APPENDIX T.

Environmental Management Plan (Planning)

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Rockhampton Regional Council
29-Apr-2019
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South Rockhampton Flood Levee

Environmental Management Plan (Planning)

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Environmental Management Plan (Planning)

Client: Rockhampton Regional Council

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Prepared by

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1.0 Introduction

This Environmental Management Plan (Planning) (EMP(P)) applies to the proposed development of the South Rockhampton Flood Levee (the Project). The EMP(P) supports the Environmental Assessment Report by highlighting key environmental elements relevant to the Project. Furthermore, the EMP(P) is in place to provide guidance to the Construction Contractor for the development of a Construction Environmental Management Plan (CEMP) to guide the environmental management during the construction phase of the Project. This EMP(P) and Construction Environmental Management Plan (CEMP) should be considered a 'live' document and be updated when required as the Project progresses.

1.1 Purpose

The purpose of the EMP(P) is to provide recommendations to be considered during the construction phase of the Project and incorporated into the project documentation, mainly the CEMP. These recommendations aim to avoid, mitigate and manage the potential impacts associated with the Project that have been identified within the Environmental Assessment Report.

This EMP(P) also provides a high-level risk assessment of potential environmental impacts prior to the implementation of the proposed mitigation measures. The Construction Contractor will be responsible for identifying effective construction mitigation measures and determining an appropriate residual risk rating for applicable impacts.

1.2 Project Background

The construction of the Project has been proposed with the purpose of reducing recurrent flood risks associated with the Fitzroy River. The levee will be built for and provide protection against a 1% Annual Exceedance Probability (AEP) event or 100 year Average Recurrence Interval (ARI) flood immunity with 600 mm freeboard. This will be equivalent to a 9.89 m gauge level (post Project construction).

The Project is situated in the city of Rockhampton, Queensland, Australia (23°23'19.08"S, 150°30'39.12"E). The Project site will be situated approximately 50 km inland from the mouth of the Fitzroy River and will run for approximately 9 km between Rockhampton Central Business District and Blackall Street at Upper Dawson Road (refer Figure 1).

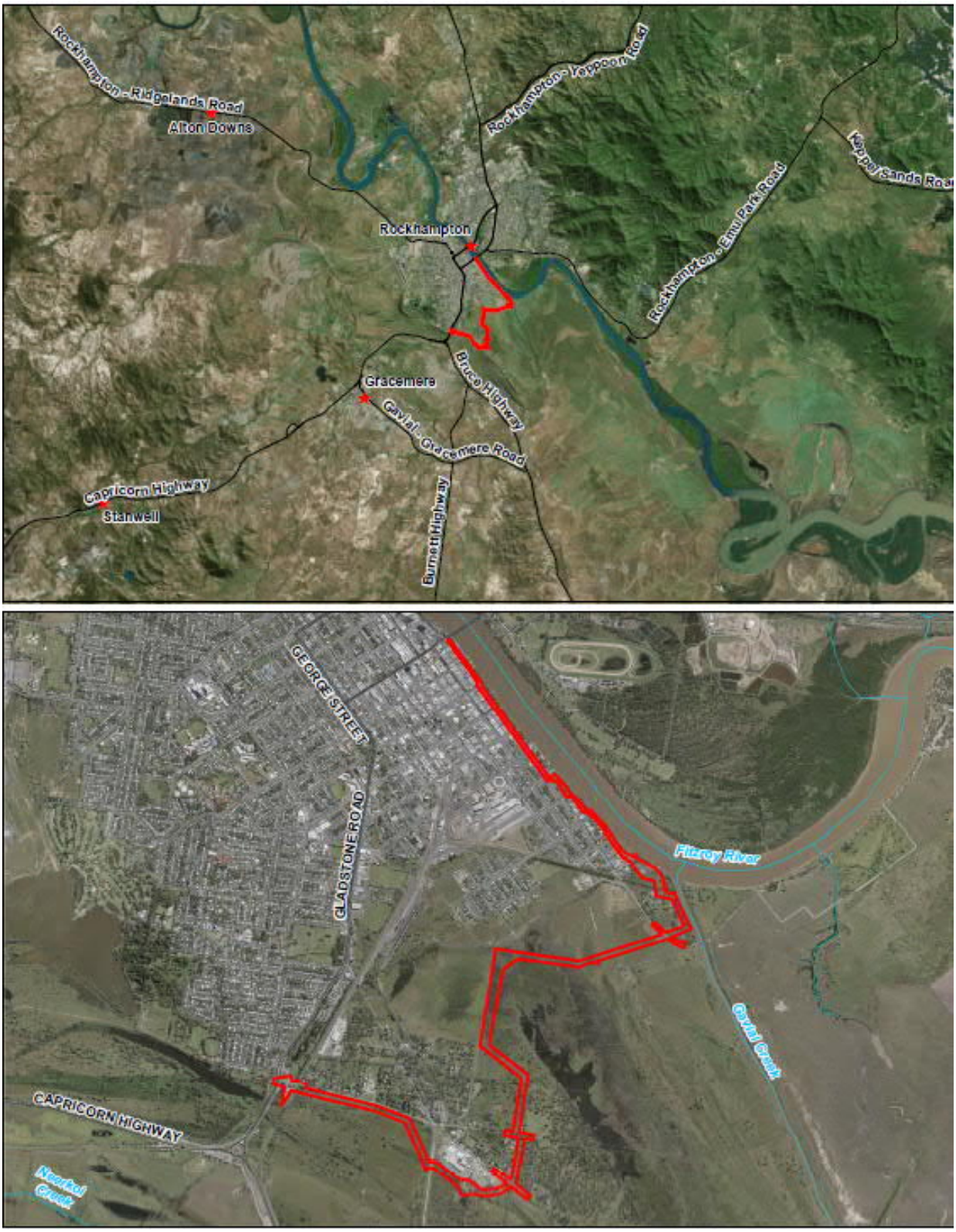

Figure 1 Project area

2.0 Proposed Works

Construction of the Project is anticipated to take approximately two years to complete and is envisioned to commence in late 2019. The Construction Contractor will be responsible for determining specific construction methodology, however it is anticipated that proposed works will include the following.

- Vegetation clearing and grubbing.
- Bulk earthworks.
- Installation of 5.9 km of earth embankment incorporating a clay core and outer shell.
- Installation of 0.7 km of crib wall.
- Installation of 0.9 km of composite flood wall.
- Installation of 0.4 km of spillway.
- Installation of 0.7 km of temporary levees.
- Installation of outlets with backflow prevention devices.
- Construction of flood gates where the levee traverses existing road/rail assets.

The Project area is approximately 50 m wide to provide space for the levee structure, drainage ditches, levee crest access ramps and other ancillary structures. An increased or decreased corridor width has been adopted in key areas where required.

The proposed works are foreseen to interact with local infrastructure including local roads, state roads, rail, a sewerage treatment plant, energy transmission, local drainage and stormwater infrastructure.

3.0 Legislative Compliance

The construction of the Project will be required to comply with all relevant Commonwealth and State legislation in relation to environmental management and duty of care.

Environment Protection and Biodiversity Conservation Act 1999

A Referral under this Act will be lodged with the Department of Environment and Energy. This EMP(P) will need to be updated to reflect the outcomes of the Referral process.

Planning Act 2016

The *Planning Act 2016* allows for the Minister to designate premises for the development of infrastructure prescribed within the Planning Regulation 2017. The Planning Regulation 2017 prescribes a number of developments considered 'infrastructure', one of which is "water cycle management infrastructure".

Where a designation is made, all development associated becomes "accepted development" under the *Planning Act 2016*. This EMP(P) will need to be updated to reflect any conditions or requirements imposed by the Minister through this process.

Other Legislation

Compliance with the requirements and / or Duty of Care in line with the following legislation must be achieved during construction.

- *Environmental Protection Act 1994*
- *Aboriginal and Cultural Heritage Act 2003*
- *Queensland Heritage Act 1992*
- *Biosecurity Act 2014*
- *Nature Conservation Act*
- *Water Act 2000*
- *Fisheries Act 1994*
- *Vegetation Management Act 1999*.

4.0 Environmental Management

The Construction Contractor will be required to consider and incorporate the information from this EMP(P) and any other pertinent information (e.g. conditions of permits, information from tender documents and specifications etc.) into a Project specific CEMP.

4.1 RRC Environmental Management System

Council requires compliance with its environmental and operational policies when undertaking construction works. Operational procedures will also be required support compliance with the policies applicable to the proposed works.

4.2 Key Personnel

This section provides the contact details for the Principal (RRC) and Construction Contractor representatives once appointed (see Table 1). Contact details for all key personnel will be required to be listed in the Construction Contractor's CEMP once prepared.

Table 1 Contact details of Principal and Construction Contractor key personnel.

Contact Details	
Principal (Rockhampton Regional Council)	
Title	
Contact	
Mobile	
Email	
Superintendent or Contract Administrator (To be advised)	
Title	
Contact	
Mobile	
Email	
Construction Contractor (To be advised)	
Title	
Contact	
Mobile	
Email	
Construction Contractor Environmental Representative (To be advised)	
Title	
Contact	
Mobile	
Email	
Construction Contractor Safety Advisor (To be advised)	
Title	
Contact	
Mobile	
Email	

4.3 Responsibilities

The Construction Contractor will be responsible for ensuring that all activities undertaken to construct the Project meet relevant Commonwealth and State legislative requirements and duty of care obligations. The Construction Contractor will be responsible for regularly monitoring construction activities and maintaining an incident register should any environmental incidents occur.

All personnel working on site, including sub-contractors, should be made aware of this EMP(P) and CEMP (once developed) and will hold personal responsibility for ensuring compliance with its contents.

It will be the responsibility of the Construction Contractor to investigate, report and ensure appropriate corrective actions are implemented if an environmental incident occurs. The Environmental Representative should inform the Principal and if necessary the relevant authority of any environmental incidents or complaints related to construction of the Project.

The Construction Contractor must provide detailed responsibilities for site personnel pertaining to environmental management throughout the Project in the CEMP.

4.4 Inductions

All personnel working on site, including sub-contractors must undertake a site induction that will inform them of their general obligations and identified site-specific environmental risks for the Project works. At a minimum the environmental induction should cover the following:

- General environmental duty of care.
- Duty to notify of environmental harm.
- Key personnel to contact and report environmental concerns or incidents.
- Cultural Heritage (historical and non-indigenous), including low, medium and high-risk cultural heritage zones on-site (if required).
- Waste management including regulated waste and bin locations.
- Hazardous substance management and storage including spill procedure and location of spill kits.
- Flora management, including no-go zones (if required).
- Biosecurity protocols, including vehicle wash-down procedures and no-go zones.
- Fauna management protocols.
- Water management, including dewatering procedures.
- Erosion and sediment control requirements.
- Air quality, including dust management.
- Noise pollution including working hours and when working close proximity to residential properties.
- Vibration monitoring requirements (if required).
- Community liaison including actions in the event of a complaint or being approached by a member of the public.

4.5 Site Inspections & Reporting

The Construction Contractor's Environmental Representative must undertake regular inspections and audits of the work site to confirm that the measures of the CEMP are met. A pre-commencement audit should be undertaken to ensure that appropriate protection measures have been adequately adopted prior to the commencement of work.

Weekly inspections of the site should be undertaken using an appropriate checklist to verify compliance with management procedures, functioning of environmental controls and identification of improvement measures. Any non-conformances should be identified, and corrective action prescribed to repair/enhance control measures or reverse any environmental harm that may have occurred. All inspections should be documented with photographic evidence of site conditions before and after remediation efforts (where necessary). It is recommended that prior to construction the Construction Contractor and Principal agree on a joint inspection schedule and provision of information requirements.

4.6 Environmental Incidents, Hazards and Complaints, Emergency Response

Environmental hazards, incidents and complaints must be reported to the Construction Contractor's Environmental Representative and/or Superintendent.in the first instance. The Environmental Representative is responsible for notifying the Principal, and/or the DES to report the incidence as per the EMP(P).

Section 320 of the *Environmental Protection Act 1994* imposes a duty on persons undertaking works to notify their employer of serious or material environmental harm as soon as it occurs.

Where serious or material harm occurs, the Principal must be informed, and the Queensland Government contacted to report the event. The Department of Environment and Science (DES) pollution hotline number is 1300 130 372.

5.0 Environmental Risk Assessment

A high-level risk assessment of potential impacts prior to the implementation of mitigation measures was undertaken to support the development of appropriate mitigation measures proposed in this EMP(P). The framework for the environmental risk assessment is shown in Table 2.

The Construction Contractor will be responsible for determining specific construction related environmental risks, including the development of additional effective construction mitigation measures as required to appropriately manage the proposed works.

The Construction Contractor must develop a CEMP that includes additional environmental risk assessments and incorporates them into a Risk Register, with a residual risk rating for applicable impacts.

Table 2 The risk matrix framework for environmental risk assessment.

Risk Matrix

Likelihood \ Severity	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Risk level
Low
Moderate
High
Very High

Severity		Likelihood	
1	Minor environmental incident with no regulatory violation	1	Rare – may occur at in rare circumstances
2	Potential complaints from local residents, no regulatory violation.	2	Unlikely - might occur at some
3	Potential for lost time / complaints from local authorities for regulatory violation.	3	Possible - could occur at some time
4	Minor regulatory violation with potential for fines / prosecution.	4	Likely - will probably occur at most times
5	Potential for major environmental release with high clean-up cost/fines and or prosecution.	5	Almost Certain - is expected to occur at most times

5.1 Risk Assessment Results

A high-level risk assessment of potential impacts prior to the implementation of mitigation measures is provided below in Table 3

The Construction Contractor will be responsible for identifying effective construction mitigation measures in the CEMP, and determining a residual risk rating for applicable impacts.

Table 3 South Rockhampton Flood Levee Environmental Risk Assessment (Pre-mitigation)

Issue	Risk to Environment	Likelihood	Severity	Risk Level
Air quality	• Temporary reduction in air quality.	3	3	Moderate
Biosecurity	• Spread of weeds via construction activities. • Spread of pest animals due to construction.	3	4	High
Cultural heritage	• Ground disturbance due to earthworks or clearing resulting in threat to items or places of cultural significance. • Tree clearing resulting in loss of cultural heritage.	2	3	Moderate
Erosion and sedimentation	• Soil loss resulting in erosion or sedimentation from construction activities. • Contamination of local drainage and waterways from sediment entering system from construction activities e.g. earthworks.	3	4	High
Fauna	• Construction activities directly impact local fauna including mortality, breeding and behaviour.	3	3	Moderate
Flora	• Vegetation removal outside approved project area.	3	4	High
Hazardous substance management	• Spills from machinery or chemicals entering local waterways or contaminating soil.	3	4	High
Noise pollution	• Increased noise from construction activities.	3	3	Moderate
Soil and contaminated land	• Disturbance of acid sulfate soils (ASS) • Spills from machinery or chemical storage	4	2	Moderate
Vibration and infrastructure	• Damage of heritage buildings from construction.	2	3	Moderate

Issue	Risk to Environment	Likelihood	Severity	Risk Level
	• Damage of residential housing, stormwater drains and /or local roads from construction.			
Waste management	• Waste migrating off-site and polluting surrounding habitat.	3	2	Moderate
Water management	• Degradation of local waterways due to release and/or runoff of contaminated water from construction.	3	4	High

6.0 Environmental Management Strategies

This section identifies key environmental elements and outlines management objectives, potential impacts, control actions, when the management strategy should be implemented/acted on, monitoring and reporting requirements for the Project.

The Construction Contractor will be required to incorporate the information from this EMP(P) and any other pertinent information (e.g. conditions of permits, information from tender documents and specifications etc.) into a Project specific CEMP.

6.1 Cultural Heritage

6.1.1 Overview

Non-Indigenous Heritage

A list of sites on the Commonwealth and Queensland Heritage Registers within and adjacent to the Project area is provided in the Environmental Assessment Report (EAR) for the Project, and summarised briefly in **Table 4**:

The Quay Street streetscape is also listed on the Register of the National Estate (RNE) as a whole (Place ID: 8855). The RNE has been suspended and is no longer a statutory list, but remains as an archive and available for educational purposes.

Table 4 Registered Heritage Places in the Study Area

Place	Location	Listing
Avonleigh	248 Quay Street	QHR
ABC Radio Stations	236 Quay Street	CHL
Bulletin Building	162-164 Quay Street	QHR
C J Edwards Chambers	174 Quay Street	QHR
Cahils Stores	232-234 Quay Street	QHR
Callianiotis Constructions	178 Quay Street	QHR
Cattle House	180 Quay Street	QHR
Clewett's Building (former)	250 Quay Street	QHR
Commercial Hotel and Chambers (former)	230 Quay Street	QHR
Criterion Hotel	150 Quay Street	QHR
Customs House Rockhampton	208 Quay Street	QHR
Evans & Hearn	206 Quay Street	QHR
Goldsborough Mort Building (Former)	238 Quay Street	QHR
Harbour Board (former)	288 Quay Street	QHR
Luck House	182 Quay Street	QHR
R Rees and Sydney Jones	186 Quay Street	QHR
Rockhampton Club	166 Quay Street	QHR
Royal Bank Building (former)	194 Quay Street	QHR
Trustee Chambers	170 Quay Street	QHR
Walter Reid Court	260 Quay Street	QHR

Potential non-indigenous heritage impacts during the construction of the composite levee include:

- Physical interactions between built heritage and construction materials or machinery, resulting in structural damage
- Vibration from construction activities in excess of 2mm/second, resulting in structural damage
- Increased dust from surface construction or transport activities resulting in corrosion of fabric
- Disturbance of archaeological deposits
- Damage to mature plantings by disturbance of root systems.

Indigenous Heritage

The cultural heritage body for the Project area is Darumbal Enterprises Pty Ltd (Darumbal). A search of the Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) database identified no registered Aboriginal heritage places within the Project area. It should be noted, however, that areas around waterways and wetlands are generally of high significance to Aboriginal people, and it is likely that the wider area contains previously unrecorded cultural heritage values, whether tangible or intangible

The planned works may be classified as Category 4 activities under the Duty of Care Guidelines. Category 4 activities are those that occur in areas that have already been subject to significant ground disturbance. As such, they are unlikely to harm Aboriginal cultural heritage, but care should be taken in case residual Aboriginal cultural heritage values are disturbed.

A Cultural Heritage Management Agreement (CHMA) is intended to be in place for the Project, and a site walk over with Darumbal will be undertaken prior to construction commencing. The Construction Contractor should develop a site-specific Cultural Heritage Plan for the CEMP that considers construction methodology and associated mitigation measures.

6.1.2 Objectives

- No harm to non-Indigenous or Indigenous cultural heritage from construction activities.
- Values of Indigenous cultural heritage materials are preserved.

Table 5 Outline of cultural heritage impacts including associated control actions, timing and responsible parties throughout the Project

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Physical interactions between built heritage and construction materials or machinery, resulting in structural damage	• Construction materials not to be stored on or adjacent to heritage places • Construction site traffic to be routed away from heritage places wherever possible • Appropriate traffic management to be employed around heritage places if required.	During all phases of construction	Construction Contractor
Vibration from construction activities in excess of 2mm/second, resulting in structural damage	• Refer to Vibration and Infrastructure Damage section of this EMP • Monitoring and structural audit to be implemented at heritage places where vibration has the potential to reach or exceed 2mm/second.	During all phases of construction	Construction Contractor
Increased dust from surface construction or transport	• Refer to Air Quality section of this EMP	During all phases of construction	Construction Contractor

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
activities resulting in corrosion of fabric	• Loose loads to be appropriately covered • Appropriate monitoring and dust management to be implemented at the construction site.		
Destruction of culturally significant items/artefacts or discovery of human skeletal materials	Further historical archaeological assessment should be undertaken where ground disturbing activities are proposed in the heritage precinct. If necessary, develop an archaeological management plan in accordance with DES Guidelines for Archaeological Investigations.	Prior to commencing work on-site	Principal
	• Site walkover • Any other activities required in the CHMA	Prior to commencing work on-site	Principal & Construction Contractor
	Cultural heritage awareness training should be included in site induction processes, alerting workers to any heritage places in the vicinity, and outlining appropriate management procedures	During all phases of construction	Construction Contractor
	A 'Stop Work' procedure should be activated if any historical archaeological materials are uncovered	Upon discovery of potential cultural heritage artefact	Construction Contractor
	If human skeletal material is found manage as follows: • FIND: Skeletal material found. • STOP: Stop work immediately and implement 50m exclusion zone. • NOTIFY: Notify Supervisor. • MANAGE: Queensland Police, Cultural Heritage Unit of DATSIMA and Darumbal notified immediately. Work not to recommence until management action has been implemented to satisfaction of all stakeholders.	Upon discovery of potential human remains	Construction Contractor

6.1.3 Monitoring

Staff undertaking high risk activities (e.g. earthworks) should visually monitor for possible cultural heritage artefacts.

6.1.4 Reporting

Any cultural heritage 'finds' must be immediately reported to the Construction Contractor, Site Supervisor, Environmental Representative and the Principal.

6.2 Noise Pollution

6.2.1 Overview

Adjoining sensitive receptors include rural and residential dwellings, commercial and industrial places, as well as environmentally sensitive areas, being waterways and wetlands. These sensitive receptors may be disturbed by noise emitted from construction work.

The Construction Contractor should develop a site-specific Noise Management Plan that considers construction methodology and associated mitigation measures. The CEMP should also incorporate recommendations and objectives detailed in this EMP(P).

6.2.2 Objectives

- No noise complaints from construction activities.
- Limit noise disturbance to sensitive receptors.

Table 6 Outline of noise impacts including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Noise disturbance	A Noise Management Plan for the Project to be developed and implemented by the construction contractor	Prior to construction works commencing	Construction Contractor
	Construction activities should be undertaken in line with the limits in Environmental Protection (Noise) Policy 2008.	All phases of construction	Construction Contractor
	Works to be carried out in general working hours. Where this is not possible, approval is to be obtained from council and surrounding residents notified. Notification should include: • An outline of the nature of work and timeframe • Potential nature of the impact • Contact details for complaints; additional questions.	All phases of construction	Construction Contractor
	Program loud noise activities to occur at times to minimise noise nuisance to surrounding sensitive receptors. Physical noise barriers such as earth mounds, mobile screens, or noise attenuation devices should be used, where necessary.	All phases of construction	Construction Contractor
	Plant to be turned off when not in use and be regularly maintained and repaired or replaced if it becomes noisier.	All phases of construction	Construction Contractor
	Non-tonal reversing alarms to be used where practicable.	All phases of construction	Construction Contractor
	Awareness training	All phases of construction	Construction Contractor

6.2.3 Monitoring

Routine noise monitoring should be conducted during the weekly site inspection and recorded in a checklist. The Construction Contractor's CEMP must identify actions in the event a noise complaint is received, including monitoring in accordance with relevant legislation and standards.

6.2.4 Reporting

The Project Environmental Representative must be immediately notified of any noise complaints or incidents to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.3 Vibration and Infrastructure Damage

6.3.1 Overview

Based on preliminary design of the Project a historical due diligence assessment has been completed by AECOM (2014). The studies identified 20 registered heritage sites (mostly located on Quay Street) that may be impacted by construction (Table 4). It is noted that since 2014, the Project design has been updated so that a significant extent of Quay Street will be protected utilising temporary barriers that do not require the construction of permanent structures.

Vibration emitted from construction activities may also impact residential properties and infrastructure such as water pipes.

6.3.2 Objectives

- No harm to heritage values.
- Minimise damage from construction works to surrounding infrastructure.
- Maintain compliance with vibration emittance throughout construction.

The Construction Contractor should develop a site-specific Vibration Plan into the CEMP that considers construction methodology and associated mitigation measures. The CEMP should also incorporate recommendations and objectives detailed in this EMP(P).

Table 7 Outline of vibration and infrastructure impact including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Damage to infrastructure, cultural heritage and vibration produced from construction.	Monitoring and structural audit to be implemented at heritage places where vibration has the potential to reach or exceed 2mm/second	Prior to vibration emitting activities	Construction Contractor

6.3.3 Monitoring

The Construction Contractor must implement vibration monitoring in the event of a stakeholder complaint, Principal request or if vibration emitting activities have the potential to exceed limits in relevant legislation. All monitoring results must be recorded and provided to the Principal.

6.3.4 Reporting

The Project Environmental Representative must be immediately notified of any vibration incidents to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.4 Air Quality

6.4.1 Overview

The Project is located in both rural urban environments. Sensitive receptors surrounding the site include residential, industrial, commercial, rural and wetlands. The Construction Contractor must develop a site-specific Air Quality Management Plan within the CEMP that considers construction methodology and associated mitigation measures. The CEMP should also incorporate recommendations and objectives detailed in this EMP(P).

Impacts to local air quality, through the release of emissions, are anticipated to be associated with the following construction activities:

- Site preparation including vegetation clearing, topsoil stripping etc.
- Stockpiling of excavated soil.
- Wind erosion from stockpiles.
- Moving and placing of earth embankment.
- Installation of services below ground.
- Vehicle and equipment movements over access tracks and work sites where ground is exposed.
- Exhaust emissions from vehicle and machinery operations.

6.4.2 Objectives

- Prevent visible emissions of dust.
- Minimise negative impacts to air quality.
- Minimise emission of greenhouse gases.
- No air quality nuisance complaints from community and/or sensitive receptors.
- Ensure quick investigation and resolution of complaints.

Table 8 Outline of air quality impact including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Degradation of air quality due to construction activities	Prepare and implement CEMP Air Quality Management Plan.	Prior to work commencing on site	Construction Contractor
	Minimise disturbed areas, through designation of work area, access tracks and no-go zones.	All phases of construction	Construction Contractor
	Undertake progressive rehabilitation/landscaping.	All phases of construction	Construction Contractor
	Amend activities based on adverse forecast weather conditions. For example, during extreme windy conditions cease dust-generating activities.	All phases of construction	Construction Contractor
	Proactive dust suppression to be implemented such as water cart, soil binders, covered loads and/or stockpiles.	All phases of construction	Construction Contractor

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
	Stabilise roads including entry and exit points.	All phases of construction	Construction Contractor
	Stockpiles and spoil located away from sensitive receivers.	All phases of construction	Construction Contractor
	No burning or incineration of materials. If burning required, obtain relevant approvals prior.	All phases of construction	Construction Contractor
	Designation of speed limits to reduce wheel-generated dust.	All phases of construction	Construction Contractor
	Adequately store all bulk materials, and cover vehicles transporting materials to and from site.	All phases of construction	Construction Contractor
	Ensure stationary plant, construction vehicles and equipment (especially those powered by diesel motors) is working correctly and maintained as per manufacturers recommendations (this will also aid in the mitigation of potential odour emissions).	All phases of construction	Construction Contractor
	Shut down plant and equipment idling for excessive periods (i.e. longer than 5 minutes) where possible. Minimise queuing of construction vehicles and idling for excessive periods (e.g. more than 5 minutes).	All phases of construction	Construction Contractor
	Awareness training (e.g. site induction, toolbox talks).	All phases of construction	Construction Contractor

6.4.3 Monitoring

Routine visual dust monitoring should be conducted during the weekly site inspection and recorded in the checklist by the Environmental Representative. Vehicles and plant should be inspected prior to entering site by the Safety Advisor (e.g. pre-acceptance checklist).

The Construction Contractor's CEMP should identify actions in the event an air quality complaint is received, including monitoring. Air quality monitoring will be in accordance with Australian Standards AS/NZS3580.10.1:2003.

6.4.4 Reporting

The Project Environmental Representative must be immediately notified of any air quality complaints or incidents to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.5 Soil & Contaminated Land

6.5.1 Overview

Acid Sulfate Soils

The Project area is part of the Quaternary Fitzroy floodplain that is characterised by clay, silt, sand and gravel. A desktop search of the Australian Soil Resource Information System (ASRIS) mapping indicated there is an area mapped as having a "high probability" of containing ASS where the Levee Alignment interacts with the Fitzroy River, with the remainder of the Project area is mapped as "extremely low probability".

Avoidance of areas which may contain ASS cannot be achieved for this Project, as works are required within and adjacent to the Fitzroy River to achieve the overall objectives of the Project, being flood mitigation and protection.

Contaminated Land

A 2018 Contaminated Land Register (CLR) / Environmental Management Register (EMR) search identified several locations where contamination may arise (Table 9).

Table 9 Potential sources of impact during Project construction

Location	Use	Description
117 Wharf Street (28 lots)	Unused Rockhampton Regional Council depot	• Former railway lines • Former fuel storage and refuelling • Former drum storage • Former washdown area and interceptor pit • Use of hazardous building materials (asbestos) • Waste storage and uncontrolled fill beneath the site
305-375 Quay Street, Depot Hill (1 lot)	Fitzroy Motor Boat Club	• Potential historical abrasive blasting and TBT containing paints • Current minor fuel, paint and chemical storage • Uncontrolled fill beneath the site
150 Port Curtis Road, Port Curtis (1 lot)	Hastings Deering	• Storage and use of chemicals, paints and petroleum products • Wastewater treatment • Vehicle and parts washing • Generation of regulated wastes
503 Quay Street, Depot Hill (1 lot)	Sewerage Treatment Plant	• Sewerage treatment facility chemical use and storage • Potential disposal of biosolids onsite.

A preliminary assessment of risks associated with contaminated land has been undertaken for the Project, which included both desktop review and site inspection. The preliminary contaminated land assessment identified that the potentially complete exposure pathways which are relevant to construction within the Levee Alignment include the following.

- Direct contact with impacted soils.
- Direct contact or incidental ingestion of surface water runoff within the construction area.
- Potential for spills of chemicals or hydrocarbons products to ground resulting in direct contact or leaching to soils or surface water runoff.

- Direct contact with and incidental ingestion of extracted groundwater during construction dewatering.
- Inhalation of dust/fibres from disturbed soils or unsealed surfaces.

Additionally, there is potential for contamination to be caused by construction activities associated with the Project. The chemicals used during the construction of the Project will include fuel (predominantly diesel and some small quantities of unleaded petrol), oil, lubricants, coatings/paint, minor quantities of solvents and acids and degreasers. The accidental release of these materials during storage, use or transport has the potential to result in land contamination.

6.5.2 Objectives

- Mitigate risks associated with ASS.
- Manage existing contaminated land.
- Limit health risks to the public and wildlife.
- No unauthorised transportation of contaminated material.

Landholders and occupiers of land which is listed on the EMR or CLR, or suspected of being contaminated, must ensure that they meet their general environmental duty under the *Environmental Protection Act 1994* when using the land to ensure that any risks to human health and the environment are known and managed. This general obligation applies to the Construction Contractor.

Table 10 Outline of soil and contaminated land impacts including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Acid sulfate soil and contaminated land exposure	Undertake an updated search of the EMR	Prior to work commencing on site	Construction Contractor
	Include ASS/PASS management controls in construction technical specifications developed for this project.	Prior to releasing tender	Principal
	Develop a site-specific Soil and Contaminated Land Management Plan into the CEMP that considers construction methodology and associated mitigation measures. This Plan should include occupational health and safety controls addressing human health risks arising from potential contamination during construction.	Prior to work commencing on site	Construction Contractor
	Prior to soil excavation work testing for ASS in accordance with the Queensland Acid Sulphate Soils Technical Manual will be undertaken to determine the presence of ASS. Where ASS has been identified and confirmed, an ASS Management Plan is to be developed in accordance with the Queensland Acid Sulphate Soils Technical Manual.	Prior to work commencing on site	Construction Contractor
	Where ASS is present, all soil disturbance work to occur in	All phases of construction	Construction Contractor

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
	accordance with the ASS Management Plan.		
	Testing for the presence of contamination prior to excavation or other earthworks will be undertaken on the lots identified in Table 9, where known or suspected contamination exists.	Prior to work commencing on site	Construction Contractor
	An unexpected contamination finds procedure is to be documented and implemented during the construction phase, to account for potential contamination that may arise.	Prior to work commencing on site	Construction Contractor
	Contaminated soils to be removed from the site and a disposal permit will be required.	If contaminated soil identified	Construction Contractor
	Excavated soil material will be reused where possible and any contaminated material unable to be remediated must be disposed of by an appropriately licensed waste contractor to a license waste facility.	All phases of construction	Construction Contractor
Contamination of land or water resulting from spill or release of hazardous material	Refer to Hazardous Substance Management section of this EMP(P).	All phases of construction	Construction Contractor

6.5.3 Monitoring

The Construction Contractor's Environmental Advisor must keep records of all contaminated land encountered and transport records. Routine soil and contaminated land monitoring should be conducted during the weekly site inspection and recorded in the checklist by the Environmental Representative.

6.5.4 Reporting

The Project Environmental Representative must be immediately notified of any soil and/or contaminated land incidents to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.6 Hazardous Substance Management

6.6.1 Overview

Hazardous substances utilised during construction activities have the potential to impact the adjacent environment, including waterways and wetlands.

The Construction Contractor must develop a site-specific Hazardous Substance Management Plan for the CEMP that considers construction methodology and associated mitigation measures. The CEMP should also incorporate recommendations and objectives detailed in the EMP(P).

6.6.2 Objectives

- No contamination to surrounding environment from chemicals and/or fuels utilised during construction activities.
- Ensure correct procedures and storage of hazardous substances are implemented.

Table 11 Outline of hazardous substance impacts including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Contamination of land or water resulting from spill or release of hazardous material	All hazardous substances, including chemicals, toxic materials and/or flammable liquids, must be stored and handled in accordance with Australian standards and guidelines.	During all phases of construction	Construction Contractor
	Safety Data Sheets for all hazardous substances must be kept on-site in a location all staff can access.	During all phases of construction	Construction Contractor
	All hazardous chemicals must be stored in a bunded area away from drains and at least 50m from a watercourse.	During all phases of construction	Construction Contractor
	Refuelling activities should occur in a designated area that is away from drainage channels and at least 50m from a waterway.	During all phases of construction	Construction Contractor
	Machinery and plant to be well maintained and inspected.	All phases of construction	Construction Contractor
	Spill kits available on-site and staff trained in spill response.	During construction	Construction Contractor
	Awareness training.	All phases of construction	Construction Contractor

6.6.3 Monitoring

Routine monitoring of hazardous substance storage should be conducted and recorded by either the Environmental Representative or Safety Advisor.

6.6.4 Reporting

The Project Environmental Representative must be immediately notified of any incidents involving chemical spills to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.7 Erosion and Sediment Control

6.7.1 Overview

The Project is located close to sensitive environments including:

- The Southern Fitzroy Floodplain and Fitzroy Delta that are classified as Nationally Important Wetlands in the Directory of Important Wetlands (DIW).
- South-western bank of the Fitzroy River and northern bank of Gavial Creek.
- A number of Wetland Protection Areas of State significance.

Water quality objectives for surface waters within the Project area and immediately downstream are outlined in the Fitzroy River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Fitzroy River Sub-basin document (DES, 2011). The “Draft environmental values and water quality guidelines: Fitzroy Basin fresh, estuarine and marine waters, including Keppel Bay for consultation”, published in 2017, should also be considered.

6.7.2 Objectives

- No deterioration of water quality from erosion or sediment laden water leaving the construction site.
- Site stabilised, and Erosion and Sediment Control (ESC') Measures implemented to mitigate against erosion and/or uncontrolled sediment leaving the construction site.

The Construction Contractor must have an appropriately qualified person develop a site-specific Erosion and Sediment Control Plan (ESCP). The Construction Contractor shall follow and incorporate recommendations from the ESCP and EMP(P) into the CEMP.

Table 12 Outline of ESC impacts including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Erosion or sedimentation resulting from construction.	Prepare and implement an ESCP in accordance with IECA Guidelines. If conditions change on-site the ESCP should be reviewed and updated.	Prior to commencing work on-site	Construction Contractor
	Installation of ESC Measures is to be as per Best Practice Erosion and Sediment Control Guidelines.	Prior to earthworks	Construction Contractor
	Disturbed areas, stockpiles and access tracks exposed for long periods to be stabilised.	During all phases of construction	Construction Contractor
	Ground disturbance and clearing to be minimised. Identification of appropriate clearing method, demarcation of clearing limits and no-go zones.	During all phases of construction	Construction Contractor
	Where possible divert clean water around site.	During construction phase and prior to earthworks	Construction Contractor
	ESC Measures must be maintained and/or replaced wherever inspections show ineffective capacity or damage.	During construction phase	Construction Contractor
	Monitor weather weekly to identify upcoming rain events.	During construction phase	Construction Contractor
	Where possible schedule high-risk works during low erosivity months.	During construction phase	Construction Contractor
	Progressive revegetation and landscaping to be implemented promptly to achieve groundcover.	During construction phase	Construction Contractor
	Staff awareness and if necessary ESC training to enable personnel to effectively carry out tasks such as ESC Measures installation.	During all phases of construction	Construction Contractor

6.7.3 Monitoring

Routine visual monitoring of ESC Measures should be conducted during the weekly site inspection and recorded in the checklist by the Construction Contractor's Environmental Representative.

Additional ESC Measures monitoring should occur pre and post wet weather events to determine effectiveness, maintenance issues and compliance.

6.7.4 Reporting

The Project Environmental Representative must be immediately notified of any erosion and sediment control incidents to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.8 Water Management

The Project is located close to sensitive environments including:

- the Southern Fitzroy Floodplain and Fitzroy Delta that are classified as Nationally Important Wetlands in the Directory of Important Wetlands (DIW);
- south-western bank of the Fitzroy River; and
- northern bank of the Gavial Creek

Groundwater along the SRFL site ranges between 3-8m below ground level (BGL). There are also 17 registered bores within a 500m of the proposed site alignment.

Water quality objectives are outlined in the Fitzroy River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Fitzroy River Sub-basin document (DES, 2011). The "Draft environmental values and water quality guidelines: Fitzroy Basin fresh, estuarine and marine waters, including Keppel Bay for consultation", published in 2017, should also be considered.

The Construction Contractor should develop a site-specific Water Management Plan into the CEMP that considers construction methodology and associated mitigation measures. This plan must address relevant legislation and guidelines.

6.8.1 Objectives

- No degradation of surface water quality and contamination in adjacent waterways from construction; and
- No degradation to groundwater resulting from construction activities.

Table 13 Outline of water impacts including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Pollution of groundwater and/or surface water from construction activities	Design criteria for the SRFL considers flow regime velocities and maintenance of hydraulic connectivity.	Prior to commencing work on-site	Principal
	Include groundwater dewatering controls in construction technical specifications developed for this project.	Prior to releasing tender	Principal
	Prepare and implement an ESCP in accordance with IECA Guidelines. If conditions change on-site the ESCP should be reviewed and updated.	Prior to commencing work on-site	Construction Contractor
	Identify water monitoring locations, and undertake baseline sampling.	Prior to vegetation	Construction Contractor

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
		clearing and/or earthworks	
	Refer to Erosion and Sediment Control section of this EMP(P).		
	Ground disturbance and clearing to be minimised to maintain soil stability including identification of appropriate clearing method, demarcation of clearing limits and no-go zones.	During all phases of construction	Construction Contractor
	Acid sulphate soils (ASS) are appropriately managed if encountered. Refer to Soil and Contaminated Land Section of this EMP(P)	During construction phase	Construction Contractor
	Maintain existing wetland recharge and flow regimes.	During all phases of construction.	Principal and/or Construction Contractor
	Dewatering procedure implemented to ensure water quality objectives met prior to pumping	During all phases of construction.	Construction Contractor

6.8.2 Monitoring

The Construction Contractor's Environmental Advisor should monitor water parameters of adjacent water bodies and water discharge locations during the weekly site inspection and records results in the weekly checklist. The results should be compared to the baseline water quality monitoring, and the WQOs for surface waters.

6.8.3 Reporting

The Project Environmental Representative must be immediately notified of any water quality incidents involving allowing for documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.9 Fauna

6.9.1 Overview

Desktop assessments and field surveys for fauna have been conducted for the Project. The desktop assessment identified 34 conservation significant fauna species (excluding those species that are exclusively marine) with the potential to occur within the Project area. No conservation significant fauna species were identified during the field surveys. Further information is provided in the EAR.

The Construction Contractor must develop a site-specific Fauna Management Plan for the CEMP that considers construction methodology and associated mitigation measures. The CEMP should also incorporate recommendations and objectives detailed in the EMP(P).

6.9.2 Objectives

- No fauna fatalities resulting from construction.
- Minimise impacts of construction activities on fauna.
- Maintain fauna habitat values and limit risks to breeding.

Table 14 Outline of fauna impacts including associated control actions, timing and responsible parties throughout the Project

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Fauna disturbance	Prepare and implement CEMP Fauna Management Plan, which includes mapping of no-go zones to avoid disturbance of sensitive habitat.	Prior to construction	Construction Contractor
	A suitably qualified person should be engaged to conduct a pre-clearance survey and determine if any animal breeding places will be impacted by works. Fauna spotter-catcher must be present during vegetation clearing.	Minimum two weeks prior to clearing activities	Construction Contractor
	If breeding place/s are identified the Contractor should apply for a Species Management Program (SMP).	Prior to commencing clearing operations	Construction Contractor
	Vegetation clearing should be minimised in sensitive environments, specifically riparian areas around creek lines and wetlands.	Prior to commencing clearing operations	Construction Contractor
	Habitat features, and logs shall be considered for relocation as microhabitat for fauna. For example, felled trees that contain hollows can be placed into nearby habitat for fauna.	During clearing	Construction Contractor
	Any injured, sick and dead vertebrate fauna must be recorded.	During construction and operation	Construction Contractor and Principal
	Speed limits enforced to limit risk of collision with wildlife and no unauthorised off-track driving.	During construction and operation	Construction Contractor and Principal
	Barriers should be installed around important habitat areas to restrict access.	During all phases of construction	Construction Contractor
	Procedures for reporting and handling wildlife on-site must be implemented and follow Australian best practice. I.e. engagement of fauna-spotter catcher.	All phases of construction	Construction Contractor
	Awareness training.	All phases of construction	Construction Contractor

6.9.3 Monitoring

A fauna-spotter catcher must be engaged to monitor clearing activities in trees identified as containing hollows and/or nests.

6.9.4 Reporting

The Project Environmental Representative must be immediately notified of any incidents involving fauna to allow documentation, investigation and corrective action response. Any injured, sick and dead vertebrate fauna must be recorded before (by fauna-spotter catcher), during and after construction and operation. Incidents must also be reported to the Principal.

6.10 Flora

6.10.1 Overview

The desktop assessment identified four Threatened Ecological Communities (TECs) as potentially occurring within the Project site. No TECs were identified within the Project site during the field survey and none are considered likely to occur.

The desktop assessment identified 13 conservation significant flora species with the potential to occur within the Project area. No conservation significance species or protected plants were recorded within the Project area during the field survey.

The Construction Contractor should develop a site-specific Flora Management Plan for the CEMP that considers construction methodology and associated mitigation measures. The CEMP should also incorporate recommendations and objectives detailed in the EMP(P).

6.10.2 Objectives

- Minimise and mitigate construction impacts to native flora.

Table 15 Outline of fora impacts including associated control actions, timing and responsible parties throughout the Project

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Vegetation clearing	Prepare and implement CEMP Flora Management Plan, which includes mapping of no-go zones to avoid disturbance of sensitive habitat. The methodology for clearing must be outlined in CEMP.	Prior to clearing	Construction Contractor
	Identification and mapping of trees to be retained and cleared.	Prior to construction	Construction Contractor
	Clearing limits should be marked on-site including no-go zones.	All phases of construction	Construction Contractor
	Awareness training.	All phases of construction	Construction Contractor
	Vegetation management activities should be undertaken in accordance with Council's policies and procedures	During operation	Principal

6.10.3 Monitoring

Routine visual monitoring of flora, including adjacent vegetation, should be conducted during the weekly site inspection and recorded in the checklist by the Construction Contractors Environmental Representative.

6.10.4 Reporting

The Project Environmental Representative must be immediately notified of any incidents involving native flora to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.11 Biosecurity

6.11.1 Overview

Under the *Biosecurity Act 2014*, a person who deals with biosecurity matter or a carrier, or carries out an activity, if the person knows or ought reasonably to know that the biosecurity matter, carrier or activity poses or is likely to pose a biosecurity risk have a 'general biosecurity obligation' (GBO). Under the GBO, individuals and organisations whose activities pose a biosecurity risk must:

- take all reasonable and practical steps to prevent or minimise each biosecurity risk
- minimise the likelihood of causing a 'biosecurity event', and limit the consequences if such an event is caused
- prevent or minimise the harmful effects a risk could have, and not do anything that might make any harmful effects worse.

The Project area is within three existing biosecurity zones:

- Cattle Tick Biosecurity Zone
- Sugar Cane Biosecurity Zone 3
- State grape phylloxera risk zone.

Field surveys in November 2018 and January 2019 recorded six introduced fauna species. The field survey undertaken in 2014 identified a further two species. It is anticipated that a number of other introduced fauna species are likely to occur within the Project site.

Eighteen introduced flora species were identified during the flora survey (Table 16). Five species identified are listed as Category 3 Restricted Matter under the *Biosecurity Act 2014* and three species are listed as *Weeds of National Significance* (WoNS).

Table 16 Weed species identified on the Project and legislative status.

Common Name	Scientific Name	Status
Gomphrena weed	*Gomphrena celosioides*	-
Balloon vine	*Cardiospermum grandiflorum*	-
Cobbler's peg	*Bidens pilosa*	-
Corky passion vine	*Passiflora suberosa*	-
Couch	*Digitaria didactyla*	-
Crowsfoot grass	*Dactyloctenium aegyptium*	-
Harrisia cactus	*Harrisia martinii*	C3
Indian bluegrass	*Bothriochloa pertusa*	-
Mango	*Mangifera indica*	-
Mimosa	*Vachellia farnesiana*	C3
Paragrass	*Urochloa mutica*	-

Common Name	Scientific Name	Status
Parthenium	*Parthenium hysterophorus*	C3, WoNS
Pigface	*Portulaca oleracea*	-
Prickly acacia	*Vachellia nilotica*	C3, WoNS
Rubber vine	*Cryptostegia grandiflora*	C3, WoNS
Sida	*Sida rhombifolia*	-
Signal grass	*Urochloa decumbens*	-
Snake weed	*Stachytarpheta jamaicensis*	-

6.11.2 Objectives

- Contain and prevent spread of invasive species.
- No new invasive species introduced to the Project area.
- No biosecurity complaints from stakeholders or the community.
- Compliance with local, state and national biosecurity legislation.

The Construction Contractor must develop a site-specific Biosecurity Management Plan as a part of the CEMP, that considers construction methodology and associated mitigation measures. The CEMP should also incorporate recommendations and objectives detailed in the EMP(P).

Management of invasive species will be in accordance with the *Biosecurity Act 2014*, local Biosecurity Pest Management Plan (Rockhampton Regional Council, 2017) and other relevant State, National legislation procedures.

Table 17 Outline of biosecurity impacts including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Introduced invasive flora and fauna	Prepare and implement CEMP Biosecurity Management Plan, which includes at a minimum: • Alignment with key national, state and local biosecurity priorities. • Clean down protocols, including accepted methodology for any vehicles, plant, equipment or machinery entering site. • Nominated permanent and temporary clean down locations established for construction work within or in the vicinity of the Project area. • Known WoNS, Restricted, Invasive or Regionally Declared weeds identified in the Project area.	Prior to work commencing on site	Construction Contractor

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
	• Identification of the origin of high risk construction materials, machinery and equipment and treatment where required to mitigate introduction of weed species. • Any imported material and equipment from outside of Australia must refer to the Biosecurity Import Conditions System and comply with import conditions. • Management methods to control spread of weeds considered to be Restricted Matters in keeping with regional management practice or Queensland Department of Agriculture and Fisheries pest control prescriptions. • Management methods to control spread of weeds, including routine weed monitoring during construction and operation to identify any new incidence of weeds. • Promotion of awareness of weed management, by inclusion of weed issues, pictures and procedures into the Project's site induction program.		
	Undertake progressive rehabilitation/landscaping to prevent re-establishment of weed species.	All phases of construction	Construction Contractor
	Awareness training (e.g. site induction, toolbox talks)	All phases of construction	Construction Contractor

6.11.3 Monitoring

The weekly environmental site inspection should incorporate visual monitoring of the site alignment, stockpiles and spoil for introduced species. This is to identify and prevent invasive species being transported off-site, allow effective control of weeds on-site and mitigate the potential establishment of new invasive species due to construction activities.

6.11.4 Reporting

The Project Environmental Representative must be immediately notified of any biosecurity incidents to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

6.12 Waste Management

6.12.1 Overview

The Construction Contractor must develop a site-specific Waste Management Plan into the CEMP that considers construction methodology and associated mitigation measures for the Project. The CEMP should also incorporate recommendations and objectives detailed in the EMP(P).

6.12.2 Objectives

- No impact on the environment from collection, storage or transportation of waste throughout duration of the Project; and
- Minimise the generation of waste during construction.

Table 18 Outline of waste impacts including associated control actions, timing and responsible parties throughout the Project.

ISSUE	CONTROL ACTION	TIMING	RESPONSIBILITY
Waste generation during construction	All rubbish must regularly be removed from site.	All phases of construction	Construction Contractor
	Designated and segregated rubbish bins to allow for effective waste management throughout construction (e.g. steel, co-mingled recyclables, regulated waste).	All phases of construction	Construction Contractor
	Regulated wastes must be tracked and disposed of by a licenced contractor to a licenced facility.	All phases of construction	Construction Contractor
	Awareness training (e.g. inductions, toolbox talks)	All phases of construction	Construction Contractor

6.12.3 Monitoring

The Construction Contractor's Environmental Representative should visually monitor the site for waste. This includes maintaining documentation of regulated waste transportation.

6.12.4 Reporting

The Project Environmental Representative must be immediately notified of any waste management incidents to allow documentation, investigation and corrective action response. Incidents must also be reported to the Principal.

7.0 References

Rockhampton Regional Council. (2017). *Biosecurity Plan for Pest Management 2017-2021.*

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