Gladstone Area Water Board

Fitzroy to Gladstone Pipeline Construction Environmental Management Plan

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Controlled Document

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Gladstone Area Water Board

CERTIFICATION

This Construction Environmental Management Plan satisfies the following requirements:

- The intent and minimum standards established by all relevant local, state and federal policies relating to environmental management.
- Review and approval by an independent suitably qualified third party that includes review of:
    - management of noise and dust generated from the site during and outside construction work hours
    - management of stormwater flows and quality around and through the site without increasing the concentration of total suspended solids or Prescribed Water Contaminants (as defined in the environmental Protection Act 1994), causing erosion, creating any ponding and causing any actionable nuisance to upstream or downstream properties
    - management of contaminated soils (if required) including removal, treatment and replacement
    - site remediation plans
    - monitoring program to identify issues of non-compliance, actions for correcting any non-compliance and who is responsible for undertaking those actions
    - a timetable and process for review of the construction management plan to assess its effectiveness and to implement amendments as required
    - weed and pest animal management plan
- Is both reasonable and practicable.
- Has detailed sufficient additional information on specific plans or controls to be detailed/developed during design and implementation

Signature: 

Date: 11/07/2023

Printed name: Tom Jefferys, Senior Environment and Sustainability Consultant - SEQ Sustainability Team Lead, GHD

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1. VERSION HISTORY

Revision	Issue	Revision Description	Revision Date
A	1	Preliminary draft	15/02/2022
B	1	Draft issued for review	14/03/2022
C	1	Draft issued for review	14/09/2022
0	1	Issued for use	04/05/2023
0	2	Issued for use	31/05/2023
1	1	Issued for use following meeting with OCG	06/07/2023
1	2	Issued for use following review by the Certifier	11/07/2023

2. ABBREVIATIONS OR DEFINITIONS

Abbreviation	Definition
AHD	Australian Height Datum
ASRIS	Australian Soil Resource Information System
ASS	Acid Sulfate Soils
BGGGTB	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
DAF	Department of Agriculture and Fisheries
DES	Department of Environment and Science
CEMP	Construction Environmental Management Plan
CEP	Construction Execution Procedure
CG	Coordinator-General
CPESC	Certified Professional in Erosion and Sediment Control
CHMP	Cultural Heritage Management Plan
CMD	Coastal Management District
DATSIP	Department of Aboriginal and Torres Strait Islander Partnerships
DCCEEW	Department of Climate Change Energy the Environment and Water
DES	Department of Environment and Science
DNRM	Department of Natural Resources and Mines
DoR	Department of Resources
DRDMW	Department of Regional Development, Manufacturing and Water
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
DSI	Detailed Site Investigation
D&C	Design and Construction
EA	Environmental Authority
ECI	Early Contractor Involvement
ERA	Environmental Relevant Authority
EIS	Environmental Impact Statement
EMR / CLR	Environmental Management Register / Contaminated Land Register
EMS	Environmental Management System
ESCP	Erosion and Sediment Control Plan
EP Act	*Environmental Protection Act 1994*

Abbreviation	Definition
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPI	Environmental Protection Instruction
EP Regulation	*Environmental Protection Regulation 2019*
FGP	Fitzroy to Gladstone Pipeline
GAWB	Gladstone Area Water Board
GED	General Environmental Duty
GRC	Gladstone Regional Council
GSDA	Gladstone State Development Area
GHD	GHD Pty Ltd
Ha	Hectares
HSEQ	Health, Safety, Environment and Quality
ISC	Infrastructure Sustainability Council
JSEA	Job Safety and Environmental Analysis
Km	Kilometres
LGA	Local Government Areas
MBJV	McConnell Dowell and BMD Constructions Joint Venture
MMS	McConnell Dowell Management System
MCU	Material Change of Use
ML	Megalitres
m	Metres
MP	Member of Parliament
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
OPW	Operational Works
PCCC	Port Curtis Coral Coast Aboriginal Peoples Charitable Trust
Personnel	All personnel including sub-contractors working on the FGP
Planning Act	*Planning Act 2016*
PMST	Protected Matters Search Tool
PPE	Personal Protective Equipment
RE	Regional Ecosystem
RRC	Rockhampton Regional Council

Abbreviation	Definition
RV	Regulated Vegetation
ROW	Right of Way
Qld	Queensland
SAP	Special Area Plan
SARA	State Assessment and Referral Agency
SDA	State Development Area
SDS	Safety Data Sheet
SDPWO Act	*State Development and Public Works Organisation Act 1971*
SGIC SDA	Stanwell-Gladstone Infrastructure Corridor State Development Area
SEIS	Supplementary Environmental Impact Statement
SEP	Site Environmental Plan
SMP	Species Management Program
SWMS	Safe Work Method Statement
TEC	Threatened ecological community
TMP	Traffic Management Plan
TMR	Department of Transport and Main Roads
WTP	Water Treatment Plant

3. INTRODUCTION

On the 23 February 2023, the Queensland Government approved the Fitzroy to Gladstone Pipeline (FGP) to progress to construction. Gladstone Area Water Board (GAWB) has been appointed to manage the design and construction of the FGP. Following construction, GAWB will own and operate the FGP.

The FGP is a critical piece of infrastructure to support the Central Queensland community. Water is integral to the continued operation of Gladstone's industry which supports thousands of jobs and significantly contributes to our regional and state economy.

The FGP will provide long-term water security to industry and urban supply in Gladstone and address the single source water supply risk from Awoonga Dam, which has repeatedly suffered from failed wet seasons. The pipeline will also support the emerging hydrogen and renewables sector that is set to expand in Gladstone.

The FGP traverses the Rockhampton Regional Council and Gladstone Regional Council Local Government Areas (LGAs). The 117 kilometres (km) long pipeline will run from the Lower Fitzroy River at Laurel Bank, with the majority of its length within the Stanwell-Gladstone Infrastructure Corridor State Development Area (SGIC SDA), and then connect with GAWB's existing water infrastructure near Yarwun within the Gladstone State Development Area (GSDA). The FGP includes three facilities: the Fitzroy River Intake and Pump Station site, Aldoga Downs Water Treatment Plant (WTP) and Aldoga Reservoirs.

The FGP has the potential to impact upon several environmental factors during the construction phase. Mitigation measures are required to minimise potential impacts and meet regulatory requirements.

The McConnell Dowell and BMD Constructions Joint Venture (MBJV) has been appointed as the design and construction contractor for the FGP. The MBJV will also be responsible for operation and maintenance for five years following construction completion.

This Construction Environmental Management Plan (CEMP) will be implemented to manage potential environmental and social impacts associated with the construction of the FGP and will be supported by:

- Constraints Protocol (under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval for excluded early works)
- Special Area Plans (SAPs) - for Waterways, Yellow Chat, Ornamental Snake and Brigalow
- Species Management Program (SMP)
- Threatened Species Translocation and Propagation Plan
- MBJV environmental aspect-specific sub-plans, as required e.g. Erosion and Sediment Control Management Sub-Plan (refer to Appendix A) and Interim Acid Sulfate Soils Environmental Management Plan (refer to Appendix B).

3.1 Purpose of this CEMP

The purpose of this CEMP is to provide an environmental management framework and associated management procedures to avoid or minimise the actual and potential environmental impacts associated with the construction phase of the FGP. Further, it aims to:

- Develop and achieve the FGP's stated environmental objectives and targets
- Outline procedures for the management and monitoring activities of environmental protection issues relevant to construction activities
- Ensure environmental compliance with the legislative framework and conditions of approval

- Fulfil the General Environmental Duty (GED)
- Identify broader issues of organisational risk
- Align with GAWB and MBJV strategic direction.

This CEMP has been developed based on:

- The Planning Environmental Management Plan provided within the EIS (Arup, 2008).
- The CEMP prepared by GHD (GHD, 2022)
- Key primary Project approvals that have been obtained, namely:
    - Commonwealth government EIS approval under the EPBC Act. (Reference: EPBC 2007/3501, approved 4 November 2011) for the proposed construction and operation of a 110 km pipeline and associated infrastructure to transport up to 30 Giga Litres of water per annum from an intake point at Laurel Bank on the Fitzroy River to Gladstone, near Aldoga, Queensland.
    - Queensland government EIS approval framework under Section 26(1) of the State Development and Public Works Organisation Act 1971 (SDPWO Act). The effect of this approval framework is that the Project was declared a 'significant project' (26 July 2007) requiring an EIS. The Coordinator-General (CG) issued an Evaluation Report in 2010 which included stated and recommended conditions of approval. The CG's Evaluation Report has since lapsed; however, it provides guidance on approval requirements and conditions.
- Updated design and land details.
- Updated construction methodologies.
- Environmental and planning environmental approvals and permits and associated conditions.
- Site environmental characteristics.

3.2 Authorisation, Revision and Distribution

This CEMP is intended to be a live document for environmental management for the construction of the FGP. The CEMP will be updated when new information becomes available, such as receipt of development approvals/permits/licences, updated ecological or other field survey data, and design changes.

This CEMP will also have appropriate controls including being authored, reviewed and approved by suitably qualified persons under delegation of authority protocols.

This CEMP is a controlled document, and updates to this document will be provided an updated Revision number including the date and lodged on the document control database (TeamBinder) to ensure the most up to date document is used.

There is no restriction on the distribution of the CEMP within GAWB and MBJV. The controlled copy of the current version of this CEMP will be maintained on TeamBinder and onsite.

3.3 Contact Details

Key contacts for the Project are include in Table 3-1.

Table 3-1 Key Contacts

Contacts	Name	Phone
Chief Operating Officer - FGP	Hugh Barbour (GAWB)	0409 643 040
Project Director	Mark Barrows (MBJV)	0407 050 161

Contacts	Name	Phone
	Grant Flekser (GAWB)	0437 930 141
Environment & Sustainability Manager	Ben Hooper (MBJV) Simon Wakefield (GAWB)	0499 883 475 0401 712 962
Construction Manager	Prashant Modak (MBJV) – pipeline Gerard Garry (MBJV) - facilities Jim McGinty (GAWB)	0409 256 979 0417 708 916 0427 961 165
Cultural Heritage related matters (including finds)	Jillian Leslie (GAWB)	0400 626 214
Discovery of contaminated land	Department of Environment and Science (DES) – Contaminated Land Unit	(07) 3330 6586 (Brisbane)
Discovery of human remains	Queensland Police	000
Fire including bushfire	Queensland Fire and Rescue Services	000
Pollution incident causing serious or material environmental harm or fish kill	DES	1300 130 372
Reporting of sightings of prohibited and restricted pest species	Department of Agriculture and Fisheries (DAF) – Biosecurity Queensland Control Centre	13 25 23
Unexpected heritage artefact/ item finds	DES – Cultural Heritage Unit	(07) 3227 6499
Wildlife rescue	DES (select wildlife from the menu provided) RSPCA Queensland	1300 130 372 or 1300 264 625 (RSPCA)

4. PROJECT SCOPE

4.1 Project Description

The FGP is a 117 km pipeline (approximately) that will transport up to 30,000 ML of water per annum from an intake point at Laurel Bank on the Fitzroy River to GAWB's existing water infrastructure near Yarwun (a Project schematic is presented in Figure 4-1).

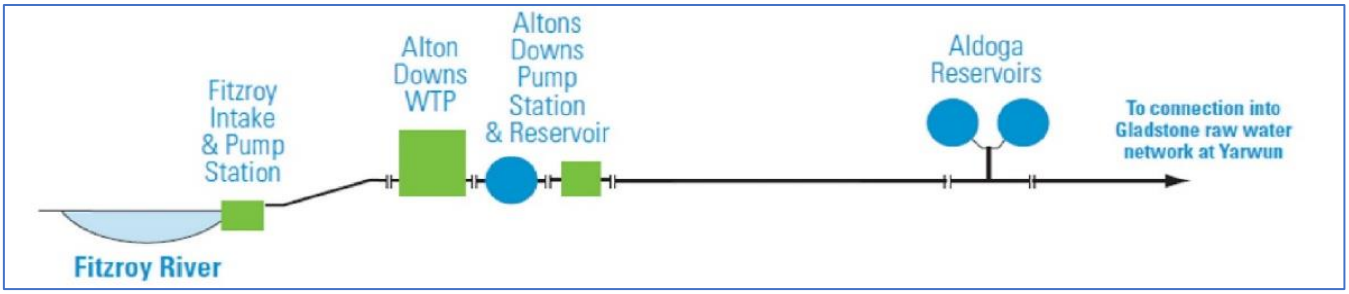

Figure 4-1 Project Schematic

The Project comprises the following key elements:

- An intake and pump station on the southern bank of the Fitzroy River, approximately 17 km upstream of Rockhampton's Alexandra Bridge near Laurel Bank, and in the vicinity of an existing Sunwater pump station that supplies the Stanwell Energy Park.
- A Water Treatment Plant (WTP) at Alton Downs near the Fitzroy River, occupying an area of approximately 11.5 hectares (ha).
- A pipeline with a length of approximately 117 km and 1,067 millimetres (mm) in diameter (for much of its length, although varying from 900 mm to 1200 mm), constructed within a right of way (ROW) corridor up to 30 metres (m) in width. Fibre optic cable will run alongside the pipeline within the trench. This will be used to transmit signals along the FGP alignment.
- Pump stations, at the Fitzroy River water intake and Alton Downs WTP, each occupying an area of approximately one hectare. Associated with each pump station there may be:
    - A single building (approximately 30 m x 25 m) housing the pumps, complete with motors, controls and starters
    - A small substation
    - Connection manifolds and valves.
- Reservoirs at Aldoga consisting of two x 50 ML water storage tanks (hydraulically acting as one).

The FGP will be buried for its full length with a minimum depth of cover of 900 mm. The depth of pipe will vary depending upon the pipe material, ground conditions and loading. However, various pieces of small infrastructure may be required on the surface (e.g. pressure release valves, etc.). GAWB is currently securing land access and tenure for the FGP.

An Environmental Impact Statement (EIS) was completed for the overall Project in 2007 (Arup, 2008), with a supplementary EIS (SEIS) completed in 2009 (Arup, 2009). The EIS was assessed under the bilateral agreement between the Queensland and Commonwealth Governments. The CG issued an evaluation of the project's EIS on 2 February 2010 which established the framework for the State approvals required for the Project (noting the report lapsed in February 2018). The Commonwealth approval under the EPBC Act was received on 4 November 2011, varied on 25 October 2021 and 20 June 2022, and remains current.

GAWB and MBJV are in the process of securing approvals for the FGP, which includes approvals under the SGIC SDA and GSDA Development Schemes, the *Planning Act 2016* and other State or local statutory requirements.

4.2 Project Delivery

The FGP is being advanced in three sections:

1. Northern Section – this section encompasses:
    - Fitzroy River Intake Structure and Pump Station
    - Alton Downs WTP
    - Approximately 15 km of pipeline
2. SGIC SDA Section – this section encompasses:
    - Approximately 81 km of pipeline
3. GSDA Section – this section encompasses:
    - Aldoga Reservoirs
    - Approximately 21 km of pipeline
    - Connection to the Gladstone raw water network.

4.3 Scope of Works

Within each of the three sections identified, Northern, SGIC SDA and GSDA, the works will progress in stages. The typical works proposed in each stage are summarised as follows:

4.3.1 *Pre-construction*

The pre-construction activities include:

- Detailed design
- Securing of approvals, permits, licences and land tenure agreements
- Development of required management plans.

4.3.2 *Early Works*

Early works for the FGP are proposed to be undertaken and include:

- Cadastral surveys
- Geotechnical investigations
- Fencing
- Signage
- Works on existing roads and access tracks, and associated drainage
- Works to construct graded unsealed formed site access tracks, and associated drainage
- Temporary site facilities, including laydown areas, workers' accommodation camp at Rockhampton, site offices and amenities.

4.3.3 *Construction*

Construction activities for the FGP are expected to start in August 2023 and finish between late 2025 and early 2026, weather and construction conditions permitting. Figure 4-2 presents an indicative construction timeline.

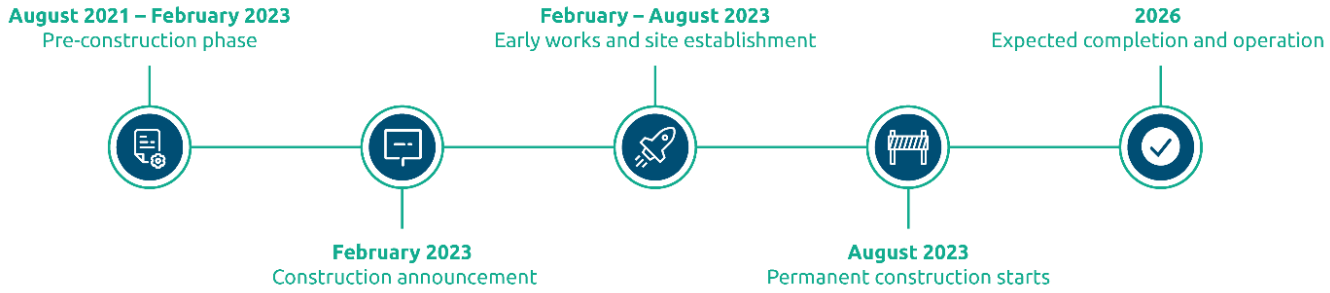

Figure 4-2 Indicative Timeline

The following are some of the activities that may occur in preparation for and during construction (refer to Figure 4-3):

- Survey – In preparation for construction, the ROW will be fully surveyed, and the FGP centre line will be pegged.
- Potholing – Some potholing may need to be carried out to identify the location of existing underground services. This will involve digging small test holes using hydro vacuum excavation and/or hand tools. Any underground services will be identified and marked with survey pegs/conduits. Overhead powerlines will be marked with colour-coded flags.
- Clearing – The ROW will be cleared of all topsoil, vegetation, rocks and other obstructions.
- Grading – Bulldozers and graders will level the ground in certain areas within the ROW to prepare a safe construction platform for the pipeline.
- Pipeline stringing – Pipes will be delivered to the site by truck from a centralised pipe stockpile location and 'strung' along the ROW end-to-end next to where the trench will be dug. The pipes will be laid on skids (timber blocks like railway sleepers used to keep the pipe off the ground) on sand or sawdust bags to protect the pipes from damage.
- Trenching – A trench will be excavated using specialist heavy earthmoving machinery. The trench will generally be 2m deep and deeper as necessary to meet the design requirements. The excavated trench spoil and any necessary imported material will be stockpiled next to the trench within the ROW.
- Trenchless (drilling or tunnelling) – Trenchless drilling or tunnelling is preferred where the conditions do not suit the use of an open trench, such as where the pipeline crosses waterways, rail and main roads. Launch and receival pits are excavated on either side of the crossing location and the pipe is guided through the hole with minimal disturbance to the surface. Trenchless crossing methods involve thrust boring, pipe-jacking, micro-tunnelling and horizontal directional drilling (further details below).
- Pipe laying and backfilling in trenches – After the pipe is laid, the trench will be backfilled and compacted using a combination of imported material (sand or crusher dust) to be placed under and around the pipe and selected trench subsoil for the remainder of the trench. The surface will be reinstated using the stockpiled topsoil and seedstock.
- Air Valves, Isolation Valves, Scour Valves – Valves are required along the length FGP mainly at high and low points. These valves will be aboveground infrastructure.
- Cathodic Protection – The FGP will be protected from corrosion by cathodic protection. Accordingly, cathodic protection test point stands will be required aboveground along the alignment.

- Pipeline cleaning and testing (commissioning) – This process occurs at the end of construction to remove debris from the inside of the pipe, test for leaks and complete performance testing for the operation of the FGP.
- Clean up and rehabilitation – All areas affected by construction will be cleaned up and rehabilitated to pre-construction conditions as far as practicable (noting any reasonable landholder requirements).
- Inspection and maintenance of the pipeline – Once operational, routine inspections will be conducted of the FGP to ensure it is operating safely and within specifications (refer to Section 4.3.7).

Figure 4-3 Pipeline Activities

Construction activities will take place during Monday to Sunday from 6:30am to 6:30pm in consultation and agreement with landholders. If agreement is not reached, construction activities will be undertaken from 6:30 am and 6:30 pm Monday to Saturday.

Work may be required outside these hours for critical works such as waterway or infrastructure crossings, concrete pours and/or hydrostatic testing. If work outside routine hours is required, and assessment will be undertaken and affected landholders will be consulted and the activity conducted in accordance with any relevant regulatory notification requirements. Blasting will not occur on Sundays.

Construction activities / works for the FGP are defined as per the *Environment Protection and Biodiversity Conservation Regulations 2000* definition for works i.e., for an action, includes earth works, removal or replacement of groundcover, diversion of water flows, tunnelling, drilling or any other sub-surface activity on land or water.
It is noted that access to, and along, the ROW is not considered to be construction activities.

4.3.4 *Key Infrastructure Elements*

Water Pipeline

The FGP will be buried at a nominal depth of 2m with varying cover depending on pipe material, ground conditions and loading (minimum cover 900 mm). It will be laid with a minimum grade of 1 in 500. The annual average flow rate in the pipeline will be up to 30,000 ML per annum with an approximate anticipated maximum operating pressure of 2,500 kPa and will vary along the pipeline route depending on elevation and distance from pump stations.

The main pipeline material is proposed to be mild steel cement lined, with high-density polyethylene used for the sections from the Fitzroy River Intake to the WTP and from the Aldoga Reservoirs to the connection with existing water infrastructure near Yarwun. Bulldozers and graders will level the ground in certain areas within the ROW to prepare a safe construction platform. Pipes will be delivered to site by truck then laid next to the trench on skids or sandbags to protect the pipe from damage.

Right of Way

A ROW of 30 m has been nominated for the pipeline, with a reduction in width in sensitive environments, i.e. waterways and Brigalow vegetation community. A typical ROW is provided in Figure 4-4.

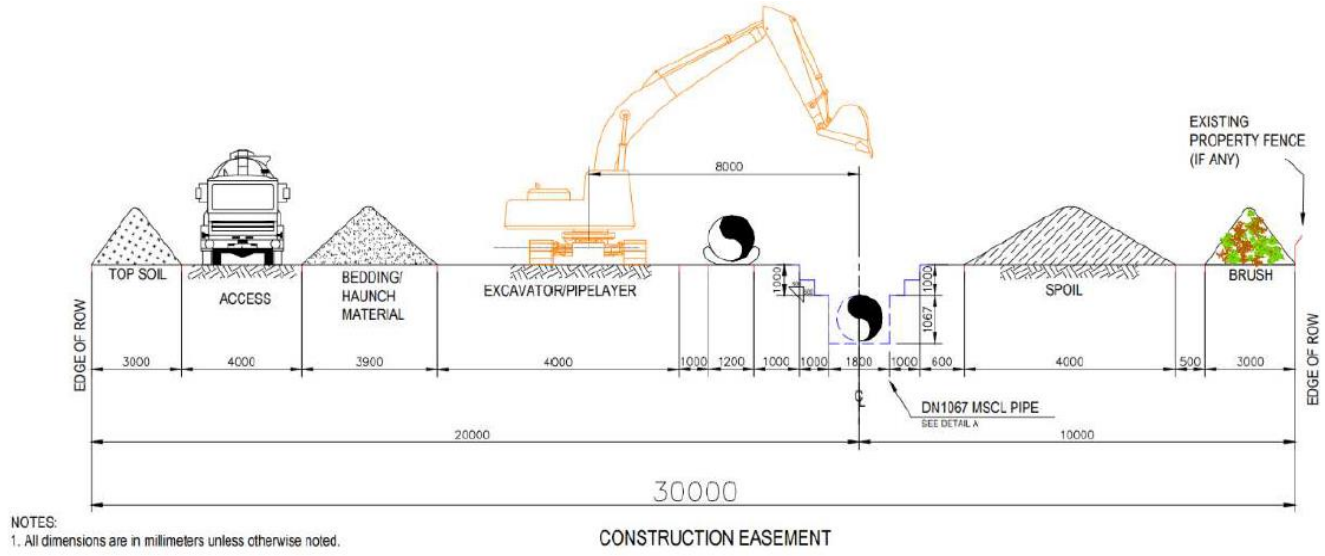

Figure 4-4 Typical ROW

Crossing Methods

Several construction methods have been considered for the pipeline crossing creeks, roads, rails and other infrastructure; it should be noted that trenchless methods have been used for major crossings. Construction methods include:

- Open trenching (non-trenchless):
    - It involves excavation of the trench directly though the stream or roadway. Excavators or backhoes are generally used with the trench spoil to be stockpiled away from the stream bed or road. The prefabricated pipe is strung out, lowered in and the trench backfilled immediately.
    - This method is proposed for minor roads and minor/dry creeks.
- Thrust boring or pipe-jacking:
    - Trenchless method involving launch and receival pits which are excavated on both sides of the crossing location.

    - An enveloper pipe with an open face is pressed into the ground with hydraulic jacks from the launch pit to the reception pit and an auger or drill removes the materials inside the pipe. The carrier pipe is then laid inside the enveloper pipe. The annular space between the enveloper and carrier pipes are then grouted.
    - The launch pit would be approximately 8 m by 4 m and the receival pit approximately 4 m by 3 m.
    - This method is proposed for major road and rail crossings.
- Micro-tunnelling or horizontal directional drilling:
    - Trenchless method involving launch and reception pits on either side of the crossing.
    - A tunnelling machine is used to excavate an underground path for the pipeline.
    - Powerful hydraulic jacks are used to push specially designed enveloper pipes through the ground behind a shield at the same time as excavation is taking place within the shield. The enveloper pipe is pushed from the launch pit to the reception pit. After the installation of the enveloper pipe, the carrier pipe is laid inside the enveloper pipe. The annular space between the enveloper and carrier pipes are then grouted. This method is suitable for sections up to 350 meters in length. Provided the working pits are set well back there is minimal impact to fringing riparian vegetation and river banks.

The use of blasting for pipeline installation is unlikely except at the Aldoga Reservoirs and potentially at some steep sections along the alignment. A Blast Management Plan will be developed to manage any blasting impacts, as required.

Fitzroy River Intake and Pump Station

The construction of the combined intake and pump station structure will require the installation of a temporary sheet piled coffer dam or similar, extending into the river, to allow the foundation of the structure to be dewatered and excavated to the required design level. A U-shaped coffer dam utilising two parallel sheet pile walls, filled with appropriate material and held by longitudinal walers and tie bars, is proposed. The coffer dam will be keyed into the riverbank.

Excavated material will be disposed of at an approved location off the site. Water ingress into the coffer dam will be discharged directly back to the river. Crane access to the riverbank and coffer dam will be required to service the construction works.

The construction of the combined structure will take place within the coffer dam. The structure will be founded on piles and, these piles will be driven in only after the coffer dam is dewatered and dry. Dewatering is expected to be a continuous process for the duration of construction.

A concrete floor will be poured on the base of the excavation once the support piles are installed. The concrete floor will provide a solid dry working floor for the construction of the concrete intake structure and will support the formwork.

Alton Downs WTP and Pump Station

The construction of the Alton Downs WTP will firstly involve the bulk earthworks and site preparation which will flow on to the construction of the concrete structures and reservoirs. Site preparation works will require the clearing of existing trees and vegetation. The vegetation will be mulched for use in the restoration and landscaping of the site on completion, where possible.

Structural steel, pipework, access hatches and other ancillary equipment will be set into the concrete structures, as required. When concrete structures are complete, the remainder of the works will relate to installation of prefabricated equipment.

Aldoga Reservoirs

The Aldoga Reservoirs are to be located near Mt Larcom and will be fully enclosed reinforced concrete storage with 100 ML capacity (2 x 50 ML tanks), with a land area approximately 10.5 ha.

Due to the shape and size of the hilltop location, the Aldoga Reservoirs consist of two circular shaped structures approximately 90 m diameter. Extensive earthworks, including blasting / rock breaking, will be required to establish the site.

Access to the Aldoga Reservoirs will be from a newly formed access off Aldoga Road which is accessed from Gladstone-Mt Larcom Road. The reservoir site will be located on the crest of a hill with access to the site to be constructed as part of the works.

The two circular reservoirs, post tensioned and cast in-situ, will be constructed using traditional well used techniques. Construction of the floor will commence first, followed by the walls. Walls would be poured in quadrants at 2 m lifts (jump form technique). The reservoirs shall generally be reinforced concrete structures. Construction of the reservoirs will require the delivery to site of large quantities of reinforcing steel, formwork and concrete.

Ancillary Works

MBJV is responsible for ancillary works (e.g. workers' accommodation, site facilities, temporary access tracks, and laydown areas). The following ancillary works are being investigated:

- Existing rental, motel and hotel accommodation in the area will be used for short-term labour accommodation needs. An existing Gladstone-based workers' accommodation camp and a temporary camp, to be developed at Gracemere, will be used to accommodate staff.
- Temporary site facilities will be located at each of the major project work locations. Transportable buildings will be utilised to establish temporary site offices to house day-to-day workforce activities such as crib rooms, toilets and offices.
- Domestic sewage will be treated by an approved septic or anaerobic waste treatment system where possible. Minor sites which will only operate on a short-term basis will be pump out systems where waste will be removed and disposed of at an approved local council treatment plant.
- Solid waste management will be sorted and stored onsite, waste will be removed and disposed of at an approved and licensed local council waste management facility.
- Equipment wash down facilities will be placed at strategic points to clean vehicles and construction equipment of weeds, seeds and contaminated soil when transiting between sites.
- Temporary storage and laydown areas, typically one hectare in area will be required at intervals along the pipeline route to unload and store the large quantities of pipe and construction materials and equipment. Gravel hardstand areas and roadways will be laid within the stockpile sites to allow the movement of heavy equipment and to allow loading of trucks and trailers. Each storage area will be fenced for security, with minimal night lighting and regular night-time security patrols.
- Storage and laydown sites will be chosen to allow all weather truck access and provide minimal disruption to vegetation, landowners and the travelling public. The intent will be to utilise a minimal number of pipe storage sites and to reload and haul pipe by truck and trailer to the work locations as required by the construction program.

All activities undertaken at temporary site facilities will be subject to the requirements of this CEMP and other management plans as required.

4.3.5 *Rehabilitation*

All areas affected by construction including ROW, work areas, access tracks and temporary site office areas will be cleaned up and rehabilitated to pre-construction conditions as far as practicable.

Clean up will include removal of waste material and equipment, compaction relief (particularly on heavily trafficked areas) and re-profiling to original or stable contours and re-establishing surface drainage lines. Signs, fences and barriers shall be installed where required to prevent unauthorised access to sensitive areas on the pipeline route, and to prevent damage.

Rehabilitation measures will be conducted according to recommendations in the *Australian Pipeline Industry Association Code of Environmental Practice – Onshore Pipelines 2017* and relevant development permit/approval conditions. It will consider application of vegetation regeneration and/or revegetation techniques to encourage natural regeneration of disturbed vegetation.

Site clean-up and rehabilitation will be conducted in consultation with landowners. It will have a warranty period of not less than 12 months from construction completion, which includes land rehabilitation measures.

Refer to Section 7.21 - Rehabilitation and Revegetation Control Plan for further information.

4.3.6 *Commissioning*

The commissioning of GAWB's assets will be completed by MBJV in collaboration with Partner, Ventia. A detailed Commissioning Plan is currently being prepared to manage all aspects of commissioning including the water intake and discharge for hydrotesting.

The commissioning process will be undertaken in two stages for each section of the pipeline and its associated facilities. These include pressure testing and leak testing, i.e. hydrotesting.

The FGP will be commissioned in sections between isolation valves and facilities along the alignment. The commissioning will include flushing and filling each section with water to test the pressure of the pipe and for any leaks.

Following the successful commissioning of a particular pipeline section, the water will be stored in the pipeline until the next section is ready for commissioning.

It is expected that approximately 5 ML of water will be required for this testing and most of the hydrotest water be discharged at the end of the pipe into an open swale drain that feeds into Boat Creek. However, there may be some minor discharges along the ROW. The water will only be discharged if it meets the appropriate water quality release criteria and in a manner that does not cause environmental harm. The water is expected to contain residual sediments from pipeline and construction activities.

For any hydrotesting discharges measures will be taken to:

- Reuse water for each section.
- Minimise the waste volumes of water generated.
- Minimise the water to be discharged to the environment.
- Ensure that the water to be discharged meets the requirements of any relevant guidelines, water quality objectives and the requirements of stakeholders.
- Ensure erosion protection measures are in place.

4.3.7 *Operation*

Operational stages of the FGP will be managed in accordance with an Operational Environmental Management Plan and/or other procedures to be prepared.

5. LEGAL AND OTHER REQUIREMENTS

This CEMP has been prepared in general accordance with the relevant requirements of the Queensland *Environmental Protection Act 1994* (EP Act) and associated *Environmental Protection Regulation 2019* (EP Regulation). It has been designed to protect the relevant Environmental Values associated with the construction phase of the Project.

Section 9 of the EP Act describes Environmental Value as:

> *(1) A quality of physical characteristic of the environment that is conducive to the ecological health of public amenity or safety; or*
>
> *(2) Another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.*

In addition, Section 319 of the EP Act provides information about the duty to prevent and minimise environmental harm. The general environmental duty states:

> *A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm.*

The general structure of this CEMP has been developed in response to EP Act requirements, as well as the ISO 14001 Plan Do Check Act framework, and incorporates the following key items:

- Environmental Value or Element
- Performance Objectives
- Legislative Requirements
- Performance Criteria
- Implementation
- Monitoring
- Reporting
- Corrective Action.

5.1 Project Legislation

Table 5-1 provides an overarching legislation register, detailing the current applicable relevant acts, regulations and policies that are applicable to the Project in general.

Table 5-1 Legislation, Regulations and Policies

Legislation and subordinate documentation	Regulatory Authority	Purpose	Relevance
Commonwealth			
EPBC Act	Department of Climate Change Energy the Environment and Water (DCCEEW)	Provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as matters of national environmental significance.	The FGP is to comply with the EPBC Approval Conditions (EPBC 2007/3501) through implementation of this CEMP and other management plans as relevant.

Legislation and subordinate documentation	Regulatory Authority	Purpose	Relevance
Native Title Act 1993	Native Title Tribunal	– Provide for the recognition and protection of native title – Establish ways in which future dealings affecting native title may proceed and to set standards for the dealings – Establish a mechanism for determining claims to native title – Provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title.	Native title is applicable to some parts of the Project. GAWB will manage native title.
State			
Aboriginal Cultural Heritage Act 2003 *Aboriginal Cultural Heritage Act 2003* – Duty of Care Guidelines	Department of Seniors, Disability Services and Aboriginal Torres Strait Islander Partnerships	Provides for effective recognition, protection and conservation of Aboriginal cultural heritage. Require those conducting disturbance activities in areas of significance to take all reasonable and practical measures to avoid harming cultural heritage.	An approved Cultural Heritage Management Plan (CHMP) between GAWB and the Port Curtis Coral Coast Aboriginal Peoples Charitable Trust (PCCC) and Darumbal People will be finalised prior to construction commencing. All parties are to comply with the CHMP as relevant to their works.
Biosecurity Act 2014 *Biosecurity Regulation 2016*	Department of Agriculture and Fisheries (DAF)	Provides biosecurity measures to safeguard our economy, agricultural and tourism industries, environment and way of life, from: pests (e.g. wild dogs and weeds), diseases (e.g. foot-and-mouth disease) and contaminants (e.g. lead on grazing land).	Management of pests and invasive species across the Project will be required by all parties. All personnel have a General Biosecurity Obligation.
Building Act 1975	Department of Communities, Housing and Digital Economy Private certifier	Regulates building development approvals, building work, building classification, building certifiers, and to provide for matters about sustainable buildings, and for other purposes.	This act relates to the WTPs, the pump stations and other buildings or structures required for the FGP.
Coastal Protection and Management Act 1995 *Coastal Protection and Management Regulation 2017*	Department of Environment and Science (DES)	Provides for the protection, conservation, rehabilitation and management of the coastal zone, including its resources and biological diversity.	The SGIC SDA section of FGP includes work in coastal areas. The FGP will comply with the operational works (OPW) (works in a Coastal Management District) approval (2210-31440 SDA) through implementation of this CEMP and other management plans as relevant.
EP Act	DES	The object of this Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).	For all activities the GED is required.

Legislation and subordinate documentation	Regulatory Authority	Purpose	Relevance
EP Regulation	DES	Prescribes the detail for processes contained in the EP Act. For example, this regulation contains the list of 'prescribed Environmentally Relevant Activities (ERAs)' which are regulated under the EP Act and prescribes the fees to be paid, such as application fees and annual fees for ERAs.	For specific activities that trigger an ERA an environmental authority is required from DES e.g. the WTP.
Environmental Protection (Air) Policy 2019	DES	Purpose of this policy is to achieve the object of the EP Act in relation to the air environment by: – Identifying environmental values to be enhanced or protected – Stating indicators and air quality objectives for enhancing or protecting the environmental values – Providing a framework for making consistent, equitable and informed decisions about the air environment.	Implements requirements for air emissions including dust and odour. The Policy is to be met by implementation of this CEMP and other management plans.
Environmental Protection (Noise) Policy 2019	DES	Purpose of this policy is to achieve the object of the EP Act in relation to the acoustic environment by: – Identifying environmental values to be enhanced or protected – Stating acoustic quality objectives for enhancing or protecting the environmental values – Providing a framework for making consistent, equitable and informed decisions about the acoustic environment.	Implements requirements for noise emissions including vibration. The Policy is to be met by implementation of this CEMP and other management plans.
Environmental Protection (Water and Wetland Biodiversity) Policy 2019	DES	Purpose of this policy is to achieve the object of the EP Act in relation to waters and wetlands by: – Identifying environmental values for waters and wetlands – Identifying management goals for waters – Stating water quality guidelines and water quality objectives to enhance or protect the environmental values – Providing a framework for making consistent, equitable and informed decisions about waters – Monitoring and reporting on the condition of waters.	Provides relevant objectives for waterways and wetlands for the FGP to achieve. The Policy is to be met by implementation of this CEMP and other management plants.
Fisheries Act 1994	DAF	Sets out Fisheries Queensland's responsibilities for the economically viable, socially acceptable and ecologically sustainable development of Queensland's fisheries resources.	The *Fisheries Act 1994* primarily applies to waterways which are classified as waterways for the purpose of waterway barrier works located throughout the Project, and marine

Legislation and subordinate documentation	Regulatory Authority	Purpose	Relevance
			plants located in the SGIC SDA section.
Land Act 1994	Department of Resources (DoR)	Land to which this Act applies must be managed for the benefit of the people of Queensland.	Applies to the FGP and is being managed by GAWB. Appropriate land tenure or agreements may need to be sought by MBJV for ancillary works.
Native Title (Queensland) Act 1993	Native Title Tribunal	In accordance with the Native Title Act 1993 (Cwth), to validate past acts, and intermediate period acts, invalidated because of the existence of native title and to confirm certain rights. To ensure that Queensland law is consistent with standards set by the Native Title Act 1993 (Cwth) for future dealings affecting native title.	Native title is applicable to some parts of the Project. GAWB will manage native title.
Nature Conservation Act 1992 Nature Conservation (Animals) Regulation 2020 *Nature Conservation (Plants) Regulation 2020*	DES	The object of this Act is the conservation of nature while allowing for the involvement of indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition or Island custom.	Relevant for the activities impacting vegetation, animals and their habitat. The Project is to comply with the approved SMP (SMP1141) through implementation of this CEMP and other management plans as relevant.
Planning Act 2016 Planning Regulation 2017	Department of State Development, Infrastructure, Local Government and Planning (DSDILGP)	Establishes Queensland's planning framework and is supported by other Acts and regulations. It also establishes the framework of planning instruments that support the operation of the three main systems: plan-making, development assessment and dispute resolution.	Relevant for all activities. Certain accepted or assessable requirements are to be met, as described further in this CEMP.
Plumbing and Drainage Act 2018	Department of Communities, Housing and Digital Economy	The main purpose of this Act is to regulate the carrying out of plumbing or drainage work in a way that reduces risks to public health and safety, and the environment.	Relevant for buildings and permanent structures and their plumbing standards and outlets.
Queensland Heritage Act 1992	DES	The object of this Act is to provide for the conservation of Queensland's cultural heritage for the benefit of the community and future generations.	Applies to works being Raglan and any incidental potential finds.
State Development and Public Works Organisation Act 1971 State Development and Public Works Organisation (State Development Areas) Regulation 2019	CG DSDILGP	An Act to provide for State planning and development through a coordinated system of public works organisation, for environmental coordination, and for related purposes. The regulation declares SDAs and provides for the implementation of: – SGIC SDA Development Scheme – GSDA Development Scheme.	The CG issued an Evaluation Report in 2010 which included stated and recommended conditions of approval. The CG's Evaluation Report has since lapsed; however, it provides guidance on approval requirements and conditions. The respective SDA Development Schemes apply to temporary and permanent works in the SGIC SDA and the GSDA.

Legislation and subordinate documentation	Regulatory Authority	Purpose	Relevance
Transport Infrastructure Act 1994	Department of Transport and Main Roads (TMR)	The overall objective of this Act is, consistent with the objectives of the *Transport Planning and Coordination Act 1994*, to provide a regime that allows for and encourages effective integrated planning and efficient management of a system of transport infrastructure.	Relevant for use of and impacts to State-controlled transport infrastructure (roads and rail).
Vegetation Management Act 1999 *Vegetation Management Regulation 2012*	DoR	The purpose of this Act is to regulate the clearing of vegetation in a way that— a) conserves remnant vegetation b) conserves vegetation in declared areas c) ensures the clearing does not cause land degradation d) prevents the loss of biodiversity e) maintains ecological processes f) manages the environmental effects of the clearing to achieve the matters mentioned in paragraphs (a) to (e) g) reduces greenhouse gas emissions h) allows for sustainable land use.	Applies to clearing of vegetation associated with the FGP. The Project is to comply with the OPW (vegetation clearing) approvals (2211-32196 SDA and 2302-33153 SDA) through implementation of this CEMP and other management plans as relevant.
Waste Reduction and Recycling Act 2011 *Waste Reduction and Recycling Regulation 2011*	DES	The legislation establishes a framework to modernise waste management and resource recovery practices in Queensland. It will promote waste avoidance and reduction and encourage resource recovery and efficiency.	Provides requirements for the Project's waste generation, storage, transport and disposal.
Water Act 2000 *Water Regulation 2016*	Department of Regional Development, Manufacturing and Water (DRDMW)	– The sustainable management of Queensland's water resources and quarry material by establishing a system – The sustainable and secure water supply and demand management for the south-east Queensland region and other designated regions – The management of impacts on underground water caused by the exercise of underground water rights by the resource sector – The effective operation of water authorities.	Will apply to watercourses impacted and use of water for construction. Where no water entitlement is available, the FGP will comply with *Exemption requirements for constructing authorities for the take of water without a water entitlement.* The FGP will have an allocation of water from the Fitzroy River.
Water Supply (Safety and Reliability) Act 2008	DRWMW	The purpose of this Act is to provide for the safety and reliability of water supply.	GAWB's responsibility and reason for the FGP development.
Local			
Rockhampton Region Planning Scheme	Rockhampton Regional Council (RRC)	The planning scheme sets out RRC's intention for the future development in the planning scheme area, over the	Relevant for the FGP within the RRC LGA.

Legislation and subordinate documentation	Regulatory Authority	Purpose	Relevance
		next twenty (20) years. It provides a means for regulatory and identifying both assessable and accepted development.	
Rockhampton Local Laws	RRC	Under the *Local Government Act 2009*, Council may make and enforce any local law that is necessary or convenient for the good rule and local government of its area. The term "local law" includes "subordinate local law". The Local Laws likely applicable to this Project include: – Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads) 2011 – Subordinate Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads) 2011	Relevant for interactions with RRC owned roads and infrastructure.
Gladstone Regional Council Planning Scheme	Gladstone Regional Council (GRC)	The planning scheme sets out GRC's intention for the future development in the planning scheme area, over the next seventeen years to 2031. It provides a means for regulatory and identifying both assessable and accepted development.	Relevant for the FGP within the GRC LGA.
Gladstone Local Laws	GRC	Under the *Local Government Act 2009*, Council may make and enforce any local law that is necessary or convenient for the good rule and local government of its area. The term "local law" includes "subordinate local law". The Local Laws likely applicable to this Project include: – Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads) 2011 – Subordinate Local Law No 4 (Local Government Controlled Areas Facilities and Roads) 2011.	Relevant for interactions with GRC owned roads and infrastructure.

5.2 Approvals, Permits and Licences

In 2007, the Queensland Government Coordinator-General declared the Project a 'significant project, requiring an EIS under Section 26(1) of the SDPWO Act. An EIS was prepared for the Project under the Queensland and Commonwealth bilateral agreement.

Following the EIS process, the Project obtained the following primary environmental approvals:

- Commonwealth government EIS approval under EPBC Act (reference: EPBC 2007/3501, approved 4 November 2011) for the proposed construction and operation of a 110 km pipeline and associated infrastructure to transport up to 30 Giga Litres of water per annum from an intake point at Laurel Bank on the Fitzroy River to Gladstone, near Aldoga, Queensland.
- Queensland government EIS approval framework under Section 26(1) of the SDPWO Act. The effect of this approval is that the Project was declared a 'significant project' (26 July 2007) requiring

an EIS. The CG issued an Evaluation Report in 2010 which included stated and recommended conditions of approval. The CG's Evaluation Report has since lapsed; however, it provides guidance on approval requirements and conditions.

GAWB and MBJV are currently in the process of obtaining a range of other planning and environmental approvals as summarised in Table 5-2.

5.3 Guidelines and Other Requirements

In order to meet the legislation outlined in Table 5-1, the following requirements, guidelines and policies apply:

- Exemptions / accepted development requirements which outline a range of conditions that can be utilised MBJV, if met then development permits are not required:
    - Accepted development requirements for operational work that is constructing or maintaining waterway barrier works (DAF, 2018)
    - Accepted Development Vegetation Clearing Code (ADVCC): Clearing for Infrastructure (Department of Resources, 2020)
    - Exempt clearing work under the Vegetation Management Act as detailed in List of exempt clearing work (former Department of Natural Resources, Mines and Energy, 2019)
    - Riverine protection permit exemption requirements WSS/2013/726 Version 2.02 (DRDMW, 2023)
    - OSW/2020/5467 Exemption requirements for constructing authorities for the take of water without a water entitlement (DRDMW, 2021).
- Guidelines made under legislative powers that assist in meeting objectives of the legislation:
    - Environmental Protection (Water) Policy 2009: Fitzroy River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Fitzroy River Sub-basin (DES, 2011)
    - Environmental Protection (Water) Policy 2009: Curtis Island, Calliope River and Boyne River Basins Environmental Values and Water Quality Objectives (DES, 2014)
    - Water Plan (Fitzroy Basin) 2011
    - Water Plan (Calliope River Basin) 2006
    - Flora Survey Guidelines – Protected Plants (DES, 2020).
- Other guidelines include, but are not limited to:
    - Best Practice Erosion and Sediment Control (IECA, 2008)
    - Noise Measurement Manual (DES, 2020)
    - Monitoring and Sampling Manual (DES, 2018) (relates to water quality monitoring)
    - Queensland auditor handbook for contaminated land Module 6: Content requirements for contaminated land investigation documents, certifications and audit reports (DES, 2018)
    - National Environmental Protection (Assessment of site Contamination) Measure 1999 (Amended in 2003)
    - National Acid Sulfate Soils Guidance (Commonwealth of Australia, 2018)
        - National Acid sulfate soil sampling and identification methods manual (Commonwealth of Australia, 2018)

- Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines (State of Queensland, 2014).

It is further noted that:

- Pipeline works within wetland protection areas are not high impact earthworks, as defined in Schedule 24 of the *Planning Regulation 2017* i.e.: … establish underground infrastructure … if the excavated land is to be restored.
- Works at the Fitzroy River Intake are not defined as waterway barrier works as per advice received from SARA / DAF via email dated 1/11/2022 (5 m maximum encroachment of waterway which is 300 m wide at this location).
- The pipeline and WTP is accepted development under the RRC Planning Scheme as a utility installation undertaken by public sector entity.
- No clearing permit is required in connection with protected plant trigger mapping at the Aldoga Reservoirs, as ecological surveys conducted in February / April 2022 did not identify the presence of protected plants and an exempt clearing notification submitted to DES on 3 August 2022.

Table 5-2 Approvals and Permits Summary

Approval	Section	Component	Regulatory Authority	Responsible Party	Status / Indicative Timing
Material Change of Use (MCU) Development Permit assessable against the Rockhampton Regional Council Planning Scheme	Northern Section	Fitzroy River Intake and Pump Station	RRC	GAWB	Granted
MCU – Development Permit assessable against the GSDA Development Scheme	GSDA	Aldoga Reservoirs	OG	GAWB	Granted
MCU – Development Permit assessable against the SGIC SDA Development Scheme	SGIC SDA	Pipeline and facilities	CG	GAWB	Lodged Q4 2022 MCU SDA Approval expected July 2023
MCU – Development Permit assessable against the GSDA Development Scheme) and OPW for vegetation clearing	GSDA	Pipeline	CG	GAWB	Formal assessment process progressing MCU SDA Approval expected November 2023
OPW – Development permit for disturbing marine plants and Tidal Works	SGIC SDA	Pipeline	State Assessment and Referral Agency (SARA), RRC	GAWB	RRC LGA – Lodged Q4 2022 – Expected July 2023 GRC LGA – Lodged Q1 2023 – Expected August 2023
OPW – Development Permit for clearing of native vegetation	Northern Section	Pipeline and facilities	SARA	GAWB	Granted
	SGIC SDA	Pipeline and facilities	SARA	GAWB	Granted
OPW – Development Permit for works in a Coastal Management District - removal of quarry material from State land above high-water mark	SGIC SDA	Pipeline	SARA	GAWB	Granted
MCU / OPW – Development Permit assessable against the Rockhampton Regional Council Planning Scheme	Outside ROW	Pipe laydown, camp	RRC	MBJV	Progressing (laydown application lodged June 2023)
Environmental Authority	Northern Section	Alton Downs WTP	SARA, DES	MBJV	Progressing
SMP for tampering with animal breeding places	Whole of Project	Pipeline and infrastructure	DES	GAWB	Granted

Approval	Section	Component	Regulatory Authority	Responsible Party	Status / Indicative Timing
Road Corridor Permit	Whole of Project	Pipeline	TMR, GRC, RRC	GAWB / MBJV	In-principle agreements received
Road Corridor Permit	Northern	Pipeline crossing with the Rockhampton Ring Road	TMR	GAWB / MBJV	Progressing
Road Works Approval	Whole of Project	Pipeline	TMR, GRC, RRC	MBJV	Progressing
Construct and Maintain a Driveway	SGIC SDA & GSDA	Aldoga Reservoirs	GRC	MBJV	Progressing
Permitted Road Access Location (s62(1))	Northern	Alton Downs WTP	TMR	GAWB	Granted
Building works approval permit	Northern Section SGIC SDA	Alton Downs WTP, Raglan Pump Station and Reservoir	Council	MBJV	Not commenced
Plumbing or drainage works approval	Northern Section	Alton Downs WTP, Raglan Pump Station and Reservoir	Council	MBJV	Not commenced

6. IMPLEMENTATION AND OPERATION

6.1 FGP Objectives

The objectives established for the FGP are outlined in Table 6-1.

Table 6-1 Project Objectives

Project Objective	Description
Water Security	Deliver infrastructure that connects communities, deliver a sustainable and resilient network and a network that provides for immediate drought response.
Reliability	Deliver a network that runs efficiently, effectively and is fit for its intended purpose, that considers operation and whole-of-life design for replacement and availability of components, and that establishes trust in the local community that GAWB delivers as an authority on time and to its commitments.
Cost	Deliver the works within the agreed construction value and demonstrate a value for money outcome to the State Government. Ensure that cash moves quickly through the supply chain, and all subcontractors, suppliers, professional service providers are paid in a timely manner.
Time	Delivery of the asset as per the delivery program to meet water security and planning objectives.
Safety	Deliver and construct the Project with a zero rate of incidents and be injury free. Create a culture where the safety of the Project workforce, operators of the network and the general community is paramount.
Quality	Ensure that constructed works are fit for purpose and meet all Project design requirements, standards and warranties and achieve a zero defects status.
Environment	Actively manage the Project to eliminate environmental harm and demonstrate genuine sensitivity and care for the environment.
Community and Stakeholders	Engage commercially competitive local suppliers, where possible. Recruit local skilled workers. Develop and maintain productive relationships with community and stakeholders. Effectively plan and deliver communication and engagement strategies to support Project works, minimise impacts to community and stakeholders, contribute to a positive Project reputation and produce economic benefits to the local area.
Values and Behaviours	Alignment with GAWB's corporate philosophy and 'the way we work' including: – Engage –We work together. Always. – Accountable –We all contribute. Openly. – Safety & Wellbeing –We look after ourselves. And each other. – One Team –We Deliver. You and I.
QPP Compliance	Demonstrate and comply with each category of the Queensland Procurement Policy including the Best Practice Principles, Local Benefits Test and all statutory requirements. Demonstrate and comply with the Australian Industry Participation Plan and all other Project-related regulatory requirements.
Skill and System Development	Provide training and skills development opportunities for all people working in the Project team and enable GAWB to increase its overall capability as an organisation. Contribute to local and Indigenous supply chain capability and capacity development and skill development of local and Indigenous labour.

6.2 Environmental Leadership and Commitment

GAWB and MBJV undertake a reflective, resourceful, inclusive, and flexible approach to environmental management and leads by example in ensuring that statutory and contractual requirements are met, and positive environmental performance is maximised.

The approach to environmental leadership is underpinned by an ISO 14001 certified Environmental Management System (EMS) that forms part of the integrated McConnell Dowell Management System (MMS).

In line with the requirements of ISO 14001, MBJV top management, are committed to review and endorse this document as part of a broader review of the MMS every 12 months. This process ensures top management:

- Take accountability for the effectiveness of the environmental management system.
- Make certain that environmental objectives are established and are compatible with the strategic direction and the context of the organisation.
- Ensure the integration of the environmental management system requirements into the organisation's business processes.

For the FGP, MBJV will be working under the McConnell Dowell EMS. McConnell Dowell operates an ISO 14001 certified EMS that forms part of the fully integrated MMS. The MMS provides the framework for managers to implement specified corporate standards and practices in a consistent manner. It defines the application of work practices, processes, and systems for engineering/design, acquisition of materials, equipment and services, construction, and other services related to tendering and project execution.

The environmental management framework applicable to the FGP is shown diagrammatically below (Figure 6-1) and elements of the framework explained in Table 6-2.

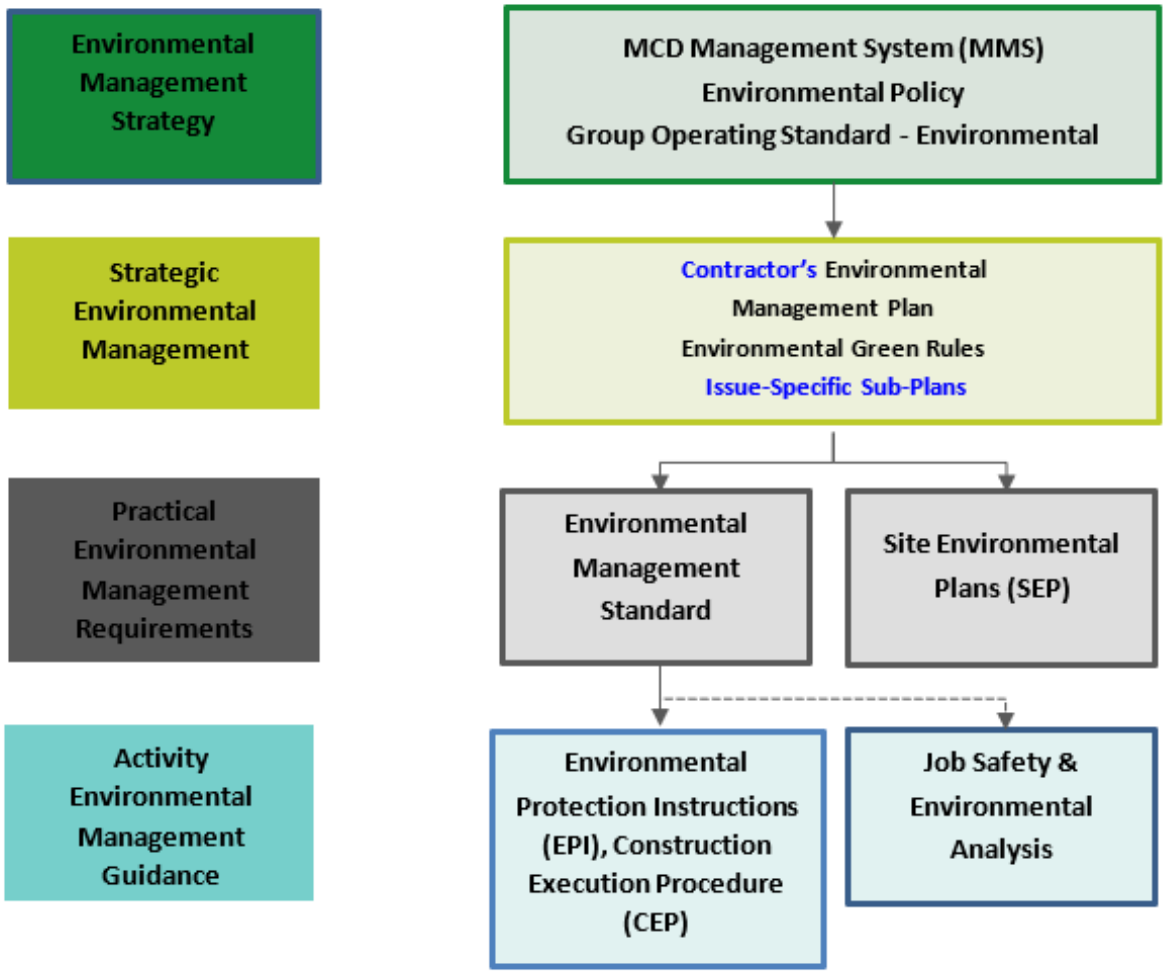

Figure 6-1 Environmental Management System Framework

Table 6-2 Description of environmental management framework documents

Document Type	Description
Environmental and Sustainability Polices	Refer to sections 6.3 and 6.4 for the Environmental and Sustainability Polices, respectively.
Construction Environmental Management Plan	This document. This CEMP provides a system and set of procedures to ensure that sound and effective controls are established and maintained to manage potential environmental impacts throughout the Project and, wherever practicable, to deliver positive environmental outcomes. As part of our commitment to continuous

Document Type	Description
	improvement we will take a proactive approach to environmental management for the FGP. This document is therefore based upon a risk management process where the environmental risks associated with each element of the FGP are identified and assessed, and appropriate mitigation strategies implemented to eliminate or minimise the subsequent risk. This CEMP is supported by other environmental management plans.
Issue-Specific Sub-Plans	Documents that focus one specific environmental issue in detail (e.g. noise and vibration), outlining risks, opportunities, mitigation and management measures in relation to that environmental issue.
Environmental Green Rules	A suite of ten environmental management rules set to enforce positive messages about what is expected as a minimum standard onsite to minimise our impact on the natural environment and local community.
Site Environmental Plans (SEPs)	SEPs are spatial representations, in the form of an aerial photographs developed for a specific footprint of the FGP to illustrate the key site features relating to environmental management. The SEPs provide a picture of the existing environmental values and demonstrate the location of the site environmental controls and other key environmentally relevant features of the FGP.
Environmental Protection Instructions (EPIs)	EPIs will be adopted from a standard suite of EPIs. They will be amended, if necessary, to meet specific Project requirements. These documents provide a summary of the method of implementation for a number of the environmental controls articulated in the CEMP and issue-specific sub-plans. As the Project progresses there may be a need for new EPIs to cover areas not identified during the pre-mobilisation risk assessment process. Any new EPIs will be developed by the Environmental Management Representative / Environmental Manager / Advisor and will be communicated to the Construction Team through inductions and toolbox talks. If necessary, training on any new EPI will be provided by the Environmental Management Representative / Environmental Manager / Advisor
Construction Execution Procedures (CEPs)	CEPs are developed and implemented for each major part of the scope of work, defining the methodology, management strategies, responsibilities, resource requirements, testing and recording requirements, contractual and legal requirements and the identification of separate work packages or stages. Safety and environmental risks are also anticipated, and associated controls recommended within these procedures. Documentation, such as Safe Work Method Statements (SWMSs), CEMP and associated environmental management plans and EPIs are referenced where applicable. CEPs are developed in consultation with the Project Environmental Team to ensure that any required environmental or sustainability controls and opportunities are embedded into the processes adopted. Personnel involved in the specific activity covered by the CEP are inducted into the requirements by the Project Engineer to ensure they understand their responsibility to comply with requirements and to implement any required controls. All CEPs require review and approval by the Environmental Team prior to work commencing on the Project.
Job Safety and Environmental Analysis (JSEA) / Safe Work Method Statement (SWMS)	JSEAs are a tool used to determine safety and environmental risk associated with tasks prior to commencing a component of work. Each task is reduced to individual steps and the potential hazard associated with each step identified. Risk mitigation steps are attributed to each hazard, thus providing a detailed plan for installation of control measures. The main strength of JSEAs prepared on the job is their ability to focus on unique risks at a particular point in time e.g. current conditions, resources, experience of workers and impact with other jobs or people. JSEAs prepared on the job are best carried out close in time and location to the execution of the associated works. It is acceptable to use a pre-existing generic JSEA as a basis to commence the process, but it is essential that current circumstances such as site conditions, level of experience of the crew, prevailing weather conditions, etc are incorporated into the job specific JSEA. A Summary of all hazard identification processes is to be maintained on JSEA /SWMS Register.

6.3 Environmental Policy

MBJV will be utilising McConnell Dowell's Environmental Policy, endorsed by the McConnell Dowell Group CEO and BMD Operations Manager. This document directs the level of commitment to positive and proactive environmental performance for all activities.

The Environmental Policy (refer to Figure 6-2) makes the following key commitments:

- Visible and demonstrated environmental leadership
- Promoting innovative thinking and practices to achieve positive environmental outcomes
- Compliance with applicable environmental obligations
- Monitoring environmental performance and seeking continual improvement
- Prevention of pollution and minimising environmental impacts.

In addition, MBJV will communicate the suite of ten environmental management rules set to enforce positive messages about what is expected as a minimum standard onsite to minimise our impact on the natural environment and local community (refer to Figure 6-3).

ENVIRONMENTAL POLICY

McCONNELL DOWELL
CREATIVE CONSTRUCTION™

McConnell Dowell undertakes a reflective, resourceful, inclusive and flexible approach to environmental management, underpinned by a robust ISO 14001 certified integrated management system. McConnell Dowell acts today with the future in mind and commits to:

- Having visible and demonstrated environmental leadership throughout the business to equip, inspire, empower and lead our people to win and deliver environmentally sound projects.
- Complying with applicable environmental legislation, regulations, codes of practice, customer and project specific requirements.
- Establishing measurable objectives and targets to quantify our environmental performance, committing to and demonstrating continual improvement.
- Ensuring strong and positive leadership engagement with tender and project delivery teams at all levels to understand and resolve the environmental challenges they face.
- Monitoring our environmental performance and identifying initiatives that lead to improved environmental outcomes.
- Developing and implementing methods to protect the environment, prevent pollution and eliminate or minimise significant environmental impacts.
- Ensuring the efficient use of resources including energy, water and materials, and providing responsible waste management.
- Promoting innovative thinking and practices to achieve positive environmental outcomes.
- Understanding our customers, business partners and subcontractors' environmental capabilities and priorities and working together to develop common strategies to achieve shared goals.
- Identifying and communicating non-conformities, lessons learnt and corrective actions arising from environmental incidents to enhance environmental performance.
- Provision of the necessary resources and management support to achieve environmental goals.
- Equipping all employees with the knowledge, skills and resources to achieve our environmental goals. Engaging with employees, subcontractors, customers, and other key stakeholders on environmental issues.

Scott Cummins
Chief Executive Officer
McConnell Dowell Corporation Limited

HSEQ-ENV-POL001-GEN-GRP
REV2 29SEP2021

Figure 6-2 Environmental Policy

Figure 6-3 Environmental Green Rules

6.4 Sustainability Policy

MBJV will be utilising McConnell Dowell's Sustainability Policy, also endorsed by the McConnell Dowell Group CEO. The policy outlines the Group's commitment to sustainability.

The Sustainability Policy (refer to Figure 6-4) makes the following key commitments:

- Business sustainability leadership through professionalism, competence, and industry participation
- Client and community protection through an uncompromising commitment to safety, quality, and the environment
- Team growth through sharing and collaboration and business growth through partnerships, market knowledge, innovation, and adaptability
- Client and community sustainability through long term relationships and acting today with the future in mind
- Actively encouraging continual improvement and promoting innovation, adaptability, and resilience
- Appropriate use of materials, including water and energy, and the resulting generation of waste and carbon emissions in all our activities

- Understanding and reducing use of carbon, energy, materials, and water footprints
- Promotion of sustainable construction practice, including the prevention and mitigation of environmental pollution, climate change adaptation, the efficient and sustainable use of resources and the principles of inclusion, engagement, equality, and diversity.

SUSTAINABILITY POLICY

McCONNELL DOWELL
CREATIVE CONSTRUCTION

McConnell Dowell undertakes its activities integrating social, environmental, economic and good corporate governance considerations. We do this with the objective of avoiding and mitigating harm to the environment, contributing to and enhancing the resilience of the communities in which we operate, and creating shared value for our customers and our people. We commit to:

- Industry leadership through our professionalism, competence and active industry participation.
- Industry leading approaches to shared value generation through the delivery of safe, smart and efficient infrastructure.
- Accountability and management responsibility through delivering on what we promise and understanding and meeting our customers' needs and community expectations.
- Promotion of sustainable construction practices, including the prevention and mitigation of environmental pollution, climate change adaptation, the efficient and sustainable use of resources, and the principles of inclusion, engagement, equality and diversity.
- Generating growth in our business and the industry by fostering long-term, strong and positive partnerships with customers, communities, regulators, industry bodies and other key stakeholders.
- Addressing the risk of modern slavery across the business and implementation of our Modern Slavery Statement.
- Taking all reasonable steps to prevent modern slavery in our operations and supply chains.
- Ensuring our procurement choices and selection of suppliers and subcontractors is achieved in a balanced and holistic manner which includes sustainability.
- Actively encouraging continual improvement and promoting innovation, adaptability and resilience.
- We actively encourage the implementation of initiatives that leave a positive legacy for our stakeholders, the environment and communities in which we operate.
- Consideration of the appropriate use of materials, including water and energy, and the resulting generation of waste and carbon emissions in all our activities. Understanding and reducing our carbon, energy, materials and water footprints.
- Creating opportunities and involving, engaging and integrating with the communities in which we work.
- Nurturing the health, wellbeing and quality of life of those we work with and alongside. Everyone goes home without harm, every day.
- Protecting our business, our partners and customers through good corporate governance, compliance and sound risk management.

Scott Cummins
Chief Executive Officer
McConnell Dowell Corporation Limited

HSEQ-ENV-POL002-GEN-GRP
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Figure 6-4 Sustainability Policy

6.5 Roles and Responsibilities

Protection of the environment is the responsibility of all individuals and organisations involved with the FGP.

All personnel will be made aware of environmental issues associated with the FGP and their responsibilities through training and awareness methods detailed in Section 6.6.

Table 6-3 provides an overview of the minimum environmental roles and responsibilities relating to delivery of the construction phase of the FGP.

Table 6-3 Roles and Responsibilities

Role	Responsibilities
GAWB Project Team	Manage compliance with the CEMP. Oversee compliance with conditions associated with approvals, permits or licences during the construction. Review of the relevance of the CEMP (and other management plan) and its effectiveness in helping meet the FGP environmental responsibilities. Minimise the potential environmental impacts associated with the FGP. Manage tender documents and contracts for construction and operation/maintenance and incorporating the requirements for complying with this CEMP and other management plans. Ensure that the CEMP and associated sub-plans are developed and implemented by MBJV, in accordance with this CEMP and any approvals, permits or licences. Ensure all relevant management plans and surveys are prepared, implemented and undertaken by MBJV. Oversee the implementation of all management plans. Work with MBJV to obtain necessary approvals under relevant legislation, not including any approvals for construction activities which are MBJV's responsibility. Ensure MBJV has obtained all necessary approvals under relevant legislation. Ensure the design meets relevant environmental legislation and approval conditions. Communicate with regulatory authorities as required. Allocate resources and personnel to oversee and monitor compliance with the CEMP and/or other management plans.
Project Director	Promote at all times the company's policies, procedures and standards relating to environmental management and ensure that they are complied with. Ensure sufficient resources are available to achieve the policy, objectives, and targets and that those resources have sufficient skills to conduct the roles competently. Report performance on a regular basis to internal and external stakeholders. Report significant incidents internally and externally as required by law and Contract Conditions.
Project Manager	Overall environmental performance of the FGP. Ensure the FGP achieves legislative compliance. Provide leadership in the development of the CEMP and authorise its use. Nominate key personnel, assigning environmental responsibilities and allocating sufficient resources to achieve implementation of this plan. Ensure all personnel are familiar with and implement all relevant environmental controls as required. Monitor environmental performance to ensure compliance and continued improvement. Participate in the review of the EMS and this CEMP. Encourage all personnel to maintain acceptable environmental management work practices and foster awareness of environmental matters. Encourage the reporting of incidents, events and other concerns and ensure appropriate feedback on proposed corrective actions.
Construction Manager	Overall environmental performance of project area/s assigned to them. Ensure the project area/s achieve legislative compliance. Nominate key personnel, assigning environmental responsibilities and allocating sufficient resources to achieve implementation of this plan in their area/s of responsibility. Ensure all personnel are familiar with and implement all relevant environmental controls as required. Monitor environmental performance to ensure compliance and continued improvement.

Role	Responsibilities
Environmental Representative/ Environmental Manager	Functional and technical leader for the FGP's environmental obligations. Principal contact for internal and external communication in relation to environmental matters. Oversee all environmental management aspects of the FGP. Authority to stop a particular task or activity in circumstances where environmental controls or mitigation measures have not been implemented, have been implemented incorrectly/inadequately, are ineffective or where activities may otherwise be considered to lead to environmental harm. In such circumstances, prescribe corrective action that will be implemented before work recommences. Develop, review, and ensure this CEMP and sub plans are correctly implemented. Ensure measures are put in place to manage and mitigate environmental risks and issues as identified. Ensure that environmental plans, procedures, and work instructions as applicable are prepared, reviewed, and approved prior to commencement of work. Ensure all significant environmental issues are reflected in the significant environmental aspects identified for the Project. Investigates and reports significant environmental incidents or complaints internally and externally as required by law and the Project Conditions. Ensure that all key environmental aspects and associated impacts are incorporated into the CEMP, and that suitable control measures are proposed to minimise the Project's environmental impact. Ensure that all relevant environmental permits are obtained for the FGP. Ensure all personnel and contractors engaged to work on the FGP are appropriately inducted and trained in environmental issues and controls relevant to the FGP. Ensure monitoring programs, which assess the performance of the CEMP and specific plans, are implemented. Report internally and externally in accordance with Project and other requirements. Investigate and report incidents and non-conformance and ensure corrective and preventive action is taken and is effective. Provide leadership sufficient to inspire and influence others to achieve the FGP objectives and targets. Manage, track compliance with all environmental approvals, licences, permits and other obligations. Lead the tracking of environmental and sustainability targets for the FGP. Ensure appropriate environmental training is identified in a Training Needs Analysis and that training is provided to all personnel where required. Review and update this plan, as required. Prepare environmental data for monthly reports.
Environmental Advisor	Support the Environmental Representative/Environmental Manager to ensure that all key environmental aspects and associated impacts are incorporated into the CEMP, and that suitable control measures are proposed to minimise the FGP's environmental impact. Support the Environmental Representative/Environmental Manager that all relevant environmental permits are obtained for the FGP. Ensure all personnel and contractors engaged to work on the FGP are appropriately inducted and trained in environmental issues and controls relevant to the FGP. Ensure monitoring programs which assess the performance of the CEMP and sub plans, and any associated documents are implemented. Report any environmental incidents to the Environmental Representative/Environmental Manager/HSE Manager. Investigate and report incidents and non-conformance and ensure corrective and preventive action is taken and is effective.
Sustainability Manager/Advisor	Drive compliance with the GAWB's sustainability requirements. Ensure monitoring programs which assess the performance of the Sustainability Management Plan, and any associated documents are implemented.

Role	Responsibilities
Engineering/Design Manager	Provide effective environmental leadership. Ensure designs are undertaken in accordance with the requirements of the scope of works, technical requirements, relevant standards, and this CEMP. Ensure design has minimal environmental impact. Ensure processes and resources are in place to adhere to environmental and sustainability obligations where they affect design or are affected by design. Participate in incident and non-conformance report investigations and ensure that corrective and preventative action proposed is implemented effectively.
Supervisor/Superintendent/Foreperson	Ensure that requirements of this CEMP are communicated to all personnel under his/her control. Be aware of all environmental risks, issues and concerns relating to his/her area of work. Be aware of all approval and contractual conditions relating to his/her area of work. Perform surveillance and monitoring of environmental controls to ensure they are adequately established, effective and maintained.
All personnel	Familiarise themselves with their responsibilities within this CEMP and EMS. Attend all site inductions and Pre-Start Talk and Site Attendance Record. Participate in site inspections, audits, environmental meetings, Toolbox Talks, environmental forums etc. where requested/required. Comply with all site environmental rules. Use or implement all controls established for eliminating or controlling environmental risks including those found in environmental documentation e.g., WMS, plans, work instructions, procedures etc. Stop work if the environment is placed at risk and discuss strategies to rectify environmental concern(s) immediately with the site foreman. If it is not resolved satisfactorily, the project manager is to be contacted. Report all hazards, incidents, near misses immediately to the site foreman as soon as it is safe to do so and prior to leaving the site. All personnel are responsible for complying with their GED and Duty to Notify in accordance with the EP Act. Actively participate in reviews of the JSEAs SWMSs etc., and in risk assessments for task(s) where the environment is to be directly affected. Site personnel, through the induction process, are empowered to refuse to complete a task that puts the environment at risk. When the circumstances of a work activity change, all relevant personnel will be informed. Should the change result in necessary changes to the EMS, CEMP, JSEA, SWMS or any other environmental documentation, then these documents must be revised and approved by the construction manager and environmental representative and communicated at the following Toolbox Talk to the necessary employee. All personnel are empowered to identify, implement, and advise of any concerns relating to any activity onsite and EMS, CEMP, JSEA, SWMS or any other environmental documentation. Comply with all environmental responsibilities assigned in relevant legislation, approvals, permits procedures, EMS, plans, job descriptions or any other environmental documentation. Raise any environmental issues or concerns immediately or during meetings with environmental representative or project manager. Uphold an active interest in workplace environmental management.

6.6 Training

6.6.1 *Environmental Awareness Training*

All Project staff, contractors and visitors who come onsite should be made aware of and commit to, via induction, the requirements of the CEMP to allow them to complete their task in an environmentally safe

manner. This should include all elements, sensitive areas and any relevant licencing or permit requirements for specific activities.

All personnel will receive training of a type and level of detail that is appropriate for the environmental aspects of their routine and emergency work assignments. As a minimum, all personnel are required to satisfactorily complete the Project Induction Training. Other mechanisms of raising environmental awareness are through toolbox talks, pre-start meetings, Health, Safety, Environment and Quality (HSEQ) alerts and more specialised training. Attendance records and assessments of all training and briefing sessions will be maintained.

Other training needs are assessed on a job-by-job, and position-by-position basis, as outlined in the HSEQ Training Matrix.

Table 6-4 Environmental Awareness Training Methods

Training Method	Description
Project Induction	The induction includes a presentation of the requirements of this plan and associated documents. All personnel are to attend the Project induction prior to starting work onsite. The purpose of the induction is to ensure that, at a minimum, the employee or sub-contractor understands: • Key issues relevant to the Project and existing environment • Environmental Policy and the environmental management framework • Concepts of environmental protection, due diligence, and duty of care • Environmental management and controls (working at and near waterways, vegetation clearing, stockpiling, etc. • Cultural heritage protocols • Environmental permits, approvals, licences, and relevant conditions • Roles and responsibilities relating to environmental management for the Project and consequences of non-compliance • Emergency response for dealing with an environmental emergency.
Pre-Start Meetings	Pre-Start meetings will be undertaken at the beginning of each day/shift before work commences with all personnel present (including sub-contractors as required). Specific environmental issues relevant to the shift's work will be raised and discussed at these meetings.
Toolbox Talks	Toolbox Talks will be undertaken once a week to discuss large site wide issues, upcoming works and give updates on any recent incidents and their outcomes. Issue-specific environmental awareness training will be provided to the workforce (including sub-contractors) via Toolbox Talks, to provide site personnel with ongoing environmental training and information throughout the works. Examples of training includes land/marine based spill response training or correct erection of a silt fence/silt curtains.
Specialised Training	Training for specific staff based on position and responsibilities. For example, noise and vibration monitoring, spill prevention and control, erosion, and sediment control.
HSEQ Alerts	HSEQ alerts are descriptions of serious HSEQ incidents and lessons learnt from other MCD Group and BMD Constructions projects and facilities and relevant industry incident. They are sent out to all MBJV Group management and HSEQ staff and are presented and discussed at Pre-Start Meetings and Toolbox Talks and posted on notice boards.

6.6.2 *Competency and Training*

The environmental competency and experience requirements for all staff positions are contained in the relevant Position Descriptions. Recruitment and procurement processes are conducted with the aim of engaging personnel with the required appropriate competency and experience.

Evidence of appropriate competency and training will be recorded.

6.7 Communication

6.7.1 *Internal Communication*

Environmental communication will primarily be through the Project Induction, Pre-Start Meetings and Toolbox Talks. However, communications can also occur during site inspections or through members of the environmental or management teams.

When the circumstances of a work activity change, all relevant personnel will be informed. Should the change result in necessary changes to the EMS, CEMP, CEPs, JSEAs, SWMSs or any other environmental documentation, then these documents will be revised and approved by the construction manager and environmental representative and communicated at the following Toolbox Talk to all personnel.

Within the construction team, procedures will be implemented to ensure management techniques are being adhered to, that personnel have the opportunity to raise concerns and address outcomes of incident reviews and changes to protocols are communicated.

6.7.2 *External Communication and Consultation*

The Project Manager is responsible for coordinating communications with all external parties. GAWB and MBJV will endeavour to effectively manage consultation and liaison with the community as an important element of the FGP. MBJV acknowledge that the nature of the FGP and direct interface with the public will require the implementation of protocols and procedures to ensure minimal impacts on the community and the GAWB's public reputation, while ensuring the public are kept well informed of the project and its progress.

Refer to Section 9.2 procedures for complaint management.

6.7.3 *Community*

The Communication Plan will be implemented for the FGP's interaction with the community and other stakeholders. The plan has a procedure and register for complaints received from the impact of construction activities. For elements within this plan there are certain reporting requirements that should be outlined for which type of complaint they apply.

The Communications Plan will also be implemented for informing landholders and other stakeholders of FGP construction information planning, contact details and processes for queries or complaints.

6.7.4 *Regulators*

Communication with regulators as part of the environmental management of the FGP will be a very high priority. Correspondence with the regulators will be transparent, upfront and carried out by the appropriate people responsible for the subject. All formal correspondence with regulators will be directed through or approved by the GAWB.

6.8 Record Management

All records and documentation will be kept for a minimum of five years and made available for regulatory agencies as requested.

TeamBinder, a construction project management document management system developed by InEight will be implemented for the FGP.

7. ENVIRONMENTAL ELEMENTS

Environmental control plans, SAPs and an SMP have been developed and will be implemented, as described throughout this CEMP with provisions for:

- Stating location-specific mitigation strategies
- Detailing the ROW and where restrictions in width and timing occur
- That no unnecessary clearing will be undertaken
- Minimising clearing along the ROW especially in sensitive habitat areas, wetlands and waterways
- Minimising impacts to waterways and riparian vegetation
- Detailing rehabilitation and revegetation in sensitive areas that will experience clearing
- Detailing ecologically sensitive weed management that will be undertaken.

The identified environmental elements for the CEMP described within this section are as follows:

- Project Environmental Management
- Climate Impacts
- Land Use and Infrastructure
- Erosion and Sediment Control
- Contaminated Land
- Acid Sulfate Soils
- Flora Management
- Fauna Management
- Bushfire Management
- Biosecurity (Fauna and Biosecurity Zones)
- Biosecurity (Flora)
- Water Resources and Water Quality
- Air Environment
- Waste Management
- Hydrotesting and Commissioning
- Noise and Vibration
- Transport and Access
- Cultural Heritage
- Social and Economic
- Handling and Storage of Dangerous and Hazardous Goods
- Rehabilitation and Revegetation
- Landscape and Visual Amenity.

7.1 Project Environmental Management

Table 7-1 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for Project environmental management.

Table 7-1 Project Environmental Management Control Plan

Element	Project Environmental Management
Performance Objectives	– To minimise the impacts of the FGP on the environment and ensure that all relevant requirements identified in the EIS and approvals as they are obtained are accounted for in the environmental management documentation.

Legislative Requirements	– Compliance with:
	• Legislation (as per Section 5.1)
	• Development requirements or guidelines:
	  • ISO 14001:2015 - Environmental management systems
	• Permits, approvals and licence conditions:
	  • CG's Evaluation Report
	  • EPBC Act approval
	  • MCU development permits
	  • OPW development permits.

Performance Criteria	– All the requirements outlined in this CEMP and supporting documents are implemented. – Consultative relationship is established with landowners and other stakeholders to allow timely notifications of planned construction activities. – All personnel are inducted onto the FGP, including Cultural inductions. – All complaints are responded to in a timely manner and in accordance with GAWB's procedure. – Achieve an Excellent Rating in accordance with Infrastructure Sustainability Council (ISC) manual version 1.2.
Implementation	**Design** – Environmental issues will be addressed during the detailed design. – Collaboration between MBJV and environment and land team during detailed design will occur to incorporate recommendations from the EIS, approvals and stakeholders. – Detailed design will consider conditions of approvals. – Commitments outlined in the CG's Evaluation Report, Appendix 4 will be implemented. – Issued for Construction drawings will be provided to the relevant authority as required by conditions of approvals. **Construction** – Within 20 business days after the commencement of the action, the person taking the action must advise DCCEEW in writing the actual date of commencement. – All other notifications will be in accordance with conditions of approvals. – All personnel will receive an induction on the requirements of the CEMP and be committed to its implementation. – The Environmental Representative / Manager and Environmental Advisor will be responsible to implement the requirements of the CEMP including checks and audits. – All personnel will always be mindful of the provisions of the CEMP to identify and notify non-conformances. – The Environmental Representative / Manager and Environmental Advisor will undertake environmental site checks for all work areas during construction of the FGP. – Environmental audits will be undertaken by an external party every 6 months in accordance with CG's Evaluation Report Condition 1. – Checklists will be developed for all environmental elements identified in this CEMP. – Communications plan will be implemented for informing landholders and other stakeholders of Project planning, contact details and processes for queries or complaints.

	– A Constraints Protocol has been approved by DCCEEW and will be implemented for "excluded early works" (this will not be required following the approval of this CEMP by the CG) defined as: • works to construct graded unsealed formed site access tracks, and associated drainage • works on existing roads and access tracks, and associated drainage • the establishment of temporary site facilities, including laydown areas, accommodation camps, site offices and amenities. – SAPs will be implemented, as described and where required throughout this CEMP with the following provisions: • Stating location-specific mitigation strategies • Outlining site-specific construction (refer to Section 4.3.3) timing constraints, i.e. May to September in wetland protection areas and Yellow chat area (between Port Alma Railway and Raglan Creek, approximate FGP chainage 54000 to 73000), and one week for trenched crossing (pipe installation and ground stabilisation) in waterways associated with the Yellow chat area. • Outlining site-specific ROW constraints i.e. 15 m clearing width for trenched waterways associated with the Yellow chat and Brigalow vegetation habitats. • That no unnecessary clearing will be undertaken • That, as far as reasonably practicable, construction activities will be limited to existing clearings • That established sensitive flora species will not be cleared, wherever reasonably practicable • That wherever reasonably practicable, trees with hollows will not be cleared, or new constructed hollows installed • That wherever reasonably practicable, damage to the edges of remnant communities will be minimised and erosion controls implemented • Detailing a rehabilitation plan for each sensitive area impacted during construction • Detailing a revegetation plan for each sensitive area that will experience clearing • Detailing ecologically sensitive weed management that will be undertaken.
Monitoring	– Monitoring of environmental outcomes and performance criteria will be undertaken during construction of the FGP as part the EMS and general environmental management. – Environmental site inspections undertaken by the Environmental Representative/Manager, Environmental Advisor during construction and check that environmental management is in place as outlined in the CEMP. – Environmental audits will be undertaken by GAWB during construction monthly (or as determined). – Formal audits will be undertaken by an independent and appropriately qualified person on a six-monthly basis.
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to external upon request, including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. – Formal audit reports will be provided to the CG within 30 business days of the end of the monitoring period.
Corrective Action	– Should any audits/checks undertaken during construction of the FGP identify non-conformances with the CEMP, MBJV will notify GAWB. Corrective actions will be implemented to address the non-conformance. A non-conformance report will be completed by the MBJV and filed by both GAWB and MBJV.

7.2 Climate Impacts and Sustainability

The potential impacts of local climate and seasonal changes during the construction of the FGP include:

- Dry conditions are likely to increase the amount of dust generated from construction activities
- Increased wind speeds during a storm are likely to increase the impact of dust-generating activities
- Erosion is likely to increase following a severe storm or flood event
- Wet weather can hamper construction activities and vehicle access to Project areas
- Droughts can impact construction activities due to the lack of construction water
- High temperatures and humidity can potentially affect construction workers, resulting in sunburn and/or sunstroke
- A cyclonic event or severe storm has the potential to cause flooding of construction areas and halt works for periods of time.

Table 7-2 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for climate impacts.

Table 7-2 Climate Impacts Control Plan

Element	Climate Impacts
Performance Objectives	– To minimise the risks to the environment, property and personnel arising from local climatic conditions and extreme climatic events.

Legislative Requirements	– Compliance with:
	• Legislation (as per Section 5.1)
	• Permits, approvals and licence conditions:
	  • CG's Evaluation Report
	  • EPBC Act approval
	  • MCU development permits
	  • OPW development permits.

Performance Criteria	– Planning and monitoring is undertaken during the construction phase to prepare for weather changes and climatic events. – No injuries to personnel or impacts to assets as a result of extreme climatic events. – Achieve an Excellent Rating in accordance with ISC manual version 1.2.
Implementation	**Pre-construction** – Taking into account seasonal conditions when scheduling work. – Preparing and implementing an Emergency Management Plan for the FGP during construction. **Construction** – Construction at sensitive sites such as wetlands and waterways will be conducted during the dry season (May to September) where reasonably practicable refer to the relevant SAP. – Short- and long-term weather forecasts will be checked on a regular basis to enable planning measures as outlined below: • Increased dampening of surfaces to reduce dust during windy conditions where practicable • Where wind speeds are excessive (approximately 10 m/s) and work is undertaken within 100 m of sensitive receptors, dust mitigation measures will be put in place to prevent dust nuisance • Sediment control measures will be checked before and after rainfall events • Works will cease during electrical storms or extreme climatic events where continuation of work impacts negatively on surrounding environment or community • Personnel will be advised of health and safety procedures in the event of a heatwave during staff induction and work hours modified where reasonably practicable to avoid the hottest time of day • Construction in flood prone areas will cease as soon as reasonably practicable prior to a predicted flood event and any machinery or stored fuels are removed from the area where reasonably practicable.

	– Develop and implement an Infrastructure Sustainability Management Plan by a suitably qualified person.
Monitoring	– Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include regular checks of weather forecasts. – Environmental checklists will include description of weather conditions at the time of inspection. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB and external auditors upon request, including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP. – Internal and external environmental audit results.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures. Corrective action will be implemented to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action to address the non-conformance. A non-conformance report will also be filed by GAWB. – All employees will be retrained in procedures where the procedures are modified, or new ones adapted. – Employees that knowingly undertake an action that does not conform to the FGP's procedures or CEMP will be retrained. – Practices, procedures and management plans will be reviewed and updated where necessary.

7.3 Land Use and Infrastructure

Land tenure will be appropriately sought and actioned by GAWB unless otherwise identified.

The FGP impacts numerous different land uses and existing infrastructure.

Table 7-3 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for land use and infrastructure.

Table 7-3 Land Use and Infrastructure Control Plan

Element	Land Use and Infrastructure
Performance Objectives	– To minimise potential impacts on land use activities and local/regional infrastructure as a result of the FGP.

Legislative Requirements	– Compliance with:
	• Legislation (as per Section 5.1)
	  • *Land Act 1994*
	  • *Plumbing and Drainage Act 2018*
	• Permits, approvals and licence conditions:
	  • CG's Evaluation Report
	  • Easements and other land use agreements as appropriate and defined by GAWB
	  • Land use agreements and licences
	  • Easement conditions
	  • Infrastructure crossing deeds and wayleaves

Performance Criteria	– Minimal disruption to land uses – Minimal disruption to local/regional infrastructure – Consultative relationship established with landowners and other stakeholders. – Cooperative working relationship with other uses in the multi-use corridors (i.e. SGIC SDA and GSDA). – Comply with the requirements of the land use, access and crossing agreements.
Implementation	**Design** – Infrastructure owners/authorities for road, rail, transmission lines, pipelines and other third-party infrastructure will be consulted by GAWB and MBJV prior to construction to determine requirements for crossing methods for infrastructure, safety protocols and obtain all relevant licenses and permits. – For any features (e.g. dams) identified within the ROW, consultation will take place with the landholders to minimise or avoid impacts. – GAWB and MBJV will identify an appropriate method of construction to minimise disruption to land use and infrastructure (e.g. trenchless crossing of major road, rail and waterways). **Pre-Construction** – GAWB and MBJV will prepare, implement and maintain a suitable Communication Plan. – MBJV will identify via Before You Dig Australia (BYDA) and positive identification via potholing where required, the location of third-party infrastructure (e.g. on drawings, during pegging and site set-out, etc) and specify buffer/separation distances where applicable. – MBJV will develop plans to ensure timely notification of planned activities during construction. **Construction** – The location of existing fences and gates impacted by construction will be determined by the GAWB and MBJV and included on construction drawings and/or during pegging and site set-out. – Temporary gates will be installed by the MBJV as approved by GAWB where required and in consultation with landowners, marrying locks where appropriate. – GAWB and MBJV will maintain a stakeholder list (as per the Communication Plan) to include: • Property specific information such as access protocols for each property on the alignment • Contact details of landowners and other stakeholders and community groups in the Project area.

	– MBJV will regularly consult and communicate with landowners and relevant stakeholders, as approved by GAWB. – GAWB and MBJV will have regular consultation scheduled to inform landholders of FGP progress and also allow the identification any issues the landholders may have in relation to the FGP. – GAWB and MBJV will log queries and complaints and respond to them in a timely manner with due respect and consideration to all parties. – All existing property gates will be left as found or otherwise instructed by the landholder. – MBJV will ensure the minimum cover over the pipeline will be in accordance with negotiated easement agreements and licences and is intended to permit existing land uses to be resumed following construction as far as is reasonably practicable. – Construction activities will be undertaken to mitigate or avoid impacts to land where reasonably practicable. – Construction of the intake will be undertaken with consideration of Sunwater's existing operations to prevent impacts to the functioning of their intake and pumps as far as reasonably practicable (i.e. in accordance with any agreement reached with Sunwater). – Consultation will occur with relevant community groups in the Project area, as per the Communication Plan. **Rehabilitation** – Rehabilitation of the construction footprint will occur in accordance with the Rehabilitation and Revegetation Plan (refer to Section 7.21) as soon as reasonably practicable after construction to enable existing use of the land to resume as much as possible. – Backfilled soils will be compacted to a level that return the levels to its original contours and surrounding soils with the aim of preventing trench subsidence. During final re-profiling of the soil, mounding may be required to compensate for potential subsidence.
Monitoring	– Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and compliance with land tenure agreements. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records to be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures. Corrective action (with approval from GAWB) will be implemented to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB.

7.4 Erosion and Sediment Control

Potential impacts arising from erosion and dispersive soil disturbance are expected from construction activities including:

- Clearing (where earth is exposed as a result of clearing)
- Excavation and other earthworks.

As the soils are generally considered highly dispersive, rain events or other contact with water is likely to result in the break-down of soils into clays, sand silt and clay, creating sediment and nutrient laden runoff into local waterways.

Erosion and sediment control management strategy will focus on prevention of runoff contamination rather than treatment and will include:

- Staged clearing of site areas to ensure the minimum amount of site is exposed at any one time.
- Early installation of erosion and sediment controls in each zone as works progress to ensure controls are in place before significant disturbance to areas occur.
- 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 the pipeline ROW and 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.

An Erosion and Sediment Control Management Sub-plan including Erosion and Sediment Control Plans (ESCPs) has been developed by MBJV and contractor Topo and is attached at Appendix A.

Table 7-4 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing erosion and sediment.

Table 7-4 Controls and Mitigations for Erosion and Sediment Control

Element	Erosion and Sediment Control
Performance Objectives	– To implement and maintain erosion and sediment control measures where necessary throughout construction. – To minimise erosion or sedimentation as a result of the construction works is minimised – To minimise areas of exposed soils during construction and to revegetate as soon as possible.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • Environmental Protection (Water and Wetland Biodiversity) Policy 2019 • Environmental Protection (Water) Policy 2009: Fitzroy River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Fitzroy River Sub-basin (DES, 2011) • Environmental Protection (Water) Policy 2009: Curtis Island, Calliope River and Boyne River Basins Environmental Values and Water Quality Objectives (DES, 2014) • *Fisheries Act 1994* • EP Act • Development requirements or guidelines: • Riverine protection permit exemption requirements WSS/2013/726 Version 2.02 (DRDMW, 2023) • Accepted development requirements for operational work that is constructing or maintaining waterway barrier works (DAF, 2018) • Best Practice Erosion and Sediment Control (IECA, 2008).

	• Permits, approvals and licence conditions:
	  • CG's Evaluation Report
	  • MCU development permits
	  • OPW development permits.

Criteria	– Erosion and Sediment Control Plans (ESCPs), and its implementation in line with the International Erosion and Sediment Association, Best Practice Erosion and Sediment Control, 2008. – RPEQ and certified ESCPs, where required – No erosion or sediment build up off-site of the Project areas. – No erosion or sedimentation of waterways.

Mitigation Measures	**Pre-construction**
	– ESCPs have been developed and will continue to be updated during construction by MBJV, ESCPs have been prepared in accordance with the *International Erosion and Sediment Association, Best Practice Erosion and Sediment Control, 2008* (IESA, 2008) and certified by Topo (and approved by GAWB) (refer to Appendix A).
	Construction
	– Management measures outlined in the Erosion and Sediment Control Management Sub-plan including ESCPs will be implemented (refer to Appendix A).
	– Surface disturbances will be kept to the minimum necessary to undertake the works.
	– The area and duration of exposed soil will be kept to the minimum during construction work.
	– The construction area and access routes will be clearly delineated to prevent disturbance to areas outside the construction footprint.
	– All personnel will be made aware that the majority of the ROW has dispersive soils prone to erosion.
	– Earthworks will be completed, and protection placed over exposed soils as soon as, and where reasonably practicable.
	– Temporary drains or bunds will be constructed where necessary to direct run-off and any overland flow from upslope of excavations, away from the construction footprint.
	– ESCPs will be implemented and maintained including sediment barriers, sediment basins, sediment fences etc.
	– Sediment control devices will be checked regularly and emptied as soon as reasonably practicable after rainfall events.
	– All necessary sediment and erosion control devices will in place prior to the commencement of works at a site.
	– During grading and trenching in the ROW, topsoil and subsoil will be stockpiled separately and topsoil later reused for restoration of the ROW. Topsoil stripping, typically 100 mm, will occur.
	– Accumulated sediment from erosion and sediment controls will be cleaned out as soon as possible and at a minimum:
	  • Sediment basins – when the settled sediment exceeds the volume of the sediment storage zone
	  • Other devises – when the capacity of the devise falls below 75%.
	– Any dewatering discharges will be released to areas that have suitable sediment and erosion controls to ensure there are no impacts from erosion and sedimentation into waterways.
	– Sediment will be placed in a disposal area or, if appropriate, mixed with dry soil onsite.
	– Sediment will be deposed of in a manner that will not create an erosion hazard.
	– New sediment fences will not be established on top of accumulated sediment.
	– Soil stockpile heights will be appropriate to prevent excessive wind blow dust and will not be in close proximity to watercourses.
	– Erosion and sediment control measures, such as silt fences, will be installed between stockpiles and waterways.
	– Sediment and dust loss from stockpiles will be minimised by stormwater flow diversions around stockpiles, stabilisation or covering of the stockpile surface, and downstream sediment containment devices where run-off is expected. Sediment fencing will be installed around all stockpiles.
	– Topsoil and subsoil piles excavated from or adjacent to wetlands and waterways will be placed at least 10m from the top of bank on either side of each waterway with appropriate sediment controls installed during wetland and waterway works until reinstatement.
	– Perimeter diversion drains or bunds will be placed around any long-term stockpiles (i.e. reserved topsoil for revegetation).

	– Long-term stockpiles will be suitably stabilised with appropriate erosion preventative measures (e.g. covers). – Soils rated as having 'moderate' or worse erosion potential will require specific management during construction of the pipeline and will not be left exposed for any significant period of time without stabilisation. – Where necessary, a light application of agricultural lime will be applied to the surface of topsoils re-used following embedment of the pipeline to limit dispersion potential until grass cover can be reinstated. However, should potentially dispersive soils be retained for re-use onsite, treatment with the addition of lime or gypsum at a rate of 2.5 kg/m³ is common. Topsoil of local origin used near waterways will be treated promptly if to be left exposed. – Disturbed area will be promptly revegetation or covering/sealing of the backfilled trench, avoiding leaving excavations opened over weekend/ extended breaks where practicable. – Temporary drains or bunds will be constructed where necessary to direct run-off and any overland flow from upslope of excavations, away from the construction footprint. – During the wet season the pipeline trench will be constructed in manageable lengths so that temporary stockpiling of spoil is minimised. – Backfill will be compacted where possible to reduce the risk of surface erosion and trench subsidence and revegetated areas should be watered to promote reinstatement of grass cover during 'dry spells' – Erosion and sediment control devices will be maintained at any sites where there is exposed soil (i.e. after construction is completed and before rehabilitation measures are established and deemed to be effective). **Rehabilitation** (refer to Section 7.21) – Any land disturbed due to the laying of the pipeline will be rehabilitated to its previous condition where practicable). – Backfill will be machine compacted to reduce the risk of surface erosion and trench subsidence post construction and rehabilitation. – Adequate cover will be placed on all disturbed areas prior to the removal of stormwater runoff controls. – Temporary stormwater and sediment control devices will be removed only once groundcover is established.
Inspection and Monitoring	– Inspections and monitoring will be undertaken in accordance with the Erosion and Sediment Control Management Sub-plan (refer to Appendix A). – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Daily visual inspections • Daily monitoring of weather conditions and forecasts • Checking for areas of potential erosion • Inspection of erosion and sediment controls at implementation and performance, weekly, and before and after rain to verify their correct function as per the ESCPs • Monitoring Project area boundaries, waterways and sensitive areas for erosion and the deposition of sediment • Review and update of the ESCPs to ensure that the current version is suitable for the construction activities • Daily checks of weather forecasts – Pre- and post-rainfall inspections. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. – Failures of the ESCPs should be reported as required. This is relevant for the design of the plan, implementation, or maintenance of controls. – Events outside of the designed capacity of the ESCP should also be reported if erosion and sedimentation has had an offsite impact.

Corrective Actions	– Review and update of the ESCP if the current controls are not performing including: • Existing controls and identifying new or addition controls • Procedures to maintain the controls. – MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB.

7.5 Contaminated Land

Disturbance to contaminated land has the potential to result in further land contamination or contamination of waterways with subsequent ecological or safety impacts. There are eleven properties intersected by the ROW that have been identified as potentially contaminated due to notifiable activities or other activities occurring at the site. There is the potential for unknown contaminated sites to exist on land associated with the FGP as a result of past land uses. There is also the potential for construction activities to contaminated land due to spills and uncontrolled releases.

Table 7-5 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing contaminated land.

Table 7-5 Contaminated Land Control Plan

Element	Contaminated Land
Performance Objectives	– To minimise the impacts caused from existing contaminated land and prevent land contamination occurring as a result of the FGP. – To protect life, health and well-being of human and fauna, aesthetic enjoyment, and local amenity.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Environmental Protection Act 1994* • *Environmental Protection Regulation 2019* • Development Requirements or guidelines • Queensland auditor handbook for contaminated land Module 6: Content requirements for contaminated land investigation documents, certifications, and audit reports (DES, 2018) • National Environmental Protection (Assessment of site Contamination) Measure 1999 (Amended in 2003) • Heads of EPA Australia and New Zealand (HEPA) (2020) PFAS National Environmental Management Plan (NEMP), Version 2.0 • Department of Health 2017 – Health Based Guidance Values for PFAS for use in Site Investigations in Australia, Food Standards Australia New Zealand. • Permits, approvals and licence conditions: • CG's Evaluation Report • MCU development permits • OPW development permits • Soil Disposal Permits (if removing contaminated land from a property listed on the DES Environmental Management Register (EMR) or Contaminated Land Register (CLR), noting no properties were on the CLR).
Performance Criteria	– Contaminated land or sites in the Project area identified and managed or removed prior to construction in those areas. – No contaminated land created as a result of the FGP.
Implementation	**Pre and during-construction** – Prior to and during construction, MBJV will carry out contamination land site investigations for the ROW, with a focus on properties identified on the EMR (and other properties of concern) that are within the ROW: • Lot 101 on DS185 • Lot 1 on RP911260 • Lot 7 on SP145439 • Lot 8 on SP218634 • Lot 1 on SP144430 • Lot 91 on SP122250 • Lot 140 on SP122252

	• Lot 3 on SP101558 • Lot 1 on SP234061 • Lot 12 on SP190336 • Lot 167 on CP859402. – PFAS investigations will be undertaken on the ROW closest to the Rockhampton airport. – The investigations will include soil and water sampling of areas of environmental interest and confirm their contamination status. The investigation should consider sampling and analysis for all relevant contaminants of potential concern based on the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (Amended in 2003). – If an area within the ROW is suspected of being potentially contaminated, works in that area will not begin until a site investigation can be completed, and the contamination identified and managed. **Construction** – All personnel will be made aware of the signs of contaminated land: • Suspected buried waste material • Discoloured/odorous soil • Evidence of previous cattle or sheep dips. – Disturbance on the above-mentioned lots will be minimised where possible and managed in accordance with the contaminated land site investigation. – If contaminated material is disturbed, a risk assessment will be undertaken to confirm the best method of management. Due to the limited ROW corridor, material may not be able to be treated onsite. – Soil Disposal Permits from DES will be obtained where contaminated material is to be removed from EMR properties along the ROW (or where contaminated is identified on other properties, or as the result of a spill during the construction phase, the material will be managed in accordance with the trackable waste provisions of the EP Regulation). This will include agreement from the spoil recipient for spoil acceptance. – Materials will be removed and transported by licensed contractors. – MBJV will develop procedures in accordance with the contaminated land assessment for management of spoil from EMR sites or other potentially contaminated land so that: • Potentially contaminated soil is not transported to a different property without the appropriate Soil Disposal Permit / Waste Transport Certificate • Risk associated with leachate is identified and managed (e.g. contaminated stockpiles may be required to be bunded) • Management measures are to be adopted specific to the contaminant of concern following the site investigations. – If an area within the ROW is suspected of being potentially contaminated, works in that area will cease until a further site investigation can be completed, and the contamination identified and appropriately managed. – All hazardous materials to be handled and stored in accordance with Section 7.20 (Handling and Storage of Dangerous and Hazardous Goods control plan). – Any refuelling undertaken at site will be undertaken in a designated refuelling area, away from waterways, with nozzles with stop valves to reduce the risk of contamination to the environment, and personnel will be trained appropriately. – Spills will be managed in accordance with the Handling and Storage of Dangerous and Hazardous Goods control plan, refer to Section 7.20. – Appropriately stocked spill kits will be located in each construction area and along the ROW and personnel will be trained appropriately in the use.
Monitoring	– All personnel will maintain visual checks for signs of contamination. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Monitoring of EMR or other potentially contaminated properties will occur in accordance with the findings of the contaminated land assessment. • Checking for evidence of any spills or releases. • Inspections of hazardous materials storage areas to ensure storage is in accordance Section 7.20 (Handling and Storage of Dangerous and Hazardous Goods control plan). • Confirming that spill kits are readily available and well maintained, stocked and functional.

	– Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results • Waste Transport Certificates / Soil Disposal Permits, where relevant. – Records of contaminated site locations and remediation to be maintained during construction by the GAWB and MBJV. – Records will be maintained of spill incidents and actions taken during construction by GAWB and MBJV.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by the constructor or operator and filed by both the GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – The source of contamination will be identified, and corrective actions will be implemented such as remediating the area, modifying the controls, or modifying procedures that may be inadequate. – Any contaminated material will be collected, placed in secure containers and disposed of appropriately. – All personnel will be retrained in procedures where the procedures are modified, or new ones adapted. – Practices, procedures and management plans will be annually reviewed and updated where necessary.

7.6 Acid Sulfate Soils

Acid sulfate soils (ASS) are likely to occur in areas of the Project where excavation to depth below 5 m Australian height datum (AHD) are required which is primarily within the SGIC SDA section. If ASS are excavated and exposed to air, i.e. oxidised, the potential environmental impacts may include:

- Reduction in water quality resulting in damage to estuarine environments and reduction of wetland biodiversity
- Acidification
- Heavy metal precipitation (e.g. aluminium, iron and manganese), which causes poor plant productivity and smothers plant vegetation and microhabitat
- Corrosion of infrastructure.

An ASS Sampling and Analysis Plan for the FGP (PSK, dated 10 May 2023; J0323-010-007 Rev1) as approved by DoR on 16/05/2023 has been prepared and will be implemented pre and during-construction to identify any ASS risk. Further, an Interim ASS Environmental Management Plan (PSK, dated 28 April 2023; J0323-010-003 Rev2) has been prepared that provides ASS management actions for pipeline trenching, pipeline crossings (i.e. waterways) and Fitzroy River Intake and Pump Station (refer to Appendix B).

Table 7-6 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing ASS.

Table 7-6 Acid Sulfate Soils Control Plan

Element	**Acid Sulfate Soils**
Performance Objectives	– To minimise the potential for environmental impacts arising from the inappropriate handling or management of ASS. – To take all reasonable and practicable measures to prevent or minimise the effects of the Project on nearby contaminated land and associated groundwater.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Environmental Protection Act 1994* • *Environmental Protection Regulation 2019* • Development Requirements or guidelines • National Acid Sulfate Soils Guidance (Commonwealth of Australia, 2018) • National Acid sulfate soil sampling and identification methods manual (Commonwealth of Australia, 2018) • Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines (State of Queensland, 2014) • State Planning Policy 2/02 Planning and Managing Development involving Acid Sulfate Soils (State of Queensland, 2002), • Permits, approvals and licence conditions: • CG's Evaluation Report • MCU development permits • OPW development permits.
Performance Criteria	– Management of ASS in accordance with State and National ASS guidance and the ASS Management Plan. – No environmental harm to occur due to exposure of ASS, acidic water or leachate. – No release of acidic waters or leachate from the construction works.
Implementation	**Pre and during-construction** – ASS investigations will be undertaken, including:

	• Investigations within the ROW where land has been identified as high risk for ASS, where land elevation is below 5 m AHD, or where land is below 20 m AHD and excavation is required to depths that are less than 5 m AHD. • Investigation will include soils and groundwater assessments. • Investigations will be undertaken progressively in accordance with the approved Acid Sulfate Soil Sampling and Analysis Plan for the FGP (PSK, May 2023). • The findings of the ASS investigations will form an ASS Management and outline mitigation measures to be adopted and any required verification testing. Currently an Interim ASS Environmental Management Plan (PSK, April 2023) has been prepared and will be implemented (refer to Appendix B). • The risk of actual ASS to impact upon Project infrastructure will be identified during the ASS investigations, mitigation identified, and the Interim ASS Management Plan will be updated accordingly and communicated to all personnel. **Construction** – All personnel will be made aware of the signs and management of ASS. – Identified areas of ASS will be clearly shown on construction plans. – The ASS Management Plan (refer to Appendix B) will meet the requirements outlined in Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines (State of Queensland, 2014). – Management actions contained in Appendix B of the Interim ASS Environmental Management Plan (PSK, April 2023) will be implemented (refer to Appendix B). – Interim liming rates contained in Appendix A of the Interim ASS Environmental Management Plan (PSK, April 2023) will be implemented and updated as required. – Sufficient good quality liming products (agricultural and hydrated) will be maintained for treatment purposes. – ASS will be treated in-situ immediately and placed as backfill within 24 hours. Lime will be adequately mixed into the ASS and backfilled into the trench. – Lime guard layers be developed for trenches prior to backfilling. – Verification sampling and analysis will be undertaken to confirm that adequate lime has been used. – Liming rates will incorporate a factor of safety of 3 to minimise verification required. – For ASS not able to be treated in-situ, a designated bunded area will be developed and used for neutralisation. – Stockpiling and treating of ASS will not occur in areas within 50 m to waterways. – Surface run-off will be controlled and captured through appropriate stormwater management. – ASS leachate from the trench will be treated hydrated with lime as required. – Appropriate disposal or use of neutralised ASS will be identified as required.
Monitoring	– Monitoring will be undertaken in accordance with the ASS Investigations and within the Interim ASS Environmental Management Plan (PSK, April 2023) will be implemented (refer to Appendix B). – Lime verification monitoring will be undertaken on all treated soil within 72 hours of lime treatment. – pH of water from excavations will be monitored daily (i.e. pH range of 6.5-8.5). – Routine daily visual observance will be undertaken during construction for signs of untreated ASS. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Confirming ASS material has been moved to the treatment area or treated in-situ • Checking of bunding around ASS treatment areas • Monitoring pH in any retention ponds (i.e. pH range of 6.5-8.5). – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. – ASS testing results and treatment measures during construction.

Corrective Action	– Corrective actions will be undertaken in accordance with the Interim ASS Environmental Management Plan (PSK, April 2023) (refer to Appendix B) i.e. liming rates to be revised. – MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB.

7.7 Flora Management

The main potential impacting processes to terrestrial flora associated with the clearing of the nominally 30 m wide ROW and construction of the FGP are:

- Reduction of flora habitats
- Removal of individual species of significance
- Disturbance to aquatic and terrestrial vegetation
- An increase in remnant vegetation edge effects.

Table 7-7 shows the performance objectives, legislative requirements, performance criteria and mitigations measures requirements for clearing vegetation throughout the various construction phases.

Table 7-7 Controls and Mitigations for Protected Flora and Vegetation Clearing

Element	Vegetation Clearing
Performance Objectives	– To minimise the impact of clearing on the natural environment. – To rehabilitate impacted areas to the state that was present prior to the FGP construction or as close as practically possible.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Fisheries Act 1994* (regarding marine plants) • *Nature Conservation Act 1992* • *Nature Conservation (Plants) Regulation 2020* • *Nature Conservation (Animals) Regulation 2020* • *Vegetation Management Act 1999* • *Water Act 2000* • *Environmental Offsets Act 2014* • Development requirements or guidelines: • Flora Survey Guidelines – Protected Plants (DES, 2020) • Accepted Development Vegetation Clearing Code (ADVCC): Clearing for Infrastructure (DoR, 2020) • Restoration of Fish Habitats – Fisheries guidelines for marine areas (FHG 002) • AS4970 – Tree Protection on Development Sites • Riverine protection permit exemption requirements WSS/2013/726 Version 2.02 (DRDMW, 2023) • Accepted development requirements for operational work that is constructing or maintaining waterway barrier works (DAF, 2018) • Permits, approvals and licence conditions: • CG's Evaluation Report • EPBC Act approval • Protected Plants Exemption Notification • MCU development permits • OPW development permits • SAPs • SMP • Threatened Species Translocation and Propagation Plan
Performance Criteria	– Minimise disturbance to flora within the Project area. – Disturbed areas rehabilitated to a condition consistent with the surrounding undisturbed environment where practicable. – No clearing outside of the construction footprint area unless authorised.

	– Construction activities timing restrictions adhered to in accordance with relevant SAPs.
Mitigation Measures	**Pre-construction** – Project areas requiring vegetation clearing will be clearly delineated to ensure disturbance to areas being retained is minimised. Limits of clearing will be delineated on-ground using barrier tape and signage prior to works commencing. – Vegetation to be protected will be shown as 'exclusion zones' and clearly marked with barrier tape (or similar) and signage to prevent personnel from entering these areas. No adverse damage to any vegetation outside the approved clearing limits will be permitted unless approved by the GAWB and relevant regulatory agencies. – All exclusion areas will be clearly shown and labelled on all operational and management drawings and plans. – Restricted width clearing areas will be cleared marked on the alignment sheets and with barrier tape and signage at required locations on the ROW and at Project facilities. – SAPs for Waterways, Yellow Chat, Ornamental Snake and Brigalow have been prepared and will be implemented in areas where specific mitigations measures have been identified including restrictions on the construction activities period and clearing disturbance limits. – A suitably qualified person (such as a qualified ecologist and/or licensed fauna spotter/catcher) will be engaged to undertake a pre-clearance survey to inspect vegetation to be removed and that it does not consist of protected plant species. If protected flora species are encountered in areas where a Clearing Permit has not been obtained, works will cease, GAWB notified, and a Clearing Permit obtained (refer to the Flora Survey Guidelines – Protected Plants). – The pre-clearance survey will form part of a pre-clearance report. **Construction** – All relevant site personnel including contractors will be made aware via inductions, toolbox talks and site information sheets, of the sensitive environs they will be working in and around and be advised of specific limitations to construction works being undertaken. – All vegetation clearing will comply with all approval conditions and only occur in areas clearly marked during the pre-clearance surveys. – The clearing footprint and areas of exclusion will remain adequately marked for the duration of the clearing activities. – The Project area and access routes will be clearly delineated to prevent disturbance to areas outside the approved construction footprint. – Vegetation clearing will be undertaken progressively, and vegetation will be felled in the direction of the Project area to avoid impacts to adjoining retained vegetation and habitat. – Non-hollow bearing trees will be cleared before hollow bearing trees in order to allow fauna the opportunity to relocate of their own accord. – Hollow bearing trees will be clearly flagged, and surrounding vegetation removed with the hollow bearing tree left standing for at least one night to encourage fauna to relocate of its own accord. Hollow bearing trees will be inspected to determine if hollows are occupied. If hollows are found not to be occupied, hollows can be salvaged, and the tree felled. – No clearing of riparian vegetation is permitted at Gavial Creek, Bob's Creek, Inkerman Creek, Horrigan Creek and Raglan Creek. Clearing of riparian vegetation at Twelve Mile, Raglan and Larcom Creeks should be avoided and only permitted if GAWB and the relevant regulatory agency is notified, and all required approvals obtained and/or in accordance with exemption requirements. – Where trees and vegetation cannot be preserved aboveground, stabilising root material will be undisturbed wherever possible. – SAPs - for Waterways, Yellow Chat, Ornamental Snake and Brigalow and the SMP will be implemented. – Cleared or trimmed vegetation will be stockpiled separately from topsoil. It will then be mulched and respread on the ROW as part of Rehabilitation Plans or disposed of offsite at an approved location. – Soil (including topsoil) and vegetation stripped from the ROW will be stored adjacent to the site where it originated. No soil or vegetation material will be translocated for storage along the ROW. This excludes the requirement for soil not to be stored near or in a waterway. – Construction activities will be scheduled to minimise the time between clearing and rehabilitation of a particular area. The schedule should be such that the works are completed in a progressive manner. – To ensure a no net loss outcome for threatened species (e.g. cycads), the Threatened Species Translocation and Propagation Plan will be implemented. **Rehabilitation**

	– All rehabilitation activities will be undertaken in accordance with the rehabilitation requirements outlined in Section 7.21 (Rehabilitation and Revegetation) and Section 5.22 (Landscape and Visual Amenity) as well as the SMP and SAPs.
Inspections and Monitoring	– Inspections and monitoring will be undertaken in accordance with the requitements outlined in the approved SAPs for Waterways, Yellow Chat and Ornamental Snake and Brigalow. – Inspections and monitoring will commence prior to clearing activities being undertaken so that pre-disturbance baseline vegetation condition can be established (i.e. pre-clearance survey). – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Identification of non-conformances from the procedures outlined in this CEMP or approval/permit conditions. • Monitoring of disturbed areas and identification of any areas that have been disturbed without approval. • Integrity of vegetation clearing boundaries. • Monitoring of establishment of vegetation in rehabilitated areas. – Environmental audits will be undertaken by GAWB during construction on a quarterly basis (or as otherwise determined by approval conditions).
Reporting	– Reporting will be undertaken in accordance with approval conditions, the SMP and relevant SAPs. – Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including: • Environmental checklists during construction • A regular ROW surveillance program report • Reports of any environmental incidents or non-conformances with the CEMP.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. – A non-conformance report including an investigation and any amendments to procedures will be instigated if vegetation clearing occurs outside approved areas. – All personnel and sub-contractors will modify work practices as required and instructed by the Environmental Manager/Officer, with managerial support. – Corrective actions will be undertaken in accordance with the SMP, SAPs and approval condition requirements.

7.8 Fauna Management

The potential impacts to fauna include direct fauna impacts and indirect impacts to fauna habitat. These impacts may include:

- Vegetation clearing and habitat disturbance
- Habitat fragmentation and disturbance to wildlife movement corridors
- Trench fall (entrapment of fauna within open trenches during construction)
- Disturbance to active or non-active animal breeding places
- Potential fauna mortality due to vehicle strikes.

Table 7-8 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for fauna management and protection.

Table 7-8 Fauna Management Control Plan

Element	Fauna Management
Performance Objectives	– To minimise the impact of the Project on fauna and fauna habitat. – To avoid clearing and disturbing vegetation and fauna habitat outside of the ROW and approved disturbance areas – To rehabilitate impacted areas to pre-disturbance condition or as close as practically possible where areas are not required to be kept clear for operation.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Fisheries Act 1994* (regarding waterway barrier works / fish passage) • *Nature Conservation Act 1992* • *Nature Conservation (Animals) Regulation 2020* • *Vegetation Management Act 1999* • *Vegetation Management Regulation 2012* • Development Requirements or guidelines: • Accepted development requirements for operational work that is constructing or maintaining waterway barrier works (DAF, 2018) • Permits, approvals and licence conditions: • CG's Evaluation Report • EPBC Act approval • Protected Plants Exemption Notification • MCU development permits • OPW development permits. • SAPs • SMP.
Performance Criteria	– Vegetation and fauna habitat features cleared or disturbed only within approved areas and boundaries. No non-approved areas are to be cleared. – No injuries or fatalities to fauna species are to occur as a result of construction and operational activities. – Disturbed areas rehabilitated to pre-disturbance condition or condition that is consistent with the surrounding environment, as far as reasonably practicable.
Implementation	**Design** – Construction activities will be sited in accordance with the approved State and Commonwealth approval conditions. – Design will include measures to reduce the impact to flora and fauna by selecting trenchless construction methods for major creek/waterway crossings and minimising clearing and disturbance widths in sensitive habitats, where possible.

	– Design measures at the Fitzroy River Intake will be incorporated to reduce the risk of fauna being impinged on the intake screens. **Pre-construction** – Prior to construction works commencing, all relevant site personnel including contractors will be made aware via inductions, toolbox talks and site information sheets of the sensitive environs they will be working in and around and be advised of specific limitations to construction works being undertaken in or adjacent to threatened fauna habitat. Personnel will also be made aware of the protected fauna they may encounter. – Project areas requiring vegetation clearing and habitat disturbance will be clearly delineated to ensure disturbance to areas being retained is minimised. Limits of clearing are to be delineated on-ground using barrier tape and signage prior to works commencing. – SAPs for Waterways, Yellow Chat, Ornamental Snake and Brigalow and SMP have been prepared and will be implemented in areas where specific mitigations measures have been identified including restrictions on the construction activities period and clearing disturbance limits. – A suitably qualified person (such as a qualified ecologist and/or licensed fauna spotter/catcher) will undertake a detailed pre-clearance survey identifying animal breeding places within the ROW and at Project facilities, and where possible, salvage and relocate identified breeding places. – The pre-clearance survey will form part of a pre-clearance report. – Where occupied breeding places are identified as part of the pre-clearance survey, these are to be left undisturbed, marked and a temporary buffer clearly established around the breeding place. A minimum 20 m temporary buffer will be established for ground habitat features. The temporary buffer is to remain in place until the breeding period has finished or until the young have been relocated by a fauna spotter/catcher. – Signage, including road signage, will be erected in the vicinity of exclusion areas and environmental buffer areas to warn of the potential presence of fauna in the area. – Site inductions will include information on the identification of protected fauna species. **Construction** – SAPs - for Waterways, Yellow Chat, Ornamental Snake and Brigalow and the SMP will be implemented. – The SMP will be implemented including the clearing of breeding places protocol. – Where reasonably practicable and as outlined in the SAPs, construction activities at sensitive areas such as waterways and specific fauna habitats will only be undertaken between May and September, inclusive. – The clearing footprint and areas of exclusion will remain adequately marked for the duration of the clearing activities. – Project areas and access routes will be clearly delineated to prevent disturbance to areas outside the approved construction footprint. – A suitably qualified person (e.g. ecologist and/or fauna spotter/catcher) will be present for all clearing activities and will conduct a walk-through survey prior to commencement of clearing and prior to clearing works. The spotter/catcher will reinspect the area of cleared vegetation immediately after clearing to locate any potentially injured fauna that will then be taken to a wildlife carer or veterinarian. The suitably qualified person will implement SMPs during clearing, it is preferable that fauna move of their own accord into the adjacent areas of habitat to be retained. Any fauna that is captured will be relocated into the adjacent habitat at least 200 m from the clearing area if clearing works are yet to be completed. Any relocation will be undertaken by a suitably qualified ecologist and/or fauna spotter/catcher with all relevant and required permits. – Mature hollow-bearing trees will be retained and protected wherever reasonably practicable. Where this cannot be achieved, hollow limbs and/or trunks should be left on the ground adjacent to the ROW (or relocated to within areas of remnant vegetation) to provide habitat for ground-dwelling fauna. – Hollow bearing trees will be clearly flagged, and surrounding vegetation removed with the hollow bearing tree left standing for at least one night to encourage fauna to relocate of its own accord. Hollow bearing trees will be inspected to determine if hollows are occupied. If hollows are found not to be occupied, hollows can be salvaged, and the tree felled. – Where occupied breeding places are identified and delaying the clearing of the breeding place is not feasible, (i.e. the clearing is critical to the activity schedule) the breeding place will not be disturbed for a minimum of 24 hours while clearing is undertaken around the breeding place as recommended by a fauna spotter/catcher. – Where unoccupied breeding places are identified and where feasible, consideration will be given to relocating the breeding structure by the fauna spotter/catcher to suitable habitat at least 200 m away from the clearing area.

- Relocated occupied or unoccupied breeding places will be retained intact to the greatest extent possible. As far as practical, the site of the relocation is to replicate the height and orientation of the original breeding or nesting structure.
- Pre- and post-works surveys of creeks (including soil profiles) will be undertaken to ensure the creek profile is restored.
- Fauna will not be fed and direct contact with fauna will be avoided (unless by a suitably qualified person).
- Logs and fallen vegetation will be used as a habitat feature post-construction to provide protection and potential habitat for native fauna (in agreement with landholders as required).
- Trees adjacent to working areas will be lopped, with complete-to-ground clearing being avoided where reasonably practicable so that some fauna habitat can remain.
- Cleared vegetation will be stockpiled so as not to impede wildlife, surface drainage and avoid damage to adjacent live vegetation.
- Habitat green waste from clearing operations will be used to provide fauna habitat in rehabilitated areas.
- Project area access is only to occur along designated site access tracks.
- Where practicable, travel during dusk, dawn and at night when fauna is most active, will be avoided.
- Vehicle operators will abide by vehicle speed limits and access to any restricted areas or exclusion zones must be limited to critical site-specific activities.
- For access along the ROW in Yellow Chat habitat (approximate FGP chainage 54000 to 73000) during October to April inclusive will be undertaken to minimise noise impacts such as reduced speeds in sensitive areas.
- Directional lighting and shields will be installed to minimise light spill outside of the immediate work areas having consideration for health and safety requirements.
- A procedure will be implemented that outlines appropriate trench management such as:
    - Construction activities will be planned and occur progressively to minimise the period of time the trench is open and the length of open trench, as far as reasonably practicable.
    - Where a trench remains open overnight or for extended lengths, the ends of the trench left open will be ramped to a gentle incline (<50%) to allow fauna to escape; escape ramps and trench plugs (temporary barriers in the open trench) will be established for every 500 m of open trench; additional methods may be adopted to create 'ladders' at regular intervals to assist small fauna to exit the trench (e.g. branches, ramped gangplanks, etc.); and/or sawdust filled hessian bags (shelter sites) will be placed intermediate to the escape ramps.
    - At the start of work hours and on a daily basis, all personnel will inspect the entire open length of the trench for entrapped or injured wildlife. If required, wildlife handlers (e.g. fauna spotter/catchers) will be called to site to attend to fauna issues.
    - Suitably qualified persons (e.g. licensed fauna spotter/catchers) will remove wildlife from the trenches, identify, record data and release the captures into nearby vegetated areas. Personnel will be legally permitted (DES, Damage Mitigation Permit), trained in appropriate handling protocols, and will possess the necessary Personal Protection Equipment (PPE) for the handling of animals.
- Any displaced fauna will be relocated to more suitable similar habitat within the surrounding area, as far as reasonably practicable.
- Fauna exclusion fences will be established where required to prevent relocated fauna inadvertently re-entering construction areas, as far as reasonably practicable. However, any temporary fencing necessary along the outer ROW boundary to contain construction works should allow passage of fauna from either side of such fencing.
- The use of barbed wire will be avoided and used only where essential to exclude stock from adjoining pastoral activities.

Aquatic Fauna and Temporary Waterway Barrier Works

- Where reasonably practicable, trenched creek and wetland crossings will be undertaken during low or no flow periods. If the works result in the temporary isolation of pools and they become susceptible to drying or poor water quality, then any resident native fish that are trapped will be relocated to areas away from impacts.
- Temporary waterway barrier works, including access tracks and erosion and sediment control measures, are to meet the Accepted Development Requirements for operational work that is constructing or maintaining waterway barrier works (DAF, 2018).

Rehabilitation

- All rehabilitation activities will be undertaken in accordance with the rehabilitation requirements outlined in Section 7.21 as well as the SMP and SAPs.

Monitoring	– Inspections and monitoring will be undertaken in accordance with the requitements outlined in the approved SMP and approved SAPs for Waterways, Yellow Chat and Ornamental Snake and Brigalow. – Inspections and monitoring will commence prior to clearing activities being undertaken so that pre-disturbance baseline vegetation condition can be established (i.e. pre-clearance survey). – Environmental site inspections undertaken by the Environmental Representative/Manager, Environmental Advisor during construction will include the following: • Identification of non-conformances from the procedures outlined in this CEMP or approval/permit conditions. • Monitoring of fauna presence in the Project area and noting of the number of fauna fatalities or required relocations. • Monitoring of establishment of vegetation in rehabilitated areas. – Environmental audits will be undertaken by GAWB during construction on a quarterly basis (or as otherwise determined by approval conditions).
Reporting	– Reporting will be undertaken in accordance with approval conditions, the SMP and relevant SAPs. – Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results.
Corrective Action	– In the event that fish that have been trapped by the works, fish salvage activities in accordance with the Fisheries Queensland Guidelines for Fish Salvage (available at www.daf.qld.gov.au) will be implemented immediately. – MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Corrective actions will be undertaken in accordance with the SMP, SAPs and approval condition requirements.

7.9 Bushfire Management

The potential impacts from bushfire impacts are associated with all phases of construction. These impacts may include:

- Loss of above ground infrastructure
- Loss of life
- Loss of biodiversity.

Table 7-10 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing bushfires.

Table 7-9 Bushfire Control Plan

Element	Bushfire
Performance Objectives	– To avoid impacts to flora and fauna due to uncontrolled bushfires caused by MBJV. – To avoid impacts to property, plant or equipment and people due to uncontrolled bushfires caused by MBJV.
Legislative Requirements	– Legislation (as per Section 5.1), specifically: • Legislation, specifically: • *Fire and Emergency Services Act 1990* • Development Requirements or guidelines • Rockhampton Region Local Disaster Management Group - Bushfire Management Study, Strategy and Mitigation Plan Summary • Gladstone Regional Council - Local Disaster Management Plan • MBJV Emergency Response Plan • Permits, approvals and licence conditions: • CG's Evaluation Report • EPBC Act approval • Landowners' requirements • MCU development permits • OPW development permits.
Performance Criteria	– No uncontrolled bushfires caused by MBJV or its sub-contractors.
Implementation	**Pre-construction** – A risk assessment will be undertaken with key stakeholders including Queensland Fire and Emergency Services, RRC and GRC. – Bushfire response methods and evacuation plans will be included in the Emergency Response Plan. – Chemical and hydrocarbon storage areas will be located in areas with low bushfire potential. **Construction** – Fire risks will be assessed for each Project area prior to works commencing. – Project areas will have adequate road access for emergency vehicles and evacuation. – An adequate and accessible water supply will be provided in tanks at the Project area for firefighting purposes. – Fire breaks will be developed to provide setbacks between buildings/structures and high risk vegetation and provide access for emergency vehicles. – Hot works will be undertaken as per requirements of Hot Works Permits. – Smoking will not be permitted outside of designated smoking areas. – No intentional fires or wood fired barbeques will be permitted.
Monitoring	– Routine daily observance will be undertaken by all personnel during construction to assess high fire danger conditions (e.g. high temperatures, high wind, and dry undergrowth).

	– Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Identification of fuel loads • Monitoring of fire breaks • Monitoring of fire-fighting water supplies. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request including: • Environmental checklists during construction • External environmental audit reports during construction • A regular ROW surveillance program report • Non-conformance reports during construction and operation.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB.

7.10 Biosecurity (Fauna and Biosecurity Zones)

The potential impacts from the biosecurity issues of pest fauna and biosecurity zones are associated with all phases of construction. These impacts may include:

- Attraction of pest fauna species
- Introduction or increase in extent of pest fauna
- Spread of pathogens or disease which impact native or agricultural species.

Table 7-10 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing introduced pests/fauna.

Table 7-10 Introduced/Pest Fauna Control Plan

Element	Introduced/Pest Fauna
Performance Objectives	– To minimise the impact of introduced/pest fauna species (hereafter referred to as pest fauna) – To minimise the spread of pest fauna species as a result of the FGP – To adhere to the requirement of the relevant Biosecurity Zones.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Biosecurity Act 2014* • *Biosecurity Regulation 2016* • Development Requirements or guidelines • General biosecurity obligation • Specific OCG, DAF, RRC and GRC requirements. • Permits, approvals and licence conditions: • CG's Evaluation Report • EPBC Act approval • Landowners' requirements • MCU development permits • OPW development permits.
Performance Criteria	No introduction or increase of pest fauna as a result of FGP construction activities.
Implementation	**Pre-construction** – Biosecurity Zones relevant to the FGP are: • Grape phylloxera Risk and Exclusion Zones • Sugar Cane Pest Zones 3 & 4 • Cattle Tick Infested Zone. – GAWB and MBJV will not be moving any grapes or sugar cane (or soils associated with the plants) or cattle, the latter may be conducted by the landholder subject to their property management requirements. – Consultation will occur with landholders and formal agreements put in place outlining specific biosecurity requirements related to construction activities and accessing their property. **Construction** – All food wastes or waste that would attract animals, will be kept in containers/bins/skips which have lids and do not allow the access of animals. Lunch and meals will be designated to crib rooms or sheds which animals cannot enter. – All putrescible waste will be stored in secure temporary holding containers and transported off site to a licensed waste management facility. – All personnel will not bring domestic animals to the Project area.

Monitoring	– Routine daily visual observance will be undertaken by all personnel during construction for conformance with the CEMP. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Identification of non-conformances from the procedures outlined above • Monitoring of pest animal species occurrence in the construction areas. – If a suspected matters of biosecurity concern are discovered onsite (including Red Imported Fire Ant previously reported in the GRC LGA but identified as since eradicated), DAF will be contacted immediately. – A ROW surveillance program will include Biosecurity Monitoring Schedule for introduced pests. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including: • Environmental checklists during construction • External environmental audit reports during construction • A regular ROW surveillance program report • Non-conformance reports during construction and operation.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Any newly identified weed and pest species will be managed in accordance with OCG, DAF, RRC and GRC requirements to prevent their growth and proliferation. – If increased densities of pest animals are observed, or new pest animals are identified, humane pest controls will be implemented to manage numbers to the scope agreed with GAWB.

7.11 Biosecurity (Flora)

The potential impacts from biosecurity issues are likely to be limited to direct impacts associated with construction of the proposed pipeline. These impacts may include:

- Increase in the spread of weeds (restricted, invasive or other environmental weeds)
- Introduction of weed species
- Spread of floral pathogens which impact native and agricultural species
- Reduction in native vegetation or agricultural health.

Table 7-11 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for weed management.

Table 7-11 Weed Management Control Plan

Element	**Weed Management**
Performance Objectives	– To minimise the impact of weeds in the Project area and surrounding lands – To minimise the spread of weeds during construction of the FGP.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Biosecurity Act 2014* • *Biosecurity Regulation 2016* • Development Requirements or guidelines: • General biosecurity obligation • Specific OCG, DAF, RRC and GRC requirements. • Vehicle and Machinery Cleandown Procedures (DAF, 2019) • Vehicle and Machinery Inspection Procedure, Biosecurity Queensland Checklists (DAF, 2013). • Permits, approvals and licence conditions: • CG's Evaluation Report • EPBC Act approval • Landowners' requirements • MCU development permits • OPW development permits.
Performance Criteria	– No introduction of new weed species to the Project area. – Presence of Restricted Invasive Plants are no greater that observed during baseline surveys and/or in surrounding land undisturbed by construction.
Implementation	**Pre-construction** – Prior to construction, weed specific surveys will be completed by MBJV in areas before construction teams enter and a detailed Weed Management Plan developed that will address the following: • Requirements of legislation • Consultation with environmental officers from Gladstone and Rockhampton Regional Council areas • Mapping of existing weed infestations • Management prioritisation of weed species • Strategies for preventing weed spread • Weed removal strategies • Weed monitoring protocols • Follow-up weed management methods and protocols. – Consultation will occur with landholders and formal agreements put in place outlining specific biosecurity requirements related to construction activities and accessing their property. **Construction**

	– All personnel will be trained with respect to weeds (e.g. colour photos, precautions, procedures, fact sheets) will be included as part of the environmental induction to be completed prior to commencement of work on the site. – Equipment and material introduced to the region, especially those from interstate, will be screened for weed species or items likely to contain weed seeds such as soil, as far as reasonably practicable. – Access roads will be identified and adhered to during construction to prevent transport of weeds from or to other areas. – Infested areas not essential for access will be avoided. If infested areas need to be cleared, then appropriate weed management or containment measures will be implemented in accordance with the Weed Management Plan. – Temporary Weed wash down bays will be installed at strategic locations within the Project footprint and meet good practice design requirement. Wash-down facilities should be situated so as not to allow mud to adhere to vehicles and machinery on exit from key weed-affected sites. – Vehicles and machinery will be subject to wash-down in accordance with the requirements of the Weed Management Plan. – All vehicles and machinery that have come from weed infested areas that require access to Project areas will be visually checked for soil/organic matter prior arrival onsite. – Vehicles and machinery will be subject to wash-down before entering sites where a request for wash-down by the landholder is identified in the Weed Management Plan and associated documentation. Proof of washdown (e.g. washdown certificates) will kept in the vehicle once it has been washed down. – Clothing and footwear will be free of mud and seeds before stepping in vehicles, as far as reasonably practicable. – Soil stripped and stockpiled from areas containing known weed infestations, particularly of declared weeds, will be stored separately and are not to be moved to areas free of weeds. – Disturbed topsoil and vegetation will be returned as close as possible to the original sites (where practicable) in order to limit the potential spread of weeds and pathogens. – All soil and plants imported to the site will be certified as weed free by the supplier using the Queensland Government Weed Hygiene Declaration Form or equivalent. – Chemical control of weeds will only be done by trained and/or qualified operators. – Only chemicals registered with the Australian Pesticides and Veterinary Medicines Authority for the target weed will be used, appropriate personal protective equipment (PPE) will be used, and Safety Data Sheets will be available from the Operator. – Weed eradication programs will be implemented if required, to mitigate Project impacts in consultation with landowners taking into account site-specific requirements such as organic farming practices and withholding periods. – Entry and exit points to construction areas at which weed hygiene protocols become effective will be identified and brought to the attention of relevant personnel. – Temporary weed wash-down bays will be established and maintained to reduce weed spread, in accordance with the Weed Management Plan.
Monitoring	– A weed survey of the construction area will be undertaken prior to construction commencement. – Routine daily visual observance by will be undertaken all personnel during construction will be undertaken to identify weed infestations. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Identification of non-conformances from the procedures outlined above • Monitoring of weeds present in the Project area and any instances of new infestations • Mapping (i.e. GIS locations) of weed infestation • A photographic record of weeds and weed management • Inspections of wash-down areas and procedures. – Weed inspections of the Project area will be undertaken by a suitably qualified person as required during construction (and into the operation phase) to monitor the effectiveness of the CEMP and to maintain a record of weed status in the Project area. – If a suspected matters of biosecurity concern are discovered onsite, DAF will be contacted immediately. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including:

	• Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. – Weed maintenance schedule and vehicle/machinery wash-down records during construction. – Weed management activities and weed status post construction.
Corrective Action	– The MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Identified weed and pest species will be managed in accordance with OCG, DAF, RRC, and GRC requirements to prevent their growth and proliferation.

7.12 Water Resources and Water Quality

The potential impacts on water resources resulting from the construction of the Project have been assessed and include:

- Potential water quality degradation through:
  - Accidental releases / spills of polluting substances (e.g. hydrocarbons, chemicals, litter and ASS)
  - Disturbance of contaminated / acidic soils
  - Sediment laden stormwater discharge from Project areas during construction impact on the water quality and bank stability of receiving watercourses
  - Discharge of groundwater and surface water from the pipeline trench.
- The extraction of water from existing surface water and groundwater sources for construction purposes.

Table 7-12 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing water resources and maintaining water quality.

Table 7-12 Water Resources and Water Quality Control Plan

Element	Water Resources and Water Quality
Performance Objectives	– To minimise and manage adverse impacts to surface and groundwater during construction of the FGP.

Legislative Requirements	– Compliance with:
	• Legislation (as per Section 5.1), specifically:
	  • *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*
	  • *Water Act 2000*
	  • *Water Regulation 2016*
	• Development Requirements or guidelines:
	  • Environmental Protection (Water) Policy 2009: Fitzroy River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Fitzroy River Sub-basin (DES, 2011)
	  • Environmental Protection (Water) Policy 2009: Curtis Island, Calliope River and Boyne River Basins Environmental Values and Water Quality Objectives (DES, 2014)
	  • Water Plan (Fitzroy Basin) 2011
	  • Water Plan (Calliope River Basin) 2006
	  • OSW/2020/5467 Exemption requirements for constructing authorities for the take of water without a water entitlement (DRDMW, 2021)
	  • Monitoring and Sampling Manual (DES, 2018)
	  • Best Practice Erosion and Sediment Control (IECA, 2008)
	• Permits, approvals and licence conditions:
	  • CG's Evaluation Report
	  • MCU development permits
	  • OPW development permits.

Performance Criteria	– No long-term impacts to surface or groundwater quality as a result of the FGP. – No visible signs of water quality deterioration as a result of FGP construction activities. – No water quality changes (upstream / downstream; baseline / during construction) in the following parameters: • Turbidity – 20 NTU or 10% increase (whichever is greatest) • pH – 1.0 pH unit change • Dissolved oxygen – 10% decrease

	– Waterway beds and banks rehabilitated as soon as reasonably practicable after construction.
Implementation	**Design** – Detailed design will include measures to reduce the impact to waterways in accordance with the waterway SAPs with trenchless methods identified for the following: • Gavial Creek • Bob's Creek • Inkerman Creek • Twelve Mile Creek • Marble Creek • Horrigan Creek • Raglan Creek • Larcom Creek – Detailed design crossing plans will identify significant environmental features. – Protection structures will be designed to prevent bed and bank disturbance at the intake location as far as reasonably practicable. – Infrastructure that is prone to damage from inundation will be located outside of flood risk areas. – Alton Downs WTP will be designed to include appropriate sludge management. – Water sensitive urban design principles will be implemented for the FGP. **Construction** – Where reasonably practicable, trenched creek and wetland crossings will be undertaken during low or no flow periods. If this cannot be achieved, a risk assessment will be undertaken to understand the risk and potential impacts and confirm whether additional mitigation measures will be required – Trenched waterway crossings will be planned to enable minimal vegetation removal as far as reasonably practicable. – The SAP – Waterways will be implemented for key waterway crossings. – Contaminated land control plan will be implemented, refer to Section 7.5. – ASS control plan will be implemented, refer to Section 7.6. – Where avoiding disturbance of ASS is not practicable, soils will be treated appropriately, and the generation of acid run-off will be minimised (or avoided), refer to Section 7.6. – Trenchless entry/exit point will be located away from sensitive locations with drill operations will stop as soon as reasonably practicable, upon detection of any lubricant release. – Erosion and sediment control measures will be implemented at waterway crossings and across the ROW. Diversion and erosion controls, including sediment basins, will be designed and implemented with reference to Best Practice Erosion and Sediment Control (IECA, 2008), including requirements for emergency planning as applicable, refer to Section 7.4. – Erosion and sediment control measures, such as silt fences, will be installed between stockpiles and waterways, refer to Section 7.4. – Temporary drains or bunds will be constructed where necessary to direct run-off and any overland flow from upslope of excavations, away from the construction footprint. – Any dewatering discharges will be released to ensure there are no and impacts from erosion and sedimentation into waterways. – Topsoil and subsoil piles excavated from or adjacent to wetlands and waterways will be placed at least 10m from the top of bank on either side of each waterway with appropriate sediment controls installed refer to Section 7.4. – Stockpiles will be protected from overland flow. – Earthworks will be minimised near waterways. – Stream bed material will be replaced over the pipe trench following trenching and additional scour protection provided where necessary. – Fuel and chemical handling, storage, distribution and spill response during construction will be managed in accordance with Section 7.20. – Natural drainage patterns will be restored following construction, as far as reasonably practicable. – Ponded / trench water at the construction sites will be disposed of appropriately. If required, treat water prior to release.

	– A high level of housekeeping will be implemented to prevent litter entering waterways including the provision of waste bins, regular site inspections and staff training in waste disposal procedures. – Hydrotest water discharges will be followed in accordance with approval requirements and Section 7.15. – Any water bodies or bores used for extraction of construction water will be monitored for water levels and water quality extraction will cease if unacceptable impacts are identified. The OSW/2020/5467 Exemption requirements for constructing authorities for the take of water without a water entitlement (DRDMW, 2021) will be met. – Compound wastewater will be disposed of offsite at a licensed facility. **Rehabilitation** – Rehabilitation of waterways will occur as soon as reasonably practicable after completion of the crossing, refer to Section 7.21. – Fertilisers and pesticides used for revegetation activities will be applied during favourable weather conditions to prevent spray drift (i.e. no high winds or runoff) and at the minimum required amount.
Monitoring	– Routine daily visual observance will be undertaken by all personnel during construction for conformance with this control plan. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Weather conditions (i.e. if significant rainfall is forecast) • Waterway condition • Water levels • Water quality observations. – Water quality monitoring and assessment will be implemented onsite to identify, measure, record and report on water quality prior to any discharges. – Monitoring will be undertaken for turbidity, pH, dissolved oxygen, and electrical conductivity. – Monitoring will be undertaken to detect changes between upstream and downstream conditions and/or between baseline and during construction: • Turbidity – 20 NTU or 10% increase (whichever is greatest) • pH – 1.0pH unit change • Dissolved oxygen – 10% decrease – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – All personnel will be retrained in procedures where the procedures are modified, or new ones adapted. – Visual checks (and sampling for applicable analytes if required) of captured stormwater will be conducted prior to release. If the water does not meet discharge criteria it will be either treated onsite or disposed of at a licensed wastewater facility.

7.13 Air Environment

Atmospheric emissions from construction activities will depend on a combination of the potential for emission (the type of activities), meteorological conditions and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to minimise the potential for adverse environmental effects:

- Exhaust emissions from site plant, equipment and vehicles
- Fugitive dust emissions from site activities.

Table 7-13 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing air quality.

Table 7-13 Air Environment Control Plan

Element	**Air Environment**
Performance Objectives	– To minimise the air quality impacts arising from the Project during construction. – To be efficient in the use of resources and minimise emissions where practical.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Environmental Protection (Air) Policy 2019* • *National Greenhouse and Energy Reporting Act 2007* • Permits, approvals and licence conditions: • CG's Evaluation Report • MCU development permits • OPW development permits.
Performance Criteria	– Minimise dust generation during construction. – Minimise air emissions (such as exhaust) and energy use for all activities. – Respond to and close out all complaints relating to air quality in a timely manner and in accordance with GAWB's policy and Section 9.2.
Implementation	**Construction** <u>Dust</u> – Directly affected landowners will be informed of potential temporary dust generation prior to the commencement of activities likely to generate dust. – Dust and particulate matter will not exceed any of the following levels when measured at any nuisance sensitive or commercial place: • Dust deposition of 120 mg per square metre per day over a 30 day averaging period, when monitored in accordance with Australian Standard AS/NZS 3580.10.1:2003: Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method (or more recent editions). – Respirable crystalline silica dust risk assessments and monitoring (as required) will be conducted. – Construction vehicles will be confined to designated access tracks in the Project area, as far as reasonably practicable. – Access tracks will be dampened where required and particularly in windy conditions to reduce the generation of dust from construction traffic. – Water sourced for dampening of roads will not be unduly saline, acidic or otherwise contaminated, to minimise impacts to soils and waterways. – Construction vehicles will travel at safe speeds suitable to the conditions with due care and attention, particularly on unsealed access tracks. – Dusty materials will be stored, handled and transported appropriately. – A water truck or similar will be used onsite (where practical) and along access roads (where appropriate) to minimise dust. – Where wind speeds are considered excessive (approximately 10 m/s) and work is undertaken within 100 m of sensitive receptors, dust mitigation measures will be put in place to prevent dust nuisance as far as reasonably practicable.

	– Where required and practicable, rumble strips or similar method will be used at the entrance/exit of construction areas to reduce the amount of mud or soil that is transported onto hard-surfaced roads. – Hoarding and gates will be used to prevent dust breakout where appropriate. – Hard-surfaced roads used for access to Project areas will be cleaned to the extent reasonably practicable to remove dust, mud or other debris that could generate a dust nuisance. – Trench spoil and topsoil will not be stockpiled to heights greater than 3 m and long-term stockpiles will be stabilised or vegetated to reduce dust generation. – Exposed ground surfaces will be revegetated as soon as reasonably practicable following construction activity. – If all reasonably practicable dust suppression methods fail to adequately prevent or suppress nuisance dust resulting in unacceptable impacts, suspension of construction activities until conditions generating dust have subsided will be considered. <u>Air emissions</u> – Energy use, resource use and greenhouse gas emissions will be recorded. – All vehicles and equipment used onsite will undergo regular maintenance in accordance with manufacturers requirements to minimise air emissions. – Plant, equipment and vehicles will be turned off when not in use to prevent unnecessary idling. – The number of vehicles used will be minimised to that essential for efficient construction activities. – Carpooling / busing to work sites where possible to reduce the number of vehicle movements associated with the Project. – The number of plant and equipment movements will be minimised by ensuring, wherever possible, that all staged works are completed prior to departure from the work area.
Monitoring	– MBJV will monitor resource use of greenhouse gas emissions as identified by GAWB. – Routine daily visual observance will be undertaken by all personnel to monitor dust generation and implement additional controls as required. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Identification of non-conformances from the implementation of the CEMP • Monitoring of dust control measures implementation and effectiveness. – Continuous monitoring dust deposition will be undertaken at sensitive receptors with dust deposition gauges to be installed at representative sites. – Respirable crystalline silica dust monitoring (as required). – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records to be kept onsite/TeamBinder and made available to GAWB or external auditors upon request, including: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. – MBJV will meet any required reporting for resource use of greenhouse gas emissions. – Any non-compliances / complaints relating to air quality impacts will be recorded and addressed in accordance with the complaints procedure, refer to Section 9.2.
Corrective action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Where air quality complaints or reports are received, MBJV will ensure the complaint/report is investigated, refer to Section 9.2. Work on the causative aspect may need to cease until corrective actions are implemented. – Where DES receives air quality complaints, and they consider the complaint reasonable, DES may ask to qualitatively or quantitatively monitor the air quality to ensure the FGP is not emitting contaminants to the air in exceedance of the *Environmental Protection (Air) Policy 2019*. If exceedances are recorded or poor air quality is observed, MBJV will investigate the construction aspect accountable and review the

	relevant procedures and practices within 24 hours of determining that the air quality is poor as a result of the Project's construction aspect/s. – All personnel and sub-contractors will be retrained in air quality management if non-conformances are identified and will modify work practices as required.

7.14 Waste Management

Potential waste sources include (but are not limited to):

- Debris from vegetation clearings
- Building waste
- Wash-down wastewater
- General waste from staff
- Sewage (blackwater)
- Trench water due to ground water infiltration and rain events
- Hazardous and regulated wastes
- Hydrocarbon wastes from end-use
- Regulated waste.

These waste streams being managed incorrectly has the potential to impact to the surrounding land and water environment.

Table 7-14 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for waste management.

Table 7-14 Waste Management Control Plan

Element	Waste Management
Performance Objectives	– To reduce the amount of waste produced during the construction of the FGP and to maximise recycling and reuse opportunities. – To manage waste generated during construction of the FGP in a manner that minimises the risk of it negatively impacting on the surrounding environment.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Environmental Protection Regulation 2019* • *Waste Reduction and Recycling Act 2011* • *Waste Reduction and Recycling Regulation 2011* • Development Requirements or guidelines • AS1940: The storage and handling of flammable and combustible liquids • Permits, approvals and licence conditions: • CG's Evaluation Report • MCU development permits • OPW development permits.
Performance Criteria	– No adverse impacts on the surrounding environment or human health from the management of waste during the construction phase. – Waste management hierarchy implemented to managing waste through avoiding the generation of waste; maximising re-use and recycling of all materials where possible and treating and disposing all those materials that are unable to be re-used or recycled in accordance with relevant legislation and guidelines. – Achieve an Excellent Rating in accordance with ISC manual version 1.2.
Implementation	**Design** – The design will endeavour to find balance between cut and fill to minimise the requirement to stockpile excess soil, remove excess soil from the site or import fill material. – The design will consider waste minimisation when designing and selecting equipment. **Construction** – Waste management will be undertaken to incorporate the waste management hierarchy, waste management procedures, training of relevant personnel and monitoring and reporting requirements.

	– All personnel will be made aware of the requirements of the CEMP as part of their inductions, prior to commencing work. – A program for strict litter control will be implemented throughout Project areas. This will include site-wide signage; an adequate number of litter bins (which by design exclude birds and vermin); bin clearance on a regular basis; daily maintenance of crib rooms to achieve cleanliness; and educational signage within crib rooms on the linkage between poor waste management practices, increases in pest animal populations, and subsequent impacts to native fauna. – Cleared vegetation will be stockpiled so as not to impede wildlife, surface drainage and avoid damage to adjacent live vegetation. It will then be mulched and respread on the ROW or disposed of offsite at an approved location in line with rehabilitation and revegetation management (refer to Section 7.21) and approved by GAWB. – Suppliers will be encouraged to reduce and/or collect packaging. – Sorting and storage recyclable wastes (such as oils, steel and plastic) will occur, and arrangement for the transfer of the recyclables to a licenced recycling facility. – All waste receptacles will be covered to prevent water infiltration and wind from causing litter. – Any temporary waste storage areas will not be located within 50 m of a waterway and will be appropriately contained to prevent litter, soil contamination or attraction of vermin. – To avoid impacts arising from the release of wash-down wastewater, equipment will be washed down in a suitable wash- down facility that is bunded and filtered, and at least 50 m from any waterways. – Sewage disposal will be managed through the use of mobile chemical treatment systems, approved septic systems or via connection with the municipal waste sewage infrastructure, depending on location of the site. – All 'trackable wastes' under the *Environmental Protection Regulation 2019 (Qld)* leaving the site will be traced. – Hazardous and regulated wastes will be controlled as per any local government or legislative requirements, stored in bunded containers / areas in accordance with AS1940 and transported and disposed of by an appropriately licensed contractor, refer to Section 7.20. – All containers will be secured to prevent movement during a flood event. – Safety Data Sheets (SDS) will be kept onsite during construction. – Depending on the quality of the material excavated, it may be practical to utilise excess material from some work sites as fill for other work sites. Excess spoil will be disposed of at the nearest approved locations along ROW, generally by agreement with landowners or local council and in accordance with Section 7.4. – Excess spoil that cannot be disposed of in the vicinity it came from will be hauled to approved disposal sites (including relevant landholders who may wish to use the excess spoil) and nominally disused borrow pits. Spoil disposal sites will be located and managed to reduce erosion, runoff into local waterways and to prevent the distribution of weeds. – Upon completion of construction in each area along the ROW, all wastes will be removed and disposed of at a licensed waste management facility. – Appropriately stocked spill kits will be located in each construction area and along the ROW and personnel will be trained appropriately in the use. – Efficient use of resources will be implemented through procurement planning and ordering materials as close as possible to required quantity to avoid oversupply.

Monitoring	– Routine daily visual observance will be undertaken by all personnel during construction to monitor the site for litter or other waste issues.
	– Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include:
	  • Monitoring of waste management practices to identify non-conformances from the implementation procedures outlined above and possible improvements in waste management practices
	  • Recording of the amount of waste being re-used, recycled and disposed of
	  • Checking of waste storage areas
	  • Checking for windblown litter.
	– Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).

Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Completed environmental checklists/reports during the construction phase

	• Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. • Quantities of wastes generated and disposed of • External environmental audit reports that review waste management practices. • Waste Transport Certificates / Soil Disposal Permits (where relevant)
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Increase recycling and reuse where possible. – Increase storage capacity or increase frequency of offsite disposal if necessary. – Repair or replace receptacles if they do not meet the requirements of the CEMP. – Retrain staff in waste management if the CEMP is not being implemented. – Incorporate additional waste minimisation measures as identified during reviews.

7.15 Hydrotesting and Commissioning

The potential impacts on surface water resulting from the hydro testing and commissioning of the FGP have been assessed and include:

- Potential water contamination through the release of hydrotesting water (e.g. wastewater from treatment process)
- Erosion and sedimentation where hydrotesting water is discharged.

Table 7-15 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for hydrotesting and commissioning.

Table 7-15 Hydrotesting and Commissioning Control Plan

Element	Hydrotesting and Commissioning
Performance Objectives	To minimise the potential impacts from hydrotesting and commissioning of the pipeline and Alton Downs WTP on the local environment, particularly waterways.
Legislative requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* • *Water Act 2000* • *Water Regulation 2016* • Development Requirements or guidelines: • Environmental Protection (Water) Policy 2009: Fitzroy River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Fitzroy River Sub-basin (DES, 2011) • Environmental Protection (Water) Policy 2009: Curtis Island, Calliope River and Boyne River Basins Environmental Values and Water Quality Objectives (DES, 2014) • Water Plan (Fitzroy Basin) 2011 • Water Plan (Calliope River Basin) 2006 • OSW/2020/5467 Exemption requirements for constructing authorities for the take of water without a water entitlement (DRDMW, 2021) • Monitoring and Sampling Manual (DES, 2018) • Permits, approvals and licence conditions: • CG's Evaluation Report • MCU development permits • OPW development permits.
Performance Criteria	– No depletion or degradation of any waterway as a result of hydrotesting, or commissioning. – Minimise hydrotest water consumption through re-use of water. – No adverse impacts to the local environment due to the discharge of water.
Implementation	**Construction / Commissioning** – The FGP will be commissioned in sections between isolation valves and facilities along the alignment, this will minimise the quantity of water required and discharged. – Hydrotest water used during testing and commissioning of the Alton Downs WTP, pipeline and reservoirs will be reused within the system and passed down the pipe if of sufficient quality, to minimise disposal. – Hydrotest water disposed during commissioning to land or waterways will be in compliance with regulatory requirements and have relevant controls in place to reduce impacts. – Hydrotest water will be discharged in a way that ensures there are no and impacts from erosion and sedimentation into waterways. – Hydrotest water disposal will not occur on areas of exposed soil in dry ephemeral creeks without appropriate erosion prevention measures such as a rock lined channel or into a grassed area.

	– Where water has been in the pipe for long periods (e.g. six months) and requires discharged, an assessment will be made of the need for aeration prior to discharge. – Chlorination will not be used for hydrotesting.
Monitoring	– Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Inspection of the waterway where the test water is to be discharged to identify appropriate disposal site • Inspection of the waterway following discharge to monitoring for erosion and sedimentation • Monitoring of water quality and if necessary, treatment will be undertaken prior to discharge of water.
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. – Records will be maintained of the water quality of test water prior to discharge and of the locations and quantities of discharge.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – All personnel will be retrained in procedures where the procedures are modified, or new ones adapted. – Visual checks (and sampling for applicable analytes if required) of captured hydrotest water will be conducted prior to release. If the water does not meet discharge criteria it will be either treated onsite or disposed of at a licensed wastewater facility.

7.16 Noise and Vibration

The potential sources of noise and vibration associated with construction of the FGP include:

- Set up of ancillary facilities
- Construction of access tracks
- Delivery of equipment and materials
- Various types of machinery use during construction
- Blasting (associated with the Aldoga Reservoirs).

Although sensitive receptors (residents) are sparse along the ROW, noise and vibration emissions have the potential to negatively impact adjacent sensitive receptors and fauna habitat). Vibration may also result is structural impact to other infrastructure or buildings.

Table 7-16 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing noise and vibration.

Table 7-16 Noise and Vibration Control Plan

Element	Noise and Vibration Management
Performance Objectives	– To manage the construction of the FGP in a way that minimises the impact of noise and vibration on the local community. – To control noise generation from the FGP to within the relevant noise standards.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Environmental Protection (Noise) Policy 2019* • Development Requirements or guidelines • Noise Measurement Manual (DES, 2020) • AS1055: Acoustics – Description and Measurement of Environmental Noise • Permits, approvals and licence conditions: • CG's Evaluation Report • Landowners' requirements • MCU development permits • OPW development permits.
Performance Criteria	– Noise generated from the construction of the FGP is maintained within relevant standards. – Respond to and close out all complaints in a timely manner and in accordance with GAWB's policy and Section 9.2.
Implementation	**Design** – Impacted landholder agreements for access routes and construction activities, including work on Sundays, will be prepared and signed in consultation with landholders. – During design, measures to reduce noise will be incorporated for the construction phase of the FGP including housing the pump and equipment in a building that includes specific noise mitigation measures. – Acoustic advice will be sought to check that the FGP noise management is providing the appropriate noise attenuation to the outside environment so that noise levels at the nearest sensitive receptors are within noise standards. – Dilapidation surveys will be undertaken for structures that may be affected by the construction work in accordance with the Dilapidation and Assessment Survey Management Plan. **Construction** – Noise mitigation strategies will be implemented where practicable to reduce the potential for adverse noise impacts and complaints. – The quietest plant and equipment will be selected as far as reasonably practicable. – All equipment and plant will be regularly maintained to manufacturers' specifications.

	– Equipment use will be timed to minimise noise impacts (i.e. construction activities managed to avoid audible noise to the nearest noise sensitive receiver). – Heavy materials will be placed not dropped into dump trucks where practicable. – For all vehicles, horns and reversing alarms will be at the minimum volume level as far as practicable and used only as required without compromising safety requirements. – Non-tonal / broadband type reversing alarms will be used where practicable. – Stockpiled materials will be used as “noise barriers” to shield sensitive receivers where practicable. – Diesel powered equipment (including, but not limited to excavators, front end loaders, dump trucks) with appropriate mufflers will be used where practicable. – Exhaust brakes will be minimised onsite. – Loading/unloading will be performed with consideration to any nearby sensitive receptors such as residential properties. – Construction activities will be undertaken 6:30 am and 6:30 pm every day, in consultation and agreement with landholders. Agreements will be forward to the OGC as received. If agreement is not reached, working will be undertaken 6:30 am and 6:30 pm Monday to Saturday. – Work may be required outside these hours for critical works such as waterway or infrastructure crossings, concrete pours and/or hydrostatic testing. If work outside routine hours is required, and assessment will be undertaken and affected landholders will be consulted and the activity conducted in accordance with any relevant regulatory notification requirements. – For access along the ROW in Yellow Chat habitat (approximate FGP chainage 54000 to 73000) during October to April inclusive, vehicle noise will be minimised by ensuring no construction activities, including unloading of materials, occur in this area, reducing speed limits to 40 km/hr and ensuring horns and reversing alarms are only used where necessary. – will be undertaken to minimise noise impacts such as reduced speeds in sensitive areas. – In response to a complaint, the source of excessive noise or vibration will be immediately shut down until adequate monitoring and reporting has been undertaken and the complaint resolved. **Community Liaison** – The landholder communication plan will be implemented. – Impacted landholders will be informed about when they may be affected by works, and the duration of the works at least two weeks prior to any works occurring. – A 24 hour contact number for the FGP will be implemented for the construction phase so that residents always have an immediate point of contact when they have questions or concerns. – All complaints received will be handled in accordance with the complaints/incidents procedure, refer to Section 9.2. **Blasting** – Where blasting is required (e.g. at Aldoga Reservoirs) a Blasting Management Plan will be prepared and implemented to detail safety measures and other management measures. – The Blasting Management Plan will be developed and implemented and comply with the *Environment Protection (Noise) Policy 2019*. – Pre- and post-construction building and infrastructure surveys on properties / infrastructure potentially susceptible to vibration damage from construction works will be undertaken. – Noise, vibration and blasting monitoring will be conducted with consideration to the relevant guidelines and standards, including but not limited to: • Noise Measurement Manual (DES, 2020) • AS 1055 – 1997 Acoustics – Description and Measurement of Environmental Noise. – Blasting activities, where required, will not take place on a Sunday or public holiday.
Monitoring	– Routine daily visual observance will be undertaken by all construction personnel during construction to monitor construction noise levels and prevent excessive noise. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Inspections of equipment maintenance records • Monitoring construction activities for non-conformances with the above procedures • Review of incidents/complaints register for noise related incidents. – Peak particle velocity (mm/s) via vibration will be monitoring at selective sites. – Construction noise levels will be monitored, including:

	• Background noise monitoring will be undertaken at the various identified sensitive receptor locations to assess the ambient noise levels in the immediate surrounding area • Attended spot check monitoring will be undertaken at the potentially most exposed receivers in proximity to construction activities • In response to a compliant. – Monitoring in the case of a complaint being received will be undertaken by an experienced and qualified noise and vibration specialist. The equipment used for the measurements will have current calibration certificates and will be appropriate for the measurements with regards to the relevant standards. – An additional monitoring program will be developed and undertaken during construction activities that are expected to generate significant noise and/or vibration (e.g. blasting and work outside regulated work hours). – Monitoring will be undertaken in accordance with the Blast Management Plan – Dilapidation surveys are to be undertaken at nominated sensitive receptors/infrastructure to define and document the existing structural integrity, and condition of the building and structures. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results • Dilapidation reports, as required – Any non-compliances / complaints relating to noise impacts will be recorded and addressed in accordance with the complaints procedure, refer to Section 9.2.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Modification or substitution of work methods will be undertaken wherever possible to minimise noise and vibration impacts, including: • Works programming assessments • Selective use of enhanced equipment/plant • Noise barriers or earthen bunds • Equipment/plant substitution.

7.17 Transport and Access

Impacts from traffic generated by construction of the FGP will consist of the following:

- Transportation of construction equipment to/from site
- Delivery of pipe
- Delivery of construction materials
- Construction workers transport
- Direct impacts, such as from pipeline crossings of roads.

These activities will impact traffic across various locations and its access points.

Table 7-17 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing transport and access.

Table 7-17 Transport and Access Control Plan

Element	Transport and Access
Performance Objectives	– To minimise the impacts on transport and access arising from the Project.

Legislative Requirements	– Compliance with:
	• Legislation (as per Section 5.1), specifically:
	  • Transport Infrastructure Act 1994
	• Development Requirements or guidelines
	  • Australian Pipeline Industry Association Vehicle Safety Guidelines
	• Permits, approvals and licence conditions:
	  • Road Works Approval / Road Corridor Permits / Traffic Control Permits (TMR)
	  • Road Reserve Works Permit (RRC)
	  • Works on Road Corridor Permit (GRC)
	  • Road Closure Permit (Queensland Police)
	  • Works within a railway corridor - Permission to interfere with railways
	  • Wayleave agreements with Aurizon and Queensland Rail
	  • CG's Evaluation Report
	  • Landowners' requirements
	  • MCU development permits
	  • OPW development permits.

Performance Criteria	– No transport or access related incidents arising as a result of the FGP.

Implementation	**Design and Pre-construction**
	– Access routes will be determined in consultation with landholders during the detailed design.
	– Landholder agreements for access routes will be prepared and signed in consultation with landholders.
	– Traffic Management Plans (TMPs) will be developed prior to construction to address site specific details for FGP. TMPs will be developed in negotiation with RRC and GRC and TMR before the commencement of construction. The plans will also take into consideration relevant approval conditions and will detail:
	  • Site accesses, including the provision of signage and traffic control during construction at site accesses and pipeline crossings
	  • Temporary speed reductions as required at site accesses or on unsealed roads in the vicinity of sensitive receptors
	  • Temporary traffic control measures
	  • Vehicle parking and access

	• Options for carpooling or use of buses by construction personnel to reduce traffic generation resulting from the FGP. – All permits and approvals required under the *Transport Infrastructure Act 1994* will be obtained including: • Approval for works within a state-controlled road corridor / road corridor permits • Approval for works within a railway corridor. **Pre-construction** – Road/intersection improvements will be undertaken at: Laurel Banks Road, Laurel Banks Road/Rockhampton Ridgelands Road intersection and Rockhampton Ridgelands Road. – Consultation will occur with TMR regarding the Rockhampton Ring Road and relevant road corridor permit required including the FGP basis of design. – The crossing of TMR roads and rail networks will be undertaken by trenchless methods to minimise impacts to traffic and transport. – Roads, particularly unsealed roads used during construction will be maintained by MBJV: • Possible road/intersection improvements required to enable safe access during construction of the Project will be discussed with the TMR and undertaken where necessary. – Where possible, construction ancillary facilities will be accessed via existing public roads. Where this is not possible, existing private access tracks on private property will be used but only with the permission of the landowner. Consultation will occur with each landowner whose property is required for access and agree on the terms and conditions relating to access arrangements. – Local road and access closures will be minimised where possible. Alternate access arrangement will be provided if access closures are required. – Access to the ROW will be by routes agreed with landholders through signed agreements with vegetation clearing minimised wherever possible. – Access for emergency vehicles will be maintained along emergency access routes, with suitable alternative access arrangements provided where required. – All drivers will comply with the road rules on local and state-controlled roads and the site rules on the ROW. Further, all drivers will be required to drive to the road conditions. – Prior to being used onsite, plant, equipment and vehicles will undergo a mechanical inspection to ensure that the plant or vehicle is in good working order, and the appropriate emission controls are in place and not modified. – All trucks will be loaded so as not to exceed the legal weight limitations in force at the time, noting weight restrictions of any bridges along designated routes.
Monitoring	– Routine daily visual observance will be undertaken by all personnel during construction to monitor transport and access issues and identify non-conformances. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and any relevant TMPs. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Completed environmental checklists/reports during the construction phase • • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. – Any non-compliances / complaints relating to transport and access will be recorded and addressed in accordance with the complaints procedure, refer to Section 9.2. – Road Dilapidation Report(s) will be prepared for affected roads (public and private) likely to be used by construction traffic prior to commencement of construction to assess the current condition of the road and describe mechanisms to restore damage that may result due to construction traffic related to the FGP.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV.

	– Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Identify the source of traffic/transport impact and repair any damage, modify the controls, or modify procedures that may be inadequate. – All personnel will be retrained in procedures where the procedures are modified, or new ones adapted.

7.18 Cultural Heritage

The FGP has the potential to impact upon known and unknown cultural heritage values (both Indigenous and non-Indigenous).

Cultural heritage items that have been identified that may be impacted by the ROW and require management, include:

- PCCC / Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People (BGGGTB) People:
    - Debitage
    - Artefact scatters
- Darumbal People
    - Isolated Stone artefacts
    - Scarred trees.

Within the ROW, between the Fitzroy and Gladstone there are two Historical Archaeological Sites that may be directly impacted by the FGP:

- Woolwash - Frogmore Pipeline
- Stone Culvert and Twelve Mile Road

Table 7-18 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing cultural heritage values.

Table 7-18 Cultural Heritage Control Plan

Element	**Cultural Heritage**
Performance Objectives	To minimise the impact of the Project on Aboriginal and historic cultural heritage.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • *Native Title Act 1993* • *Aboriginal Cultural Heritage Act 2003* • *Aboriginal Cultural Heritage Act 2003 – Duty of Care Guidelines* • *Queensland Heritage Act 1992* • Permits, approvals and licence conditions: • Cultural Heritage Management Plans • Native Title Assessment / Indigenous Land Use Agreements (to be developed)
Performance Criteria	– Comply with the CHMP and the *Aboriginal Cultural Heritage Act 2003.* – Manage all incidental cultural heritage finds during construction in accordance with the CHMP. – No impact to known historical heritage items.
Implementation	**Pre-construction** – An Aboriginal Cultural Heritage survey of the FGP will be undertaken to determine the nature and extent of subsurface archaeological material within the ROW prior to construction and before any ground disturbing activities. In accordance with CHMP, the survey of the ROW will be undertaken by representatives of the BGGGTB and Darumbal People. – The environmental induction will include training for all personnel with regard to their obligations under the CHMP and the measures to be taken in the event of an historic or Aboriginal cultural heritage find. Additional inductions from the BGGGTB and Darumbal People will also be implemented. **Construction** – The approved CHMPs with the PCCC (now BGGGTB) and Darumbal People will be implemented for the FGP. The CHMPs and the Cultural Heritage Protocols provide details of the measures to be taken in the event of an Aboriginal cultural heritage find during construction.

	– A basic level of photographic recording, which captures the nature of the item and its context within the cultural environment and within the Project area, will be undertaken prior to works commencing in the area. – In the event of incidental historic cultural heritage finds during construction, works will cease in the area until the nature of the site can be assessed, recorded and or retrieved by a Durumbal / BGGGTB People representative and/or cultural heritage specialist and in consultation with DES. – In the event of any finds of skeletal debris, the local Police will be notified immediately.
Monitoring	– Cultural heritage survey will be undertaken in accordance with the CHMP prior to any ground disturbing activities. – Routine daily visual observance will be undertaken by all personnel during construction (including earthworks during operations) for items of cultural heritage significance. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan. – Monitoring will be undertaken during earthworks by representatives of the BGGGTB and Darumbal People, as required. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP – Internal and external environmental audit results. – Reporting to DES in the event of a cultural heritage find during construction (refer to Table 3-1 for contact details).
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both the GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Retrain all personnel and sub-contractors in cultural heritage management if the CHMP is not being implemented and modify work practices as required. – Notification to the relevant BGGGTB and Darumbal People or appropriately qualified cultural heritage advisor for assessment of the find.

7.19 Social and Economic

Temporary impacts to landholders may occur during construction of the pipeline and associated infrastructure, e.g. intake facility and WTP and may include:

- Traffic impacts on local roads as a result of construction vehicles and machinery
- Temporary access delays during pipeline construction across local roads
- Amenity impacts associated with noise and dust generated during construction
- Disruption to grazing land, fencing and gates, irrigation, farm dams and other agricultural land.

In addition, the FGP will provide support the local communities and business across the region with employment opportunities and economic benefits.

Table 7-19 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for managing the social and economic environment.

Table 7-19 Social and Economic Environment Control Plan

Element	Social and Economic
Performance Objectives	– To minimise impacts to the community during construction of the FGP. – To maximise economic opportunities during the construction of the FGP.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1), specifically: • Development Requirements or guidelines: • Queensland Government Building and Construction Contracts Structured Training Policy (the 10 percent policy) • Local Industry Policy • CHMPs and relevant Indigenous participation requirements • Permits, approvals and licence conditions: • CG's Evaluation Report • Landowners' requirements • MCU development permits • OPW development permits • Road Works Approval / Road Corridor Permits / Traffic Control Permits (TMR) • Road Reserve Works Permit (RRC) • Works on Road Corridor Permit (GRC) • Road Closure Permit (Queensland Police).
Performance Criteria	– Comply with the *Queensland Government Building and Construction Contracts Structured Training Policy (the 10 percent policy)*. – Comply with the *Local Industry Policy* through the development of a Local Industry Participation Plan in consultation with the Department of Tourism, Regional Development and Industry. – Adhere to the GAWB and MBJV's EMS. – Achieve an Excellent Rating in accordance with ISC manual version 1.2.
Implementation	**Planning** – A Project office will be established in Rockhampton which will potentially increase the opportunities for local and Indigenous residents in Rockhampton to gain employment on the FGP. – Impacted landholder agreements for access routes and construction activities will be prepared and signed in consultation with landholders. **Construction** – Mitigation measures will be implemented to address the accommodation impacts for the FGP include: • Local labour and sub-contractors will be employed where practicable

	• Works will be planned to avoid concurrent operations where practicable • A workers accommodation camp will be developed in Gracemere. **Community Liaison** – Impacted landholder agreements for access routes and construction activities, including work on Sundays and water sources, will be prepared and signed in consultation with landholders. – Impacted landholders will be informed about when they may be affected by works, and the duration of the works two weeks prior to any works occurring. – A 24 hour contact number for the FGP will be implemented for the construction phase so that residents always have an immediate point of contact when they have questions or concerns. – All complaints received will be handled in accordance with the complaints/incidents procedure, refer to Section 9.2.
Monitoring	– Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Monitoring will be undertaken as required of Human Resourcing, housing and Industrial Relations. • Monitoring will be undertaken in accordance with the Air Environment, Noise and Vibration, Transport and Access and Cultural Heritage Control Plans (Sections 7.13, 7.16, 7.17, and 7.18, respectively) – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Local and First Nations employment numbers • Local and First Nations business employed • Reports of any environmental incidents or non-conformances with the CEMP. – Internal and external environmental audit results.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB.

7.20 Handling and Storage of Dangerous and Hazardous Goods

The potential impacts from the transport, storage and handling of dangerous and hazardous goods during construction of the FGP have been assessed and include:

- Pollution of land
- Pollution of water
- Impacts to flora and fauna
- Impacts to human health.

Table 7-20 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for handling and storage of dangerous goods.

Table 7-20 Handling and Storage of Dangerous Goods

Element	Handling and Storage of Dangerous Goods
Performance Objectives	– To manage the purchase, handling, storage and disposal of dangerous goods onsite in a manner that does not cause harm to the environment, Project personnel or the public.

Legislative Requirements	– Compliance with:
	• Legislation (as per Section 5.1), specifically:
	  • *Dangerous Goods Safety Management Act 2001*
	• Development Requirements or guidelines
	  • AS1940: The storage and handling of flammable and combustible liquids
	  • AS2187: The storage, transport and use of explosives
	  • The Australian Code for the Transport of Dangerous Goods by Road and Rail
	• Permits, approvals and licence conditions:
	  • CG's Evaluation Report
	  • MCU development permits
	  • OPW development permits.

Performance Criteria	– No contamination of the environment and no injuries to personnel or the public from the storage or handling on dangerous goods.

Implementation	**Construction**
	– All personnel will receive an induction prior to commencing work on the site in the handling and storage of dangerous goods and in spill containment procedures.
	– A hazard identification and risk assessment process will be undertaken for the storage of dangerous goods in Project areas.
	– The SDS for all dangerous goods and hazardous materials will be kept onsite/TeamBinder.
	– Licenses or permits will be obtained from the relevant local governments if required for flammable and combustible liquids.
	– Risks posed by dangerous goods and hazardous materials stored or handled during construction will be minimised where reasonably practicable through:
	  • Minimisation of the quantities kept onsite.
	  • Compliance with SDS instructions.
	  • Segregation of incompatible dangerous goods and hazardous materials.
	  • Appropriate separation of dangerous goods and hazardous materials storage areas from people and property.
	  • Storage of flammable or combustible dangerous goods away from ignition sources.
	– Flammable and combustible liquids will be stored in bunded containers / areas in accordance with AS1940 and transported and disposed of by an appropriately licensed contractor.
	– Liquid dangerous goods will be stored in bunded containers with sufficient capacity to contain the potential spillage and any rainfall (i.e. 110% of the largest tank).
	– Personal protective equipment will be provided to personnel required to work with dangerous goods.

	– If a spill occurs: • cease the activity • contain the spill • clean up the spill • commence incident management and response process, refer to Section **9.1**. – Appropriately stocked spill kits will be located in each construction area and along the ROW and personnel will be trained appropriately in the use. – Any refuelling undertaken at site will be undertaken in a designated refuelling area, away from waterways, with nozzles with stop valves to reduce the risk of contamination to the environment. – Portable fire extinguishers will be available if required at Project areas and in vehicles. – Plant and equipment will be maintained in accordance with manufacturers' specification to minimise the leakage of oil, fuel, hydraulic and other fluids. – Regulated wastes will be transported by a licensed contractor to a licensed waste management facility able to accept the waste. – Explosives (dangerous goods class 1) will be used if the drill and blasting option is pursued in accordance with a Blasting Management Plan. Explosives will be stored in accordance with AS2187: The storage, transport and use of explosives and will be handled by a licensed explosives expert. Noting these would only be brought onto the Site on the day of discharge (i.e. not stored on the ROW).
Monitoring	– Routine daily visual observance will be undertaken by all personnel during construction for possible incidents related to dangerous goods and hazardous materials. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Inspecting the dangerous goods storage area(s) • Checking for evidence of spills or releases • Recording of any spills occurring at Project areas and implementing corrective actions • Inspecting spill kits to ensure they are readily available and well maintained, stocked and functional. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results. – Inventory of dangerous goods and hazardous materials at the site during construction and operation including their storage requirements, locations and SDS.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – The following corrective actions will be undertaken: • Immediately clean up the spill and dispose of any contaminated material • Repair the containment facilities to reduce the risk of further spills occurring • In addressing a major spill involving dangerous goods DES and local authority will be contacted as required. – Non-compliance with the implementation measures above will be corrected immediately and a non-conformance report completed.

7.21 Rehabilitation and Revegetation

The construction of the FGP will result in temporary and permanent impacts. These impacts primarily relate to ground disturbance, vegetation clearing, and fauna habitat clearing of Project areas and include temporary impacts that are restricted to the construction period as well as permanent impacts for access and maintenance purposes (i.e. 10 m wide maintenance access track). In addition, some areas would be used on a temporary basis for access to the ROW, laydown areas and to accommodate workers to support the construction.

Table 7-22 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for landscape and visual amenity management.

Table 7-21 Rehabilitation and Revegetation Control Plan

Element	Rehabilitation and Revegetation
Performance Objectives	– To create stable landforms with similar land use capability and or suitability that existed prior to the disturbance unless an alternative end land use is pre-determined and or agreed. – To reinstated and rehabilitate marine plants to pre-disturbance conditions.
Legislative Requirements	– Compliance with: • Legislation (as per Section 5.1) • Permits, approvals and licence conditions: • CG's Evaluation Report • EPBC Act approval • Landowners' requirements • MCU development permits • OPW development permits.
Performance Criteria	– No environmental harm to occur due to rehabilitation and revegetation activities. Landform is stable, shows negligible movement and represents the pre-disturbance conditions. – All rehabilitation and revegetation areas remain in good health. – Vegetation composition represents pre-disturbance conditions. – All disturbed land reinstated to pre-disturbance profiles so that the spatial extent of terrestrial and marine plants represents pre-disturbance levels. – Species richness, density and cover representative of pre-disturbance conditions.
Implementation	**Pre-construction** – The ROW and facility locations will be inspected and surveyed prior to construction in order to establish baseline conditions and to: • Identify trees and vegetation that are required to be protected / retained • Identify marine plant species and number of individuals impacted • Identify any weeds and pests to be managed • Identify any contamination sources • Identify the condition of the land. – Prior to clearing activities, where possible, marine plants will be removed and relocated to a suitable area within the ROW or a suitable nursery with plant health monitored during daily inspections. Following construction activities, surviving plants will be relocated back to the area they were removed from. – Vegetation clearance, including at sensitive sites, will be minimised where practicable. **Construction** – Rehabilitation and remediation controls contained in the SAPs - for Waterways, Yellow Chat, Ornamental Snake and Brigalow vegetation habitats will be implemented. – Reinstatement and revegetation, where required, will commence as soon as practicable after construction activities and no later than one month after completion of works. impacting terrestrial marine plants.

	– Revegetation and replanting will commence as soon as practicable after construction activities and no later than one month after completion of works impacting marine plants. – Any land disturbed due to the laying of the pipeline will be rehabilitated to its pre-clearance or disturbance condition where practicable. – Topsoil will be stripped and reused for rehabilitation and landscaping purposes. – Soils will be replaced so that the topsoil depth is consistent with pre-clearance depths and profiles. – Ground cover will be established at disturbed sites following respreading of topsoil. Ground cover can include organic material, leaf litter, mulch, hydromulch, living or dead plant material, rocks, logs, other woody materials or erosion control materials. – Disturbed areas may also be sown with a cover crop immediately following topsoil respreading in areas with high erosion potential. – Backfill will be machine compacted to reduce the risk of surface erosion and trench subsidence post construction and rehabilitation. – Adequate cover will be placed on all disturbed areas prior to the removal of stormwater runoff controls. – At the end of construction, all areas of exposed soil will be mulched and/or grassed to minimise any ongoing erosion issues from Project areas. – Temporary stormwater and sediment control devices will be removed only once groundcover is established. – Temporary hoardings, barriers, traffic management and signage will be removed when no longer required. – Waterway crossings and wetlands will be revegetated with trees, shrub and grasses endemic to the area, sufficient to re-establish a riparian environment and protect bed and banks from erosion as per the Riverine protection permit exemption requirements WSS/2013/726 Version 2.02 (DRDMW, 2023). – Rehabilitation will include the following measures, to be undertaken progressively as works are staged: • Recontouring and compaction • Topsoil replacement • Weed control • Erosion protection • Revegetation, consistent with pre-clearance and surrounding conditions.
Monitoring	– Pre-clearance surveys will be undertaken for Project areas to assess pre-disturbed conditions. – Photo monitoring sites will be established. – Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and include monitoring for: • Landform stability, soil cover and erosion. • Rehabilitation health • Species diversity • Foliage cover at reference sites • Induction or presence of weeds. – Monitoring for marine plant rehabilitation will be undertaken in accordance with the SAP – Waterways. – Post-rehabilitation and revegetation monitoring will be undertaken for a period of five years or until the revegetation has stabilised and in good health (this will be addressed in the Operation Environmental Management Plan).
Reporting	– Environmental records to be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Completed environmental checklists/reports during the construction phase • Completed monitoring reports • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results.
Corrective Action	– MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV.

	– Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB. – Where either natural regeneration or reinstatement of the relocated marine plants fails to meet the performance criteria, assisted revegetation and direct planting will be undertaken with a species mix and density that is consistent with the pre-clearance conditions, as outlined in the SAP – Waterways.

7.22 Landscape and Visual Amenity

The construction of the FGP would create short-term impacts. These impacts would primarily relate to the visual appearance of the construction works that would be temporary, restricted to the construction period. Some areas would be used on a temporary basis for storage areas and accommodate workers to support the construction.

Table 7-22 shows the performance objectives, legislative requirements, performance criteria, mitigations measures, inspections, monitoring, reporting and corrective action requirements for landscape and visual amenity management.

Table 7-22 Landscape and Visual Amenity Management Control Plan

Element	Landscape and Visual Amenity
Performance Objectives	– To minimise visual modification impacts upon landscape and visual amenity that arise during construction and operation. – To return visual amenity back to pre-disturbance condition where possible.

Legislative Requirements	– Compliance with:
	• Legislation (as per Legislation (as per Section 5.1)
	• Permits, approvals and licence conditions:
	  • CG's Evaluation Report
	  • Landowners' requirements
	  • MCU development permits
	  • OPW development permits.

Performance Criteria	– Protect and/or reasonably restore landscape and visual amenity. – Stable landforms with similar land use capability and or suitability that existed prior to the disturbance unless an alternative end land use is pre-determined and or agreed.
Implementation	**Construction** – Project areas will be inspected prior to construction to • Identify trees and vegetation that are required to be protected / retained • Identify any weeds and pests to be managed • Identify any contamination sources • Identify the condition of the land. – Vegetation clearance, including at sensitive sites, will be minimised where practicable. – Topsoil and cleared vegetation will be stripped and reused for rehabilitation and landscaping purposes. – Temporary hoardings, barriers, traffic management and signage will be removed when no longer required. – Lighting of compounds and works sites will be restricted low impact lighting for security purposes, where and when required. – Lighting spill will be minimised by directing lights away from sensitive receptors. – Temporary storage facilities will be located out of sight of residential areas where practicable. – A high level of housekeeping will be maintained with materials and machinery being stored tidily during construction, and where possible behind solid hoardings. – Roads providing access to site compounds and work areas will be maintained free of dust and mud as far as reasonably practicable. – Upon completion of construction, all construction materials will be removed to a suitable location. – Screen planting and/or natural vegetation revegetation will be undertaken as required at locations outside the ROW (e.g. facility sites). – Appearance of other features such as signs and fencing will be considered minimise visual amenity impacts. – Rehabilitation (refer to Section 7.21) will include the following measures, to be undertaken progressively as works are staged:

	• Recontouring and compaction • Topsoil replacement • Weed control • Erosion protection • Revegetation, consistent with surrounding conditions.
Monitoring	– Weekly environmental inspections will be undertaken by the Environmental Representative/Manager, Environmental Advisor during construction to ensure environmental management is implemented in accordance with this control plan and will include: • Identification of visual amenity issues • Identification of landscaping vegetation health. – Post-rehabilitation and landscaping monitoring will be undertaken on a monthly basis. – Environmental audits will be undertaken by GAWB during construction quarterly (or as determined).
Reporting	– Environmental records will be kept onsite/TeamBinder and made available to GAWB or external auditors upon request. This file will contain the following: • Completed environmental checklists/reports during the construction phase • Reports of any environmental incidents or non-conformances with the CEMP • Internal and external environmental audit results.
Corrective Action	– Undertake a site inspection following a complaint of a visual amenity issue. Inspect the area for where the complaint was made and if complaint is valid undertake appropriate management measures to rectify. – MBJV will notify GAWB of any non-conformances with the above measures and corrective action (with approval from GAWB) will be taken to address the non-conformance. A non-conformance report will be completed by MBJV and filed by both GAWB and MBJV. – Where GAWB is responsible for the non-conformance, it will report on non-conformances and corrective action will be taken to address the non-conformance. A non-conformance report will also be filed by GAWB.

8. PERFORMANCE AND EVALUATION

The MBJV Environmental Representative/Manager and Environmental Advisor will implement the requirements of the CEMP with support from GAWB. The environmental performance of the FGP will be determined by implementing environmental monitoring programs and site inspection programs consistent with this CEMP. Compliance with environmental requirements will be assessed during site inspections, monitoring and environmental audits. All environmental management matters and monitoring, inspection and audits will be documented and recorded.

Based on the type of inspection, monitoring or audit, they should be carried out by suitably qualified persons. For example, a daily inspection should be complete by a person who understands the operations and controls in the area.

MBJV will implement any changes necessary to its EMS, management plans, procedures and processes in response to Project changes with the intention to drive continuous improvement for the FGP.

8.1 Monitoring and Inspections

The FGP's environmental performance will be tracked through regular monitoring and inspections. The aim of the monitoring and inspections will be to show the effectiveness or suitability of controls should there be an incident or complaint.

Monitoring activities will be conducted by suitably qualified persons. Monitoring will be carried out in accordance with guidelines and standards and conditions of approvals and the requirements of the SMP and SAP – Waterways.

The inspections will also be conducted by suitably qualified persons and review all environmental controls that are relevant to the construction activities underway at the time of the inspections. Implementation of all mitigation measures should be verified and recorded as suitable and effective. The date and time of the inspections will be recorded as well as comments on non-conformance and corrective action taken. Copies of the site inspection checklist will be signed and maintained onsite and in TeamBinder.

The results of the monitoring programs and inspections will be interpreted and reviewed regularly. Results will be reported to relevant authorities within agreed timeframes as determined in approval conditions. The incident management procedures will describe the procedures for instances, where monitoring results trigger the need for a management and/or reporting response.

Where a non-conformance is identified and does not present a significant risk of environmental harm, and can be corrected promptly, the corrective action will be closed out on the checklist. Where the risk of environmental harm is more significant and/or the corrective action cannot be undertaken promptly, the action will be recorded in the corrective action register.

Where a non-compliance, incident or near miss is observed during inspections, the incident investigation and reporting procedure will be followed.

An overview of the monitoring and inspection is provided in Table 8-1 and monitoring program is outlined in Table 8-2, refer to each control plan for detailed monitoring requirements.

Corrective actions are outlined in each control plan and will be assigned to Environmental Representative / Manager to ensure implementation.

Table 8-1 Monitoring and Inspection Requirements

Monitoring/Inspection Requirement	Description
Inspection	Regular (weekly) environmental compliance inspections are carried out by the Environmental Representative / Manager and Environmental Advisor for the FGP and relevant work areas. The findings of the Inspection are recorded on Weekly Site Environmental Inspection Report, in which required remedial actions are also recorded, including a responsibility

Monitoring/Inspection Requirement	Description
	and timeline for completion. These shall be monitored to ensure that they are closed out in the required time frame.
Monitoring	Monitoring and inspection will be conducted on a routine basis; however, additional monitoring may be required in the event of an incident, complaint or change in circumstances. The Environmental Representative/ Manager is responsible for the implementation of onsite environmental measurements, including delegation to appropriate personnel on the Project.
Calibration of Monitoring Equipment	Monitoring equipment will be calibrated prior to use and in line with user manuals for the equipment. Any equipment identified as having doubtful accuracy or precision will be removed from use and recalibrated. Where any monitoring equipment is found to be out of calibration, the validity of the previous monitoring results will be assessed and documented. Calibration of monitoring equipment will be recorded on Equipment Calibration Record.

8.2 Analysis and Evaluation

Monitoring and inspection results will be used to assess the environmental performance of the Project against the relevant criteria depending upon the aspect and the monitoring requirements. The Environmental Representative / Manager is responsible for checking monitoring and inspection results against the environmental obligations and identifying any non-conformances. The Environmental Representative/Manager or Environmental Advisor also is also responsible for raising a non-conformance, incident and/ or corrective action as necessary.

8.3 Environmental Auditing

GAWB will undertake compliance audits on a quarterly basis or otherwise determined. These audits will be conducted to measures the Project's environmental performance against this CEMP, other relevant management plans and against conditions of approvals.

In addition, third party audits to verify compliance with all applicable environmental requirements will be conducted on a six-monthly basis and/or as specified by relevant approval conditions. This will include verifying compliance with at least the following requirements:

- CEMP relevant to construction (this plan)
- EMS
- Applicable legislative and approval requirements
- Other applicable environmental requirements.

Audits will be conducted by an appropriately qualified person, independent of the construction activities or operations being audited. The audit results, conclusions and corrective actions required will be communicated to those responsible for implementing the corrective actions.

An audit report will be prepared to summarise the findings of the audits including non-compliances, corrective actions, revised practices and evidence to support the findings of the audit. The audit reports will be provided to the Coordinator-General within 30 business days of the end of the monitoring period to which the audit relates and made available to other relevant environmental authorities as required.

The audit period will begin on commencement of construction and end once all audit report corrective actions have been completed.

Table 8-2 Monitoring Program

Environmental Issue	Document Reference	Location onsite	Monitoring Parameter	Frequency	Record	Responsibility
Flora and Fauna	Fauna Management Control Plan Flora Management Control Plan Rehabilitation and Revegetation Control Plan Landscape and Visual Amenity Control Plan Species Management Program	Entire Project Area	Adherence to minimum areas of site clearance and disturbance/damage around Project areas.	At all times	Acceptance/sign off	Environmental Representative / Manager
		As required	All fauna identified during construction activities (refer to relevant SAPs)	At all times	Inspection	Environmental Representative / Manager
		As required	All vegetation removed or disturbed must be tracked in a vegetation tracking register. Rehabilitation performance. Refer to relevant SAPs.	At all times	Register	Environmental Representative / Manager
Weed, pest and disease	Biosecurity Control Plan	Entire Project Area	Monitoring and control to prevent outbreak of weeds, pests, and diseases	Pre-construction and at all times	Inspection	Environmental Representative / Manager
Materials, fuel, and waste management	Dangerous and Hazardous Goods Control Plan Waste Management Control Plan Sustainability Management Plan (SMP)	Entire Project Area	Waste to be avoided, reused, or recycled in preference to disposal	At all times, at least weekly	Inspection; monthly National Green House Emission Reporting data	Environmental Representative / Manager
		Construction waste storage locations	Correct waste classification for all waste	At all times, at least weekly	Inspection; monthly National Green House Emission Reporting data	Environmental Representative / Manager
		Entire Project Area	Waste management volumes	At all times, at least weekly	Inspection; monthly	
Hazardous materials	Dangerous and Hazardous Goods Control Plan	Entire Project Area	Observation of vehicle/plant maintenance and refuelling activities	At all times	Inspection	Environmental Representative / Manager

Environmental Issue	Document Reference	Location onsite	Monitoring Parameter	Frequency	Record	Responsibility
Water quality	Water Resources and Water Quality Control Plan	Receiving environment	Turbidity, pH, dissolved oxygen, electrical conductivity	Prior to active discharge to storm water drainage systems or marine environment (via overflow or pumping), during rainfall events when runoff from site		Environmental Representative / Manager
ASS	ASS Control Plan	Identified ASS areas	Lime validation Water quality	Within 72 hrs Daily	Laboratory results Water quality readings	Environmental Representative / Manager
Erosion and Sediment	Erosion and Sediment Control Plan	Entire Project Area	ESC devices condition and operability Weather conditions Turbidity, pH, dissolved oxygen, electrical conductivity	Weekly Daily during weather events Prior to discharges	ESC device condition Water quality readings	Environmental Representative / Manager
Air quality	Air Environment Control Plan	Entire Project Area at sensitive receptors installed at representative sites.	g/m2/month Respirable crystalline silica dust as required	Continuous dust deposition monitoring In response to a complaint	Records	Environmental Representative / Manager
Noise and Vibration	Noise and Vibration Control Plan	At selected sites with the potential for high vibration e.g. blasting / rock breaking at Aldoga Reservoirs	Peak particle velocity (mm/s) via vibration	During high vibrational activities In response to a complaint	Records	Environmental Representative / Manager Acoustic consultant
		At selected sites	Leq,15min dB(A), airborne noise	In response to a complaint	Records	Environmental Representative / Manager Acoustic consultant

Environmental Issue	Document Reference	Location onsite	Monitoring Parameter	Frequency	Record	Responsibility
Material Movement	Dangerous and Hazardous Goods Control Plan Waste Management Control Plan	Entire Project Area	Material movement	At all times, at least weekly	Waste Transport Certificate	Environmental Representative / Manager

8.4 Environmental Recording

TeamBinder, a construction project management document management system developed by InEight will be implemented for the FGP.

Records collected as part of environmental management activities will be retained by GAWB and MBJV for the legally required period of time. Environmental records include but may not be limited to:

- Site inspection checklists
- Environmental audit reports
- Monthly reports
- Training records
- Monitoring data
- Complaints and associated records of communication
- Non-conformance and incident records including investigation and close out details
- Meeting minutes.

Records of all activities for monitoring, inspections and audits will be recorded for the purpose of any condition compliance required. Environmental files will be kept onsite and made available to GAWB or external auditors upon request. This file will contain the following:

- Completed environmental checklists/reports during the construction phase
- Reports of any environmental incidents or non-conformances with the CEMP
- Internal and external environmental audit reports including audit action plans
- Annual audits regarding compliance with EPBC Act approval conditions.

8.5 Reporting

TeamBinder will be implemented for the FGP that will be able to generate dashboards and reporting.

Reporting requirements will evolve as the FGP progresses. In the early phases, emphasis is on the establishment of systems, controls, and competence of all personnel, while later the emphasis will shift to monitoring performance. When nearing completion (as applicable) the focus will be on final reports to address approval requirements.

The Environmental Management Representative/Environmental Manager is responsible for managing environmental performance reporting. The Project Manager is responsible for submitting the reports required externally.

Routine reporting requirements are summarised in Table 8-3, noting other Project / legislative reporting requirements will be relevant from time to time.

Table 8-3 Reporting Requirements

Reporting Requirement	Reporting Frequency	Responsibility
Weekly inspection checklist and reports	Weekly	Environmental Representative / Manager
Monthly Reports (including training records, monitoring data, regulator interactions)	Monthly	Project Manager
Annual Status Reports	Yearly	Environmental Representative / Manager
Project completion report	Project completion	Project Manager

Reporting Requirement	Reporting Frequency	Responsibility
Approval condition closeout report	Project completion/when required (e.g., permit closeout/surrender)	Environmental Representative / Manager
Incidents/Complaints Register	As required	Environmental Representative / Manager
Non-conformances	As required	Environmental Representative / Manager
Corrective Action Register	Monthly	Environmental Representative / Manager
Pre-clearance Reports	Monthly	Environmental Representative / Manager
Weed wash-down Register during construction	Monthly	Environmental Representative / Manager
Internal and external environmental audit reports	As completed	Environmental Representative / Manager
Sustainability data (including energy use, water use, waste generation and meeting minutes)	Monthly	Environmental Representative / Manager
Greenhouse gas emissions data	Monthly	Environmental Representative / Manager
Quantities of wastes generated and disposed	Monthly	Environmental Representative / Manager
Records of Hydrotest water quality prior to discharge and of the locations and quantities of discharge	Prior to and Monthly during commissioning	Environmental Representative / Manager
Review of the CEMP	Six-monthly, or as required.	Environmental Representative / Manager

9. INCIDENTS, NON-CONFORMANCES, COMPLAINTS AND EMERGENCIES

9.1 Incidents and Non-Conformances

All personnel must always be mindful of the provisions of the CEMP to identify and notify near misses, incidents and non-conformances to GAWB and relevant regulatory agency as required. Incidents will be managed and investigated, and reports raised, tracked, and closed out.

The cause of all incidents will be subject to an investigation, convened by the Environmental Representative / Manager to determine the root causes of the incident and to ensure that remedial/corrective action is able to be implemented to ensure a repeat of the incident is avoided.

Environmental impact is defined as the following:

- Environmental Impact may be direct or indirect
- Harm to the environment involving removal or destruction of native flora and fauna or the removal and destruction of the habitat of native flora and fauna
- Alteration of the environment to its potential or actual detriment or degradation
- Alternation of the environment to the potential or actual detriment or degradation of an environmental principle
- Alteration of the environment of a prescribed kind.

Environmental incidents and near-misses are defined as follows:

- Serious Environmental Impact can be defined as:
    - Environmental harm that – Is permanent, of high impact or on a wide scale
    - Is significant or in an area of high conservation value or special significance
    - Results in actual or potential loss, property damage or damage costs of $100,000 or more (to financial year ending 30 June 2023, after which this is increased by the consumer price index), or could result in costs of more than $100,000 for action to prevent or minimise harm and to rehabilitate and restore the environment
    - An incident or set of circumstances during or as a consequence of which, there is or is likely to be a leak, spill or other escape or deposit of a substance (liquid, solid, gas), as a result of which pollution (material environmental harm) has or is likely to occur.
- Material Environmental Impact can be defined as:
    - Environmental harm that - Is not trivial or negligible in nature, extent, or context
    - Could cause loss or damage to property of more than $10,000 but less than $100,000 (to financial year ending 30 June 2023, after which this is increased by the consumer price index)
    - Could result in costs of more than $10,000 but less than $100,000 (2022/2023) for action to prevent or minimise harm and to rehabilitate and restore the environment to its condition before the harm.
- Minor environmental incident can be defined as:
    - An environmental incident that does not result in serious or material environmental harm but does result in degradation to the receiving environment that is contained without further impact or rectified in a timely manner, at a cost less than $10,000.

- A Near-miss environmental incident is an event where environmental damage/loss/impact could have occurred but did not (i.e., Spill to impervious surface, hardstand, spoil, or bare earth (where topsoil has been stripped), less than 5L and cleaned up with no residual impact to the environment i.e., hydraulic hose burst resulting in 2L spray to asphalt.). Near-misses must be raised and discussed to drive continual improvement in environmental best practice.
- A Hazard is a source or situation that may pose a risk of harm to a person or the environment (i.e., an in-secure hydraulic hose presenting the potential for drip of a hydrocarbon onto soil, resulting in land contamination. The hazard must be raised, and a corrective action assigned. This method will capture the required data for reporting purposes.

A summary and review of incidents for the duration of the Project and for the relevant month will be included in the Monthly Report.

9.1.1 *Notification Procedure*

GAWB and MBJV parent companies, and applicable regulatory agency (where relevant) will be notified of incidents and non-conformances that trigger notification as defined in the Incident Reporting and Investigation procedure. These triggers include offsite discharges, unauthorised disturbance or destruction of fauna, flora or heritage sites and breaches and non-conformances of licences and permits issued for the FGP.

The Project Manager is responsible for notifying GAWB and parent companies of reportable incidents. Depending on the nature of the incident and/or non-compliance (and project approval), the Environmental Representative / Manager is responsible for notifying the relevant regulatory agency.

9.2 Complaints

To minimise impacts to the community during construction of the FGP, a complaints procedure will be implemented by MBJV in consultation with GAWB and with consideration of relevant approval conditions. The procedure includes:

- All complaints are responded to in a timely manner and in accordance with GAWB's policy.
- Corrective action to address any complaint is taken as soon as possible or an explanation given to the complainant.
- Adherence to GAWB and MBJV's EMS.

The complaint procedure includes:

- A 24 hour contact number for the Project will be implemented for the construction phase to provide the community and stakeholders with a channel of communication to the Project team particularly if there is a complaint.
- Information updates will be distributed to relevant stakeholders (e.g. adjacent properties) at regular intervals during construction and when disturbance is expected from a particular construction activity.
- An incidents/complaints report form (categorised as a complaint for tracking purposes) will be in place prior to the commencement of construction and will be used to record the following information:
    - Date, time, and nature of the incident/complaint
    - Contact details of the complainant – where available
    - Whether it is a repeat complaint
    - Nature of the enquiry or issue of concern
    - Record of communication with the complainant
    - The person responsible for investigating/addressing the complaint.

- The outcome of the complaint investigation and any remedial/corrective actions taken by the construction team to cease the impact.

9.3 Emergencies

MBJV has developed an Emergency Response Procedure in accordance with the CEMP, and GAWB and MBJV's EMS.

10. REVIEW AND IMPROVEMENT

10.1 CEMP Review

This CEMP will be live document, and as such, GAWB and MBJV are responsible for the updating and review of this plan. The CEMP will remain up to date with the most current information, revised and reviewed as required to maintain currency. Where non-conformances or incidents resolve findings that can be implemented as a positive change, that change should also be made in this document if relevant. The review will consider the following:

- Changes in legislative requirements (including conditions of approvals)
- Amendments to approvals and permits
- Environmental performance, findings of environmental audits and inspections
- Outcomes of regulatory agency consultation
- Outcomes of consultation with communities and resolution of complaints
- Changes in external and internal policies, standards and guidelines
- Changes in risk profile.

This CEMP will be reviewed, at a minimum, on a six-monthly basis by Project leadership. The Environmental Representative / Manager will be responsible for ensuring this is carried out. The review will ensure the continuing suitability, adequacy and effectiveness of the CEMP, and the EMS. The review will include assessing opportunities for improvement. Further the review will include:

- Progress of the implementation of this CEMP
- Effectiveness of this CEMP
- Adequacy of resources
- Effectiveness of training and training requirements
- Results of inspections and audits
- Critical non-conformances or repeated non-conformances
- Overall performance against environmental compliance obligations
- Organisational changes, changes to legislation and other obligations.

Records of the review will be recorded and any actions arising will be recorded in the corrective actions register.

10.2 Document Control

This CEMP is a controlled document, and updates to this document will be provided an updated Revision number including the date and lodged in TeamBinder to ensure the most up to date document is used.

This CEMP will also have appropriate controls included authored, reviewed and approved by suitably qualified persons under a delegation of authority protocols.

10.3 Management of Change

Management of change will be undertaken in line with the MBJV Change Management Procedure.

- Environment changes could introduce circumstances that lead to:
- Uncertainty amongst workers and sub-contractors
- Lack of confidence amongst workers
- Increased potential for unidentified hazards leading to increased risk
- Unplanned events and short cuts in work practices
- Fatigue/workplace stresses
- Potential breaches of licence and permit of contract conditions.

The key aspects to the change management procedures are:

- Identifying changes and their potential impact
- Assessing the change using a risk-based approach
- Stopping work where applicable
- Utilising existing risk management procedures
- Involving workers and managers according to the level of risk
- Establishing control measures
- Documenting necessary change controls
- Documenting further actions
- Monitoring new change controls
- Reviewing new change controls.

Appendix A Erosion and Sediment Control Management Sub-Plan

McConnell Dowell Constructors (Aust) Pty Ltd and B.M.D. Constructions Pty Ltd Joint Venture (MBJV)

Erosion & Sediment Control Management Sub-Plan

Doc No: PRJ-ENV-PLN007-GEN-1151
Client: Gladstone Area Water Board (GAWB)
Project: Fitzroy to Gladstone Pipeline Project
Location: Rockhampton to Gladstone, QLD
Project No: 1151

MMS ID: HSEQ-HS-TEM017-GEN-1151

Commercial-in-Confidence

Revision History

Rev	Date	Details	Author	Reviewer	Approver
A	21 Feb 23	Draft for Construction Use	K. Wilson		M. Barrows
B	17 Mar 23	Issued for Principal Review	B. Hooper	P. Modak	M. Barrows
C	23 Mar 23	Issued for Principal Review 2	B. Hooper	M. O'Grady	P. Modak
0	05 Apr 23	Issued for Use	B. Hooper	P. Modak	M. Barrows

Contents

1. Introduction

The Erosion and Sediment Control Management Sub-Plan (ESCMP) is one component of the MCD BMD Joint Venture's (MBJV) Construction Environmental Management Plan (CEMP) for the Gladstone to Fitzroy Pipeline Project (hereafter referred to as "the Project"). Section 2.1 of the CEMP provides further background and detailed description of the Project.

The ESCMP describes how erosion and sediment control will be managed and any potential impact will be minimised during construction. This ESCMP has been prepared with consideration of Project requirements, and to address the legal and other requirements outlined in Section 2.

1.1. Plan Purpose

The purpose of this ESCMP is to:

- Describe how MBJV 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 and/or licence and contractual requirements.
- Meet the requirements set out in the GAWB CEMP Section 5.4 Erosion and Sediment Control.

1.2. 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 after a site soil assessment undertaken by Field Environmental Personnel prior to construction.** • **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. • Erosion and Sediment Control Plans (ESCPs) will be developed to support this Plan. This Plan and ESCPs implementation will be in line with the International Erosion and Sediment Association, Best Practice Erosion and Sediment Control, 2008 • RPEQ certified ESCPs, where required. • No erosion or sedimentation of the pipeline corridor occurring post construction and rehabilitation. • No erosion or sedimentation of waterways. • No complaints related to water quality or erosion from the community.

1.3. Plan Scope

This plan applies to all works associated with the Project during Pre-construction and Construction.

1.4. Interface with other documents

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

2. Legal and Other Compliance Requirements

Legislation

- **Environmental Protection Act 1994**
- **Environmental Protection Regulation 2019**
- **Environmental Protection (Water and Wetland Biodiversity) Policy 2019**
- **Fisheries Act 1994**
- **Environmental Protection (Water) Policy 2009: Fitzroy River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Fitzroy River Sub-basin (DES, 2011)**
- **Environmental Protection (Water) Policy 2009: Curtis Island, Calliope River and Boyne River Basins Environmental Values and Water Quality Objectives (DES, 2014)**
- **Development requirements or guidelines:**
- **Riverine protection permit exemption requirements WSS/2013/726 Version 2.01 (former Department of Natural Resources, Mines and Energy, 2019)**
- **Accepted development requirements for operational work that is constructing or raising waterway barrier works (Department of Agriculture and Fisheries, 2018).**
- **Best Practice Erosion and Sediment Control (IECA, 2008).**
- **Permits, approvals and licence conditions:**
- **Coordinator-General's Evaluation Report on the Environmental Impact Statement, 2010**
- **Material Change of Use Development Approvals**
- **Operational Works Development Approvals**

Australian Standards and Industry Guides

- **IECA Best Practice Erosion and Sediment Control Guidelines**
- **Riverine protection permit exemption requirements WSS/2013/726 Version 2.01 (former Department of Natural Resources, Mines and Energy, 2019)**
- **IECA Best Practice Erosion and Sediment Control Guidelines - Appendix P - Land-based pipeline construction**

Project Specific Documents

- **Site Specific Erosion and Sediment Control Plans (ESCP) such as for sensitive environmental areas. facilities, accommodation camps, laydown areas etc.**
- **Special Area Plans (Base, 2022)**
- **Species Management Program (Base, 2022)**

3. Context

3.1. 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 a number of 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.

3.2. 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; and
- 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	Potential for discharge of sediment-laden runoff into waterways or drainage systems. 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.

Proposed Activity	Potential Impacts/Risks
	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.
Post construction and rehabilitation	Increased erosion due to exposure of erodible subsoils and previously disturbed areas. Potential offsite sedimentation impacts. Potential for discharge of sediment-laden runoff into waterways or drainage systems.

4. Roles and Responsibilities

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 ESCMP 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 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 Project Manager is responsible for overseeing implementation of this Sub-plan and overall CEMP. Refer to section 5.4 of the CEMP for broader environmental management roles and responsibilities associated with the Project.

5. Implementation Strategy

5.1. Erosion and Sediment Control Plans

For the Project, Appropriately Qualified Persons (AQPs) and Certified Professional in Erosion and Sediment Control (CPESCs) will be used to develop ESCPs.

Detailed ESCPs have been provided in Appendix A, and have covered the following aspects:

- Different stages of construction (e.g. site establishment - clearing, stripping and stockpiling of topsoil; earthworks; drainage).
- Various work areas (e.g. construction compounds; facilities; sediment basins).
- Waterway crossings which employ a reduced right of way (ROW) to minimise environmental impacts.

Additional ESCPs 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
- 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.

5.2. 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	ESC management strategy will focus on prevention of runoff contamination rather than treatment and will include: 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. 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 the pipeline ROW and 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.	During construction	Environment Team Superintendent Supervisors
02	Intent of this 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
03	All personnel will be made aware that the majority of the ROW has dispersive soils prone to erosion during the Induction presentation.	Prior to construction	Environment Team
04	Requirements relating to this Plan and any ESCPs will be presented and revisited frequently through Toolbox and Prestart meetings.	During construction	Environment Team
05	The construction area and access routes will be clearly delineated with signage to prevent disturbance to areas outside the construction footprint. The Project induction will inform the workforce of the need to adhere to approved access tracks and roads.	Prior to construction	Environment Team
06	All necessary sediment and erosion control devices will in place prior to the commencement of works at a site.	During construction	Environment Team Superintendent Supervisors
07	All reasonably practicable erosion and sediment controls will be installed and appropriately maintained to minimise any water pollution.	During construction	Environment Team Superintendent Supervisors
08	This Plan will be supported by ESCPs and 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 at these locations	Environment Team Superintendent

<table>
<tr><th>Reference</th><th>Mitigation and Management Actions</th><th>Timeframe/s</th><th>Responsibility</th></tr>
<tr><td></td><td>Appendix A of this Plan incorporates the methodologies undertaken for clear and grade activities during construction on the ROW and at waterways.
A number of trenched watercourses crossings and one other location have been identified as requiring a reduction of clearing width to minimise impacts upon the species habitat.
These are outlined in the table below and will use D05, D06 and D07 drawings as the required ESCPs:
<table>
<tr><th>Number</th><th>KP</th><th>Name</th><th>Lot Number</th><th>Species</th></tr>
<tr><td>1</td><td>54700</td><td>Unnamed Watercourse</td><td>Lot 3 on RP601795</td><td>Marine Plants</td></tr>
<tr><td>2</td><td>55600</td><td>Unnamed Watercourse</td><td>Lot 3 on RP601795</td><td>Marine Plants</td></tr>
<tr><td>3</td><td>56500</td><td>Inkerman Creek</td><td>Lot 1 on AP2418</td><td>Marine Plants</td></tr>
<tr><td>4</td><td>56900</td><td>Unnamed Watercourse</td><td>Lot 68 on DS141</td><td>Yellow Chat</td></tr>
<tr><td>5</td><td>57500</td><td>Unnamed Watercourse</td><td>Lot 69 on DS141</td><td>Yellow Chat</td></tr>
<tr><td>6</td><td>58300</td><td>Unnamed Watercourse</td><td>Lot 93 on DS611</td><td>Yellow Chat</td></tr>
<tr><td>7</td><td>59300</td><td>Unnamed Watercourse</td><td>Lot 95 on DS186</td><td>Yellow Chat</td></tr>
<tr><td>8</td><td>61100</td><td>Unnamed Watercourse</td><td>Lot 100 on DS185</td><td>Yellow Chat</td></tr>
<tr><td>9</td><td>62400</td><td>Unnamed Watercourse</td><td>Lot 102 on DS185</td><td>Yellow Chat</td></tr>
<tr><td>10</td><td>63400</td><td>Unnamed Watercourse</td><td>Lot 84 on DS185</td><td>Yellow Chat</td></tr>
<tr><td>11</td><td>64600</td><td>Unnamed Watercourse</td><td>Lot 85 on DS185</td><td>Yellow Chat</td></tr>
<tr><td>12</td><td>64600</td><td>Unnamed Watercourse</td><td>Lot A on SP226062</td><td>Yellow Chat/Marine Plant</td></tr>
<tr><td>13</td><td>68700</td><td>Unnamed Watercourse</td><td>Lot C on SP226064</td><td>Yellow Chat</td></tr>
<tr><td>14</td><td>59700-60250</td><td>Brigalow Habitat</td><td>Lot 98 on DS186</td><td>Brigalow</td></tr>
<tr><td>15</td><td>68700</td><td>Pelican Creek</td><td>Lot 1543 on DS588</td><td>Yellow Chat</td></tr>
<tr><td>16</td><td>72050</td><td>Horrigan Creek</td><td>Lot 167 on CP859402</td><td>Marine Plants</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>09</td><td>This Plan and ESCPs will to be reviewed at various stages of works including the following milestones:
• At the finish of all initial clearing and grubbing works</td><td>During construction</td><td>Environment Team Superintendent</td></tr>
</table>

Reference	Mitigation and Management Actions	Timeframe/s	Responsibility
	• At the commencement and finish of earthworks • Following rehabilitation.		Supervisors
10	Temporary drains or bunds will be constructed where necessary to direct run-off and any overland flow from upslope of excavations, away from the construction footprint.	During construction	Superintendent Supervisors
11	In potentially dispersive soils to be retained for re-use on site, treatment with the addition of lime or gypsum at a rate of 2.5 kg/m³ may be used. Topsoil of local origin used near waterways will be treated promptly if to be left exposed for more than 21 days or if heavy rainfall above 20mm in a 24-hour period is forecast by the BOM Qld.	During construction	Environment Team Superintendent
12	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
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. Topsoil stripping, typically 100 mm, will occur where depths of topsoil are apparent.	During construction	Superintendent Supervisors
14	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
15	Sediment and dust loss from stockpiles will be minimised by stormwater flow diversions around stockpiles, stabilisation or covering of the stockpile surface, and downstream sediment containment devices where run-off is expected. Sediment fencing may be installed around some stockpiles depending upon duration of exposure. Any topsoil stockpiles left for more than 3 months will have will stabilised by appropriate methods that minimise soil losses such as binder, self-seeding or other.	During construction	Environment Team Superintendent Supervisors
16	Topsoil and subsoil piles excavated from waterways or adjacent to waterways will be placed at least 10m from the top of bank on either side of each waterway with appropriate sediment controls installed during waterway works until reinstatement.	During construction	Environment Team Superintendent Supervisors
17	Wherever possible stormwater collected during construction works will be utilised during onsite dust suppression activities.	During construction	Superintendent Supervisors
18	Discharge water will be checked for visual oil presence, ASS leachate, pH and turbidity prior to discharge to a filtering device and release to the natural environment off the ROW.	During construction	Environment Team Supervisors

Reference	Mitigation and Management Actions	Timeframe/s	Responsibility
19	Any sediment basins used during construction will be designed and installed in accordance with the IESCA guidelines.	During construction	Environment Team Superintendent Supervisors
20	During grading and trenching in the ROW, topsoil and subsoil will be stockpiled separately and topsoil later reused for restoration of the ROW. Topsoil stripping, typically 100 mm, will occur where depths of topsoil are apparent.	During construction	Environment Team Superintendent Supervisors
21	Temporary drains or bunds will be constructed where necessary to direct run-off and any overland flow from upslope of excavations, away from the construction footprint.	During construction	Superintendent Supervisors
22	Drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) and drains and depressions must be designed and constructed in accordance with relevant DAF Waterway Barrier Guidelines.	During construction	Environment Team Superintendent Supervisors
23	Minimise duration and area of disturbance within watercourses where possible	During construction	Environment Team Superintendent Supervisors
24	Reinstatement and rehabilitation is to occur progressively and as part of the completion of each construction stage.	During construction	Environment Team Superintendent Supervisors
25	Backfill will be machine compacted to reduce the risk of surface erosion and trench subsidence post construction and rehabilitation.	During construction	Superintendent Supervisors
26	ESC will be maintained at any sites where there is exposed soil (i.e. after construction is completed and before rehabilitation measures are established and deemed to be effective).	During construction and post rehabilitation	Superintendent Supervisors
26	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
28	Rain gauges will be monitored at multiple locations on the Project.	During construction	Environment Team

Reference	Mitigation and Management Actions	Timeframe/s	Responsibility
29	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 a runoff-producing rainfall event • Post Wet Weather Event Checklist	During construction	Environment Team Superintendent Supervisors
30	Water quality will be managed and monitored according to the Surface and Groundwater Management Sub-plan.	During construction	Environment Team
31	On-going visual checks of ESC and water quality 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
32	Sediment control devices will be checked regularly during weekly inspections and daily by supervisors if works are present. They will be emptied as soon as reasonably practicable after rainfall events if required.	During construction	Environment Team Supervisors
33	Repairs or maintenance to ESC will be completed within 24 hours of directive, or immediately where rainfall is imminent (as per BOM forecast for area).	During construction	Superintendent Supervisors
34	Erosion, sediment, and drainage controls to be regularly maintained to ensure at least 70% capacity at all times.	During construction	Superintendent Supervisors
35	Accumulated sediment from erosion and sediment controls will be cleaned out as soon as possible and at a minimum: • Sediment basins – when the settled sediment exceeds the volume of the sediment storage zone • Other devises – when the capacity of the devise falls below 75%.	During construction for facilities	Environment Team Supervisors
36	All ESC non-conformances or actions will be captured in the Corrective Actions Register (CAR) and tracked in this system. The monthly environmental and sustainability CAR's will be reported, actioned, monitored and tracked in the CAR register for ESC.	During construction	Environment Team Superintendent

Reference	Mitigation and Management Actions	Timeframe/s	Responsibility
37	Site Facility work areas (Intake structure, Alton Downs Water Treatment Plant and Aldoga reservoirs) will have standalone, bespoke ESC plans developed prior to construction starting. The plans will be developed by a Suitably Qualified professional to current best practice standards. All plans will be implemented progressively as site works progressive and prior to any rainfall occurring.	Prior to Construction starting.	Environment Team Superintendent

6. Performance Evaluation

6.1. 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 ESCs, 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
- Tracking against ESC management objectives and tracking against these.

Environmental records are to be kept on the Project SharePoint system and be made available to the GAWB or external auditors upon request. This SharePoint file/folder will contain the following:

- Completed environmental checklists/reports during the construction phase
- Completed environmental checklists/reports during the operational phase
- Reports of any environmental incidents or non-conformances with the CEMP
- Internal and external environmental audit results.

Failures or non-conformances of the ESCPs will be reported as required as per the CEMP reporting requirements. Events outside of the designed capacity of the ESCP should also be reported if erosion and sedimentation has had an offsite impact.

6.2. Corrective Actions

Following any non-compliance with this Plan the following actions will be undertaken:

- Document and track the non-compliance in the (CAR) and tracked in this system. CARs will be reported, actioned, monitored and tracked.
- Review and update the ESCPs.
- Review the ESCs.
- Review the procedures to maintain the controls.
- MBJV will notify GAWB of any non-conformances and corrective actions that will be implemented to address the non-conformance.

7. Review and Improvement

7.1. Review

This Plan and ESCPs will 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 and following rehabilitation.

7.2. 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 accordance with the CEMP requirements.

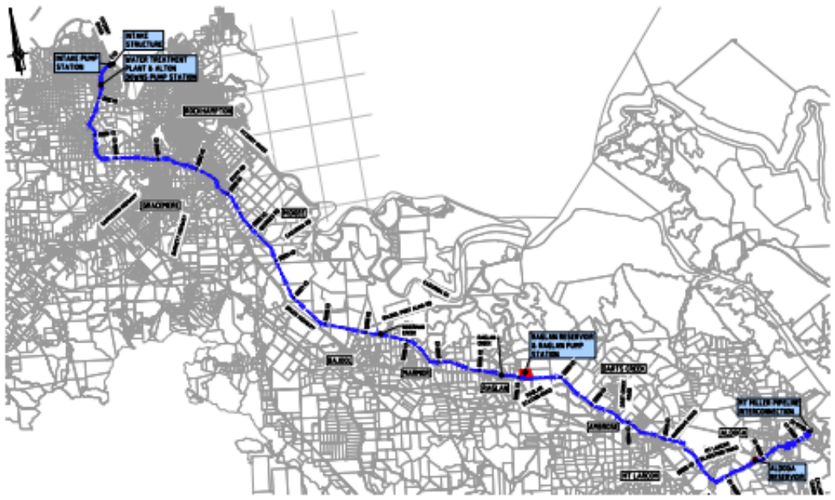
In the event of a complaint, non-compliance or incident, an investigation will be undertaken to determine the cause of the problem and will be led by the Project Manager. Any identified impacts on erosion and sediment control management, the identified source and corrective actions are to be documented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

7.3. Document Updates

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

Appendix A - Erosion and Sediment Control Plans

EROSION AND SEDIMENT CONTROL DRAWINGS
GLADSTONE - FITZROY PIPELINE



CLIENT - GLADSTONE AREA WATER BOARD

DRAWING LIST:
D00 - COVER SHEET
D01 - LAYOUT PLAN
D02 - TYPICAL DETAIL - LOW RISK PIPELAYING
D03 - TYPICAL DETAIL - LOW RISK PIPELAYING
D04 - TYPICAL DETAIL - ON-GRADE CLEAN WATER CROSSING
D05 - RESTRICTED WIDTH WATERWAY CROSSINGS
D06 - RESTRICTED WIDTH WATERWAY CROSSINGS
D07 - RESTRICTED WIDTH WATERWAY CROSSINGS
D08 - TYPE 2 SEDIMENT CONTROL OPTIONS
D09 - TYPE 2 SEDIMENT CONTROL OPTIONS
D10 - ROCK FILTER DAM CALCULATIONS AND SIZING
D11 - EXCAVATED SEDIMENT TRAP CALCULATIONS AND SIZING
D12 - DIVERSION BUND / TOPSOIL WINDROW SIZING
D13 - CLEAN WATER FLOW-THROUGH DETAIL
D14 - TYPICAL DETAIL - TEMPORARY CROSSINGS
D15 - TYPICAL DETAIL - STOCKPILES

REVISION	DESCRIPTION	APPROVED BY	DATE
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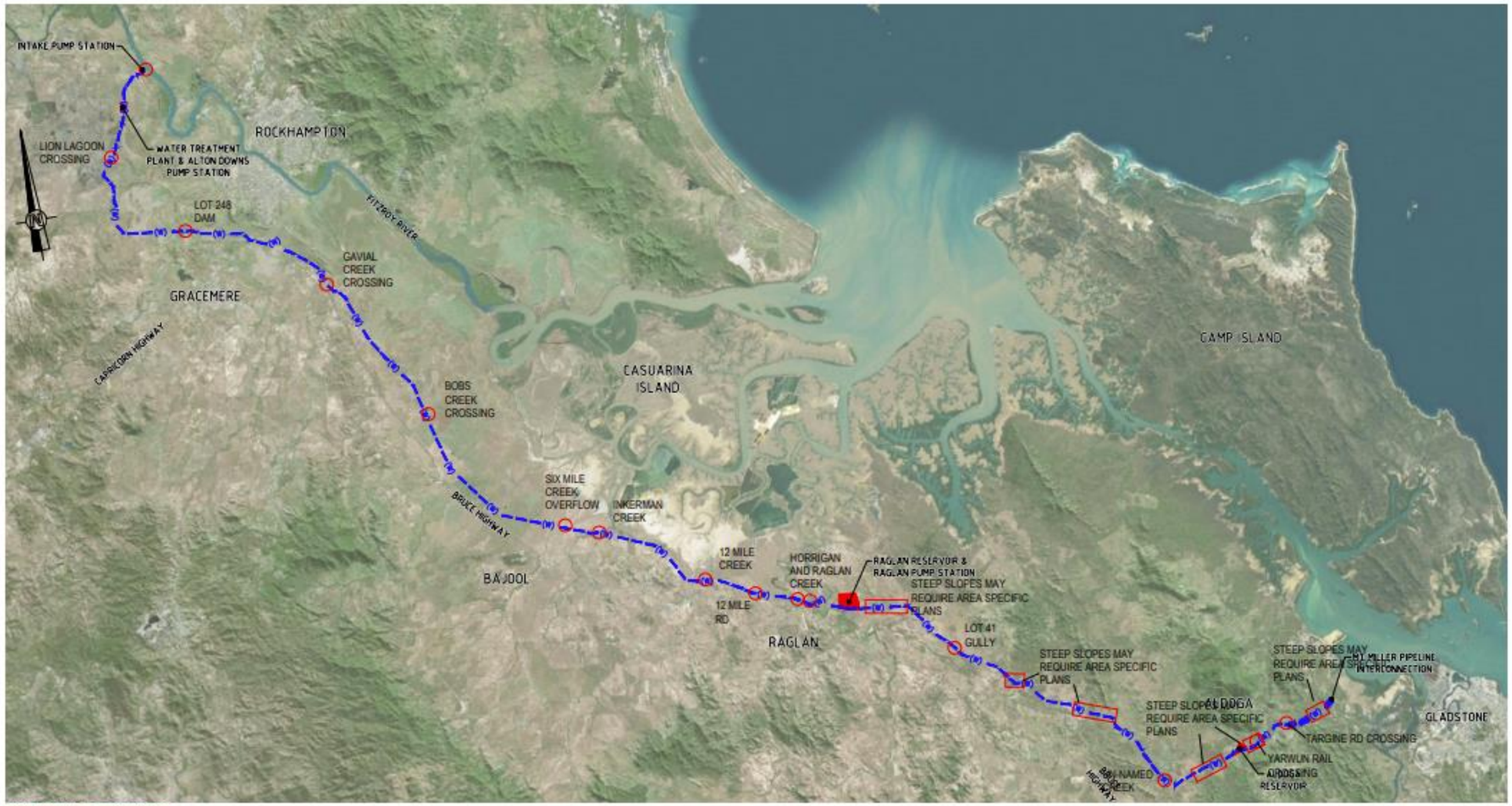
DESIGNED: TB
DATE: 17/03/23
RPEQ / SIGNATURE (IF REQUIRED):

PROJECT: GLADSTONE - FITZROY PIPELINE PROJECT
DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN
COVER PAGE
PROJECT No: 22-0075
DRAWING No: D00
REVISION: A



NOTE: STOCKPILE LOCATIONS NOT MARKED

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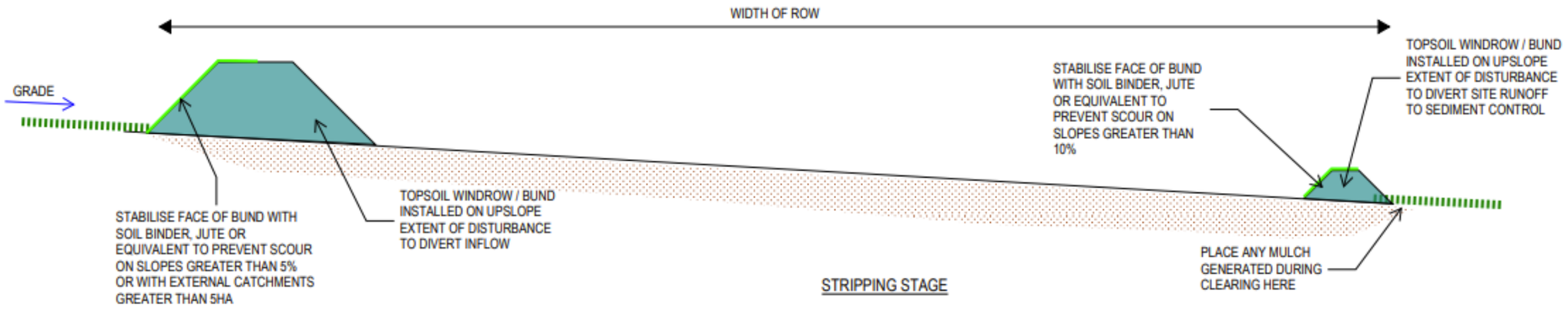
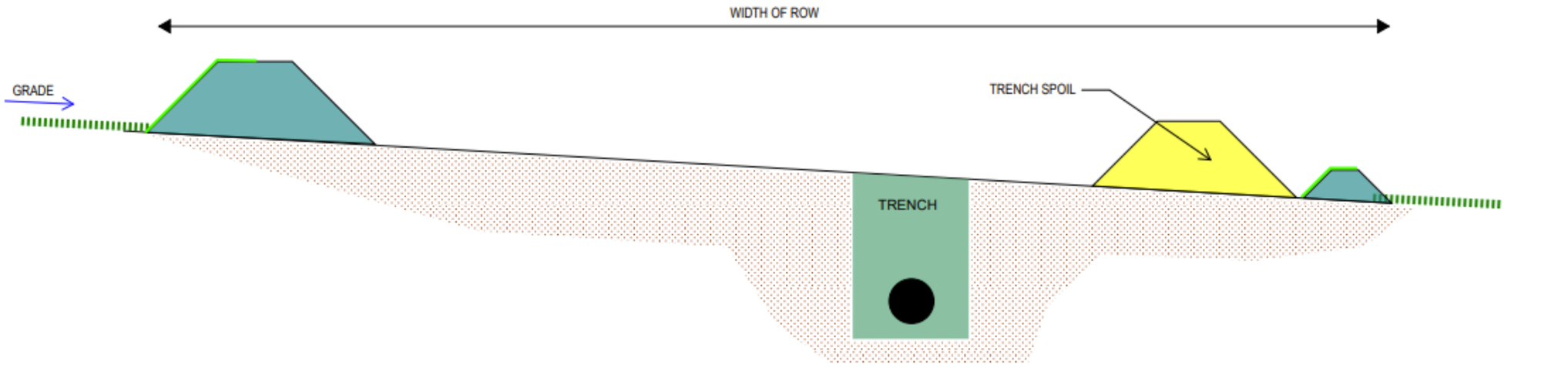
PROJECT: GLADSTONE - FITZROY PIPELINE PROJECT

DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN LAYOUT PLAN

PROJECT No.	DRAWING No.	REVISION
22-0075	D01	A



STRIPPING STAGE



PIPELAYING STAGE

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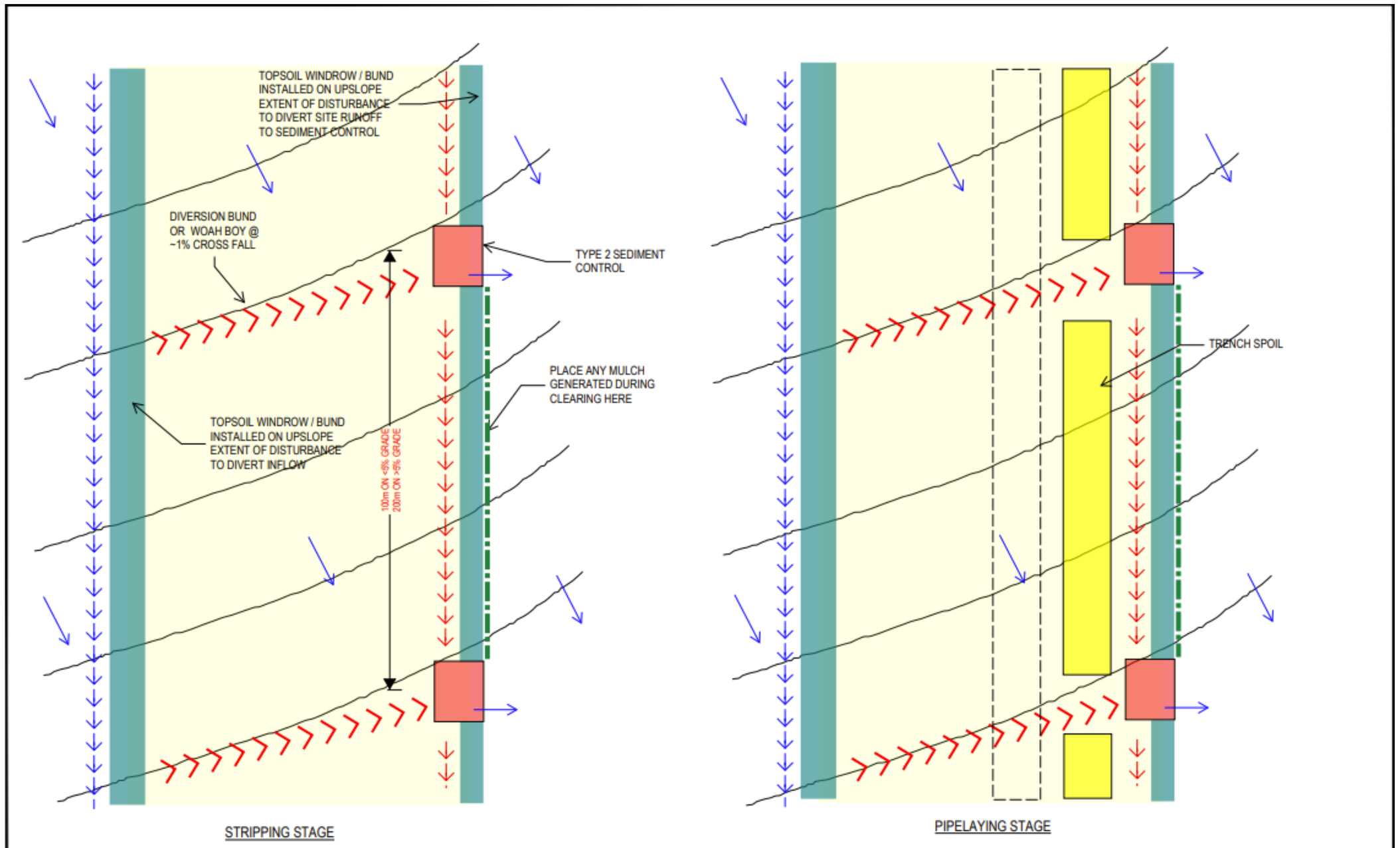
PROJECT	
GLADSTONE - FITZROY PIPELINE PROJECT	
DRAWING TITLE	
EROSION AND SEDIMENT CONTROL PLAN TYPICAL DETAIL - LOW RISK PIPELAYING	
PROJECT No.	DRAWING No. / REVISION
22-0075	D02 / A



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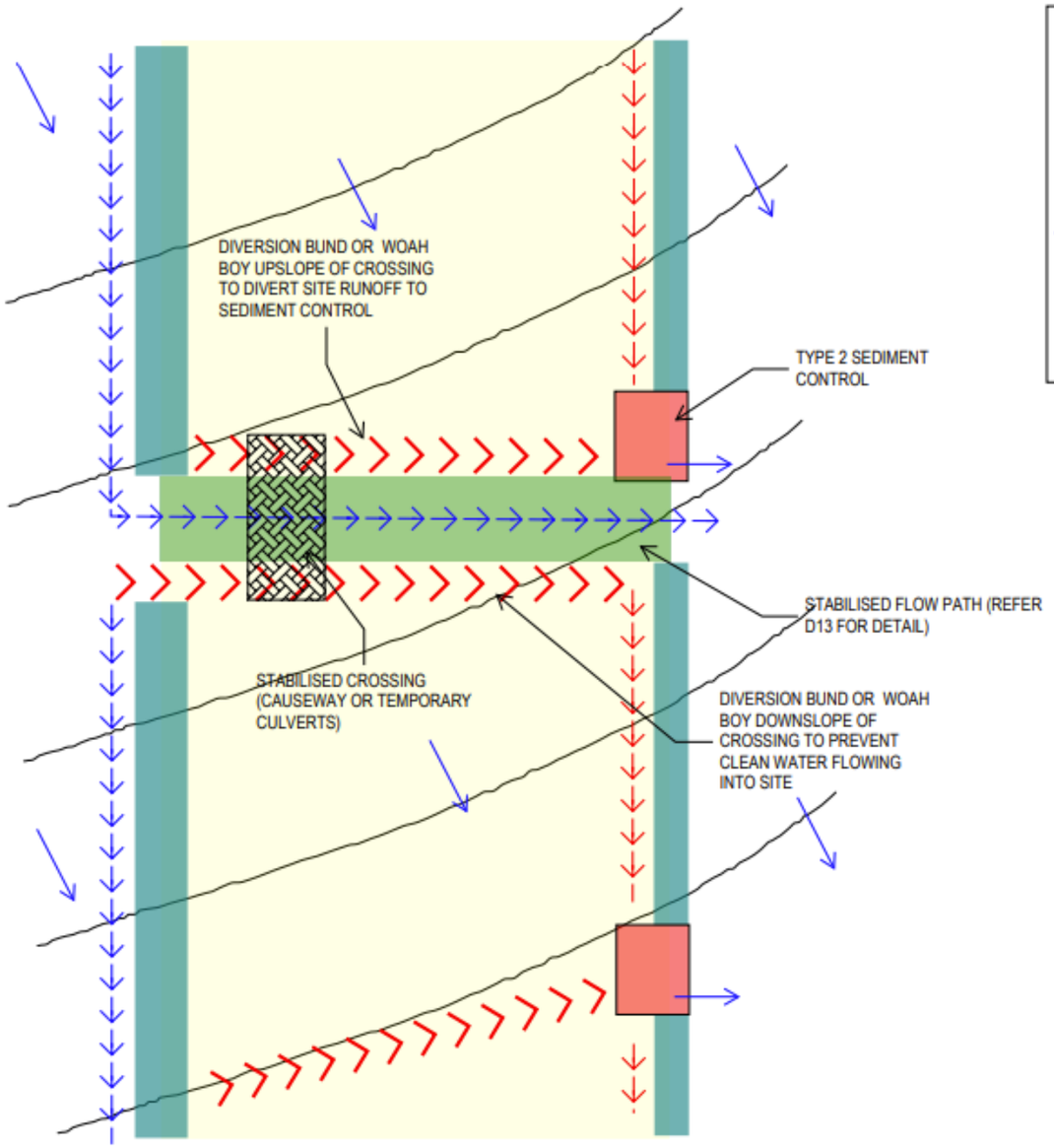
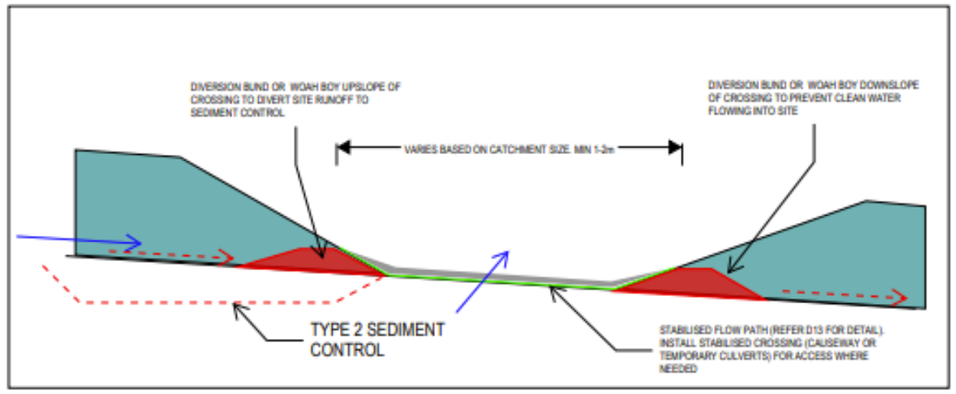
PROJECT: GLADSTONE - FITZROY PIPELINE PROJECT

DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN
TYPICAL DETAIL - LOW RISK PIPELAYING

PROJECT No.	DRAWING No.	REVISION
22-0075	D03	A



ON GRADE PIPELINE - CLEAN WATER CROSSING PLAN



ON GRADE PIPELINE - CLEAN WATER CROSSING SECTION

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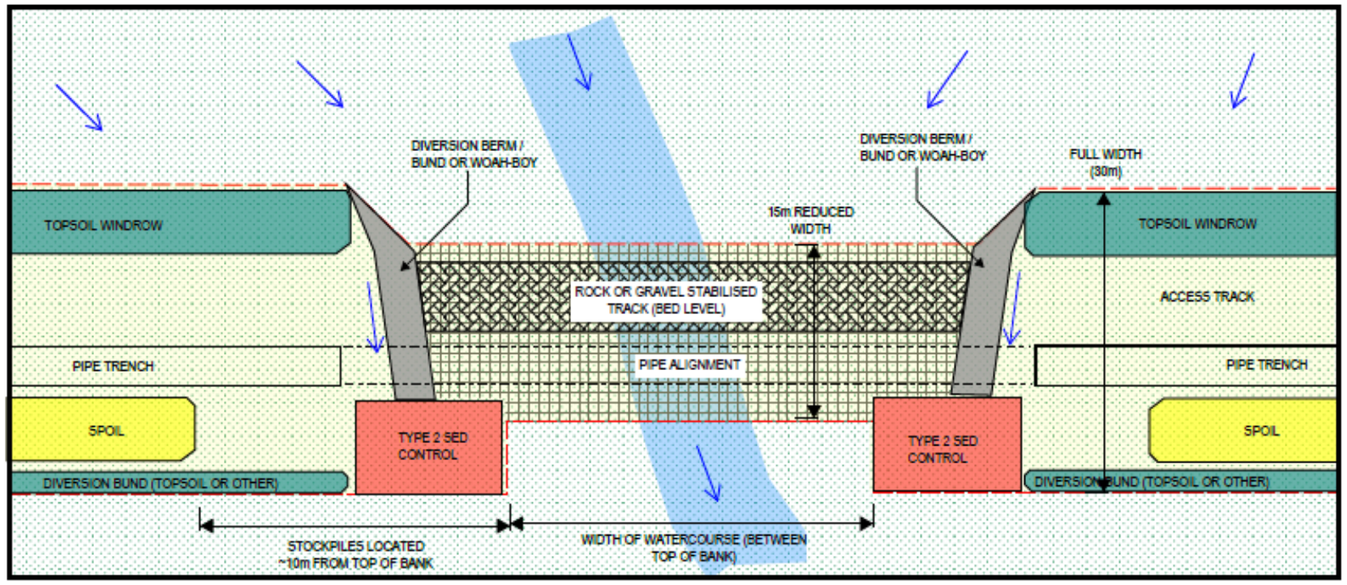
PROJECT: GLADSTONE - FITZROY PIPELINE PROJECT
DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN
TYPICAL DETAIL - ON-GRADE CW CROSSING
PROJECT No: 22-0075 | DRAWING No: D04 | REVISION: A

RESTRICTED WIDTH CROSSING



NOTES:

APPLICATION: USE FOR DRY FLOW PATH CROSSINGS WHERE THE RISK OF INFLOW CAN BE MANAGED BY RAINFALL FORECAST BASED RISK ASSESSMENT. TO BE APPLIED AT CROSSINGS WHERE ROW WIDTH RESTRICTIONS APPLY

1) STRIPPING AND PIPELAYING TO EXTEND TO THE TOP OF WATERWAY BANKS. INSTALL DRAINAGE AND SEDIMENT CONTROLS ACCORDING TO STANDARD DETAIL PROVIDED FOR PIPELAYING
2) RETAIN EXISTING GROUND COVER OR PLACE JUTE, OR CLEAN ROCK THROUGH THE WATERWAY BETWEEN TOP OF BANKS
3) FORM TRAFFICABLE BUND, WOAH BOY OR BERM AT TOP OF BANK TO DIVERT SITE RUNOFF TO THE SEDIMENT CONTROLS.
4) ENSURE SPOIL OR OTHER STOCKPILES ARE NOT LOCATED WITHIN 10m OF TOP OF BANK
5) THE TOPSOIL WINDROW MUST EXTEND UP TO THE WATERWAY TO DIVERT CLEAN WATER PAST THE SITE SEDIMENT CONTROLS
6) COMPLETE PIPELAYING THROUGH THE WATERWAY DURING A FORECAST PERIOD OF DRY WEATHER SUCH THAT STRIPPING, EXCAVATION, BACKFILL AND RE-STABILISATION CAN BE COMPLETED PRIOR TO ANY ANTICIPATED INFLOW. OTHERWISE, ADOPT STANDARD DETAIL PROVIDED FOR WET CROSSINGS.

WATER QUALITY OBJECTIVES:

CHANGE (UPSTREAM / DOWNSTREAM)
- SUSPENDED SOLIDS – 5MG/L OR 10% INCREASE (WHICHEVER IS GREATEST)
- PH – 1.0PH UNIT CHANGE
- DISSOLVED OXYGEN – 10% DECREASE

FOR SPECIAL AREA PLAN LOCATIONS OR AREAS NEAR CONFIRMED YELLOW CHAT HABITAT, THAT IS, CONSTRUCTION WORKS IN AREAS ALONG THE PIPELINE ALIGNMENT BETWEEN THE PORT ALMA RAILWAY AND HORRIGAN CREEK:

- CONSTRUCTION WORKS WILL BE UNDERTAKEN DURING THE PERIOD BETWEEN MAY AND SEPTEMBER INCLUSIVE, WHERE POSSIBLE.
- FOR THOSE CROSSINGS NOT BEING CONSTRUCTED BY TRENCHLESS METHODS, WIDTH OF DISTURBANCE FOR EACH WATERCOURSE CROSSING WILL BE REDUCED TO 15 M.

CREEK WATER LEVELS WILL BE MONITORED DURING CREEK CROSSING CONSTRUCTION TO ALLOW EARLY IDENTIFICATION OF CHANGED WATER LEVELS THAT MAY AFFECT YELLOW CHAT HABITAT AND APPROPRIATE CORRECTIVE ACTION TO BE UNDERTAKEN.

TOPO.

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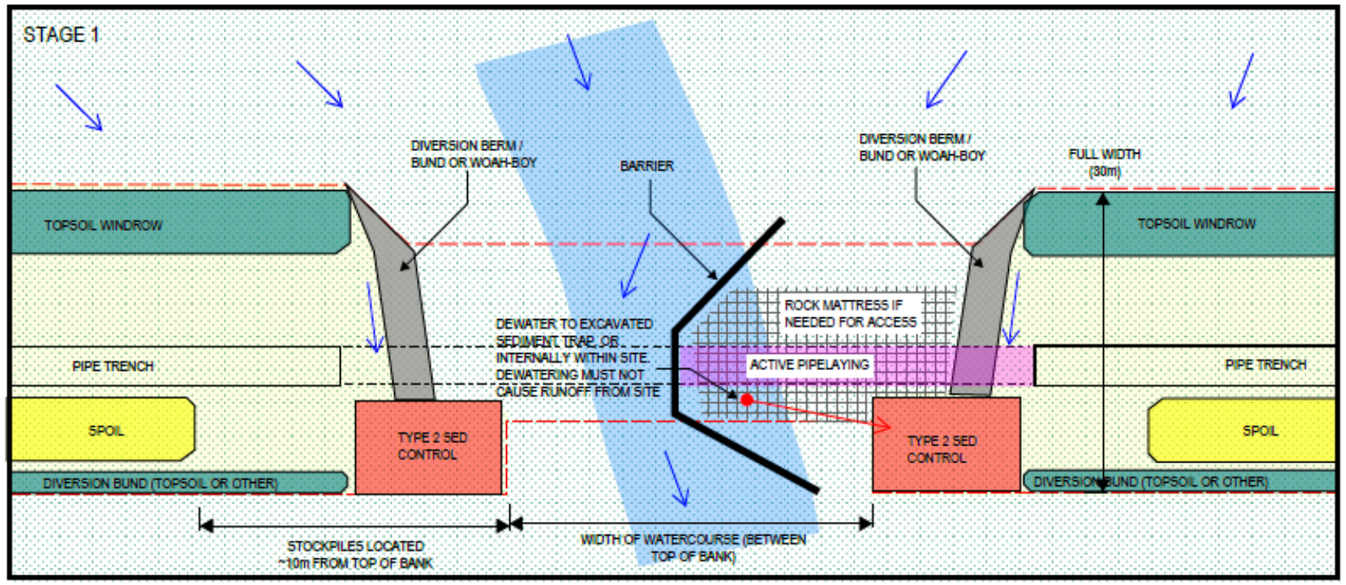
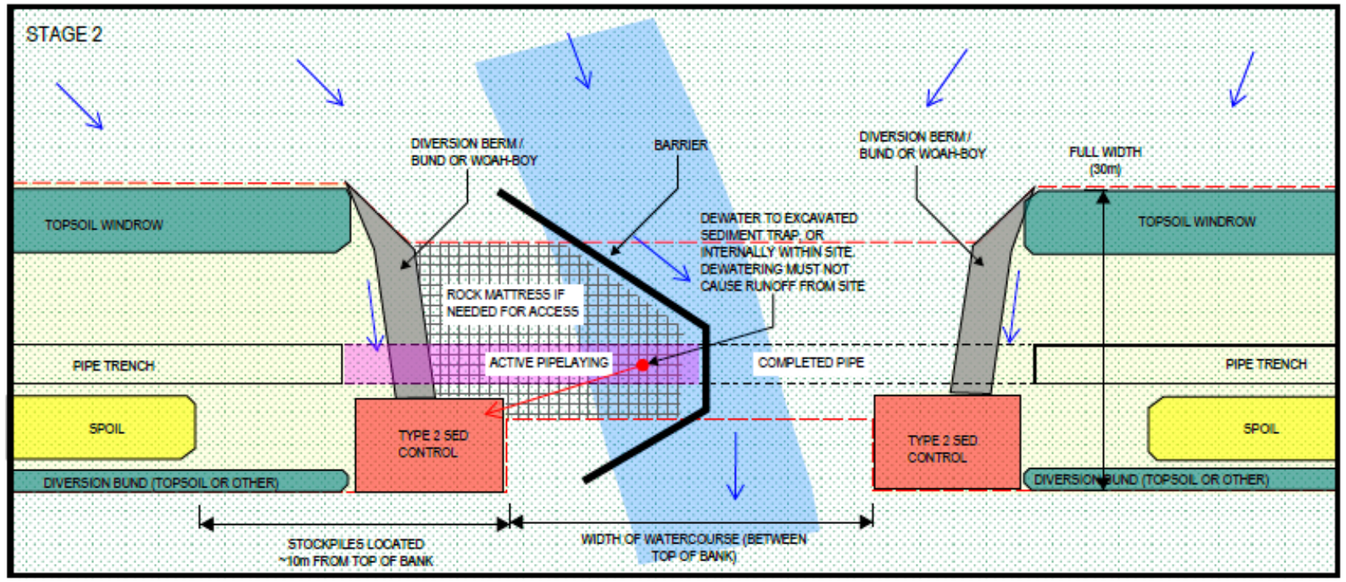
SPECIFICATION (IF REQUIRED):

PROJECT: GLADSTONE - FITZROY PIPELINE PROJECT
DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN RESTRICTED WIDTH WATERWAY CROSSINGS
PROJECT No: 22-0075 | DRAWING No: D05 | REVISION: A

RESTRICTED WIDTH CROSSING OPTION 1 - FLOW DIVERSION





NOTES:

APPLICATION: USE FOR WIDE (WET) CROSSING WITH SIGNIFICANT FLOW RATE NOT SUITABLE FOR BYPASS PUMPING. TO BE APPLIED AT CROSSINGS WHERE ROW WIDTH RESTRICTIONS APPLY

1) STRIPPING AND PIPELAYING TO EXTEND TO THE TOP OF WATERWAY BANKS. INSTALL DRAINAGE AND SEDIMENT CONTROLS ACCORDING TO STANDARD DETAIL PROVIDED FOR PIPELAYING
2) RETAIN EXISTING GROUND COVER OR PLACE JUTE, OR CLEAN ROCK THROUGH THE WATERWAY BETWEEN TOP OF BANKS
3) FORM TRAFFICABLE BUND, WOAH BOY OR BERM AT TOP OF BANK TO DIVERT SITE RUNOFF TO THE SEDIMENT CONTROLS.
4) ENSURE SPOIL OR OTHER STOCKPILES ARE NOT LOCATED WITHIN 10m OF TOP OF BANK
5) THE TOPSOIL WINDROW MUST EXTEND UP TO THE WATERWAY TO DIVERT CLEAN WATER PAST THE SITE SEDIMENT CONTROLS
6) INSTALL A BARRIER PART-WAY THROUGH THE WATERCOURSE USING SHEET-PILE, SHORING BOX, PLY OR SIMILAR TO ISOLATE HALF THE PIPELINE FROM INFLOW
7) FORM ROCK MATTRESS IF NEEDED TO ACCESS THE WORK AREA
8) EXCAVATE, BACKFILL AND RE-STABILISE THE ISOLATED PORTION OF TRENCHING
9) RELOCATE THE TEMPORARY BARRIER TO THE OTHER BANK AND REPEAT THE PROCESS FOR THE REMAINING PORTION OF PIPE

WATER QUALITY OBJECTIVES:

CHANGE (UPSTREAM / DOWNSTREAM)
- SUSPENDED SOLIDS – 5MG/L OR 10% INCREASE (WHICHEVER IS GREATEST)
- PH – 1.0PH UNIT CHANGE
- DISSOLVED OXYGEN – 10% DECREASE

FOR SPECIAL AREA PLAN LOCATIONS OR AREAS NEAR CONFIRMED YELLOW CHAT HABITAT, THAT IS, CONSTRUCTION WORKS IN AREAS ALONG THE PIPELINE ALIGNMENT BETWEEN THE PORT ALMA RAILWAY AND HORRIGAN CREEK:

- CONSTRUCTION WORKS WILL BE UNDERTAKEN DURING THE PERIOD BETWEEN MAY AND SEPTEMBER INCLUSIVE, WHERE POSSIBLE.
- FOR THOSE CROSSINGS NOT BEING CONSTRUCTED BY TRENCHLESS METHODS, WIDTH OF DISTURBANCE FOR EACH WATERCOURSE CROSSING WILL BE REDUCED TO 15 M. CREEK WATER LEVELS WILL BE MONITORED DURING CREEK CROSSING CONSTRUCTION TO ALLOW EARLY IDENTIFICATION OF CHANGED WATER LEVELS THAT MAY AFFECT YELLOW CHAT HABITAT AND APPROPRIATE CORRECTIVE ACTION TO BE UNDERTAKEN.

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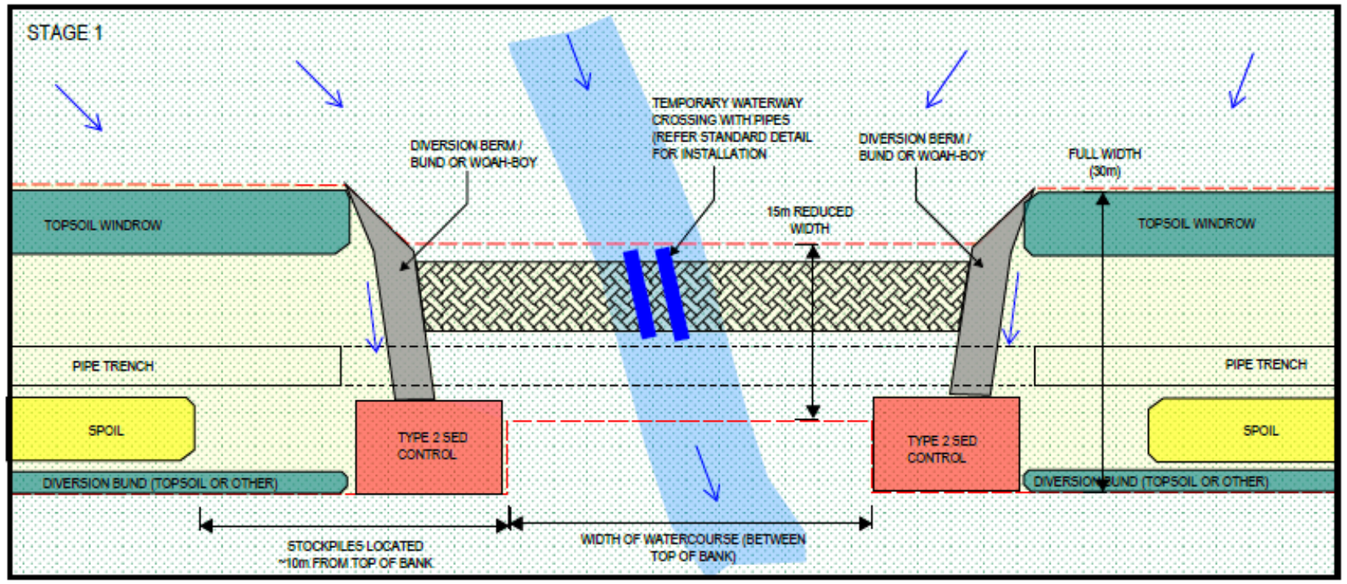
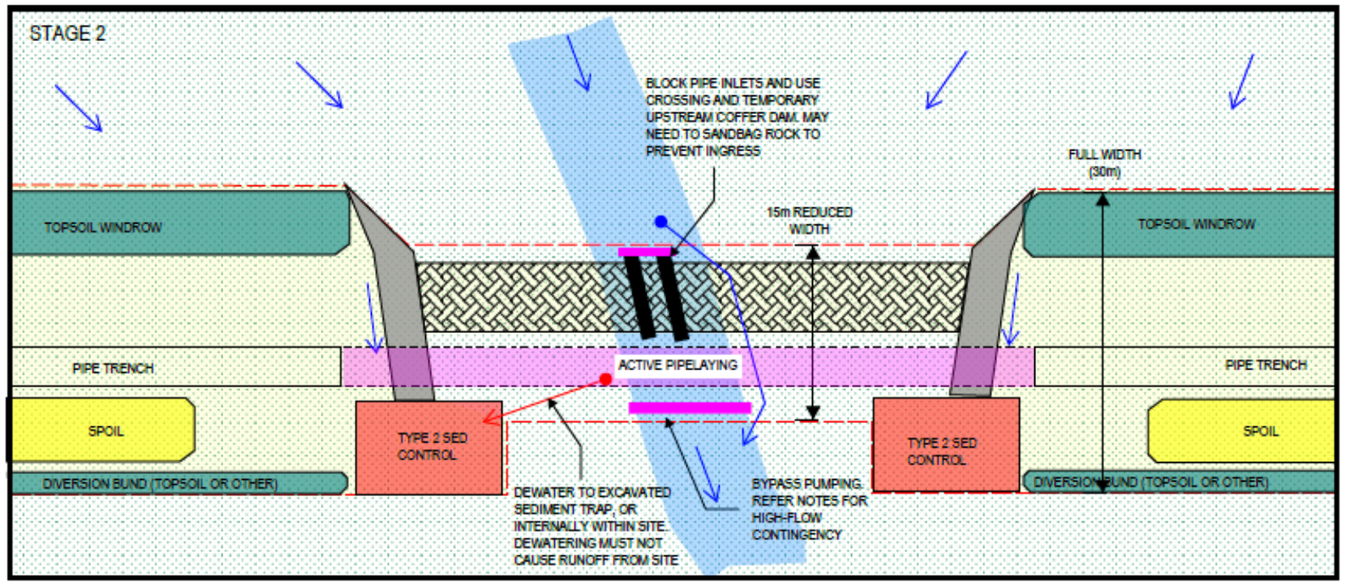
VERIFICATION (IF REQUIRED)			
PROJECT	GLADSTONE - FITZROY PIPELINE PROJECT		
DRAWING TITLE	EROSION AND SEDIMENT CONTROL PLAN RESTRICTED WIDTH WATERWAY CROSSINGS		
PROJECT No.	22-0075	DRAWING No. D06	REVISION A

RESTRICTED WIDTH CROSSING OPTION 2 - COFFER DAM





NOTES:

APPLICATION: USE FOR SMALLER (WET) CROSSINGS WITH LOWER FLOW RATES. TO BE APPLIED AT CROSSINGS WHERE ROW WIDTH RESTRICTIONS APPLY

1) STRIPPING AND PIPELAYING TO EXTEND TO THE TOP OF WATERWAY BANKS. INSTALL DRAINAGE AND SEDIMENT CONTROLS ACCORDING TO STANDARD DETAIL PROVIDED FOR PIPELAYING
2) RETAIN EXISTING GROUND COVER AND INSTALL TEMPORARY WATERWAY CROSSING IN ACCORDANCE WITH THE STANDARD DETAIL PROVIDED
3) FORM TRAFFICABLE BUND, WOAH BOY OR BERM AT TOP OF BANK TO DIVERT SITE RUNOFF TO THE SEDIMENT CONTROLS.
4) ENSURE SPOIL OR OTHER STOCKPILES ARE NOT LOCATED WITHIN 10m OF TOP OF BANK
5) THE TOPSOIL WINDROW MUST EXTEND UP TO THE WATERWAY TO DIVERT CLEAN WATER PAST THE SITE SEDIMENT CONTROLS
6) IMMEDIATELY PRIOR TO PIPELAYING THROUGH THE WATERWAY BLOCK THE UPSTREAM PIPES. IF FLOW PASSES THROUGH THE SURROUNDING ROCK USE SANDBAGS TO INCREASE THE IMPERMEABILITY
7) INSTALL A DOWNSTREAM COFFER DAM USING SANDBAGS/BULKER BAGS, GEOFABRIC WRAPPED EARTH OR SIMILAR
8) ESTABLISH BYPASS PUMPING, MATCHING THE WATERWAY FLOW RATE WITH THE PUMP FLOW RATE TO MAINTAIN HEADWATER LEVELS. USE SCOUR PROTECTION AT THE INLETS AND OUTLETS. MONITOR WATER LEVELS DURING PUMPING TO ENSURE NO CHANGE TO WATER LEVELS.
9) DEWATER THE WORK AREA IN ACCORDANCE WITH THE WATER QUALITY OBJECTIVES
10) CHECK RAINFALL FORECASTS TO ENSURE FLOWS ARE UNLIKELY TO INCREASE DURING INSTREAM WORKS
11) IN THE EVENT OF HEAVY RAINFALL, OR INCREASED FLOW DURING THE WORKS, REMOVE ALL LOOSE MATERIAL FROM THE FLOW PATH, STABILISE EXPOSED AREAS AND REMOVE TEMPORARY COFFER DAMS. ENSURE SUITABLE MATERIAL IS AVAILABLE ON SITE TO ACHIEVE THIS AT ALL TIMES.
12) COMPLETE THE WORKS AND RE-STABILISE THE FLOW PATH. DEWATER ANY CONSTRUCTION WATER IN ACCORDANCE WITH THE WATER QUALITY OBJECTIVES.

WATER QUALITY OBJECTIVES:

CHANGE (UPSTREAM / DOWNSTREAM)
- SUSPENDED SOLIDS – 5MG/L OR 10% INCREASE (WHICHEVER IS GREATEST)
- PH – 1.0PH UNIT CHANGE
- DISSOLVED OXYGEN – 10% DECREASE

FOR SPECIAL AREA PLAN LOCATIONS OR AREAS NEAR CONFIRMED YELLOW CHAT HABITAT, THAT IS, CONSTRUCTION WORKS IN AREAS ALONG THE PIPELINE ALIGNMENT BETWEEN THE PORT ALMA RAILWAY AND HORRIGAN CREEK:

- CONSTRUCTION WORKS WILL BE UNDERTAKEN DURING THE PERIOD BETWEEN MAY AND SEPTEMBER INCLUSIVE, WHERE POSSIBLE.
- FOR THOSE CROSSINGS NOT BEING CONSTRUCTED BY TRENCHLESS METHODS, WIDTH OF DISTURBANCE FOR EACH WATERCOURSE CROSSING WILL BE REDUCED TO 15 M. CREEK WATER LEVELS WILL BE MONITORED DURING CREEK CROSSING CONSTRUCTION TO ALLOW EARLY IDENTIFICATION OF CHANGED WATER LEVELS THAT MAY AFFECT YELLOW CHAT HABITAT AND APPROPRIATE CORRECTIVE ACTION TO BE UNDERTAKEN.

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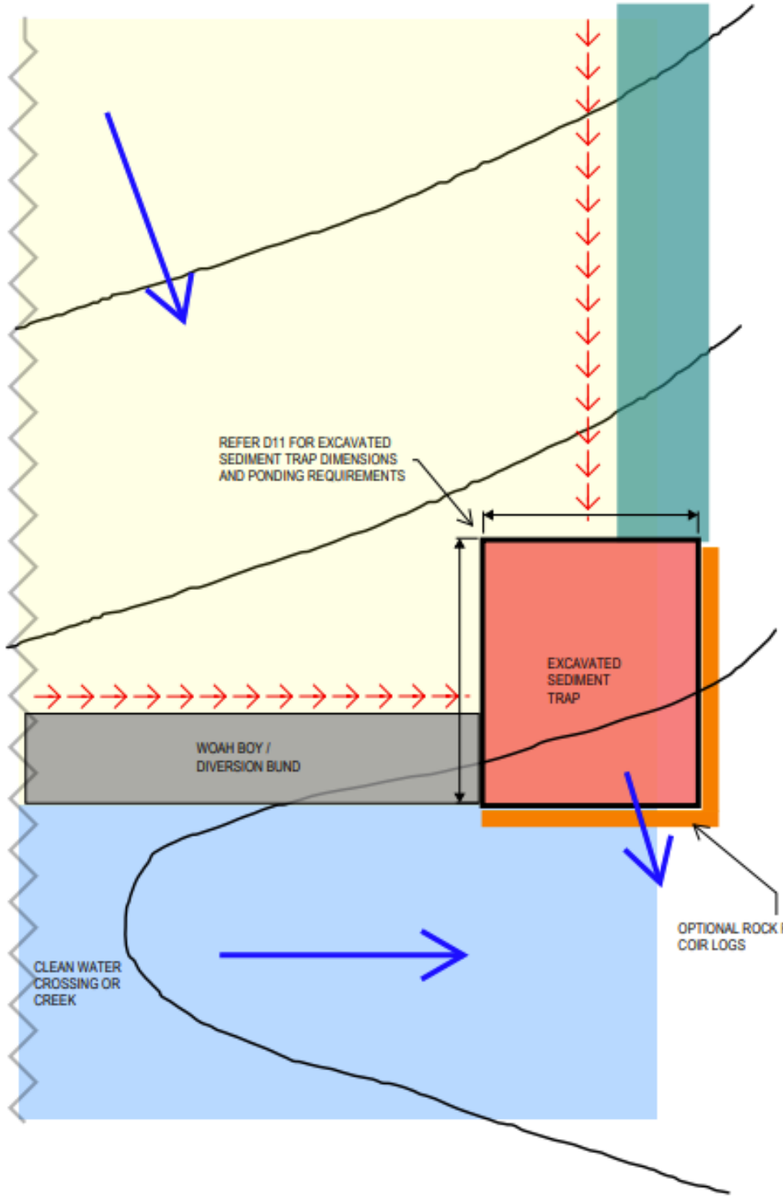
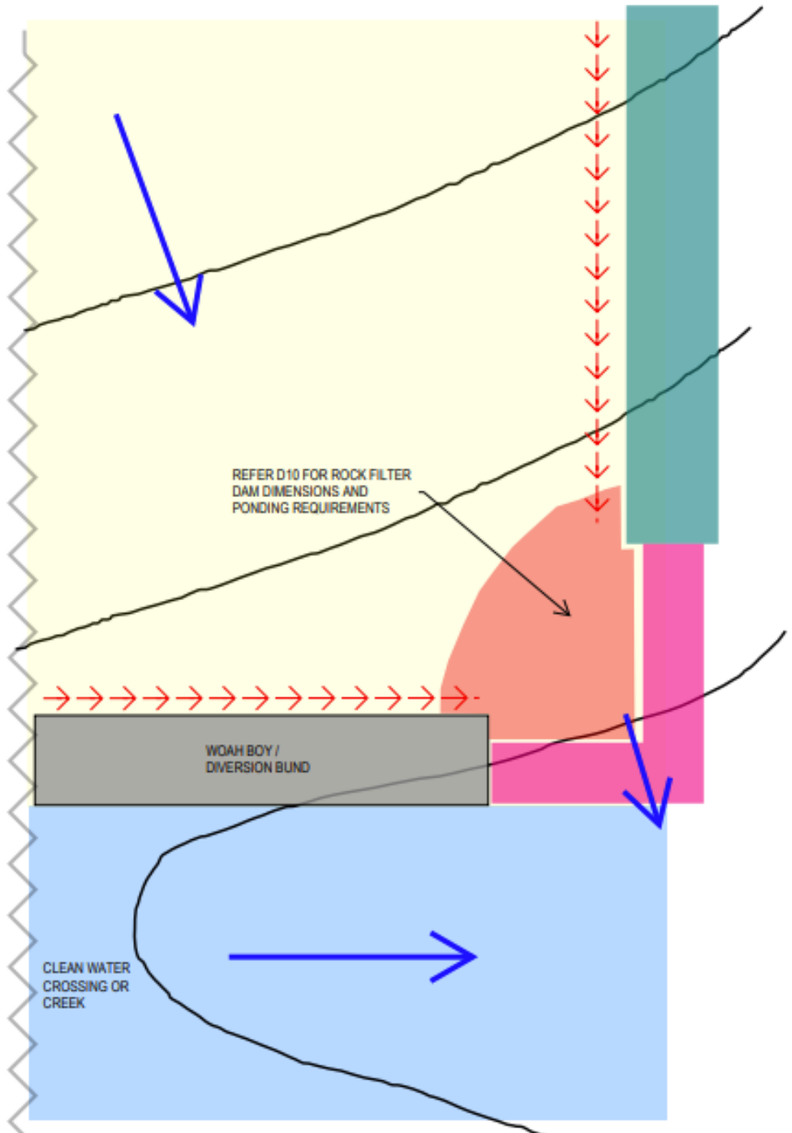
PROJECT: GLADSTONE - FITZROY PIPELINE PROJECT

DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN
RESTRICTED WIDTH WATERWAY CROSSINGS

PROJECT No.	DRAWING No.	REVISION
22-0075	D07	A





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PROJECT: GLADSTONE - FITZROY PIPELINE PROJECT

DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN
TYPE 2 SEDIMENT CONTROL OPTIONS

PROJECT No.	DRAWING No.	REVISION
22-0075	D09	A

ROCK FILTER DAM CALCULATIONS AND SIZING

Catchment Area (Ha)	TYPE 2 Sediment Control	
	Minimum Surface Area (m2)	Design Surface Area (m2)
0.5	5.0	19.9
1.0	9.9	39.7
2.0	16.7	67.0

TABLE NOTES:

1. **Design surface area** based on critical sediment size of 0.05mm for Type 2.
   Minimum surface area based on critical sediment size of 0.1mm for Type 2.
2. Design flow of 0.5 x Q1 critical storm
3. Includes allowance (20%) for turbulent inflow
4. Surface area must be able to pond runoff and can include that available behind bunds or within temporary storages

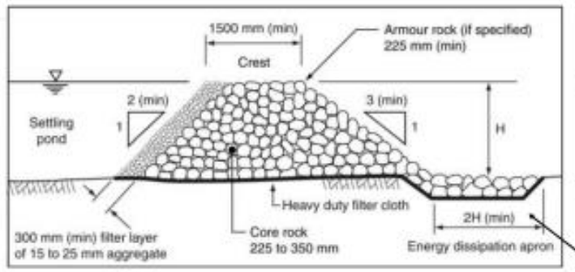


Figure 1 – Rock filter dam with aggregate filter

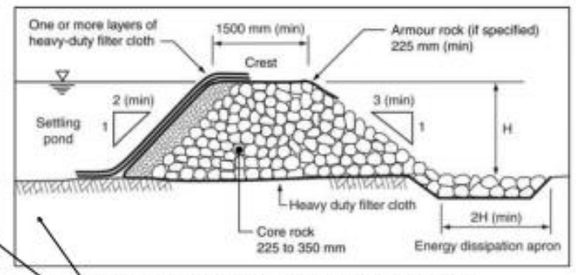
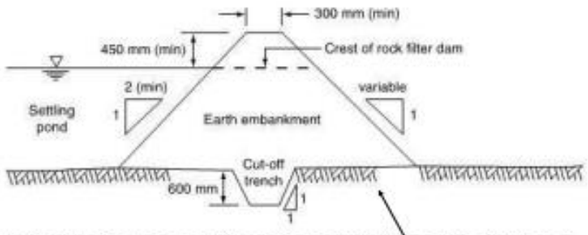


Figure 2 – Rock filter dam with geotextile (filter cloth) filter

SUBSOILS MAY REQUIRE AMELIORATION PRIOR TO INSTALLATION. PENDING SOILS INVESTIGATION

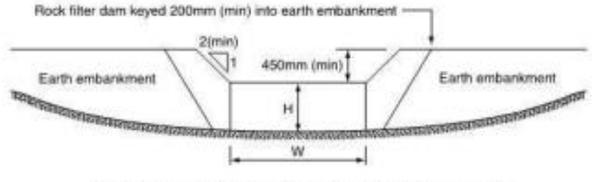
GUIDE FOR SELECTING APPROPRIATE ROCK FILTER DAM SIZE:

1. DETERMINE CATCHMENT REPORTING TO DAM BASED ON CURRENT LEVELS, SITE SURVEY, ESCP AND BEST ESTIMATE
2. SELECT MINIMUM REQUIRED PONDING SURFACE AREA BASED ON CATCHMENT AREA FROM TABLE ABOVE.
3. NOTE PONDING CREATED BY ROCK FILTER DAM MAY BE SUPPLEMENTED BY ONSITE EXCAVATIONS AND EMBANKMENTS
4. ADJUST ROCK FILTER DAM HEIGHT TO ACHIEVE REQUIRED SURFACE AREA NOMINATED IN TABLE ABOVE
5. SURFACE AREA = THE PROJECTED AREA FROM THE INVERT OF THE RFD WEIR EXTENDING WITHIN THE SITE AREA



(c) Typical cross-section of constructed earth abutment

SUBSOILS MAY REQUIRE AMELIORATION PRIOR TO INSTALLATION. PENDING SOILS INVESTIGATION



(d) Typical profile of rock filter dam crest when integrated into an earth embankment

Design standard	Critical sediment size (mm)	Surface area of settling pond per unit discharge ($m^2/m^3/s$) [1]			Allowable through-velocity (m/s)
		10° C [2]	15° C [2]	20° C [2]	
Type 3 sediment trap	0.50	6	5.2	4.6	0.3
	0.20	38	33	29	0.3
	0.15	67	60	52	0.3
Type 2 sediment trap	0.10	150	130	115	0.2
	0.05	600	525	460	0.2
Type 1 sediment trap	0.04	940	820	720	0.2
	0.02	3700	3230	2860	0.2

[1] Pond area is based on a rectangular pond operating with uniform inflow conditions across its width.
[2] Assume a pond temperature the same as the typical rainwater temperature during the time of year when the pond is likely to be operating at capacity.

Classification	Minimum particle size	Typical trapped particles
Type 1	< 0.045mm	Clay, silt & sand
Type 2	0.045 – 0.14mm	Silt & sand [1]
Type 3	> 0.14mm	Sand
Supplementary	> 0.14mm	Sand

[1] Technically, silt particles have a grain size of 0.002 to 0.02mm, which means that only Type 1 sediment traps are likely to capture silt-sized particles. However, for general discussion purposes, it can be assumed that Type 2 systems capture a significant proportion of silt-sized particles.


RFD EXAMPLE


RFD EXAMPLE

STANDARD DRAWINGS SOURCED FROM CATCHMENTS AND CREEKS PTY LTD
FOR FURTHER DETAILS ON STANDARD DRAWINGS INCLUDING MATERIAL REQUIREMENTS, DOWNLOAD FULL STANDARD DRAWING FOR EACH CONTROL AT WWW.CATCHMENTSANDCREEKS.COM.AU

TOPO

REVISION	DESCRIPTION	APPROVED BY	DATE
A	ORIGINAL ISSUE	TB	17/03/23

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PROJECT: GLADSTONE - FITZROY PIPELINE PROJECT
DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN WATERWAY CROSSINGS
PROJECT No: 22-0075 | DRAWING No: D10 | REVISION: A

EXCAVATED SEDIMENT TRAP CALCULATIONS AND SIZING

Catchment Area (Ha)	TYPE 2 Sediment Control	
	Minimum Surface Area (m2)	Design Surface Area (m2)
0.5	7.8	30.5
1.0	15.5	61.1
2.0	26.2	103.0

TABLE NOTES:

1. **Design surface area** based on critical sediment size of 0.05mm for Type 2.
2. Design flow of 0.5 x Q1 critical storm
3. Includes allowance (20%) for turbulent inflow
4. Surface area must be able to pond runoff and can include that available behind bunds or within temporary storages

GUIDE FOR SELECTING APPROPRIATE EST SIZE:

1. DETERMINE CATCHMENT REPORTING TO EST BASED ON CURRENT LEVELS, SITE SURVEY, ESCP AND BEST ESTIMATE
2. SELECT MINIMUM REQUIRED PONDING SURFACE AREA BASED ON CATCHMENT AREA FROM TABLE ABOVE.
3. NOTE PONDING CREATED BY EST MAY BE SUPPLEMENTED BY ONSITE EXCAVATIONS AND EMBANKMENTS
4. ADJUST EST DIMENSIONS TO ACHIEVE REQUIRED SURFACE AREA NOMINATED IN TABLE ABOVE
5. SURFACE AREA = THE AREA COVERED BY THE EST + ANY AREAS THAT SUPPLEMENT THIS AREA (IE EXCAVATIONS OR EMBANKMENTS)

Table 1 – Required pond surface area for various treatment standards ($m^2/m^3/s$)

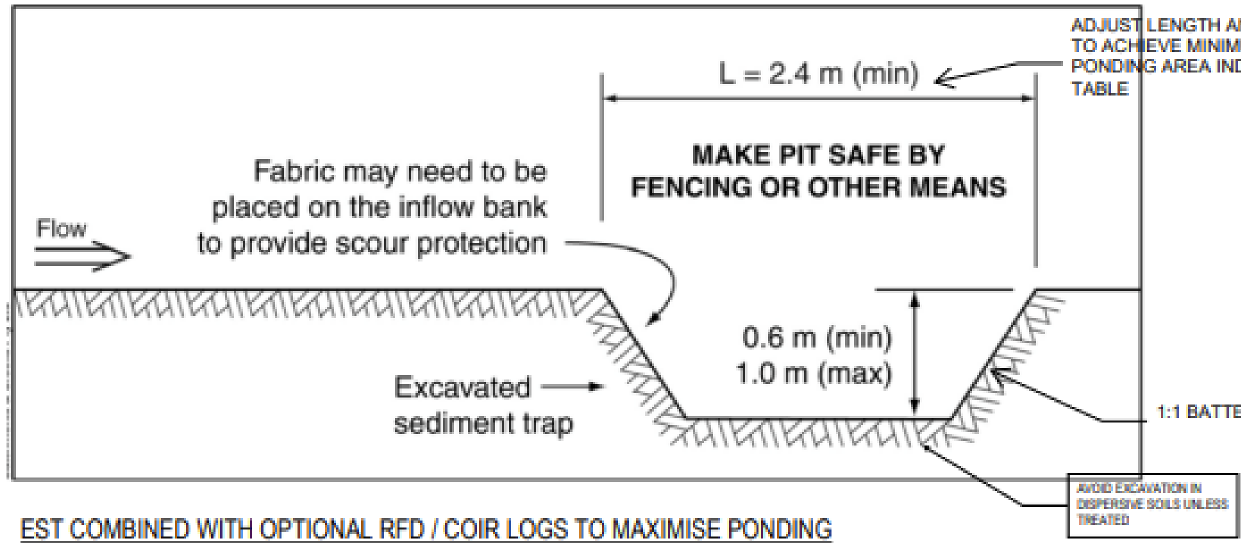
Design standard	Critical sediment size (mm)	Surface area of settling pond per unit discharge for various water temperatures ($m^2/m^3/s$) [1]		
		10° C	15° C	20° C
Type 3 sediment trap	0.50	7.2	6.3	5.5
	0.20	45	40	35
	0.15	80	70	62
Type 2 sediment trap	0.10	180	160	140
	0.05	720	630	550

[1] A 20% increase in the theoretical surface area has been included to account for inflow turbulence.

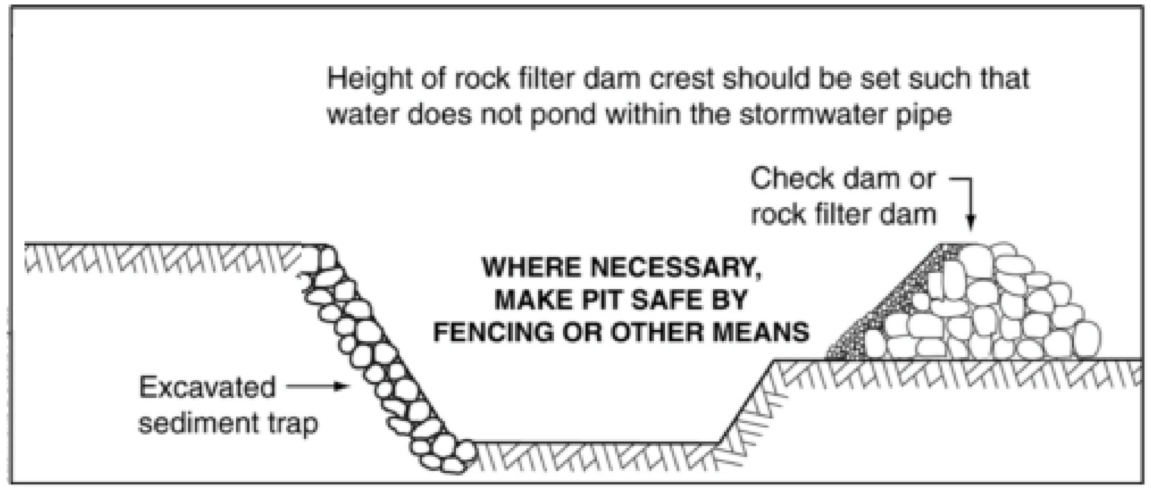
Classification	Minimum particle size	Typical trapped particles
Type 1	< 0.045mm	Clay, silt & sand
Type 2	0.045 – 0.14mm	Silt & sand [1]
Type 3	> 0.14mm	Sand
Supplementary	> 0.14mm	Sand

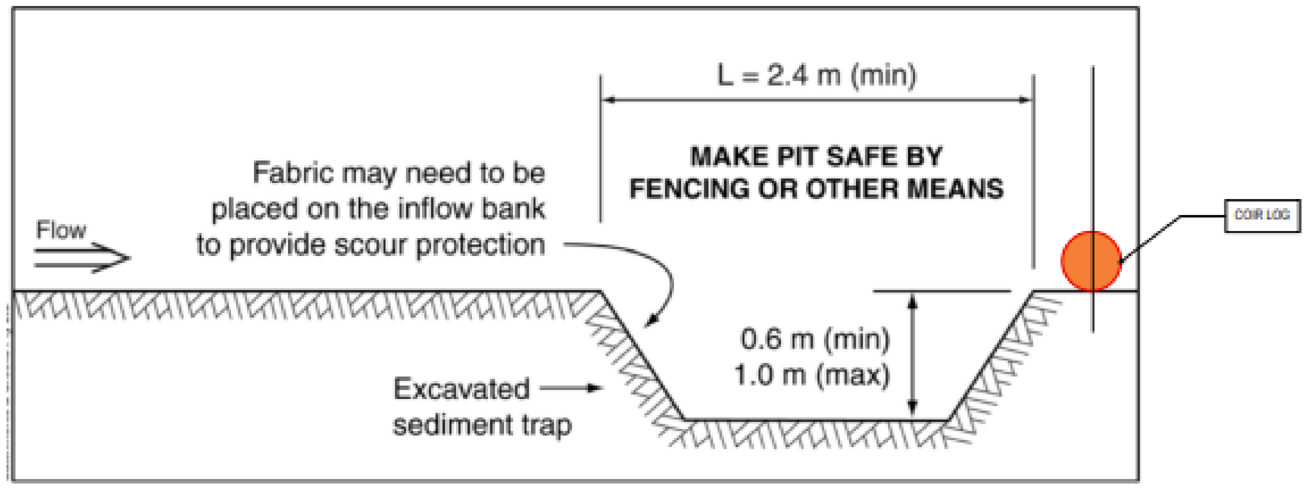
[1] Technically, silt particles have a grain size of 0.002 to 0.02mm, which means that only Type 1 sediment traps are likely to capture silt-sized particles. However, for general discussion purposes, it can be assumed that Type 2 systems capture a significant proportion of silt-sized particles.

TYPICAL EXCAVATED SEDIMENT TRAP



EST COMBINED WITH OPTIONAL RFD / COIR LOGS TO MAXIMISE PONDING





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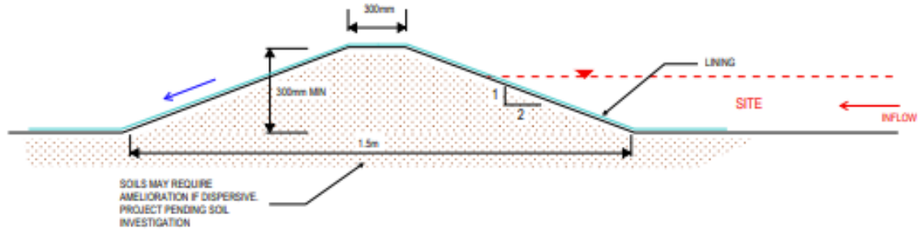
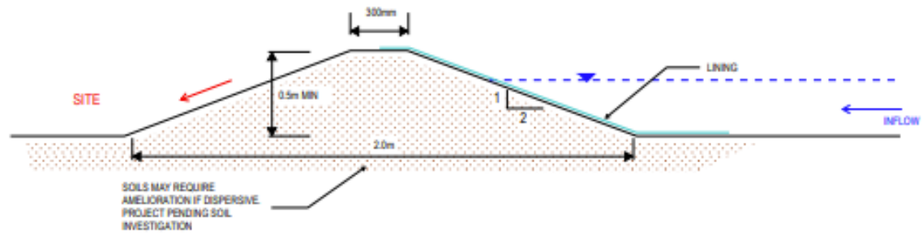
PROJECT No: 22-0075 | DRAWING No: D11 | REVISION: A

DIVERSION BUND / TOPSOIL WINDROW SIZING

	Catchment Reporting (Ha)	Flow Rate Q2 (m^3/s)	Bund					
			Height (m)	Batters (V:H)	Top Width (m)	Base Width (m)	V (m/s)	Lining
Clean Water	5	0.82	0.43	1:2	0.3	2.01	0.93	Geotextile, Juste mesh or Vital HR 1L/m^2
	10	1.43	0.39	1:2	0.3	1.87	2.13	Coir mesh or Vital HR 2L/m^2
	20	2.28	0.44	1:2	0.3	2.06	2.39	Coir mesh or Vital HR 2L/m^2
Dirty Water	0.5	0.11	0.24	1:2	0.3	1.27	1.13	Geotextile, Juste mesh or Vital HR 1L/m^2
	1	0.19	0.26	1:2	0.3	1.35	1.29	Geotextile, Juste mesh or Vital HR 1L/m^2
	2	0.38	0.30	1:2	0.3	1.49	1.53	Coir mesh or Vital HR 2L/m^2



DIRTY WATER DIVERSION BUND SECTION



CLEAN WATER DIVERSION BUND SECTION

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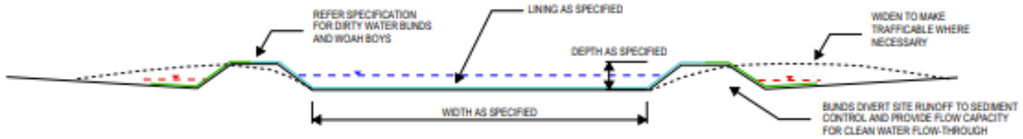
DRAWING TITLE	EROSION AND SEDIMENT CONTROL PLAN DIVERSION BUND / TOPSOIL WINDROW SIZING	
PROJECT No: 22-0075	DRAWING No: D12	REVISION: A

CLEAN WATER FLOW-THROUGH

SUMMARY

Catchment Reporting (Ha)	Flow Rate Q2* (m^3/s)	Velocity (m/s)	Internal Batters	Depth (m) **	Base Width	Lining***
5	0.82	1.33 - 2.56	1V:2H	0.4 - 0.5	1	Undisturbed existing veg., coir mesh, Vital HR @ $2L/m^2$
10	1.43	1.45 - 2.73	1V:2H	0.4 - 0.5	2	Undisturbed existing veg., geospray, rock, or other approved binder
20	2.28	1.58 - 2.91	1V:2H	0.4 - 0.5	3	Undisturbed existing veg., geospray, rock, or other approved binder

*FLOW-THROUGH CHANNELS SIZED FOR 2 YEAR ARI IN ACCORDANCE WITH IECA 2008 FOR <12 MONTH DESIGN LIFE
** DEPTH INCLUDES 150mm FREEBOARD
*** SPECIFICATION FOR LINING BASED ON CALCULATED VELOCITY AND TESTING/SPECIFICATION PROVIDED BY OTHERS. ALTERNATIVE LINERS MAY BE ADOPTED ON THE PROVISION THAT SUPPLIER SPECIFICATION INDICATES THAT PRODUCTS WILL BE NON-ERODIBLE AT THE CALCULATED VELOCITY.
**** CAUTION MUST BE USED IN ADOPTING TEMPORARY DRAINAGE CONTROL FOR MANAGING CATCHMENTS GREATER THAN 20HA. TEMPORARY DIVERSIONS AND FLOW THROUGH CHANNELS HAVE BEEN PRESCRIBED AND SIZED IN ACCORDANCE WITH BEST PRACTICE EROSION AND SEDIMENT CONTROL AND MAY NOT BE SUITABLE FOR LONG-TERM, SIGNIFICANT HYDRAULIC STRUCTURES.



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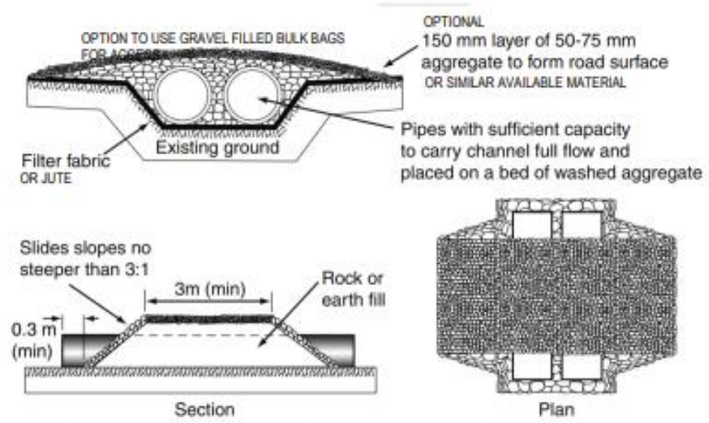
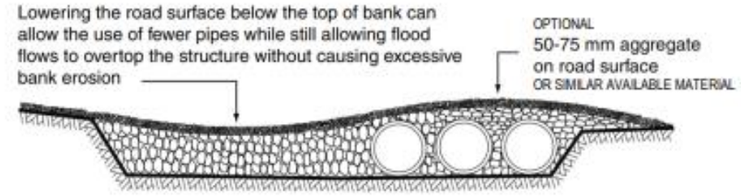
DRAWING TITLE: EROSION AND SEDIMENT CONTROL PLAN
CLEAN WATER FLOW-THROUGH DETAIL
PROJECT No: 22-0075 | DRAWING No: D13 | REVISION: A

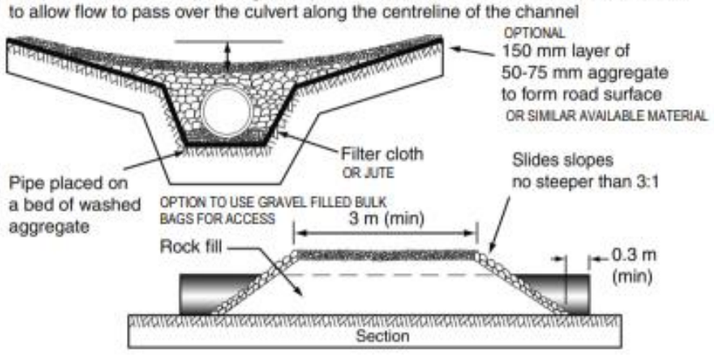


(a) Preferred arrangement for temporary culvert crossings



(b) Typical profile of temporary culvert crossings of wide channels

In situations where it is not practicable to allow overflows to initially passing around the culvert on a stable (well vegetated) stream bank, then the center must be set low to allow flow to pass over the culvert along the centreline of the channel



(c) Alternative layout for the crossing of confined channels

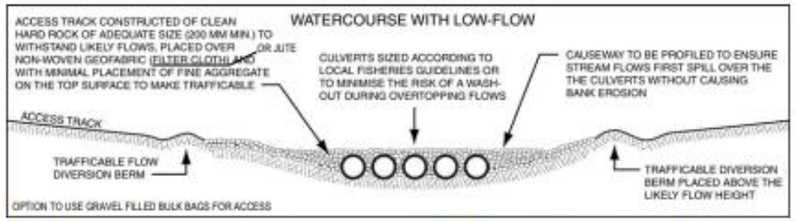


Figure P32 – Typical profile of temporary culvert crossing (cross-section)

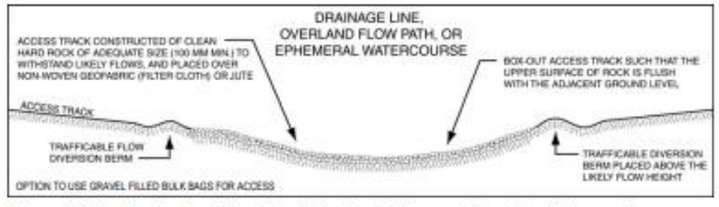


Figure P30 – Typical profile of bed-level vehicle crossing of a drainage line

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PROJECT	GLADSTONE - FITZROY PIPELINE PROJECT		
DRAWING TITLE	EROSION AND SEDIMENT CONTROL PLAN TYPICAL DETAIL - TEMPORARY CROSSINGS		
PROJECT No.	DRAWING No.	REVISION	
22-0075	D14	A	

STOCKPILE MANAGEMENT

Material	Stockpile cover [1]	Comments
Sand	No cover	• When wind erosion and dust control is not an issue.
	Synthetic cover, porous or not porous	• When the control of wind erosion is essential for reasons of safety.
Soil	No cover	• When wind erosion and dust control are not an issue.
	Mulching, vegetative cover, chemical stabilisers, soil binders, or impervious blanket [2]	• Long-term (>28 days) stockpiling of dispersive soils. • Long-term (>28 days) stockpiles of clayey soils when turbidity control is desirable. • Long-term (>5/10 days) soil stockpiles during months of Extreme/High erosion risk as per Section 4.4. • Short and long-term stockpiles of clayey soils when turbidity control is essential.

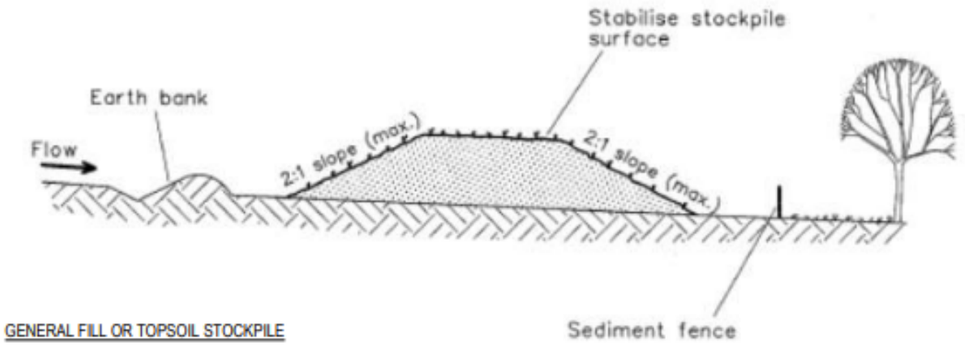
Notes: [1] Applicable only when displacement of the stockpiled material has the potential to cause environmental harm. The practice of covering stockpiles may need to be modified if theft or damage to covers becomes excessive.

[2] Mulching is normally applied at the first opportunity that mulch or hydromulch can be introduced to the site. Minimum 70% cover is required for both mulch and vegetative covers. Though still desirable, a cover may not be required if runoff from the stockpile is directed to a Type 1 sediment trap.

Material	Sediment control	Comments
Sand or gravel	Woven Sediment Fence or equivalent	• Sediment control is only required if stockpiled material could be displaced and cause safety risks or environmental harm.
Topsoil	Woven Sediment Fence or equivalent	• If the topsoil is moderately to highly erodible and is likely to release significant clay-rich (turbid) runoff, refer to the recommendations below for subsoil stockpiles.
Subsoil	Woven Sediment Fence or equivalent	• Stockpiles located up-slope of suitably grassed areas that will allow for the infiltration of stormwater runoff from the stockpile (minimum 15m of flow length), or all runoff is directed to a Type 1 or Type 2 sediment trap.
	Compost Berm, Filter Fence, composite (non-woven) Sediment Fence, or equivalent	• Stockpiles not located up-slope of a suitable grassed area, or Type 1 or Type 2 sediment trap. • Soil stockpiles located adjacent permanent drainage channels or waterways.

TOPSOIL STOCKPILE MANAGEMENT

Condition of topsoil	Recommended stockpiling requirements
Topsoils containing valuable plant seed content that needs to be preserved for re-establishment.	• Upper 50mm of soil stockpiled separately in mounds 1 to 1.5m high. • Topsoil more than 50mm below the surface stockpiled in mounds no higher than 1.5 to 3m. • The duration of stockpiling should be the minimum practicable, but ideally less than 12 months.
Imported topsoil, or in-situ topsoil containing minimal desirable or undesirable seed content.	• Maximum desirable stockpile height of 2m. • The duration of stockpiling should be the minimum practicable, but ideally less than 12 months.
Topsoils containing significant undesirable seed content.	• Ideally replace soil with alternative local topsoil free of weed seed content (seek expert advice). • Depending on expert advice, stripped topsoil may be appropriately treated to prevent germination of weed seed content, covered with clear plastic sheeting to help burn-off the weed seed content, or buried under a minimum 100mm of soil.
Topsoils containing weed seed of a declared noxious or otherwise highly undesirable plant species.	• Suitably bury the topsoil on-site, or remove the soil from the site for further treatment (in accordance with local and State laws). • Stripped soil must **not** be transported off-site without appropriate warnings and identification.
Previously disturbed sites where the surface soils consist of a mixture of topsoil and dispersive subsoil.	• Mix the soil with gypsum, lime or other appropriate ameliorants prior to stockpiling in either high or low mounds according to required protection of seed content. • Choice of chemical treatment of the dispersive soil depends on desired pH adjustments (seek expert advice).



GENERAL FILL OR TOPSOIL STOCKPILE

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TB	TB	17/03/23	
SIGNATURE (IF REQUIRED)			

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DRAWING TITLE	EROSION AND SEDIMENT CONTROL PLAN TYPICAL DETAIL - STOCKPILES	
PROJECT No.	DRAWING No.	REVISION
22-0075	D15	A

Appendix B Interim Acid Sulfate Soils Environmental Management Plan

INTERIM MANAGEMENT PLAN

INTERIM ACID SULFATE SOILS ENVIRONMENTAL MANAGEMENT PLAN

Fitzroy to Gladstone Pipeline (FGP) Project, QUEENSLAND

Submitted to:

MBJV
Level 6, SW1 Building, 52 Merivale Street
South Brisbane, QLD 4101

7 July 2023
Document Number:
J0323-010-003 Rev3

TABLE OF CONTENTS

FIGURE

FORMS

APPENDICES

GLOSSARY

AASS	Actual Acid Sulfate Soils
AHD	Australian Height Datum
Al	Aluminium
ANC	Acid Neutralising Capacity
ASS	Acid Sulfate Soils
CAR	Corrective Action Requests
CPSS	Certified Professional Soil Scientist
CRS	Chromium Reducible Sulfur
DO	Dissolved Oxygen
EA	Environmental Auditor
EC	Electrical Conductivity
ECR	Environmental Compliance Reports
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP	Environmental Protection
EPP	Environmental Protection (Water) Policy 2009
EO	Environmental Officer
Fe	Iron
FGP	Fitzroy to Gladstone Pipeline
GAWB	Gladstone Area Water Board
HDD	Horizontal Directional Drilling
ha	Hectares
m	Metres
MBJV	McConnell Dowell and BMD Joint Venture
NATA	National Association of Testing Authorities
OH&S	Occupational Health & Safety
PASS	Potential Acid Sulfate Soils
RL	Reduced Level
SNAS	Net Acid Soluble Sulfur
SPOCAS	Suspension Peroxide Oxidation Combined Acidity and Sulfate
SPP 2/02	State Planning Policy 2/02 - "Planning and managing development involving acid sulfate soils"
WTP	Water treatment plant
WQO	Water Quality Objective

1.0 DOCUMENT REVISION

The following table outlines revisions made to this document. Revisions to the document are made to reflect changes to environmental procedures, or environmental management. The Environmental Management Plan (EMP) should be viewed as a 'living document'.

DATE	NATURE OF REVISION	EDITOR
23 March 2023	DRAFT – Rev0	PSK Environmental Pty Ltd
12 April 2023	DRAFT – Rev1	PSK Environmental Pty Ltd
28 April 2023	DRAFT – Rev2	PSK Environmental Pty Ltd
7 July 2023	DRAFT – Rev3	PSK Environmental Pty Ltd

2.0 ENVIRONMENTAL DEFINITIONS

Environmental Harm (EP Act 1994)

Any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value, and includes environmental nuisance.

Environmental Nuisance (EP Act 1994)

Is unreasonable interference or likely interference with an environmental value caused by:

a) aerosols, fumes, light, noise, dust, litter etc.; or

b) an unhealthy, offensive or unsightly condition because of contamination; or

c) another way prescribed by regulation.

3.0 INTRODUCTION

This Environmental Management Plan (EMP) has been prepared to provide management measures for Acid Sulfate Soils (ASS) present along the Fitzroy to Gladstone Pipeline (FGP) project alignment. The FGP project alignment extends from the Lower Fitzroy River at Laurel Bank to Gladstone. The project alignment is shown in Figure 1. The FGP project is being commissioned by Gladstone Area Water Board (GAWB).

This EMP is an interim report only as design details are preliminary and ASS investigations have not been completed. Data available to date has been included in this EMP and is considered indicative only. Final liming rates will be provided once the ASS investigations are completed.

This EMP has been revised (Revision 1) to amend the location of groundwater monitoring wells required for the project and to update Table 1 with the additional data from longitudinal sections between Raglan and Aldoga.

This EMP has been revised (Revision 2) following a meeting attended by MBJV, Department of Resources (DoR), GAWB and PSK on 20 April 2023 in response to a letter submitted to DoR by PSK on 17 April 2023 seeking approval for a reduced ASS sampling density for the project (PSK Doc. Ref. J0323-010-006 Rev0). During the meeting, DoR gave in principal approval for a reduced sampling frequency, pending review of the project Sampling and Analysis Plan (SAP) which is being developed.

This EMP will be updated as additional ASS data is collected and upon finalisation of the project design.

4.0 BACKGROUND

4.1 Project Description

The FGP Project includes a 117 kilometres (km) long pipeline (1,067 millimetres (mm) in diameter) which will extend from the Lower Fitzroy River in Rockhampton, predominantly within the Stanwell-Gladstone Infrastructure Corridor State Development Area (SGIC SDA) and will connect to GAWB's existing water infrastructure network near Yarwun within the Gladstone State Development Area (GSDA). The FGP will be constructed within a right of way (ROW) corridor up to 30 metres (m) in width. The FGP will have the capacity to transport 30,000 ml per annum of water from the Fitzroy River to Gladstone. The alignment for the project is shown on Figure 1 attached.

Based on the Construction Environmental Management Plan (GHD Pty Ltd 2022), the project works will include:

- An intake and pump station on the southern bank of the Fitzroy River ('Fitzroy Pump Station') approximately 17 km upstream of Rockhampton's Alexandra Bridge near Laurel Bank, and in the vicinity of an existing Sunwater pump station that supplies the Stanwell Energy Park.
- A Water Treatment Plant (WTP) at Alton Downs near the Fitzroy River, occupying an area of approximately 11.5 hectares (ha).
- Reservoirs at Aldoga consisting of two water storage tanks of approximately 100 ML.
- Two pump stations, one located at the Fitzroy River water intake, and another at the Alton Downs WTP, each occupying an area of approximately one hectare. Associated with the pump station there may be:
  - A single building (approximately 30 m x 25 m) housing the pumps, complete with motors, controls and starters
  - A small substation
  - Connection manifolds and valves
- Fibre optic cable will run alongside the pipeline within the trench. This will be used to transmit signals along the FGP alignment..

4.1.1 Fitzroy Pump Station

The design plans for the Fitzroy Pump Station (C-001, C-002, C-003) and information provided from McConnell Dowell and BMD Joint Venture (MBJV) (Ben Hooper, email communication, 20 March 2023) indicates the following:

- The Fitzroy Pump Station is rectangular in shape and occupies and area of 162 m^2 (18 m long by 9 m wide). The ground level within the development footprint ranges from approximately 9 m Australian Height Datum (AHD) to -2 m AHD.
- The depth of excavation for the development of the pump station will be approximately 12 m at deepest point.

Given that the land proposed for the Fitzroy Pump Station is low-lying, adjacent to the Fitzroy River and that land below 5m AHD will be disturbed, it is possible that the proposed earthworks for the construction of the Fitzroy Pump Station will intercept ASS.

4.1.2 Water Treatment Plant (WTP) at Alton Downs

The design plans for the Alton Downs WTP (TP-CIV-DWG-00003, 00010,00011) indicate the following:

- One treated water storage tank with an approximate diameter of 60 m, and two sludge balance tanks with an approximate diameter of 16 m are proposed along with a sludge dewatering facility, screening facility, chemical storage facility, sludge trap basin, emergency sludge stockpile area and associated roads.
- The sludge dewatering facility contains a switchboard room and a centrifuge room, and has a design floor RL of 14.70 m.
- The chemical storage facility contains 12 tanks with an approximate diameter of 4.5 m and volume of 35 m^3. The facility is grille flooring supported by double headed adjustable legs and has a design top of grating RL of 14.70 m and top of plinth RL of 14.30m.

Given the surface elevation, the proposed earthworks for the construction of the Alton Downs WTP are not likely to intercept ASS, unless excavations below 5 m AHD are proposed.

4.1.3 Aldoga Reservoirs

The design plans for the Aldoga Reservoir (C-003, C-004, C-005) indicate the following:

- Two water storage tanks, each having an approximate diameter of 80 m, are proposed along with an association 350 m access road.
- The existing surface will be predominantly cut by a depth ranging from 0.50 m to 7.32 m to form the reservoir platform which has a design elevation of Reduced Level (RL) 96.50 m.
- Shallow earthworks are required along the proposed access road. The existing surface will be cut by a depth ranging from 0.02 m to 0.54 m to achieve a design elevation ranging between 67.21 m AHD and 91.21 m AHD.

Given the surface elevation, the proposed earthworks for the construction of the Adloga Reservoir are not likely to intercept ASS.

4.1.4 Pipeline Trenching

MBJV has provided the longitudinal sections of the alignment between Ridgelands Road, Alton Downs and Raglan. No longitudinal sections have been provided for the alignment between Raglan and Gladstone or Fitzroy River to Ridgelands Road.

The FGP will be buried for its full length. The depth of pipe will vary depending upon the pipe material, ground conditions and loading and predominantly ranges between 2 m and 4 m. Ancillary infrastructure may be required on the surface (e.g. pressure release valves, etc.).

It is understood from discussions with MBJV (Ben Hooper, email communication, 6 March 2023) that the width of the pipeline trench is likely to range from 1600 mm to 4000 mm. It is proposed to excavate and return spoil to the trench resulting in no waste spoil.

According to standard pipeline notes, the minimum pipeline cover will be 750 mm except in flood prone areas (Chainage 4100 – 44300 and Chainage 49400 – 75000) where the minimum cover will be 1100 mm. The minimum pipeline cover under roads and creeks will be 900 mm. The maximum pipeline cover will be 3500 mm.

The pipeline alignment between Raglan and Gladstone (i.e., from Chainage 75000 to 117000), traverses land that is located above 5 m AHD, and therefore limited ASS investigations have been undertaken in this section. Available data from within this section indicates the absence of ASS.

4.1.5 Pipeline Crossings

Based on design plans (08164-DWG-24100-C 4115 to 08164-DWG-24100-C 4177) and *Creek Crossings_Working* document, deeper excavations will be required at discrete locations along the pipeline alignment at road crossings and creek crossings where horizontal directional drilling (HDD) is proposed to install the pipe. At these location, 6m x 8m shafts will be excavated on either side of the crossing. Microtunnels measuring 1 m in diameter will be drilled beneath the crossings. Spoil from the shaft excavations and microtunnels will be considered waste spoil and will be lime treated (if required) and reused on the ROW or taken offsite for disposal.

4.2 Investigations Completed to Date

A preliminary ASS investigation (including desktop assessment) along the alignment was undertaken for the preparation of the Environmental Impact Statement (EIS) (Arup 2008). Some supplementary ASS testing was undertaken at a later stage in conjunction with geotechnical testing (SMEC 2022). A Construction Environmental Management Plan (CEMP) was also developed (GHD 2022).

The references for these reports are as follows:

- Arup 2008, 'Soils and Contaminated Land (Chapter 5)', in *Gladstone-Fitzroy Pipeline Project Environmental Impact Statement,* Gladstone Area Water Board (GAWB).
- GHD Pty Ltd 2022, '*Construction Environmental Management Plan, Fitzroy to Gladstone Pipeline*, Gladstone Area Water Board, Project number 12559247 Rev C.
- SMEC Pty Ltd (2022). ASS Identified (Technical Memorandum), Fitzroy to Gladstone Pipeline (FGP) Project, Reference number 30032687-CVL-MEM-FGP Pipeline ASS Rev D.

Acid Sulfate Soil data obtained during the investigations have been summarised in Appendix A. Liming rates have been recalculated by PSK. Two liming rates have been provided: one includes Acid Neutralisation Capacity (ANC) and one excludes ANC. The data is considered indicative only and liming rates for the project are to be developed following additional ASS investigations. The adoption of the ANC in the net acidity equation is to be determined by a CPSS.

4.3 Environmental Procedures

Environmental Procedures appended to this EMP are to be implemented in order to minimise the risk of Environmental Harm to the receiving environment, and limit any Environmental Nuisance, resulting from:

- disturbance of Actual and Potential Acid Sulfate Soils (AASS/PASS) on site during earthworks
- impact to groundwater chemistry (through disturbance of ASS) and migration of impacted groundwater off-site towards drains, creeks or waterways along the project.
- 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.

4.4 Receiving Environment

The majority of the project area is located within the Fitzroy River catchment (a sub-catchment of the Fitzroy Basin catchment), with the south eastern section of the project area located within the Calliope River catchment. The Fitzroy River ultimately flows into Kepple Bay, which is part of the Great Barrier Reef Marine Park (Arup 2008).

In regards to the *Environmental Protection (Water) Policy 2019* (EPP), the projects intercepts the Fitzroy River Sub-basin Environmental Values and Water Quality Objectives and the Curtis Island, Calliope River and Boyne River Basins Environmental Values and Water Quality Objectives (Department of Environment and Resource Management 2010). From north to south, the FGP project intersects the following EPP environmental value zones:

- Fitzroy main channel above barrage
- Fitzroy south/central tributaries
- Fitzroy main channel below barrage (estuarine)
- Fitzroy lower estuarine creeks
- Raglan Creek and tributaries (estuarine reaches)
- Raglan Creek and tributaries
- Munduran Creek and other fresh waters (draining to the Narrows/Deception Creek)
- Gladstone SDA waters (mainland)

The northern extent of the of the FGP alignment intercepts wetlands of high ecological significance, located in the Great Barrier Reef wetland protection area.

5.0 OBJECTIVES

The objectives of this EMP are to:

- Protect life, health and well-being of human and other forms of life, aesthetic enjoyment and local amenity,
- Provide strategies aimed at minimising avoidable environmental harm during the remediation of the Site, and
- Comply with the relevant statutory environmental requirements and industry best practise.

6.0 ACID SULFATE SOIL MANAGEMENT

6.1 Pipeline Trenching

Acid Sulfate Soil investigations will be undertaken along sections of the alignment that will result in disturbance to land below 5 m AHD. This information is summarised in Table 1 along with the maximum excavation depths and conservative estimates of excavation volumes. A trench width of 2.5 m has been assumed. The liming rates will be calculated once the investigations are completed.

Table 1. Summary of pipeline works between Ridgelands Road (near Fitzroy River) and Aldoga that will disturb land below 5 m AHD

Plan No.	Chainage	Disturbance Below 5 m AHD	Length of Disturbance Below 5 m AHD (m)	Maximum Excavation Depth (m)	Indicative Excavation Volume[1] (m^3)	Liming Rate (kg Aglime /m^3)
Ridgelands Road (near Fitzroy River) to Neerkol Creek						
4043	4000-5700	NA	-	-	-	NA
4044	5700-7400	Only chainage 7200-7400	200	3.20	1600	TBD

Plan No.	Chainage	Disturbance Below 5 m AHD	Length of Disturbance Below 5 m AHD (m)	Maximum Excavation Depth (m)	Indicative Excavation Volume[1] (m^3)	Liming Rate (kg Aglime /m^3)
4045	7400-9000	Only chainage 7400-7650	250	2.57	1606	TBD
4046	9000-10600	NA	-	-	-	NA
4047	10600-12200	NA	-	-	-	NA
4048	12200-13800	NA	-	-	-	NA
4049	13800-15400	Only chainage 13800-13850 and 14650-15200	600	3.70	5550	TBD
4050	15400-17000	Only chainage 16680-16710	30	3.91	293	TBD
Neerkol Creek to south of Roope Road						
4051	17000-18600	Entire section	1600	3.13	12520	TBD
4052	18600-20200	Entire section	1600	3.42	13680	TBD
4053	20200-21800	Entire section	1600	3.16	12640	TBD
4054	21800-23400	Entire section	1600	4.22	16880	TBD
4055	23400-25000	Entire section	1600	3.99	15960	TBD
4056	25000-26600	Entire section	1600	3.51	14040	TBD
4057	26600-28200	Entire section	1600	3.11	12440	TBD
4058	28200-29800	Entire section	1600	4.83	19320	TBD
4059	29800-31400	Entire section	1600	3.22	12880	TBD
4060	31400-33000	Entire section	1600	3.58	14320	TBD
South of Roope Road to South of Bob's Creek						
4061	33000-34600	Entire section	1600	3.53	14120	TBD
4062	34600-36200	Entire section	1600	3.77	15080	TBD
4063	36200-37800	Entire section	1600	3.08	12320	TBD
4064	37800-39400	Entire section	1600	3.26	13040	TBD
4065	39400-41000	Entire section	1600	3.64	14560	TBD
4066	41000-42600	Only chainage 41000-41800	800	3.07	6140	TBD
4067	42600-44200	Entire section	1600	3.08	12320	TBD

Plan No.	Chainage	Disturbance Below 5 m AHD	Length of Disturbance Below 5 m AHD (m)	Maximum Excavation Depth (m)	Indicative Excavation Volume[1] (m^3)	Liming Rate (kg Aglime /m^3)
4068	44200-45800	Only chainage 45200-45300	100	3.18	795	TBD
4069	45800-47400	NA	-	-	-	NA
4070	47400-49000	NA	-	-	-	NA
South of Bob's Creek to east of Bajool Port Alma Road						
4071	49000-50600	Only chainage 49350-49700	350	3.65	3193	TBD
4072	50600-52200	Entire section	1600	2.96	11840	TBD
4073	52200-53800	Entire section	1600	3.21	12840	TBD
4074	53800-55400	Entire section	1600	4.26	17040	TBD
4075	55400-56500	Entire section	1100	3.95	10862	TBD
4093	56500-57200	Entire section	700	8.22	14385	TBD
4076	57200-58600	Entire section	1400	3.46	12110	TBD
4077	58600-60200	Entire section	1600	3.56	14240	TBD
4078	60200-61800	Entire section	1600	3.28	13120	TBD
4079	61800-63400	Entire section	1600	3.75	15000	TBD
4080	63400-65000	Entire section	1600	3.15	12600	TBD
East of Bajool Port Alma Road to Raglan						
4081	65000-66600	Entire section	1600	3.96	15840	TBD
4082	66600-68200	NA	-	-	-	NA
4083	68200-69800	Entire section	1600	3.30	13200	TBD
4084	69800-71400	Entire section	1600	2.92	11680	TBD
4085	71400-73000	Entire section	1600	6.70	26800	TBD
4086	73000-74600	All chainages except 74200-74300	1500	9.21	34537	TBD
4087	74600-76000	Only chainage 74600-74900	300	3.83	2872	TBD
Raglan to Aldoga						
6034 series	76000-101390	NA	-	-	-	NA

Notes: [1] Indicative only and calculated using an average trench width of 2.5 m. Insitu volume only; does not include bulking factor. This is considered a conservative estimate given that the maximum excavation depth is adopted per section. NA = Not applicable, TBD = To Be Determined.

6.2 Pipeline Crossing

Acid Sulfate Soil investigations will be undertaken at specific low-lying (i.e., <5 m AHD) creek, river or road crossings where deeper excavations are proposed due to the adoption of HDD methods to install the pipe. These locations are summarised in Table 2 along with the maximum boring depths and conservative estimates of excavation volumes. The liming rates for spoil excavated will be calculated once the investigations are completed.

Waterways shown in blue text are considered 'major' waterways for the purpose of this report as they are located in areas with high probability of ASS occurrence. Groundwater monitoring will be required at the banks of the major waterway crossings.

Table 2: Summary of data for deep excavation works between Fitzroy River and Raglan

Document	Chainage	Reason for Disturbance	Length of Disturbance (m)	Maximum Boring Depth (m)	Indicative Excavation Volume[1] (m^3)	Liming Rate (kg Aglime /m^3)
4120	7375-7575	Lion Lagoon	200	2.47	180	TBD
Creek Crossing	9700	Lion Creek	10	3.0	9	TBD
Creek Crossing	16000	Neerkol Creek	37	3.0	35	TBD
4125	22175-22215	Old Capricorn Highway	40	4.96	35	TBD
4130	23960-24040	Bruce Hwy/Yeppen Rail line	80	5.68	70	TBD
Creek Crossing	25500	Scrubby Creek	122	3.0	110	TBD
4137	29170-29270	Gavial Creek	100	10.95	90	TBD
Creek Crossing	38100	Midgie Creek	10	3.0	9	TBD
4177	40710-40770	Bob's Creek	60	6.57	53	TBD
Creek Crossing	45900	Station Creek	50	3.0	44	TBD
Creek Crossing	46500	Oakey Creek	20	3.0	18	TBD
4140	54560-54615	Bajool Rail Station	55	3.11	50	TBD
4145	56825-56935 (325 to 435)	Inkerman Creek	110	8.22	98	TBD
4172	58250-58290	Bajool Port Alma Road	40	4.36	35	TBD
4150	65600-65650	Twelve Miles Creek	50	3.97	45	TBD

Document	Chainage	Reason for Disturbance	Length of Disturbance (m)	Maximum Boring Depth (m)	Indicative Excavation Volume[1] (m^3)	Liming Rate (kg Aglime /m^3)
4155	66435-66480	Marble Creek	45	3.47	40	TBD
Creek Crossing	68700	Pelican Creek	80	3.0	71	TBD
4160	72355-72450	Horrigan Creek	95	13.22	85	TBD
4165	73485-73575	Raglan Creek	90	9.54	80	TBD
Creek Crossing	102500	Larcom Creek	36	8.0	32	TBD
Creek Crossing	111100	Sandy Creek	10	3.0	9	TBD

Notes: [1] Indicative only and calculated using an average trench diameter of 1.067 m. Insitu volume only; does not include bulking factor. This is considered a conservative estimate given that the maximum boring depth is adopted per section. Creeks/rivers shown in blue will require groundwater monitoring at the banks. TBD = To Be Determined.

6.3 Other Areas

ASS investigations will also be required at the Fitzroy Pump Station as the area is located below 5 m AHD. Investigations will be required to a maximum depth of 13 m below ground level. The volume of disturbance is currently unknown as design drawings are not yet finalised.

7.0 CONTRACTOR MANAGEMENT

The Principal Contractor (MBJV) and sub-contractors are required to comply with the provisions of this EMP at all times.

8.0 MONITORING AND INSPECTION

Environmental monitoring and inspection of the FGP Project will be carried out by means of a routine monitoring program. These measures will be used to identify any areas of non-conformance or opportunities for improvement. Monitoring shall be documented as outlined in Section 12.0.

The groundwater will need to meet the appropriate discharge criteria before being allowed to discharge via soaker hoses or similar onto the ground and allowed to infiltrate back into the local water table. Discharge to the environment must also consider the presence of any contaminants in the water to be discharged.

9.0 ENVIRONMENTAL COMPLIANCE

Any non-compliance with the Environmental Procedures specified in this EMP must be addressed promptly and enacted as soon as is practical, to avoid environmental harm occurring.

The personnel responsible for the non-compliance must be notified immediately for purposes of issuing corrective action requests (CAR).

Non-compliances are to be documented/reported as outlined in Section 12.0.

10.0 AUDITING OF THE EMP

Earthworks and environmental procedures undertaken at the Site may be audited for compliance with this EMP.

11.0 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 12.

12.0 REPORTING FRAMEWORK

12.1 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 (MBJV) to verify the satisfactory completion of an appropriate Site Induction form.

12.2 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.

12.3 Environmental Compliance Reports

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

12.4 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 issued to the Principal Contractor (MBJV).

12.5 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.

A Material Tracking Sheet is attached as Form A to this ASS EMP.

12.6 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 requried. Soil Treatment Monitoring Forms need to be retained for record keeping.

A Soil Treatment Monitoring Forms is attached as Form B to this ASS EMP.

12.7 Concerns Register

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

A Concerns Register is attached as Form C to this ASS EMP.

13.0 REFERENCES

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*')

Project Specific Documents

- Arup 2008, ‘Soils and Contaminated Land (Chapter 5)’, in *Gladstone-Fitzroy Pipeline Project Environmental Impact Statement,* Gladstone Area Water Board (GAWB)
- Arup 2008, ‘Water Resources and Water Quality (Chapter 9)’, in *Gladstone-Fitzroy Pipeline Project Environmental Impact Statement,* Gladstone Area Water Board (GAWB
- GHD Pty Ltd 2022, *Construction Environmental Management Plan, Fitzroy to Gladstone Pipeline*, Gladstone Area Water Board, Project number 12559247 Rev C
- SMEC Pty Ltd 2022, *ASS Identified (Technical Memorandum), Fitzroy to Gladstone Pipeline (FGP) Project*, Reference number 30032687-CVL-MEM-FGP Pipeline ASS Rev D
- PSK Environmental 2023, *Acid Sulfate Soil Desktop Assessment and Gap Analysis, Fitzroy to Gladstone Pipeline (FGP) Project, Queensland*, Document Number: J0323-010-001 Rev0, dated 23 March 2023.
- PSK Environmental 2023, *Proposed Acid Sulfate Soil Sampling Approach - Fitzroy to Gladstone Pipeline (FGP) Project*, Document Number: J0323-010-006 Rev0, dated 17 April 2023.

14.0 STUDY LIMITATIONS

Your attention is drawn to the document – Limitations, attached at Appendix D.

The statements presented in this document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks associated with the services provided for this project. The document is not intended to reduce the level of responsibility accepted by PSK, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

PSK ENVIRONMENTAL

Dr Amir Shiva
Senior Environmental Scientist / Operations

Dr Silvana Santomartino
Managing Director (CPSS-CSAM)

A.B.N. 87162 860 371

FIGURE

Alton Downs
Fitzroy River
Lion Lagoons
Gracemere
Midgee
Fitzroy River
Casuarina Island
Bajool
Raglan
Aldoga

LEGEND

- Pipeline Alignment
- Major Watercourses

Notes:
1. Base plan map extracted from QGIS on 20/03/2023
2. EMR- Environmental Management Lots

PSK Environmental

Client:	MBJV	
Drawn:	TW	22/03/23
Checked:	SLS	22/03/23
Scale:	0 m — 10 km	

Project: Fitzroy to Gladstone Pipeline Project

Title: **Fitzroy to Gladstone Pipeline- Alignment Overview**

N

Job No.:	Fig No.:	Rev:	
J0323-010-001	1	0	A3

FORMS

Material Tracking Sheet (Trenching)

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: _____

CONCERNS REGISTER

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

APPENDIX A

HISTORICAL ACID SULFATE SOIL DATA SUMMARY (RECALCULATED)

TABLE 1: HISTORICAL ACID SULFATE SOIL TESTING DATA SUMMARY

Quantitative Test Results

Location/Depth (m)	Source	Soil Texture	Action Criteria (mol H^+/t)	TAA (mol H^+/t)	S_{CR}/S_{POS} (%)	a-S_{CR}/a-S_{POS} (mol H^+/t)	ANC (mol H^+/t)	Net Acidity (excl ANC) (mole H^+/t)	Liming Rate (excl ANC) (kg Ag Lime /m^3)	Net Acidity (incl ANC) (mole H^+/t)	Liming Rate (incl ANC) (kg Ag Lime /m^3)
BH411 2.00-2.50	SMEC (2022)	N/A	18	<10	<0.02	<10	-	0	nil	0	nil
TP424 0.50-0.80	SMEC (2022)	Silty Clay	18	12	<0.02	<10	-	12	nil	12	nil
TP431 0.50-0.90	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	218	0	nil	0	nil
TP433 1.40-1.80	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	143	0	nil	0	nil
TP434 1.50-1.60	SMEC (2022)	Sandy Clay	18	<10	<0.02	<10	823	0	nil	0	nil
TP501 0.70-0.80	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	-	0	nil	0	nil
TP504 0.30-0.50	SMEC (2022)	Sandy Silt	18	<10	<0.02	<10	-	0	nil	0	nil
TP116 0.50-0.60	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	-	0	nil	0	nil
Chainage 67000-77000											
TP69 1.5m	ARUP (2008)	LC	18	26	<0.02	<10	-	26	3	**26**	3
TP70 0.5m	ARUP (2008)	MC	18	37	<0.02	<10	-	37	4	**37**	4
TP71 0.0-0.5m	ARUP (2008)	LC	18	31	<0.02	<10	-	31	4	**31**	4
TP72 0.0-0.2m	ARUP (2008)	SL	18	20	<0.02	<10	-	20	2	**20**	2
TP73 0.0-0.5m	ARUP (2008)	SCL	18	12	<0.02	<10	-	12	nil	12	nil
BH32 6.00-6.45	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	-	0	nil	0	nil
BH47 2.00-2.30	SMEC (2022)	Clay	18	<10	0.84	524	137	524	61	**432**	51
BH47 3.00-3.30	SMEC (2022)	Clay	18	<10	0.85	530	175	530	62	**414**	48
BH47 4.0-4.30	SMEC (2022)	Clay	18	<10	0.06	37	156	37	4	0	nil
BH47 5.50-5.80	SMEC (2022)	Gravelly Sand	18	<10	0.03	19	150	19	2	0	nil
TP74 0.00-0.25m	ARUP (2008)	SCL	18	11	<0.02	<10	-	11	nil	11	nil
TP74 0.50-0.75m	ARUP (2008)	LC	18	<2	<0.02	<10	-	0	nil	0	nil
TP74 1.00-1.25m	ARUP (2008)	SCL	18	<2	<0.02	<10	62	0	nil	0	nil
TP74 1.50-1.75m	ARUP (2008)	MC	18	<2	<0.02	<10	60	0	nil	0	nil
TP74 2.5-2.75m	ARUP (2008)	MC	18	34	<0.02	<10	-	34	4	**34**	4
TP74 2.75-3.00m	ARUP (2008)	LC	18	92	<0.02	<10	-	92	11	**92**	11
BH48 0.70-0.80	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	62	0	nil	0	nil
BH48 1.50-1.95	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	-	0	nil	0	nil
BH48 3.00-3.45	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	-	0	nil	0	nil
BH48 4.05-4.40	SMEC (2022)	Silty Clay	18	150	<0.02	<10	150	150	18	**150**	18
BH48 6.0-6.95	SMEC (2022)	Silty Sand	18	<10	<0.02	<10	-	0	nil	0	nil
BH48 7.50-7.95	SMEC (2022)	Silty Sand	18	<10	<0.02	<10	-	0	nil	0	nil
TP77 0.0-0.6m	ARUP (2008)	LS	18	13	0.02	12	-	25	3	**25**	3
TP78 0.0-0.2m	ARUP (2008)	CL	18	44	<0.02	<10	-	44	5	**44**	5
TP79 0.00-0.25m	ARUP (2008)	SL	18	10	<0.02	<10	-	10	nil	10	nil
TP79 2.00-2.25m	ARUP (2008)	HC	18	<2	<0.02	<10	53	0	nil	0	nil
TP80 0.00-0.25m	ARUP (2008)	SCL	18	18	<0.02	<10	-	18	nil	18	nil
TP80 1.00-1.25m	ARUP (2008)	LS	18	<2	<0.02	<10	-	0	nil	0	nil
TP81 0.00-0.25m	ARUP (2008)	SCL	18	8	<0.02	<10	-	8	nil	8	nil
TP81 0.50-0.75m	ARUP (2008)	ZCL	18	<2	<0.02	<10	184	0	nil	0	nil
TP82 0.00-0.25m	ARUP (2008)	ZCL	18	5	<0.02	<10	50	5	nil	0	nil
TP82 0.50-0.75m	ARUP (2008)	LC	18	22	<0.02	<10	-	22	3	**22**	3
TP82 2.00-2.25m	ARUP (2008)	HC	18	11	<0.02	<10	-	11	nil	11	nil

Australian Soil and Land Survey Field Handbook (3rd ed) - Field texture grade

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LS - Loamy sand	SCL - Sandy clay loam	LMC - Light medium clay
CS - Clayey sand	CL - Clay loam	MC - Medium clay
SL - Sandy loam	CLS - Clay loam, sandy	MHC - Medium heavy clay
L - Loam	ZCL - Silty clay loam	HC - Heavy clay

Notes:

TAA - Titratable Actual Acidity, S_{CR} - Chromium Reducible Sulfur, S_{POS} - SPOCAS, ANC - Acid Neutralising Capacity, '-' denotes no analysis undertaken

Net acidity recalculated by PSK.

Liming rates are indicative and based on a Factor of Safety (FOS) of 1.5, assumed density of 1.5 tonne/m3 for clay and 1.7 tonne/m3 for sand and an Ag Lime neutralising value of 96.

SMEC did not provide soil classification as per the Australian Soil and Land Survey Field Handbook (3rd ed)

TABLE 1: HISTORICAL ACID SULFATE SOIL TESTING DATA SUMMARY

Quantitative Test Results

Location/Depth (m)	Source	Soil Texture	Action Criteria (mol H^+/t)	TAA (mol H^+/t)	S_{CR}/S_{POS} (%)	a-S_{CR}/a-S_{POS} (mol H^+/t)	ANC (mol H^+/t)	Net Acidity (excl ANC) (mole H^+/t)	Liming Rate (excl ANC) (kg Ag Lime /m^3)	Net Acidity (incl ANC) (mole H^+/t)	Liming Rate (incl ANC) (kg Ag Lime /m^3)
Chainage 57000-67000											
TP83 0.0-0.2m	ARUP (2008)	CL	18	23	<0.02	<10	-	23	3	**23**	3
TP87 0.3-0.45m	ARUP (2008)	ZL	18	29	<0.02	<10	-	29	3	**29**	3
TP88 0.0-0.6m	ARUP (2008)	SL	18	4	<0.02	<10	64	4	nil	0	nil
TP91 0.50-0.75m	ARUP (2008)	HC	18	25	<0.02	<10	33	25	3	3	nil
TP92 0.00-0.25m	ARUP (2008)	HC	18	46	<0.02	<10	-	46	5	**46**	5
TP92 0.75-1.0m	ARUP (2008)	HC	18	26	<0.02	<10	-	26	3	**26**	3
TP92 1.50-1.75m	ARUP (2008)	HC	18	6	<0.02	<10	18	6	nil	0	nil
TP93 1.25-1.50m	ARUP (2008)	HC	18	21	<0.02	<10	-	21	2	**21**	2
TP94 1.25-1.50m	ARUP (2008)	LMC	18	18	<0.02	<10	-	18	nil	18	nil
TP95 0.00-0.25m	ARUP (2008)	SCL	18	6	<0.02	<10	-	6	nil	6	nil
TP95 2.25-2.50m	ARUP (2008)	LC	18	<2	<0.02	<10	29	0	nil	0	nil
TP96 2.25-2.50m	ARUP (2008)	LC	18	6	<0.02	<10	-	6	nil	6	nil
TP97 2.75-3.0m	ARUP (2008)	LC	18	<2	0.22	137	33	137	16	**115**	13
TP98 0.00-0.25m	ARUP (2008)	HC	18	6	<0.02	<10	-	6	nil	6	nil
TP98 2.75-3.0m	ARUP (2008)	HC	18	<2	<0.02	<10	23	0	nil	0	nil
TP99 0.00-0.25m	ARUP (2008)	MC	18	<2	<0.02	<10	304	0	nil	0	nil
TP102 0.00-0.25m	ARUP (2008)	LC	18	<2	<0.02	<10	-	0	nil	0	nil
TP102 0.75-1.0m	ARUP (2008)	MC	18	<2	<0.02	<10	53	0	nil	0	nil
TP102 2.25-2.50m	ARUP (2008)	HC	18	<2	<0.02	<10	149	0	nil	0	nil
Chainage 50000-57000											
TP103 2.50-2.75m	ARUP (2008)	MC	18	<2	0.03	19	209	19	2	0	nil
TP104 1.00-1.25m	ARUP (2008)	HC	18	<2	<0.02	<10	29	0	nil	0	nil
TP104 1.50-1.75m	ARUP (2008)	HC	18	<2	0.03	19	66	19	2	0	nil
TP105 0.00-0.25m	ARUP (2008)	LC	18	13	0.03	19	-	32	4	**32**	4
TP105 0.50-0.75m	ARUP (2008)	HC	18	20	<0.02	<10	32	20	2	0	nil
TP105 2.25-2.50m	ARUP (2008)	LC	18	<2	0.02	12	199	12	nil	0	nil
BH901 2.50-2.95	SMEC (2022)	N/A	18	<10	0.19	119	-	119	14	**119**	14
BH901 4.00-4.45	SMEC (2022)	N/A	18	<10	0.57	356	-	356	42	**356**	42
BH902 2.50-2.95	SMEC (2022)	N/A	18	<10	1.63	1017	-	1017	119	**1017**	119
BH902 4.00-4.45	SMEC (2022)	N/A	18	<10	0.20	125	-	125	15	**125**	15
TP106 1.75-2.0m	ARUP (2008)	LC	18	13	0.97	605	-	618	72	**618**	72
TP106 2.25-2.5m*	ARUP (2008)	LC	18	29	0.08	50	-	93	11	**93**	11
TP107 0.25-0.5m	ARUP (2008)	LC	18	<2	0.04	25	90	25	3	0	nil
TP108 0.0-0.25m	ARUP (2008)	MC	18	5	<0.02	<10	-	5	nil	5	nil
TP108 2.75-3.0m	ARUP (2008)	HC	18	24	<0.02	<10	-	24	3	**24**	3
TP109 0.0-0.25m	ARUP (2008)	LS	18	13	<0.02	<10	-	13	nil	13	nil
TP110 0.0-0.25m	ARUP (2008)	LC	18	12	<0.02	<10	-	12	nil	12	nil
TP112 2.25-2.5m	ARUP (2008)	MC	18	9	0.02	12	-	21	3	**21**	3
TP114 0.0-0.25m	ARUP (2008)	ZL	18	14	<0.02	<10	-	14	nil	14	nil
TP119 0.0-0.25m	ARUP (2008)	ZL	18	10	<0.02	<10	-	10	nil	10	nil
TP119 0.5-0.75m	ARUP (2008)	ZCL	18	9	<0.02	<10	67	9	nil	0	nil

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PSK Environmental

Notes:

TAA - Titratable Actual Acidity, S_{CR} - Chromium Reducible Sulfur, S_{POS} - SPOCAS, ANC - Acid Neutralising Capacity, '-' denotes no analysis undertaken

Net acidity recalculated by PSK.

Liming rates are indicative and based on a Factor of Safety (FOS) of 1.5, assumed density of 1.5 tonne/m3 for clay and 1.7 tonne/m3 for sand and an Ag Lime neutralising value of 96.

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Sample contains retained acidity (16 moles H^+/t)

TABLE 1: HISTORICAL ACID SULFATE SOIL TESTING DATA SUMMARY

Quantitative Test Results

Location/Depth (m)	Source	Soil Texture	Action Criteria (mol H^+/t)	TAA (mol H^+/t)	S_{CR}/S_{POS} (%)	a-S_{CR}/a-S_{POS} (mol H^+/t)	ANC (mol H^+/t)	Net Acidity (excl ANC) (mole H^+/t)	Liming Rate (excl ANC) (kg Ag Lime /m^3)	Net Acidity (incl ANC) (mole H^+/t)	Liming Rate (incl ANC) (kg Ag Lime /m^3)
Chainage 34000-50000											
TP123 0.25-0.5m	ARUP (2008)	MC	18	23	<0.02	<10	90	23	3	0	nil
TP130 0.0-0.25m	ARUP (2008)	ZL	18	35	<0.02	<10	-	35	4	**35**	4
TP130 0.5-0.75m	ARUP (2008)	ZL	18	13	<0.02	<10	-	13	nil	13	nil
TP131 0.0-0.25m	ARUP (2008)	MHC	18	13	<0.02	<10	-	13	nil	13	nil
TP132 0.0-0.25m	ARUP (2008)	ZL	18	24	<0.02	<10	-	24	3	**24**	3
TP138 0.0-0.25	ARUP (2008)	LS	18	9	<0.02	<10	-	9	nil	9	nil
Chainage 2000-34000											
TP151 1.75-2.0m	ARUP (2008)	LC	18	25	<0.02	<10	-	25	3	**25**	3
TP155 1.75-2.0m	ARUP (2008)	MC	18	<2	<0.02	<10	16	0	nil	0	nil
TP159 0.0-0.6m	ARUP (2008)	LC	18	2	<0.02	<10	-	2	nil	2	nil
TP160 0.0-0.5m	ARUP (2008)	ZL	18	4	<0.02	<10	-	4	nil	4	nil
TP163 0.0-0.9m	ARUP (2008)	LC	18	12	<0.02	<10	-	12	nil	12	nil
TP163 2.25-2.50m	ARUP (2008)	LMC	18	<2	<0.02	<10	136	0	nil	0	nil
TP165 0.00-0.25m	ARUP (2008)	SCL	18	25	<0.02	<10	25	25	3	8	nil
TP165 1.00-1.25m	ARUP (2008)	LC	18	<2	<0.02	<10	260	0	nil	0	nil
TP166 0.00-0.25m	ARUP (2008)	MC	18	16	<0.02	<10	-	16	nil	16	nil
TP167 0.00-0.25m	ARUP (2008)	MC	18	<2	<0.02	<10	75	0	nil	0	nil
TP167 2.50-2.75m	ARUP (2008)	HC	18	<2	<0.02	<10	55	0	nil	0	nil
TP105 0.40-0.90	SMEC (2022)	Clay	18	19	<0.02	<10	-	19	2	**19**	2
TP168 0.00-0.25m	ARUP (2008)	ZCL	18	25	<0.02	<10	-	25	3	**25**	3
TP169 0.00-0.25m	ARUP (2008)	LMC	18	27	<0.02	<10	80	27	3	0	nil
TP172 0.00-0.25m	ARUP (2008)	CL	18	26	<0.02	<10	80	26	3	0	nil
TP172 0.75-1.0m	ARUP (2008)	LC	18	<2	<0.02	<10	173	0	nil	0	nil
TP102 0.40-0.60	SMEC (2022)	Silty Clay	18	<10	<0.02	<10	-	0	nil	0	nil
Fitzroy River											
TP220 0.0-0.4m	ARUP (2008)	LC	18	<2	<0.02	<10	-	0	nil	0	nil
TP220 2.0-3.0m	ARUP (2008)	LC	18	2	<0.02	<10	28	2	nil	0	nil

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APPENDIX B

ENVIRONMENTAL PROCEDURES
(ACID SULFATE SOILS)

Elements / Issues:	**Acid Sulfate Soils** – Earthworks operations involving disturbance of ASS, specifically: 1. Excavation of shallow AASS/PASS soils 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 Actual and Potential Acid Sulfate Soils (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 December 2013. Includes Addendum released in July 2014 • State Planning Policy, July 2017 • State Planning Policy - State Interest Guideline Water Quality April 2016 (Policy 9) • State Planning Policy 2/02, 'Planning and Managing Development involving Acid Sulfate Soils' Queensland Acid Sulfate Soil Technical Manual – Soil Management Guidelines 1 (Version 3.8)

Statutory Requirements (Cont.):	• 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'*) • Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines V 4.0, Brisbane: Department of Science, Information Technology, Innovation and the Arts, Queensland Government, 2014 (*Soil Management Guidelines V4)*
Performance Limits:	1. ASS spoil from trench excavations that is placed as backfill can be limed *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. 2. Any lime treated ASS spoil from the Fitzroy Pump Station, pipeline trenching or creek/road crossings 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. 3. 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. 4. Photographic records made of the developed site should be used to demonstrate no obvious degeneration of aesthetic value of the site and immediate surrounds. 5. 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.

Performance Limits (Cont.):

6. 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.

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

8. Any untreated spoil sent off-site for disposal must meet the acceptance criteria of the proposed disposal facility (e.g. licensed landfill).

Groundwater

9. Monitoring parameters and provisional limits for groundwater are to be based on 'base line' values established prior to construction.

10. 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

11. 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.

Implementation Strategy (Cont.):

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/m^2 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 m^3 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.

Creek/River/Road Crossing

13. Horizontal Directional Drilling (HDD) will be adopted at a number of creek, river and road crossings. Additional ASS testing is required at the banks of the waterways where HDD will result in disturbance to soils below 5 m AHD (refer Table 2).
14. 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*. If ANC corroboration testing is undertaken, and ANC is deemed to be effective, the net acidity equation can take into account ANC.
15. Spoil is to be lime treated at the rates determined following the ASS investigations.
16. ASS material excavated from HDD activities is to be placed within a purpose built lime treatment area for treatment and verification testing using the SPOCAS or CSR suite. Testing shall be conducted at a rate of 1 test per 100 m^3 of spoil, or minimum 1 sample per excavation location at shafts and micro tunnels (so 3 samples per crossing).
17. Any soil that does not meet the performance criteria shall have further lime added and be re-tested to confirm neutralisation.

Fitzroy Pump Station

18. Additional ASS testing is required at the Fitzroy Pump Station. Spoil is to be lime treated at rates determined following the ASS investigations within the footprint of the pump station.

Implementation Strategy (Cont.):

19. ASS material excavated from the during the construction of the pump station is to be placed within the purpose built lime treatment area for treatment and validation using the SPOCAS or CSR suite. Testing shall be conducted at a rate of 1 test per 100 m^3 of spoil.
20. Any soil that does not meet the performance criteria shall have further lime added and be re-tested to confirm neutralisation.

Management of ASS

21. 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.
22. 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 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/m^2.
23. 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.
24. 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

25. 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.
26. 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

27. Design details of designated lime treatment areas is to be included in this EMP once these are available.
28. Lime treatment areas shall not be constructed within 50 m of waterways.
29. 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.
30. 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) a

Implementation Strategy (Cont.):

layer 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/m^2 and worked in using a rotary hoe (or similar) and compacted to create a suitable 'pad'.

31. 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.
32. All spoil requiring treatment on the pad is to be treated within 24 hours of disturbance.
33. 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.
34. 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.
35. Materials requiring liming at differing rates are to be kept separated at all times and tracked independently.
36. 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.
37. 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.
38. Lime treatment areas are to be reinstated at the conclusion of the project.

Lime Guard Layers

39. 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.
40. 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

41. Mitigation strategies in the Corrective Actions Section shall be implemented if remediation procedures fail to achieve the nominated 'Performance Limits'.
42. 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

Implementation Strategy (Cont.):

covered, where necessary to prevent nuisance dust, in volumes sufficient for predicted treatment works.

43. 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.
44. 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

45. No 'active' drawdown of the permanent groundwater table is to take place in areas containing PASS during trenching or any other construction activities.
46. 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).
47. 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).
48. 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.
49. 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).
50. 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

51. 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.
52. To enable adequate monitoring of lime mixing operations the following must be adopted:
53. A photographic record of the lime mixing procedure is to be made and retained for reference.
54. 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.

Implementation Strategy (Cont.):	**Groundwater** 55. Groundwater monitoring wells are to be installed at the following major creek/river crossings, which are located in areas mapped as containing ASS, to assist with establishing baseline groundwater quality: • Lion Lagoon • Neerkol Creek • Bob's Creek • Inkerman Creek • Raglan Creek 56. If any wells are damaged and need replacement, a new well will need to be installed as close as is practical to the original location.
Monitoring:	1. Soil verification and groundwater and receiving water monitoring shall be undertaken by MBJV (the EO or an appointed third party). 2. Samples for laboratory analysis are to be collected in specified sample containers supplied for the purpose by a National Association of Testing Authorities (NATA) accredited laboratory and kept refrigerated during sampling and up until dispatched to the laboratory. 3. Lime verification sampling and analysis is to be undertaken on all treated spoil within 72 hours of lime treatment. **Water in Excavations** 4. The pH of water in any water bodies (including excavations) shall be monitored: • Daily, during actual disturbance (i.e. works) and • Weekly, if excavations remain open unexpectedly. 5. Water to be discharged from any excavation shall be monitored for pH and EC, prior to discharge to ground elsewhere onsite. The pH must be between 7.0 - 8.5 (or specified local discharge limits) for discharge. If necessary, a small amount of hydrated lime ($Ca(OH)_2$) shall be added to adjust the pH to between 7.0 and 8.5 before discharge. 6. Any water required to be released off-site or directly to water bodies shall be first sampled and analysed for following additional parameters: • Electrical Conductivity (EC), Dissolved Oxygen (DO), Suspended Solids; dissolved Aluminium (Al) and Iron (Fe). 7. Water discharged shall meet either ANZG limits or State/Local Water Quality Objectives (WQOs) as well as other non-ASS related parameters that may be specified for discharge offsite under the auspice of unrelated legislation.

Monitoring (Cont.):

Groundwater

8. A minimum of three rounds of baseline monitoring shall be undertaken to establish baseline conditions. Baseline monitoring is to include analysis for the general ASS suite including pH, EC, DO, acidity, alkalinity, sulfate, chloride, total and dissolved Fe and total and dissolved Al. Following this, a baseline range of values is to be reported for groundwater and shall be used as the basis for on-going monitoring at the site.
9. Should any wells become damaged during the monitoring period, they shall be repaired or replaced.
10. Monitoring of groundwater for pH, EC, DO, dissolved Fe and Al, acidity and alkalinity shall be undertaken at the following frequency:
    - Monthly during earthworks. Monitoring at each well need only start once construction activities commence within 500 m of the well,
    - Monthly for a period of 3 months post works, or until parameters remain within performance limits for 3 consecutive months.
11. Performance limits for pH and dissolved Al apply

Receiving Waters

12. During earthwork activities, monitoring of water bodies is to be undertaken if groundwater monitoring indicates likely impacts to groundwater/receiving water from earthwork activities.

Limed Spoil

13. 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 m^3.
14. Lime verification sampling and analysis is to be undertaken on all treated spoil within 72 hours of lime treatment.
15. 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.
16. Verification sampling must be undertaken by a suitably trained person.

Sample Handling

17. 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.
18. Samples must be submitted to the NATA accredited laboratory, accompanied by the appropriate 'chain of custody' documentation.

Reporting:

1. Permanent records of earthworks activities are to be kept and updated regularly, to enable review by means of a simple 'check list' or similar method. Typically, such records would include:
   - the location and depth of daily excavations
   - quantities of spoil from excavations and all material movements
   - the location of any untreated or treated spoil awaiting transport;
   - the final use/destination of ASS materials
   - quantities of lime brought on-site and onto the lime treatment area and quantities of AASS/PASS lime treated *insitu* and at the lime treatment pad
   - location of any lime treatment areas
   - pH of water collected and discharged from excavations during excavations
   - results of verification tests undertaken to support that ASS materials have been adequately neutralised
   - placement / replenishment of lime 'guard layers'
   - weather conditions on day(s) excavations works are conducted
   - records of water discharged off site (including any flood events)
   - requests for 'Corrective Actions' lodged and responses.
2. Any changes to adopted management procedures shall be documented and if deemed significant, the ASS EMP is to be revised accordingly.
3. The performance of the EMP shall be reported to the responsible party:
   - Weekly during earthwork activities
   - As soon as possible within 48 hours, if requests for 'Corrective Action' are lodged, or non-conformances with the EMP occur.
4. Post construction, all relevant site records shall be retained by the Project Manager and Principal (for possible future audit).
5. A copy of any weigh bills or other proof of quantities of any AASS/PASS spoil removed offsite (where applicable) shall be reported on a daily basis (by the Contactor) during works.
6. At least one assay test (per source) shall be furnished by the supplier confirming purity of lime used is at least 90%.
7. Records of maintenance, calibration and repairs to any monitoring or lime mixing equipment shall also be retained.

Corrective Actions:

1. Should failure to meet specified water monitoring 'Performance Indicators' occur, a request for Corrective Action shall be lodged (with the Construction Manager) within 48 hours; and operations involving the direct disturbance (excavation) of AASS/PASS soils ceased until specialist advice is sought, and remedial action or temporary preventative measures are taken (if required), and the Performance Indicators are then complied with.

Corrective Actions (Cont.):

Lime Treatment

2. 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 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.

Auditing:

Auditing is typically required to demonstrate implementation of construction and operation management strategies and compliance with 'Performance Limits' and 'Monitoring' specified in the ASS EMP.

1. An audit of construction activities and all site monitoring records shall be carried out periodically by a suitably qualified and experienced, person(s), (i.e. Environmental Consultant or Officer, or Government Regulator) during construction.
2. During construction, records of the on-going site monitoring shall be maintained for review by the auditor or the regulating authorities.
3. Post excavation, relevant site records (for each phase of the project) should be maintained for possible future audit and a copy given to the Principal.
4. A final Environmental Compliance Report is to be prepared. This report may need to include handover certification testing if requested by the State Regulator.
5. Permanent records for each stage of earthworks activities must be kept on site and updated regularly, to enable audit/review by means of a simple 'check list' or similar method.
6. Records of any testing instrument calibrations, i.e. pH meter, shall also be kept. Calibration will be in accordance with the manufacturer's instructions.

APPENDIX C

WATER TREATMENT GUIDANCE (SPP 2/02 STATE PLANNING POLICY GUIDELINE)

Table 5: Quantity of pure neutralising agent required to raise from existing pH to pH 7 for 1 megalitre of low salinity acid water.

Current Water pH	$[H^+]$ (mol/L)	H^+ in 1 Megalitre (mol)	Aglime to neutralise 1 Megalitre (kg pure $CaCO_3$)	Hydrated lime to neutralise 1 Megalitre (kg pure $Ca(OH)_2$)	Sodium bicarbonate to neutralise 1 Megalitre (kg pure $NaHCO_3$)
0.5	.316	316 228	15 824	11 716	26 563
1.0	.1	100 000	5004	3705	8390
1.5	.032	32 000	1600	1185	2686
2.0	.01	10 000	500	370	839
2.5	.0032	3200	160	118	269
3.0	.001	1000	50	37	84
3.5	.00032	320	16	12	27
4.0	.0001	100	5	4	8.4
4.5	.000032	32	1.6	1.18	2.69
5.0	.00001	10	0.5	0.37	0.84
5.5	.0000032	3.2	0.16	0.12	0.27
6.0	.000001	1	0.05	0.037	0.08
6.5	.00000032	.32	0.016	0.012	0.027

Notes on Table 5:

1. 1 m^3 = 1000 litre = 1 kilolitre = 0.001 Megalitre
2. Correlations between current water pH and [H+] (mol/L) do not account for titratable acidity. The titratable acidity component should be included in any calculations of neutralising agent requirements.
3. Agricultural lime has a very low solubility and may take considerable time to even partially react. While aglime has a theoretical neutralising value of 2 mol of acidity (H+), this tends to be only fully available when there is excess acid. This, together with it's very low solubility, means that much more aglime beyond the theoretical calculation will generally be required.
4. Hydrated lime is more soluble than aglime and hence more suited to water treatment. However, as $Ca(OH)_2$ has a high water pH, incremental addition and thorough mixing is needed to prevent overshooting the desired pH. The water pH should be checked regularly after thorough mixing and allowing sufficient time for equilibration before further addition of neutralising product.
5. Weights of material given in the table above are based on theoretical pure material and hence use of such amounts of commercial product will generally result in under treatment.
6. To more accurately calculate the amount of commercial product required, the weight of neutralising agent from the table should be multiplied by a purity factor (100/ Neutralising Value for aglime) or (148/ Neutralising Value for hydrated lime).
7. If neutralising substantial quantities of ASS leachate, full laboratory analysis of the water will be necessary to adequately estimate the amount of neutralising material required.
8. Neutralising agents such as hydrated lime $Ca(OH)_2$, quick lime CaO, and magnesium oxide MgO neutralise 2 mol of acidity (H^+), while sodium bicarbonate $NaHCO_3$ and sodium hydroxide NaOH neutralise only 1 mol of acidity.

APPENDIX D

LIMITATIONS

LIMITATIONS

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