area is in the distal receiving environment, where no works are planned in this area.
Waterway providing fish passage	Waterway for waterway barrier works (DAF 2023)	A dam, weir or other barrier across a waterway if the barrier limits fish stock access and movement along a waterway under the Fisheries Act.	No. The Order 1 watercourse that intercepts the project site, however mapped as of moderate risk is unlikely to provide fish passage due the artificial stock dam stopping connectivity of the watercourse. Existing CBIP approval has conditions for fish passage works[3], that has now been completed.
Marine plants	Marine plants as defined in the Fisheries Act.	Some marine plants (e.g. mangroves, seagrass, samphires, saltcouch and saltmarsh plants) are protected regardless of their location on or above tidal land. Marine plants that grow adjacent to tidal land provide valuable habitat to fish when hydrologically	No. Above HAT (small portion on extent North of project site, approximately 2,480.5 m²)[4], has been cleared. Existing approval and offsets for marine plants are conditioned

		connected to the marine environment.	under OPW24/0107 for CBIP developer
Legally secured offset areas	Offsets gained under EO Act	A legally secured offset area is a MSES.	No legally secured offset areas intersect the Project area and therefore the proposed activity does not trigger the MSES – legally secured offset areas. Previously secured offset exists north of road access for wetland Essential Habitat buffer area (see **Figure 8**)

Notes: *[1] Access road intersects mapped and field-verified remnant vegetation within the defined distance of a wetland. This vegetation clearing approval is including in CBIP Operational Works and has now been cleared.*

*[2] Access road intercepts a HES wetland (DES, 2022b) which is located to its north (see **Figure 8**), vegetation clearing approval is included in CBIP Operational Works and has now been cleared.*

*[3] See **Section 4.1.7** The importance of the tidal area (below HAT, mapped as a major risk waterway). This area, however, is not part of the Project development.*

[4] Above and below HAT (access road).

Figure 6: Matters of National and State Significance Conservation Areas

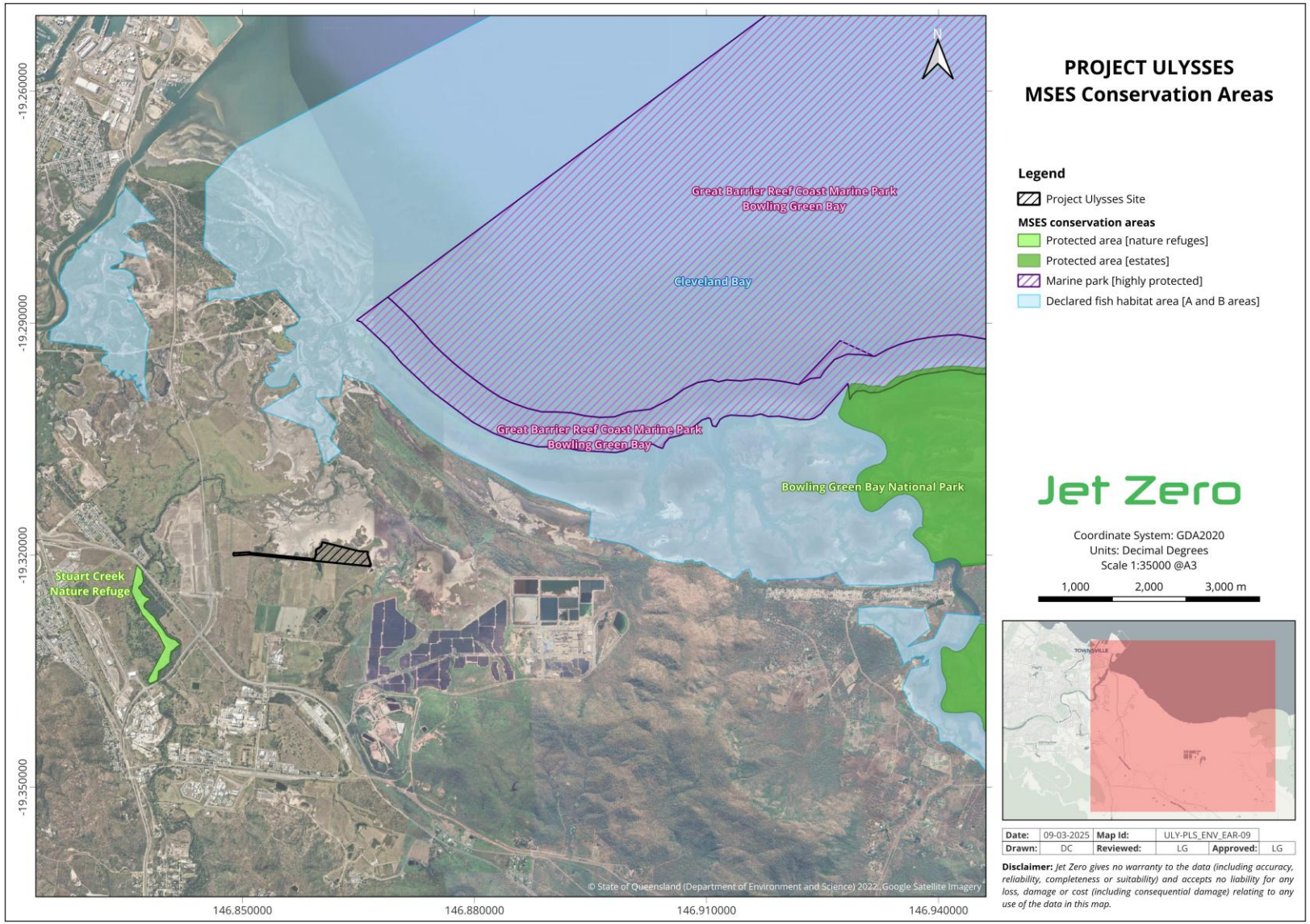


Figure 7: Matters of State Environmental Significance Vegetation and Wetlands

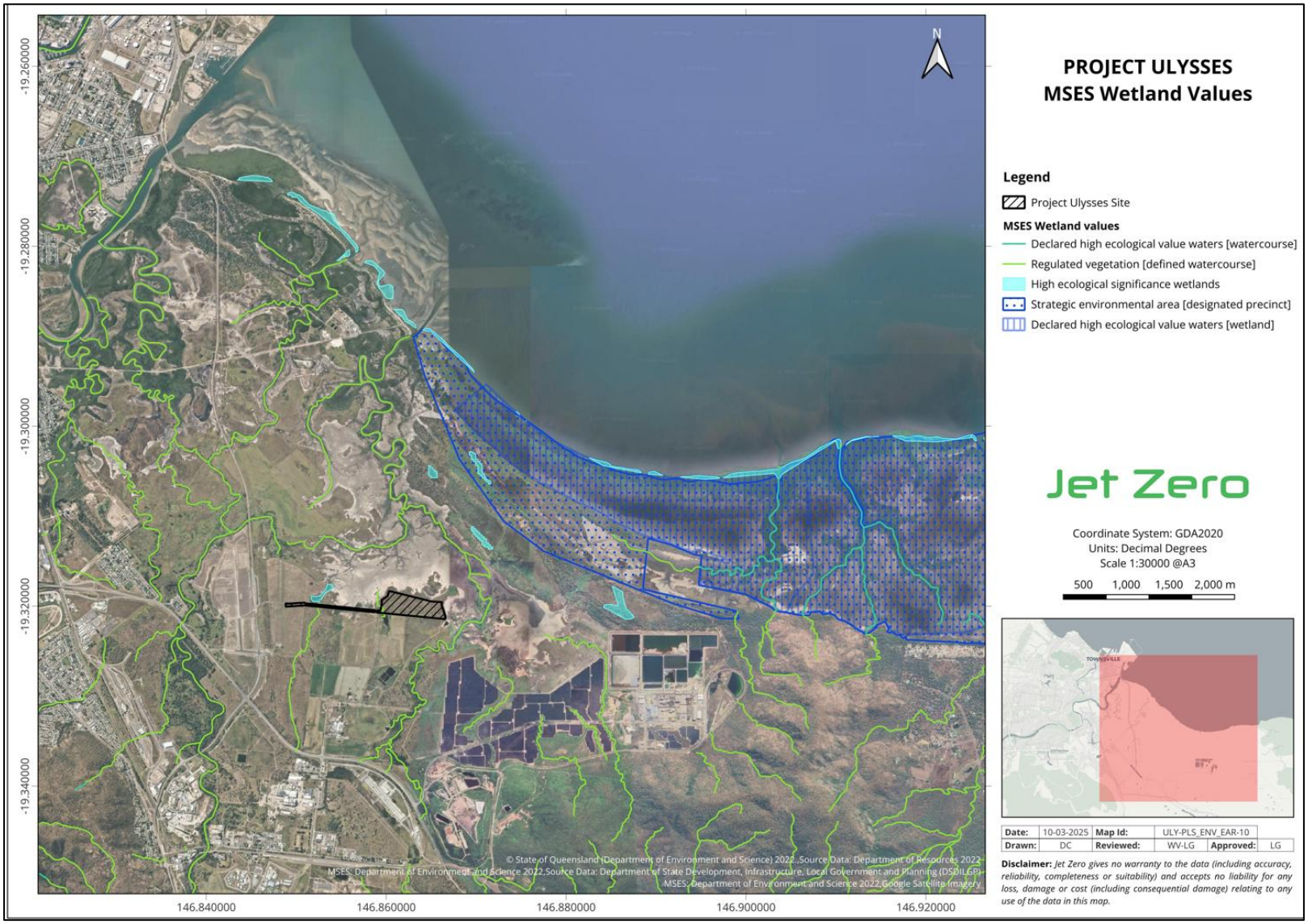


Figure 8: High Ecological Significance and Vegetation Management Wetlands

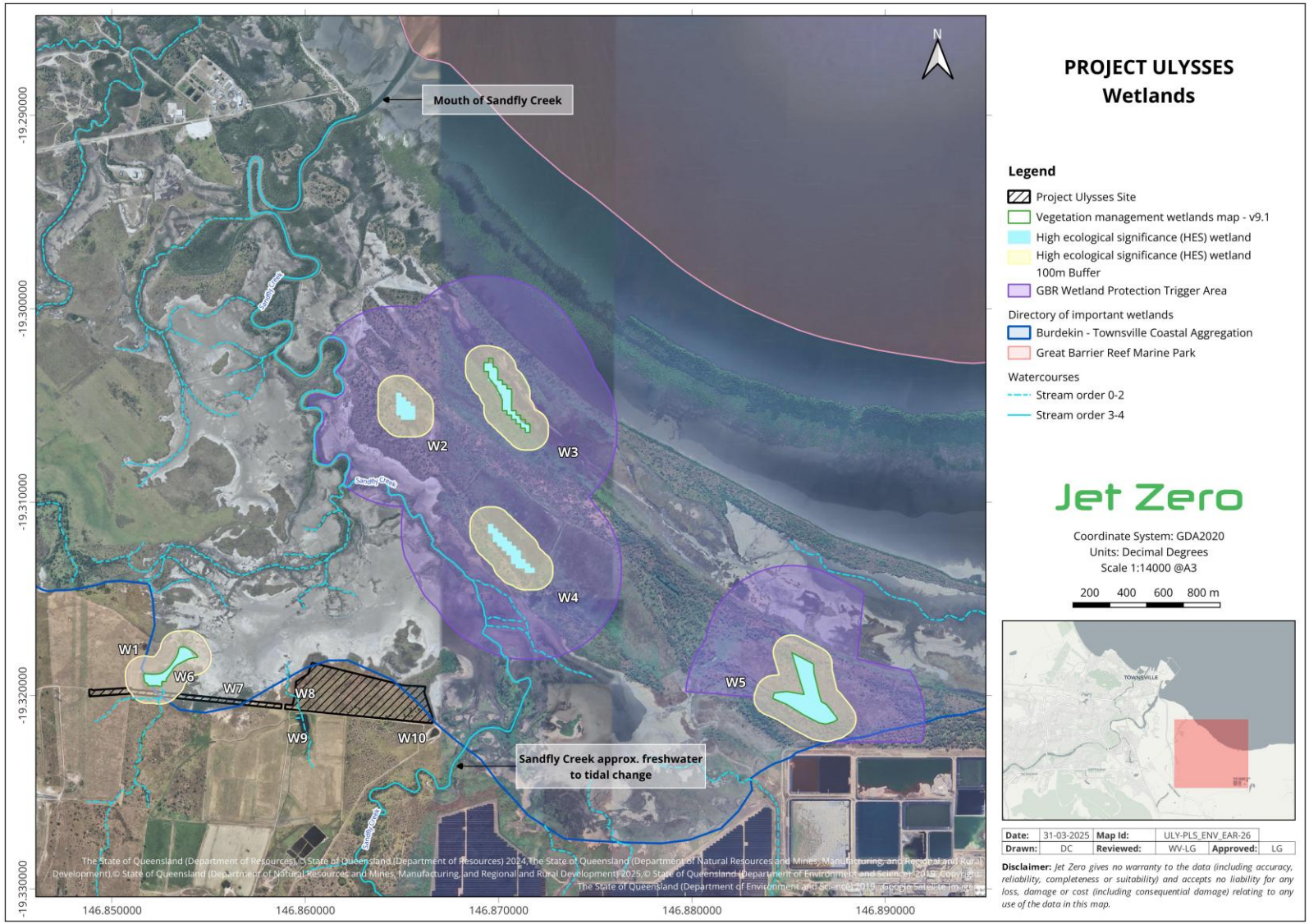
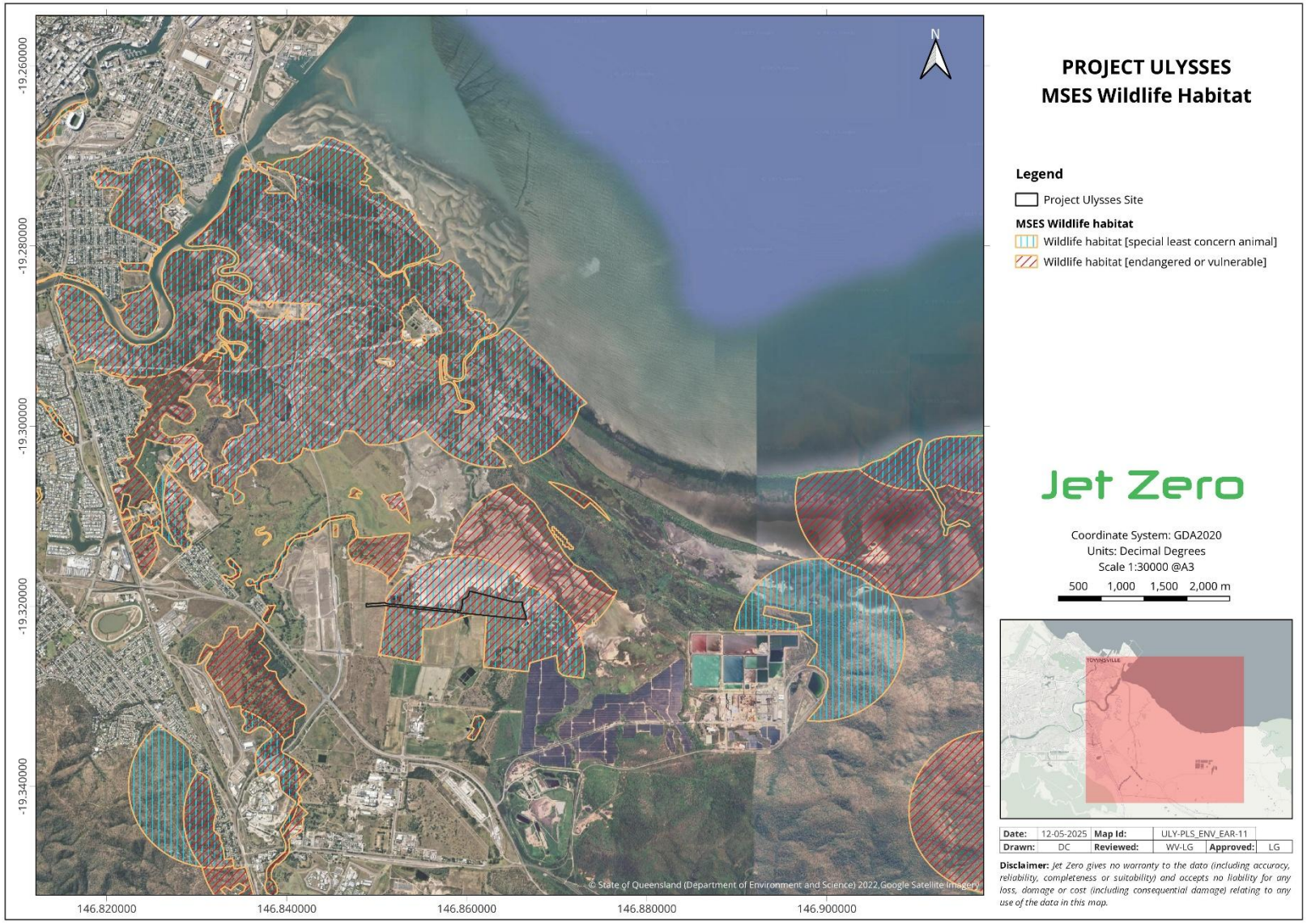


Figure 9: Matters of State Environmental Significance Wildlife Habitat



3.3. Wetlands and Waterbodies

A baseline assessment of the wetlands and waterbodies surface water quality was conducted by Terra Solutions (2025), where results are summarised in the below section.

The project area is located in the Sandfly Creek catchment of the Ross River basin, approximately 2 km from the coastline. Any stormwater releases from the project will discharge into the lower reaches of Sandfly Creek, a tributary of the Ross River Basin (Basin 118). Sandfly Creek arises from ranges approximately 5 km south of the site and flows in a northerly direction before entering Cleveland Bay (which is included in the GBRWHA and GBRMP).

A stream order 1 tributary of Stuart Creek is located 1.4 km north-east of the site. This area is the divide between the Stuart Creek and Sandfly Creek catchments. The Stuart Creek tributary flows northwest under Ron McLean Drive before heading north, while Sandfly Creek flows east and serves as the receiving environment for the project. Stuart Creek tributary is not within the same catchment as the project site.

The immediate receiving environment of the Project includes upper tidal limits of Sandfly Creek, which is classified as middle estuary (WQ1181) (DETSI, 2020), including a stream order 3 which is located northeast of the site which flows in a northerly direction. A stream order 1, also classified as middle estuary, is located north of the site and flows in an easterly and then northerly direction before its confluence with the stream order 3 watercourse. From its confluence Sandfly Creek flows for 5 km before entering Cleveland Bay. Upstream of the site, Sandfly Creek is classified as lowland freshwaters (WQ1181), where an ephemeral stream order 3 watercourse arises to the south of the site and flows in a northerly direction, bounding the site to the east.

Other watercourse features associated with the access road, includes a stream order 1 watercourse which arises from the Bruce Highway in the south, flowing in a northerly direction before terminating at a palustrine wetland 700 m west of the project area. A small palustrine wetland associated with JBS water infrastructure is located immediately south of the site. The wetland flows into a stream order 1 watercourse which intersects the south-east corner of the project area, before sheet flowing into the Sandfly Creek tidal flats.

There are no wetlands mapped under the *Vegetation Management Act 1999* (VM Act) within the Project site area. **Table 10** and **Figure 8** present the waterbodies, including wetlands and streams, and whether they intersect the project footprint and the project location in relation to the Sandfly Creek catchment. This includes the approximate location of the freshwater to tidal change. The project site is approximately 3.1 km from the mouth of Sandfly Creek.

Table 10: Relevant Wetlands and Surface Water Values Identified Within a 10 km Radius of the Project Site

Figure Tag	Relevant Value	Description	Intersects Project Footprint?
W1	High Ecological Significance (HES) and High Ecological Value Wetlands (MNES)	This area is mapped as an estuarine wetland and described as having tidal influence, containing salt flats and saltmarshes.	No[1]
W2 – W5	GBR HES wetlands (MSES)	Four were identified: Wetland B (1.1 ha); Wetland C – 1.9 ha; Wetland D (1.7 Ha) and Wetland E (5.1 Ha) within two kilometres radius of the site. The GBR HES Wetlands are mapped as palustrine wetlands by DETSI Wetland Mapping (Version 6) and described as coastal/sub coastal floodplain tree swamps (Melaleuca and Eucalypt).	No. Occurs downstream north/NE of project site.

Figure Tag	Relevant Value	Description	Intersects Project Footprint?
(area)	Burdekin-Townsville Coastal Aggregation - DIWA[1] wetland (DIWA QLD 005)	Bounds the northern, eastern and western extent of the area, with approximately 1.1 ha of the northern extent of the site mapped as the DIWA. The wetland occurs on large low gradient coastal floodplain, divided by inconsistent depressions, continuing onto a shallow water embayment. It forms a collection of shallow marine waters from the coastal zone to permanent and seasonal freshwater lakes inland, on the adjacent coastal plain (DCCEEW, 2004).	No. However, occurs adjacent of the project area.
W6	Modified palustrine wetland	Field-verified modified palustrine wetland mapped as of high ecological significance (HES wetland), hydrologically modified habitat through bunding of a natural channel (DES, 2022a,b; DESI, 2024a), identified as an aquatic GDE. An existing stormwater structure south-west of the wetland reports to the wetland. There is a 2-m wide swale depression intersecting the access road, which waters discharge to the palustrine wetland, likely to be of low value for fish passage.	No. Occurs 700 m west of project site[2].
W7	Swale depression	Field-verified and characterised as an ephemeral waterbody (periodic inundation during king tides) within the access road. Potentially provide fish passage, as represented by waterways for waterway barrier works mapping (DAF, 2023).	No[2].
W8	Watercourse	A field-verified first-order stream, intersecting the south-western extent of the project site was identified. Its upstream connectivity is interrupted by a stock dam wall. As verified by Terra Solutions (2024), 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 (W8).	Yes, occurs within southwestern portion of project site.
W9 – W10	Artificial wetlands (JBS stock dam)	Two artificial stock dams were identified during field survey, to occur just south of the project site, within JBS land. One constructed circa 1991 (W8) stops the connectivity of the watercourse (W7). The other dam was constructed circa 1980 (W9). Both waterbodies are likely to be of low value as fish habitat and were not considered sensitive receptors.	No However, the dam wall (W7) was observed seeping towards the extension of the access road in several occasions.

[1] Directory of Important Wetlands in Australia (DIWA), list of wetlands of national importance published by DCCEEW (update October 2021). Nationally important wetlands are not MNES.

[2] Access road intersects this area.

3.4. Vegetation

3.4.1. Regional Ecosystems and Threatened Ecological Communities

Vegetation communities observed within the survey area were not consistent with Queensland Government regulated vegetation mapping. Field-verified REs was also found to be different from the VM Act (see **Figure 10**):

- All vegetation in the Project site was found to be non-remnant, apart from a small area in the north-east, samphire forb land on marine mudflats (RE 11.1.2b), which is now cleared.

- The area mapped as a Vegetation Management Wetland (**Figure 8**) was confirmed to be a palustrine wetland containing remnant vegetation (see **Figure 10**).
- The presence of all mapped watercourses was confirmed (see **Figure 10**). Each of the watercourses was found to be bordered by non-remnant vegetation.

No potential presence of any Threatened Ecological Communities (TECs) was identified, under the EPBC Act. None of the vegetation communities observed within the survey area are listed as TECs under the EPBC Act and TECs are not likely to occur. Hence, no T/NT plants were present in the Project footprint[2], and none are predicted to occur.

Marine plants under the *Queensland Fisheries Act 1994* (Fisheries Act) were observed above the Highest Astronomical Tide (HAT) within the Project site and access road. Marine plants within the facility site cover only a small portion within northern boundary within corresponding transect, with approximately 2,480.5 m^2, whereas 82 % correspond to marine plants and 17 % to leaf litter (see **Figure 11**). This area of marine plants has now been cleared as part of OPW approval. Species within Project site are:

- *Fimbristylis polytrichoides*
- Beadweed (*Salicornia quinqueflora* subsp. *auinqueflora*)
- Sea Purslane (*Sesuvium portulacastrum*)
- Sand Couch (*Sporobolus virginicus*)
- *Vincetoxicum carnosum*.

[2] Regarding the access road (CBIP development), most REs vegetation along was identified to be remnant (RE 11.1.2b and 11.3.27x1a) and marine plants above and below HAT along access road, covering an area of approximately 24,879.8 m^2.

Figure 10: Mapped Versus Field-Verified Regional Ecosystems

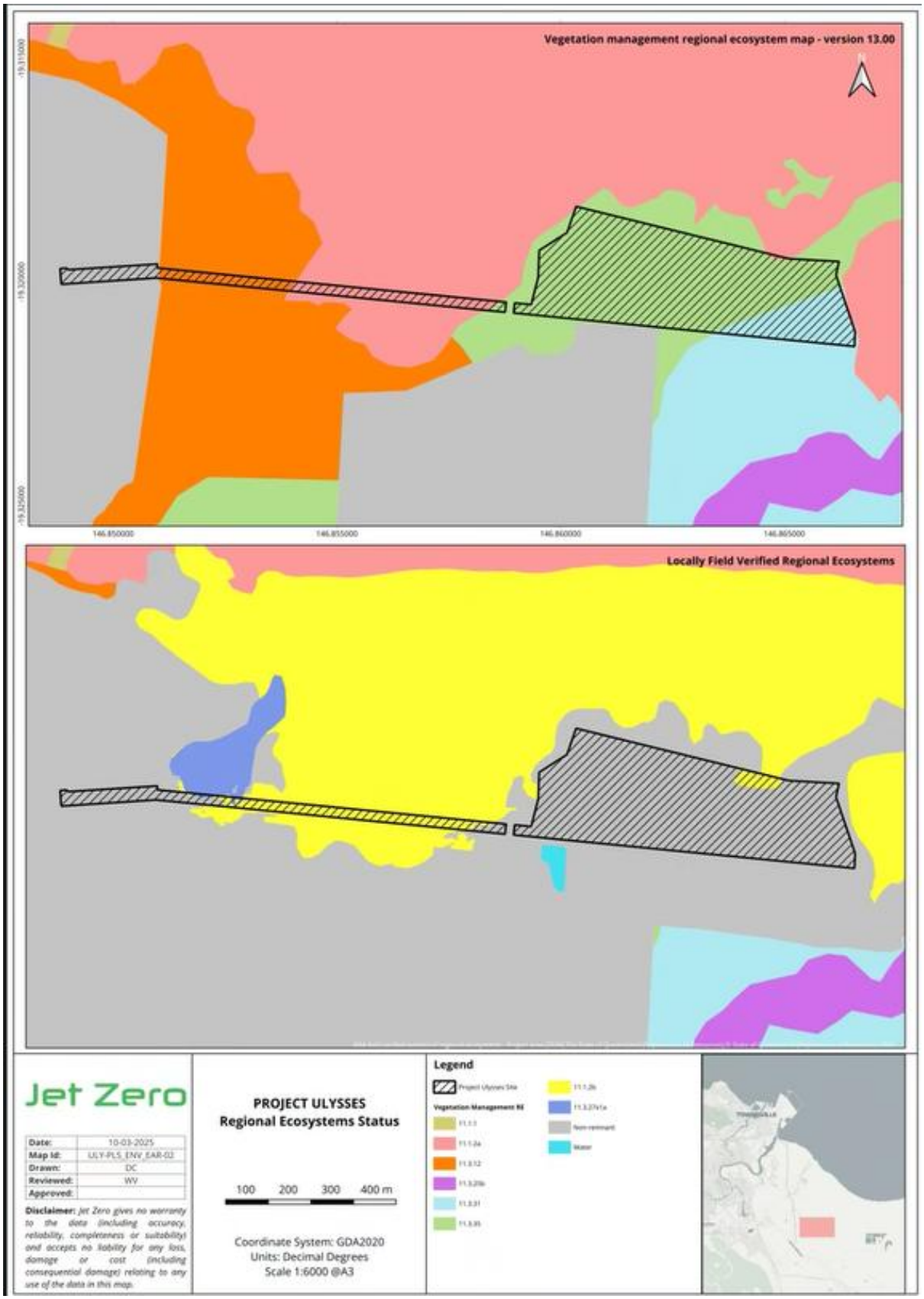
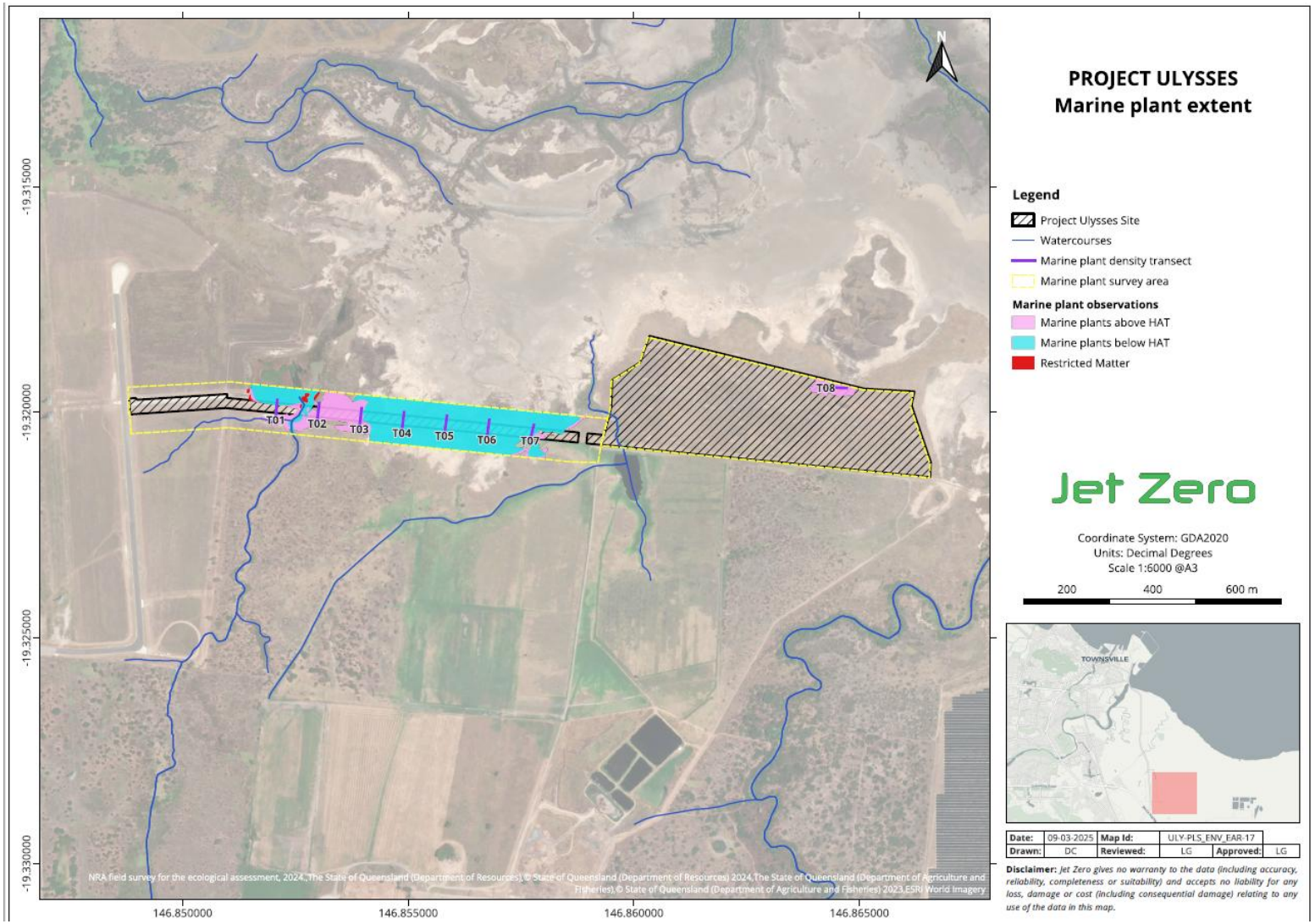


Figure 11: Mapped Versus Field-Verified Marine Plants



3.4.2. Vegetation Providing Habitat

No areas of core habitat intersect the project footprint, and none occur in the nearby receiving environment. Near the project footprint, field verified important habitats comprising saltmarsh (below HAT), mangroves and freshwater wetlands (excluding the dam southwest of the facility site).

Habitats that intersect the project footprint are considered auxiliary (poor quality and/or with limited resources). None of the vegetation communities observed within the survey area are listed as TECs under the EPBC Act and TECs are not likely to occur.

3.5. Fauna

The presence of T/NT and Migratory fauna was confirmed in the project receiving environment during the field surveys and other T/NT, Migratory and/or Special Least Concern species may occur.

The project occurs on the southern margin of the 'Cleveland Bay' important Migratory shorebird habitat as defined by Weller et al. (2020).For most shorebird species using this area, including those listed in **Table 8**, core habitat comprises the sand spit near Ross River mouth (roosting habitat) and the intertidal flats extending from the river mouth along the Cleveland Bay coastline (foraging habitat). The results from the shorebird surveys indicate that inland areas, including habitats to the west, north and east of the facility site are visited by certain Threatened and migratory shorebird species when conditions are suitable, primarily in association with spring tide events and following substantial rainfall. Observed abundances of all migratory shorebird species in the Project receiving environment were below the thresholds for national significance. The area within 500 m of the core infrastructure footprint does not contain core habitat for Threatened and/or migratory shorebird species.

Field habitats observed during field surveys are presented in **Figure 12**. Habitats that intersect the core infrastructure footprint are considered auxiliary for MNES and MSES fauna[3]; no areas of core habitat intersect the Project, and none occur in the nearby receiving environment.

Table 11 presents the fauna expected to have a presence within the Project receiving environment, while **Figure 13** presents those with presence observed during field survey.

Table 11: Fauna Observed within Project Receiving Environment

Species		EPBC Act	NC Act	Expected Presence
Common Name	Scientific Name			
Microbats				
Bare-rumped Sheathtail Bat	*Saccolaimus saccolaimus nudicluniatus*	Vulnerable	Endangered	Regular presence (foraging)
Coastal Sheathtail Bat	*Taphozous australis*	Not listed	Near Threatened	Uncertain
Migratory Shorebirds				
Eastern Curlew	*Numenius madagascariensis*	Critically Endangered and Migratory	Critically Endangered	Intermittent (foraging and/or roosting)
Black-tailed Godwit	*Limosa limosa*	Endangered and Migratory	Endangered	Incidental observation, exceptionally rare
Sharp-tailed Sandpiper	*Calidris acuminata*	Vulnerable and Migratory	Vulnerable	Intermittent (foraging and/or roosting)

[3] Listed under the EPBC Act and/or Queensland *Nature Conservation Act 1992* (NC Act). List excludes 'exceptionally rare' fauna.

Species Common Name	Scientific Name	EPBC Act	NC Act	Expected Presence
Latham's Snipe	*Gallinago hardwickii*	Vulnerable and Migratory	Vulnerable	Intermittent (foraging and/or resting)
Red-necked Stint	*Calidris ruficollis*	Migratory	Special Least Concern	Intermittent (foraging and/or resting)
Whimbrel	*Numenius phaeopus*	Migratory	Special Least Concern	Intermittent (resting and/or foraging)
Common Sandpiper	*Actitis hypoleucos*	Migratory	Special Least Concern	Intermittent (roosting and/or foraging)
Pacific Golden Plover	*Pluvialis fulva*	Migratory	Special Least Concern	Intermittent (roosting and/or foraging)
Fork-tailed Swift	*Apus pacificus*	Migratory	Special Least Concern	Intermittent presence (foraging)
Caspian Tern	*Hydroprogne caspia*	Migratory	Special Least Concern	Intermittent presence (flying over)
Glossy Ibis	*Plegadis falcinellus*	Migratory	Special Least Concern	Intermittent presence (foraging)
Eastern Osprey	*Pandion haliaetus cristatus*	Migratory	Special Least Concern	Intermittent presence (foraging and potentially nesting)
Migratory reptiles				
Estuarine Crocodile	*Crocodylus porosus*	Migratory	Vulnerable	Intermittent presence (foraging)
Mammals				
Short-beaked Echidna	*Tachyglossus aculeatus*	Not listed	Special Least Concern	Intermittent presence

Figure 12: Field-Verified Wildlife Habitat

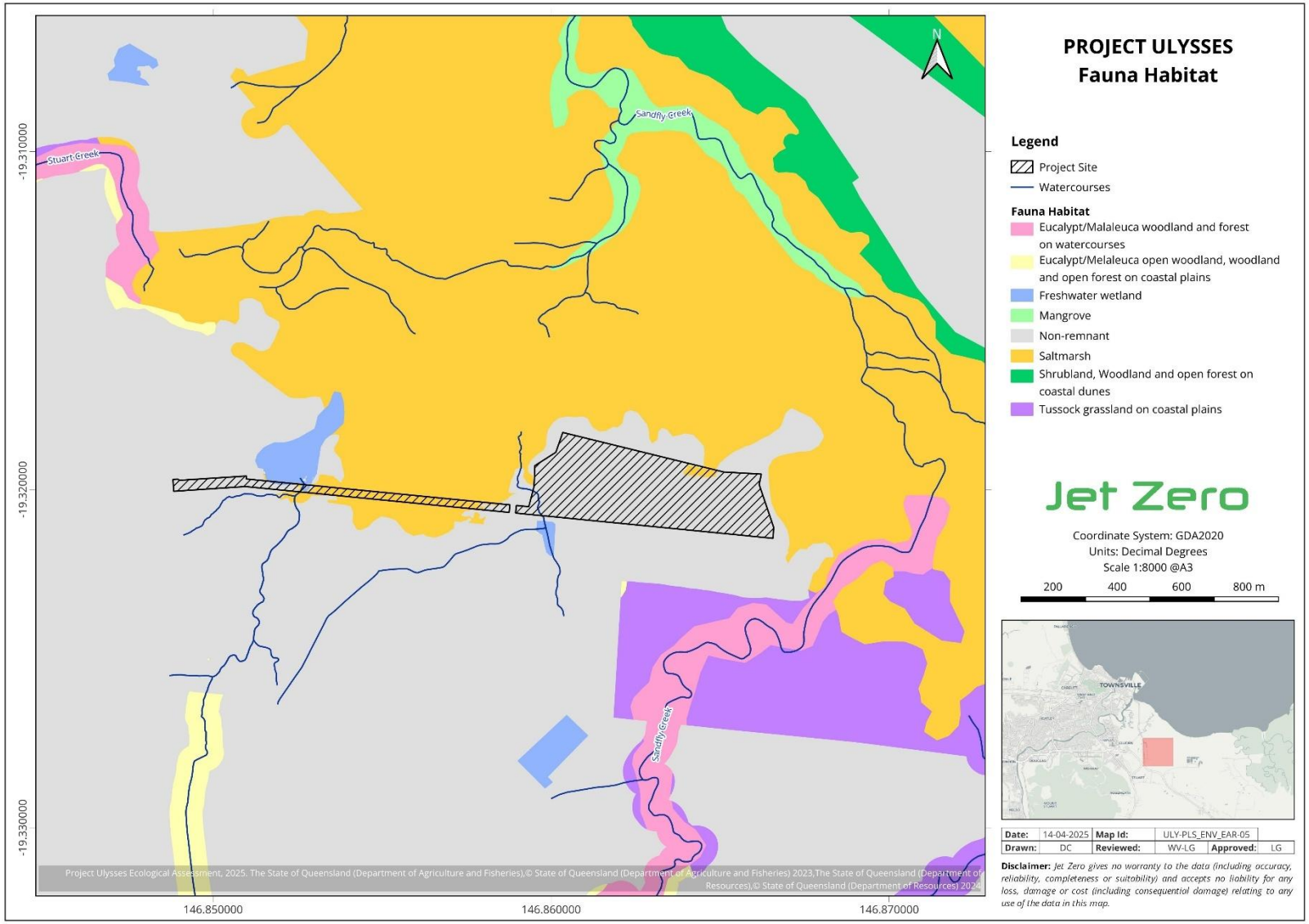
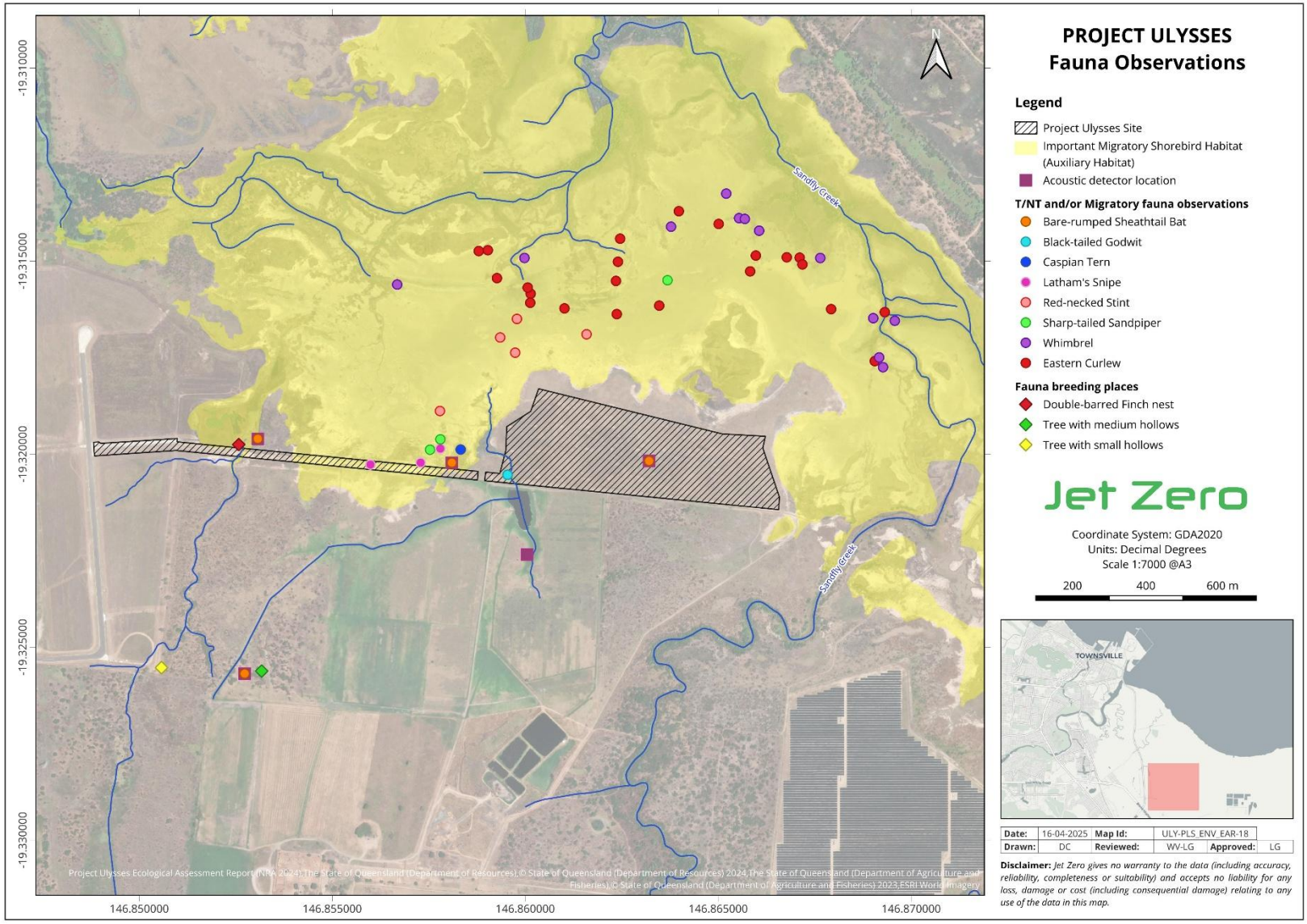


Figure 13: Field-Verified Fauna Observations



3.6. Biosecurity

Significant weeds were observed widely over the core infrastructure footprint. Pest fauna were observed and evidence of their activity was widespread in the project footprint. Significant weeds and pest fauna included the following species listed as Restricted Matter under the Queensland *Biosecurity Act 2014* as presented in **Figure 14**:

- Rubber Vine (*Cryptostegia grandiflora*)
- Chinee Apple (*Ziziphus mauritiana*)
- Parkinsonia (*Parkinsonia aculeata*)
- Prickly Acacia (*Acacia nilotica*)
- Pig (*Sus scrofa*)
- Dingo/Dog (*Canis familiaris*)

3.7. Ecology Sensitivity of Values

The ecology sensitivity receptors and their environmental values are presented in **Table 12**.

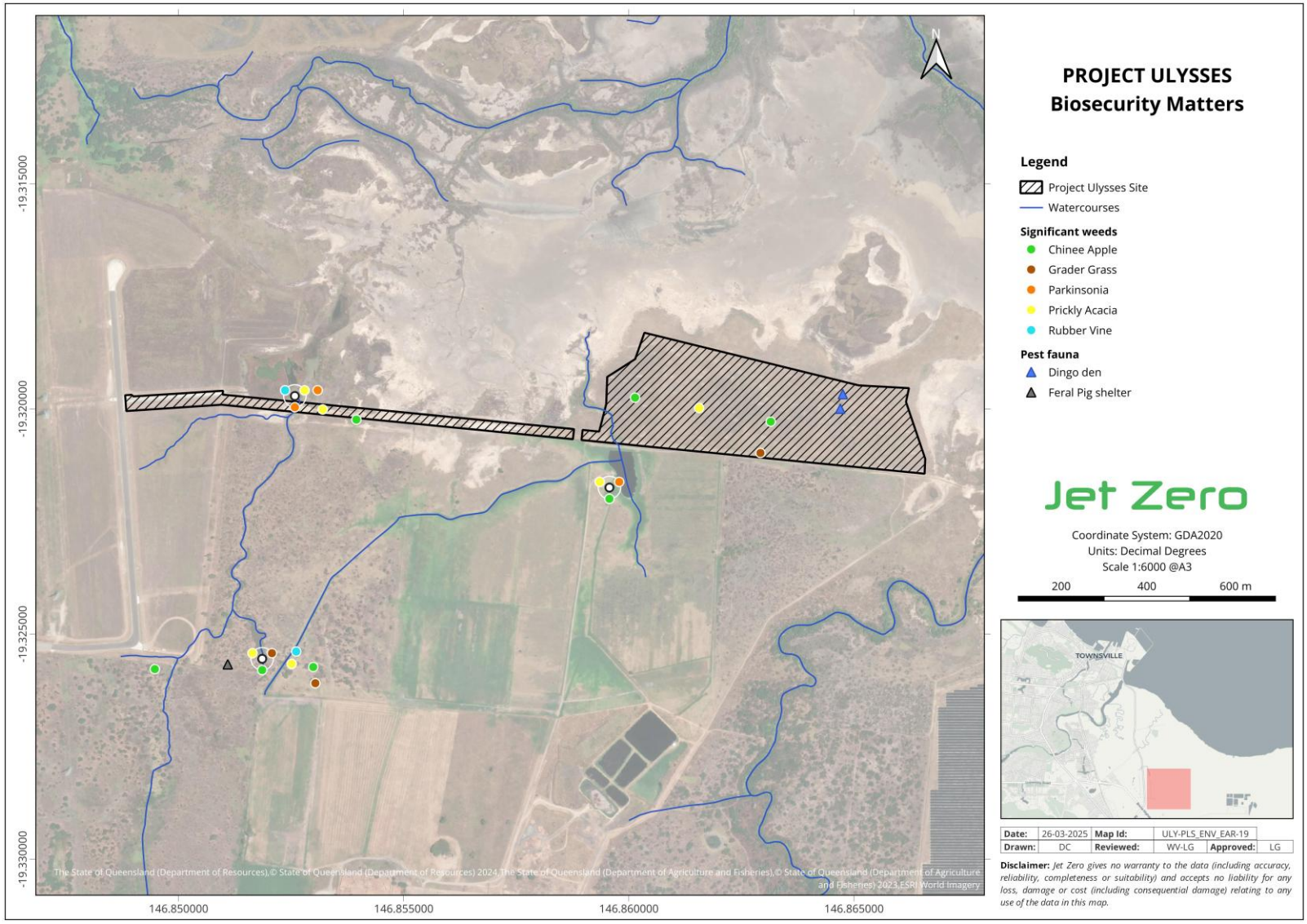
Table 12: Sensitive Receptors - Ecology

Sensitive receptor	Environmentally significant resource and context	Sensitivity of value
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.	Extreme to High
Vegetation within project site	Mostly non-remnant within project site. A few MSES marine plants identified above HAT (small portion on extent North of project site)[1].	Moderate (marine) Low (REs)
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 was observed intersecting the project area. The Bare-rumped Sheathtail Bat is likely to maintain a regular presence (foraging) over the project footprint. Other species observed in the receiving environment north of the project site.	Extreme
Fish habitat areas	The mapped fish habitat area is in the distal receiving environment, where no works are planned in this area.	Low
Stuart Creek Nature Refuge	Stuart Creek Nature Refugee It is located 2.2 km, south-west upstream of the project site. 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)	Moderate
Wildlife essential habitat (MSES)	Located approximately 750 m north-west of the project site. MSES wildlife essential habitat.	High

Sensitive receptor	Environmentally significant resource and context	Sensitivity of value
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.	Extreme
Bowling Green Bay National Park and Cleveland Bay – Magnetic Island	Of international (Ramsar), MNES and MSES relevance. Occurs on the distal area of project site.	Extreme

[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 14: Biosecurity Matters



4. POTENTIAL IMPACTS OF DEVELOPMENT

This section provides a discussion of the potential impacts to ecological values as a result of construction, operation and decommissioning of the Project site, and potential interactions with environmental values. NRA (2025a) assessed the ecological values, Terra Solutions (2025) the surface water values, and the relevant ecology values are presented in **Section 3** with the impact assessment presented below.

4.1. Potential Impacts to Ecological Values

The following Project-related threads to ecological values in the receiving environment were identified:

- Air pollution
- Sensory disturbance (noise and light)
- Soil loss and degradation
- Water pollution
- Habitat loss and degradation
- Direct mortality or harm to fauna
- Altered hydrological regimes
- Ingress and proliferation of biosecurity matters
- Traffic / vehicles movement.

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

4.1.1. Air Pollution

During construction, air emissions and dust created from earthmoving activities will likely be contained within the Project site and controlled through dust control migitation such a watering. If dust emissions drift outside of the Project site that could cause minor impact to ecological values. These construction activities are inherently temporary, and potential off-site impacts upon air quality (primarily as dust) are typically addressed under construction management practices. Dust deposition on vegetation, or in water, may 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 and mitigation controls for the Project.

During operational phase, the release of nitrous oxide can have an impact on the broader environment through air pollution, with other sources are from the combustion of natural gas and flaring hydrocarbons during routine and non-routine operations.

The key air pollutants of concern include NOx and some non-combusted hydrocarbons and VOCs. According to Vipac (2025), air emissions from the operational vent releases, fugitive sources are expected to be minor. There is also potential for traces of particulate matter and sulphur dioxide (SO_2) from the flaring operations, however, these are negligible (USDoE, 2021; USDoA, 2021; Georgia DNR, 2022). Air emissions during operations are expected to have a minor impact to ecological values.

4.1.2. Sensory Disturbance

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). It was identified that:

- Light emissions are expected to increase brightness within the project area and its surroundings during construction and operation. 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 and Ark Energy solar farm 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 Project infrastructure 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. However, it is important to note that 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 15 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 **Figure 16** were taken from the project site perspective to present the existing environment, corroborating the lighting conditions as of 2015.

Figure 15: Zenith Sky Brightness Within Project Site and Surrounding Environment

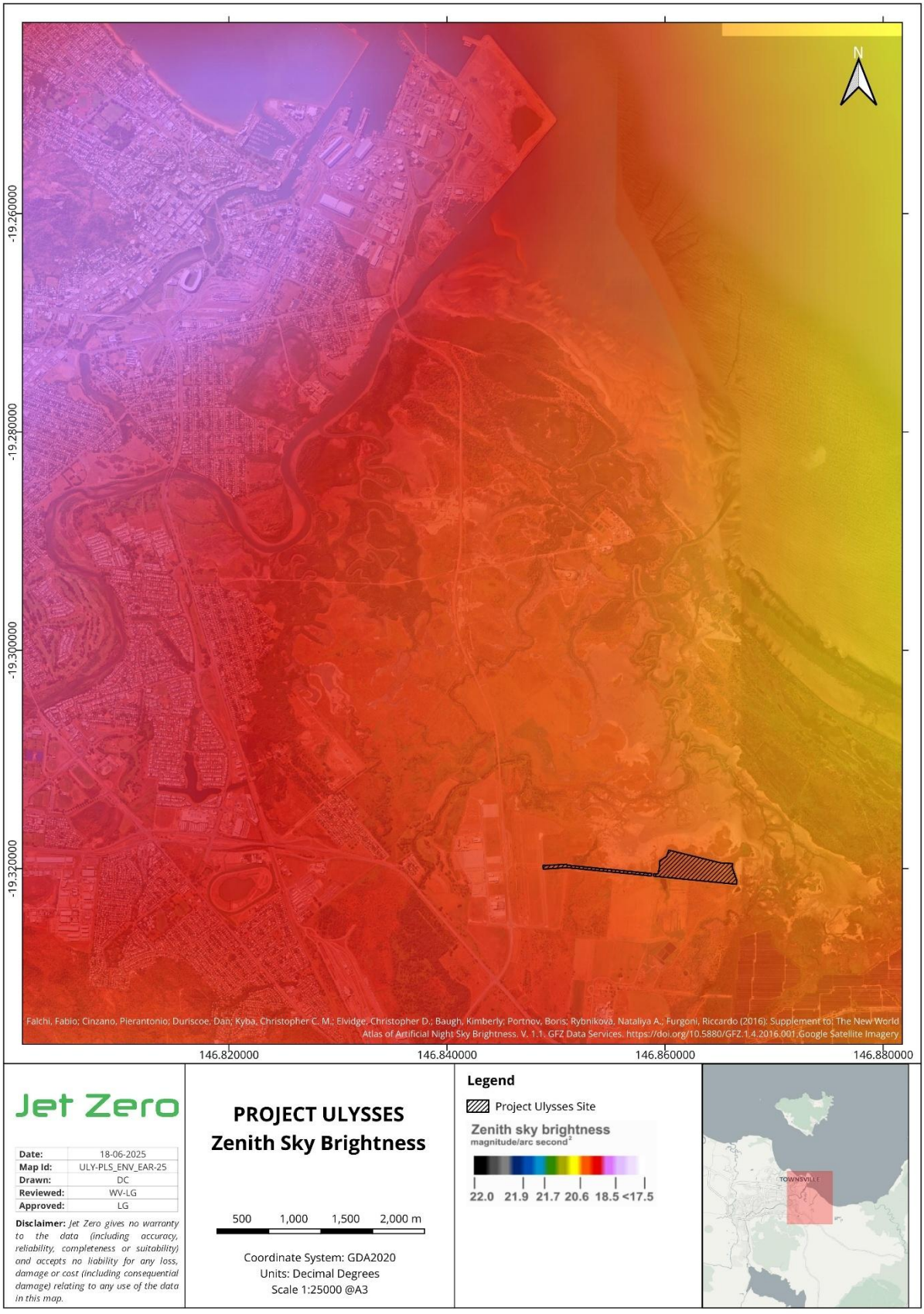


Figure 16: Photos Taken During Lighting Assessment Within Project Site



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).*

Likewise, the baseline noise measurements for the site are typical of an industrial area adjacent to an area of natural environment with low background levels. The highest levels of noise predicted to occur during construction and operation will occur within, and immediately adjacent to, the actual footprint of the Project site, in the receiving environment, allowing a buffer distance to habitat to the north.

The predicted worst-case noise levels from operation are approximately 50-66dB(A) at the site boundary (**18**) and these noise levels are not expected to cause an adverse response to animals or livestock. Typically, animals will avoid high-noise areas, and it is expected that animals will relocate away from such areas. Absolute worst-case construction noise levels, albeit temporary are marginally higher at approximately 57-80 dB(A) at the site boundary (**Figure 17**).

Predicted noise levels at the Stuart Creek Nature Refuge are 37-42dB(A) during neutral and adverse weather conditions throughout the construction phase, and 26-31dB(A) during neutral and adverse weather conditions throughout the operation phase. These noise levels are not expected to have any detrimental effect on animals or livestock.

As observed by Vipac (2025b) and Radle (1998), the impacts of noise on animals are generally inconclusive. In general, there is little to no evidence of cause and effect regarding behavioural or physiological effects on domestic animals, and possibly slight evidence of some effects on some types of wild animals (especially for high or impulsive levels of noise). Finally, it is noted that animals tend to habituate to disturbances over time, particularly when it is steady and associated with nonthreatening activity. A ground vibration prediction during construction was calculated for the project site. Based on experience from similar projects, ground-based vibration levels during construction and operation 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).

Figure 17: Worst-Case Construction Noise Emissions Scenarios

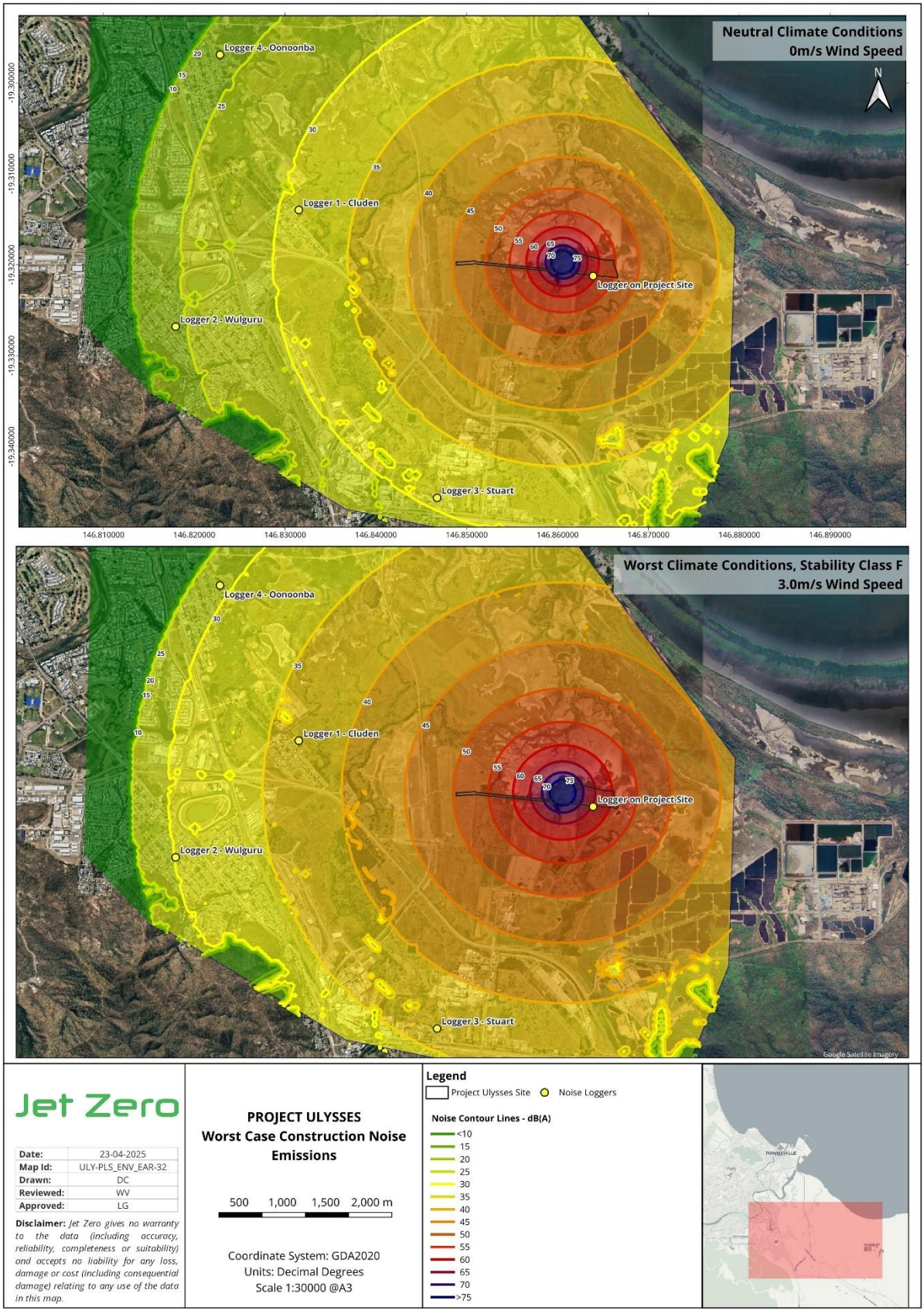
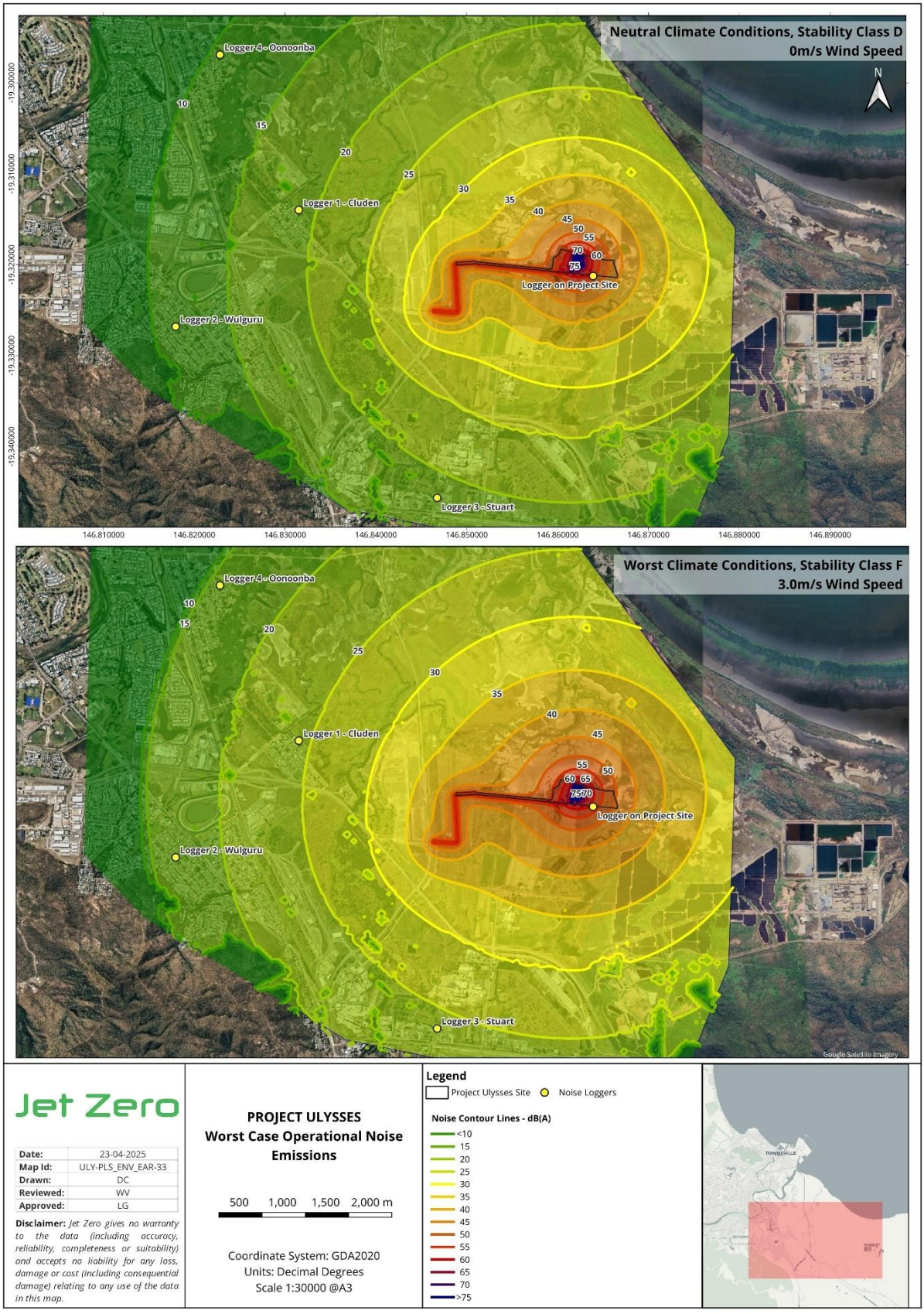


Figure 18: Worst-Case Operational Noise Emissions Scenarios



4.1.3. Soil Loss and Degradation

The loss and/or degradation of soil resources may occur through various mechanisms, including accelerated erosion (caused by water and wind), contamination, physical impacts on soil structure (such as compaction), alteration of hydrological regimes (e.g., changes in chemical properties like salinity), and alteration of organic matter input into soils (resulting from vegetation loss). These soil changes can negatively affect biota that depend on pre-impact soil conditions and may lead to secondary impacts, such as sedimentation affecting water quality.

Erosion and sediment runoff can potentially occur during a rainfall event following the clearing of topsoil and exposure of subsoil during the clear and excavation construction. This can lead to a pollution discharge outside site boundaries and potential sedimentation of the receiving environment, including the watercourses and the tidal environment. Erosion-prone areas within the project site and surrounding environment are presented in **Figure 19**.

The site consists of sodosols, which are highly prone to waterlogging and dispersion if disturbed. The top 0–0.25 m (A1 Horizon) has moderate susceptibility to erosion, with dispersion potential increasing in deeper layers (Moderately to high susceptibility).

- Elevated ESP consistently exceeds 6 % and reaching up 34.4 % further indicates high sodicity, and high potential for erosion.
- The Emerson Aggregate Test classifications show most Class 1 and 2 results in subsoils, demonstrating very high potential for soil dispersion upon saturation.

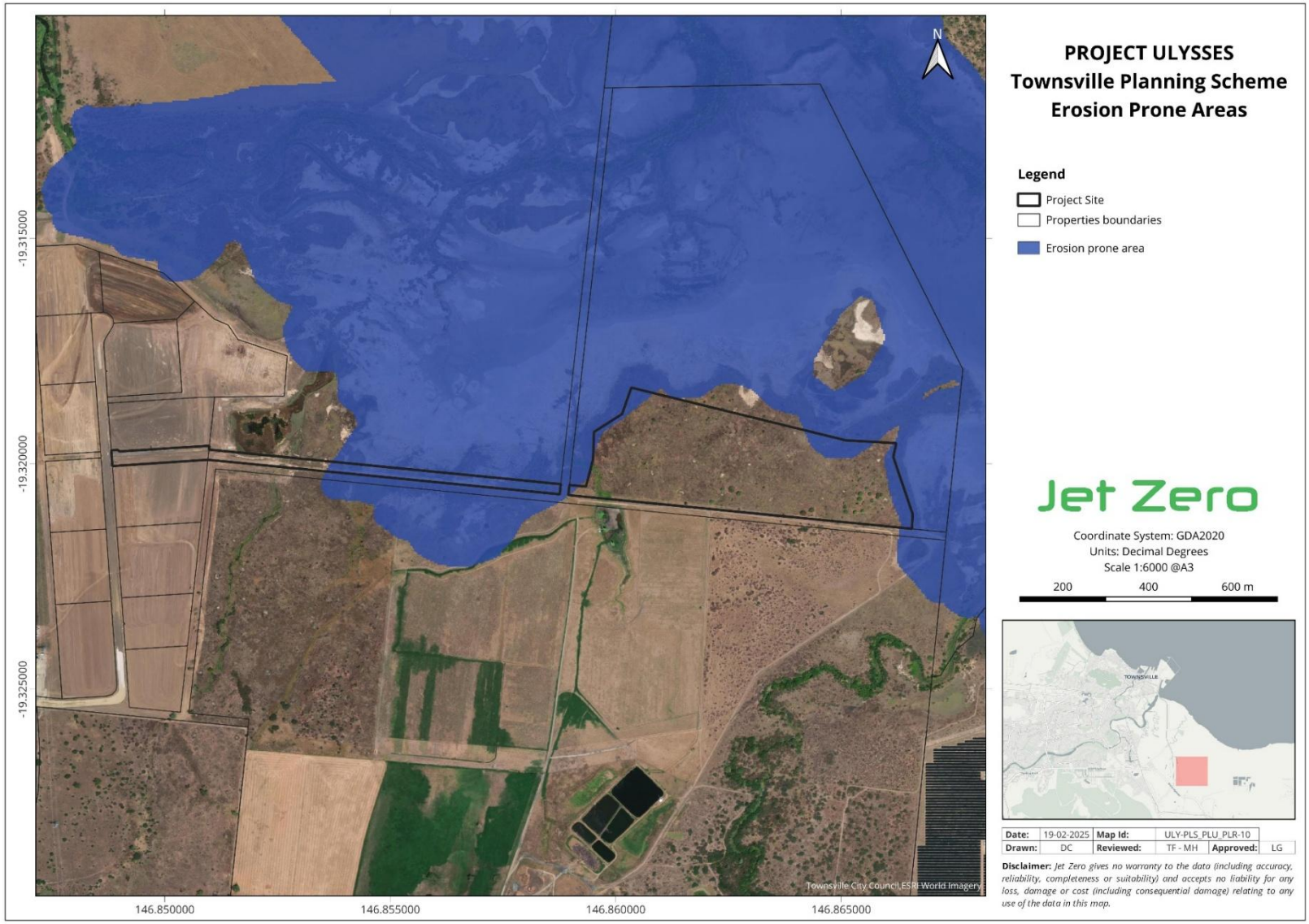
The Project site is within the mid-to-lower reaches of Sandfly creek catchment. The lower portions are tidally influenced and saline, indicating these to be highly erodible when disturbed. Soil displacement from the project area may increase sediment runoff into Sandfly Creek, potentially affecting water turbidity, aquatic habitats, and hydrology. Reduction in Dissolved Oxygen and increased risk of floodplain instability may also lead to alteration of the estuarine environment, impacting potential habitat in these areas.

Dispersive soils are also prone to tunnel erosion which can result in instability and result in rill and gully erosion. Impacts are expected to be higher during construction, as the topsoil removal will expose the susceptible erosive subsoils to erosion.

The topsoil layer is generally rich in organic matter and essential nutrients for plant growth. Loss of topsoil is expected to occur due to erosion, which can impact vegetation growth and soil health.

Upon completion of earthworks, the construction site and temporary accesses that is not part of the plant operations, will be required to be rehabilitated. If required, to ensure successful revegetation, it is crucial to account for this nutrient deficiency when selecting plant species and the implications for soil fertility and management, especially to B horizons (moderate to high CEC) and deeper soils (low to high CEC). The top 0.25 meters of soil at the Project site is characterised by its moderate susceptibility to erosion and unstable soil structure, which further reduces the success of rehabilitation measures.

Figure 19: Erosion Prone Areas



4.1.4. Water Pollution

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

4.1.4.1. Impacts to Surface Water During Construction

Construction has the potential to cause several direct and indirect processes that could potentially affect water quality. These include the sedimentation of waterways and the receiving environment. Potential impacts may occur from grout washing, cement additives and potential for spills, particularly of fuel and lubricants from construction equipment.

The construction works for the project site are located within the Sandfly Creek catchment, with activities occurring adjacent to tidal areas and waterways (Sandfly Creek) that flow into Cleveland Bay. Should sedimentation from construction enter these watercourses during flow events, it could detrimentally affect surface water quality in the immediate area, particularly due to the elevated suspended sediment concentrations in marine waters. These effects on surface water quality could, in turn, impact both aquatic and terrestrial biota, especially given the ecological significance of Cleveland Bay as a receiving environment.

The construction phase poses short-term impacts primarily related to land disturbance (see **Section 4.1.3**), which can lead to increased sedimentation and runoff into nearby water bodies and estuarine tidal areas. Activities such as excavation, grading, and the movement of heavy machinery can disturb soil and vegetation, resulting in erosion and sediment transport into Sandfly Creek and Cleveland Bay.

Additionally, a reduction in water quality may occur due to acid generation from spoil material associated with Actual Acid Sulfate Soils (AASS)/Potential Acid Sulfate Soils (PASS). When these soils are exposed to air through earthworks or excavation, they can oxidize, producing acidic conditions that mobilize metals such as iron, aluminium, and other heavy metals into both surface water and groundwater. This mobilization poses further risks to water quality and the surrounding aquatic ecosystems.

As observed in Terra Solutions (2025), the strongly seasonal rainfall experienced in the project area and the ephemeral nature of the receiving watercourses will significantly reduce the risk of any uncontrolled releases during the dry season. Given the current level of disturbance to the catchment and limited disturbance footprint any increase in sedimentation is unlikely to have any significant impacts during the construction phase. Although multiple sources of sedimentation are likely to have a cumulative effect.

4.1.4.2. Physical Disruption of Aquifer

Temporary construction dewatering (pumping out groundwater) could alter natural flow patterns, potentially impacting aquifers both within the project site and in the surrounding receiving environment. This process may lead to localised groundwater drawdown, which could potentially:

- Change aquifer hydraulic properties, such as permeability and storage capacity, due to sediment compaction or structural shifts.
- Impact Groundwater Dependent Ecosystems (GDEs) if water levels drop below critical thresholds.
- Affect nearby groundwater users, if wells rely on the same aquifer for water supply.

- Increase the risk of induced contamination, as altered flow paths may mobilise existing contaminants or saline water intrusion.

4.1.4.3. Reduction of Groundwater Quality due to the Exposure to Acid Sulfate

Reduction in water quality can occur due to acid generation from spoil material associated with AASS/PASS. When exposed to air through earthworks or excavation, these soils can oxidise, producing acidic conditions that mobilise metals such as iron, aluminium, and heavy metals into groundwater. This process may lead to:

- Mobilisation of heavy metals and toxic elements, which can impact aquatic and terrestrial ecosystems.
- Change in groundwater chemistry and occurrence of precipitates resulting in clogging of aquifer sediments, which may cause drainage issues.
- Corrosion of infrastructure over time.
- Earthworks dewatering of groundwater not managed adequately, leading to contaminated water discharged to sensitive environmental values.

4.1.5. Habitat Loss or Degradation

Habitat loss and/or degradation can occur as a direct consequence of vegetation / habitat 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).

The Project plant site and road access vegetation verified in the field survey was identified to be non-remnant. Within the plant site, a small area containing marine plants of approximately 2,480.5 m² was identified within the north-east of the plant site, above HAT and is included as part of the CBIP Operational Works approval, but not identified within the CBIP field survey (see **Table 2**).

The Project plant site and road access handle have now been cleared of vegetation and habitat; therefore, no further habitat loss will occur as part of the Project construction and operation, and so no direct impacts from habitat loss are planned.

4.1.6. Direct Mortality or Harm to Fauna

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

The Project plant site and road access handle may have indirect impacts to fauna, mostly to the north, with Inland shorebird habitats mangroves, saltmarsh and freshwater wetlands; with this area only providing functional habitat when inundated with tidal and/or rainwater (NRA, 2025b). As observed by NRA (2025a), this habitat primarily occurs along the margins of remnant habitat (**Figure 10**) that is generally in poor condition and mapped as auxiliary for some MNES and MSES.

For most shorebird species using the Cleveland Bay area, core habitat comprises the sand spit near Ross River mouth (roosting habitat) and the intertidal flats extending from the river mouth along the Cleveland Bay coastline approximately 8 km's from the Project site (foraging habitat) (NRA, 2025b).

As observed by NRA (2025a), most habitats in the Project site area are non-remnant and of low value to fauna. The likelihood of mortality to MSES during machinery or object strike is negligible. The likelihood of mortality to MSES due to a vehicle strike is low.

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

The construction of physical structures (e.g. roads, hardstand areas) may alter (block, restrict and/or concentrate) the flow of water across the land surface 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 saline conditions.

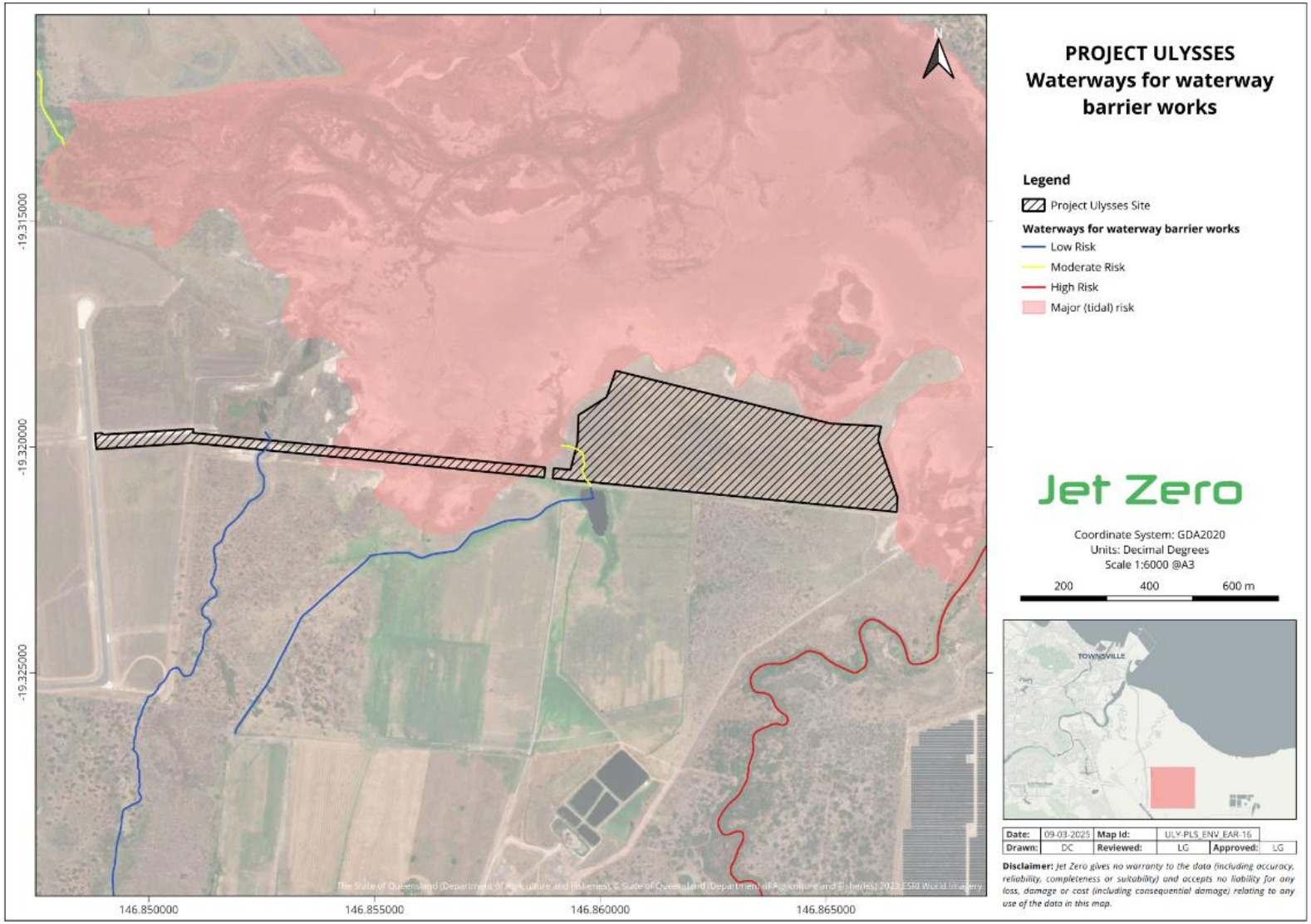
These habitats are sensitive to changes in hydrological regimes. Water flow regimes in waterways directly influence the plant and animal assemblages that use an area (e.g. fish passage).

The Order 1 watercourse that intercepts the Project site (**Figure 20**), however mapped as of moderate risk is unlikely to provide fish passage due the artificial stock dam stopping connectivity of 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 in this area.

The road access has been constructed as part of the existing OPW approval. There are no additional construction impacts expected for the plant site phase, providing mitigation controls within the CEMP are implemented.

Figure 20: Waterway for Waterway Barrier Works



4.1.8. 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 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).

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.

4.1.8.1. Module and Plant Equipment Movements into Port of Townsville

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* (Commonwealth), and 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).

4.1.9. Traffic Movements Impact to Fauna

The traffic movements on site will increase during construction with heavy and light vehicle traffic to and from the site causing some disturbance. 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.

The traffic movements during operation will be significantly lower than during construction and so impacts are expected to be minor.

4.1.10. Waste Generation

4.1.10.1. Waste Types and Classification

The waste types generated by the proposed activities, include 'general solid waste' such as construction materials waste, green waste, putrescible and domestic waste. These wastes are planned to be removed from the site to Stuart Waste Facility, which is located within the TSDA, close to the project site. The disposal site is lawfully able to accept the waste under the EP Act. There is also capacity to dispose of waste on site as the current EA permits a limit of no more than 50,000 tonnes of general waste to be disposed of per annum.

The EPP Regulation includes a risk-based waste classification framework where regulated waste is classified as either:

- Category 1 regulated waste (highest risk)

- Category 2 regulated waste (moderate risk)
- Not-regulated waste/general waste (lowest risk).

Limited 'regulated waste' generated on site such as waste oils, lubricants and liquids, paints, tyres, etc. will be removed and transported from site by a person who holds a current authority to transport such wastes to the waste handling facility to be determined. A lawfully receiving facility will be selected prior to commencement of construction and operation to receive regulated waste. The facility will be lawfully able to accept the regulated waste under the EP Act.

4.1.10.2. Potential Impacts from Construction Waste

The construction phase of the Project is expected to generate the most significant volume of waste throughout its lifecycle, with a substantial portion requiring off-site disposal due to limited opportunities for on-site utilisation. However, certain excavated materials, such as topsoil, rock, and sediment recovered from erosion and sediment control devices, will be repurposed within the site wherever feasible, thereby reducing reliance on external sources and minimising waste.

As presented in **Section 1.7.2.1**, typical construction waste is expected to be generated, with volumes assessed during FEED.

The majority of construction waste will be generated during key activities, including site preparation, the development of the project site and the construction of operational infrastructure. Effective waste management strategies will be implemented to optimise material reuse, recycle where possible, and ensure environmentally responsible disposal of non-recyclable waste.

The majority of waste generated during the construction phase would be classified as general solid waste, which may include both putrescible and non-putrescible materials.

Waste, which may include both putrescible and non-putrescible materials, can have various impacts if not properly managed. The potential generation of waste soil, including AASS during construction is also considered to be a potential impact. Improper handling and disposal of such soils can lead to acidification of the environment, causing soil degradation, water contamination, and harm to plant and animal life.

4.1.10.3. Potential Impacts from Plant Process Waste

During the operational phase, waste generation is expected to be minimal, consisting primarily of small quantities of putrescible waste from staff amenities, redundant equipment, used oils, and general waste associated with routine maintenance activities.

As described in **Section 2.5.3**, the majority of waste generated during operations is from intermittent waste streams and slops:

- Heavy ethanol impurities purge, from the bottom of the ethanol pre-treatment column C - 1100.
- Light organics purge, Methanol and Acetaldehyde from the lights on the pre-treatment column C-1100.
- Flare heavies liquid (V-2150 fractionation vessel, dropout from flare).
- Liquid hydrocarbon purge - paraffin liquid (C-2600 fractionation column from Bottoms Pump P-2602).
- Mid-boiler blowdown, the boiler is 85 tph boiler and typical blowdown in industry with high quality RO feedwater is 1 % from a continuous blow down system.
- Vacuum pump discharge, small flow from vacuum column mainly Naphtha.
- Surplus hydrogen added in Hydrogenation stage is directed to the boiler.
- Hydrocarbons from decanter, not normal flow.
- Seal fluid and waste.
- Wastewater approximately 4,000 COD hydrocarbons.

- Light hydrocarbons, examples would be changing filters small volumes would be captured and contained in Intermediate Bulk Container (IBC) for disposal.
- Heavy hydrocarbons, examples would be changing filters small volumes would be captured and contained in IBC for disposal.
- Feed impurities (light and heavy).

Certain materials, including oils, lubricants, redundant equipment, and various metals, will require periodic replacement throughout the operational lifespan of the Project (including during construction). While these materials will not be replaced frequently, their eventual disposal will be necessary as they reach the end of their functional life.

This will include the proper handling and disposal of used lubricants and oils, such as replacement oils from machinery and equipment maintenance, as well as the decommissioning and disposal of outdated or non-functional equipment and metal components.

4.2. Avoidance, Mitigation and Management Measures

A Construction and Operations Management Plan (CEMP and OEMP) will be developed to address the potential harm to ecology. The subsections below identify the proposed mitigation and management measures associated with ecological features.

4.2.1. Environmental Offsets

Mostly vegetation within Project site were identified to be non-remnant. Small areas of MSES marine plants identified above HAT with an area of approximately 2,480.5 m^2 (portion on extent north of Project site) were identified and is included as part of the CBIP Operational Works approval (see **Table 2**).

4.2.2. Air Quality Mitigation Controls

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

- All phases:
    - Achieve the air quality objectives of the Queensland Environmental Protection (Air) Policy 2019.
    - 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.
    - Communication with the local community/residences that may be affected regarding ~~construction and operational~~ activities to reduce perceived nuisance impacts.
- During design:
    - Obtain specialist advice ~~at the design phase~~ to ensure generation of nitrous oxide due to combustion of hydrogen is avoided or appropriately mitigated.
- During construction:
    - Monitor weather conditions and adjust dust control measures, accordingly, including controls for strong wind events.
    - Conduct daily site inspections for dust issues and ensure prompt responses.
    - Water spraying on earthworks to reduce dust emissions when appropriate. Keep exposed soil moist and minimise the height from which materials are dropped to reduce airborne dust.
    - Deploy dust deposition gauges to track dust levels. If levels approach or exceed a daily dust deposition threshold of 120 mg/m^2 per day, as per ESR/2015/1840 (DESI, 2024a), the project team should investigate and adjust dust control measures.
    - Development and implementation of an Erosion and Sediment Control Plan.

- Progressive rehabilitation of the earthwork's areas post-construction.
    - During operation: Establish an annual stack emission testing program of stack sources, including flowrates, velocities, pollutant concentrations, temperature, and pressure.
    - Implement a Leak Detection and Repair (LDAR) Program to be implemented to manage potential fugitive emissions.

4.2.3. Sensory Disturbance Mitigation Controls

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

- Design that is in accordance with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023).
- Design that 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).
- Design that minimises light proliferation into the surrounding environment.
- Design that aims to achieve the acoustic objectives of the Queensland Environmental Protection (Noise) Policy 2019.
    - During construction:
        - • Set up of an exclusion zone.
            - Do not allow construction site and personnel to operate beyond construction works site boundaries, especially towards Sandfly Creek and Sandfly Creek reserve.
            - Noise activities should also be avoided within the access road, as it is located closer to these sensitive protected areas and to the JBS site, where pasture is used by livestock
        - • Ensure truck drivers are informed of designated vehicle routes, parking locations, delivery hours, and minimising engine braking and idling.
    - During operations:
        - Conduct noise loggings at relevant sensitive receptors as required (e.g., after systematic complaints or noise increase due to abnormal operations).
- Procedures for plant and equipment to be adequately maintained and serviced according to specifications.

4.2.4. Hazardous Materials, Substances and Dangerous Goods Mitigation Controls

The following practices were suggested by NRA (2025a) and will be implemented to manage hazardous materials potentially posing hazards in relation to ecological values:

- Ensure a risk assessment for each hazardous substance is periodically reviewed and appropriate controls implemented into the relevant Project HSE Plan.
- Dispose of hazardous materials at a licenced facility with full chain-of-custody documentation.
- Minimise hazardous substances stored on site.
- Ensure all Safety Data Sheets are checked and hazardous substances identified and entered into hazardous substance register prior to substance arriving at site.
- Ensure all permits are in place for storing and handling hazardous substances.
- Ensure personnel have appropriate training for handling, storage and transport of hazardous substances.
- Retain all licences, permits and approvals on site as required by statutory authorities.
- Ensure any hazardous substances such as hydrocarbons are stored under roof and on a surface of concrete, asphalt or similar imperious substance, and bunded.
- Ensure all flammable and combustible liquids (including hazardous waste materials):

- have the contents and volume clearly identified be numbered for identification
- are contained within an on-site containment system within the facility site
- are controlled in a manner that prevents environmental harm and maintained in accordance with appropriate standards, with Hazchem signs displayed.
- Ensure a spill kit is available to clean up potential spills.

4.2.5. Biosecurity Mitigation Controls

The following practices were suggested by NRA (2025a) 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 2014 and Queensland Biosecurity Regulation 2016.
- Ensure equipment and vehicles are washed down and be free of weed, seed, soil, pests and pathogens prior to being brought to site.

4.2.6. Fauna and Flora Mitigation Controls

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

- Ensure vegetation clearing and disturbance is contained with the Project site. Ensure relevant statutory approvals are in place prior to clearing.
- 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.
- Place food waste into lined bins and cover to prevent attracting fauna to the site.

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

4.2.7. Waste Management Mitigation Controls

To ensure responsible waste management, waste materials will be collected, temporarily stored onsite, and disposed to licensed waste and waste recover facilities, with an emphasis on recycling and resource recovery wherever feasible.

Jet Zero has established the following waste management objectives for the Project:

- Any waste generated, transported, or received as part of carrying out the activity is managed in a way that protects all environmental values.
- Design the plant, construction and operations to minimise the generation of waste.
- Minimise the generation of waste through applying the avoidance, minimisation and mitigation principles to reduce, reuse, recycle, recover, treat and dispose of waste.
- Ensure safe management and disposal of waste that cannot be reused or recycled.

Table 13 presents potentially receiving facilities within Townsville. The suitability and compliance will be assessed prior to the commencement of construction and operation.

Table 13: Waste Disposal and Resource Recovery Facilities Within Townsville

Category	Facility Name	Location	Accepted Waste Streams[1]
Construction Waste Operational (General Waste)	Stuart Waste Transfer Station	Stuart, QLD	Accepts general waste such as green, wood, oil and goods waste at small volumes.
Dangerous Goods Waste (Category 1 and 2 Regulated Waste)	Bohle Waste Facility	Bohle, QLD	Accepts chemical, combustible materials, fuel and oil liquids and solvents, and other hazardous wastes at large industrial quantitates.

[1] Preliminary search as of 21 March 2025. The suitability and compliance to regulatory requirements will be assessed prior to the commencement of construction and operation.

The following practices were suggested by NRA (2025a) and waste management practices will be implemented in relation to ecological values:

- Ensure procurement procedure includes waste avoidance as a key criterion for the selection of goods and services.
- Contain construction materials in containers where possible.
- Segregate and recycle solid wastes generated by work activities, offices and mess-rooms or engage contractor to recycle waste off site.
- Ensure that materials are not left in exposed situations where they can be washed or blown away to become litter.
- Provide bins for construction workers and staff at indoor locations where food is consumed.
- Maintain awareness with personnel of the need to avoid littering.
- Dispose of waste material at an appropriately licenced waste facility.

4.2.8. Soil Management Mitigation Controls

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

- 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 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 (in DES, 2022c).

4.2.9. Water Management Mitigation Controls

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

- During construction, ensure surface runoff management measures include:
    - Timing of construction to avoid wet season rainfall
    - 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, 2018). Works not able to comply with DAF (2018) will require statutory approval before proceeding.
    - Manage runoff to minimise the release of pollutants to waterways and achieve relevant State policy water quality objectives (Queensland Environmental Protection (Water and Wetland Biodiversity) Policy 2019).

Regarding groundwater, natural recovery of water table is expected post-construction to mitigate potential physical disruption of aquifer. Further to this, the following strategies will be implemented:

- Monitoring of groundwater levels to assess changes over time.
- Use of recharge wells or barriers to maintain stable aquifer conditions.
- Minimise groundwater inflow into excavations and limit drawdowns.
- Systematic groundwater monitoring to detect early signs of acidification and metal mobilisation. Solinst Level Loggers were deployed in four of the monitoring bores (monitoring of groundwater level and temperature).
- AAS monitoring and management (as described in **Section 6.3**).
- Trigger Action Response Plan / Emergency Response and Spill Management.

4.3. Residual Impact

With the implementation of the management and mitigation controls described in this section, overall impact significance is expected to be reduced to acceptable with all residual impacts either a 'Medium' or 'Minor' impact, thus controllable and manageable levels, as indicated in **Table 14**.

Table 14: Residual Impacts to Ecological Values

Potential Impact	Project Phase	Prior to mitigation			Residual		
		Sensitivity	Intensity / Magnitude	Impact	Sensitivity	Intensity / Magnitude	Impact
Air pollution to flora and fauna	C, O	Significant	Low	Minor	Significant	Low	**Minor**
Sensory disturbance (noise, light) to fauna protected species: listed threatened species, and migratory species	C, O	High	Significant	Major	High	Moderate	**Medium**
Soil loss and degradation, water pollution	C, O	High	Significant	Major	High	Moderate	**Medium**
Direct loss or degradation of fauna habitat by vegetation clearing	C	High	Moderate	Medium	High	Low	**Medium**
Direct loss of conservation value (Cleveland Bay, GBR broader area)	C, O	Extreme	Moderate	Medium	Extreme	Low	**Medium**
Altered hydrological regimes	C, O	Significant	Significant	Major	Significant	Low	**Minor**
Proliferation of invasive and pest species	C, O	Significant	Significant	Major	Significant	Moderate	**Medium**
Traffic movements impact to fauna	C, O	Significant	Moderate	Medium	High	Low	**Medium**

C – Construction; O – Operation

5. CONCLUSION

The ecological assessment indicates that the proposed project is positioned within a landscape where anthropic activities already occur (i.e. within TSDA), with limited ecological values likely to be significantly impacted. While some MNES were identified in the broader area, including the receiving environment (such as migratory shorebirds such as the black-tailed Godwit) and the Bare-rumped Sheathtail Bat, no critical habitat was found within the immediate Project site. No significant threatened flora species or essential fauna habitats were identified within the Project site, and all observed vegetation clearing activities are expected to comply within accepted development guidelines.

The nearest ecologically significant areas, including the GBR World Heritage and National Heritage Areas, are located at a sufficient distance (2.5 km or more) where direct or indirect impacts are unlikely to occur.

Additionally, minimal risk posed to fish passage or wetland integrity as the majority of construction impacts have occurred with the road access and plant site preparation being completed. Overall, the findings suggest that the Project can proceed with minimal residual ecological impact, provided that the existing environmental management mitigation controls are implemented.

A summary of the ecological assessment is shown in **Table 15**.

Table 15: Summary of Ecological Assessment

Ecological Aspect	Summary
Matters of National Environmental Significance **Migratory species**	• Listed Threatened Ecological Communities or migratory bird species not found within Project site, and there are no planned activities that could directly impact these communities or species. • Field survey confirmed the presence of potential marginal foraging habitat for threatened migratory shorebirds. Listed Threated Species of shorebirds detected within 300 m north of plant site (listed species in **Table 8**), that may be indirectly impacted by noise and light emissions, at low levels in comparison to existing baseline noise and light levels. • EPBC Approval Conditions for Bare-rumped Sheathtail Bat for previous site activity, confirmed with presence located within study area across a wide foraging area. • GBR World Heritage Area, GBR Marine Park and GBR National Heritage Areas at least 2.5 km from Project site with no direct impacts.
Significant flora (MSES)	• No significant residual impact assessment for threatened flora is expected due to the absence of species or habitat within the Project Area. All flora has been cleared within the Project site. • No T/NT flora species listed under the Queensland *Nature Conservation Act 1992* (NC Act) or the EPBC Act were observed within the survey area, and none will occur due to site clearing.
Remnant vegetation (MSES)	• Marine plants within the survey area cover approximately 2,480.5 m^2 in the north-east of the plant site (RE 11.1.2b) (NRA, 2025a). The removal, destruction, or damage of marine plants within the footprint of the proposed vegetation clearing works can be undertaken as accepted development in accordance with the Accepted Development Requirements for Operational Work that is the Removal, Destruction, or Damage of Marine Plants (DAF, 2017). This area of marine plants has been cleared as part of the existing OPW approval.
Significant fauna (MNES / MSES)	• No areas of essential habitat for protected fauna intersect the core infrastructure footprint. • T/NT and migratory fauna species recorded in the Project site include the Black-tailed Godwit and Bare-Rumped Sheathtail Bat, that have a wide forging range and no essential habitat existing within the Project site.

Ecological Aspect	Summary
Aquatic ecosystems and wetland (MSES)	• All watercourses within the study area are likely to have a low risk for impacts for fish passage, including the section of watercourse mapped by DAF (2023) as having a 'moderate' risk. No additional activities are planned to impact these watercourses are planned for the Project.

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APPENDIX A

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