Gladstone Area Water Board

EROSION AND SEDIMENT CONTROL MANAGEMENT PLAN

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

Queensland Government

SDA approval: AP2024/014

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CONTENTS

1. INTRODUCTION

The Erosion and Sediment Control Management Plan (ESMP) is one component of the Gladstone Area Water Board (GAWB) Construction Environmental Management Plan (CEMP) for the East End Pipeline Project (hereafter referred to as “the Project”). Section 4.1 of the CEMP provides further background and detailed description of the Project.

The ESMP describes how Erosion and Sediment Control Management will be managed and any potential impact minimised during construction. This ESMP has been prepared with consideration of Project requirements, and to address the legal and other requirements outlined in Section 4.

2. PLAN PURPOSE

The purpose of this ESMP is to:

- Describe how GAWB and its contractors will manage and control risks associated erosion and sediment control during the construction of the Project.
- Provide strategies to control potential impacts of erosion and sediment control during construction.
- Address the requirements of applicable legislation.
- Address approval, permit/licence and contractual requirements.

3. MANAGEMENT OBJECTIVES AND PERFORMANCE CRITERIA

Objectives and performance criteria for the Project in relation to erosion and sediment control include the following:

Objectives	Performance Criteria
• To provide a strategic and systematic framework to enable construction of the project with minimal environmental or social impact due to erosion or sediment-laden runoff. • To identify relevant site characteristics and construction activities which have the potential to contribute to erosion or sedimentation impacts. • To ensure all construction activities are • undertaken with the objective of preventing such impacts. • To ensure no potential risks to health or amenity occur due to construction related erosion or sediment-laden runoff.	• No release of site water will occur until compliance with water quality values is verified through testing. • No accidental or uncontrolled release of sediment-laden water to surrounding waterways or storm water system. • No irreversible erosion or loss of soil from exposed surfaces, drainage channels or batters. • No changes to measurable parameters of • receiving aquatic systems above normal background fluctuations attributable to construction works. • Conformance with provisions of all regulatory and other requirements to be achieved throughout construction phase. • No complaints related to water quality from the community.

3.1 Plan scope

This plan applies to all works associated with the project.

3.2 Interface with other documents

This ESMP forms part of the overall CEMP for the Project.

4. LEGAL AND OTHER COMPLIANCE REQUIREMENTS

4.1 Legislation

- *Environmental Protection Act 1994*
- Environmental Protection Regulation 2019
- Environmental Protection (Water and Wetland Biodiversity) Policy 2019
- *Fisheries Act 1994*

4.2 Australian Standards and Industry Guides

- IECA Best Practice Erosion and Sediment Control Guidelines
- Riverine protection permit exemption requirements WSS/2013/726 Version 2.03 (Department of Regional Development, Manufacturing and Water, 2023)

5. CONTEXT

5.1 Existing environment

The purpose / objective of erosion and sediment control, as defined by IECA (2008), is 'To take all reasonable and practicable measures to minimise short and long-term soil erosion and the adverse effects of sediment transport'. This objective is consistent with the general environmental duty under the *Environmental Protection Act 1994*.

In addition to the above-mentioned objectives, this plan relates specifically to several objectives including:

- to minimise the area to be disturbed
- to minimise soil loss and degradation
- to minimise sediment and nutrient release off site and adverse impacts on water quality
- to maintain water quality, water flow rates and regimes
- to minimise disturbance to the immediate watercourse and bank stability
- to minimise impacts on aquatic flora and fauna.

Implementation of this plan, in conjunction with the CEMP will assist to achieve these objectives and fulfil the general environmental duty of care.

5.2 Key risks

Land that has been disturbed or cleared of vegetation is potentially subject to erosion as a result of stormwater runoff. Soil particles that are eroded in such a way are transported down-slope, usually settling in watercourses.

Erosion and sedimentation may result in many adverse environmental impacts including:

- reduction in water quality
- increased turbidity in receiving waters
- nutrient enrichment of water bodies
- damage to vegetation communities
- disturbance to aquatic flora and fauna
- increased potential for flooding
- reduction in recreational values
- reduction in aesthetic values
- increased maintenance costs
- promotion of weed growth.

Below provides a summary of potential environmental impacts from various Project activities.

Proposed Activity	Potential Impacts / Risks
Construction or modification to waterways and drainage systems	• Potential for accidental discharge of sediment-laden runoff into waterways or drainage systems
Discharge of water detained onsite following rainfall	• Potential for polluted water to be accidentally discharged offsite
Earthworks	• Increased erosion due to exposure of erodible subsoils. Potential offsite sedimentation impacts. • Disturbance of areas outside the project footprint. Potential for dust to be blown offsite • Erosion of small cut batters (mostly <1.0 m in height) if gradients are steep and if subjected to flows from upslope areas
Haulage of spoil	• Crossing waterways and drains. Potential for sedimentation impacts in receiving waters • Potential for dust to be blown from trucks or scrapers, impacting neighbours
Loading and transport of materials	• Potential for dust impacts during loading and transport.
Stockpiling of materials	• Potential for sediment-laden runoff to wash offsite into local waterways and drains and the receiving environment • Potential for dust to be blown offsite, impacting neighbours
Vegetation clearing and grubbing	• Increased erosion as a result of loss of ground cover • Potential offsite sedimentation impacts • Accidental removal of vegetation outside of clearing limits • Raindrop impacts on bare soil and movement of detached sediment by inter-rill erosion • Potential creation of topsoil stockpiles, with erosion of bare stockpiled soil likely to affect batter slopes • Exposure of dispersive soil

6. ROLES, RESPONSIBILTIES AND AUTHORITIES

All site personnel are responsible to ensure that they minimise environmental nuisance or harm by adherence to all Project Management Plans and other documentation. Site personnel are also responsible for ensuring they do not act in contravention of any Environmental Approval or the Contract.

Field Supervisors are responsible for implementation and maintenance of mitigation measures outlined in the ESMP for all activities or work areas under their control.

The Environmental Manager is responsible for routine surveillance and monitoring, communication of requirements of this Sub-plan, coordination of visual monitoring, and all other responsibilities related to erosion and sediment control identified within this plan and overall CEMP. Importantly the Environmental Manager is responsible for the immediate notification of State and/or Commonwealth government authorities of impacts that have mandatory reporting requirements.

The Project Manager is responsible for overseeing implementation of this plan and overall CEMP. Refer to section 6.4 of the CEMP for broader environmental management roles and responsibilities associated with the Project.

7. IMPLEMENTATION STRATEGY

7.1 Mitigation and management actions

The Table below outlines the mitigation and management measures to be carried out to ensure the Project meets all necessary requirements.

Reference	Mitigation and Management Actions	Timeframe/s	Responsibility
01	Intent of this sub-plan will be communicated through the Site Induction process, to ensure all site personnel are aware and take ownership of sub-plan requirements relating to this element.	Prior to construction	Project Manager
02	Requirements relating to this plan to be revisited frequently through Toolbox and Prestart meetings	During construction	Environment Team
03	All reasonably practicable erosion and sediment controls must be installed and appropriately maintained to minimise any water pollution.	During construction	Environment Team Superintendent Supervisors
04	An ESCP will be supplied to the Superintendent, prior to works commencing in the relevant area. Works on site will not commence until the ESCP has been approved by the Superintendent	During construction	Environment Team
05	The ESCP is to be reviewed at various stages of works including the following milestones • At the finish of all initial clearing and grubbing works • At the commencement and finish of earthworks	During construction	Environment Team Superintendent Supervisors
06	ESCP to be distributed to management and field supervision prior to new works commencing	During construction	Environment Team Superintendent Supervisors
07	Bureau of Meteorology forecasts to be monitored frequently by the Environmental Representative and site foremen to ensure prior warning and preparedness for any rainfall event	During construction	Environment Team Superintendent Supervisors
08	Rain gauges will be monitored at multiple locations on the Project	During construction	Environment Team Superintendent Supervisors
09	ESC Strategy to focus on prevention of runoff contamination rather than treatment: • Undertake staged clearing of site areas to ensure the minimum amount of site is exposed at any one time • Early installation of ESCs in each zone as works progress to ensure controls are in place before significant disturbance to areas occur	During construction	Environment Team Superintendent Supervisors

	• Early installation of site cross drainage to allow the controlled flow of clean water from upstream catchments through the site at the earliest possible stage • Diversion of clean water from upslope of the site through the installation of the final turf lined catch drains located at the top of batters • Progressive rehabilitation of cut and fill batters as works progress in each zone • Use of temporary ground cover covers such as binding sprays and site mulch for coverage of temporary stockpiles and high risk areas.		
10	Inspections will be carried out by the Environmental Representative, and Supervisor at the following intervals: • At least daily during on-going wet weather • Once per week regardless of weather patterns • Within 24 hours of imminent rainfall (as per BOM forecast) • Pre-Wet Weather Event Checklist • Within 18 hours of runoff-producing rainfall • Post Wet Weather Event Checklist	During construction	Environment Team Superintendent Supervisors
11	Repairs or maintenance to ESC controls will be completed within 24 hours of directive, or immediately where rainfall is imminent (as per BOM forecast for area)	During construction	Superintendent Supervisors
12	Erosion, sediment and drainage controls to be regularly maintained to ensure at least 70% capacity at all times.	During construction	Superintendent Supervisors
13	Stripped topsoil will be stored at available locations within the site. Topsoil will be stockpiled to a height of no more than 2m, in an area with less than 5º gradient; protected by enclosed sediment fencing around the down- slope perimeter	During construction	Superintendent Supervisors
14	On-going visual checks will be carried out to ensure no releases to receiving waterways or storm water systems occur or have the potential to occur	During construction	All persons
15	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and cess drains and depressions must be designed and constructed in accordance with relevant DAF Waterway Barrier Guidelines	During construction	Environment Team Superintendent Supervisors
16	Topsoil must be stockpiled separately to other soils/earthen material and clearly signed/marked on site drawings and maps, to allow for its reuse in any reinstatement and rehabilitation processes	During construction	Superintendent Supervisors
17	All stockpiles are to be located as close as practical to the source of the material and should be clearly demarcated on the type of material they contain	During construction	Superintendent Supervisors
18	Minimise duration and area of disturbance within watercourses where possible	During construction	Environment Team Superintendent Supervisors

19	Reinstatement and rehabilitation is to occur progressively and as part of the completion of each construction stage, as per contract requirements. This should be in accordance with any relevant or applicable aspects of contract requirements, conditions of approval or licences	During construction	Environment Team Superintendent Supervisors
20	Wherever possible stormwater collected during construction works should be utilised during onsite dust suppression activities	During construction	Superintendent Supervisors
21	Any sediment basins used during construction should be designed and installed in accordance with the IESCA guidelines	During construction	Environment Team Superintendent Supervisors

7.2 Erosion and sediment controls plans (ESCPs)

For the Project, the Appropriately Qualified Persons (AQPs) involved in the preparation and implementation of the Certified Professional in Erosion and Sediment Control (CPESCs).

Detailed Erosion and Sediment Control Plans (ESCP) will address the following aspects:

- The different stages of construction (e.g. site establishment - clearing, stripping and stockpiling of topsoil; earthworks; drainage); and
- Various work areas (e.g. construction compounds; facilities; sediment basins).

The ESCP will be prepared in consultation with construction personnel, will identify risk and be prepared prior to construction activities commencing. Plans will typically be prepared over A3 drawings and indicate (where relevant):

- Catchment areas
- Construction boundaries
- Exclusion zones and sensitive areas
- Maintenance of buffer zones where possible
- Assumed catchment boundaries
- Access points and tracks
- Compounds and storage areas
- Stockpile sites
- Temporary work areas
- Material processing areas
- Permanent and temporary controls (including order of implementation)
- Notes specific to high-risk activities if applicable.

In some instances, more than one ESCP may be required for an activity due to:

- Staging rendering the process complicated
- Change in the construction process, scope of work or work method
- Controls are found to be ineffective following rainfall.

7.3 Construction staging

Works will be planned and staged to facilitate effective erosion and sediment control. Strategies include:

- Ensuring perimeter surface water controls are in place prior to disturbance
- Ensuring primary sediment control structures are in place prior to work in each catchment
- Planning to minimise site disturbance, construction footprint and duration between commencement and stabilisation works
- Installation of permanent drainage as soon as practical
- Identification of high-risk areas and work planning in these areas to achieve stabilisation as soon as possible
- Staging of clearing operations Access for emergency vehicles will be maintained along key emergency access routes throughout the construction period, with suitable alternative access arrangement provided where required.

8. PERFORMANCE EVALUATION

8.1 Monitoring

General inspections and auditing will be undertaken in accordance with Section 7 of the CEMP. The Environmental Team will undertake environmental inspections to develop and evaluate the effectiveness of environmental controls. This will include:

- Daily visual inspections
- Weekly inspections using the Weekly Environmental Checklist
- Pre and Post Rainfall Inspection Checklists
- Monthly reporting will be recorded through Project Monthly Reports
- Annual independent audit

Regular inspections will be undertaken in relation to erosion and sediment controls, and include the following:

- Effectiveness of the mitigation measures
- Any environmental incidents, hazards or near-misses documented in relation to erosion and sediment control management
- Community complaints in relation to erosion and sediment control management, and the construction contractor's response
- Erosion and sediment control management objectives, and tracking against these

9. REVIEW AND IMPROVEMENT

9.1 Reporting

The Environmental Weekly Checklist, pre and post rainfall checklist, monthly reporting and annual independent audits undertaken throughout the construction phase of the project will be documented and kept on record by the Environmental Manager or their delegate for the duration of the Project.

In the event of a complaint, non-compliance or incident, an investigation will be undertaken to determine the cause of the problem and will be led by the Project Manager. Any identified impacts on erosion and sediment control management, the identified source and corrective actions are to be documented and managed in accordance with this ESMP.

9.2 Document updates

The Site Environmental Management Representative will amend, update and continue to develop and improve this ESMP on an ongoing as the construction program progresses and continual improvement opportunities are identified.

10. APPENDIX 1 – EROSION AND SEDIMENT CONTROL PLANS

To be prepared – Principal contractor to prepare prior to activities commencing

Gladstone Area Water Board

East End Pipeline Acid Sulfate Soil Management Plan

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1 INTRODUCTION

The Acid Sulfate Soil Management Plan (ASS MP) is one component of the GAWB Construction Environmental Management Plan (CEMP) for the East End Pipeline Project (hereafter referred to as "the Project"). Section 4.1 of the CEMP provides further background and detailed description of the Project.

The ASS MP describes how acid sulfate soil (ASS) will be managed and any potential impact minimised during construction. This ASS MP has been prepared with consideration of Project requirements, and to address the legal and other requirements.

1.1 Plan purpose

The purpose of this ASS MP is to:

- Describe how GAWB and its contractor(s) will manage and control risks associated with ASS during the construction of the Project
- Provide strategies to control potential impacts of ASS during construction
- Address the requirements of applicable legislation
- Address approval, permit/licence and contractual requirements.

1.2 Management objective and performance criteria

Objectives and performance criteria for the Project in relation to ASS include the following:

Objectives	**Performance Criteria**
• To provide a strategic and systematic framework to enable construction of the project with minimal environmental or social impact due to ASS • To ensure all construction activities are undertaken with the objective of preventing such impacts	• Consider disturbance and management of ASS/PASS • No adverse impacts to land or groundwater chemistry

1.3 Plan Scope

This plan applies to all works associated with the Project.

1.4 Interface with other documents

This ASS MP forms part of the overall CEMP for the Project.

2 ASS MANAGEMENT PROCEDURES

Elements / Issues:	**Acid Sulfate Soils** – Earthworks operations involving disturbance of ASS, specifically: 1. Excavation of shallow Actual and Potential Acid Sulfate Soils (AASS/PASS) located at below 5 m AHD during earthwork activities associated with the project. 2. On-site treatment of AASS/PASS spoil from excavations either insitu or at a lime treatment area, or removal off-site for disposal at licensed facility (if required due to the contamination status of the soil). 3. Potential adverse changes to groundwater dynamics and chemistry, particularly near creek crossings. 4. Discharge of acidic groundwater, seepage or intercepted rainwater off-site.
Operational/policy	To minimise adverse impacts resulting from: • disturbance of AASS/PASS on site during construction • impact to groundwater chemistry (through disturbance of ASS) and migration of impacted groundwater off-site towards drains, creeks or waterways temporary placement of spoil containing ASS on site • on-site treatment of AASS/PASS spoil from excavations, and discharge of any acidic seepage and intercepted rainwater off-site.
Statutory Requirements:	Development is covered under the: • *Environmental Protection Act, 1994*; and • Environmental Protection (Water) Policy, 2019. Additional reference is made to: • The ANZG 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality - 2018' • State Planning Policy Part E Interim development assessment requirements, State interest—water quality 2016. • State Planning Policy, July 2017 • State Planning Policy - State Interest Guideline Water Quality February 2021 • State Planning Policy 2/02, 'Planning and Managing Development involving Acid Sulfate Soils' Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines 2 (Version 3.8) • Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines Version 5.1, 2024 • Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources, Canberra ACT. CC BY 4.0. (National ASS Sampling Guidelines) • Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT. CC BY 4.0. ('*National Acid Sulfate Soil Laboratory Guidelines*') • Shand, P, Appleyard, S, Simpson, SL, Degens, B, Mosley, LM 2018, National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments, Department of

	Agriculture and Water Resources, Canberra, ACT. CC BY 4.0. *'National Acid Sulfate Soil Dewatering Guidelines'*)
Performance Limits	1. ASS spoil from trench excavations that is placed as backfill can be limed 2. in-situ utilising a factor of safety of 3.0 and re-placed as backfill within 24 hrs. Lime verification analysis is not required given that a higher factor of safety is adopted. 3. Any lime treated ASS spoil that cannot be backfilled into the trenches shall be subject to verification testing using the Suspension Peroxide Oxidation Combined Acidity and Sulfate (SPOCAS) or the Chromium Reducible Sulfur (CRS) suite. The lime-treated material is to have: • a 'verification net acidity' of less than zero, • a pH_{KCl} after neutralisation of greater than or equal to 6.5. Note: Net Acid Soluble Sulfur (S_{NAS}) analyses is to be undertaken if ASS investigations indicate the presence of jarosite in the soils. 4. Records of lime used to treat spoil quantities should match records of bulk lime bought on to site and used for that purpose. A general photographic record of the lime mixing procedures should be made and maintained for reference. 5. Photographic records made of the developed site should be used to demonstrate no obvious degeneration of aesthetic value of the site and immediate surrounds. 6. The pH of any surface waters accumulating on site, including during the installation of the pipeline, shall be monitored and if necessary treated on-site to achieve a pH between 7.0 and 8.5 before discharge on-site. 7. Discharge water quality criteria are to be set for local waterways based on either ANZG limits or State/Local Water Quality Objectives (WQOs). Should it become necessary to discharge water from excavations directly to any drain or waterway (e.g. following a heavy rainfall event) monitoring parameters and provisional limits set for discharge of surface waters off site are to be met. 8. Note that other non-ASS related parameters such as nutrient load may be specified for discharge offsite under the auspice of unrelated legislation. 9. Any untreated spoil sent off-site for disposal must meet the acceptance criteria of the proposed disposal facility (e.g. licensed landfill). **Groundwater** 10. Monitoring parameters and provisional limits for groundwater are to be based on 'base line' values established prior to construction. 11. Should results of groundwater monitoring indicate potential impacts to receiving water quality, i.e. rivers or creeks along the alignment, monitoring would be required at upstream and downstream locations within the waterway. **Receiving Waters** 12. Should it become necessary to discharge water directly to any rivers or creeks along the alignment for any reason (e.g. following unexpected heavy rainfall) water quality shall meet the State Government WQOs for the relevant river or creek.
Implementation Strategy	**Treatment of ASS** **Trenching** 1. Additional ASS testing is required where trenching will result in disturbance to soils below 5 m AHD (refer Table 1).

2. A liming regime shall be developed for the trenching works. Lime treatment rates are to be calculated using the approach outlined in the National ASS Sampling Guidelines. Professional judgment by a CPSS is to be used to determine whether Acid Neutralising Capacity (ANC) can be used in the net acidity equation. For example, for high-risk areas, ANC should not be considered unless corroboration testing is undertaken, and ANC is deemed to be effective. In low-risk areas, consideration can be given to utilising ANC in the net acidity equation.
3. Spoil is to be lime treated at the rates determined following the ASS investigations.
4. ASS spoil from trench excavations is required to be limed in-situ and placed as backfill within 24 hrs. Liming rates shall incorporate a factor of safety of 3 which will be sufficient to negate the requirement to undertake verification testing of the material used to backfill the trenches.
5. During trenching, spoil shall be placed on the up-gradient side of the trench.
6. A layer of lime shall be applied to the surface prior to the placement of spoil on the side of the trench (nominally spread at rates of 2.5 - 5 kg/m2 pending the results of additional testing).
7. During excavation of the trench, local drawdown of the groundwater table (where required) shall be undertaken in stages to minimise the risk of oxidation of PASS.
8. During excavation of the trench, lime shall be adequately mixed into the soil as it is backfilled into the trench. Backfilling of treated spoil shall be carried out within 24 hours of disturbance.
9. Excavated material that cannot be backfilled into the pipe trench (mounding of spoil <0.3 m thickness on top of the backfilled trench is acceptable), is to be collected and placed within a purpose-built treatment area for treatment and verification.
10. Spoil at the lime treatment area is to be verified by carrying out the CRS suite or SPOCAS analysis. Testing shall be conducted at a rate of 1 test per 100 m3 of spoil.
11. Any soil that does not meet the performance criteria shall have further lime added and be re-tested to confirm neutralisation.
12. Stockpiling of soil and liming shall not be carried out in areas directly adjacent to creeks and rivers.

Management of Naturally Acidic Non ASS

13. Wherever possible, excavations involving disturbance of ASS are to be carried out in a staged manner to minimise the time that ASS are exposed and minimise the risk of further oxidation and impact to the receiving environment.
14. Spoil to be treated at a lime treatment area must be taken offsite within 48 hours of excavation. No stockpiling is to take place within 25 m of a waterway. Should it be required to stockpile spoil for longer than 48 hours, spoil shall be taken to a stockpiling area that is not
15. within 50 m of a waterway or open drain and shall be positioned above flood levels with appropriate bunding. A guard layer of agricultural lime shall be placed beneath the stockpile at a rate of 5 kg/m2.
16. ASS spoil that is required to be taken to a lime treatment area is to be transported in covered trucks. The top of the spoil shall be moistened by the application of a light water spray before covering. The trucks will then be covered by a tarpaulin or other dust proof cover and effectively sealed prior to transport off-site.
17. All trucks are to be visually checked for closed tailgates and

fastened covers before leaving the site. Trucks are to be free of any considerable amount of adhering soil.

Management of Naturally Acidic Non ASS

18. Spoil identified during investigations as containing naturally acidic non ASS can undergo a lower level of treatment as per the Soil Management Guidelines V4. A reduced factor of safety of 1.2 can be adopted for material reused as backfill in trenches.
19. Any identified naturally acidic non ASS that cannot be used as backfill within trenches can have required aglime added during transport in trucks, thus achieving a degree of mixing during transport and placement. Alternatively, the aglime can be incorporated into the spoil at a designated treatment area/s. Verification testing is not required for naturally acidic Non ASS.

Lime Treatment Areas

20. Design details of designated lime treatment areas is to be included in this EMP once these are available.
21. Lime treatment areas shall not be constructed within 50 m of waterways.
22. Due to the project length, more than one treatment area may be utilised. Treatment areas will be progressively constructed then decommissioned once works cease in a particular area.

    Lime treatment areas are to be free of vegetation and either (a) covered by a sealed hard surface such as concrete or asphalt, or (b) alayer of imported compacted non-ASS clayey material (0.3 metres thick), or (c) if clays are present at the soil surface, have guard layer of agricultural lime applied to the exposed surface at a rate of 5 kg/m2 and worked in using a rotary hoe (or similar) and compacted to create suitable ‘pad’.

23. Lime treatment areas are to be surrounded by an adequate low permeability perimeter bund (low permeability compacted earth or concrete/block work or layers of sandbags or similar) to prevent runoff from escaping following rainfall.
24. All spoil requiring treatment on the pad is to be treated within 24 hours of disturbance.
25. Excavated ASS spoil that is not backfilled in trenches (or taken directly offsite for disposal to landfill) is to be placed in one of the purpose-built lime treatment areas for treatment with agricultural lime.
26. ASS material shall be placed on top of the 'guard layer' in up to 300 mm thick layers (or windrows) to allow drying (if wet) before lime addition and mixing.
27. Materials requiring liming at differing rates are to be kept separated at all times and tracked independently.
28. Once a layer of ASS is sufficiently dry (the length of drying time will depend on the texture of the soil), apply agricultural lime to the spoil using physical or mechanical means, at the required liming treatment rate and mix well.
29. Lime neutralisation of treated ASS spoil is to be verified by carrying out SPOCAS or CSR suite on the treated spoil in accordance with the Monitoring Section of this EMP and held in the bunded treatment area until verification testing is completed and results meet performance criteria. Once verified, the material may be used in earthwork activities subject to the suitability of geotechnical properties of the material.
30. Lime treatment areas are to be reinstated at the conclusion of the project.

Lime Guard Layers

31. Anywhere where alluvium is exposed at the base of the trench excavations, a surface application of lime is to be applied to the base of the excavation prior to backfilling. Rates are to be determined following the site investigations.

32. A surface application of lime is to be applied to the base of all excavations left uncovered for longer than 48 hours, at rates of the order of 2.5-5 kg/m^2 (to be confirmed following additional investigations).

Liming General

33. Mitigation strategies in the Corrective Actions Section shall be implemented if remediation procedures fail to achieve the nominated 'Performance Limits'.

    Sufficient quantities of the lime shall be retained on site to allow replenishment of guard layers and lime treatment of spoil. Stockpile(s) of agricultural lime will be kept well inside the site boundary and covered, where necessary to prevent nuisance dust, in volumes sufficient for predicted treatment works.

34. Personnel working with ASS shall be inducted to a site Occupational Health and Safety Plan. As a minimum, personnel in contact with ASS shall wear nitrile gloves, long sleeved shirt, full length pants and safety footwear when directly handling untreated ASS and during prolonged exposure to lime.

35. Lime to be used shall be of high quality (calculations are based on 96% purity) and kept in a dry state.

Management of Surface Water

36. No 'active' drawdown of the permanent groundwater table is to take place in areas containing PASS during trenching or any other construction activities.

37. Sufficient quantities of the chosen water neutralising agents (e.g. hyrdrated lime) shall be kept on-site in a dry state (eg. locked in a shed, toolbox).

38. Should significant volumes of water become ponded in the trench or open excavations (eg. > 50 litres), water monitoring and when required, treatment, shall be undertaken prior to discharge. Treatment shall involve the application of hydrated lime (in small amounts) until the pH is between 7.0 and 8.5 and other performance indicators are met. Small quantities of the neutralising agent shall be used and the pH shall be regularly monitored during lime addition to limit the risk of over dosing (refer to Table 5 of the SPP 2/02 attached in Appendix C).

39. Once neutralised, the water may be discharged to sewer if a licence is obtained from Council and Councils discharge parameters are met or else discharged on-site using 'soaker' hoses in areas at least 100 m away from waterways.

40. Should discharge to any river or creek be required, the discharge water shall be sampled and analysed to meet either ANZG limits or State/Local Water Quality Objectives (WQOs).

41. Note that other non-ASS related parameters such as nutrient load may be specified for discharge offsite under the auspice of unrelated legislation.

Spatial Tracking

42. Spatial tracking is to be undertaken and records of day to day earthworks and treatment activities operations shall be maintained. This includes in-situ lime treatment and treatment at a designated lime treatment areas.

43. To enable adequate monitoring of lime mixing operations the following must be adopted:

	44. A photographic record of the lime mixing procedure is to be made and retained for reference. 45. Where verification testing is required, lime treated spoil from a specific location shall not be 'accepted' until verification test results are known, reported and accepted.
Monitoring	**Limed Spoil** 1. Lime neutralisation of treated ASS spoil is to be verified by either the SPOCAS or CRS suite. Verification testing should be undertaken at a rate of one sample per 100 m3. 2. Lime verification sampling and analysis is to be undertaken on all treated spoil within 72 hours of lime treatment. 3. Each sample taken for verification testing is to be a composite (of at least 1 kg) blended from a minimum of 6 discrete grab samples collected from within the treatment cell. 4. Verification sampling must be undertaken by a suitably trained person. **Sample Handling** 5. Soil verification samples are to be collected in specified sample containers supplied by a NATA accredited laboratory, and kept refrigerated during sampling and frozen up until dispatched to the laboratory. 6. Samples must be submitted to the NATA accredited laboratory, 7. accompanied by the appropriate 'chain of custody' documentation.
Corrective actions	**Lime Treatment** 1. Should results of verification testing of ASS spoil treated at a lime treatment area indicate residual acidity outside the allowable limits the affected material shall remain within the nominated treatment area, and be re-treated with sufficient lime to achieve the 'Performance 2. Limits' and verification process repeated until these limits are met. **Surface Waters** 3. If the pH of any water to be discharged off-site is outside of the specified performance limits, dose locally with hydrated lime slurry at a concentration sufficient to adequately increase the pH level (refer to the SPP 2/02 Table 5) and monitor pH during dosing to limit risk of over dosing. 4. Once earthworks are underway, should water quality in any monitoring wells fall outside adopted 'Performance Limits', resample affected wells and if the parameters do not return to within the required 'Performance Limits' at the next scheduled event, contact the Environmental Officer, implement more frequent sampling and analysis, and meet with the Principal Contractor to review ASS management strategies.

3 DOCUMENTATION

The following documents are required to measure environmental performance of the project in relation to ASS management:

1. Environmental Management Plan (EMP) – Acid Sulfate Soils
2. Site Induction Form(s)
3. Inspection and Monitoring Records – Form(s)

4. Environmental Compliance Report(s)
5. A Site Activities Register
6. Rectification Request and Instruction – Form(s)
7. General Progress Report(s)
8. Material Tracking Sheet
9. Soil Treatment Monitoring Form
10. Concerns Register

Item 1 is included in Appendix B; the remaining items are defined in Section 4.

4 REPORTING FRAMEWORK

4.1 Site Induction / Training

All employees of the Principal Contractor and sub-contractors working at site must undergo a site induction relating to the Environmental Procedures and Management framework outlined in the EMP. The induction will aim to develop and instil a high level of environmental awareness in all project personnel. It is the responsibility of the Principal Contractor to verify the satisfactory completion of an appropriate Site Induction form.

4.2 Records of Monitoring and Inspection

The outcome of all on-going site monitoring programs, ASS verification testing, weekly meetings, and site ‘walk over’ inspections will be recorded on an appropriate Inspection and Monitoring Record form. Any monitoring that requires more frequent attention shall be completed as required and recorded on a separate form.

4.3 Environmental Compliance Reports

Audit(s) of implementation of this EMP shall be carried out and an Environmental Compliance Report prepared.

4.4 Corrective Action Requests and Instructions

Any non-conformance will be documented on an appropriate form stating the nature of the non-conformance and the mechanisms implemented to rectify the problem. Any CARs (and follow up actions) are to be reported in the Monthly Monitoring Report.

4.5 Material Tracking Sheet

All ASS material excavated shall be recorded by the Site Supervisor daily on the Material Tracking Sheet. Material Tracking Sheets need to be returned to the site environmental officer or the environmental team for record keeping.

Refer to Section 6 for the for the Material Tracking Sheet.

4.6 Soil Treatment Monitoring Form

Soil Treatment Monitoring Forms are required for each lime treatment area in order to log the activities associated with lime treatment, including verification testing of treated ASS material where this is required. Soil Treatment Monitoring Forms need to be retained for record keeping.

Refer to Section 6 for the for the Soil Treatment Monitoring Form.

4.7 Concerns Register

The Concerns Register is to be filled out by the Site Supervisor for each concern raised by a member of the public.

Refer to Section 6 for the Concerns Register.

5 REFERENCES

5.1 Regulatory Documents

- *Queensland Environmental Protection Act 1994*.
- Queensland Environmental Protection (Water and Wetland Biodiversity) Policy 2019.
- State Planning Policy, July 2017
- State Planning Policy – State Interest Guideline Water Quality April 2016 (Policy 9)
- Department of Local Government and Planning and the Department of Natural Resources and Mines 2002, State Planning Policy (SPP 2/02) Guideline "Planning and Managing Development involving Acid Sulfate Soils“
- Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, National Acid Sulfate Soils guidance: National acid sulfate soils sampling and identification methods manual, Department of Agriculture and Water Resources, Canberra ACT. CC BY 4.0. (*'National ASS Sampling Guidelines 2018'*)
- Sullivan, L, Ward, N, Toppler, N and Lancaster, G 2018, National Acid Sulfate Soils Guidance: National acid sulfate soils identification and laboratory methods manual, Department of Agriculture and Water Resources, Canberra, ACT. CC BY 4.0. (*'National ASS Laboratory Guidelines 2018'*)
- Shand, P, Appleyard, S, Simpson, SL, Degens, B, Mosley, LM 2018, National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments, Department of Agriculture and Water Resources, Canberra, ACT. CC BY 4.0. (*'National ASS Dewatering Guidelines 2018*')
- Dear, S-E, Ahern, CR, O'Brien, LE, Dobos, SK, McElnea, AE, Moore, NG and Watling, KM 2014, Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines V4.0, Department of Science, Information Technology, Innovation and the Arts, Queensland Government (‘*Soil Management Guidelines V4*')

MATERIAL TRACKING SHEET

This form is to be filled out by the Site Supervisor on a daily basis in order to track the movement of ASS from its excavation location to the lime treatment area.

Material Tracking Sheet No.:

Excavation					Transport to Lime Treatment Area (Yes/No)		Lime Treatment
Area / Chainage	Date excavated	Depth of excavated soil (m)	Approximate Volume excavated (m^3)	Reused as backfill (Yes/No)	Date transported	Time	Treatment Location/ Area

Site Supervisor Name: **Site Supervisor Signature:**_____ **Date:**

Please include additional comments overleaf.

RETURN THIS FORM TO THE SITE ENVIRONMENTAL OFFICER OR THE ENVIRONMENTAL TEAM FOR RECORD KEEPING

SOIL TREATMENT MONITORING FORM

This form is to be filled out by the Site Supervisor for each treatment area in order to log the activities associated with lime treatment including verification testing of treated ASS material.

Soil Treatment Monitoring Form No.:

Origin of excavated spoil requiring lime treatment (i.e. Area/Chainage)	**Date transported to treatment area**	**Treatment Location/ Area**	**Date of soil treatment**	**Spoil has been treated according to the liming rates specified in the ASS EMP** *(Yes / No Liming Rate)*	**Discrete, composite samples have been collected for verification testing** *(Yes / No)*	**Date of verification Sampling**	**Samples have 'passed' verification testing** *(Yes / No)*	**Date of Round 2 Verification Sampling**	**Samples that 'failed' verification (if any) have now 'passed' verification** *(Yes / No / NA)*

Site Supervisor Name: **Site Supervisor Signature:**_____ **Date:**

Please include additional comments overleaf.

RETURN THIS FORM TO THE SITE ENVIRONMENTAL OFFICER OR THE ENVIRONMENTAL TEAM FOR RECORD KEEPING

CONCERNS REGISTER

This form is to be filled out by the Site Supervisor for each concern raised by a member of the public.

Concerns Register Form No:

Fitzroy to Gladstone Pipeline	**CONCERNS REGISTER**	Complaint No.

Complainant Details

Name: _____

Address: _____

Contact Phone No. _____

Date: _____

Time: _____

Received by: _____

Nature of Concern

Detail of Complaint: _____

_____

Location of Incident: _____

Date of Incident: _____

Persons Involved: _____

Concern Received By:

Telephone:

In Person:

In Writing:

Action Taken or Required:

Action Required (Y/N):

Time/date of Action: _____

Type of Action: _____

_____

Responsible Person: _____

Follow Up

Remedial activities performed _____ Date: _____

_____ Performed by: _____

Complainant Response To Action: _____

Further Action Required? (Y/N)

If Yes, Details of Further Action Required: _____

Prevention Of Re-Occurrence

Preventative Action Required? _____

If Yes, Details of Further Action Required: _____

Site Supervisor Name: **Site Supervisor Signature:** _____ **Date:**

RETURN THIS FORM TO THE SITE ENVIRONMENTAL OFFICER OR THE ENVIRONMENTAL TEAM FOR RECORD KEEPING

Gladstone Area Water Board

Bushfire Management and Mitigation Management Plan

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

Queensland Government

SDA approval: AP2024/014

DATE OF ISSUE:	November 2025
MAINTAINED BY:	Position of Document Owner
CURRENT VERSION:	Version 1
REVIEW DATE:	12 months from 'Date of Issue'
DOCUMENT TYPE	Management Plan

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Gladstone Q 4680
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Gladstone Area Water Board

CONTENTS

1. INTRODUCTION

The Bushfire Management Sub-Plan (BMP) is one component of the GAWB Construction Environmental Management Plan (CEMP) for the East End Pipeline Project (hereafter referred to as "the Project"). Section 4.1 of the CEMP provides further background and detailed description of the Project.

The BMP describes how bushfires will be managed and any potential impact minimised during construction. This BMP has been prepared with consideration of Project requirements, and to address the legal and other requirements outlined in Section 3

1.1 Plan purpose

The purpose of this BMP is to:

- Describe how GAWB and its contractor(s) will manage and control risks associated with bushfires during the construction of the Project
- Provide strategies to control potential impacts of bushfires during construction
- Address the requirements of applicable legislation
- Address approval, permit/licence and contractual requirements.

1.2 Management objective and performance criteria

Objectives and performance criteria for the Project in relation to bushfires include the following:

Objectives	**Performance Criteria**
• To provide a strategic and systematic framework to enable construction of the project with minimal environmental or social impact due to bushfires • To ensure all construction activities are undertaken with the objective of preventing such impacts	• No uncontrolled bushfires caused by GAWB or its contractors • No loss of protected or native fauna and flora due to uncontrolled bushfires caused by GAWB or its contractors • No damage to property, plant or equipment resulting in delays to the Project due to uncontrolled bushfire

1.3 Plan Scope

This plan applies to all works associated with the Project.

1.4 Interface with other documents

This BMP forms part of the overall CEMP for the Project.

2. LEGAL ANDOTHER COMPLIANCE REQUIREMENTS

2.1 Relevant legislation

- *Environmental Protection Act 1994*
- *Environmental Protection and Biodiversity Conservation Act 1999*
- *Fire and Emergency Services Act 1990*

2.2 Australian Standard and Industry guidelines

- Gladstone Regional Council - Local Disaster Management Plan
- Permits, approvals and licence conditions
- Landowners' requirements
- MCU development permits
- Operational works development permits

3. CONTEXT

3.1 Key risks

Where work is in and around native bushland and grasslands, fuel/fuel load of any type there is a potential risk of bushfire/fire. A robust understanding of bushfire risk is vital to minimising its potential impact and increasing resilience in the Region. By considering a range of factors, including wind, ecology, topography, climate, bushfire prone area mapping, fuel load, fire history and community consequence.

Under the Gladstone Regional Council Planning Scheme, the project predominately passes through high and medium bush fire hazard areas.

Road Centrelines

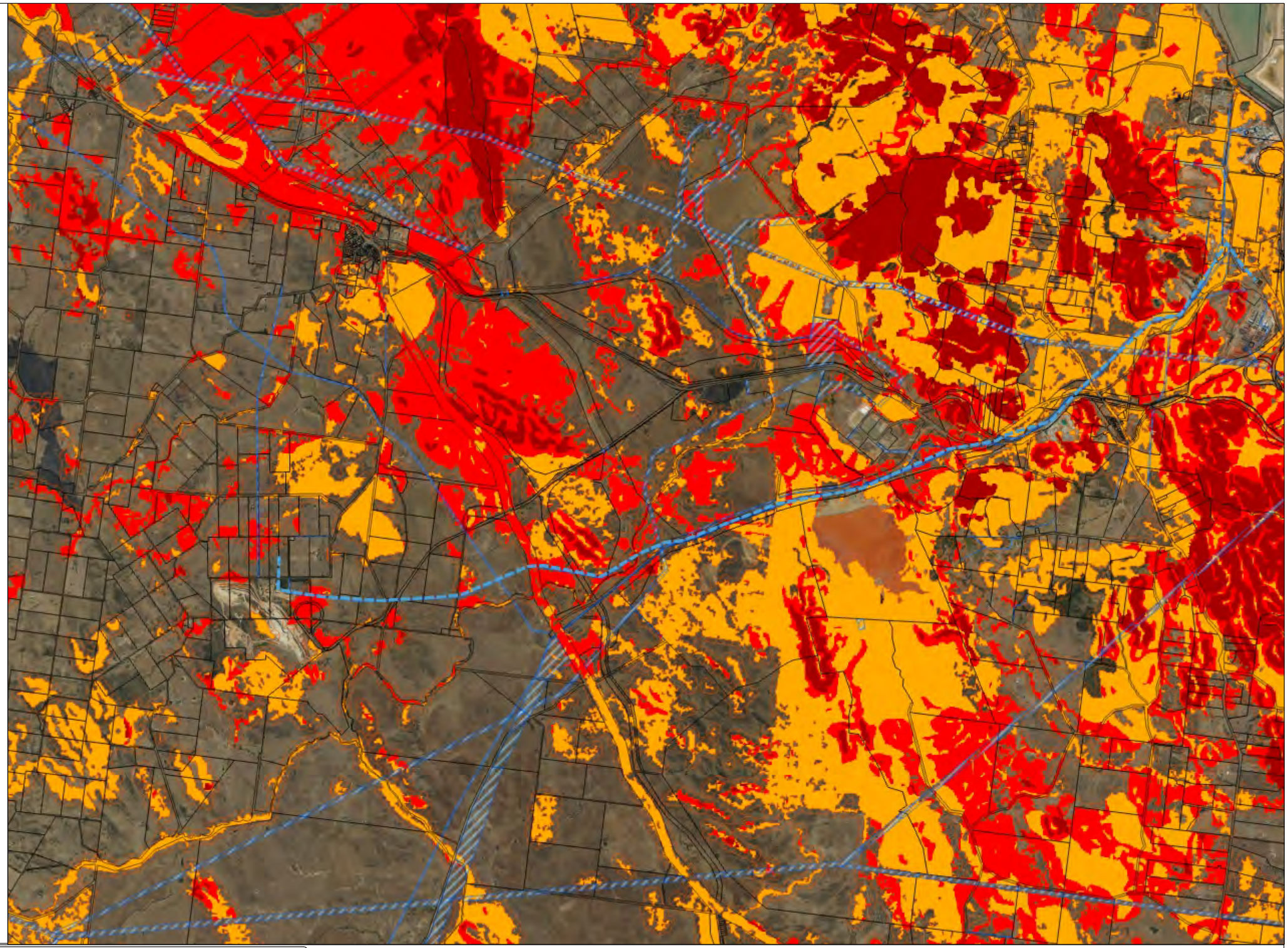
Easement

Base Parcel

Base Point

Bushfire Prone Areas

- Very High Potential Bushfire Intensity
- High Potential Bushfire Intensity
- Medium Potential Bushfire Intensity
- Potential Impact Buffer



GLADSTONE REGIONAL COUNCIL

Map Title

1,891.35 0 945.68 1,891.35 Meters

Printed: 25-Nov-2024

Map Scale 1: 75,654

Original Size: A3

3.1.1 *Risk assessment process*

Due to the inherent nature and seasonal variability of bushfire hazards, bushfire risks shall be incorporated into the Project Risk Register. The risk assessment will consider:

- BOM and Bushfire CRC seasonal and daily predictions
- Existing and predicted fire danger ratings / predicted fuel loads
- Fire history
- Geographic location of project works and local knowledge
- QFRS and other relevant agency advice and recommendations; and
- Status of the project and project activities.

3.1.2 *Risk controls*

Bushfire risk controls are specific to the particular risk, and are prioritised in the order of reduction, mitigation, and suppression activities. All risk controls shall be reviewed annually. Risk treatment shall seek to:

- Provide training to all employees/contractors on fire hazard minimisation
- eliminate all possible ignition sources
- eliminate or restrict available fuel sources
- enable a prompt and effective suppression response to an outbreak
- enable situational awareness of current circumstances (fire risk)
- encourage partnerships with adjoining landowners
- enable safer work practices aligned to Fire Danger Ratings
- consultation and engagement.

3.1.3 *Queensland Fire and Rescue Service (QFRS) and Rural Fire Brigades*

GAWB (or its contractor) will leverage the existing Fitzroy to Gladstone Pipeline's (FGP) close working relationship with the local Queensland Fire and Emergency Services (QFES) / Rural Fire Services (RFS) and Gladstone Regional Councils Disaster Management Committees in its area of operations, including:

- Conduct of emergency response exercises and joint training activities
- consideration of resource support
- corridor and rollingstock familiarisation
- operational communication protocols
- participate in ongoing liaison with Queensland Fire and Emergency Services (QFES) / RFS, including
- membership of appropriate consultative groups and committees
- providing location information regarding the corridor
- providing location of corridor access roads
- providing location of staging areas
- provision of local knowledge for inclusion in CEMP
- review of emergency response plans and procedures
- sharing of fire risk intelligence.

3.1.4 *Emergency Contact list*

Up to-date emergency contact list shall be compiled and maintained for owners and occupiers of all properties adjoining the EEPL site enabling relevant stakeholders to be contacted and advised of any bushfire related activity, threat, or issues.

3.1.5 *Accessibility*

GAWB acknowledges that access to a bushfire is critical in successfully combating the bushfire and its impact. The Contractor, in coordination will aid the QFES and RFS in gaining access to bushfire by providing up-to-date maps and locations of:

- Site access gates and roads
- Signed staging areas

3.1.6 *Fire suppression equipment*

The GAWB engaged principal contractor will provide and maintain in operational condition the following fire suppression equipment for use in fire suppression activities, which will be compatible with QFES and RFS:

- Fire extinguishers (appropriate to the hazard)
- Water Tankers (can be used for dust control and firefighting).

4. ROLES, RESPONSIBILITIES AND AUTHORITIES

All site personnel are responsible to ensure that they minimise environmental nuisance or harm by adherence to all Project Management Plans and other documentation. Site personnel are also responsible for ensuring they do not act in contravention of any Environmental Approval or the Contract. Field Supervisors are responsible for implementation and maintenance of mitigation measures outlined in the BMP for all activities or work areas under their control.

The Environmental Manager is responsible for routine surveillance and monitoring, communication of requirements of this Sub-plan, coordination of visual monitoring, and all other responsibilities related to bushfire management identified within this Sub-plan and overall CEMP. Importantly the Environmental Manager is responsible for the immediate notification of State and/or Commonwealth government authorities of impacts that have mandatory reporting requirements

The Construction Director is responsible for overseeing implementation of this Sub-plan and overall CEMP.

5. IMPLEMENTATION STRATEGY

5.1 Mitigation and Management Actions

The Table below outlines the mitigation and management measures to be carried out to ensure the Project meets all necessary requirements.

Reference	Mitigation and Management Action	Timeframe/s	Responsibility
01	Intent of this sub-plan will be communicated through the Site Induction process, to ensure all site personnel are aware and take ownership of sub-plan requirements relating to this element	Prior to construction	Construction Director
02	Requirements relating to this sub-plan to be revisited frequently (during the induction, site mobilisation and high-risk days such as extreme heat waves) through Toolbox and Prestart meetings	During construction	Environment Team
03	Fire risks will be assessed for each work area prior to works commencing	During construction	Safety Team Superintendent Supervisors
04	Work areas will have adequate road access for emergency vehicles and evacuation.	During construction	Superintendent Supervisors

05	An adequate and accessible water supply will be provided for firefighting purposes. Water will be supplied from local councils, dams and licenced bores in remote locations. It will be stored in dams, water trucks and small mobile firefighting trailers.	During construction	Superintendent Supervisors
06	Fire breaks will be developed to provide setbacks between buildings/structures and hazardous vegetation, and provide access for emergency vehicles	During construction	Superintendent Supervisors
07	Hot works to be undertaken as per requirements of Hot Works Permits.	During construction	Superintendent Supervisors Safety Team Engineers
08	Fire breaks shall be checked regularly and maintained as necessary.	During construction	Superintendent Supervisors
09	Bushfire response methods and evacuation plans will be included in the Emergency Response Plan.	During construction	Safety Team Superintendent
10	Electrical cables will be kept in good condition	During construction	Superintendent Supervisors
11	Chemical and hydrocarbon storage areas will be located in areas with low bushfire potential	During construction	Superintendent Supervisors
12	Water carts on site will be suitable for use in firefighting circumstances (e.g. compatible with QFES).	During construction	Superintendent Supervisors
13	Smoking will not be permitted outside of designated smoking areas.	During construction	All Persons
14	Any stockpiles of vegetation to be used as mulch will be kept moist to prevent outbreak of fire.	During construction	Superintendent Supervisors
15	All site vehicles and access areas will contain a fire extinguisher	During construction	All Persons
16	No intentional fires or wood fired barbeques will be permitted.	During construction	All Persons

6. PERFORMANCE EVALUATION

6.1 Monitoring

General inspections and auditing will be undertaken in accordance with Section 8 of the CEMP. The Environmental Team will undertake environmental inspections to develop and evaluate the effectiveness of environmental controls. This will include:

Monitoring action	Record	Frequency	Responsibility
Routine daily visual observance by all personnel during construction to monitor the site.	Daily Visual Inspection	Daily	Environmental Manager
Weekly inspections using the Weekly Environmental Checklist.	Weekly Environmental Checklist Report	Daily	Site Supervisor
Monthly reporting will be recorded through Project Monthly Reports.	Monthly Report submitted to GAWB	Monthly	Environmental Manager

Regular inspections will be undertaken in relation to bushfires and include the following:

- Effectiveness of the mitigation measures
- Any environmental incidents, hazards or near-misses documented in relation to bushfire management
- Community complaints in relation to bushfire management, and the construction contractor's response
- Bushfire management objectives and tracking against these.

7. REVIEW AND IMPROVEMENT

7.1 Reporting

The Environmental Weekly Checklist, monthly reporting and annual independent audits undertaken throughout the construction phase of the project will be documented and kept on record by the Environmental Manager or their delegate for the duration of the Project.

In the event of a complaint, non-compliance or incident, an investigation will be undertaken to determine the cause of the problem and will be led by the Construction Director. Any identified impacts on bushfire management.

8. DOCUMENT UPDATES

The Site Environmental Management Representative will amend, update, and continue to develop and improve this BMP on an ongoing as the construction program progresses and continual improvement opportunities are identified.

Document Control

Title:	Ecological Assessment Report – Landing Road Pump Station and Raw Water Pipeline
Job Number:	J0309
Client:	Gladstone Area Water Board

Document Issue

Issue	Date	Prepared By	Reviewed By
REV A – DRAFT	10/12/2024	Sophie Homan	Craig Streatfeild
Rev 0 – Response to client comments	11/12/2024	Sophie Homan	Craig Streatfeild

PLANS AND DOCUMENTS
referred to in the
SDA APPROVAL

Queensland Government

SDA approval: AP2024/014

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Figure List

Table List

1.0 Introduction

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

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

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

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

Site Context

Figure 1

BASE/

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

Legend

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

Scale @ A3: 1 : 150000

0 5 10 km

N

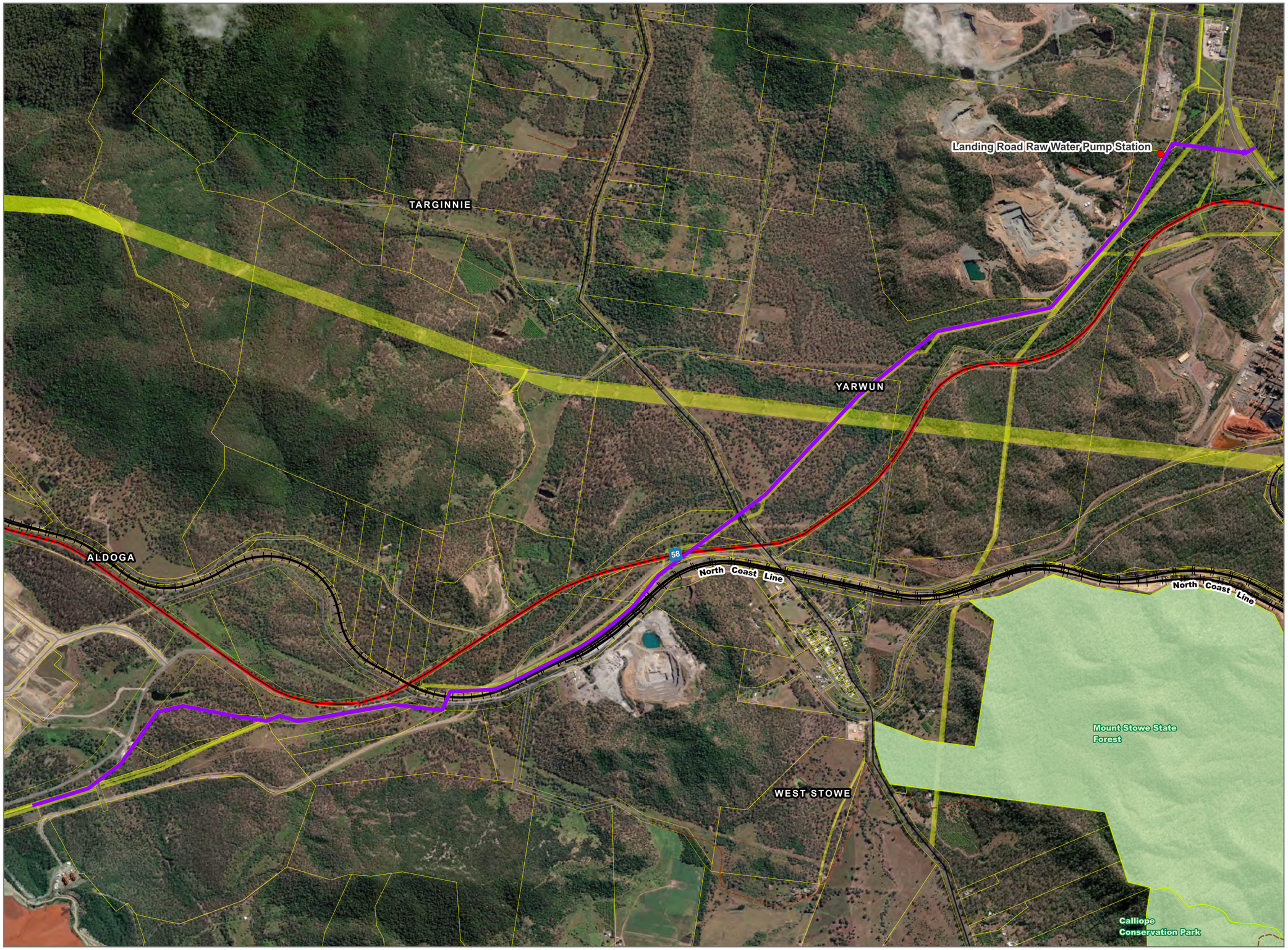
Datum: GDA2020 **Job Number: J0000**

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

Project Area

Figure 2

BASE/



Legend

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

Scale @ A3: 1 : 17679

0 0.6 1.2 km

N

Datum: GDA2020 **Job Number: J0000**

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

1.1 Project description

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

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

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

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

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

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

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

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

2.0 Relevant Legislation

2.1 *Environment Protection and Biodiversity Conservation Act 1999*

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

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

2.1.1 Commonwealth Biosecurity

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

2.1.1.1 Weeds

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

2.1.1.2 Pest animals

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

2.1.2 Biosecurity Act 2015

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

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

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

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

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

2.2 State Legislation

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

2.2.1 *Nature Conservation Act 1992*

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

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

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

2.2.2 *Vegetation Management Act 1999*

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

2.2.3 *Biosecurity Act 2014*

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

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

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

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

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

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

3.0 Methodology

3.1 Approach

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

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

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

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

3.2 Desktop Assessment

3.2.1 Online searches and reports

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

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

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

3.3 Field Assessments

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

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

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

3.3.1 Flora Survey

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

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

3.3.2 Fauna Survey

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

Table 1 Fauna survey methods

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

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

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

3.3.3 Survey Limitations and Assumptions

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

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

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

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

4.0 Results

4.1 Desktop Assessment Results

4.1.1 PMST

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

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

Table 2 Protected Matters Search Tool (PMST) Summary

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

4.1.2 WildNet

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

4.1.3 Protected Plants Flora Survey Trigger Map

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

4.1.4 Desktop mapped Regional Ecosystems

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

Table 3 Mapped regional ecosystems within the Project Area

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

4.1.5 Essential Habitat

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

4.1.6 Waterways

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

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

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

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

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

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

4.2 Field Assessment Results

4.2.1 Flora

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

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

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

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

4.2.1.1 Field Verified Vegetation Communities

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

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

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

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

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

4.2.1.2 Introduced Flora

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

Table 5 Introduced flora species

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

4.2.2 Fauna

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

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

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

4.2.2.1 Fauna Habitat

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

- Non-remnant grasslands.
- Eucalypt woodland.

- Eucalypt forests to woodlands.

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

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

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

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

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

Table 6 Fauna habitat types

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

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

4.2.2.2 Introduced Fauna

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

Table 7 Introduced fauna species

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

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

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

5.0 Impacts and Mitigation Measures

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

5.1 Construction Phase

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

5.1.1 Direct Impacts

5.1.1.1 Vegetation Clearing and Habitat Loss

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

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

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

5.1.1.2 Habitat Fragmentation

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

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

5.1.1.3 Disturbance, Injury and Mortality of Fauna

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

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

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

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

5.1.2 Indirect Impacts

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

5.1.2.1 Impacts to Waterways

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

5.1.2.2 Weed Species

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

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

5.1.2.3 Pests and Feral Fauna

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

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

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

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

5.1.2.4 Activity and Noise

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

- Reduced foraging ability by auditory predators due to increased background noise.
- Increased risk of predation by visual predators due to increased background noise.
- Increased potential for collisions with vehicles.

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

5.1.2.5 Increased Dust

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

5.2 Operation Phase

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

5.3 Mitigation Measures

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

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

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

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

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

6.0 Conclusion

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

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

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

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

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