PENINSULA PORTS

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Port Spencer Grain Export Facility

Amendment to Public Environmental Report

VOLUME 4 OF 5

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APPENDIX B – Draft Construction Environmental Management Plans (EMPs)

McConnell_Dowell
MCD Management System
ABN No. 71 002 929 017

CONTRACTORS ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

MMS ID: **HSEQ-ENV-TEM004-GEN-XXXXX**

Former Id: 025-J002-100

Client: Free Eyre

Project: Port Spencer

Location: Lipson, South Australia

Project No: 5279

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Revision History

Rev	Date	Details	Author	Reviewer	Approver
A	05-09-2019	DRAFT for ECI Review	M. Ross	T. Walker	N. Ayres

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COMPLIANCE TABLE

Requirement	Reference Location
TBC	TBC

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TERMS AND DEFINITIONS

PLEASE REFER TO MMS DEFINITIONS (**HSEQ-DOC-PRO001-GEN-GRP-ATT 2**) PLUS:

Term/ Acronym	Definition
CEMP	Contractor's Environmental Management Plan
CEP	Construction Execution Procedure
CMO	HSEQ compliance database software
Contractor	#MCCONNELL_DOWELL_ENTITY#
EMS	Environmental Management System
EPI	Environmental Protection Instructions
ERP	Emergency Response Plan
HSEQ	Health, Safety, Environment and Quality
JSEA / SWMS	Job Safety and Environment Analyses / Safe Work Method Statement
PDCA	Project Development, Controls and Approvals register
MMS	McConnell Dowell Management System

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1 INTRODUCTION

1.1 PLAN PURPOSE

This Contractor's Environmental Management Plan (CEMP) is part of the suite of documents required for Project activities as outlined in **PMP Document Register** (COR-GNG-TEM001-GEN-ALL ATT 1) and has been developed in accordance with ISO 14001:2015. It covers the strategies, systems and procedures to ensure the Port Spencer (hereafter referred to as the Project) meets legislative, contractual and other environmental obligations and targets as relevant.

This CEMP forms and integral part of the McConnell Dowell Management System (MMS) and applies to the activities that are anticipated to occur during the Project activities.

The purpose of this CEMP and incorporated documents is to:

- Achieve the Project's stated environmental objectives and targets.
- Ensure legal and contractual compliance.
- Outline procedures for the management of environmental protection issues relevant to the activities being performed.

The CEMP is the primary document for managing potential environmental risks and opportunities specific to the Project during the works. It provides the framework for identifying environmental aspects and impacts associated with the works. In addition, it provides a framework for managing the environmental controls and processes implemented by McConnell Dowell personnel, subcontractors and consultants in carrying out their respective responsibilities in relation to the Project.

1.2 PLAN SCOPE

In development of this CEMP the following considerations have been incorporated:

- External and internal issues.
- Compliance obligations.
- Organisational units, functions and physical boundaries.
- Activities and services.
- Authority and ability to exercise control and influence.

The scope of works in relation to the Project is outlined in Section 2.2.

1.3 INTERFACE WITH OTHER PLANS

This plan has been developed in conjunction with other management plans and strategic documents required under the Contract and should be read in conjunction with these plans. The relationship of the CEMP to other key management plans (including issues-specific sub-plans) is illustrated in Figure 1-1 below.

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[TBC - flowchart figure here outlining how various key plans are related]

Figure 1-1 Relationship of the CEMP to other key management plans

1.4 PLAN DISTRIBUTION

There is no restriction on the distribution of this Plan within McConnell Dowell Group entities. The controlled copy of the current version of this Plan will be maintained on the project document control database. A controlled copy of this Plan, as well as future updates, will be provided to Free Eyre.

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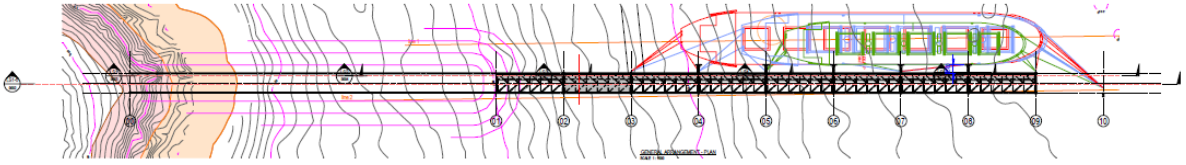
2 PROJECT DESCRIPTION AND SCOPE

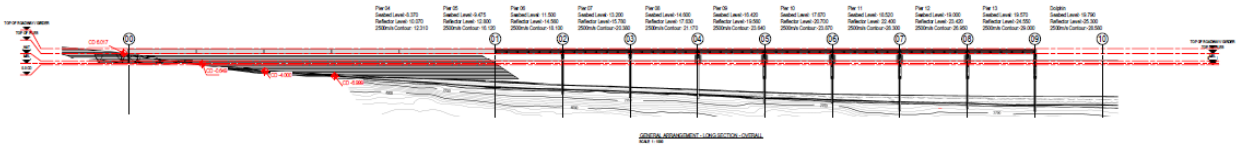
2.1 PROJECT DESCRIPTION AND CONTEXT

FREE Eyre Limited (FEL) is a public company owned by 475 EP grain growers and supporters and is proposing to develop and operate an alternate supply chain for the benefit of its shareholders and grain growers. This will include a deep-sea port (Panamax capable) at Port Spencer / Sheep Hill and up to one million tonnes of storage capacity.

The development of a Deep Water Port Facility (Port Spencer) at the Sheep Hill location was previously approved by the State Government under Section 48 for Centrex. The proposed development was the subject of a Public Environmental Report and an Assessment Report under Sections 46 and 46 C of the Act, declared a Major Development.

Various options are still being considered for the eventual wharf design, however this CEMP is based on the incrementally launch option.





2.1.1 Project Location

The environmental context of the activities and the environmental elements that may be impacted by the works or impact upon the works is outlined in Section 2.4 Environmental Context.

2.2 SCOPE OF WORKS

The main activities are outlined in Table 2-1.

Table 2-1 Key Activities

Activity	Timeframe/s
Design and logistics	October 2019 – March 2020
Offsite fabrication	May 2020 – October 2020
Site mobilisation	June 2020
Abutment preparation (excluding earthworks)	July 2020
Onsite fabrication	June 2020 – March 2021
Jetty construction using incrementally launched method	June 2020 – May 2021
Installation of piles and anchors (driven and drilled and grouted)	September 2020 – May 2021
Installation and welding of headstocks and bearings	June 2020 – June 2021
Installation of prefabricated sections	June 2020 – June 2021
Abrasive blasting and painting	June 2020 – June 2021
Mechanical and electrical works	September 2020 – June 2021
Installation and welding of ship-loader rail	September 2020 – June 2021

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2.3 PROJECT STAKEHOLDERS AND INTERESTED PARTIES

2.3.1 Key Participants

Key participants in the Project will be those identified in (Table 2-2):

Table 2-2 Key Participants

Participant	Details
Free Eyre	Client / Proponent
Jacobs	Design Engineers
McConnell Dowell	Principal Contractor
TBC	Civil Contractor (directly to Client)
TBC	Offsite Fabrication
TBC	Shipping Company/ Agent
TBC	Tugs / Marine Support
TBC	Concrete Supplier

2.3.2 Interested Parties and Influential Stakeholders

McConnel Dowell takes seriously its obligations in relation to understanding the needs and expectations of interested parties. The following parties (Table 2-3) are identified as having a specific interest in the Project with particular interest in its environmental management.

Table 2-3 Interested Parties

Interested Party	Details
Statutory & Regulatory Bodies TBC	Complying with the statutory and regulatory requirements as defined from time to time Local community complaints
Other agencies/ bodies specific to the project - TBC	Complying with their respective requirements as identified in the contract and from time to time
Public Neighbouring sensitive land uses Local residences Any other public interfaces	Safety and environmental compliance of the project Does not cause an environmental nuisance
Certification Body LRQA	The environmental management system developed based on MMS is being is complied with.

Consultation to understand the needs and expectations of these interested parties will be developed if and as required or necessary throughout the Project.

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2.4 ENVIRONMENTAL CONTEXT

Table 2-4 describes the environmental context of the works in relation to key environmental elements and known significant environmental issues. The performance of the activities, as outlined above, have the potential to impact on or be impacted by these.

More detailed information on the environmental conditions and related management control measures on site will be developed into environmental issue-specific management Sub-Plans.

Table 2-4 Environmental Context

Environmental Element	Existing Conditions and Key Issues
Air Quality	No major developments near the site and sensitive receptors are not located adjacent to the site. Civil contractor will be responsible for controlling dust during construction of the project works. Project will need to consider impacts of construction dust from saw cutting and blasting on adjacent marine environment.
Archaeology/ Cultural Heritage	A number of sites and locations were identified during background research and field studies, the majority of which are located outside the proposed development area or are registered as having no heritage value. Three sites of value (one non-indigenous and two indigenous) are identified within, or adjacent to, the area. Impacts can be avoid through design, and Ministerial approval is required to disturb the sites.
Fauna and Flora	Based on the outcomes of the Spencer Gulf proposed ports, and the approval conditions for Port Spencer, it is considered highly likely an EPBC self-assessment in the least will be needed for this proposed port development and transhipment locations. A key concern of the regulators for all recent port proposals has been the interaction or perceived risk of impacts to migrating whales, specifically the Southern right whale. Important to this project, the Port Spencer development was deemed a controlled action with Commonwealth approval granted provided environmental protection measures were in place to minimise harm to Southern right whales (and all cetaceans) during construction of the wharf. The main element of the approval was for the implementation of exclusion and shut down zones around the wharf construction to prevent underwater noise impacts to whales. The southern right whale is a baleen whale and one of three species classified as right whales. SA whale migration starts in May and finishes in October, with frequent sightings occurring between June and September.
Noise and Vibration	No major developments near the site and sensitive receptors are not located adjacent to the site. Conditions will result from impacts to marine fauna. Specific limits have been previously imposed through approval conditions.
Soils and Ground Contamination	Initial reports suggest slightly elevated heavy metal concentrations in the underlying soil (land) but are considered normal for the area and are a result of interaction with metamorphised rock.
Water - Groundwater	No significant contamination issues.

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Environmental Element	Existing Conditions and Key Issues
Water – Oceanic data	The wave climate and oceanic conditions at the site have been based on the Cardno Lawson Treloar report 'Wave Climate North of Lipson Cove' RM32182/LJ5577 DRAFT version 0.0 commissioned by SKM (now Jacobs) on behalf of Centrex Metals. This report indicates that the location of the proposed facility is largely protected from the strong swells of the Southern Ocean with a percentage exceedance for 0.5m swell height of 1.72%. The report also indicates that the swell direction ranges from East-South-East to South-South-East. In response to this, and to limit the mooring and berthing loads and therefore extent of infrastructure required, Jacobs has aligned the jetty options at a bearing of 125 degrees from North. It is assumed that vessels will be berthed bow into the swell.
Geotechnical	Golder Associates Report 087661006 031 R Rev 0 outlines a baseline geotechnical study for the proposed Centrex Export facility. The report included a program of test pitting and drilling 8 boreholes to determine the underlying conditions at the site. The borehole investigation found the site was underlain by weathered granite or schist ranging from medium to very high strength. It has been assumed for the purposes of concept design that the site has shallow underlying rock.

2.5 EXTERNAL & INTERNAL ISSUES

The external and internal issues are identified as having a specific interest in the Project, with particular interest in its environmental management. Refer to Table 2.5

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TABLE 2.5 – INTERNAL AND EXTERNAL ISSUES

External / Internal	Factor	Bias	Risk / Opportunity	Consequence	Control / Mitigation	Monitoring & Review Mechanism
Internal	Leadership	Negative	• Delegating authority to the project environmental manager and not taking ownership	• Senior management not accountable for the environmental management system (EMS)	• Senior management ensure that measurement of effectiveness of leaders is tied to the effectiveness of the EMS	• Management review meetings • Review KPIs
Internal	Resourcing	Negative	• Lack of competency of personnel involved with construction	• More frequent and severe environmental incidents	• Define the skill and knowledge required for each job	• CVs • Qualification / training certificates • Competency matrix • Position Descriptions
Internal	Resourcing	Negative	• Inadequacy of personnel to perform the work	• Personnel overloaded with work	• Determine the required number of personnel at tender stage and project commencement	• Internal audits
Internal	Operating	Negative	• Environmental management system not followed	• Non-conformances • Delays in construction • Additional costs	• Ensure inspection and monitoring plans are developed and complied with • Regular monitoring	• Non-conformance reports • Management review meetings
Internal	Operating	Negative	• Customer dissatisfaction	• Future work • Project takeover • Loss of revenue	• Ensure customer requirements are met	• Satisfaction surveys • Management review meetings • Internal audits

External / Internal	Factor	Bias	Risk / Opportunity	Consequence	Control / Mitigation	Monitoring & Review Mechanism
External	Supply Chain	Negative	• Failure to conform to requirements • Supply delays	• Loss of customer satisfaction • Production delays • Non-conformances	• Requirements clearly stated in the contracts • Perform audits / inspections on suppliers based on risk profile to the project • Incoming material inspections • Part B sub-contractor assessment	• Supplier audits • Supplier monitoring reports • Material receipt inspection reports
External	Legal	Negative	• New standards/ regulatory requirements	• Increased costs • Additional requirements missed out • Non compliance due to new regulations	• Monitor changes to standards via SAI Global web site • Change management process • Review record environmental legal and other requirements • Registration to regulator updates	• Internal audits • Regular reviews of legislation requirements at a project level
External	Customer	Negative	• Not meeting expectations of the contract	• Non compliance with contract requirements. • Environmental incidents due to not addressing site specific aspects	• Contract compliance table within all project CEMPs • Internal and external review process	• Compliance and obligations register

3 ENVIRONMENTAL MANAGEMENT APPROACH

3.1 ENVIRONMENTAL LEADERSHIP AND COMMITMENT

McConnell Dowell undertakes 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.

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

In line with the requirements of ISO 14001, McConnell Dowell Group top management, represented by the Executive Committee (EXCO), 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 (EXCO):

- 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; and
- Ensure the integration of the environmental management system requirements in to the organisation's business processes.

3.2 ENVIRONMENTAL POLICY

McConnell Dowell have established an Environmental Policy (Environmental Policy HSEQ-ENV-POL001-GEN-GRP endorsed by the McConnell Dowell Group CEO. This document directs the level of commitment to positive and proactive environmental performance for all activities (refer.

The Environmental Policy (attached at Appendix A) 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.

3.3 SUSTAINABILITY POLICY

McConnell Dowell have also established a Sustainability Policy (Sustainability Policy HSEQ-ENV-POL002-GEN-GRP also endorsed by the McConnell Dowell Group CEO. The policy outlines the Group's commitment to one of our five core values - sustainability

The Sustainability Policy (attached at Appendix A) makes the following key commitments:

- Business sustainability leadership through professionalism, competence and industry participation.

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- 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.

3.4 ROLES, RESPONSIBILITIES AND AUTHORITIES

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

All personnel will be made aware of environmental issues associated with the Project and their responsibilities through training and awareness methods detailed in Section 5.3.

The Organisational Chart describes the organisational structure for environmental management in Project delivery.

The roles and responsibilities of personnel specifically responsible for implementation of this document are summarised in Table 3-1 below. Note: roles and responsibilities for specific environmental operational controls are also set out in the **Environmental Management Standard** (REF-HSEQ-ENV-GUID004-GEN-GRP) and issue-specific Sub-Plans.

Table 3-1 Roles and Responsibilities

Role	Responsibilities
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 Project. Ensure the Project achieves legislative compliance. Provide leadership in the development of this plan 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 Project environmental management system and this plan. 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.

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Role	Responsibilities
Environmental Management Representative	Functional and technical leader for the Project's environmental obligations. Principal contact for internal and external communication in relation to environmental matters. Oversee all environmental management aspects of the Project. 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 document (and associated plans) is 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. Report significant incidents internally and externally as required by law, 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 Project. Ensure all staff and contractors engaged to work on the Project are appropriately inducted and trained in environmental issues and controls relevant to the Project. 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 Project objectives and targets Manage and track compliance with all environmental approvals, licences, permits and other obligations. Lead the tracking of environmental and sustainability targets for the Project. Ensure appropriate environmental training is identified in a Training Needs Analysis and that training is provided to personnel where required. Review and update this plan, as required. Prepare environmental data for monthly reports.
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 plan. Ensure design has minimal environmental impact.

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Role	Responsibilities
	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 plan 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	All personnel are responsible for complying with environmental controls and requirements of this plan. Active awareness, demonstrated by reporting inadequate environmental controls or practices to supervision.

3.4.1 Supplier and Subcontractor Management

All personnel engaged on the Project are required to operate within the requirements of this plan. Subcontractor selection and engagement, including consideration of environmental management and sustainability factors, is managed through the **Part B Pre-Award Evaluation** process **(*Delete/ retain as appropriate to region:* Part B Pre-Award Evaluation (**CMC-PRO-FRM009-GEN-ALL)**.**

Subcontractors will be made aware of environmental issues related to the Project and their responsibilities through training and awareness methods detailed in Section 5.3.

In some circumstances, based on the activities to be conducted by the subcontractor, the Environmental Management Representative may determine that the subcontractor be required to develop a Project specific Subcontractor Environmental Management Plan.

Where a Subcontractor Environmental Management Plan is required, the document is to address the specific work packages awarded and will be submitted to the Environmental Management Representative for approval. Works will be unable to commence until approval has been received. Such plans must assess the level of environmental risk and implement appropriate management controls for the subcontractor's full scope of work to a standard that is consistent with this plan.

Regardless of the approach to managing a subcontractor's environmental impacts, all subcontractors will be subject to the following:

- Regular on-site auditing to assess their performance against the requirements of this plan.
- Completion of the appropriate training requirements as specified.
- Implementation, protection and maintenance of environmental management controls as set out in environmental management documentation.
- Monthly reporting of sustainability data.

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4 PLANNING

4.1 RISK AND OPPORTUNITY IDENTIFICATION

Environmental risks and opportunities associated with the Project are managed through the **HSE Risk Management** (HSEQ-HS-PRO006-GEN-ALL) process and risks to the environmental management system shall be verified within the **Tender - Project Risk & Opportunities Register (CMC-RSK-TEM001-GEN-ALL)**. This process complies with the Standard AS/NZS ISO 31000:2009 Risk Management Principles and Guidelines. During Project execution, the principal objectives of risk management are to develop and monitor the implementation and effectiveness of risk treatments and to identify and evaluate changes in the risk profile of the Project.

4.2 ENVIRONMENTAL ASPECTS AND IMPACTS

Relevant environmental aspects and impacts are managed through the combined HSE Project Risk Register, (Ref. Project **HSE Risk** (HSEQ-HS-TEM003-GEN-ALL). This is reflective of our integrated management approach and will be kept as a live document on site. It covers all aspects of the Project, including normal and abnormal operations or activities, planned, new or modified activities and any potential emergency situations.

The Risk Register is a live document, to be continually revised during the Project duration as risks or further information comes to hand. A preliminary Risk Register for the Project has been developed from available tender / planning information. This document will form the basis for future revisions.

In determining the processes of identifying risks and opportunities, consideration is to be given to the external issues, internal issues and interested parties relevant to the project and their ability to meet the needs of the environmental management system.

To mitigate the likelihood and consequences of risks identified within the Tender project Risk & Opportunities Register, additional measures will be put in place to reduce risk occurrence and improve effectiveness of the environmental management system.

4.3 ENVIRONMENTAL COMPLIANCE OBLIGATIONS

McConnell Dowell ensures compliance with all relevant compliance obligations and aims to employ best practice environmental management procedures for the Project. Environmental compliance obligations include compliance with applicable environmental legislation, standards (including ISO 14001:2015), policies, procedures and other governance processes. Compliance obligations also include requirements of and commitments outlined in Project contract and related governance documents.

4.3.1 Legislation and Approvals

The **Compliance with Legal and Other Requirements** (LGL-LGL-PRO001-GEN-GRP) procedure outlines how McConnell Dowell identifies, maintains and evaluates compliances with legal and other related requirements that are applicable to delivery of the Project. This legislation is identified and recorded within **Review Record Environmental Legal & Other Requirements**. Legislation and compliance are reviewed by Project management on at least a 3-monthly basis.

The applicable legislative and approvals-based environmental compliance obligations for the management of the Project include (Table 4-1):

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Table 4-1 Relevant Legislation, Permits and Approvals

Legislation	Description	Approval/ Permit Required	Approval/ Permit Holder	Compliance
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	EPBC Act provides specific protection for the following Protected Matters: • Threatened species and ecological communities. • Migratory species - including those listed under International Agreements such as the Japan-Australia Migratory Bird Agreement (JAMBA), the China-Australia Migratory Bird Agreement (CAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), or the Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention).	Yes	Client	Threatened species which are known to occur or may occur within proximity to the proposed site are highlighted in the Centrex PER 2012. Many of the marine mammals that may potentially occur in the area are listed as migratory and are protected as such within Commonwealth waters; these species are also discussed in the Centrex PER. It should be noted that the Centrex PER was completed several years ago and changes to threatened species status may have occurred in this time. A key concern of the regulators for all recent port proposals has been the interaction or perceived risk of impacts to migrating whales, specifically the Southern right whale. Important to this project, the Port Spencer development was deemed a controlled action with Commonwealth approval granted provided environmental protection measures were in place to minimise harm to Southern right whales (and all cetaceans) during construction of the wharf. The main element of the approval was for the implementation of exclusion and shut down zones around the wharf construction to prevent underwater noise impacts to whales.
Environment Protection (Sea Dumping) Act 1981	Regulates the dumping, incineration, and loading for the dumping or incineration of wastes and other matter at sea.	No	N/A	It is anticipated there will be no requirement for dredging based on the conceptual options proposed therefore a Sea Dumping approval and dredge permit are not considered to be required. If, however dredging was including in the construction the disposal of dredged material (at sea) has the potential to have a significant impact on MNES, it would then require approval under the EPBC Act.

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Legislation	Description	Approval/ Permit Required	Approval/ Permit Holder	Compliance
Development Act 1993	To regulate the use and management of land and buildings, and the design and construction of buildings; to make provision for the maintenance and conservation of land and buildings where appropriate; and for other purposes.	TBC	TBC	More detail about the relevance of this Act is provided in the preliminary planning review (Jacobs 2017).
Harbours and Navigation Act 1993	The Act governs the safe, efficient and reliable movement of cargo vessels within South Australia.	Yes	Client	To operate a port within South Australia the port area must be declared by the Minister and a Port Operators Agreement (POA) approved by DPTI who require a biosecurity plan and Oil Spill Contingency Plan to be provided by the port operator.
Native Vegetation Act 1991 (SA)	Controls the clearance of indigenous remnant vegetation and provides incentives and assistance to landholders in relation to the preservation and enhancement of native vegetation.	Yes	TBC	Recent port development submissions have all required hydrodynamic models to be developed in order for DEWNR and the EPA to be satisfied that impacts to the coastline along with the seabed have been considered in the design process. DEWNR have also expressed concern in regard to the build-up of seagrass wrack (dead and shed seagrass) along artificial structures and the cost implication of clearing and maintain access to harbours.
National Parks and Wildlife Act (SA)	Allows for the protection of habitat and wildlife through the establishment of parks and reserves (both on land and in State waters) and provides for the use of wildlife through a system of permits allowing certain actions, i.e. keeping, selling, trading, harvesting, farming, hunting and the destruction of native species.	TBC	TBC	There are several threatened species that were identified in the Port Spencer area during the PER investigations, it would be advised that up to date data on the presence, distribution and use of the area by fauna be confirmed in new surveys prior to detailed designs being developed.
Protection of Marine Waters (Prevention of Pollution from Ships) Act 1987	Enacts Australia's commitment to the International Convention for the Prevention of Pollution from Ships (MARPOL) in South Australia.	Yes	Client	All ships operating in and out of the proposed port will be bound by these commitments. The development of a Port Management plan would be used in addressing these requirements.

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Legislation	Description	Approval/ Permit Required	Approval/ Permit Holder	Compliance
Marine Parks Act 2007	Covers 19 marine parks around the State with each park consisting of up to four zones - general managed use, habitat protection, sanctuary and restricted access.	No	N/A	The proposed port site is not located within a marine park the location. This will only be applicable for operations.
Fisheries Management Act 2007	Provide for the conservation and management of the aquatic resources of the State and the control of exotic aquatic organisms and disease in aquatic resources.	No	N/A	It is not anticipated that this development would require approvals under this Act.
Coast Protection Act 1972	Provides a legislative framework to make provision for the conservation and protection of the beaches and coast of South Australia.	TBC	TBC	The Act is implemented via the Coast Protection Board who is the primary authority and prescribed body in South Australia for the management of the coast including coastal protection and advice on coastal development. The proposed development would need to satisfy the Coast Protection Board within DEWNR that impacts to the coastal environment would be minimied. Experience from other port approvals has shown that the use of a hydrodynamic model and sediment transport model are key tools for demonstrating whether a proposed port would negatively impact coastal erosion etc.
Natural Resources Management Act 2004	Aims to achieve ecologically sustainable development in the State by establishing an integrated scheme to promote the use and management of natural resources.	TBC	TBC	Coastal development is reviewed against regional plans, in consultation with the Coast Protection Board.
Environment Protection Act 1993	Provides for the protection of the environment and defines the Environment Protection Authority's (EPA) functions and powers.	TBC	TBC	

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4.3.2 Standards and Directives

4.3.2.1 Organisational Standards

McConnell Dowell operates under an organisational Directive called **Environmental Management Standard** (REF-HSEQ-ENV-GUID004-GEN-GRP), which is a suite of minimum required standards for environmental management across all McConnell Dowell Group projects, across all geographies.

The minimum standards relate to key environmental risks common to organisation-wide activities and relates to each one of the ten **Environmental Green Rules (**REF-HSEQ-ENV-GUID003-GEN-GRP), a set of rules to enforce positive messages about what is expected as a minimum standard on site.

The objective of the Environmental Management Standard and Environmental Green Rules Directives is to ensure the application of minimum environmental management standards on all projects and a consistency of approach across the organisation.

4.3.3 Contract-Specific Environmental Compliance Obligations

Environmental compliance obligations relevant to the Project works are presented in Table 4-2. These will be reviewed on a regular basis and updated where appropriate to reflect any changes that may occur to the project scope of works. Table 4-3 outlines any contract specific hold points and/ or witness points

Table 4-2 Contract Specific Environmental Compliance Obligations

Clause/ Reference	Compliance Obligation	Compliance Evidence
TBC	TBC when documents received	

Table 4-3 Contract Specific Hold Points/ Witness Points

Hold Point/ Witness Point	Objective	Compliance
TBC	TBC when documents received	

4.4 DOCUMENT ENVIRONMENTAL OBJECTIVES AND REQUIREMENTS

4.4.1 Organisational Environmental Objectives

McConnell Dowell is committed to maintaining a high level of excellence in environmental compliance and continual improvement, which is reflected in our organisation-wide environmental objectives and targets, relevant to all McConnell Dowell works. These are presented in Table 4-4.

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Table 4-4 Environmental Objectives and Key Performance Indicators

Objective	Lead Performance Indicator		Lag Performance Indicator	
	Description	Target	Description	Target
Ensure compliance with all applicable environmental legislation and prevent environmental harm	Number of INR raised during internal audit program relating to environmental legislation	Zero non-compliances	Serious Environmental Incident Frequency Rate (SEIFR)	0.00
	% completion of planned weekly environmental inspections	100%	Statutory Notices received	Zero
	% of environmental actions closed out within required timescale	100%	Fines or prosecutions for an environmental offence	Zero
Ensure effective reporting of environmental data	% completion of monthly environmental data reported	100%	-	-

4.4.2 Contract-Specific Environmental Objectives

In addition to the contract-specific environmental compliance obligations, as outlined in section 4.3, there are also a number of environmental objectives and targets relevant to the Project. These include:

- TBC following discussions with client

4.5 ACHIEVING ENVIRONMENTAL OBJECTIVES

4.5.1 Environmental Management System

McConnell Dowell operates an ISO 14001 accredited Environmental Management System that forms part of the fully integrated McConnell Dowell Management System (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 project is shown diagrammatically below (Figure 4-1) and elements of the framework explained in Table 4-5.

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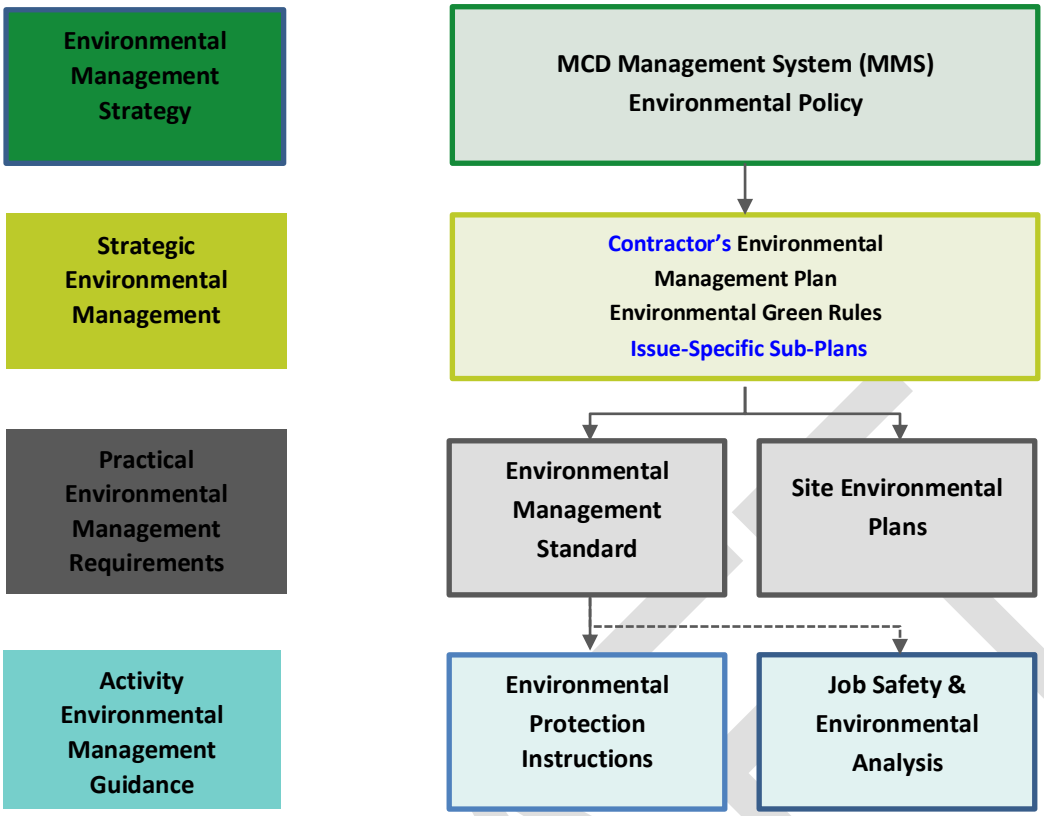

Figure 4-1 Environmental Management Framework

Table 4-5 Description of environmental management framework documents

Document Type	Description
Environmental Policy	See section 3.2
Environmental Management Standard	See section 4.3
Contractor's 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 improvement we will take a proactive approach to environmental management for the Project. This document is therefore based upon a risk management process where the environmental risks associated with each element of the Project are identified and assessed, and appropriate mitigation strategies implemented to eliminate or minimise the subsequent risk.
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.

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Document Type	Description
Environmental Green Rules	A suite of ten environmental management rules set to enforce positive messages about what is expected as a minimum standard on site to minimise our impact on the natural environment and local community
Site Environmental Plans	Site Environmental Plans (SEPs) are spatial representations, in the form of an aerial photographs developed for a specific footprint of the Project 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 Project.
Environmental Protection Instructions	Environmental Protection Instructions (EPIs) will be adopted from a standard suite of EPIs on REF. 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 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.
Job Safety and Environmental Analysis (JSEA)	**JSEAs** (HSEQ-HS-FRM001-GEN -location) 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 — for example, 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** (HSEQ-HS-FRM004-GEN-ALL).

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5 SUPPORT FOR PLAN DELIVERY

5.1 RESOURCES

The Project Manager is responsible for determining and providing the necessary resources needed for the effective establishment, implementation, maintenance and continual improvement of this plan and associated documents. Specific requirements are outlined, where relevant, in the Environmental Management Standard and issue-specific sub-plans.

5.2 COMPETENCE REQUIREMENTS

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.

5.3 ENVIRONMENTAL AWARENESS TRAINING

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, 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 **Project Location Training Plan** (HR-HR-TEM001-GEN-ALL).

Table 5-1 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 on site. 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 permits, approvals, licences and relevant conditions. • Roles and responsibilities relating to environmental management for the Project and consequences of non-compliance.
Pre-Start Meetings	Pre-Start meetings will be undertaken at the beginning of each day/ shift before work commences with all personnel present (including subcontractors 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 subcontractors) via Toolbox Talks, to provide site

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Training Method	Description
	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 health, safety, environmental or quality incidents and lessons learnt from other MCD Group projects and facilities and relevant industry incident. They are sent out to all MCD Group management and HSEQ staff and are presented and discussed at Pre-Start Meetings and Toolbox Talks and posted on notice boards.

5.4 COMMUNICATION

5.4.1 Internal Communication

Within the construction team it is important to ensure that management techniques are being adhered to, that employees have the opportunity to address concerns and outcomes of incident reviews and changes to protocols are communicated. Environmental communication will primarily be through Pre-Start Meetings, Toolbox Talks and weekly team meetings. However, communications can also occur during site inspections or through members of the environmental or management teams.

5.4.2 External Communication

The Project Manager is responsible for coordinating communications with all external parties.

Validated complaints will be recorded on CMO Incident Report Form, categorised as a complaint for tracking purposes. As a minimum, the following will be recorded:

- The date and time of the complaint.
- Personal details of the party lodging the complaint (if available, subject to privacy considerations).
- Nature of the enquiry or issue of concern.
- The outcome of the complaint investigation and any remedial actions taken by the construction team to cease the impact.

5.5 DOCUMENTED INFORMATION

5.5.1 Creating and Updating Documents

This CEMP will be further developed and revised to address any changes in the environmental management process, customer or key stakeholder comments, and changes identified through the continual improvement process.

This plan will be reviewed, at a minimum, on a twelve-monthly basis by Project leadership. The Project Manager will be responsible for ensuring this is carried out. Review of the CEMP is outlined further in Section 7.4 Performanace evaluation & Improvements

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The project shall conduct management review meetings where all identified risks and opportunities from the TPRR will be monitored, measured and analysed to evaluate if the risks remain relevant and that any new or emerging risks are identified and managed. Any risks and opportunities that are identified during internal/external audits and customer satisfaction surveys will be considered for inclusion into the TPRR.

The project will implement any changes necessary to its environmental management systems and processes in response to changes in risk with the intention to drive continuous improvement for the project.

Management Review.

The project shall conduct management review meetings where all identified risks and opportunities from the FPRR will be monitored, measured and analysed to evaluate if the risks remain relevant and that any new or emerging risks are identified and managed. Any risks and opportunities that are identified during internal/external audits and customer satisfaction surveys will be considered for inclusion into the TPRR. The project will implement any changes necessary to its environmental management systems and processes in response to changes in risk with the intention to drive continuous improvement for the project.

The Project Manager is also responsible for ensuring the development and authorising for use any other required environmental management documentation.

5.6 DOCUMENTED CONTROL

5.6.1 Document Control

Document control, including record keeping and archiving, will be undertaken in accordance with the relevant documents outlined in the **PMP Document Register** (COR-GNG-TEM001-GEN-ALL ATT 1).

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6 OPERATION AND IMPLEMENTATION

6.1 IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT MEASURES

The implementation of environmental controls on site is the responsibility of the Project Manager and Supervisors. Environmental controls are to be implemented prior to the beginning of the works, wherever practical and relevant, and maintained through the length of those works.

The outputs from the planning of works and the specific environmental management measures and their implementation are outlined in the Appendix B: Environmental Management and Mitigation Measures (Preliminary Risk Register).

The following plans in Table 6-1 are issue-specific sub-plans that are proposed to be further developed on award of contract. This list is not exhaustive and will evolve as the project progresses.

Table 6-1 Environmental Control Documents

Document Type	Description
Biosecurity Management Sub-Plan	Includes controls for bringing overseas materials to Australia, vessel movement controls within Australian waters, and land based movements for weeds, pests, parasites and other biological contaminants.
Abrasive Blasting and Painting Control Sub Plan	Includes controls for garnet blasting and painting, encapsulation and disposal, and EPA licence application.
Pile Installation Environmental Sub-Plan	Includes controls for noise and vibration, and extraction of waste rock/ slurry mix and deposition back into the ocean.
Marine Fauna Management Sub-Plan	Including a Southern Right Whale Plan to meet approval conditions.
Spill Response Sub-Plan	Including an Oil Spill Contingency Plan to meet approval conditions.
Concrete and Grouting Management Sub-Plan	Includes controls for prevention of spill to ground or water and disposal of water. Will also include management of batch plant onsite if required.
Maintenance and Refuelling Sub-Plan	Process and procedures for equipment maintenance and refuelling both on land and over water.
Waste Management Sub-Plan	Controls on waste minimisation, segregation and management.
Marine Debris & Working over Water Sub-Plan	Includes controls for housekeeping, marine debris and retrieval.
Environmental Nuisance Management Sub-Plan	Includes interference with an environmental value caused by air emissions, light, noise, or vibration.

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6.2 INCIDENT MANAGEMENT, REPORTING AND INVESTIGATION

Incidents will be managed, and reports raised, tracked and closed out in accordance with Incident Reporting and Investigation (HSEQ-HS-PRO003-GEN-ALL).

Onsite management of environmental incidents are the responsibility of the Environmental Management Representative with assistance from any other resources required to contain the incident and prevent further environmental harm.

The cause of all incidents will be subject to an investigation, convened by the Environmental Management Representative 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.

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

6.2.1 Notification Procedure

The Client and applicable Regulator (where relevant) shall be notified of incidents 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 Project.

The Project Manager is responsible for notifying the Client and parent companies of reportable incidents.

The Client Environmental Management Representative is responsible for notifying relevant Regulators.

6.3 EMERGENCY PREPAREDNESS AND RESPONSE

The **Emergency Response Plan** (HSEQ-HS-TEM001-GEN-ALL) to be produced for the Project will take into account the following factors:

- Parts of the site or adjoining properties likely to be affected.
- Degree of predictability of the emergency.
- Likely speed of onset.
- Likely effect of the emergency.

The contents of the Emergency Response Plan are to include:

- Description of the potential emergency.
- Person responsible for actioning the Emergency Response Plan (ERP).
- Equipment required to deal with the emergency including rescue equipment.
- Emergency contact numbers.
- Direction to site workers and other affected persons on what they are required to do.
- Methods used to deal with the emergency (e.g. How to use specific equipment).

Emergency services are to be contacted and invited to visit the site in order to become aware of site access and other emergency considerations, during development and implementation of the ERP.

The ERP will incorporate the following components:

- Emergency contact list (for the above).
- Emergency Reporting Instructions.
- Emergency Muster Point Location.

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- Emergency Response Co-ordinator Action Plan.
- Emergency Personnel and Equipment.

The Emergency Response Plan will be displayed in prominent locations around the site and employees will be trained in its requirements. All relevant Project personnel, subcontractors and relevant emergency agencies will be instructed and rehearsed, as appropriate, in the requirements of this Plan.

In the event of an environmental emergency incident, McConnell Dowell will provide the Client with written notification within 2 days and will provide records of the incident, response and corrective actions as required.

6.4 MANAGEMENT OF CHANGE

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

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7 PERFORMANCE EVALUATION

7.1 MONITORING, MEASUREMENT, ANALYSIS AND EVALUATION

7.1.1 Monitoring and Inspection

The Project's environmental performance will be tracked through regular monitoring and inspection.

A brief overview of proposed monitoring and inspection is provided in Table 7-1 and Project monitoring program is outlined in Table 7-2.

Table 7-1 Monitoring and Inspection Requirements

Monitoring/ Inspection Requirement	Description
Inspection	Regular environmental compliance inspections are carried out by the Environmental Management Representative for the Project or relevant work areas. The findings of the Inspection are recorded on Weekly Environmental Inspection (CMO), in which required remedial actions are also recorded, including a responsibility and timeline for completion. These shall be monitored to ensure that they are closed out in the required time frame.
Monitoring	Monitoring and inspection is conducted on a routine basis, however, additional monitoring may be required in the event of an incident, complaint or change in circumstances. The Environmental Management Representative is responsible for the implementation of on-site 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 wil 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.

Table 7-2 Monitoring program

Item	Frequency	Record	Responsibility
TBC based on approval and contract requirements			

7.1.2 Analysis and Evaluation

Monitoring and inspection results will be used to assess the environmental performance of the Project against the relevant criteria.

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The Environmental Management Representative is responsible for checking monitoring and inspection results against the environmental obligations, and identifying non-conformance. They are also responsible for raising a non-conformance, incident and/ or corrective action as necessary (See Section 8).

7.2 REPORTING

Reporting requirements will evolve as the Project 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 is responsible for submitting the reports required externally.

Reporting requirements are:

- Reporting to client and key stakeholders as specified within contract documents.
- Specific reporting to regulatory agencies.
- Reporting as required by legislation.
- Monthly National Greenhouse and Energy Reporting information
- Sustainability data reporting (including energy use, water use and waste generation).
- Other Project specific reporting requirements (See Table 7-3).

Table 7-3 Reporting Requirements

Reporting Requirement	Reporting Frequency	Responsibility
TBC based on approval and contract requirements		

7.3 AUDITING

Environmental audits are to be carried out and reported in accordance with the requirements of **Audit Internal** procedure (HSEQ-SYS-PRO003-GEN-GRP).

In addition to these internal audits, McConnell Dowell will cooperate with any external environmental audits conducted by an authorised party in relation to compliance with contract or legislative requirements.

7.4 PERFORMANACE EVALUATION & IMPROVEMENTS

The project shall conduct management review meetings where all identified risks and opportunities from the TPRR will be monitored, measured and analysed to evaluate if the risks remain relevant and that any new or emerging risks are identified and managed. Any risks and opportunities that are identified during internal/external audits and customer satisfaction surveys will be considered for inclusion into the TPRR.

The project will implement any changes necessary to its environmental management systems and processes in response to changes in risk with the intention to drive continuous improvement for the project.

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7.5 MANAGEMENT REVIEW

7.5.1 Top Management Review

EXCO may include the Project in their regular review of the organisation's environmental management system to ensure its continuing suitability, adequacy and effectiveness.

The 12 monthly EXCO review includes consideration of:

- The status of actions from previous management reviews.
- Changes in:
  - External and internal issues that are relevant to the environmental management system.
  - The needs and expectations of interested parties, including compliance obligations.
  - Its significant environmental aspects.
  - Risks and opportunities.
- The extent to which environmental objectives have been achieved.
- Information on the organisation's environmental performances, including trends in:
  - Nonconformities and corrective actions.
  - Monitoring and measurement results.
  - Fulfilment of its compliance obligations.
  - Audit results.
- Adequacy of resources.
- Relevant communication(s) from interested parties, including complaints.
- Opportunities for continual improvement.

The outputs of the management review shall include:

- Conclusions on the continuing suitability, adequacy and effectiveness of this document and the environmental aspects of MMS.
- Decisions related to continual improvement opportunities.
- Decisions related to any need for changes to this document and the environmental aspects of MMS, including resources.
- Actions, if needed, when environmental objectives have not been achieved.
- Opportunities to improve integration of this document and the environmental aspects of MMS with other business processes, if needed.
- Any implications for the strategic direction of the organisation.

Documented information shall be retained as evidence of the results of management reviews.

7.5.2 Project Management Review

Review of the implementation and effectiveness of this plan and associated documents will be performed on an annual basis as minimum, by the Project management team. The responsibility for this review lies with the Project Manager.

The review will include:

- Progress of the implementation of this plan.
- Effectiveness of this plan.

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- 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 on **Minutes of Meeting** (COR-GNG-FRM001-GEN-GRP). Any actions arising will be recorded in the Actions module of the CMO database.

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8 IMPROVEMENT

8.1 NON-CONFORMITY AND CORRECTIVE ACTION

Corrective and preventative actions may be identified from inspections, audits, non-conformances, incidents, management reviews and complaints. Correctives and preventative actions will be raised, assigned, tracked and closed out in the CMO compliance database.

The CMO database is used to record and monitor close-out of all corrective actions arising from hazard reports, incident reports, audits and inspections.

CMO is to be accessible to Project Management personnel and key team members, including environmental management and HSEQ representatives for review and close out of outstanding items.

Persons responsible for close out of corrective actions are to ensure that the items are closed out prior to the end of the close out date. Unclosed items that have passed the close out date shall be raised and discussed at team meetings and elevated as required for management action.

Where any changes and improvement to working practices are identified through the investigation of environmental incidents, these will be assessed and incorporated into the CEMP as part of the incident reporting and investigation process.

8.1.1 HSEQ Alerts

Where a repeat incident occurs or where there is a significant incident, a HSEQ Alert may be issued.

HSEQ Alerts are used where incidents with broader implications and lessons that may be applicable to other Projects and Facilities are summarised and distributed to disseminate findings more widely. HSEQ Alerts from other Projects and Facilities may also be relevant to this Project. Where applicable these lessons are communicated to the work force through Toolbox Talks and Pre-Start Meetings.

8.2 CONTINUAL IMPROVEMENT

This CEMP has been developed using the best available methods, procedures, expertise and experience available to McConnell Dowell Group Entity and as such it represents best practice environmental management standards. However, consistent with the philosophy of continuous improvement, there will be opportunities during the Project work to implement new or improved procedures, aside from the annual review of this plan and associated documents.

During the contract term relevant changes in technology and work methods will be examined for opportunities to improve the processes and systems for the benefit of all Project stakeholders. The Project Manager will be accountable to Free Eyre for ensuring continuous improvement in all aspects of the design, construction, commissioning and completion of the Project.

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APPENDIX A: ENVIRONMENTAL AND SUSTAINABILITY POLICIES

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ENVIRONMENTAL POLICY

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
REV1 01JUN2018

SUSTAINABILITY POLICY

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.
- Actively encouraging continual improvement and promoting innovation, adaptability and resilience.
- 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
REV1 01JUN2018

APPENDIX B: ENVIRONMENTAL MANAGEMENT & MITIGATION MEASURES (PRELIMINARY RISK REGISTER)

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Doc # 025-Y002-XXXX **CEMP Environmental Risk Assessment** Rev 0

Likelihood (L) 1 = Rare, 2 = Unlikely, 3 = Possible, 4 = Likely, 5 = Almost Certain			Consequence (C) A- Low, B- Moderate, C- Serious, D-Major, E-Catastrophic		
Risk Rating (R)	**LOW RISK** **Broadly acceptable - Manage by routine procedures.**	**MODERATE RISK** **Tolerable – With identified controls fully implemented.**	**HIGH RISK** **Undesirable risk – do not commence activity.**	**VERY HIGH RISK** **Intolerable risk – do not commence activity.**	**EXTREME RISK** **Intolerable risk – do not commence activity.**

Item No.	Work Process	Work Area	Activity / Job Step	Hazards (Potential For Harm)	Risks (Unwanted Event)	Risk Source (Health Safety Environment)	System / Current Controls	Primary Risk Assessment			Additional Controls	Hierarchy of control						Residual Risk Assessment			Review / Comments
								Likelihood	Consequence	Risk Score		Elimination	Substitution	Isolation	Engineering	Administration	PPE	Likelihood	Consequence	Risk Score	
1	**WATER QUALITY - (Spills to the Sea / Land)**																				
1.1		Wharf / Dolphin / topsides	General activities including: Concrete cutting, breaking and lifting/ removing	Equipment failure, human error during operation of equipment (generators, motors for diamond saws, cranes, refuelling equipment)	Hydrocarbons released to the marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Plant Management Plan Hazardous Substance Management and Spill Response Sub-Plan	likely	Moderate	Moderate	Maintenance and inspections; spill trays/ drains (where applicable); self-bunded machinery; refuelling procedures for in situ refuelling. Emergency and Spill Response Plan; Monitoring; Spill kits; hydrocarbon booms. Trained response personnel.			X	X	X		Unlikely	Moderate	Low	
1.2		Marine vessels	Vessel movements Support vessel / tug operations	Equipment failure, human error during towing operations or activities on deck (crane, generators, crib facilities personnel, chemical toilet with tanks, air compressors). Bunkering failure	Hydrocarbons released to the marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Plant Management Plan Hazardous Substance Management and Spill Response Sub-Plan	Possible	Serious	High	Vessel certification. Competent Master and crew. Maintenance and pre-mobilisation inspections; spill trays/ drains (where applicable); self-bunded machinery. Operational procedures. Emergency and Spill Response MP; Monitoring; Spill kits; hydrocarbon booms. Trained response personnel. Biodegradable oils where possible.			X	X	X		Unlikely	Serious	Moderate	
1.3		Wharf / Dolphin / topsides	Equipment travelling on the wharf deck (excavator, mobile crane, dump trucks, light vehicles)	Mechaniclal failure of vehicle / plant	Hydrocarbons released to the marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Plant Management Plan Hazardous Substance Management and Spill Response Sub-Plan	Possible	Moderate	Moderate	Inspection and assessment of structure. Coordination and operational procedures - max. axle load and configuration. Trained personnel. Emergency and Spill Response MP; Monitoring; Spill kits; hydrocarbon booms. Trained response personnel.			X	X	X		Rare	Moderate	Low	
1.4		Wharf / Dolphin / topsides	Mobile equipment (excavator, crane) operating on traveller	Equipment failure, human error during operation or refuelling of mobile equipment	Hydrocarbons released to the marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Plant Management Plan Hazardous Substance Management and Spill Response Sub-Plan	Possible	Serious	High	Maintenance and inspections; spill trays; self-bunded; refuelling procedures for in situ refuelling, refuling to occur from bunded fuel cell, refuleing to be montiored at all times by personel and spill pads on hand to catch any drips. Emergency and Spill Response MP; Monitoring; Spill kits; hydrocarbon booms. Trained response personnel. Avoid mesh floor in high risk areas.			X	X	X		Unlikely	Serious	Moderate	
1.5		Wharf / Dolphin / topsides	Site sheds/ crib rooms	Equipment failure, human error during operation	Chemicals / septic released to the marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Plant Management Plan Hazardous Substance Management and Spill Response Sub-Plan	Likely	Moderate	Moderate	Maintenance and inspections; self-bunded / temporary bunding; refuelling procedures for in situ refuelling. Emergency and Spill Response MP; Monitoring; Spill kits; hydrocarbon booms. Trained response personnel.			X	X	X		Unlikely	Moderate	Low	
1.6		Foreshore	Mobile equipment and fuel/oil storage (excavator, crane, trucks, generators, light vehicles) operating on foreshore	Equipment failure, human error during operation or refuelling of mobile/storage equipment	Hydrocarbons released to the terrestrial environment	Environment	Contractor's Environmental Management Plan (CEMP) Plant Management Plan Hazardous Substance Management and Spill Response Sub-Plan	Likely	Moderate	Moderate	Maintenance and inspections; spill trays; self-bunded / bunding; dedicated hydrocarbon/hazardous substances storage areas; refuelling procedures for in situ refuelling, refuling on sealed surface. Emergency and Spill Response MP; Monitoring; Spill kits; Trained response personnel. Designated hazardous goods storage location on land. Biodegradable oils, hose sheething to contain and protect hoses			X	X	X		Unlikely	Moderate	Low	
2	**BIOSECURITY - (Invasive Marine Species)**																				
2.1		Marine vessels	Marine vessel movements to location (within defined project boundary) - towed from at risk port location	Human error, procedural failure during transportation	Invasive marine species introduced to marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Biosecurity Management Sub-Plan	Possible	Major	High	IMS Assessment prior to mobilisation. - history of vessel to be provided including location of last port and previous antifouling applications			X	X	X		Rare	Major	Moderate	
2.2		Foreshore	Operational activities on land / vehicle movements	Soil disturbance, relocation of seeds/weeds	Introduction/spreading of weed species	Environment	Contractor's Environmental Management Plan (CEMP) Biosecurity Management Sub-Plan Plant Management Plan	Possible	Serious	High	Inspection of machienery prior to mobilising to check for contaminants/weeds - machine to be confirmed clean prior to mobilisation			X	X	X		Unlikely	Serious	Moderate	
2.3		All areas	Receival of imported materials and packaging / dunnage	Imported weeds, seeds, species or pathogens present in imported materials	Invasive species / pathogens introduced to environment	Environment	Contractor's Environmental Management Plan (CEMP) Biosecurity Management Sub-Plan	Possible	Serious	High	Inspection of goods received upon arrival to site to check for contaminants; quarantine area and procedure; inspection paperwork of major items fabricated / shipped from overseas; use of reputable inspection and shiopping agent			X	X	X		Unlikely	Serious	Moderate	
3	**AIR QUALITY - (Dust and Particulate Emissions)**																				
3.1		Wharf / Dolphin / topsides	Concrete cutting, breaking and lifting/ removing	Mechanical cutting of concrete	Wind-borne dust particles (nuisance at sensitive receptors)	Environment	Contractor's Environmental Management Plan (CEMP) Environmental Nuisance Managemetn Sub-Plan Waste Management Sub-Plan Weekly Environmental Inspection	Unlikely	Moderate	Low	Wet vacuum removal &/or water dust suppression. Significant distance from sensitive receptors. Dust monitoring.			X	X	X		Unlikely	Moderate	Low	
3.2		All locations	Equipment and vehicle use	Duel burnign equipment	Excessive and non-compliant emissions	Environment	Contractor's Environmental Management Plan (CEMP) Environmental Nuisance Managemetn Sub-Plan Waste Management Sub-Plan Weekly Environmental Inspection	Unlikely	Moderate	Low	Cleaning operation prior to work commencing. Maintenance / periodic cleaning works where practicable. Removal of oils or malfuntioning equipment			X	X	X		Unlikely	Moderate	Low	

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Item No.	Work Process	Work Area	Activity / Job Step	Hazards (Potential For Harm)	Risks (Unwanted Event)	Risk Source (Health Safety Environment)	System / Current Controls	Primary Risk Assessment			Additional Controls	Hierarchy of control						Residual Risk Assessment			Review / Comments
								Likelihood	Consequence	Risk Score		Elimination	Substitution	Isolation	Engineering	Administration	PPE	Likelihood	Consequence	Risk Score	
3.3		Wharf / Dolphin / topsides	Abrasive blasting and painting	Use of uncontained blast medium and overspray of paint	Release of contaminents to air then to water	Environment	Contractor's Environmental Management Plan (CEMP) Environmental Nuisance Managemetn Sub-Plan Waste Management Sub-Plan Abrasive Blasting and Painting Control Sub-Plan Weekly Environmental Inspection	Likely	Moderate	Moderate	Use of temporary encapsulated blast chambers built around work area. Use of inert garnet as blast medium. Prestart inspection to ensure no damge to chamber; ongoing inspection during blast to ensure no blow outs; collection of spent blast medium and waste immediately after works in sealed bags.			X	X	X		Unlikely	Moderate	Low	
4	**NOISE - (Noise and Vibration)**																				
4.1		Wharf / Dolphin / Caisson topsides	Concrete cutting, breaking and lifting / removing	Mechanical cutting and breaking of concrete, equipment operations	Air-borne noise and transmission of vibration (nuisance at sensitive receptors)	Environment	Contractor's Environmental Management Plan (CEMP) Environmental Nuisance Management Sub-Plan Marine Ecology Management Sub-Plan Southern Right Whale Management Plan	Possible	Moderate	Moderate	Equipment maintenance and inspection. Use of noise monitoring equipment for indicative noise levels at sensitive receptor boundary (if applicable). Construction noise criteria and requirements compliance. Hours of operation agreed for certaln activities.			X	X	X		Unlikely	Moderate	Low	
4.2		Marine vessels	Activities on deck (crane, generators, air compressors)	Mechanical cutting and breaking of concrete, equipment operations	Air-borne noise and transmission of vibration (nuisance at sensitive receptors)	Environment	Contractor's Environmental Management Plan (CEMP) Environmental Nuisance Management Sub-Plan Marine Ecology Management Sub-Plan Southern Right Whale Management Plan	Possible	Moderate	Moderate	Equipment maintenance and inspection. Use of noise monitoring equipment for indicative noise levels at sensitive receptor boundary (if applicable). Construction noise criteria and requirements compliance. Hours of operation agreed for certaln activities.			X	X	X		Unlikely	Moderate	Low	
4.4		Pile driving / drilling activities	Piling (includes using hammer, drill and vibrator head)	High noise and vibration generating activity	Air-borne noise and transmission of vibration (nuisance at sensitive receptors - marine mammals)	Environment	Contractor's Environmental Management Plan (CEMP) Environmental Nuisance Management Sub-Plan Marine Ecology Management Sub-Plan Southern Right Whale Management Plan	Likely	Serious	High	Equipment maintenance and inspection. Use of noise monitoring equipment for indicative noise levels. Pre-start visual observations from shore or jetty by trained MMO; exclusion zone implimented to *** radius; soft start procedures; restrictions on piling times between migration season; monitoring program.			X	X	X		Unlikely	Serious	Moderate	
4.5		Foreshore	Activities on foreshore (crane, cutting and breaking equipment, generators, air compressors)	Mechanical cutting and breaking of concrete, equipment operations	Air-borne noise and transmission of vibration (nuisance at sensitive receptors)	Environment	Contractor's Environmental Management Plan (CEMP) Environmental Nuisance Management Sub-Plan Marine Ecology Management Sub-Plan	Possible	Moderate	Moderate	Equipment maintenance and inspection. Use of noise monitoring equipment for indicative noise levels at sensitive receptor boundary (if applicable). Construction noise criteria and requirements compliance. Hours of operation agreed for certaln activities.			X	X	X		Unlikely	Moderate	Low	
4.6		All areas	Activities occuring 24 hours a day - including welding, paint prep, drilling, piling, crane lifting, precast, assembly	Noise, light and traffic movements at night	Disturbance to public	Environment	Contractor's Environmental Management Plan (CEMP) Environmental Nuisance Management Sub-Plan Marine Ecology Management Sub-Plan	Possible	Moderate	Moderate	Equipment maintenance and inspection. Use of noise monitoring equipment for indicative noise levels at sensitive receptor boundary (if applicable). Construction noise criteria and requirements compliance. Minimise vehicle movements, environementally sensitive lighting plans. Education and training of workforce			X	X	X		Unlikely	Moderate	Low	
5	**MARINE ECOLOGY AND TERRESTRIAL ECOLOGY - (Protected Species)**																				
5.1		Marine vessels	Vessel movements (within defined project boundary)	Impact of vessels with marine mammal	Marine mammal strike	Environment	Contractor's Environmental Management Plan (CEMP) Marine Ecology Management Sub-Plan	Possible	Serious	High	Low speed operation. Training and awareness. . Crew observations. Navigation aids with demarcation of seagrass bed area and avoidance. Anchor plans to note location of sea grass			X	X	X		Unlikely	Serious	Moderate	
5.2		Causeway	Causeway construction	Direct contact with seagrass bed or indirect disturbance (turbidity)	Seagrass bed disturbance	Environment	Activity completed by others														
5.3		Drilled pile locations	Installtion of piles into bedrock	Direct contact with seagrass bed	Seagrass bed disturbance; localised turbidity	Environment	Contractor's Environmental Management Plan (CEMP) Marine Ecology Management Sub-Plan	Likely	Serious	High	Marine ecology assessment; Controlled activity, extracted at very low speed and small seabed displacement. Monitoring of 200m zone around the turbidity generating works; project approval for disturbance to known area of seagrass.	X		X	X	X		Unlikely	Serious	Moderate	
5.4		Drilled pile locations	Drilling of piles / anchors into bedrock	Indirect disturbance from deposition of spoil material (turbidity)	Seagrass bed disturbance; localised turbidity	Environment	Contractor's Environmental Management Plan (CEMP) Marine Ecology Management Sub-Plan	Likely	Serious	High	Marine ecology assessment; Controlled activity, extracted at very low speed and small seabed displacement. Monitoring of zone around the turbidity generating works; only seawater and drill spoil (rock / sand) will be redeposited as close as possible to base of installed pile; Plume will be short lived and settle quickly due to sandy bottom; extracted material to be filtered through steel bin to capture large soilds; dewatered slurry to be released as low as so far as practical to minimise plume.	X		X	X	X		Unlikely	Serious	Moderate	
5.5		Foreshore	Activities on the foreshore area	Personnel / equipment movement and wildlife presence in area	Fauna species impacts	Environment	Contractor's Environmental Management Plan (CEMP) Marine Ecology Management Sub-Plan	Possible	Moderate	Moderate	Trained and competent personnel, reporting of sightings and locations of birds/nests, identification and avoidance of nesting sites. Nesting deterrence in high use areas with the potential for nest location. 5m buffer zone, 20m observation zone for nesting sites.			X	X	X		Unlikely	Moderate	Low	
6	**TRAFFIC MANAGEMENT - (Vehicle Movements)**																				
6.1		Public Roads	Transport of waste from refinery site to recycling or disposal location	Heavy vehicle movements	Disturbance of public vehicle movements	Environment	Contractor's Environmental Management Plan (CEMP) Waste Management Sub-Plan Traffic Management Plan	Possible	Moderate	Moderate	Traffic Management Plan. Loads covered			X	X	X		Unlikely	Moderate	Low	
7	**WASTE MANAGEMENT - (Waste to Sea / Land)**																				

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Item No.	Work Process	Work Area	Activity / Job Step	Hazards (Potential For Harm)	Risks (Unwanted Event)	Risk Source (Health Safety Environment)	System / Current Controls	Primary Risk Assessment			Additional Controls	Hierarchy of control						Residual Risk Assessment			Review / Comments
								Likelihood	Consequence	Risk Score		Elimination	Substitution	Isolation	Engineering	Administration	PPE	Likelihood	Consequence	Risk Score	
7.1		Wharf / Dolphin / topsides	Mobile equipment operation (truck, cranes)	Equipment failure, human error during operation of mobile equipment	Loss of mobile equipment to marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Marine Debris & Working over Water Sub-Plan Waste Management Sub-Plan	Possible	Moderate	Moderate	Maintenance and inspections, operational procedures, trained and competent personnel. Emergency Response MP, trained response personnel.			X	X	X		Unlikely	Moderate	Low	
13.4		Wharf / Dolphin / topsides	Concrete cutting, breaking and lifting/ removing	Equipment failure, human error during operation	Loss of concrete waste to marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Marine Debris & Working over Water Sub-Plan Waste Management Sub-Plan	Possible	Moderate	Moderate	Qualified personnel. Certified and maintained equipment. Rigging concrete blocks to minimise risk of droppage to the ocean. . Dropped object Register maintained to record dropped and falling objects. Concrete/steel are inert substances. Recovery of objects is based on a risk approach - ie items which cannot be safely recovered will be left in situ if they do not pose a risk to the environment			X	X	X		Unlikely	Moderate	Low	
14.1		Wharf / Dolphin / topsides	Concrete cutting, breaking and lifting/ removing	Equipment failure, human error during operation of crane equipment	Loss of steel / rusted waste to marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Marine Debris & Working over Water Sub-Plan Waste Management Sub-Plan	Possible	Moderate	Moderate	Lift Plan in place. Complex lifts have an Engineered Lift Plan. Qualified personnel. Certified and maintained equipment. . Dropped object Register maintained to record dropped and falling objects. Concrete/steel are inert substances. Recovery of objects is based on a risk approach - ie items which cannot be safely recovered will be left in situ if they do not pose a risk to the enviroment			X	X	X		Unlikely	Moderate	Low	
14.7		Wharf / Dolphin / topsides	Portaloo	Weather conditions, human error, equipment failure	Loss of sewage / waste to the marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Marine Debris & Working over Water Sub-Plan Waste Management Sub-Plan	Possible	Moderate	Moderate	Secured appropriately. Regular maintenance/ pump out of tanks. regular pump out of tank			X	X	X		Unlikely	Moderate	Low	
14.8		Wharf / Dolphin / topsides	Site sheds/ crib rooms near service platform or upper manifold platform	Weather conditions, human error, equipment failure	Loss of general waste to the marine environment	Environment	Contractor's Environmental Management Plan (CEMP) Marine Debris & Working over Water Sub-Plan Waste Management Sub-Plan	Possible	Moderate	Moderate	Waste receptacles with lids; secured appropriately' segregation of hazardous and non-hazardous wastes; Implementation of waste management plan.			X	X	X		Unlikely	Moderate	Low	

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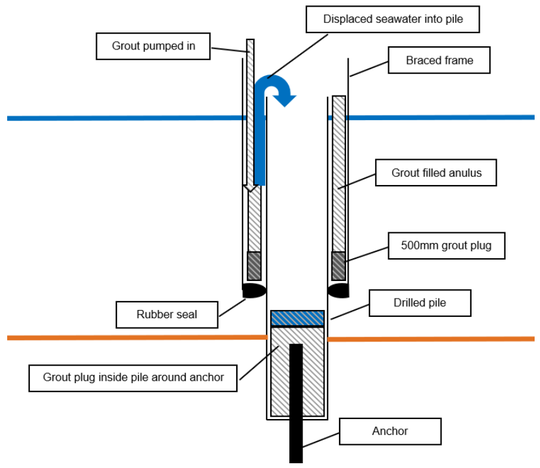
High Environmental Impact Work Activities Over Water

	Hours of Operation Required	Duration (time of year)	Average Total hours of high impact work	Location	Process Description / Methodolgy	Diagram	Environmental Receptor(s) Affected
Pile Driving	24 hours	June 2020 to June 2021	Pile driving average 2 hours per pile. Total 36 hours of high impact work over the duration.	Marine	Piling will occur from bent 7 at the end of the 238m causeway. Approximately 18no Steel tubular piles (1200mm diameter) will be used in the construction of the jetty and wharf. Piles are delivered to site on extendable truck. Piles are upended by crane and lowered into piling gates (frame for holding piles in place). Piles are then driven vertically into seabed using a hydraulic hammer until the piles either achieve a design depth or refuse to be driven deeper. Final pile depth shall be between 6 and 10.5m into the seabed (drilling required to achieve depth). Piling activity will not occur continuously, but require the option to use hammer at any point during the 24 hours.		1) Seagrass in direct impact zone of pile. 2) Marine fauna impacts from noise and vibration caused by zone of influence of the piling hammer 3) Adjacent residents - 1 nos farm house within 1km
Pile Drilling	24 hours	July 2020 to June 2021	Pile anchor drilling - average 18.2 hours per pile. Total 36 days of high impact drilling work over the duration.	Marine	After piles have been driven the pile is drilled to depth, and also to install an anchor. Initially an RCD (Reverse Circulation Drill) is used to remove the overburden down to bedrock. The drill is then swapped for a DTHH (Down The Hole Hammer) that will drill a 900mm diameter hole 10m deep into the bedrock. During the drilling activities, seawater will be extracted from the ocean and will be to flush out the drill spoil (sand and bedrock) from the hole. This spoil will then be disposed of from from approx. 6inch outlet on the drill head back into the ocean anything up to 60l/s, adjacent to the newly drilled pile. Largest size of drill spoil will be up to 25mm diameter. The drill spoil quantity per pile will be between 14m3 and 17m3. The total drill spoil will be approximately 250m3 (on current design). Due to type of material, the drill spoil will sink and disapate quickly, leaving only a short term impact to the water column. No other additives are used in the drill process.		1) Seagrass in direct impact zone of pile. 2) Marine fauna impacts from noise and vibration caused by zone of influence of the piling hammer 3) Adjacent seabed / seagrass / surrounding water column from water and drill spoil returned to the ocean.

High Environmental Impact Work Activities Over Water

	Hours of Operation Required	Duration (time of year)	Average Total hours of high impact work	Location	Process Description / Methodolgy	Diagram	Environmental Receptor(s) Affected
Concrete / Grouting Works over water	24 hours	July 2020 to June 2021	Pile anchor grouting and annulus rate at 6m3/hour. Total 108 hours - (4.5days) of grouting operations over the duration.	Marine	Upon completion of drilling activities a steel tubular anchor will be lowered into the drilled hole in the bedrock. Grout will then be pumped into the pile using a tremmie pipe to fill the drilled hole and the inside of the anchor. When the braced frame is installed over the top of the piles the anulus between the pile and the braced frame will be filled with grout. A rubber seal will be pre-installed at the bottom of the braced frame to prevent grout escaping. A ~500mm plug of grout will initially be poured in the anulus and allowed to set prior to the final full length pour. All water from the anulus will be disposed of inside of the pile. Grout pump equipment will be set up in a semi-fixed location on top of the wharf. Pump lines inspected and fitted correctly prior to grout pumping.		1) Marine environment from unplanned grout or slurry release to water
Abrasive Blasting and Painting	24 hours	July 2020 to June 2021		Onshore/ Marine	Structural steel / welding joints will be coated in the following steps: 1. Area to be painted will be fully encapsulated 2. The steel surface will be blasted with an abrasive medium (industry standard inert garnet) to remove surface rust, paint and contaminants. At the end of blasting, all blast medium will be collected and resused or disposed of. 3. The cleaned steel surface will then be coated with two coats of paint using a airless spray gun. There shall be a fixed site on land for preparatory work and various temporary locations set up in situ on the wharf itself.		1) Air and water surrounding the blast and paint location - unplanned migration of pollutant. 2) Ground impacts on land based blast and paint site.
Welding / Hot works over Water	24 hours	August 2020 to March 2021		Onshore/ Marine	The following offshore welding activities will occur - Welding headstock to piles - Welding pile caps on top of piles/braced frame - welding pot bearing baseplates. Hot welding slag, fragments, shavings and broken welding disks will all be prevented from falling into the water by use of welding mats or equivalent around the site of the hot works.		1) Marine environment from housekeeping and unplanned waste / objects entering into the water.

[Project Number]

Lipson Cove (Port Spencer) Grain Facility

DRAFT Project Management Plan

Rev	Prepared by			Reviewed by			Approved by		
	Name	Signature	Date	Name	Signature	Date	Name	Signature	Date
A									

Rev	Issued To	Organisation	Format	Issue Date
A				

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1 Introduction

The purpose of this Project Management Plan (PMP) is to provide detailed information regarding the identification and management of work health and safety, environmental and quality risks for the scope of works to be performed.

The requirements detailed in this plan apply to Bardavcol employees, subcontractors and other workers under Bardavcol's control.

The PMP has been prepared with regard to:

- Bardavcol's Integrated Management Systems certified to ISO 9001, AS 4801 and ISO 14001 and accredited by the Office of the Federal Safety Commissioner;
- applicable legislative and other requirements (ie. Codes of Practice, regulatory approvals);
- Australian standards relevant to the scope of work being undertaken;
- specific requirements of the project contract and specifications; and
- other relevant factors (ie. interfaces with other contractors, site conditions).

A current copy of this PMP will be maintained at the project site for the duration of the project and will be available for all workers to review (if required). Specific requirements will be communicated to Subcontractors and other workers on site, as required.

Integrated Management System documentation referenced in this plan is available electronically to the project team and for currency concerns are not included as hard copies unless expressly required.

2 Project Overview

Project No.:	[XXXX]
Project Name:	Lipson Cove (Port Spencer) Grain Facility
Location:	Port Spencer, Eyre Peninsula, SA
Client:	Peninsula Ports
Principal Contractor:	Bardavcol Pty Ltd
Project Description (scope of works):	Blasting, crushing, earthworks, pavements, marine construction, condiut placement, stormwater drainage
Start date:	Jan 2020
Anticipated end date:	TBC
Anticipated duration:	22 months
Approximate Value	TBC

2.1 Project scope

2.1.1 Summary of key activities and timeframes

Activity	Commence Date	End Date
Mobilisation to site	January 2020	
Blasting activities	January 2020	May 2020
Crushing activities	January 2020	December 2020
Groyne construction	January 2020	April 2020
Silo and shed pad	April 2020	August 2020
Western bunkers and marshalling area	April 2020	March 2021
Demobilisation from site		June 2021

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2.1.2 Summary of quantities

Material generated (and method)	Anticipated quantity
Run of quarry (blasting and sifting) Core+ abutment fill	300,000 t
8 tonne armour rock (blasting and selection)	16,000 t
2 tonne armour rock (blasting and sifting)	13,000 t
Crushed rock (blasting and crushing) for Pavement	260,000 t
Cut to Fill (OTR) – Bunkers & internal Roads	200,000 m3
Pavement Construction - Bunkers	160,000 t
Pavement Construction – Internal Roads	60,000 t
Pavement Construction – Lipson Cove Road	25,000 t
Bunker Walls	13,000 lm
Bunker Sealing	20,000 t AC7 or AC10

2.1.3 Methodology for key activities

2.1.3.1 Blasting

- Blasting works are to be carried out in accordance with AS 2187 Explosives – Storage Transport and Use
- Vibration Limits will be set within the Blast Management Plan (BMP) and will be guided by limits set out in Appendix J of AS 2187
- Refer to Appendix A for a sample Blast Management Plan used successfully on a previous Bardavcol project
- Blasting is required to generate excavations for the Jetty construction launch site and silos area, This site won rock will subsequently be used to produce several products for re use within the project :-
    - Groyne Materials – varying size to 8t
    - Pavement Source Rock – Varying size up to 600 mm max to enable crushing.
    - If required as general fill materials for bunker construction
- Drilling and Blasting are programmed to be carried out as dayshift operations.

2.1.3.2 Groyne construction

- Prior to construction a floating silt curtain will be placed around the groyne footprint. It is likely that this will be placed progressively and extended as the works proceeds to the final footprint.
- A combination of end tipper trucks and a dozer is to place and push the mined rock to be used for the Groyne core out into the footprint of the groyne to create a 'finger'
    - Core material is intended to be "Run of Mine" material loaded with a skeleton bucked to reduce fines content.

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- Note that rocks are to be placed on the existing sea bed with no preliminary works deemed to be required
- A long reach excavator is to be used to trim the batters of the core to be 1:1.5
- As the groyne encroaches into the water and wave zone, a capping of 8 tonne rock is to be carted and placed using a combination of end tipper trucks and excavators
- As the depth of the groyne exceeds the wave impact zone depth at AHD -4.8m, a toe of 1-2 tonne rock is to be carted and placed using a combination of end tipper trucks and excavators prior to the placement of the 8 tonne rock
- It is proposed that the armour rock gets placed progressively to mitigate the risk of washout of the groyne core during a storm event
- Groyne construction is to be a day / night (double shift) operation
- No on ground personnel will be required on the groyne during construction
- A work boat will be in attendance at all times for silt curtain placement and management.

Refer to Appendix B1 for a diagrammatic representation of the above methodology.

During groyne works, aquatic sediment control in the form of floating silt curtains will be installed to minimise the impact of earthworks on the marine environment. Environmental controls specific to water quality will be managed through a Soil Erosion, Drainage and Water Quality Management Plan (refer section 9.8).

2.1.3.3 Crushing

- Crushing of blasted rock is required to produce pavement materials to be used in
  - Construction of bunkers
  - Backfill to Silo foundations
  - Internal roads and marshalling areas
  - Upgrade of Lipson Cove Road
  - Stormwater drainage materials
- Subject to crushing trials it is anticipated an “all in product” will be produced with a 2 stage (jaw crusher + secondary crusher) process. Producing approx. 7000-9000 tonne/week on a dayshift only basis.
- Subject to productivity targets short term night shift crushing may be required
- Due to the requirement to establish the Launch and Silo pads as soon as practically possible, the parent material for the crushing will be excavated from the blast site and stockpiled to the south of the site.
- Crushing and stockpiling will occur here (see attached Preliminary Layout Plan – Appendix B2), with crushed material incorporated into the works , being transported by off road trucks.

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2.1.3.4 Earthworks and pavement construction

- Approximately 200,000m^3 of cut/fill works are required for the bunkers, marshalling area internal roads and silo/shed pad
- All earthworks materials will be won from within the site, with the majority of the fill being generated from rock overburden and cut zones within the western bunkers.
- Off road dump trucks (ADT's) are anticipated to be the haulage units. Compaction will be carried out using standard compaction equipment (compactors and 12-15T vibrating rollers.)
- Following subgrade preparation and moisture conditioning, crushed rock will be spread to form the pavements. The pavement material will be hauled from the crushed material stockpile, condition and compacted. Compaction will be carried out using standard compaction equipment (12-15T vibrating rollers.)
- Both cut to fill (earthworks) and pavement works are anticipated to be dayshift operations

2.1.3.5 Bunker Walls

- Bunker walls are likely to be extruded concrete barriers (slip formed) with pre mixed concrete being hauled from Tumby Bay and extruded
- Bunker Wall construction will be a dayshift operation

2.1.3.6 Asphalt Works

- Portions of the bunkers , internal roads will require placement of thin layers of asphalt to reduce in service dust scouring of pavement materials
- 30-40mm of AC7 Asphalt is anticipated to be incorporated into the works
- Asphalt will be sourced from Port Lincoln to negate the need for an onsite Asphalt Plant and the placement will be carried out during daylight hours

2.1.3.7

2.1.3.8 Construction Water

- Construction water is required for all of the above activities. Fresh potable water is not mandatory (technically) except for the production of concrete.
- Subject to designer approval salt water may be used to construct pavements, earthworks and dust suppression. Salt water will be sourced by placing a sump in the location of the detention basin.

3 Integrated Management System

This PMP forms part of Bardavcol's Integrated Management System (IMS), which is certified to ISO 9001, AS/NZS 4801 and ISO 14001.

The IMS is underpinned by our commitments to Safety, Quality and Environment, which are detailed in the following policies:

- Work Health and Safety
- Quality
- Environmental

Copies of these policies are contained in Appendix C of this PMP and are to be displayed on the project notice board.

4 Planning

4.1 Project Organisation

4.1.1 Key Project Contacts

Client: Peninsula Ports			
Name	**Position**	**Phone**	**Email**
Mark Wilson	Project Manager / Superintendent		
	Contract Manager		

Design Team: Jacobs			
Name	**Position**	**Phone**	**Email**
Scott Snedden	Design Manager		
Rachel Rickards	Civil Lead Engineer		

Main Contractor: Bardavcol Pty Ltd			
Name	**Position**	**Phone**	**Email**
[TBC]	Project Manager		
	WHS Advisor		
	Quality, Safety and Environmental Representative (QSEMR)		
	Project Engineer		
	Construction Engineer		
	Site Supervisor		
Corporate Support:			
Darren Foster	Managing Director	0418 816 804	dfoster@bardavcol.com.au
Shane Prince	Construction Manager	0407 513 150	sprince@bardavcol.com.au
Robyn Murdey	Return to Work Coordinator	0400 805 613	rmurdey@bardavcol.com.au
Henning Klovekorn	HSE Manager	0439 280 666	hklovekorn@bardavcol.com.au
Daniel Kranixfeld	Operations Manager	0419 851 965	dkranixfeld@bardavcol.com.au

Other Contacts:			
Organisation	**Description**	**Phone**	**Email**

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SA EPA	General Enquiries / Incident Reporting	8204 2004	epainfo@epa.sa.gov.au
Safework SA	General Enquiries Incident Reporting	1300 365 255 1800 777 209	help.safework@sa.gov.au
Department for Environment and Water	General Enquiries	8204 1910	Refer www.environment.sa.gov.au
Office of the Technical Regulator (Electrical, Gas Utility Infrastructure)	General Contact Line	8266 5500	Refer https://www.sa.gov.au/topics/energy-and-environment/electrical-gas-and-plumbing-safety-and-technical-regulation/about-the-otr/office-of-the-technical-regulator
Aboriginal Affairs and Reconciliation (Department of State Development)	General Enquiries	8226 8900	Refer https://statedevelopment.sa.gov.au/aboriginal-affairs/aboriginal-affairs-and-reconciliation
Dial Before You Dig (DBYD)	General Service	1100	sa-nt@1100.com.au
SA Power Networks	General Enquiries Faults / Emergencies	13 12 61 13 13 66	-
SA Water	Customer Service 24/7 Fault Report Line	1300 650 950 1300 883 121	-

4.1.2 Project Team Structure

An overview of the Bardavcol project team structure is presented in the project organisation chart in Appendix D.

4.1.3 Roles and Responsibilities

All workers must ensure that work is performed safely and without risk to themselves, others or the environment. This includes the authority to stop work if these objectives cannot be achieved.

Details of the specific roles and responsibilities for this project are provided in Appendix D.

4.2 Site establishment and operation

4.2.1 Site Access and Amenities

A site layout plan is provided in Appendix E, which indicate the:

- entry/exit points;
- site office(s);
- amenities (ie. lunch rooms, toilets);
- site parking;
- water source locations;
- material storage areas;
- refueling locations; and
- Contractor's Activity Zone (CAZ).

4.2.2 Working Hours

Bardavcol will typically* undertake site works within the hours outlined below. All work outside of the below times must be approved by the Bardavcol Project Manager and are subject to change depending on negotiations with the applicable subcontractors and programme commitments.

Nominated working hours (24-hour time)			
Monday – Friday	0700	to	1800
Saturday	0700	to	1800
Sundays, Public Holidays and Industry RDOs	Not worked		

*Crushing activities may require extended shifts to meet programming requirements

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4.3 Objectives and Targets

The objectives and targets applicable to this project are summarised in the table below and are applicable to all workers and activities that are Bardavcol's responsibility.

Objective	Target	Measure
Deliver the project with zero significant injuries	*Zero Lost Time and Medical Treatment Injuries*	*Number of LTI and MTIs*
Deliver the project with zero service strikes	*Zero services strikes*	*Number of services strike incidents*
Minimise construction environmental impacts	*Re-use or recycle ≥80% of waste generated*	*Quantity of waste re-used/recycled Vs waste disposed*
Construction quality to satisfy project specifications	*Zero non-conformances for duration of the project*	*Number of non-conformances*
Deliver the project with minimal disruption to the community	*No justifiable community complaints*	*Number of community complaints*

4.4 Legislation, Contract and other requirements

Bardavcol's legal register, which is accessible through the intranet, lists legislation, codes of practice and other statutory requirements that are applicable to this project. Bardavcol will take all reasonable and practicable steps to ensure that work performed under its control complies with the:

- Work Health and Safety Act and Regulations; and
- Environment Protection Act and related Environment Protection Policies.

Contract or client specific requirements that are also applicable to this project are summarised below:

Reference/Title	Author	Date
[TBC]		

Licenses and approvals that are applicable to the project are summarized below:

Licence / Approval	Authority	Relevant Legislation	Activity	Project Responsibility
[TBC]				

4.5 Hazards, Risk Assessment and Control

4.5.1 Project Risk Review and Register

During the pre-construction phase, the project team will conduct a risk workshop to:

- identify risk sources, hazards and aspects
- identify potential consequences
- assess the risk (ie. consideration of likelihood and consequence)
- assign controls (with reference to the hierarchy of controls)
- analyse the residual risk based on the application of controls to ensure that it is acceptable (this process may need to be repeated if the residual risk is acceptable and controls are revised)
- assign responsibilities for the implementation of controls

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The Project Manager must ensure that the above process includes the assessment of applicable risks identified by the Safety in Design assessment provided by the client or Design Team.

The outcome of this workshop will be documented in the Risk Register (located in Appendix F), which will be used to communicate project specific hazards and risks to workers and for reference in the development of task specific risk assessments, such as Safe Work Method Statements (SWMS).

A copy of the risk register will be made available to the client and Bardavcol workers, including subcontractors under Bardavcol's control.

The Project Manager is responsible for maintaining the risk register and ensuring that it is reviewed at least monthly.

The risk assessment process and controls are based on the intent to reduce the risk as low as reasonably possible (ALARP) in accordance with the hierarchy of controls.

4.5.2 Safe Work Method Statements (SWMS)

SWMS will be prepared for high risk construction work and other activities/tasks identified in the risk register, or as required by Bardavcol's IMS. The SWMS must provide sufficient information for the workers performing the tasks to understand the work method, associated hazards and required controls. The SWMS must also include details on:

- any plant and equipment that will be used;
- any hazardous chemicals that will be used;
- training and competencies (eg. qualifications) that are required; and
- details of emergency procedures and equipment required in addition to the project Emergency Management Plan and protocols.

The SWMS must be prepared, reviewed and accepted prior to the activity or task commencing. The development of all SWMS will be undertaken using Bardavcol's SWMS Review Record. The review and acceptance will be documented on the SWMS Review Record, with any additional conditions that may be required. All SWMS developed for high risk construction work will be provided to the client for review prior to commencing.

All workers must read, understand and sign onto the SWMS applicable to the tasks they perform prior to commencing work.

Copies of the SWMS must be retained in the site office and a register of SWMS maintained to enable them to be tracked and ensure that they are reviewed at least quarterly.

4.5.3 Job Task Cards

Job Task Cards may be completed for work that does not require a SWMS (eg. non-high risk construction work) or in addition to a SWMS for the purposes of identifying specific changes, hazards and controls that are applicable to the work to be performed on that specific day or shift.

Job Task Cards are to be completed by the work group to facilitate communication and consultation amongst the workers.

At the end of the day/shift, completed Job Task Cards are to be provided to the Supervisor for filing.

4.5.4 Plant Risk Assessment

All plant and equipment that is introduced to the project site must be made available to Bardavcol for inspection and issued a Plant Permit to Work, prior to commencing work. Bardavcol will ensure that all inspection records, plant risk assessments, maintenance records, and any operating manuals are maintained onsite. As a minimum, plant and equipment must conform to the manufacturer's specifications and any applicable legislation and standards.

Supervisors are responsible for ensuring that plant and equipment allocated to their activities are inspected prior to each shift, and that any faults or damage is reported to the Bardavcol Workshop, Subcontractor or Hire Company, as appropriate. Plant operators are responsible for ensuring that plant pre-start inspections are documented prior to operation at each shift and that any faults or damage is reported to the relevant Supervisor.

5 Implementation

5.1 Communication, Consultation and Coordination

Workers involved in the project will be kept informed of project specific hazards, risks, controls and performance requirements through a range of communication, consultation and coordination activities. These include inductions, pre-start meetings, toolbox talks and worker participation and consultation in the preparation of SWMS.

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5.1.1 Induction

All workers under Bardavcol's control are required to report to the site office on arrival and attend the following inductions as a minimum, prior to commencing work:

- Bardavcol Site Specific Induction – for all workers
- Bardavcol visitor induction – for visitors;

Bardavcol's project induction will be conducted by project team personnel nominated by the Project Manager and include key information such as the project scope, amenities, legal requirements applicable to the project, high risk work, hazards and controls (including site rules) and emergency response processes. Workers must complete the induction form to confirm that they understand the information that has been provided. Induction details will be entered into an induction register that will be maintained for the duration of the project.

Visitors must complete the visitor induction and are not permitted to perform any works on the project. They must be escorted by a member of the Bardavcol project team.

Delivery drivers that frequently visit site must complete a truck driver induction and may be required to sign the prestart briefing for the day of delivery. The Supervisor will be responsible for ensuring that drivers that enter site are informed of any new or additional hazards / procedures relevant to that day's activities and conditions.

Induction records will be stored in a secure location to prevent unauthorised access of personal information.

5.1.2 Daily Pre-Start Briefings

Daily pre-start briefings will be held prior to the start of each shift to communicate and consult with workers on the day's activities, coordination and interface issues and key hazards and controls. Records of pre-start meetings will be retained on file. All workers are required to sign on to the daily pre-start before entering their designated work zone, even if they arrive at site after the shift has commenced.

5.1.3 Toolbox Talks

Toolbox talks will be held fortnightly to communicate and consult with workers on safety, environmental and quality related issues. All workers must attend and records of the talks and attendance will be retained on file.

As a minimum, the agenda will include information/update on:

- Hazards and controls
- Accidents and incidents
- Corrective actions
- Feedback on inspections and audits
- Open discussion on topics relating to hazards and controls

5.1.4 Notice board

A notice board will be located in the site compound or mobile lunchroom (as applicable) that will display key safety, environmental and quality information for the project. This includes Bardavcol's safety, environmental, quality and other corporate policies, the emergency response plan, site location and movement plan and key project contacts.

5.1.5 Bulletins

Bulletins may be issued to the project teams from time to time, which provide information on safety, environmental or quality related issues, such as alerts and lesson learnt.

Bulletins will be communicated to workers through Toolbox Talks and posted on the project notice board.

5.1.6 Community Relations

Bardavcol will notify the Client prior to commencing any construction work that is likely to affect nearby properties.

If required by Peninsula Ports, Bardavcol will liaise with property owners / residents prior to commencing any construction work that is likely to cause a disturbance. This form of notification will be in the form a letter that will have the following objectives:

- introduce Bardavcol to the property owners and businesses
- provide Contact name(s) for the property owners and businesses
- provide a contact number of the site based telephone service for complaints or enquiries

A complaints register will be established to log and manage all complaints and enquiries.

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Once construction has commenced, Bardavcol will issue another letter with the aim of:

- ascertaining the specific access requirements required for each property, so that reasonable and practicable arrangements can be made; and
- providing 24 hrs notice in writing prior to undertaking any operation affecting property access.

5.2 Training and Competency

5.2.1 Competency

All workers under Bardavcol's control are required to have adequate skills and training to perform their tasks. Workers are not permitted to perform work for which they have not been adequately trained.

As a minimum, Bardavcol will retain copies of:

- Construction industry induction (ie. white card)
- Driver's licence
- Trade licences and operating certificates
- Relevant medical information
- Verification of competency

Plant and equipment operators may be assessed during the project, as a means of verifying their competence.

Documentation verifying competencies must be provided by subcontractors and labour hire organisations in relation to their workers to confirm their knowledge and skills. Evidence of verification of competency of Bardavcol workers is retained in the organisation's Training and Competency Register, which is accessible through the intranet.

5.2.2 Training

As per the previous section entitled *Communication, Consultation and Coordination*, all workers are required to complete Bardavcol's project induction prior to commencing work and any additional inductions or training required by the contract.

Additional training will be provided in accordance with the project training needs analysis, as identified by a SWMS or risk assessment, in consideration of a worker request or in response to a corrective action raised through an inspection, audit, hazard observation or incident investigation.

Records of training will be provided to the HSE Manager to update the Corporate Training and Competency Database.

5.3 Fitness for Work

Bardavcol is committed to providing a safe and healthy workplace to ensure that workers are in a suitable medical condition (ie. physical and mental) to perform their work. Bardavcol will ensure that health assessments are undertaken, as required by legislation or the contract.

Workers are required to disclose any medical or physical conditions that could limit or impair their ability to work safely. The Project Safety Advisor will maintain a register of workers who have indicated a medical or physical condition that may impact on safety (ie. to themselves and others) and, in consultation with the Project Manager, consider if any restrictions need to be imposed.

When allocating tasks and resources, consideration must be given to a worker's medical and physical condition and the effect of the actual work environment (eg. weather, manual handling) to minimise exposure to unreasonable health and safety risks. This includes new workers and those that are returning to work for the first time from injury, illness or extended periods of leave.

5.3.1 Alcohol and other drugs

Bardavcol has a zero tolerance policy to alcohol and other drugs in the workplace to ensure that workers do not place themselves or other at risk. Workers are required to disclose all medications that they are taking and where required, provide documentation from their medical practitioner to confirm that the medications will not affect their ability to perform their work, or provide details on limitations or controls to ensure that they can work safely. If the medical practitioner provides details of limitations or controls, the worker must adhere to these at all times.

Random alcohol and other drug testing will be conducted, in accordance with Bardavcol's Alcohol and Other Drugs Procedure. The scheduling of random testing will be coordinated by the HSE Manager to ensure independence from the project team.

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All workers under Bardavcol's control must comply with Bardavcol's Alcohol and other Drugs Procedure.

5.3.2 Hygiene

Amenities, including lunch rooms, toilets and offices will be maintained and kept clean and tidy at all times. Work areas will be maintained in a clean and tidy condition, with waste materials frequently removed and disposed of accordingly.

5.3.3 Smoking

Smoking is not permitted, except within designated smoking areas that are identified and communicated accordingly. These areas will be located in accordance with applicable laws, regulations, policies, client requirements and hazard controls.

5.3.4 Sun and UV Protection

All workers must be protected when exposed to the sun or UV radiation by use of long sleeves, long trousers, UV factored sunscreen and shade structures. Additional controls, such as the use of tinted safety glasses and broad brim shades for hard hats are encouraged, subject to the requirements of the tasks performed.

Adequate potable water and other applicable controls will be provided to workers to minimise the risks associated with sun and heat exposure (eg. dehydration).

5.3.5 Return to Work (RtW)

The management of the return to work of Bardavcol employees following injury or illness will be the responsibility of Bardavcol's Return to Work Coordinator (RtWC). The RtWC will liaise with the Project Safety Advisor and applicable Supervisor and Project Manager to ensure that they understand any Return to Work Plans and related requirements that apply to workers on the project.

The return to work of subcontractor workers will be managed in consultation with their RtWC.

Ongoing monitoring of workers will be undertaken in accordance with the Return to Work Plan.

5.4 Work Group and Subcontractor Management

5.4.1 Bardavcol Work Group

Prior to commencing work on site, Bardavcol Supervisors that will be responsible for overseeing work groups will be briefed on the scope of works, project safety, environmental and quality requirements and hazards and controls that are relevant to their role and work group. This includes consultation on the risk register and contract requirements.

Prior to commencing work, Supervisors are required to prepare and submit SWMS for high risk construction work or work specified by Bardavcol and contribute to the following (as required):

- Verification of worker competencies (VOC);
- Preparation of quality documentation (eg. Inspection and Test Plans);
- Risk assessment of hazardous chemicals and provision of safety data sheets; and
- Ensuring that plant and equipment risk assessment, maintenance and inspection records are up to date.

5.4.2 Subcontractor management

Prior to engagement, Subcontractors and suppliers will be evaluated to confirm that they have the expertise, experience, resources and capabilities to meet the applicable project safety, environmental and quality requirements.

Where required, further communication and consultation with Subcontractors and suppliers may be undertaken to ensure that they understand and are aligned with the project requirements, hazards and controls that are relevant to their role and scope of work. Any clarifications and agreements that arise from this process will be documented and confirmed prior to engagement.

Prior to commencing work, Subcontractors and suppliers are required to provide information, including:

- Safety and Environmental Management Plans (if required)
- SWMS for high risk work or as requested by Bardavcol;
- Verification of worker competencies (VOC);
- Quality documentation (eg. Inspection and Test Plans);
- Safety Data Sheets for hazardous chemicals; and
- Plant and equipment risk assessment, maintenance and inspection records

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Additional information may be required from Subcontractors and suppliers prior to and during construction to ensure that safety, environmental and quality requirements will be achieved, subject to their scope of work and risk profile. Bardavcol will communicate the additional information required to the applicable Subcontractor or supplier.

5.5 Emergency Preparedness and Response

5.5.1 Emergency Response

Bardavcol will maintain an Emergency Management Plan that describes the roles and responsibilities in the event of an emergency. This plan will be aligned with any client Emergency Management Plan or procedures that are applicable to the project.

The Project Manager will be responsible for ensuring that the Emergency Management Plan addresses potential emergency scenarios applicable to the project, its various locations and nearby activities. The Project Manager may consult with the project team and other information sources in identifying and considering the appropriateness and adequacy of the emergency management plan.

Bardavcol will ensure that the requirements of the Emergency Management Plan are communicated to all workers and visitors through the project induction, including any changes through Daily Pre-start Meetings, Toolbox Talks and specific area inductions.

The Emergency Management Plan, muster point locations and list of First Aiders will be displayed in all amenities (eg. lunch room, offices) and other areas as appropriate.

An emergency evacuation drill will be held within the first 3 months of the project commencing to evaluate the effectiveness of the Emergency Management Plan and related requirements. The evaluation will be documented with any corrective actions that need to be implemented. Further emergency evacuation drills will be held every 3 months thereafter.

5.5.2 Fire-fighting equipment

Fire extinguishers and other fire prevention equipment will be installed and maintained in locations where there is the potential for fire (eg. ignition sources, flammable fuel sources). Consideration will be given to the type, capacity and number of extinguishers or equipment required based on the fire risk and associated hazards (eg. electricity).

SWMS and the relevant work permits must include details of any task specific firefighting equipment that is required.

Information on the types, locations and use of firefighting equipment will be communicated as part of the project induction. Specific training requirements will be identified and managed through the project training and competency processes.

5.5.3 First aid and Medical Treatment

Bardavcol will ensure that access is available to appropriate first aid and medical facilities.

There will be at least one First Aider for every 15 workers under Bardavcol's control, with their details displayed on site, as detailed above (refer Emergency Response)

First aid kits will be maintained at designated locations and contain supplies appropriate to the work performed and potential injuries or illnesses that could arise. Work groups and subcontractors are required to ensure that additional task specific first aid kits or supplies are available to ensure that they can adequately respond to an incident or emergency. This may include ensuring sufficient quantities of eye wash are available when using a hazardous chemical.

All injuries and illnesses must be reported to the Bardavcol project team. Injuries or illness that require specialised medical attention that cannot be administered by a First Aider on site must be referred to the Bardavcol nominated medical facility for the project (refer below). A Bardavcol project team member will accompany the injured or ill person to the medical facility.

First Aid and Medical Treatment Details:

Location of First Aid Equipment	**Equipment Type**	
Bardavcol Site Office	Large Occupational First Aid Box	
Bardavcol Light Vehicles	Medium Size First Aid Pouch	
Hospitals		
Nominated Hospital	*Address*	*Phone No.*

Tumby Bay Hospital	8 Esplanade, Tumby Bay SA 5605	8688 2007
Port Lincoln Health & Hospital Service	Oxford Terrace, Port Lincoln SA 5606	8683 2200

Note: Details of Bardavcol First Aiders for the project will be displayed on posters at various locations on site.

5.5.4 Spill response

Spill kits will be deployed in locations and work areas where there is the potential for spills or discharges that could pollute or cause environmental harm (ie. damage). Consideration will be given to the type, capacity and number of spills kits required based on the type and quantity of materials that could be discharged and any associated hazards (eg. incompatibility). This assessment will be documented in the Risk Register (as applicable) and may also identify the need for additional controls to prevent the spill or spread of materials.

SWMS and the relevant work permits must include details of any task specific spill mitigation and response equipment that is required.

Information on the types, locations and use of spill response equipment will be communicated as part of the project induction. Specific training requirements will be identified and managed through the project training and competency processes.

5.5.5 Incident Reporting and Management

All workers and visitors are required to report incidents including near misses, injuries, illness, environmental impacts or pollution, property damage and security related events. This includes incidents that involve the public and that occur external to the project site where Bardavcol or workers under its controls are involved (eg. plant-public interaction). As part of Bardavcol's reporting and management processes on site, the client will be notified of all incidents.

Incidents must be reported immediately to a Bardavcol Supervisor and Project Manager. The Project Manager or their representative must notify the HSE Manager within 4 hours of a significant incident (including a high potential near miss) and within 24 hours for all other incidents.

Supervisors and the relevant project team members are responsible for completing the incident report, incident statements and associated paperwork and undertaking a preliminary investigation. Incident reports (even if partially completed) must be forwarded to the HSE Manager within 24 hours of the incident.

The HSE Manager will typically report 'notifiable incidents' to the relevant statutory authority and will liaise with the Project Manager and other relevant workers to ensure that this occurs within the required timelines, and that the incident scene is not disturbed (unless required to prevent further injury, impact or damage).

The Project Manager or their nominated representative will ensure that the Client and other relevant project stakeholders are notified of incidents in accordance with the contract specific timelines and requirements.

Detailed incident investigations will be undertaken for high potential near misses and incidents that have an actual consequence rating of major or catastrophic in relation to injuries/illness, environmental harm and/or property damage. Investigations must commence as soon as possible after the incident and will be undertaken by the HSE Manager or nominated person.

Following the completion of the investigation, findings and recommendations will be communicated at the earliest scheduled Toolbox meeting.

Corrective actions identified during the preliminary and detailed (if applicable) investigation will be documented in the incident report and managed through this process.

5.5.6 Change Management

Change that requires a formal management process is:

- amendment to this PMP or other project related management plan;
- amendment to IMS documentation (eg. policies, procedures, work instructions);
- changes to critical project and corporate roles and responsibilities; and
- changes to legislation and other statutory requirements, contract or client compliance requirements.

A risk assessment must be conducted to identify any variation to the hazards and risk and to evaluate the effectiveness of the existing controls (if any) and management responsibilities. New or additional controls must be implemented in accordance with the hierarchy of controls to reduce the risk as low as reasonably possible.

Following this assessment, the Project Manager must ensure that:

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- the PMP (including appendices) and risk register are updated accordingly;
- the change, including hazards and controls are communicated to all affected workers;
- SWMS, ITPs, IPCs and other 'process controls' are reviewed and amended, as appropriate; and
- Peninsula Ports are advised of any changes to the PMP and provided with an updated copy of the PMP.

6 Monitoring and Evaluation

6.1 Inspection

Inspections will be undertaken to assess project performance and evaluate the effectiveness of controls. This includes observation of hazards, 'at risk' and positive behaviour, hold points, non-conformance and conforming/positive behaviour.

The inspection tools that will be used, frequency and responsibilities are detailed in the table below. Inspection results will be communicated with the relevant Supervisors who will initiate corrective actions and provide records of close out. The nominated project team member(s) will ensure that the records of inspection, corrective action and close out are retained on file.

Findings, including lessons learnt from the inspection process will from time to time be communicated to workers through Toolbox meetings or Daily Pre-start Meetings.

A schedule of known inspections for the project is as follows:

Inspection Type	Scope	Frequency	Responsibility
Hazard Observation	Identify positive performance, hazards and opportunities for improvement	1 / fortnight	PM, PE, Supervisor, Project Safety Advisor
SWMS Task Observation	Evaluate task compliance with the applicable SWMS	1 / fortnight	PM, PE, Supervisor, Project Safety Advisor
Safety Inspection	Evaluate general site safety performance (eg. site establishment)	1 / month	Project Safety Advisor
Environmental Inspection	Evaluate environmental performance and controls	1 / month	EMR
Quality Inspection	As per the Inspection and Test Plan	As per the Inspection and Test Plan	QMR

6.2 Audit

During the construction period, the project may be subject to an internal, second party (ie. client) and/or third party audit. These will occur in accordance with Bardavcol's internal audit schedule, client/contract auditing requirements and the timing of third-party audit programs (eg. TQCSI and OFSC).

The audits are regarded as learning opportunities to identify the processes, actions and risks that are effectively implemented and controlled, as well as those areas that are non-complying and require action.

Non-conformances and improvement opportunities will be recorded in the project corrective action register and tracked to ensure close out within the agreed timeframes.

6.3 Health Surveillance

The project risk assessment will identify any workers, activities or hazardous materials that require health surveillance in accordance with legislation or the contract. If required, external advice will be obtained to assist in determining the health risks, controls and whether surveillance is required.

The Project Manager will ensure that a register of workers that require health surveillance is maintained and that monitoring results for Bardavcol employees are provided to the individual workers and the HSE Manager. Results of monitoring for non-Bardavcol employees will be provided to the appropriate person within their organisation to disseminate and manage.

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6.4 Performance Reporting

The Project Manager will ensure that data is collected, analysed and reported to monitor and evaluate ongoing project performance and opportunities for improvement. This process will be undertaken monthly and reports provided to the HSE Manager and Construction Manager. Performance summaries will be communicated to workers through Toolbox meetings.

Client/contract specific monitoring and reporting requirements will be included in the above process. For this project, the following additional data will be collected and reported:

Report Type	Frequency	Responsibility
WHSE Report	Monthly	Project Manager
Monthly Construction Statement	Monthly	Project Manager

6.5 Daily Report Sheet

A Daily Report Sheet is maintained by the project team and is used to record daily activities and other relevant information (eg. weather conditions, subcontractors on site) that may be referenced to support performance reporting, in the event of query, claim or potential conflict in relation to the project management. Daily Report Sheets will be provided to Peninsula Ports weekly, but otherwise are available upon request.

6.6 PMP Review

To ensure the ongoing currency and effectiveness of this PMP, the Project Manager must ensure that this document is reviewed at least quarterly, with more frequent reviews required in response to changes to the scope of work and project hazards/risk and controls. The review must evaluate the:

- Currency of the information within the PMP;
- Effectiveness of project processes and controls;
- Changes to hazards, risks and statutory and contract/client requirements (if any);
- Adequacy of project roles and responsibilities; and
- Opportunities to improve project performance.

The outcome of the review process must be communicated to the relevant members of the project team and the HSE Manager.

6.7 Document and Record Management

The Project Manager will ensure that document and record management processes are established and maintained to demonstrate compliance with Bardavcol's IMS, contract and statutory requirements.

All records will be stored and retained such that they are readily identifiable, accessible and located to prevent damage or deterioration. Records identified as containing personal information (eg. details of medical conditions) will be stored in a secure location with access restricted to critical personnel. Upon project completion, all records will be transferred to Bardavcol's head office for archiving. Archived documents will be securely retained for a period of not less than 7 years from the end of the defects liability period (final completion) of the project. After this time the documents will be disposed of securely by a specialist document disposal service.

The Project Manager will also maintain on-site a means of secure document disposal for the destruction of any confidential, classified, private or commercial in confidence documentation that is required to be destroyed. This will be in the form of a document shredder machine or a lockable collection bin for an offsite secure document destruction service.

7 Quality

This section outlines the quality management practices and processes that will be implemented by Bardavcol during the project. Bardavcol's systems are designed to ensure delivery of the client's brief, project specifications and contract, as well as providing control measures for project risks affecting quality. Quality will be controlled via inspection and test plans, hold /witness points, product traceability registers and Bardavcol's quality management database.

Prior to development of our quality database, a detailed analysis of the project contract, specifications and supporting documentation will take place to extract the quality deliverables of the project. This process will identify all project hold

point/witness points that are required, testing needed to be undertaken, verification records to be maintained, and work instructions to be developed. This process will developed by the QMR with the Project Engineers.

Once identified, Bardavcol will divide the varying work disciplines into lots/packages in consultation with the client. The definition of the lots will take place as part of this discussion. Bardavcol will then proceed to ensure that the relevant release points, test and verification certificates, in-process checklists and documented work methods are included in each lot. Once all elements of that particular work package are complete, the lot will be submitted to Peninsula Ports for approval.

7.1 Condition assessment

Prior to mobilisation to site, Bardavcol will undertake a dilapidation survey that will consist of an assessment (eg. photos, comments, video) of the current condition of the existing infrastructure on site, including any existing assets within the general construction area. The assessment will be conducted to assist in determining damage or impact on the condition of the site and related amenities and structures that is caused by the project's activities.

7.2 Quality Controls

7.2.1 Inspection and Test Plan (ITP)

Bardavcol's method for providing evidence that the project specifications are met will be through the development of a number of ITPs. The ITP will document the sequence of activities for a detailed delivery process, listing all inspection and testing requirements to complete the activity. The ITP will document the acceptance criteria, frequency and responsible personnel for the successful completion of that task. Any relevant standard, hold points and records will also be documented. Each ITP will identify the critical aspects of a particular activity and will be submitted to the client for approval before commencing work.

A register will be maintained onsite of all accepted and active ITPs and is available upon request.

7.2.2 In-Process checklist (IPC)

In-Process Checklists (IPC) may be used in conjunction with the ITPs to provide additional information where steps in the ITP require a more detailed assessment and to document any special or unusual conditions under the contract. IPCs may include the following:

- hold points and/or witness points to ensure the product is held until all verification activities required have been undertaken prior to proceeding to the next stage of the works;
- a check that materials have passed verification and are suitable for inclusion in the project;
- any survey verification required;
- compaction testing or other external testing requirements;
- environmental conditions, if any, prior to work proceeding;
- critical product specification requirements and workmanship criteria;
- parties responsible for carrying out inspections and tests;
- comments column recording checks of the above;
- assign discrete lots for sections of work.

IPCs will act as a live checklist and will be updated as the work progresses.

A register will be maintained of active IPCs and will be regularly reviewed by the QMR.

7.2.3 Work Method Statement (WMS)

Work method statements will be developed in situations where a detailed methodology is necessary (eg. high risk or complex work). The methodology will provide a step by step approach to ensure that the appropriate testing, records and control measures and undertaken in the correct order.

7.2.4 Material Tracking

A load tracking register will be developed as part of Bardavcol's method for tracking and monitoring all material movements during the project. The register will document the type and source of the material, as well as the location on site where it is being used. In order to avoid any cross-contamination of material, all stockpiles will be labelled under a unique code identifier.

As part of the tracking process, each truck driver will fill out their project provided load tracking sheet that will be submitted to the QMR or delegate at the completion of each day for entry into the register.

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7.2.5 Purchasing, Supplier and Product Identification Process

Deliveries of civil construction products batched offsite and used in large quantities (eg. concrete, quarry materials) will be identified by a unique identifier code or docket number that will enable traceability of the products back to their original source batch and production process. The docket provided at point of delivery will provide information on the supplier, date and time of manufacture and date and time of delivery to site.

Multiple deliveries of homogenous material will be identified by a "Supply Lot" of a defined quantity that includes testing at the specified frequencies to confirm product conformance to the specification. Details of these tests and requirements will be included on the Inspection and Test Plans for that process.

Smaller and individual purchasing of custom manufactured non-homogenous materials that are to be incorporated into the works (eg. pipes) will involve the development of a purchasing schedule that will uniquely label the items for their placement within the works. Where possible, a labelling system that is consistent with that which is included on the project drawings will be used. At time of delivery, such items will be clearly labelled according to the schedule.

7.2.6 Handling, Storage and Delivery Procedures

Delivery of homogeneous mass-produced civil construction products that are batched offsite will be by use of purpose built heavy vehicles for that specific material. Where practicable material will not typically be 'double handled' and will be delivered direct from source to the point of placement within the works (eg. to the location of the concrete pour in the case of concrete or to the paver machine or spreading site in the case of quarry products and asphalt).

The person nominated on the ITP will be responsible for ensuring that the product is inspected and docket checked prior to receipt/placement, to ensure that the material is a conforming product. Depending on the process and the type of material, the ITP or IPC may require further checks of the product at the point of delivery including temperature checks or curing time confirmation.

Individual deliveries of custom manufactured, non-homogenous materials will involve handling, storage and delivery by methods appropriate to that individual material. At point of delivery a general inspection of the materials will typically occur to confirm conformance to the specification prior to unloading. Any specific inspection and testing requirements at time of delivery will be included on the ITP for that process.

Storage of materials will be in a secure location appropriate to the storage of the particular material and will include consideration of specific safety, environmental and quality requirements.

7.3 As Built Documentation

Throughout the duration of the project, Bardavcol will maintain a red-pen mark-up of a drawing set that will be maintained in the site office and managed by the QMR or delegate. This mark-up will form part of Bardavcol's As-Built submission at the conclusion of works. This submission will also be supported by any relevant survey reports.

7.4 Non-Conformances

In the event that a non-conforming product is identified during the project, a non-conformance report will be raised in our quality database. As part of this report, Bardavcol will investigate and detail the root cause of the non-conformance, as well as provide a disposition or corrective action addressing the problem. All close outs of a non-conformance report will require approval from both Bardavcol and Peninsula Ports.

Peninsula Ports will be notified of the non-conformance as soon as practicable following its identification.

7.5 Defects Management

At the completion of project, the works will be inspected by the Contractor's Representative and a Notice of Completion will be issued. The notice of completion will list any minor defects that remain to be corrected. These listed defects, as well as any further defects identified during the liability period will be tracked on a defects register maintained by the QMR. The register will list responsibilities and well as any defect responsibilities required to be remedied by Subcontractors. Bardavcol will act to remedy defects on the register as soon as possible and in the timeframes agreed with Peninsula Ports.

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8 Safety

The sections below provide details on the minimum requirements for the control of key hazards that are applicable to this project. Any deviation from these minimum requirements must be assessed through the change management process described above and approved by the Project Manager.

8.1 Asbestos

For the purpose of this plan asbestos means asbestos containing material (ACM).

Prior to commencing work on site an assessment will be carried out to consider the potential for asbestos to be present. This assessment will involve the review of an Asbestos Register, clearance certificate or equivalent documentation applicable to the site and a site inspection to identify any objects or materials that warrant further investigation. A copy of the relevant site's asbestos register(s) or equivalent documentation will be provided to any subcontractors that undertake work on that site.

Persons attending site will be provided with asbestos management information as part of the site induction, toolbox and daily prestart meetings, as well as access to a copy of the Asbestos Register(s) or equivalent documentation, which will be maintained on site.

Bardavcol will ensure that warning signs to indicate the location of asbestos are installed and if required, exclusion zones established to prevent unauthorised access and any necessary controls documented in a SWMS.

8.1.1 Asbestos Removal

The removal of asbestos will only be carried out by a licensed contractor and only commence after an Asbestos Removal Plan has been reviewed and accepted by the Project Manager. This plan must be prepared in accordance with the WHS Regulations and Codes of Practice.

The removal of asbestos will be performed under controlled conditions as per the Asbestos Removal Plan and SWMS.

After the asbestos has been removed, a clearance inspection is to be conducted by a Licensed Asbestos Assessor and confirmation of asbestos removal obtained. Where air monitoring is required, a Clearance Certificate based on sample(s) analysed by a NATA accredited laboratory must be obtained prior to workers being allowed to access areas that involved the removal of asbestos.

The Asbestos Register is to be updated to reflect the change as a result of the clearance and workers updated on the change via a Toolbox Talk, Daily Pre-start and/or Subcontractor meeting.

If at any time the project program and/or the work method to remove asbestos are varied, work in the affected area must cease until the changes have been reviewed and accepted by the Project Manager.

8.1.2 Asbestos Disturbance or Discovery

Where construction activities are likely to disturb asbestos or result in unexpected discovery or disturbance of asbestos:

- work must not commence, or must cease immediately;
- the area must be made safe; and
- an exclusion zone established to prevent unauthorised access to the area.

If the asbestos is to be removed, it must be done under controlled conditions and by a licensed contractor before the exclusion zone is opened for access by workers.

Any unexpected discovery or disturbance of asbestos must be reported using the incident report form.

In certain circumstances, the incident may need to be reported to SafeWork SA, which will be assessed in consultation with the WHS Advisor.

8.2 Concrete Works

Concrete works must not commence until the project specific hazards and risks have been assessed, including:

- Access and egress
- Ground conditions (including gradient)
- Interaction with plant and pedestrians
- Traffic management
- Underground and overhead services

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- Clean up of equipment

The hazards and controls to be implemented must be documented in a SWMS that is submitted and accepted by Bardavcol prior to work commencing.

Operators of concrete pumps and related plant and equipment must be competent and ensure that work is performed in accordance with the relevant legislation and manufacturer's requirements. Exclusion zones must be set-up around concrete pumps during operation and cleaning of lines to minimise access. Communication must be maintained between the pump operator and pump line at all times.

8.3 Demolition

Demolition works may be undertaken across site, typically through blasting activities although more detailed demolition of existing infrastructure may be required.

Demolition works must not commence until:

- The area to be demolished has been inspected and assessed for hazards (eg. overhead, underground and in-structure services, structural components);
- 'Live' services within the area/structure to be demolished have been isolated or adequate controls are in place;
- SWMS have been prepared, submitted and accepted by Bardavcol;
- Applicable WMS has been developed and are acceptable;
- Permits, as required have been obtained (eg. hot works);
- Regulatory notification of the demolition works has been undertaken, where this is required by WHS legislation

Exclusion zones must be established to the maximum extent practicable to isolate the demolition works and prevent unauthorised access.

8.4 Electricity

Electrical work must only be performed by Licensed electricians and comply with AS/NZS 3000 and AS/NZS 3012, including electrical works to establish and de-mobilise the site compound and related amenities.

All redundant wiring (eg. cables, lights, switches) must be removed or isolated and labeled accordingly. All electrical services must be treated as 'live'.

Electrical installations must be undertaken in accordance with a SWMS and commissioning and handover plan that is prepared by the electrical contractor.

Bardavcol and any subcontractors will be required to maintain a register of portable electrical leads and equipment and ensure that testing, inspection and tagging of leads, equipment and RCD protection is performed by a competent person and in accordance with AS/NZS 3012.

Socket outlets, including GPOs, lighting circuits, transportable buildings and welding equipment must be protected by a Residual Current Device (RCD) that complies with AS3190.

The location and overhead and underground electrical services must be identified prior to commencing work and controls implemented with regard to the hierarchy of controls. Electrical service locations must be communicated through the site induction and warning signage and other physical indicators (as appropriate) installed.

8.5 Excavation

Excavation work is defined as:

- The use of mechanical equipment (eg. excavator, trenching machine, dozer) to dig at any depth
- The use of manual tools and techniques (eg. shovel, crowbar) to dig to a depth greater than 150 millimetres and includes activities such as the installation of posts, droppers and survey pegs

Excavation work must not commence until an Excavation Permit has been issued by the Bardavcol Permit Issuer. The process of issuing an Excavation Permit will consider any client, services and statutory requirements applicable to the work and ensure that specific controls or conditions are detailed and communicated to the Permit Holder. The Permit Holder must ensure that

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the requirements of the Permit and associated SWMS or risk assessment are communicated to all workers that are involved in the excavation works.

Additional requirements include:

- The location of underground and overhead services must be assessed and identified prior to commencing any excavation work and the hazards and controls communicated to all workers involved in the task or activity.
- Any excavation deeper than 1.5 metres must be managed in accordance with SWI 21 Excavation and Trenching Work.
- Safe access and egress from the excavation must be provided and controls in place to eliminate or minimise the associated risk of fall (including workers and objects)
- Where workers are required to enter the excavation, prior to entry a specific risk assessment must be undertaken to confirm if it is a confined space (if it is deemed to be a confined space, a permit and other controls apply)
- Plant and vehicles must be routed away from the excavation wherever possible and maintained at least 1 metre from the excavation edge
- Physical barriers must be installed at least 1 metre away from the edge of the excavated area and where reasonable and practicable suitable covers installed
- Workers must not be located in the vicinity of mechanical equipment when undertaking excavation work

Excavations will be inspected by a competent person at the start of every shift, following any change or event that may affect the strength or stability of the excavation or any accidental collapse or fall of material.

Erosion controls will be installed, appropriate to the excavation type, location and activities performed to prevent erosion and movement of sediment from the work area.

8.6 Hazardous chemicals

Hazardous chemicals intended to be used on the project must be:

- risk assessed to identify specific hazards and controls applicable to their use, handling and storage;
- recorded in a Hazardous Chemicals Register and include details of quantities that will be used, handled or stored
- accompanied with a copy of the current Safety Data Sheet (SDS)

SWMS for tasks or activities that involve the use of hazardous chemicals must include information on the hazards and controls that will be implemented and identify any special emergency response requirements, as per the SDS.

General emergency response equipment including first aid, fire extinguishers and spills kits will be maintained by Bardavcol at designated locations and where hazardous chemicals are used or stored.

Workers must ensure that any additional first aid (eg. quantity of eye wash) and other emergency response equipment, as detailed in the SDS are easily accessible.

Hazardous chemicals must be stored:

- in designated areas that are bunded (120% of net capacity of largest container) or have equivalent controls
- in appropriate containers that are clearly labeled
- such that incompatible chemicals are adequately separated

Copies of SDSs will be located in storage areas, where reasonable and practicable.

Environmental controls and disposal will be managed in accordance with the SDS and any applicable statutory requirements. The EMR will perform routine inspections of hazardous substance storage areas to ensure compliance with this management plan.

8.7 Hot Work

Hot work includes activities that involve heating, burning, cutting, soldering, welding, grinding, drilling or other similar activities that may present a fire hazard (ie. ignition source). Work that involves such activities must not commence until a Hot Work Permit has been issued by a member of the management team and complies with any fire ban or restrictions applicable to the project location. The SWMS prepared for tasks involving hot works must provide adequate details on the controls that will be implemented to eliminate or minimise the risk of a fire, injury/illness and related damage, including the management of byproducts, waste and other materials that may present a fire hazard (eg. swarf, welding rods).

Work must be performed in accordance with the Hot Work Permit and the Permit Issuer (as identified on the Permit) notified when the work has been completed.

8.8 Lifting Operations

All lifting equipment must be inspected for wear and damage prior to use. Lifting equipment must be inspected by a competent person (eg. rigger, dogman) at least quarterly and evidence of this inspection provided to the project team as requested. Annual inspections must be conducted of all lifting hooks and shackles by a certified company.

Lifting equipment that is defective or damaged must be tagged out and removed from site.

Bardavcol will maintain records of its lifting equipment in its Plant and Equipment Register, which will be made readily accessible to users. Subcontractors that bring lifting gear onto site must maintain their own register ad ensure that this is available for inspection at any time.

Any lift will be undertaken by competent and licensed personnel with a dogman/rigger used to sling and control all lifts.

Crane/plant must be set up in correctly in an appropriate position and exclusion zones established for all lifts.

Tag lines will be used for all lifts and under no circumstances shall a load be lifted or suspended over personnel or critical plant and equipment. Lift studies must be developed for heavy, dual and complex lifts.

8.9 Manual Handling

Manual handling risks will be assessed and controls listed within the task or activity specific SWMS or a separate risk assessment. The process will involve consultation with workers that will perform the work and regular evaluation of controls to ensure that they are effective.

8.10 Mobile Plant and Equipment, including plant/person interaction

Mobile plant and equipment must have a current registration (where applicable) and be inspected by a competent person prior to operation. A Plant Permit to Work must be completed for mobile plant prior to use on site, including Bardavcol, subcontractor and hire plant.

A register of mobile plant and equipment will be maintained, with Subcontractors required to maintain a register of their own mobile plant and equipment for periodic review by Bardavcol. Mobile plant and equipment must be inspected prior to use (ie. each shift) and documented in a daily pre-start checklist or equivalent. Any faults or damage that prevents the safe use of the mobile plant or equipment must be reported to the Supervisor immediately and be rectified prior to operation.

Verification of competency (including details of licences, certificates etc) must be provided for all workers that operate mobile plant and high risk equipment (as defined by legislation or Bardavcol) prior to commencement of work. Workers must not operate mobile plant if their licence expires, or they are not fit for work (eg. impaired by medication).

Seat belts must be worn at all times when operating mobile plant. Mobile phones must not be used when operating mobile plant and equipment

Plant and equipment must not be left unattended unless the controls are in position for parking/stopping, parking brakes are fully applied (where applicable) and the engine is turned off.

All plant must be fitted with a reverse alarm and an amber rotating or flashing light

Refuelling and maintenance of mobile plant must be undertaken in designated areas. Refueling of equipment should occur prior to operation. The designated areas will ensure that control measures such as physical barriers are in place to separate workers and other heavy equipment.

Mobile plant and equipment must be used for its intended purpose and in accordance with the manufacturer's specifications. Loading capacities must not be exceeded and all loads must be restrained in accordance with statutory requirements.

Mobile plant cabins must be kept tidy at all times, free of rubbish and items properly secured.

Interactions between mobile plant and workers will be controlled via the project risk management process by ensuring the hierarchy of controls are used to eliminate or reduce the risk to as low as reasonably practicable. A site movement plan detailing vehicle routes will be developed and updated as work progress. Changes to the site movement plan and controls will be communicated through daily pre-start meetings and Toolbox Talks.

Preference will be to separate plant, light vehicles and personnel where possible which may include separate routes, hard barriers, signage, warning devices, speed restrictions, traffic lights, high visibility clothing and spotters.

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8.11 Night works

Should there be any project requirement for work at night, risks and controls relating to work performed will be addressed in dedicated SWMS and consider potential issues, including fatigue, illumination, visibility, communication and interactions with other workers. This process will also assess the requirement for any permits or approvals from the Client or statutory organisations.

8.12 Noise

All activities, plant and equipment that have the potential to generate noise at harmful levels will be identified and controls detailed in the Construction Noise and Vibration Management Plan, Project Risk Register and/or SWMS. Plant and equipment that has the potential to emit harmful levels of noise will be eliminated by using alternative plant/equipment or method, where practicable. Other controls applied will be in accordance with the hierarchy of controls. Minimum PPE requirements will be detailed in the relevant SWMS and communicated in the Daily Pre-start, as required. Signage advising workers of specific PPE requirements will be displayed in appropriate locations.

Noise/vibration monitoring may be conducted to assess activities that may pose a risk to workers or the effectiveness of controls that are implemented.

Ongoing maintenance of plant and equipment during the project will be required to minimise the risk of noise impacts.

Any management noise and vibration relating to blasting activities will be addressed in the Blast Management Plan.

8.13 Personal Protective Equipment (PPE)

The minimum mandatory PPE required for this project is:

- Hi-viz clothing or vest;
- Safety helmet;
- Safety boots, high cut, steel capped and lace-up
- Long sleeve and long trousers, or equivalent (ie. overalls);
- Gloves carried at all times, appropriate to the task and worn when performing work.

Task and work area specific PPE may be required, in accordance with SWMS, work permit or as directed by Bardavcol.

Task and work area specific PPE may be communicated through Daily Pre-start Meetings, Toolbox Meetings or through the use of information tags located at the entrance to a work area.

Task and work area specific PPE may include:

- Respiratory equipment
- Eye Protection
- Face shields
- Hearing protection

All PPE must conform to and be used and worn in accordance with the applicable Australian Standard and WHS Regulations.

Safety helmets are not required to be worn within vehicles or when working in the project office and amenities compound, unless specified in a SWMS or other task specific risk assessment.

8.14 Services – gas, water, sewer, communications

All services must be identified prior to work commencing to eliminate and reduce the risk of damage or injury from service strikes. This includes services that are located underground, above ground and within structures (eg. buildings, tunnels, bridges).

Identification may involve a combination of Dial Before You Dig, use of a service locator by a competent person, assessment by a licensed tradesperson (eg. electrician) or visual assessment of service location indicators (eg. service pits, distribution boards). The relevant permits must be in place where service location activities involve work such as excavation, entry to confined space, isolation and working at heights.

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The location of services must be documented on site drawings and communicated to the relevant workers to inform the preparation of SWMS and ensure that risks and controls are understood and implemented.

Service information must be provided with relevant permits, such as excavation, confined space and working at heights.

Service utilities will be contacted to confirm service locations and specific controls, where these are not clear or in accordance with statutory requirements.

Services must be isolated prior to work commencing and an isolation permit issued by Bardavcol. Work must only be performed on services by competent and licensed workers

As services are installed, or further information on service locations is obtained, site drawings must be updated and controlled and the details communicated to the relevant workers.

8.15 Site Establishment

Site establishment risks will be assessed and controls listed within the task or activity specific SWMS or a separate risk assessment. Permits must be issued for activities involving working at heights, excavation, hot works and entry to confined space.

The process will involve consultation with workers that will perform the work and regular evaluation of controls to ensure that they are effective.

8.16 Traffic Management

Traffic management plans (TMP) will be developed and implemented in accordance with the Road Traffic Act 1961 (SA) where plant, vehicle and pedestrian movements are to impact roads. The only public road that is likely to be directly affected by the project is Lipson Cove Road.

TMPs will be controlled in a site register indicating their status and revision. Access to all council roads and properties will be maintained throughout the duration of the contract, as far as reasonably practicable and in accordance with the project specifications. Peninsula Ports and the Council will be notified of any changes to TMPs.

All personnel required to undertake traffic management will have current Workzone Traffic Management (WZTM) licences, and will be required to have these inspected and photocopied at the site induction.

The monitoring of TMPs and related controls will be undertaken in accordance with Bardavcol's Traffic Management Daily Workzone Report.

Traffic management risks will be assessed and controls listed within the task or activity specific SWMS or a separate risk assessment. Key hazards and issues that will be considered include:

- contact with moving road traffic or plant that could result in a serious injury, fatality, property damage and/or environmental incident;
- night works or working in periods of low light (eg. dawn, dusk) with reduced visibility;
- road user behaviour; and
- protection for Traffic Controllers.

The risk assessment process will involve consultation with workers that will perform the work and regular evaluation of controls, using the Traffic Management Daily Workzone Report and Bardavcol's standard inspection processes (eg. Hazard Observation, SWMS Task Observation). Corrective action(s) will be taken as soon as is reasonably practicable to address any non-compliance or opportunities for improvement identified.

Movement of plant, site vehicles and pedestrians within the Contractors Activity Zone will be undertaken in accordance with the Site Movement Plan. The site movement plan will be made available to workers during their induction and with the daily pre-start, with any changes to the plan addressed during the discussion of the day's activities.

8.17 Vermin/Pest animals

All Vermin/Pest animal risks will be assessed and controls listed within the task or activity specific SWMS or a separate risk assessment. The process will involve consultation with workers that will perform the work and regular evaluation of controls to ensure that they are effective.

8.18 Weather/UV

Weather/UV risks will be assessed and controls listed within the task or activity specific SWMS or a separate risk assessment. The process will involve consultation with workers that will perform the work and regular evaluation of controls to ensure that they are effective. Any work conducted in extreme heat will be proactively managed by Bardavcol to eliminate the risk of temperature related injury or illnesses.

8.19 Working at Heights/Fall from heights

Working at height risks will be assessed and controls listed within the task or activity specific SWMS or a separate risk assessment. The process will involve consultation with workers that will perform the work and regular evaluation of controls to ensure that they are effective.

When using working at heights equipment personnel must have completed working at heights training and additional training relevant to the equipment (eg. EWP >11m).

A Working at Heights Permit must be issued prior to commencing an activity that involves a worker(s) wearing a harness and/or accessing a roof.

A register is to be kept of all fall arrest/restraint equipment.

All working at heights equipment is to be inspected by a competent person prior to use and periodically as per legislative requirements.

Where there is a risk of a person falling from a height equal to or greater than 2 metres, fall protection or prevention controls must be implemented.

All mobile work platforms, temporary work platforms, equipment or machinery used for work at height must have edge protection in place.

Excavations and trenches must be risk assessed and controls put in place to eliminate or reduce the likelihood of any person, plant, tool or equipment falling into the excavation or trench.

As a last report fall restraint or fall arrest systems can be used such as, a lanyard attached to a static line, inertia reel, attached to an adequate steel structure or fixed anchorage points, self-locking anchorages and winching equipment.

Fall protection systems will be managed in accordance with the standard Industrial fall arrest systems and devices AS 1891.1.

Ladders should only to be used for access and egress or performing light work. If there are no other practicable alternatives a ladder may be used as long as appropriate risk mitigation strategies are implemented (eg. platform ladder, spotter holding ladder, fall restraint/arrest etc).

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9 Environment

9.1 Contaminated Soil

Currently, no locations of known or suspected contamination exist for the Port Spencer project. As the design and site investigations progress, locations may be identified. As they are discovered, these locations will be indicated on site drawings, identified (and isolated, i.e. no blending) on site with appropriate barricading/bunting and signage and communicated to workers through the induction.

Areas of suspected contamination that form part of the scope of work must be assessed by a qualified environmental consultant to clarify the type and extent of the contamination, controls required and applicable management or disposal requirements. This will be done in consultation with the client and in accordance with statutory requirements (via the Environment Protection Act 1993 (SA) and associated regulations and guidelines). Details relating to the hazards and controls will be addressed in the Project Risk Register and SWMS.

Contaminated soil transported from site will be through registered EPA Licensed transporters and taken to appropriately EPA Licensed facilities. Copies of Transport Certificates must be obtained to confirm the receipt of the contaminated soil at the correct facility.

Any contamination of soil must be reported immediately with waste material to be removed from site as per above.

A register of stockpiled material (topsoil, excavated material, etc) will be developed and maintained by the EMR for the duration of the project. Sediment control devices will be installed where appropriate (refer section 9.6).

9.2 Dust/Fumes

Dust/fume risks have been assessed on a project-wide level with general controls listed within the risk register. Prior to works commencing on a particular site, task and activity specific SWMS will be developed and will document the relevant risks and controls. The process will involve consultation with workers that will perform the work and regular evaluation of controls to ensure that they are effective. Any complaints in relation to air quality will documented and maintained by the EMR in the environmental complaints register.

9.3 Flora and Fauna

Flora and fauna identified as high value or requiring protection will be communicated to workers and appropriate controls implemented to minimise damage and disturbance. This may include the use of signage and exclusion zones to prevent unauthorised access.

Removal of flora (i.e. vegetation) will only occur in accordance with the project specifications, relevant approvals and with the approval of the Project Manager. All native vegetation clearance boundaries will be approved by Peninsula Ports before commencing clearing.

The Project Risk Register and SWMS will includs details of controls to prevent or minimise flora and fauna impacts.

A register of flora and fauna that requires protection during the project will be maintained and controls assessed as part of the project inspection process.

9.4 Heritage (Aboriginal and Non-Aboriginal)

The project management team will liaise with the client representative to ensure adequate knowledge is acquired of any culturally significant areas or objects at the site or project. In the event that areas or objects of significance are unexpectedly discovered, Bardavcol will act in accordance with EWI 08 and the client's heritage protection procedures. An outline of these procedures will be included in the induction and displayed on site at all times.

Additional control measures for the disturbance of heritage listed artefacts can be found documented in the project risk register and relevant SWMS. It will be the responsibility of the EMR to conduct routine inspections of disturbed areas to monitor for signs of Aboriginal heritage; notwithstanding, all site personnel shall be aware of and looking for potential impacts during ground-engaging activities.

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9.5 Noise & Vibrations (environmental)

Areas adjacent to the construction activity zone will be assessed to identify potential sensitive receptors to noise and vibration (e.g. residents, schools, hospitals). Amenities, plant and equipment that have the potential to emit excessive noise will be located, as far as way as possible from these receptors, where practicable.

A communication strategy will be implemented, in consultation with the client, to engage with potential sensitive receptors in relation to the project and activities that may emit noise.

Prior to commencing work onsite, any required control measures in regards to noise and vibrations will be identified and documented in the risk register or relevant SWMS and communicated to all workers.

9.6 Soil Erosion and Drainage Management

Potential impacts on site drainage, storm water run-off, vegetation works (clearing and rehabilitation), site exit and egress points and stockpile management will be assessed as part of the Project Risk Register. Where these risks are identified, a Soil Erosion, Drainage and Water Quality Management Plan (SEDMP) will be developed and implemented to eliminate or minimise environmental impacts.

9.7 Waste

The Project Manager will identify possible waste streams generated by the project and management opportunities to minimise disposal to landfill. An appropriate number and types of containers and/or storage areas will be provided onsite for each of the different types of waste, with the aim to maximise re-use and recycling where practicable. Containers/storage areas will be clearly marked and monitored for cross-contamination of wastes.

Materials will be salvaged and re-used where appropriate and safe to do so.

Hazardous waste will be transported and disposed of by EPA licensed companies and copies of Transport Certificates obtained to confirm the correct management of the waste. Any specific statutory requirements relating to the handling, transport and disposal of hazardous waste will be adhered to.

Waste re-use, recycling and disposal performance will be monitored using the Waste Tracking Register and reviewed monthly.

Anticipated waste and management options are summarised in the table below.

Waste Type	Waste Generating Activities	Applicable Contractors	Waste Management Outcome			
			Re-use	Recycle	Recover	Disposal
Waste soil (unsuitable for fill)	Excavation	Bardavcol				x
Vegetation	Topsoil strip, tree removal	Bardavcol		x		

All personnel working on site will be informed of the waste management requirements, as part of the project induction. The induction will communicate to workers the importance of keeping work areas free of loose rubbish and waste materials with an emphasis on clearing at the end of each shift.

9.8 Water Quality

Water quality risks will be primarily managed through a Soil Erosion, Drainage and Water Quality Management Plan (SEDMP), with additional controls to prevent pollution addressed in the SWMS. The management plan will be developed once site mobilisation has occurred and a topographical survey has been undertaken to establish flow paths and low points.

Specific controls will be implemented where required and practicable to prevent water quality impacts caused by project activities.

Where water quality testing is deemed to be required (as per the Project Risk Register), details relating to the water quality parameters to be tested and frequency of testing will be contained in the SEDMP.

APPENDIX A – SAMPLE Blast Management Plan

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Project No. 1807

KANGAROO CREEK DAM SAFETY UPGRADE

Client Reference: CW6942_1

SP 19 – Blast Management Plan

Prepared	Signature	Date:	Reviewed	Signature	Date	Approved	Signature	Date	Revision
B. Vreugdenburg		7/6/16	A. Wood		16/6/16	M. Schultz		16/6/16	0
B. Vreugdenburg		30/6/16	A. Wood		30/6/16	M. Schultz		30/6/16	1
B. Vreugdenburg		9/9/16	M. Schultz		9/9/16	M. Schultz		9/9/16	2

BLAST MANAGEMENT PLAN

1. Project Location:

The blasting works are to be undertaken adjacent to the existing spillway at the Kangaroo Creek Reservoir accessed via Stone Hut Road in Castambul, SA.

2. Scope:

This Plan applies to the Drill and Blast of approximately 200,000m3 of rock for the Kangaroo Creek Dam spillway excavation.

3. Purpose:

To ensure compliance with the contract, specifications, relevant Australian Standards, Acts and Regulations.

4. Objectives:

To detail actions and procedures to be carried out during the Kangaroo Creek Dam Safety Upgrade in order to achieve the desired outcome with the minimum impact on the surrounding environment.

The desired outcomes are:

- Ensure that all obligations contained within the project documents and other legal and regulatory controls relevant to the blasting works are implemented.
- Ensure that policies, objectives and targets that satisfy the requirements of SA Water and approval authorities are established.
- Identify risks and hazards associated with the blasting works, including control and/or mitigation.
- Control the blast process from design to initiation, evaluation and misfire treatment.
- Assure the safety of the public, site personnel, SA Water infrastructure and surrounding properties.
- Identify Site Specific requirements.
- Define processes for auditing, inspecting, reviewing, updating, recording and monitoring the performance and effectiveness of the Blast Management Plan.
- Blasting impacts to be identified through monitoring and minimised where possible.

5. Surrounding Infrastructure:

The effect of the blasting on the following structures will be taken into consideration during the blast design as outlined in the blasting subcontractor's management plan:

- The existing spillway wall left abutment block and Ogee crest 12m from the blast site
- The existing dam embankment located 21m from the blast site
- The existing residential properties in the area & concrete water tanks, nearest is 811m from the blast site.
- New concrete outlet works 75m from the blast site.
- Gorge Road 172m from the blast site

Monitoring will be undertaken during blasting to ensure the vibration at these locations is within the specified limits. Refer to section 11 for further details on the monitoring.

The closest non SA Water public infrastructure to the blast area is a section of Gorge Road. To ensure public safety from any potential risks associated with blasting a temporary road closure will be implemented. Refer to section 12 Blast Warning Systems for detailed advanced notice signage for road closures and Traffic Management Plans to be implemented prior to blasting.

6. Responsibilities:

a) Project Director

i) Review and approval of this plan

ii) Review and approval of the traffic movement plan

b) Project Manager (Earthworks)

i) Engagement of a suitably qualified contractor to undertake the drilling and blasting works
ii) Engagement of a suitably qualified consultant to review the Blast Management Plan, initial blast designs and blast reports
iii) Management of blasting sub-contractor & blast consultant
iv) Determination of work methods in consultation with the Project Supervisor
v) Reviewing and approving the Safe Work Method Statement for the works
vi) Development and revision of this plan
vii) Monitoring of site works for conformance with the specification
viii) Ensuring all works are undertaken in accordance with this plan
ix) Ensuring that blast monitoring is undertaken in accordance with the specification
x) Provision of the Blast Report and Blast Exceedance Report to SA Water
xi) Manage Blast notification boards including public road boards on Gorge Road and Torrens Hill Road
xii) Provide training to the Blast Guards
xiii) Application for Blast permit
xiv) Issuing of Blast permit
xv) Notification of stakeholders prior to blasts
xvi) Liase with Project Manager (Concrete Works) & Project Manager (Specialist Works) to co-ordinate and notify of upcoming blasts.

c) Environmental & Safety Management Representative

i) Ensuring all workers are inducted into the site and relevant SWMS
ii) Liaise with SA Water over any complaints received
iii) Assistance with Blast monitoring

d) Project Supervisor (Spillway Earthworks)

i) Ensuring all workers are inducted into the site and relevant SWMS
ii) Fill the role of blast controller
iii) Provide training to the blast sentries
iv) Manage the site clearance process prior to blasting
v) Ensuring all workers on site are aware of the blasting activities and exclusion zones in place.
vi) Provide safe access to site for the drill and blast contractor
vii) Co-ordinate works with the drill and blast contractor

e) Quality Management Representative

i) Ensuring all Hold Points and Witness Points are complied with
ii) Ensuring that blast design reports are provided to SA Water
iii) Assistance with the blast monitoring and submission of reports to SA Water

f) Drill and Blast Subcontractor

i) Provide SWMS for the works
ii) Provide risk assessment for the works
iii) Provide a detailed Blast Management Plan for the design of the blasts and the management of the physical blasting works.
iv) Provide a blasting safety procedure
v) Provide onsite training for blast controller and blast guards
vi) Coordination of works with the Bardavcol management team
vii) Provision of blast designs that meet the project requirements
viii) Ensuring blasting works are carried out in accordance with the relevant Australian Standards
ix) Provision of licensed explosive transport vehicles
x) Provide suitably licensed and experienced shot firers to mange works
xi) Provision of the Blast Report and Blast Exceedance Report to Bardavcol

g) Blast Consultant

i) Review the Blast Management Plan and provide comment on its suitability

ii) Review the initial blast designs and provide comment on their suitability
iii) Review the initial blast reports and provide recommendations on revision to the Blast Management Plan and blast designs

7. Responsible Persons / Contacts

Name	Company	Position	Mobile	Email
Michael Schultz	Bardavcol	Project Director	0400 901 114	mschultz@bardavcol.com.au
Benjamin Vreugdenburg	Bardavcol	Project Manager (Earthworks)	0488 104 464	bvreugdenburg@bardavcol.com.au
Cranstone Turner	Bardavcol	Project Supervisor (Spillway Earthworks)	0419 818 979	cranstone.turner@bigpond.com
Andrew Wood	Bardavcol	ESMR	0499 554 944	awood@bardavcol.com.au
Ron Joyce	Joyce D&B	Director	0428 126 141	Joyces4@bigpond.com
Paul Joyce	Joyce D&B	Operations Manager	0426 886 414	pauljay@adam.com.au
Peter Bellairs	Bellairs Pty Ltd	Consultant	0401 716 708	Peter.bellairs@optusnet.com.au

8. Licences:

Copies of all relevant licences for the shotfirers to undertake the works on site are attached in Appendix J.

9. Blasting Methods

Detailed methods for the blasting works as requested in the specification can be found in our subcontractors Blast Management Plan in Appendix 1.

10. Preliminary Blast Design

A preliminary blast design can be found in Appendix 1 outlining the intended blast hole diameter, burden spacing, depth, explosive and stemming details as well as estimated vibration and airblast. Final blast designs will be provided to SA Water 24 hours prior to the blast. The final blast designs will also be provided to our independent blast consultant (Peter Bellairs) 48 hours prior to the blast for comment. The independent blast consultant will review blast designs throughout the works at random to ensure ongoing suitability.

11. Blast Monitoring

Bardavcol will undertake the blast monitoring in house using Texcel GTM blast monitors. Each monitor will require calibration every 12 months; these calibration certificates will be provided to SA Water prior to use of the vibration monitors. Texcel will provide training in the use of the monitors to the Project Manager (Earthworks) and ESMR. The QMR will also maintain a calibration register for the monitors.

The specified ground vibration limits are shown in the below table:

Description	PPV (mm/s)
Residential houses	5
Concrete less than 7 days old	10
Concrete after 7 days	25
Concrete after 28 days (including existing concrete structures or concrete placed as part of the works)	50
Pressure grouted foundations	20
Grouted rock anchors less than 24 hours old	0
Grouted rock anchors greater than 24 hours old	70
Domain G	13

The locations for the blast monitors can be seen in section 15 of the Joyce Drilling & Blasting Contractors Blast Management Plan located in Appendix 1.

The results of the monitoring will be provided to SA Water after each blast as part of the Blast Report. Should the limits be exceeded a Blast Exceedance report will be provided to SA Water in accordance with section 7.5 of the specification. The blast consultant will also review the vibration reports for the blasts in which they have reviewed the design. The blasts will also be filmed in high definition to monitor fly rock.

In addition to the above blast monitoring, the outlet tunnel at the Kangaroo Creek Dam is at its closest point approximately 100m away from the blast zone. The outlet tunnel is an unsupported rock tunnel and as such, prior to resuming work in the outlet tunnel after blasting a geotechnical engineer will inspect the tunnel and confirm that it is safe to resume work inside the tunnel.

12. Blast Warning Systems

Prior to the commencement of blasting works on site notification signs will be installed at the following locations:

- Main compound entrance gate (Gate 18)
- Embankment entrance
- Crest entrance gate
- Main Compound

Road closure signs will be installed at the northern entrance to Torrens Hill Road, Athelstone and two on Gorge Road (near Torrens Hill Road and the Playford Bridge informing the public of the *anticipated* road closure. The project road closure signage will only inform the public of the road closure locations and times for clarity. Appendix K shows the locations and details of the signs.

On the day prior to the blast the Project Manager (Earthworks) will undertake the following notifications:

- Mark the time and date of the blast on the blast notification signs
- Adjust the Road closure signs to inform the public of a closure tomorrow
- Provide blast details to the following:
    - SA Water – Eric Von Wielligh (eric.vonwielligh@sawater.com.au)
    - DPTI Traffic Control Centre (dpti.tmc@sa.gov.au)
    - Call or email the landholders within the immediate vicinity (Batchelor & Stone Hut Road)
    - SAPOL – Sergeant Allan Cuk (allan.cuk@police.sa.gov.au)
    - Safework SA – Luke Brammy (luke.brammy@sa.gov.au) & Brett Pfeffer (brett.pfeffer@sa.gov.au)

On the day of each blast the Project Manager (Earthworks) will adjust the Road closure signs to inform the public that there will be a road closure today and adjust the site blasting signs to show that there will be a blast today. The spillway earthworks supervisor will notify the project personnel of the blast during the daily prestart including an outline of the no go zone during the loading of the shot and the site clearance procedure prior to blasting. The early works compound will be informed of the information prior to the prestart to ensure the embankment and crest are evacuated prior to the scheduled blast time.

When the blast has been loaded the shotfirer will indicate to the Bardavcol Blast Controller that the site is to be cleared. The blast controller will then direct all workers on site to park their plant clear of the blast and proceed to the site offices. The Blast Controller will then request the blast sentries take up their positions as attached in Appendix 1 section 12.7, blast sentries will be located at the following locations:

- Main Compound
- Gate 18
- Dam Embankment Entrance at the early works compound
- Playford Bridge on Gorge Road
- Gorge Road Lookout approximately 500m East of the Crest Entrance

Traffic Management will be set up in accordance with the attached plan in Appendix I on Gorge Road to close the road from the Playford Bridge to Torrens Hill Road during the blast period and two Bardavcol employees and a front end loader and tandem tipper will be on standby at the early works compound in case of rock fall on Gorge Road or Old

Gorge Road. A detour will not be implemented due to the short closure time, low traffic volume and the length of detour setup required. The traffic controllers will talk to each of the vehicles stoped at the closure informing them of the 20-45 minute wait time to allow them to determine if they wish to take a detour or wait. We do not anticipate more than one car per minute based on previous road observations on Gorge Road.

Once the sentries are in place the Blast Controller will confirm with each blast sentry via UHF radio that their area is secure. Three Siren Runs will then be undertaken by the site supervisors as follows:

- Spillway Blast Zone to Gate 18 and Fire track 18A by the blast controller
- Dam embankment toe to the early works compound along Old Gorge Road
- Playford Bridge to Dam Lookout on Gorge Road including the crest access road

On successful completion of the siren run the Blast Controller will check with each of the blast sentries that their areas are still secure and clear and he will then hand over the cleared site over to the shotfirer for blasting. The shotfirer will call “firing in 5 seconds” and give a countdown to the blast.

The blast shall be inspected by the shotfirer and if there are no misfires, shall advise the guards that it is “all clear”

Gorge Road will then be inspected for rock fall and cleaned up prior to opening the road to the public. It is anticipated that Gorge Road will be closed between 20 minutes and 45 minutes for each shot.

All personnel whom will be a blast sentry shall have specific training undertaken by the Bardavcol blast controller to outline the importance of their roles, timing and communication protocols to be used. During this training each sentry will be provided with a copy of the blasting safety procedure. At completion of the training and prior to the first blast a dry run will be undertaken to ensure the clearance procedures are implemented correctly.

Further details of the blast clearance procedures are provided in the subcontractors blasting safety procedure in Appendix 1

13. Blast Safety Management

Refer to attached Joyce Safe Work Method Statements in Appendix B & C.

14. Review and Development

After each blast the Blast Management Plan, blast design and monitoring results will be reviewed by the Bardavcol Project Manager (Earthworks), blasting subcontractor and the blast consultant (for the blasts he is reviewing) and changes implemented as required to insure the Blast Management Plan objectives and specified requirements are met.

15. Records

- Site Induction Records
- SWMS
- Plant Inspections
- Blast Designs
- Blast Reports
- Blast audits
- Safety Inspections
- Complaints Register
- Prestart Meeting Records
- Blast Guard Safety Training Register
- Blast Permits

16. References

- AS 2187.0-1998 Explosives – Storage, Transport & Use – Terminology

- AS2187.2-2006 Explosives – Storage & Use – Use of Explosives
- AS1678 Emergency Procedure Guide – Transport
- South Australia Explosives Regulations 2001
- South Australia Explosives Act 1936
- The Australian Dangerous Goods Code Edition 7.4
- Australian Code for the Transport of Explosives by Road and Rail 3rd Edition
- Detailed Specification

17. Schedules

- Appendix 1 Joyce Drilling & Blasting: Blast Management Plan
- Appendix A Joyce Drilling & Blasting: Drilling SWMS & SDS Sheets
- Appendix B Joyce Drilling & Blasting: Blasting SWMS & SDS Sheets
- Appendix C Joyce Drilling & Blasting: Risk Assessment
- Appendix D Joyce Drilling & Blasting: Orica Capability Presentation
- Appendix E Joyce Drilling & Blasting: Drilling Standard Operating Procedures
- Appendix F Joyce Drilling & Blasting: Blasting Standard Operating Procedures
- Appendix G Joyce Drilling & Blasting: WHS Policy
- Appendix H Joyce Drilling & Blasting: Orica Licensing Transport and Personnel
- Appendix I Joyce Drilling & Blasting: Orica Emergency Procedure Guide and Transporting Explosives to and From Magazines SSOP
- Appendix J Joyce Drilling & Blasting: Licenses and Tickets
- Appendix K Road Information Signs
- Appendix L Gorge Road Traffic Management Plan
- Appendix M Vibration Monitor Calibration Certificates
- Appendix N Blast Permit

Appendix 1
Joyce Drilling & Blasting
Blast Management Plan

Bardavcol Kangaroo Creek Dam Upgrade

BLAST MANAGEMENT PLAN

PREPARED BY

Joyce Drilling & Blasting Contractors Pty Ltd
ABN 64 107 522 298

FOR

Bardavcol Pty Ltd
ABN 98 007 784 732

29 June 2016

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Please contact Ron Joyce prior to replicating this content in any way.

BMPV3 - 9 SEPTEMBER 2016

1. PURPOSE

The purpose of the Blast Management Plan is to identify the processes and manage all risks associated with drilling and the use of explosives in blasting for the Kangaroo Creek Dam (KCD) Upgrade project to ensure there is no adverse impact to community, infrastructure from flyrock or ground and air vibration and ensure blasting is carried out in a responsible and safe manner in line with the relevant State and Federal legislations, Australian Standards and Codes and industry best practices.

This Blast Management Plan has been developed for Bardavcol Pty Ltd by Joyce Drilling & Blasting Contractors Pty Ltd (JD&B). JD&B has been involved in a number of major projects including the similar undertaking at the Little Para Dam Upgrade in South Australia.

The Blast Management Plan prescribes that necessary controls to be engaged to ensure that there are no adverse impacts as a result of the drill and blast component of the project. This plan encompasses all requirements for the security, supply, on site transport, use, handling and disposal of explosives offsite.

2. SCOPE

The following Blast Management Plan outlines requirements for the drilling and blasting process including interaction between Bardavcol as Principal Contractor and all relevant stakeholders. This plan shall be read in conjunction with current and relevant statutory Acts, regulations and standards in addition to other Bardavcol site specific management plans and guidelines and JD&B Procedures.

3. REFERENCES

- AS 2187.0-1998 - Explosives - Storage, Transport and Use, Part 0: Terminology
- AS 2187.1 - 1998 - Explosives - Storage, Transport and Use, Part 1: Storage
- AS 2187.2 - 2006 - Explosives - Storage, Transport and Use, Part 2: Use of Explosives
- South Australia Explosives Act 1936
- South Australia Explosives Regulations 2011
- South Australia Dangerous Substances Act 1979
- South Australia Dangerous Substances Regulations 2002
- South Australia Work Health & Safety Act 2012
- South Australia Work Health & Safety Regulations 2012
- Australian Explosives Industry and Safety Group Inc (AEISG) Codes of Practice
- Australian Code for the Transport of Explosives by Road and Rail (AE Code)
- Australian Dangerous Goods Code

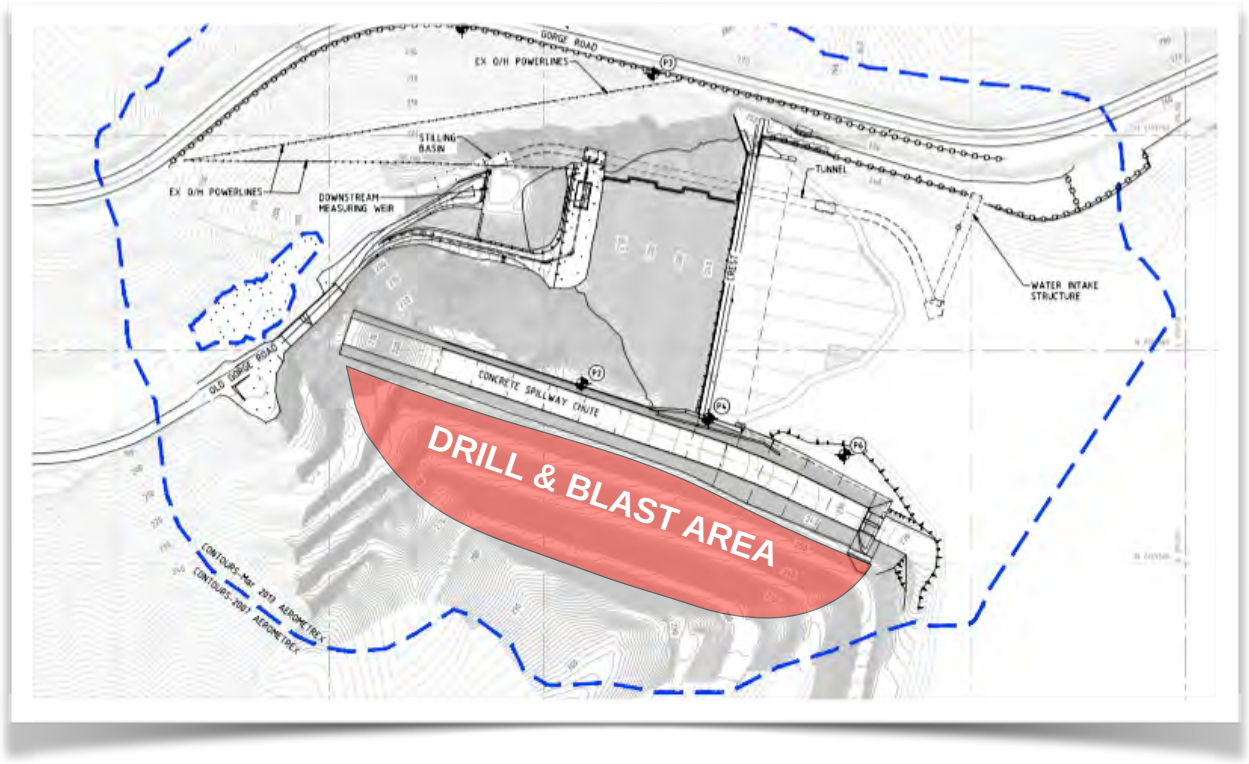
4. PLAN OBJECTIVES AND PERFORMANCE INDICATORS

Objectives	Performance Indicators
Compliance with legislative and regulatory requirements.	• Compliance with legislation and industry best practice. • Airblast or ground vibration not to exceed criteria nominated by Principal Contractor; • Blasting to be conducted in accordance with legislative requirements and industry best practice; • No flyrock beyond blast boundary, or unplanned flyrock events; • Minimisation of off-site odour, dust and fume emissions.
Control the blast process from design to implementation, initiation and evaluation.	Comply with project approval requirements.
Identify the risks and hazard associated with blasting, including control and/or mitigation.	Safely blast and comply with Project Approval requirements.
Implement best practice measures for the management and minimisation of dust and noxious fumes from surface blasting.	Mitigation of dust and fumes.
Assure the safety of the public, site personnel and surrounding properties from flyrock.	No flyrock incidents resulting in personal injury or infrastructure / property damage.
Limit the risk of damage to infrastructure by controlling blast vibration and flyrock.	No blast vibration exceedences or flyrock incidents.
Establish effective communications and active links between all stakeholders.	Effective communication.
Ensure the safe operation of the mechanical excavation and adjacent drill and blast activities.	• Effective communication. • No blast related incidents involving personnel, equipment, infrastructure.

5. EXISTING INFRASTRUCTURE AND PLANNED BLAST AREA

The KCD Project located in Castambul, South Australia and accessed via Stone Hut Road, includes the following major areas and infrastructure:

- Dam Crest, concrete faced dam wall and earth embankment
- Dam Control & Ventilation and Inlet Control Buildings
- Dam Spillway, crest, flip bucket and right hand wall
- Public access Gorge Road and SA Water access road
- Various other workings including stairs, ramps and CCTV



The planned drill and blast operations to be undertaken on the southern previously blasted batters adjacent the left hand spillway wall.

6. DEFINITIONS

Blast	Any explosive charge or shot, regardless of size or number.
Burden	Distance between blast rows, or in case of front burden the distance between the face of the blast and the front row of holes.
Spacing	Distance between blast holes within a row.
Subdrill	Length of drilling and charge which lies beneath the required grade level.
Blast Type	Softwall, Production or Presplit Blast.
Charge	Explosive or blasting agent, or both, placed in a blast hole or other position for the purpose of producing an explosion.
Flyrock	Flying rock or other material projected from a blast.
Nonel	Non-electric shock tube type delay detonator
Blast Controller	The Blast Controller is a responsible person nominated by Bardavcol for the blast or shot being undertaken and handle the logistics of the clearance of the Blast Exclusion Zone.
Shotfirer	A person who has been trained and certified/licenced by Safework SA as being able to design, supervise and undertake explosive work.
Blast Boards	Designated boards located in areas where all site personnel gather or pass, dedicated to the site blasting activities and indicating the location, time and date of any scheduled blasting and updated before the shift start on the day of firing.
Blast Exclusion Zone	The area that is determined by the risk assessment process, to ensure that all the expected / foreseen dangers and affects of the blast, are maintained within a controlled area.
Blast Guard	Industry terminology for a hard barrier consisting of a suitable person and equipment (visual indicators, suitable vehicle and communications equipment), strategically located to act as a hard barrier against unauthorised access to a designated Blast Exclusion Zone.
Post Blast Fume	The cloud of material generated after the initiation of ammonium nitrate based explosives which is sometimes yellowish through to a red / brown colour.
Down the hole delay (DTH)	The down the hole delay (DTH) in the blast hole which transmits energy from the trunkline down the hole to the primer to initiate the explosive column in the blast hole.

7. RESPONSIBILITIES

	Task Description	JD&B	Bardavcol
	General		
1	Mobilisation of equipment and personnel	Yes	-
2	Develop, review, monitor, record and report Progress of Work, Continuous Improvement Program and Key Performance Indicators	Yes	Yes
3	Develop, review and implement SWMS prior to commencing operations	Yes	Yes
4	Supply drilling and support equipment that meet regulatory and Principal Contractor operating standards including site specific requirements	Yes	-
5	Provide Drill Operators and / or Drill Fitters and support personnel	Yes	-
6	Provide transport for Drill Operators, Fitters and support personnel	Yes	-
7	Provide personnel for inductions and safety meetings	Yes	-
8	Provide $20 Million Public Liability Insurance	Yes	-
9	Prepare WHS and other reports as requested by the Principal Contractor	Yes	-
10	Site Induction of personnel	Yes	Yes
11	Provide Waste disposal facilities for general rubbish and used filters / oils	-	Yes
12	Inspect and approve on site use of drilling and support equipment and consumables to ensure they meet regulatory and Principal Contractor requirements	Yes	Yes
13	Provide limited use of office, telephone, crib and ablution facilities	-	Yes
14	Provide area / facility for lay down and storage of drill parts, equipment and drilling consumables	-	Yes
15	Provide accommodation and meals for JD&B personnel	Yes	-
	Planning & Design		
16	Project planning	-	Yes
17	Survey positioning and control points	-	Yes
18	Prepare drill plans and schedules with hole position and quantities	Yes	-
19	Review and approve drill pattern designs prior to commencement of drilling	Yes	Yes

	Drilling Operations		
20	Drill blast holes as per approved design / drill plan	Yes	-
21	Measure and record depth and log significant changes in ground conditions	Yes	-
22	Recording and reporting of drilling performance including metres drilled, hours worked, hours down, availability and utilisation	Yes	-
23	Maintain drill pattern delineation signage	Yes	-
24	Install and maintain drill hole collar protection	Yes	-
25	Provide and maintain mine specific radios in drills and support vehicles	Yes	-
26	Undertake periodic equipment safety inspections	Yes	Yes
27	Prepare daily drilling reports	Yes	-
28	Prepare monthly drilling summary reports	Yes	-
29	Provide tramming and service time to access Principal provided fuel and water	Yes	-
30	Supply collar hole protection devices	Yes	-
31	Prepare bench for drill and blast patterns and provide clear access to patterns	-	Yes
32	Where blast services are implemented, mark out patterns as per approved design / plan	Yes	
33	Provide “Ground Engaging” consumables for drill rig including bits, shanks, rods, couplings, TAC Tubes, cheater bars etc	Yes	-
34	Provide water for water injection (dust suppression)	-	Yes
35	Provide lighting plants for night shift drilling, if required	-	Yes
36	Provide after hours access, if required	-	Yes
	Plant Maintenance and Servicing		
37	Provide for evacuation of oils during routine maintenance (if required)	Yes	-
38	Provide diesel fuel into drill rig tank and site support vehicles as required	Yes	-
39	Maintain drill maintenance and repairs records	Yes	-
40	Supply oil, grease and other lubricant consumables for drilling equipment and support vehicles	Yes	-
41	Track drill maintenance schedules	Yes	-
42	Management, coordination, implementation of blasting operations	Yes	Yes

	Blasting Operations		
43	Management of safety, health and environment for shot firing activities	Yes	-
44	Preparation of site specific “Drill & Blast Manual” including management and procedures plan	Yes	Yes
45	Drill and Blast design and planning including drilling, charging, initiation sequence etc	Yes	-
46	Review and approval of blast designs prior to commencement of blasting	Yes	Yes
47	Firing time notification	Yes	Yes
48	Provision of blast guards	Yes	Yes
49	Blast pattern delineation	Yes	-
50	Selection explosive products by blast hole in accordance with design	Yes	-
51	Supply labour to dip and charge blast holes, prime, stem and tie up	Yes	-
52	Dewatering blast holes if required	-	Yes
53	Correct over or under charging	Yes	-
54	Environmental monitoring for compliance with statutory and Principal Contractor requirements	-	Yes
55	Measurement of blast hole depths	Yes	-
56	Misfire management (retrieving lost down lines, supervision of misfire recovery etc)	Yes	-
57	Prepare blasting reports record keeping	Yes	-
58	Blast hole charging, priming, stemming and tie up initiation system	Yes	-
59	Provision of loading records of explosive / type / quantity per hole	Yes	-
60	Two way communication equipment	Yes	-
61	Blast approval	-	Yes
62	Supply suitable material for stemming 7mm-10mm	-	Yes
63	Supply equipment for placement of stemming material	-	Yes
64	Provision of blast signage	Yes	-
65	Shot firing duties including initiation, checking, appropriate clearances etc	Yes	-
	Explosives Supply		
66	Supply of all explosive product and accessories on site	Yes	-
67	Supply of explosive BULK product into blast holes	Yes	-
68	Storage of all explosive product and accessories on site if required	No	No

8. DRILLING

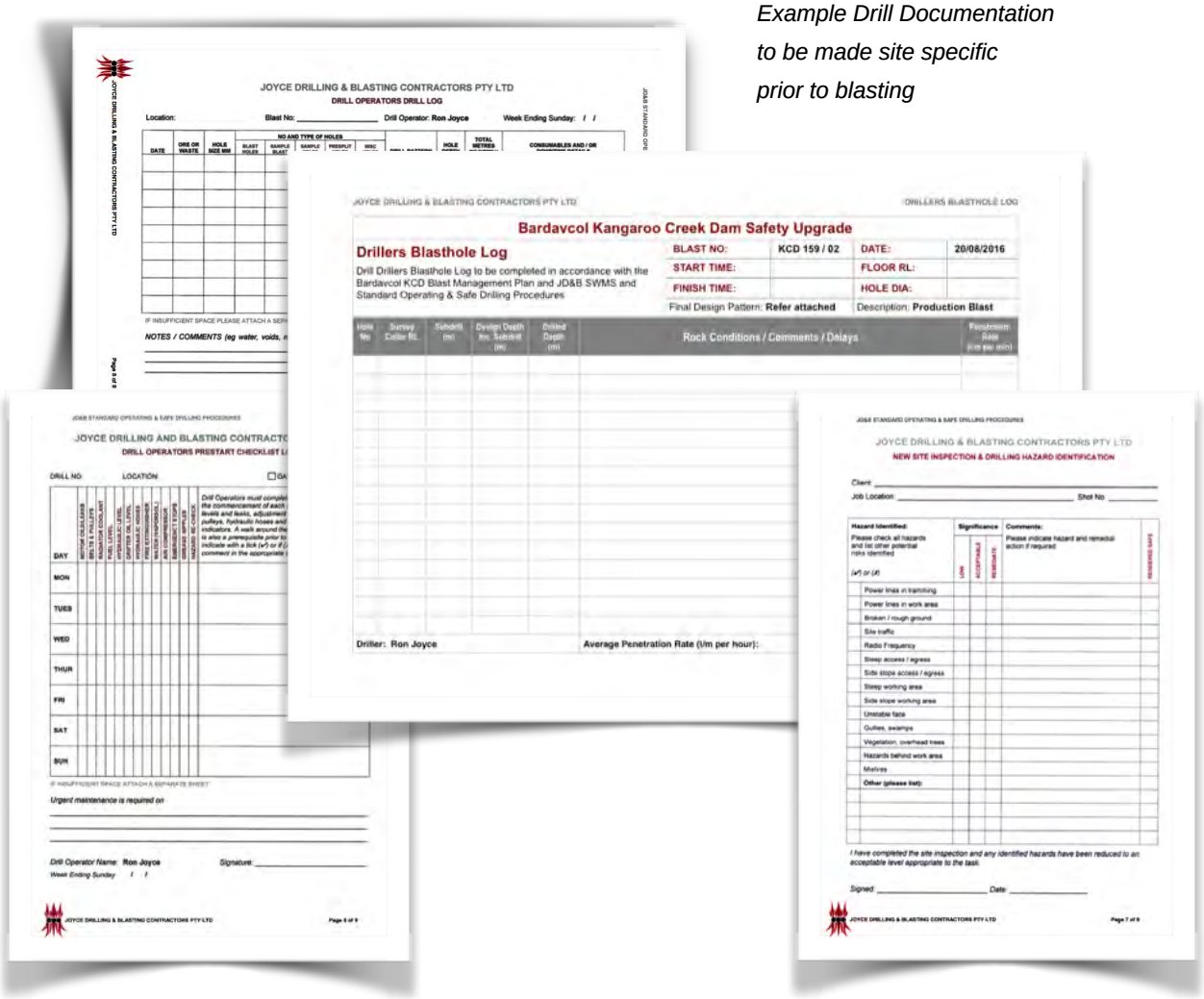
Following the approval of the Blast Design the Driller shall drill the pattern in accordance with the approved blast design and survey plan. As each drill blasthole is completed, the driller will check the blasthole depth and record any relevant details (including design blasthole depth, actual blasthole depth, voids, fractures, water depth and ground conditions) on the drillers' Blasthole Log (see below).

It is important to note that the penetration rate of the Drill Rig will contribute to the Powder Factor of the final blast design should it vary significantly within a given pattern and/or between blast patterns.

Potential problem blast holes are to be identified and marked with paint or a cone.

The tolerance for drilling depth is +0m and -0.2m for depth while the tolerance for collar location is the drill bit diameter. Marking out of the drill pattern is to be undertaken by surveyors to achieve a KPI of +/-1 hole diameter. Best practice drill bit tolerance KPI of +/- 5% and an azimuth and angle KPI of +/-3° and +/-2° respectively have been recommended and to be audited by the responsible shotfirer and Bardavcol.

At the time of drilling, any blastholes that are under-drilled by more than 200mm must be redrilled. Blastholes that are over-drilled by more than 200mm shall not be backfilled until final QA prior to charging. During the course of drilling a blast pattern, unused or remnant blastholes must be identified and be back filled with appropriate stemming material.



Example Drill Documentation to be made site specific prior to blasting

9. SHOTFIRER

The shotfirer employed at the KCD Site must make themselves conversant with this document and ensure the following:

Explosives Usage Report:
Explosive usage report to be supplied by the Explosive Supplier and all documentation will be included in the Post Blast reporting.

Misfire Report:
Completed by the Responsible Shotfirer each time a misfire occurs or on discovery. The misfire report must determine the root cause and what actions are to be taken to minimise or eliminate the risk occurring again.

9.1. BLAST CREW ASSISTING SHOTFIRER

The shotfirer must ensure that all personnel working on site are Safework SA certified 'Under the Direct Supervision of the Shotfirer' and receive instruction on the safe handling of explosives and precautions to be followed when working on a shot, in the form of JD&B Standard Operating Procedures, SWMS, Job Safety Analysis and tool box meetings.

10. EXPLOSIVE STORAGE & TRANSPORT

All explosives will be transported to site by the preferred supplier in strict accordance with statutory legislation and regulations. **No explosives are to be stored on site.**

- Explosives will only be brought onto site in the required amount to undertake the proposed blast and with the minimum amount of time prior to commencement of loading.
- The explosives vehicle shall comply with all relevant regulations, standards and codes for the transport of explosives in South Australia.
- A "Pre Blast" checklist will be formed to verify the quantity of explosives brought onto site, used in the blast, and removed from site to ensure that all explosives can be accounted for at all times. This will be included in the post blast report.
- Whilst onsite the explosives shall remain in the approved vehicle until the vehicle reaches the blast area. The blast area shall be delineated with yellow or yellow/orange cones to a distance of 8m from the nearest blasthole.
- Explosives shall remain in this area until utilised in the blast or returned to the explosives transport vehicle. At the completion of loading the explosives transport vehicle and blast area will be checked by the designated shotfirer for any inventory still remaining. The explosives vehicle shall not be left unattended at any time whilst carrying explosives.
- Explosives must be locked in approved receptacles on the explosive vehicle when not in use and may only be accessed by the responsible shotfirer or an authorised delegate.
- Once the blasting has been completed, the explosives vehicle shall return all explosives to the designated magazine off site.

10.1. TRANSPORT OF EXPLOSIVES ON-SITE

Transport of any explosives or blasting agents at the KCD Site will be the responsibility of the explosive supplier and must be in vehicles designed and approved for that purpose and ensure each vehicle has the correct licences to transport, the drivers have licences to transport explosives and the vehicles meet the requirements to transport explosives as per AS 2187 including

Refer Appendix H - Orica Licensing Transport and Personnel

- Follow the Orica Emergency Procedure Guide that is available in every vehicle, according to function and content

Refer Appendix I - Orica Vehicle Emergency Procedure Guide and Orica Transporting Explosives To and From Magazines SSOP

- Fire extinguisher, Flashing light on cab
- Chock blocks for placing under the downhill side of the rear wheels
- Signs Front, rear and each side with the word "EXPLOSIVE" and rear appropriate hazard diamond
- Maximum speed limits are dependent on prevailing conditions that allow for safe operation. However, vehicles carrying explosives must not exceed a speed of 40 KPH, or less (if posted speed limit is less).
- Transport of explosives by vehicles between the magazine and the site must only be via the designated access roads.
- All vehicles used for transporting explosives must be inspected by a shotfirer daily before starting to ascertain that the vehicle is in good working order and all safety and warning requirements are in place.
- Detonators must be carried in approved quantities in special receptacles, which must be used only for detonators.
- No person is permitted to smoke while in or near an explosive vehicle, nor allow other persons to smoke or bring a naked flame within 8m of the vehicle.
- Empty boxes to be disposed of daily after all references to explosives and the names have been painted out and all boxes inspected to ensure no residual explosives.
- Explosive receptacle doors must be shut or the coverings must be replaced and made secure at all times, except to allow the immediate loading or removal of explosives.
- Where a fire cannot be rapidly contained by fire extinguishers, the driver must immediately endeavour to clear/evacuate the area to a safe distance (1000 metres in all directions) and give warning to and restrain all traffic.
- A vehicle carrying explosives must not be left unattended at any time.(This does not apply to working on the same shot). Except during a fire/electrical storm (refer to following point).
- If the proximity of an electrical storm is such that it constitutes an imminent or immediate hazard, all vehicles conveying explosives are to park up as specified by the Responsible Shotfirer and ensure the safe removal of the drivers and other personnel.

10.2. TIMING OF BLASTS

Every endeavour will be made to conduct Blasting at the same designated time each day.

The nominated firing time will be at a time to minimise disruption to the on site workforce and the general public travelling on the Gorge Road.

However, the blast time of **3:30pm** nominated by Bardavcol is an estimate only as the final decision will rest with the shotfirer in consultation with the PME.

The time for a blast will be dependent on weather conditions and this will be checked the day prior and morning of the blast. If adverse or extreme weather conditions are anticipated (electrical storm, heavy rain, heavy cloud cover) the blast will be postponed before loading, or if feasible, brought forward to avoid extremes of weather. Blasts will generally not be fired during adverse weather conditions, unless for safety reasons or to minimise deterioration of the blastholes and explosive product.

Following an initial series of trial blasts the blast time can be reviewed, subject to blast volumes, to a lunchtime time slot, as opposed to end of shift.

10.3. BLAST SIGNAGE

Prior to commencement of blasting works on site signs will be supplied by JD&B and installed by Bardavcol at the following locations:

- Main Compound Entrance Gate (Gate 18)
- Embankment Entrance Gate
- Crest Entrance Gate

Bardavcol will install road closure signs at the entrance to Torrens Hill and Gorge Roads near the DPTI road closure signs informing the public of anticipated road closure. These signs will not inform the public that the closure is due to blasting works.

Blast signs will also be placed in each compound crib facilities.

10.4. BLASTING PRELIMINARIES

The shotfirer must inspect the shot to be blasted and conduct a Risk Assessment / Take 5 that includes the following actions:

- Request any clean ups that are required through the Earthworks Supervisor (i.e. bench preparation and ramp access).
- Sufficient signs and cones delineation are placed to prevent unauthorised access to the shot. Signs are not to be within 8m of a blast.
- Ensure that the charge sheet details the required amount of explosive charges for each hole and tie-in plan is attached.

10.5. CHARGING

Only vehicles or personnel directly involved in the charging operation are permitted within the designated blast area.

Charging may be conducted concurrent to back-filling and clean ups as long as equipment and personnel other than that used for the charging operation are clear of the area (not closer than 8m).

In order to avoid the occurrence of vehicles interfering with explosives, the following shall be observed when charging patterns:

Before Priming

Signs displaying "Danger - No Entry Blasthole Charging & Danger Authorised Entry Only" will be placed at any access path to the blast area or blast hole loading in progress.

Priming Blastholes

On any shot, the shotfirer shall be responsible for the retrieval of unused priming devices.

- The number of priming devices used in each blast hole will be determined by the shotfirer and based upon the recommended design. Taking into account blast hole diameter, length of explosion column, water conditions, type of explosive and geology of the area.
- Where a column of explosives is, or may be, discontinuous, each part of the column will include a priming device.
- Charging of blast holes must not take place within ten (10) metres of drilling operations or within ten (10) metres of projected holes not drilled but intended in the designed blast.
- Use down the hole delay (DTH) of suitable length wherever possible to avoid having excessive lengths of tubing outside the blast hole.
- The tail of the down the hole delay (DTH) left at the top of the hole shall be secured in the drill cuttings as close as possible to the hole, parallel to the direction of loading.

Charging

No charging operations shall take place until all holes to be charged are inspected and found to be clear of any obstructions that may necessitate re-drilling.

- All persons employed in charging operations shall be under the direct supervision of the shotfirer.
- The shotfirer in charge of any blasting operation shall ensure by the provision of training that each person in the blast crew is adequately trained for the tasks they are required to perform, with respect to the particular blasting systems and materials being employed.

The following rules are to apply when charging:

- Undue force must not be used to insert the primer or the charge into the blast hole.
- Down the hole delays (DTH) should be firmly secured at the collar of blast holes to prevent them from being drawn into and lost down blast holes.
- When using packaged emulsions care must be taken to ensure continuity of the charge.
- Primers must be located in good quality explosive product approximately 300mm above the bottom of the blast hole.
- Primers must be lowered into blast holes in a controlled manner.

NOTE: Excavators that are still digging the bench face may dig to within 8m of a charged hole only when delineated by no-dig tapes, cones and signs are in place.

The recommended KPI's for charging are:

- Hole Depth KPI +/- 0m/0.2m modified by blasthole logs.
- Stemming Length KPI to be the minimum of the designed stem length based on the SDB or longer if soft or broken ground in the stemming region
- Any excess bulk explosive must be sucked out using a PVC "sucker pole" to remove any excess charge length and destroyed it with water or detergent laden water

Achieving MIC takes precedence over stem length as long as the stem length is a minimum of the final design and the recommended KPIs are to be audited by the shotfirer and Bardavcol.

Stemming

Prior to stemming, all blast holes must be measured with a tape or stemming pole to ensure that the correct length of hole is available for stemming material.

- Stemming Length KPI to be the minimum of the designed stem length based on the SDB or longer if soft or broken ground in the stemming region
- Overloaded holes must be remedied (by removing excess charge prior to stemming).
- Care must be taken to ensure that the down the hole delay (DTH) is not damaged or lost down the blast hole during the placement of stemming material.
- All production blast holes are to be stemmed with 7mm-10mm crushed rock aggregate placed carefully in the hole to prevent bridging of the aggregate as directed by the shotfirer. Following the initial trial blasts the performance of the stemming will be reviewed and if required substituted with 5mm-7mm.
- Presplit holes to have hole plugs inserted at the nominated depth and det cord covered with 400mm of sand.
- If tamping is to be under taken only tamping rods constructed of wood or other non-metallic material must be used.
- Stemming material is placed on the shot with a front end loader / IT and spotter (to assist with manual stemming of each blasthole) prior to loading.

Tie-in

The shotfirer must utilise the manufacturer endorsed method(s) and the authorised pattern for tie-in of the blast holes, including the Point of Initiation, method of tie-in and location of each delay. Unless otherwise directed all tie-ins shall use Nonel surface and downhole delay products as per the authorised design blast.

- The shotfirer must connect the control row and then tie-in can proceed from back of the shot to the control row. shotfirer must inspect the entire shot
- The use and compatibility of each product must be in accordance with the suppliers instructions or training.
- Tie-in of any blast holes shall not commence until all vehicles are removed from the charging area. Once tie-in is completed, ensure that no vehicle is allowed to re-enter the blast area and the shotfirer nominates a shot guard to remain with the shot at all times.
- At the completion of the tie-in and prior to firing the shot the shotfirer and assistant must "walk the shot" from opposing ends to confirm all connections have been correctly made and are in the correct place.
  NONEL FIRING

When utilising Nonel leadlines the following procedures must apply:

- The shot primer must be stored separately to the Nonel initiating device in a locked container
- Prior to any connection to the firing device or "starter" detonators the end of the Nonel leadline must be inspected and if necessary a portion cut off and discarded.
- Ensure end caps are applied to protect the Nonel tube from ingress of foreign matter or moisture.
- Personnel and equipment must not walk, tram or drive over None leadlines.
- Only manufacturer specified joiners must be used to connect Nonel tube.
- Only approved firing devices (electric firing device that converts electric energy into a shock wave and start gun firing device that requires shell shot primers No. 20) must be used for initiating Nonel leadline.
- The shotfirer is responsible for the control of the firing device and any other components required for its operation.
- In the case of firing devices that require shell shot primers No. 20, the primers must not be stored in the firing device.

10.6. BLAST EXCLUSION ZONE

The safe clearance distance or exclusion zone shall be determined by the shotfirer in consultation with the Principal Contractor, however in the initial instance the minimum clearance is to be 250m or based on the final design output, whichever is the greater on the basis of safety. Following the initial trial blasts the exclusion zone will be reduced to suit.

The type of material to be fired and previous historical flyrock data will have an influence on the safe distance required and this may be reviewed following initial blasts.

10.7. MISFIRES

A misfire must be determined as follows:

- Any suspect misfire is to have a 10m delineation with no digging permitted.
- The misfire investigation is to be undertaken to determine the cause and the best method to mitigate the misfire and systems put in place to prevent that type of misfire occurring again.
- If unfired Nonel tube is exposed in a portion of a hole that has been fired, that hole must be treated as a misfire subject to visual inspection and presence of “aluminium powder” within the tube.
- Unless cut-offs or remaining portions of holes which are suspected of containing explosives have been shown to be free of explosives, they must be treated as misfires.
- Water can be used with ANFO but detergent laded water is required to neutralise pumped emulsion explosives.

10.8. MISFIRE PROCEDURE

If the shotfirer suspects or otherwise determines a misfire, they must inform the Blast Controller and Project Manager (Earthworks) of the "Misfire" and:

- Advise of the time required to deal with it; or
- Advise of the action to be taken for the marking of the area and ensure that the Blast/Misfire Information Sheet is completed.
- Following production blasting, road closures will be reopened with traffic to resume normal operation. If the shotfirer determines that a misfire is to be dealt with by blasting then this will be treated as a separate blast.

WARNING: The shotfirer must not give the "all clear” for re-entry into the blasting area until they are satisfied that the misfire has been dealt with.

The shotfirer must report and record all misfires in the Misfire Record Book.

Precautions

The following precautions must apply after a misfire:

- If a Nonel detonator that is initiated to fire the shot fails, a waiting period of 5 minutes must be observed before any inspection is conducted, provided the leadline is disconnected from its firing device.
- If a misfire is suspected or identified and is to be left, before clearance is given, its position must be identified by signs and tapes not closer than 10m to the suspected or identified area by the shotfirer. This distance must be increased if, in the opinion of the shotfirer, it is required.

If a misfired charge consists of a blasting agent:

- The charge may be re-primed and fired (if necessary, more stemming material should be placed around the blast hole to prevent fly rock); or
- Remove stemming by applying water under pressure through a non-ferrous blowpipe, ensuring that any detonator or explosive which may be susceptible to detonation during this process is not disturbed.
- When stemming and charge have been removed from a water resistant charge, the primer must be recovered.
- If a misfire contains an explosive that is rapidly destroyed by water the explosive may be washed out, after which the primer must be recovered.

If re-firing or washing out fails to detonate/remove all explosives or blasting agents in a misfired hole, the shotfirer must:

- Clean off any rock around the misfire and determine the position of that hole; and remove the remaining portion of the hole, either by digging it out in accordance with procedures specified by the shotfirer.
- No person must leave unguarded, abandon, discard or otherwise neglect to safely dispose of any explosives recovered in the treatment of misfires.

Product Found Whilst Digging

If product is found whilst excavating following a blast the following shall apply:

- Digger Operators to be conversant with bulk / packaged product
- Contact Site Superintendent / shotfirer
- Shotfirer to delineate 10m area of concern
- Shotfirer to assess status of product and Nonel tubing
- Shotfirer to propose remedial action
- Shotfirer to directly supervise and spot should digging out of product be required
- Product made safe refer above

10.9. SECONDARY BLASTING PROCEDURES

Secondary blasts inherently pose a high risk of producing excessive and long range flyrock. Consequently, secondary blasting will not occur at the Bardavcol KCD Site.

11. WORKING NEAR CREST OF BENCHES

Explosive Suppliers have instigated a two-metre exclusion zone from crests. No personnel will enter this area at any time.

Activities on bench include survey, mark-out, drilling, boretracking, dipping, loading, stemming, firing as well as visits by supervisors, managers etc. It is seen that all these activities are exposed to the hazard of working close to the crest but that all can be executed without the need to enter into the two-metre danger zone.

- Two-metre "Danger Zone" to be identified on all blast areas with cones and/or a painted line parallel and 2 metres from the crest where there is a face height of greater than 1.8 metres. Note: the crest is defined as the edge of the face where competent ground begins.
- JD&B and explosive suppliers will not mark-out or load any holes where operators have to go within the two-metre danger zone, or allow its personnel within the two-metre zone.
- Mark-out and loading of holes between 1.5 metres and 2.0 metres of the crest should be achievable with the operator remaining behind the two-metre danger zone line.
- Explosive suppliers will conduct a pre job risk assessment on each visit to the bench by explosive supplier personnel.
- Provide safe access and bench conditions at industry best practice
- Instigate mark-out and drilling practices so that no holes are closer than 2 metres to the competent crest.
- Not to request taking the loading hose to load holes where the two-metre danger zone would be compromised.

12. BLAST GUARDING

12.1. RISK ASSESSMENT

A formal risk assessment will be completed prior to the commencement of the blasting campaign(s), identifying the potential hazards and controls that may be presented by the individual blasts at each stage, including the extent of the Blast Exclusion Zone during the firing sequence.

Any risk assessment must be approved and signed by all of the relevant parties involved in the blasting process prior to the blasting campaign(s) process being undertaken.

Factors that may be taken into account during the risk assessment may include (but not be limited to) the following:-

- The type of shot (presplit, softwall, production);
- Aim of the shot (fragmentation, maximum heave, etc);
- The ground type (hardness / bedding planes);
- Known geological abnormalities within the blast design area;
- Burden and spacing (including face row design);
- Average bench height;
- Vertical location of the bench;
- Average blast hole load;
- The designed blast powder factor;
- Timing and effects;
- Historical records of flyrock events;
- Access to and from the proposed Blast Exclusion Zone;
- The location of equipment and personnel during the blast;
- The location of protected works and/or associated works;
- The location of external infrastructure potentially affected by the blasting activities;
- The formation and management of any blast fume;
- Radio communication ‘black spots’;
- The expected weather conditions.

12.2. BLASTING NOTIFICATION

The site superintendent responsible will notify all persons on the morning of the scheduled blasting time and ensure the blasting information has been passed on to all personnel under their direct control (including sub-contractors and visitors) using the site pre-shift/ huddle meeting and other relevant forms of communication. All blasting notification shall be presented in a format which includes an agreed or common language used for all site personnel.

Notification may include relevant external parties to the KCD site within close proximity of the blasting area as deemed necessary by the Project Manager (Earthworks).

The site Blast Boards will be updated prior to shift start on the day of firing.

The site Blast Boards will be positioned to ensure that all personnel entering the KCD site have direct visual information relating to the scheduled blast.

The use of white “Blasting Today” letters on red background denotes the ‘active’ nature of the Blast Board and the Blast Boards will be positioned on each of the 3 access roads into the KCD site.

A general radio announcement will be made each day at a nominal time to indicate the blasting requirements of the day.

12.3. PUBLIC ‘GORGE ROAD’ CLOSURE

As rock falls and mud slides are commonplace during winter and the slightest ground vibration may exacerbate this issue, it has been deemed necessary to include Gorge Road in the blast exclusion zone and to close Gorge Road to the public prior to blasting.

This responsibility is assumed by Bardavcol and will fall within the logistical process for blast guarding.

The requirements for a person to perform the Blast Guard role and close a public roadway may include the provision of a ‘Traffic Controller’ qualification, as per the local authority requirements and the nominated persons to perform the role under such circumstances are to be appropriately equipped and qualified for the role.

The Project Manager (Earthworks) is to ensure that the Blast Guards who are responsible for any public roadway closure, have the appropriate signage positioned on the boundaries of the Blast Exclusion Zone on Gorge Road.

12.4. THE BLAST GUARD PROCESS

The person assuming the role of the 'Blast Controller' will be responsible for the logistical elements of the blast in terms of:-

Prior to the blast guard meeting, ensuring that adequate resources are available to provision the Blast Exclusion Zone in terms of :-

- A suitable number of maps have been provided to assist each blast guard as a reference document for the individual location and specific blast information;
- The correct numbers of competent personnel required to be blast guards are available and have been advised of the blast guard meeting time and location;
- The numbers of suitable vehicles required to support/indicate the blast guard locations;
- Visual indicators associated with each blast guard location;
- Ensuring that the designated Blast Exclusion Zone is clear of all personnel and equipment, in accordance with the specification of the blast design, and in accordance with the nominated site timeframes, prior to the firing of any blast, by communication with the relevant KCD site personnel supervising non blast related activities within the designated Blast Exclusion Zone;
- Establishing the security of the Blast Exclusion Zone perimeter, including the positioning and monitoring (visually and by radio contact) of the blast guards; and
- Conducting a safety sweep of the designated Blast Exclusion Zone prior to the firing of the blast to ensure that requirements of the Blast Exclusion Zone design parameters have been met.

Each person designated as a Blast Guard will have two main roles:-

- To create a physical barrier at a defined access point to a blast area to ensure no persons can enter the Blast Exclusion Zone during the firing process;
- To immediately communicate any breach of the Blast Exclusion Zone to the Blast Controller.

NOTE: A sign or barricade is NOT sufficient to ensure that unauthorised persons are NOT within the area of danger prior to blast firing process.

Physical checks and guards are a mandatory part of any blast clearance process. The obligation of a Blast Guard is to work under the direct instructions of the designated Blast Controller and no other person for the duration of the blast guarding duties.

The Blast Guards will proceed to the designated Blast Guard points and conduct a complete clearance inspection of their area, checking for personnel and the position of equipment.

During the inspection, the Blast Guards may need to get out of their vehicle as required, to check areas that are not accessible by a vehicle or where machines have been shut down for mechanical repairs, to ensure all persons are evacuated.

- The Blast Guard must then report the results of the inspection to the Blast Controller via the 2-way radio and receive confirmation of the message from the shotfirer and Blast Controller.
- The Blast Guard should then establish and man the Blast Guard position.
- Under NO circumstances will Blast Guards leave their position or relocate their position without consultation with the Shotfirer / Blast Controller.
- Once the Blast Guard is in position at the barricade point, the access to the Blast Exclusion Zones is to be closed by a physical barrier, e.g. by parking their vehicle at a 90° angle to the Blast Exclusion Zone access.
- The Blast Controller will conduct a safety sweep of the Blast Exclusion Zone once all of the Blast Guards have confirmed that they are in the correct location and their area is clear of unauthorised personnel and equipment by the agreed radio protocol.
- Under NO circumstances will the Blast Guards leave their position until the shotfirer has given the “ALL CLEAR” and confirmed with each Blast Guard via the 2-way radio system that their duties have been completed.
- Under NO circumstances shall any unauthorised traffic or personnel be permitted to venture inside the Blast Exclusion Zone past this point until the “ALL CLEAR” from the shotfirer has been received by the Blast Guard.

In the event that a Blast Guard barricade has been breached or the Blast Guard observes personnel within the exclusion area, the blasting process MUST immediately be stopped by notifying the Blast Controller via the 2-way radio.

The Blast Guard will immediately call on the designated 2 Way Radio channel “STOP THE SHOT” twice and wait for a response.

If there is no response from the Blast Controller within 2-3 seconds the Blast Guard is to make the call again. The Blast Guard will continue to broadcast the radio alert of the unauthorised access, until receiving a suitable response from the Blast Controller.

The Blast Controller will acknowledge the radio call from the Blast Guard and:

- Immediately abort the firing procedure and, disconnect and secure, the explosives initiating (firing) apparatus;
- Confirm with the Blast Guard the details of any reported breach of the Blast Exclusion Zone;
- Communicate to all Blast Guards to hold their current positions;
- Release the radio silence;
- Document the details of the reported breach of the Blast Exclusion Zone (blast guard number, time, area, vehicle / person identification, etc.);
- Investigate the reported breach of the Blast Exclusion Zone;
- Consider what corrective actions are to be taken (e.g. restart the firing procedure / reschedule the firing of the blast).

If there is no response from the Blast Controller to the initial radio alert from the Blast Guard, a relay radio message may be required to be passed to the Shotfirer / Blast Controller from another Blast Guard, or relevant site personnel who have heard the radio alert call.

The Blast Guard who has witnessed / reported the unauthorised access within the closed Blast Exclusion Zone shall not leave the designated position, to follow or remove any unauthorised personnel, under any circumstances.

Under these conditions the firing of the blast will be delayed, and the designated Blast Controller will investigate all reports of unauthorised access within any closed Blast Exclusion Zone, before resuming the blast firing sequence.

Following investigation, the Blast Controller will provide a report of any unauthorised access to a blast exclusion zone to the Project Manager (Earthworks).

12.5. BLAST GUARD POSITIONING

Prior to the shot being fired, the Blast Guards must be in position 20 minutes before the blast.

Once asked to close access to the Blast Exclusion Zones, the Blast Guard vehicle is to be parked in a 90° position that blocks the access to the exclusion area and is clearly visible to all oncoming traffic.

Each designated Blast Guard vehicle will have a working flashing light activated (hazard lights may be used as well) and have 2 way radio communications (either hand held or vehicle mounted) with the nominated Shotfirer and Blast Controller.

In the event of the designated Blast Guard position being located in a radio ‘black spot’ the position may need to be relocated to an alternative position where clear radio communications can be clearly established prior to the firing of the shot. This action will be completed through consultation and with the approval of the Shotfirer and Blast Controller.

The Blast Guard position will allow clear vision of the position access along roadways and the surrounding area and shall not be located in a position that can cause confusion or place the blast guard in danger from moving traffic (e.g. on corners, directly on intersections, etc.).

Blast Guards must remain with the vehicle and ensure there is ready 2-way radio communications during the Blast Guarding process.

Once in position, no unauthorised traffic or personnel will be permitted to pass the Blast Guard location, unless evacuating the exclusion area, or in an event of an emergency.

The Shotfirer / Blast Controller must be notified immediately via the 2-way radio of any emergency condition.

12.6. CLEARING BLAST EXCLUSION ZONE

On the day prior to the blast the Project Manager (Earthworks) or designate (Blast Controller) will undertake the following notifications:

- Mark the time and date of the blast on the various blast notification signs
- Adjust the road closure signs to inform the public of a road closure tomorrow

Provide the blast details to:

- SA Water – Eric Von Wielligh (eric.vonwielligh@sawater.com.au)
- DPTI Traffic Control Centre (dpi.tmc@sa.gov.au)
- Call the landholders within the immediate vicinity via emails or telephone
- SAPOL – Sergeant Allan Cuk (allan.cuk@police.sa.gov.au)
- Safework SA - Luke Brammy or Brett Pfeffer (luke.brammy@sa.gov.au) and/or (brett.pfeffer@sa.gov.au)

On the day of each blast the Shot Controller will adjust the Road Closure signs that there will be a road closure today and the blast notification signs that there will be a blast today. The Blast Controller will notify project personnel of the blast today at the daily prestart including the outline of the blast exclusion or no go zone and the site clearance procedure

- PME or designate ensures that the Blast monitors are out and operational and contacts the Blast Controller with this information
- The Bardvacol Blast Controller will contact all the blast guards ensuring that they know of the blast and their guarding location and the time and location of the Blast Guard Meeting
- The shotfirer shall inform the Blast Controller that the blast is ready to be fired
- The Blast Controller calls for the site to be cleared over the 2 way
- The Blast Controller then calls the Blast Guard meeting ensuring that each guard knows their guard location as well as the requirement to clear as they proceed, how they are to block the road including the use of a flashing light and that they all have working radios. The traffic controllers attending to the Gorge Road road closures also move into position
- The Blast Controller calls for radio silence over the radio as blasting is about to occur.
- Once the sentries are in place the Blast Controller will confirm with every blast guard including the traffic controllers that they are in position and their area is secure by stating… BLAST GUARD NO 1 IN POSITION AND AREA SECURE
- The Blast Controller calls for the 3 sirens runs by the Supervisors covering the Spillway to gate 18 and the Fire Track 18A by the blast controller, the Dam embankment toe to the early works compound and the Playford Bridge to the Dam Lookout on Gorge Road including the crest access road

- On successful completion of the siren run confirmed by the other two supervisors the Blast Controller will check with the blast guards that their areas are still secure
- Once this is done the BC hands the area over to the shotfirer to fire the blast
- The shotfirer will give the 60 second warning and will commence insertion of the lead in line and the blast firing mechanisms
- The shotfirer will then call over the radio Blasting in 10 seconds with a count from 10 to six and then silent from 5 to 1 and call Firing the Shot over the radio. The silence from 5 seconds to 1 second enables the shot to be stopped in case of a breach of the blast clearance as the words **STOP THE SHOT… STOP THE SHOT…** are clearly heard over the radio
- The shotfirer announces over the radio that the shot has been fired and will be inspected once possible blast fume and dust have cleared indicating that radio silence is still in force and hands control of the Blast Clearance area back to the Blast Controller
- The Blast Controller indicates that all guards are to remain in position
- The shot is inspected and the shotfirer gives the ALL Clear over the radio to the Blast Controller
- The Gorge Road will be inspected by the relevant guard after the all clear and if there are debris these must be cleaned up prior to the road being reopened. This is achieved by contacting the Blast Controller who shall organise the clearing of the road after the guard contacts the Blast Controller after the guards have been stood down and the All Clear is given to the Project
- The Blast Controller then gives the All Clear to the site
- The Blast Controller contacts the blast guards requesting that they stand down one at a time… Blast Guard 1 standing down
- A misfire is covered by the misfire procedure (10.9)

A trial run of the entire procedure will be undertaken prior to the first blast.

Refer following ‘Site Specific Blast Firing Checklist’ and ‘Instructions for Blast Guards’ Section 12.7

12.7. BLAST FIRING CHECKLIST & BLAST GUARD INSTRUCTIONS

Bardavcol Kangaroo Creek Dam Upgrade

Site Specific Blast Firing Checklist

Blast ID:		**Blast Controller (BC):**	
Blast Date:		**BC Phone No:**	
Blast Time:		**Shotfirer:**	
RADIO CHANNEL: UHF 24			
Blast Guard 1 (BG1):		**Siren Runner 1:**	
Blast Guard 2:		**Siren Runner 2:**	
Blast Guard 3:		**Siren Runner 3:**	
Blast Guard 4:		**Traffic Control 1:**	
Blast Guard 5:		**Traffic Control 2:**	

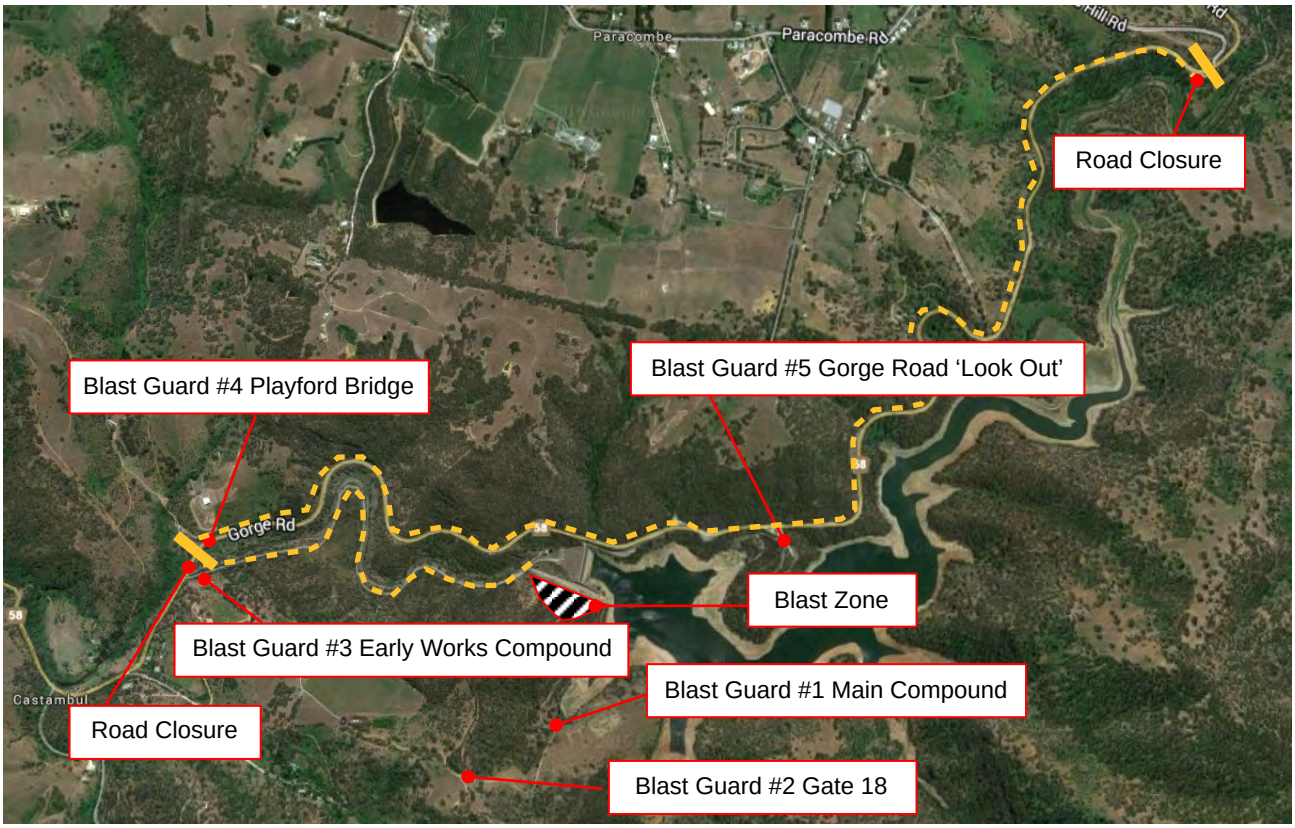
**Blast Guard locations on attached map. If unsure please refer to Blast Controller prior to the blast.*

TIMELINE	ACTIVITY	✓
Blast Boards	Blast boards are displayed with all relevant information and the **Blasting Today** overlay is in place at the end of shift the previous evening of the day of blast.	☐
Notifications	Notification the day prior may include relevant external parties within close proximity of the KCD site as deemed necessary by the Project Manager.	☐
Pre Start Meeting	Morning Pre-start meeting all relevant personnel to confirm blast clearance plan and Blast Time. At this time all guards and traffic controllers are assigned position and identification call signs.	☐
2/3 hours prior	Blast Controller reminds all personnel of Blast Time over UHF 24 & 25.	☐
45 mins prior	Blast Controller to instruct all onsite personnel and visitors within the blast exclusion zone to evacuate site via UHF.	☐
40 mins prior	Blast Controller to confirm that all blast monitors are in position and recording and that the blast monitor personnel are secure.	☐
30 mins prior	Nominated blast guards and traffic controllers move to locations and conduct radio checks with Blast Controller on UHF 24 and assume blast guard positions. Radio checks to state "**BLAST GUARD (Number) (Name) IN POSITION STANDING BY**". If radio check fails, a relay will be set up (e.g. Blast Guard 4 will relay for Blast Guard 3)	☐
20 mins prior	Blast Controller instructs traffic controllers that traffic on Gorge Road can be stopped. **"TRAFFIC CONTROLLER (Number) (Name) TRAFFIC STOPPED"**	☐

15 mins prior	Blast Guards confirm with the Blast Controller that access to site at their location is now blocked with vehicle at 90° and hazard/amber lights flashing "**BLAST GUARD (Number) (Name) IN POSITION AND AREA SECURE"**.	☐
15 mins prior	**Blast Guard 2 for Gate 18 to acknowledge visual inspection of Fire Track 18A in their response.**	☐
15 mins prior	Blast Controller instructs commencement of siren runs from: 1. Levels 5 to 1 and Main Compound 2. The Dam embankment toe to the Early Works Compound 3. Playford Bridge to the Dam Lookout on Gorge Road including the crest access road. **BC "SIREN RUNNERS COMMENCE SIREN RUN"** **SR2 "SIREN RUNNER 2 COMMENCING RUN"** **SR2 "SIREN RUNNER 2 RUN COMPLETE"**	☐
10 mins prior	The shotfirer will confirm with the Blast Controller that the blast is ready to fire.	☐
5 mins prior	Blast Controller confirms with shotfirer that the **"SITE IS SECURE"**.	☐
1 min prior	Siren is sounded by the Shotfirer and announces **"Attention all personnel… we are blasting in 60 seconds… (area) and (position) of blast… Observe radio silence……firing in 60 seconds"**	☐
10-0 secs prior	Shotfirer announces **"firing in 10 seconds"** with a count **10,9,8,7,6**… and then silent from 5 to 1 and call **"Firing the Shot"** over the radio. *The silence from 5 seconds to 1 second enables the shot to be stopped in case of a breach of the blast clearance zone as the words **STOP THE SHOT… STOP THE SHOT**… can be clearly heard over the radio*	☐
5 mins post	Shotfirer to inspect blast area following dissipation of dust and possible fume and confirms "**ALL CLEAR**" with Blast Controller	☐
5 mins post	Blast Controller confirms traffic controllers are to remain in position and Siren runners 2 & 3 conducts a sweep of Gorge Road. Any debris is to be cleaned up by the standby loader and sweeper. **"SIREN RUNNER 2 & SIREN RUNNER 3 SWEEP GORGE ROAD AND REPORT IN"**	☐
5 mins post	Blast Controller stands down each blast guard. Blast guards are to respond individually… **"BLAST GUARD 3 NAME… STANDING DOWN"**	☐
10 mins post	When Gorge Road is clear Blast Controller calls for the release of traffic and stands down the traffic controllers. They are to respond individually… **"TRAFFIC CONTROLLER 1 NAME… STANDING DOWN"**	☐
15 mins post	Blast Controller announces final **"ALL CLEAR"** to the site and resume normal duties.	☐

Bardavcol Kangaroo Creek Dam Upgrade

Instructions for Blast Guards



1. Ensure you attend the Pre-Start meeting morning of the blast to receive confirmation of Blast Time and your position and any further instructions.
2. Attend the Pre-Blast meeting 45 minutes prior blast.
3. Be ready to take your assigned position 30 minutes before the blast. If you have been instructed to advise people of the impending blast, commence your clearance. Make sure machines are already moving out of the blast clearance area. Respond to the Blast Controller that you are in position.
4. Block access at the 15 minutes call from the Blast Controller. Keep a visual on your area and do not let anyone into the blast area. Contact the Blast Controller immediately if the blast area is breached or if you see anyone in the area. For example : ***"Blast Guard 5 (name)… Stop the blast… the blast area has been breached"***. If there is no response from the Blast Controller within 2-3 seconds the Blast Guard is to make the call again. The Blast Guard will continue to broadcast the radio alert of the unauthorised access, until receiving a suitable response from the Blast Controller.
5. If there is no response from the Blast Controller to the initial radio alert from the Blast Guard, a relay radio message may be required to be passed to the Shotfirer / Blast Controller from another Blast Guard, or relevant site personnel who have heard the radio alert call.
6. Respond to the Blast Controller's calls with your blast guard ID and name "***Blast Guard 5 (name)…***
7. If your part of the blast exclusion zone is secure, respond to the Blast Controllers final blast clearance call using the phrase : **"This is *Blast Guard 5 (name)…* access is blocked and the area is secure."**
8. Do not use the words ***"ALL CLEAR"*** these are reserved for the Blast Controller and shotfirer.
9. In the unlikely event that a misfire has occurred the Blast Controller will instruct all blast guards and traffic controllers ***"Attention all personnel… a misfire has occurred… please remain in position and await instructions"***
10. In the unlikely event that a blast fume event has occurred the Blast Controller may instruct a blast guard to move away from the plume,***"There is blast fume moving to the (east). Blast guard (3) (name) please move away from your position"***.

12.8. BLAST FIRED

The shotfirer will then inspect the blast and may confirm the “ALL CLEAR” after giving due consideration to:-

- Identification of any misfire and / or the associated corrective action required to make the area safe;
- Procedures to be adopted, if the inspection reveals that the “ALL CLEAR” cannot be given;
- Continuous inspection procedures during the approach to the post-blast site that might identify unusual or abnormal results indicating possible hazards;
- Whether there is a need to wash down/or scale exposed surfaces;

The shotfirer may then communicate:

- That a misfire or other problem has been identified and the “ALL CLEAR” cannot be given and that further action is required; or
- That the “ALL CLEAR” has been given and that normal operation may recommence;
- Where the “ALL CLEAR” has been given by the shotfirer, the Blast Controller will release or “STAND DOWN” the Blast Guards;
- Blast Guards will acknowledge the “STAND DOWN” message.

NOTE: Until the “ALL CLEAR” signal is given, no traffic or personnel are permitted to gain access to the site blast area.

Following the “ALL CLEAR” Traffic Controllers will sweep Gorge Road for debris or hazards and if necessary call on the standby loader or brush to clear the road prior to allowing the public to proceed.

Refer preceding 12.7 ‘Site Specific Blast Firing Checklist’ and ‘Blast Guard Instructions’

13. BLAST DESIGN

13.1. PROCESS FOR BLAST DESIGN & APPROVAL

Prior to blasting a formal Pre Blast Plan, identified by chainage, RL and a Blast No. for each area to be blasted.

Pre Blast Report design proposals will include:

- Proposed location of the blast
- Bardavcol surveyor to supply distance information to monitors
- Date and time for firing
- Number of blastholes
- Nature of the face (free face or choked face)
- Pattern type (rectangular, square or staggered)
- Bench height
- Blasthole diameter(s)
- Blasthole inclination
- Burdens and spacings
- Stemming depth
- Size and type of stemming
- Subdrill
- Primer type and weight
- Explosives type and density
- Column rise
- Charge configuration (column, decked, decoupled)
- Blasthole loading sheet with depth, charge and stemming length per blasthole
- Total explosives for the blast
- Design powder factor
- Type of initiating system
- Plan view of the blast pattern showing tie in configuration with nominal delay times
- Nominal timing for each blasthole
- Distance to nearest sensitive monitors - Bardavcol surveyor to supply
- Maximum Instantaneous Charge (MIC) and predicted Peak Particle Velocity (PPV) vibration values calculated from the minimum distance to the nearest monitor.

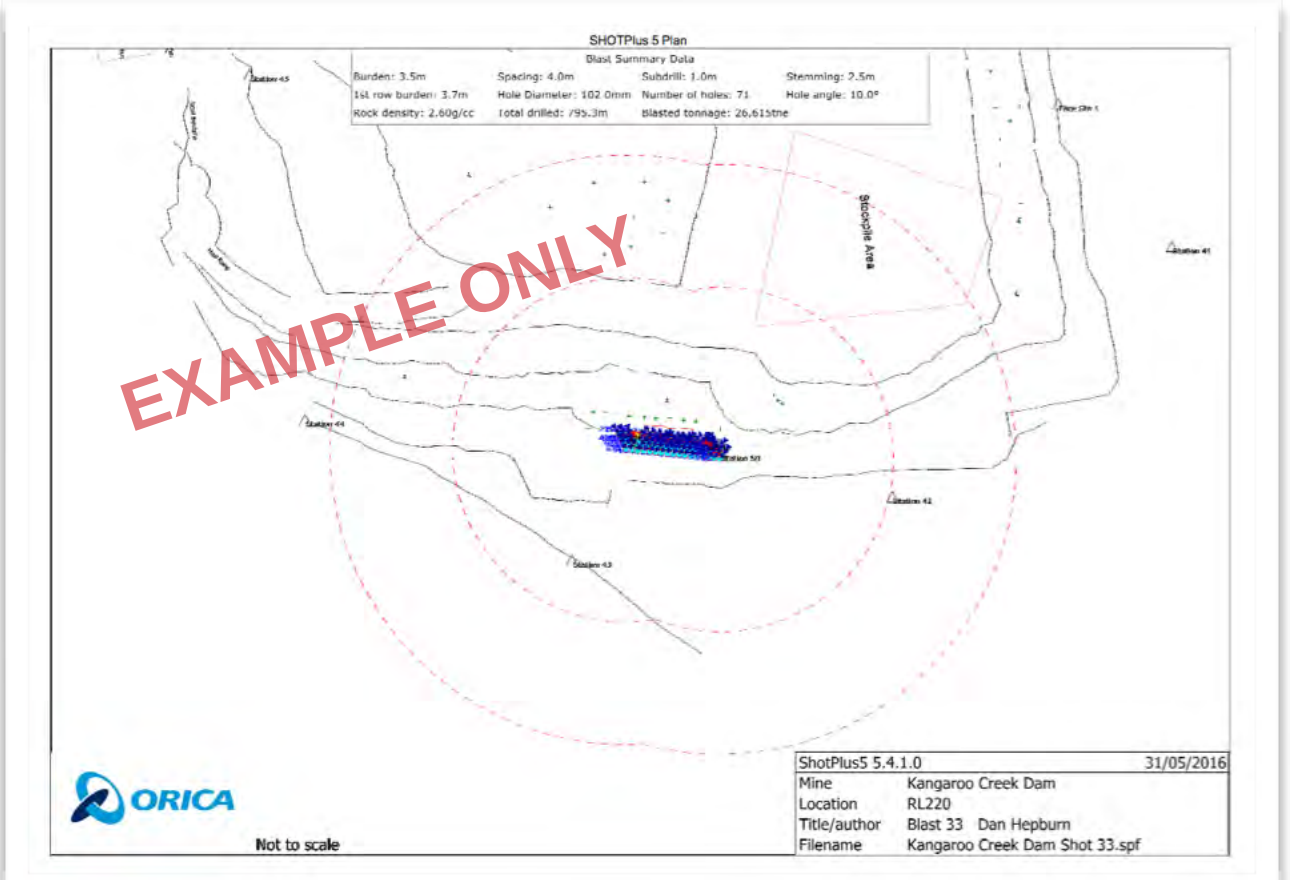
Once approval by the KCD Project Manager (Earthworks) has been given, it shall be considered the Approved Blast Design and will then be implemented.

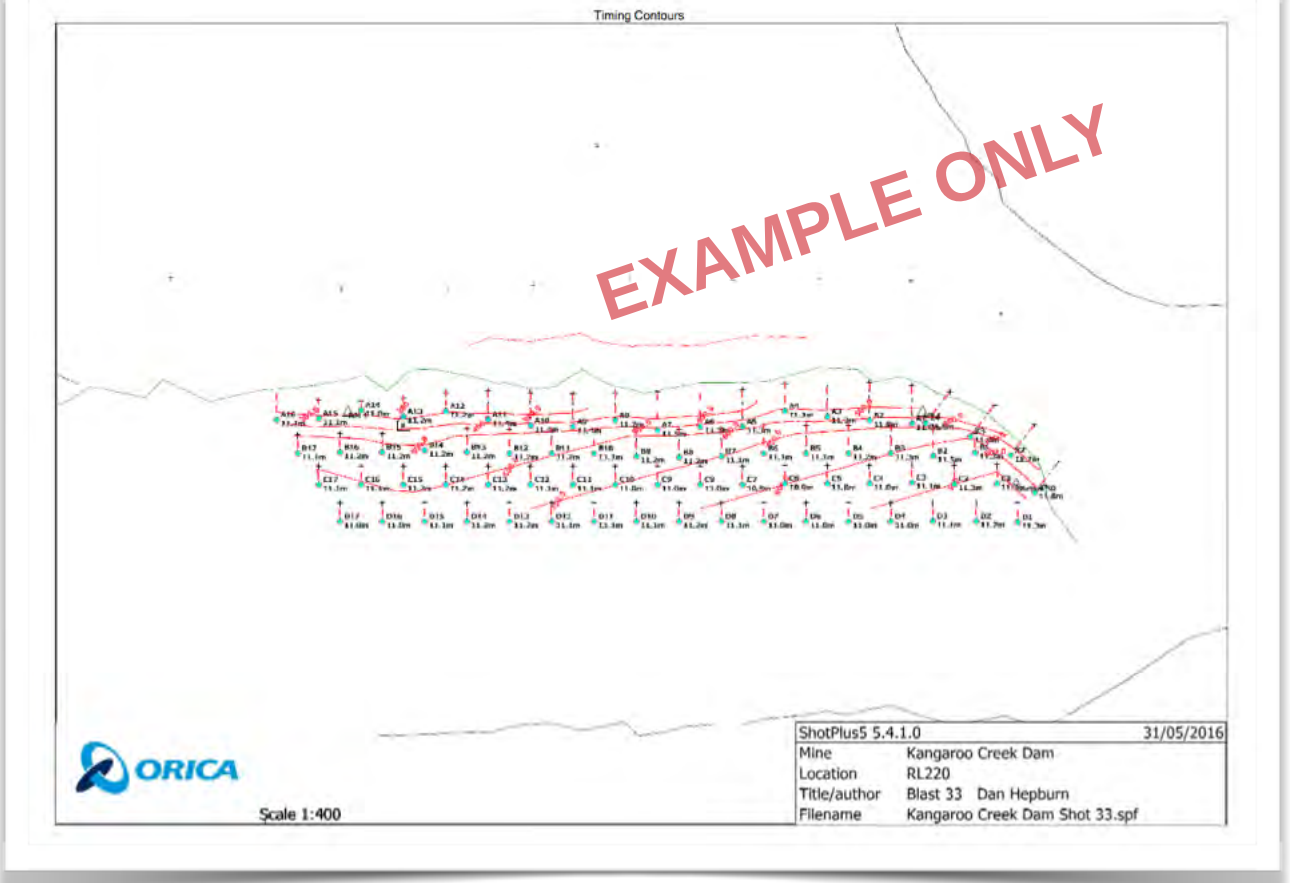
JD&B will use industry recognised blast design software to determine drill, load and initiation tie in Plans to achieve environmental and production requirements for the project.

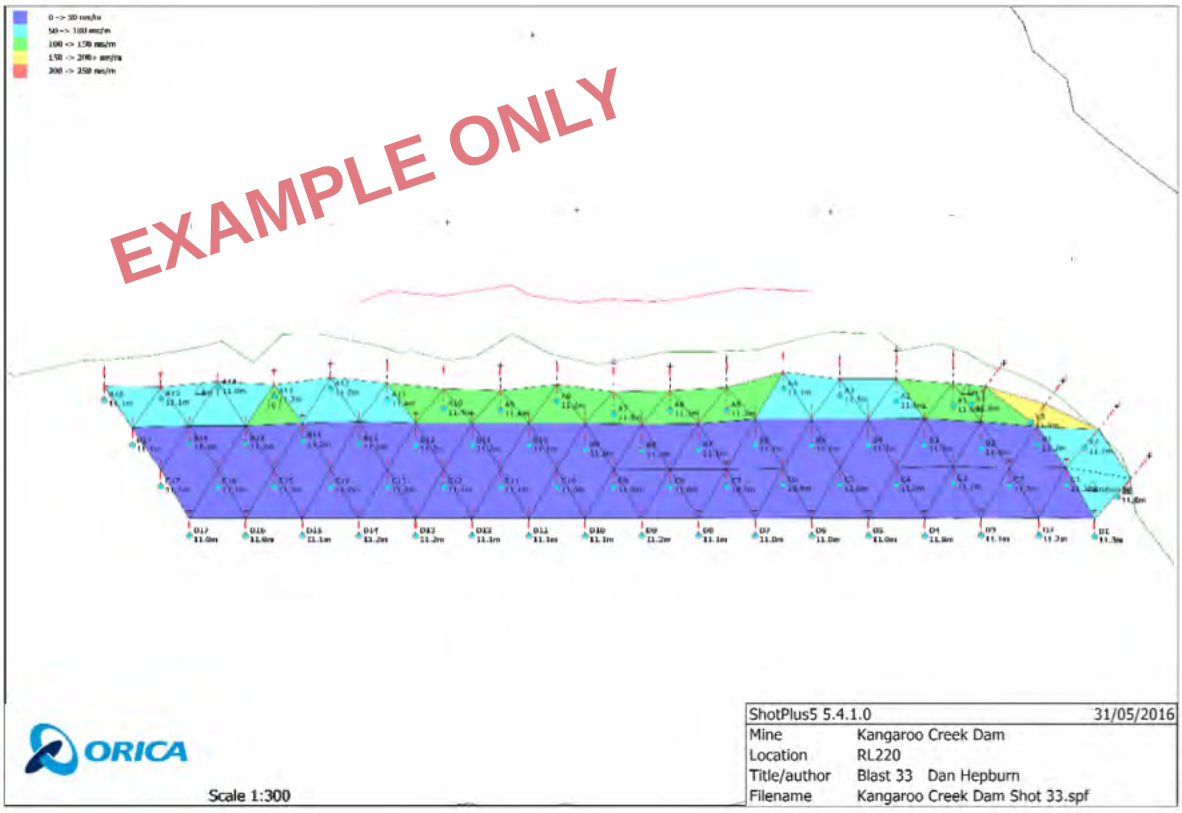
Refer following for example Pre Blast Plan and blast design software outputs.

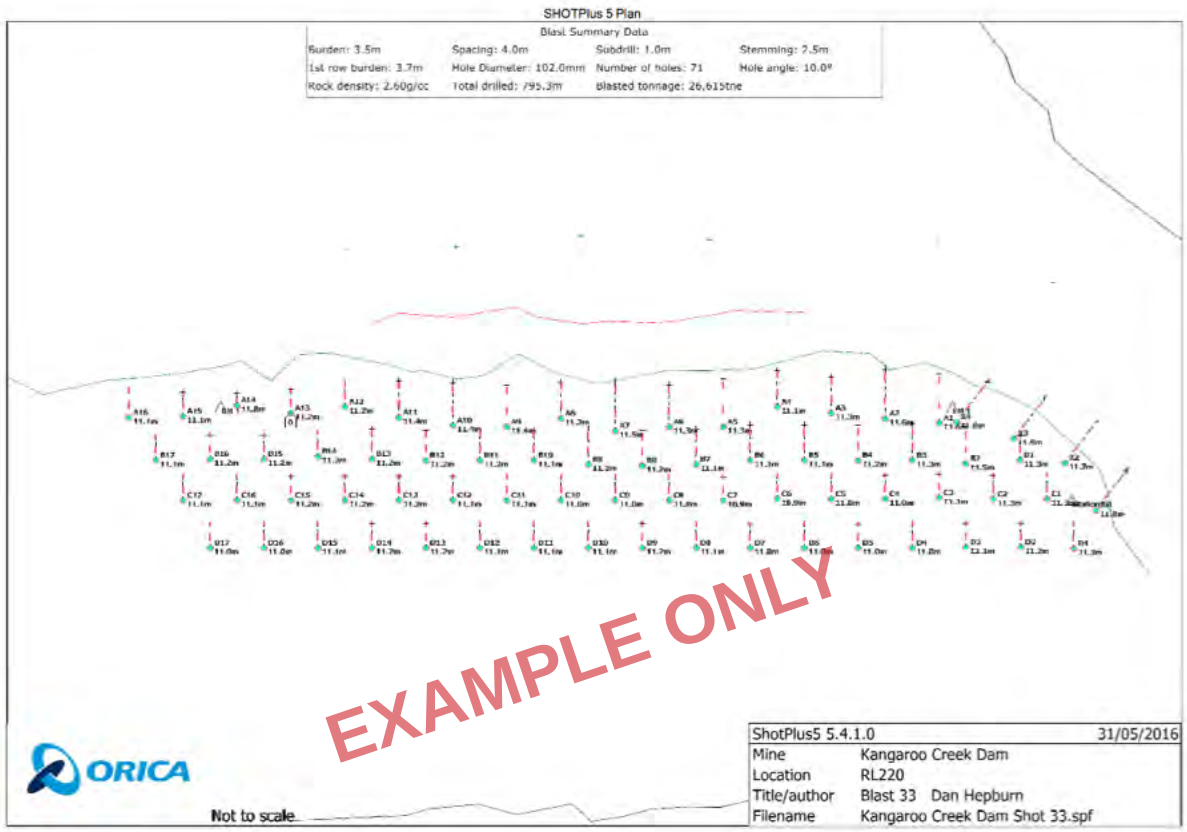
13.2. EXAMPLE BLAST DESIGN OUTPUTS

The following are **illustrative** examples only of blast documentation.






EXAMPLE ONLY
ORICA
Scale 1:300
ShotPlus5 5.4.1.0 31/05/2016
Mine Kangaroo Creek Dam
Location RL220
Title/author Blast 33 Dan Hepburn
Filename Kangaroo Creek Dam Shot 33.spf


SHOTPlus 5 Plan
Blast Summary Data
Burden: 3.5m Spacing: 4.0m Subdrill: 1.0m Stemming: 2.5m
1st row burden: 3.7m Hole Diameter: 102.0mm Number of holes: 71 Hole angle: 10.0°
Rock density: 2.60g/cc Total drilled: 795.3m Blasted tonnage: 26,615tne
EXAMPLE ONLY
ORICA
Not to scale
ShotPlus5 5.4.1.0 31/05/2016
Mine Kangaroo Creek Dam
Location RL220
Title/author Blast 33 Dan Hepburn
Filename Kangaroo Creek Dam Shot 33.spf

The Power of Partnership

Orica Australia Pty Ltd
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188-198 Churchill Avenue
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http://www.orica.com

June 5, 2016

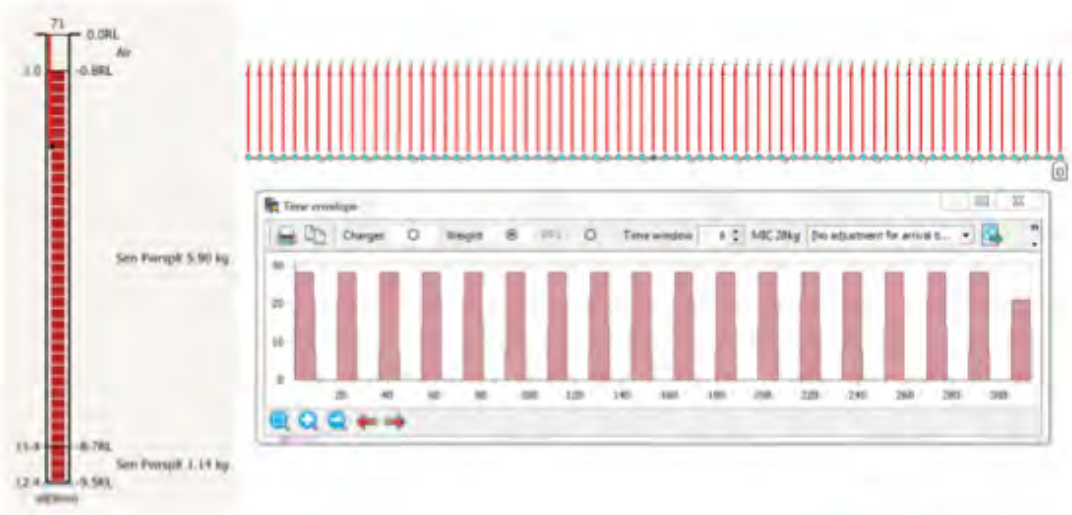
Ron Joyce
Joyce Drilling & Blasting Contractors Pty Ltd
6 Rowland Road
Magill SA 5072

Dear Ron,

Re: Presplit blast environmental predictions

As requested I have designed a presplit blast to the following blast parameters;

Blast Hole Diameter:	89 mm	Presplit Length:	70 m
Blast Hole Spacing:	1.0 m	Explosive:	26 mm Powersplit™ Packaged Emulsion Explosives
Presplit Hole Length:	12.4 m	Initiation System:	Exel 17ms MSC and 5g Plastic detonating cord.
Hole Angle:	40°	Maximum Instantaneous Charge Weight (8ms)	4 holes (28 kg)



ORICA
www.oricaminingservices.com

Again as requested I have calculated a best estimate of vibration generated from this blast for a distance of 70m, and the air overpressure 'airblast' at the nearest sensor receiver approximated to be 1000m from the blast.

As discussed with no site law, or any vibration data from Kangaroo Creek Dam, all site constants and exponents have been taken from Australian Standard AS2187.2: Explosives Storage and Use.[1]

Ground Vibration has been approximated using the following equation:

$$ppV = K^* \left(\frac{D}{\sqrt{Q}} \right)^{-B} \qquad ppV = 1140 * \left(\frac{70}{\sqrt{28}} \right)^{-1.6}$$

Where

ppV	= ground vibration as vector peak particle velocity, in millimeters per second.
R	= distance between charge and point of measurement, in meters.
Q	= maximum instantaneous charge (effective charge mass per delay), in kilograms.
K, B	= constants related to site and rock properties for estimation purposes. (1140, 1.6)

The Peak Particle Vibration estimated to be produced by the presplit blast at a distance of 70m is:

18.3 mm/s

Air Overpressure 'airblast' has been approximated using the following equation:

$$P = K \left(\frac{D}{\sqrt{Q}} \right)^{-\alpha} \qquad P = 516 * \left(\frac{1000}{\sqrt{28}} \right)^{-1.45}$$

Where

P	= pressure, in kilopascals.
Q	= explosives charge mass, in kilograms.
R	= distance from charge, in metres.
K	= site constant (516)
α	= site exponent (1.45)[2]

The air overpressure 'airblast' estimated to be produced by the presplit blast at a distance of 1000m is:

0.11537 Kilopascals (kPa) or 75.2 decibels (dBL)

Ron if you would like any more estimations based on the above design, please let me know:

Kind regards

Daniel Hepburn
Senior Technical Engineer
Orica 0423 021 421

EXAMPLE ONLY

[1] These predictions must be treated as 'best guess' estimates and as no site data has been provided, as measured in field environmental results may vary significantly.
[2] A site exponent of 516 was adopted for the overpressure estimates as the presplit is more closely related to an "unconfined surface charge", than that of a "confined blasts hole" as described in AS 2187.2

Bardavcol Kangaroo Creek Dam Upgrade

Pre-Blast Plan Consent is given to undertake blasting operations outlined below and the attached in accordance with the Bardavcol KCD Blast Management Plan and Joyce Drilling & Blasting Standard Operating & Safe Blasting Procedures	**BLAST NO:** KCD 159 / 02
	BLAST DATE: 20/08/2016
	BLAST TIME: 4:30 pm
Authorised Shotfirer: **Ron Joyce**	Blast Controller: **Nominated Person**
Locality: **Refer attached locality plan**	Description: **Production Blast**
Set Out: Refer attached plan view showing sequence and direction of firing, face type (free or choked), timing and initiation point	

Number of Holes	**150**	Explosive Type	**ANFO**
Number of Rows	**5**	Exp Column Rise (lineal/m)	**4.98kg**
Burden (m)	**2.8m**	Total Bulk Explosive (kg)	**1490kg**
Spacing (m)	**3.0m**	Initiating System	**Nonel**
Bench Height (m)	**4.2m**	Primer Type / Weight	**150g**
Subdrill (mm)	**300mm**	Charge Height (kg/m)	**2.00m**
Hole Diameter (mm)	**89mm**	Powder Factor	**0.28**
Hole Inclination	**0°**	MIC (kg)	**10kg**
Nature of Face	**Choked**	Pattern Type	**Square**
Stemming Height (m)	**2.5m**	Delay Times	**See attached**
Stemming Material	**5-7mm**	Designed BCM / m^3	**5290 m^3**

Authorised Shotfirer: **Ron Joyce** Assistant: **TBA** Date: **18 / 03 / 2016**

AUTHORISED BY BARDAVCOL REPRESENTATIVE

NAME SIGNATURE DATE

14. POST BLAST REPORTING

A Post Blast Report Package will be submitted to Bardavcol Project Manager (Earthworks) within 48 hours of the blast being fired. A completed post blast report package shall consist of:

- Approved Blast Design
- Survey Plan
- Drillers Log
- Explosives Loading Sheet
- Explosives and initiation system usage
- Surface Tie-In Plan
- Shotfirer/Blast Controller Checklist
- Post Blast Report
- Applicable Vibration Monitoring Reports
- Blast video

15. VIBRATION & OVERPRESSURE

15.1. GROUND VIBRATION / AIRBLAST

Monitoring activities are to be conducted by Bardavcol and will be carried out for each blast that occurs. The results of the monitoring shall be included in the Post Blast report.

Blasting will be monitored by video recording and blast monitoring equipment as discussed below. The peak particle velocity of each blast will be measured as well as the airblast levels to ensure compliance with the targets set in this Blast Management Plan. The monitoring requirements and limits are set out in the following table:

DESCRIPTION	PPV (mm/s)
Residential Houses	5
Concrete less than 7 days old	10
Concrete after 7 days	25
Concrete after 28 days including concrete structures or concrete placed as part of the works)	50
Pressure grouted foundations	20
Grouted Rock Anchors less than 24 hours old	0
Grouted Rock Anchors greater than 24 hours old[1]	70
Domain G	13

Note[1]:After 24 hours, the peak particle velocity shall not exceed 70 mm/s at any of the recently installed bars. However, it is generally the case that if rock adjacent to the recently installed bars suffers blast damage, then the grout shall also be damaged.

Therefore, if blast damage to such rock is noted then the vibration limit shall be reduced as directed by the Superintendent.

- Monitoring and recording of air overpressure, noise and ground vibrations shall be carried out for all blasts at all relevant sensitive receivers.
- Video footage of each blast shall be taken to monitor movement of the blast and any indications of extent, direction and impact points of flyrock (if any).
- Endeavour to meet fragmentation to meet required criteria by the application of industry best practice blasting principles notwithstanding the **design limitations** required to achieve flyrock and vibration control.
- Protection of material below and beyond the final limits of excavation by ongoing review of the effects of blasting on the site material types. Generally, pattern sizes, QA tolerances and charge weights will be reduced to minimise over break on final lines and levels.
- Minimise disruption to the public using the Gorge Road through safe, effective and professional firing and post blast clearance processes

15.2. PROPOSED GROUND VIBRATION MINIMISATION KPI's

The proposed KPI's for minimising blast induced vibration are:

- Blast design predicated on the Rules of Thumb for blasting based on the hardness and the natural fracture density of the rock to be blasted
- Holes marked out using a surveyor with an accuracy of +/- 0.07m
- Hole collar accuracy KPI +/- 0.07m
- Explosive density KPI to ensure that the correct explosive of the correct density is loaded therefore obtaining the designed MIC required for bulk explosive being used as per Orica's quality assurance
- It is recommended that packaged product be used in holes close to structures (within 60m) as exact MIC's can be obtained
- Hole depth KPI aimed at ensuring the targeted MIC is obtained and no over confined explosive that increases the ground vibration
- MIC or column rise KPI – in this case MIC KPI that ensures less than design can be loaded but not over the MIC
- MIC design is based on 85% of the 95% Confidence Site Vibration Law. In the KCDSU case 90% of the 97% Free Face confidence equation using a K Factor of 2000 and a beta factor of -1.6
- For confined production blasting it has been recommended that a K Factor of 5000 be used with a Beta Factor of -1.6 with similar design percentages to free face blasting
- For Presplit blasting a 7000 K Factor is recommended with a Beta Factor of -1.6 with similar design percentages as the fee face blasting
- Reduce explosive charge as required from drill hole log sheets as this reduces MIC
- Where ever possible use free face blasting to provide relief for the blast reducing ground vibration
- Use timing that promotes progressive relief as this reduces blast induced ground vibration
- Ensure that the designed timing design is implemented
- Consider using decked charging firing top deck down
- Audit bit diameter using callipers
- Bardvacol to spot audit the KPI's
- Bardvacol to accurately measure blast induced ground vibration

15.3. AIRBLAST NOISE

The air vibration limits during the limited working hours are restricted to a maximum level of 115 dBL at Monitor 1 nearest residence only. This shall be achieved through appropriate blast designs and implementation processes and strategies.

DAY	TIME	MAXIMUM LEVEL	LEVEL & FREQUENCY
Monday to Saturday	8 am to 5 pm	115 dBL	115 dBL for 9 in any 10 consecutive blasts, regardless of the interval between blasts
All other times	No blasting allowed		

Air vibration levels shall comply with the requirements of AS 2187.2-2006 when measured at the nearest residence.

15.4. BLAST MONITORING

Monitoring activities will be carried out by Bardavcol for each blast that occurs. Bardavcol have purchased 5 Texcel GTM monitors and an associated training package to assume responsibility for the ground vibration and airblast monitoring.

The results of the monitoring will be supplied to JD&B for inclusion in the Post Blast report.

The peak particle velocity of each blast will be measured as well as the airblast levels to ensure compliance with the targets set in Appendix B2 - Part 7 of the specifications and as outlined in this Blast Management Plan.

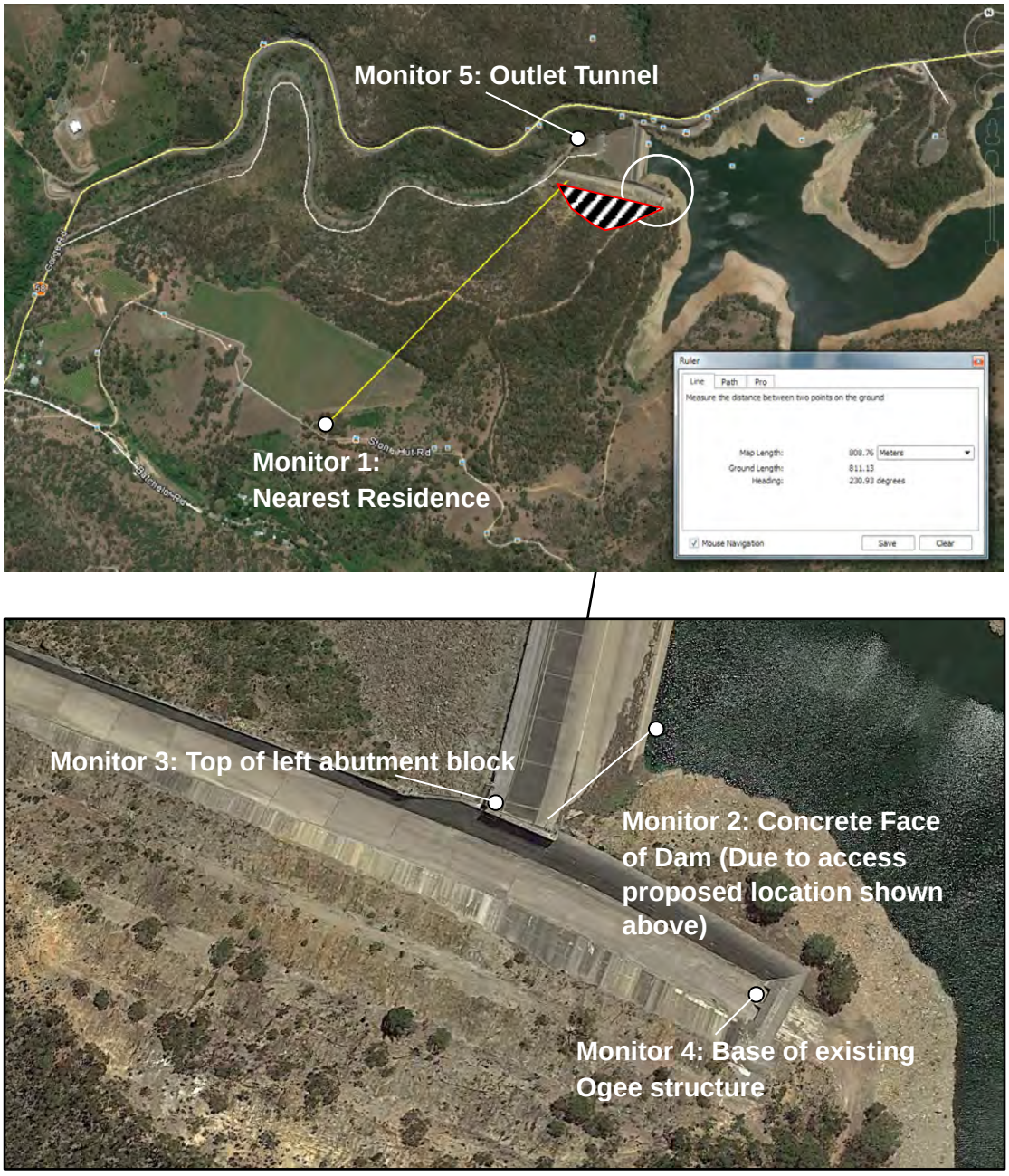
Should the monitoring activities indicate an actual or apparent non-conformance with the limits set all further blasting activities will cease and in consultation with the Bardavcol Project Manager (Earthworks), the blasting consultant and the Client take steps to address the situation to ensure future compliance.

5 monitoring stations have been nominated at the following locations:

- **Monitor 1:** Nearest Residence
- **Monitor 2:** Concrete Face of Dam
- **Monitor 3:** Top of left abutment block
- **Monitor 4:** Base of existing Ogee structure
- **Monitor 5:** Gorge Road for the first two blasts and then the outlet tunnel and concrete pours as required

Please refer following 15.5 Blast Monitor Locations Map

15.5. BLAST MONITOR LOCATIONS MAP



16. FLYROCK MITIGATION CONTROL

Flyrock is generally perceived as the rock propelled beyond the blast area.

PRIMARY CAUSES OF FLYROCK

Generally, flyrock is caused by a mismatch of the explosive energy with the geo-mechanical strength of the rock mass surrounding the explosive charge. Factors responsible for this mismatch include:

- Abrupt decrease in rock resistance due to joint systems, bedding layers, fracture planes, geological faults, mud seams, voids, localised weakness of rock mass, etc.
- Incorrect and non-compliant stemming
- High explosive concentration leading to localised high energy density
- Inadequate delay between the holes in the same row, or between the rows
- Inappropriate blast design
- Deviation of blast holes from designed directions
- Improper loading and firing practices

To ensure that flyrock control/mitigation techniques follow industry best practice with regard to flyrock control in a sensitive environment the following techniques will be adopted to achieve the objective of zero flyrock incidents:

Primary Control - Cautious Blasting Techniques

- Blast design based on scaled depth of burial (SDM) of 1.8 within 60m of structures which is increased if there is soft or well fractured rock in the stem region obtained from blast hole drilling logs
- Orica quality assured product and loading documentation
- Blasts will be designed to control flyrock risk whilst producing reasonable fragmentation. No flyrock must be projected outside the designated blast area towards infrastructure.
- The geology, rock structure and general lay of the land combined with the QA drill hole depths, drill penetration rates and the delineation of blastholes with anomalies will be inspected prior to each blast to assess the specific conditions of the blast area. Blast designs are especially intended to prevent fly-rock.
- Dipping of every blasthole and backfilling if required combined with the load sheet per hole and re-dipping of the stem height to ensure final design compliance.
- The inclusion of closely spaced unloaded 102mm or 89mm “easer holes” on the outer perimeter of each bench will be used wherever appropriate to vent gases and mitigate the potential for flyrock emanating from the existing batters. This will also have a positive effect on ground vibration.

In line with industry best practices, the following general blast parameters will be considered as a preliminary guide:

- Blasthole diameters in the range 76mm to 89mm
- Blasthole depths to be a minimum of 2.8m for 76mm blastholes and 3m for 89mm blast holes to allow sufficient stemming material to contain the resultant explosive gases.
- Powder factor should be in the range of 0.2kg/m^3 to 0.4kg/m^3 for effective environmentally sensitive blasting.
- Consider the use of decking
- Drilling areas shall be prepared so that drills have a reasonable, level surface to drill
- Accurate mark out and drilling of blast holes by survey where required
- Drill logs will record blasthole depths and any abnormal geology encountered or voids identified during drilling. Ensure charge length and stemming length is consistent with blast design.
- The shotfirer shall inspect each blast at the drilling, loading, stemming and tie in stage for quality assurance
- All blastholes are charged to design and are not overcharged.
- Remove any excess explosives from overcharged blastholes.
- All production blast holes are to be stemmed with 7mm-10mm crushed rock aggregate placed carefully in the hole to prevent bridging of the aggregate and accurate measurements of product column rise and stem height as directed by the shotfirer.
- Stemming operations to be conducted carefully with a stemming pole to ensure no bridges or blockages result in insufficient stemming.
- Blastholes not used (due to blocked, etc) on the blast area must be backfilled with appropriate stemming material.
- Incorporate approved, industry best practice explosive products to ensure reliable initiation and performance.
- Blast design to ensure powder factor is not excessive when compared to the drill rate penetration for each blast
- The shotfirer and assistant will walk the shot from opposing ends to ensure no holes have been missed and the tie in is correct and compliant.

Secondary Control — Blasting Mats, In-situ Material & Imported Cover

The shotfirer in consultation with the Bardavcol Project Manager(Earthworks) and/or Blasting Consultant will carry out an assessment of secondary control requirements for each blast to determine whether secondary controls such as blasting mats will be required. If the assessment determines that secondary control is required, this will be incorporated into the proposed blast design notwithstanding the extensive logistics and expense that will be incurred.

Secondary controls to be agreed and approved by Bardavcol as an integral part of the blast design submission and approval process.

17. FUME MANAGEMENT

Fume generation can widely be attributed to 6 circumstances that, either singularly or combined, can be managed to minimise or mitigate the production of NOx:

- Explosive formulation and quality assurance.
- Geological conditions.
- Blast Design.
- Explosive product selection.
- On-Bench Practices.
- Contamination of explosive in the blast hole.

While other factors such as meteorological conditions, storage of bulk products, Sleep Time, Training and Reporting are contributing factors, the six listed above are considered to be the 'primary causes' in accordance with the AEISG Code of Practice.

To assist with the management and control of the potential blast fume risk at the KCD project a fume management and mitigation process has been included in the JD&B Blasting Operations SWMS outlining typical causes, hazards and controls associated with blast fume.

Please refer Appendix B Blasting Operations SWMS attached

It is unlikely that exposure to blast fume in a well-ventilated environment will cause impacts to human health, however NOx gases are still considered a potential threat and will be managed accordingly. Generally NOx plumes generated during blasting will dissipate to background levels in a relatively short time. Dissipation is highly dependent on local atmospheric conditions.

Due to the nature of the KCD project, the relatively small blasts and relatively small column rise and low MIC coupled with small diameter blastholes and Orica quality assurance standards and documentation it is not anticipated that blast fume will pose a significant risk.

17.1. FUME EXPOSURE PREVENTION

In cases where a NOx plume does not dissipate quickly and has the potential to result in human exposure, the following actions will be taken:

- Following initiation blast guards and traffic controllers will remalin in position until the Blast Controller stands down each blast guard individually via UHF after the shotfirer has given the "ALL CLEAR"
- No personnel will be permitted to enter the blast exclusion zone or potential plume
- If in a vehicle, personnel will stay inside and use recirculated air conditioning if possible.

17.2. FOLLOWING EXPOSURE

If a person has been exposed to NOx gases, the Project Manager (Earthworks) must be notified immediately and medical attention is to be provided as soon as it is safe to do so (i.e. once the fume cloud has cleared). The possibility of delayed and life-threatening pulmonary oedema dictates that:

- Any person exposed to a visible plume of NOx, and/or any person experiencing sudden acute effects of coughing, shortness of breath or irritation of the mucous membranes of the eyes, nose or throat following post-blast NOx events will be examined by a medical practitioner without delay, even if no NOx smell was noticed or symptoms are mild.
- The treating medical practitioner will be informed of the potential NOx exposure and provided with the “Advice to Medical Staff” as per AEISIG Prevention and Management of Blast Generated NOx Gases in Surface Blasting Code of Good Practice

17.3. NOTIFICATION OF FUME EVENT

The shotfirer will provide verbal and written notification attached to the Post Blast Report delivered to the Project Manager (Earthworks) of any blast fume incident that rates over 3 as per Appendix 2 AEISIG Prevention and Management of Blast Generated NOx Gases at its highest extent and the plume leaves the KCD project site.

The written notification report will detail:

- Date and time of blast
- Explosives type, quantity, mixing method, depth, initiation type
- Ground geology (soft, faults, wet)
- Presence of noticeable post-blast NOx gases
- Post-blast NOx gas rating, eg 0 - 5 (refer Appendix 2 AEISIG Prevention and Management of Blast Generated NOx Gases)
- Extent of post-blast NOx gas event, eg A,B or C (refer Appendix 2 AEISIG Prevention and Management of Blast Generated NOx Gases)
- Duration of any post-blast NOx gas event (measure of time to disperse);
- Direction of movement of any post-blast NOx plume;
- Movement of any post-blast NOx gas plume relative to the established exclusion zone
- Climate conditions, including temperature, wind speed and direction, cloud cover, rain;
- Details of any person exposed to a NOx gas event and received medical attention

17.4. POST FUME INVESTIGATION

Should a significant blast fume be generated from a blast an incident investigation to identify which of the fundamental causes was the significant contributor to the generation of NOx. Once the likely causes have been identified appropriate action plans will then be put in place to mitigate and reduce the generation of fume from future blasts under similar circumstances.

The investigation will also educate relevant personnel to ensure appropriate steps are taken in the design, loading and firing of the blast to minimise the likelihood of generating fume from the blast.

18. APPENDICES

APPENDIX A
JD&B DRILLING SWMS & SDS SHEETS

APPENDIX B
JD&B BLASTING SWMS & SDS SHEETS

APPENDIX C
JD&B KCD RISK ASSESSMENT

APPENDIX D
ORICA CAPABILITY PRESENTATION

APPENDIX E
JD&B STANDARD OPERATING SAFE DRILLING
PROCEDURES & WORK METHOD STATEMENTS

APPENDIX F
JD&B STANDARD OPERATING SAFE BLASTING
PROCEDURES & WORK METHOD STATEMENTS

APPENDIX G
JD&B WHS POLICY

APPENDIX H
ORICA LICENSING TRANSPORT AND PERSONNEL

APPENDIX I
ORICA VEHICLE EMERGENCY PROCEDURE GUIDE AND
TRANSPORTING EXPLOSIVES TO AND FROM MAGAZINES SSOP

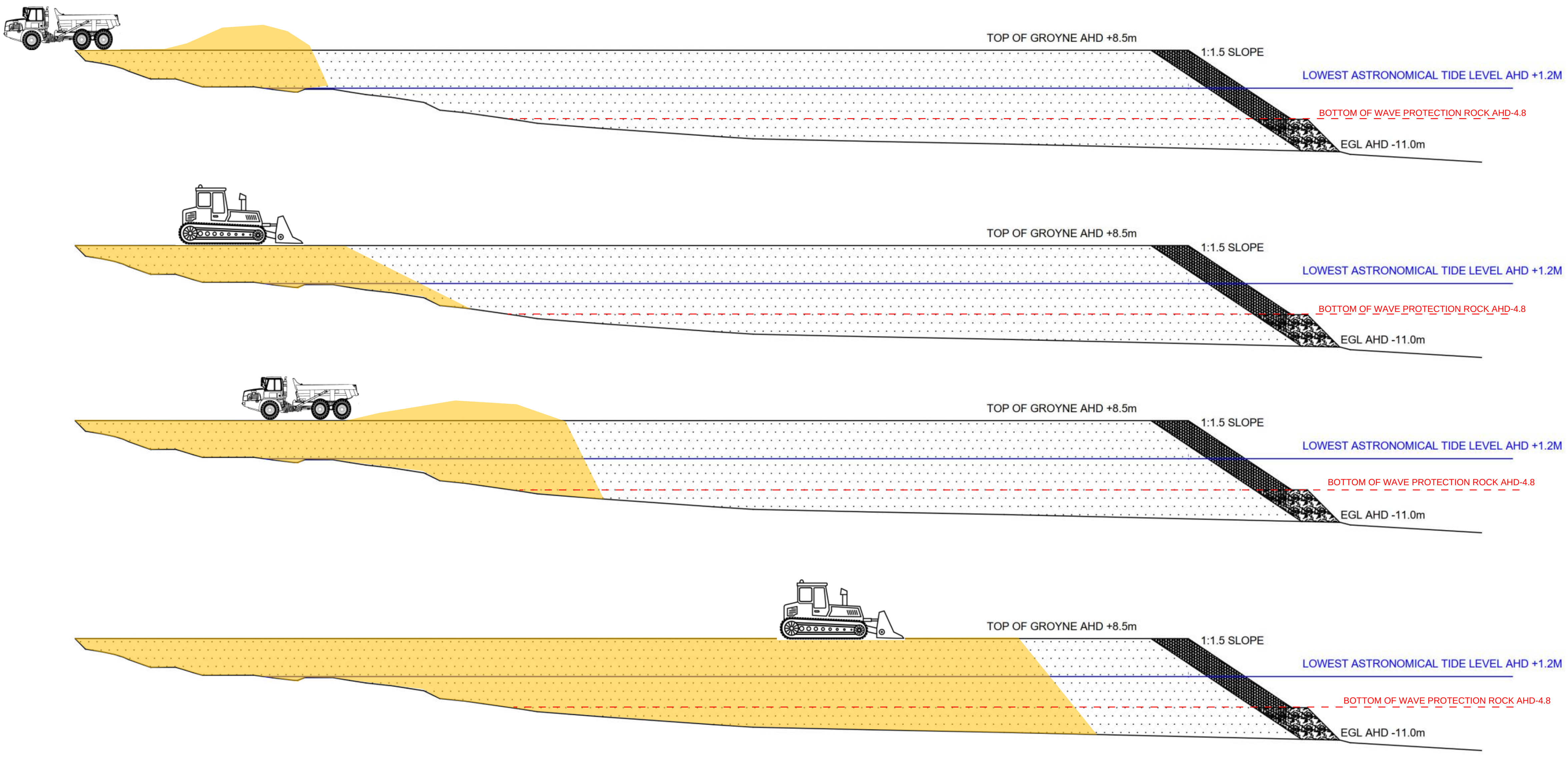
APPENDIX B –Methodology

B1 Groyne Construction

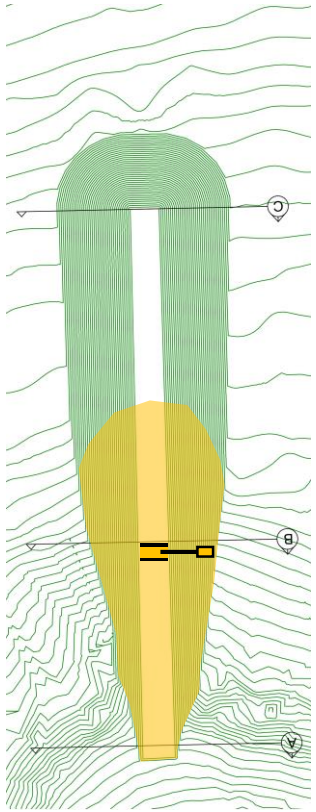
B2 Rock Processing

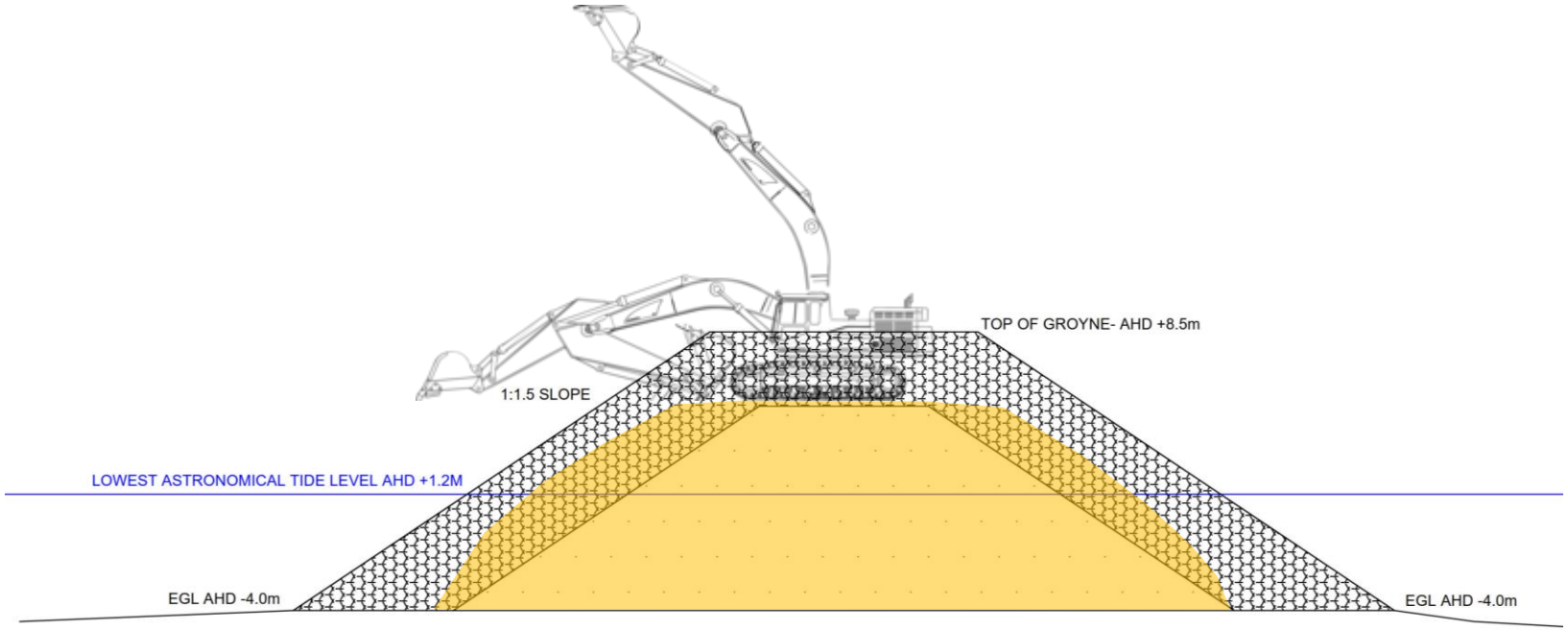
DRAFT

A combination of trucks and a dozer to create a platform out into the water over footprint of groyne

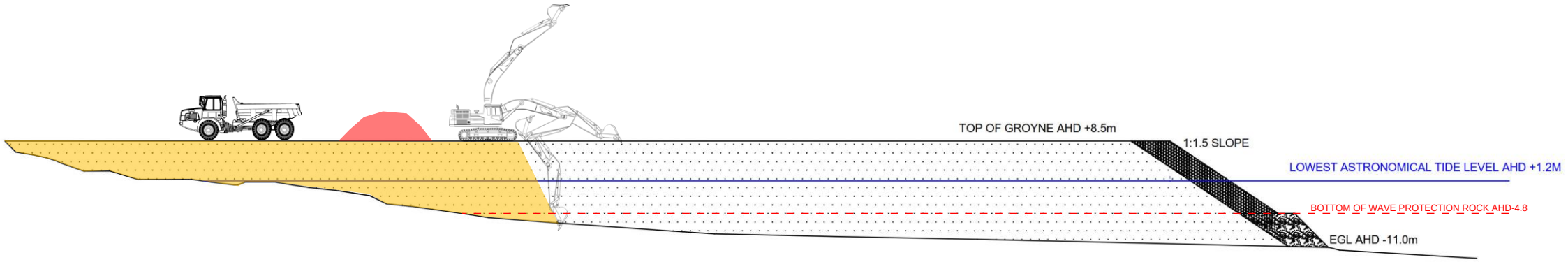


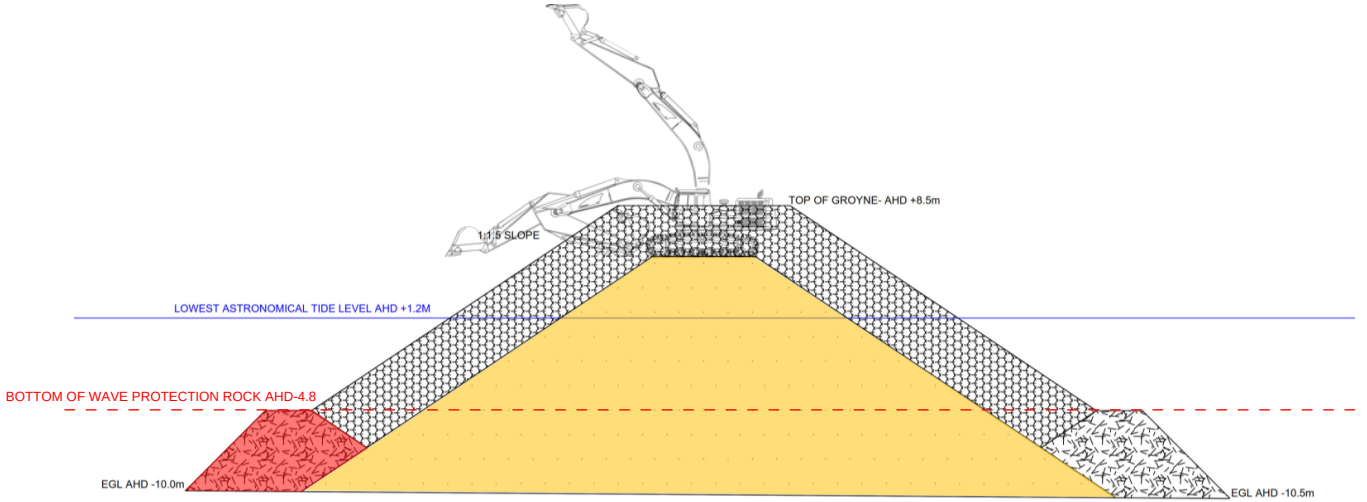
A long reach excavator is to trim the batters from the platform created by the trucks and dozer



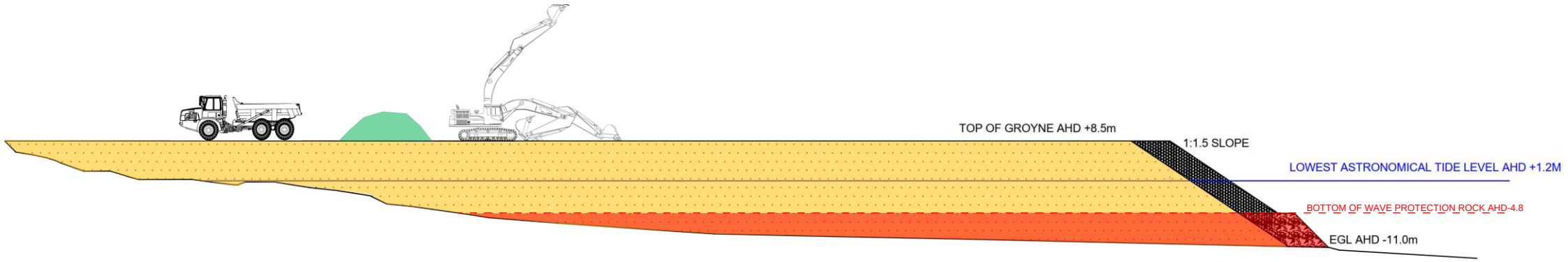


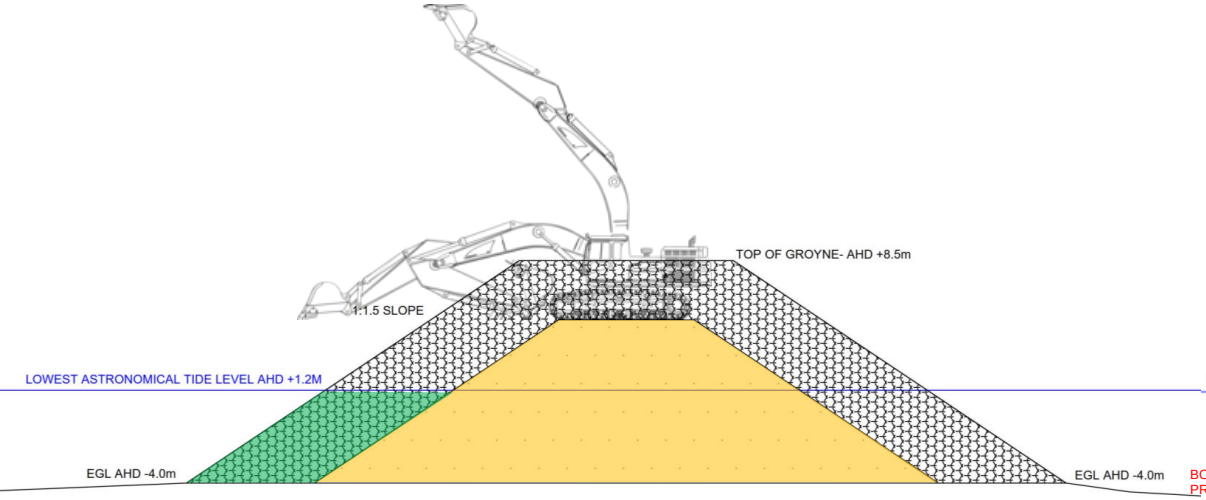
A truck is to end tip the 1-2 tonne armour rock onto the trimmed core and an excavator is to place the rock on/roll the rock down the Groyne batters to create a bench for the 8 tonne rock to sit on

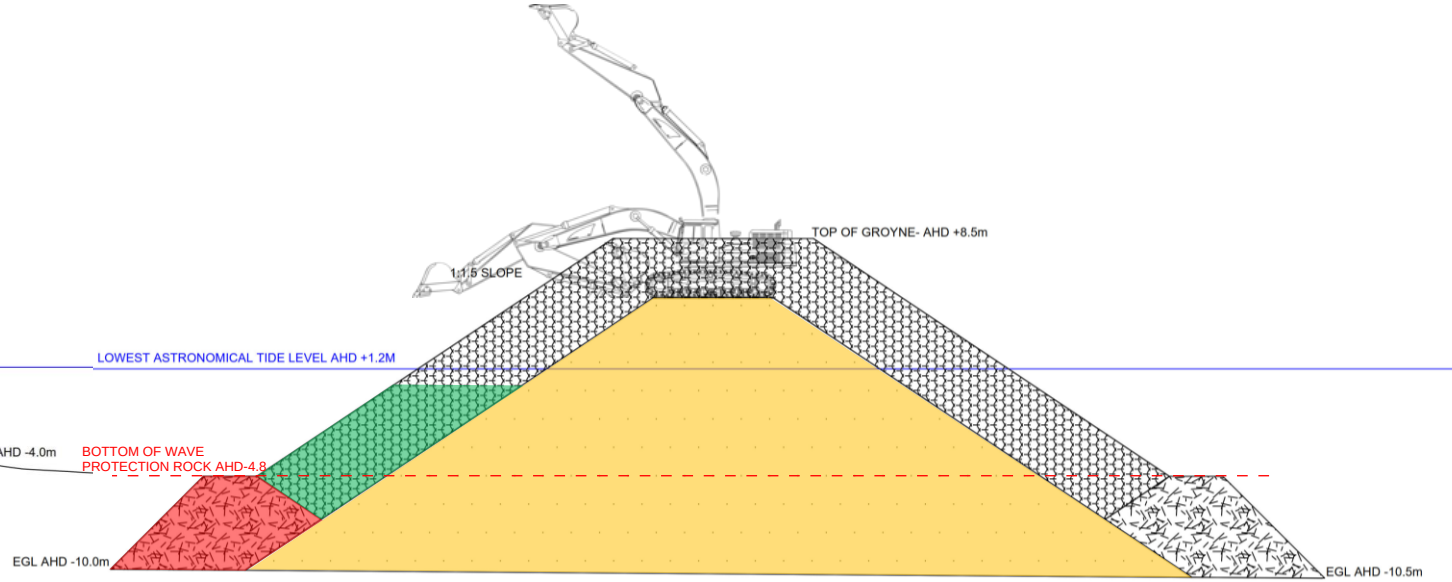


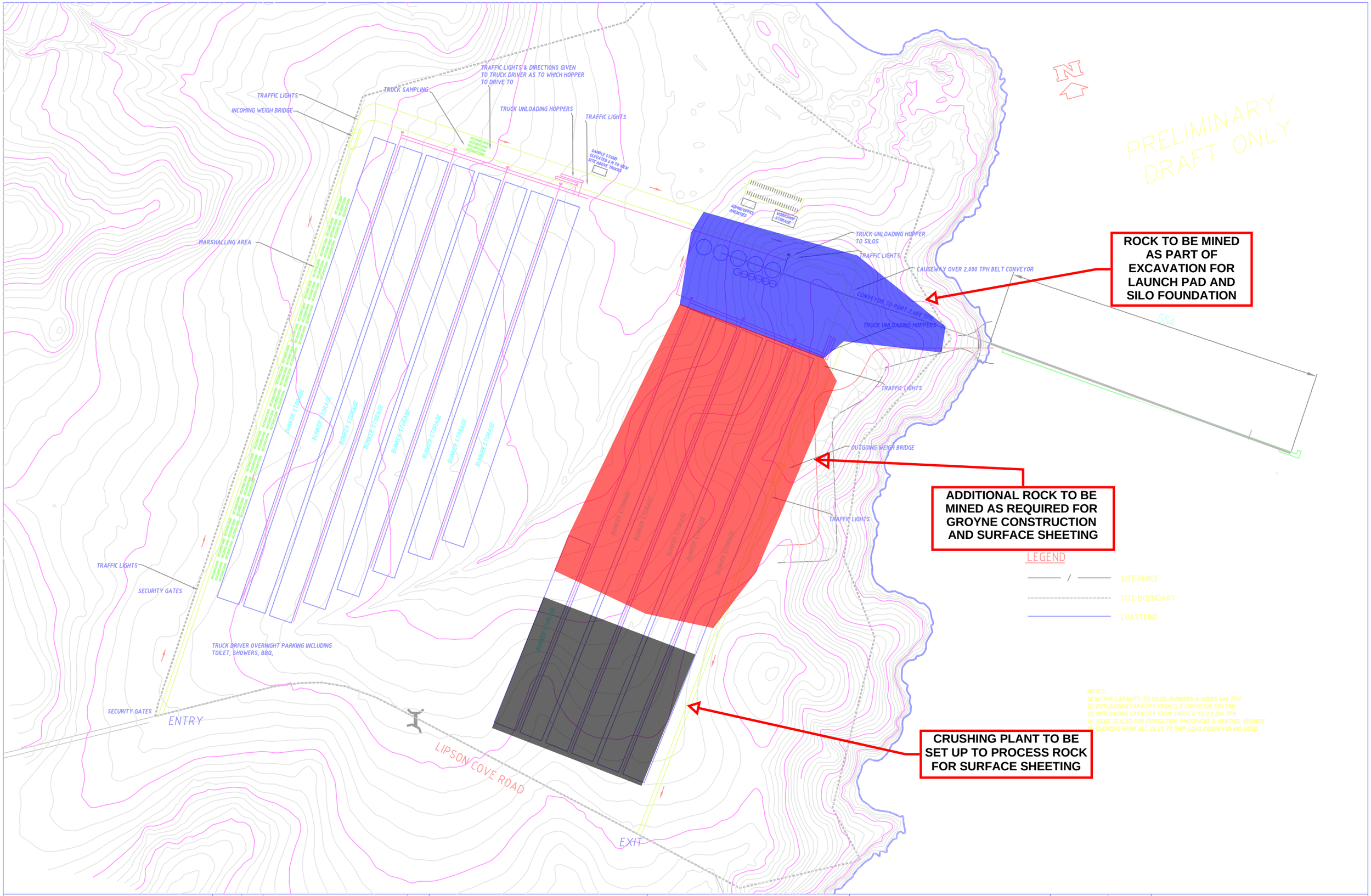


A truck is to end tip the 8 tonne armour rock onto the trimmed core and an excavator is to place the rock on the Groyne batters









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8-01-18	A	ISSUED FOR COMMENT	KJ
15-01-18	B	REVISED TO SUIT NEW JETTY ANGLE	KJ
12-02-18	C	BUNKERS RECONFIGURED.	KJ
27-02-18	D	GRAIN SHEDS RELOCATED	KJ
23/03/18	E	NOTATIONS ALTERED	KJ
16-8-19	F	SITE RECONFIGURED	J.W

SURFACE TREATMENT

GENERAL NOTES UON

ALLIED GRAIN SYSTEMS
ACN 109 894 260
Ph: 02 6382 7474 Fax: 02 6382 5149
Email: john@alliedgrainsystems.com.au
41 Rockdale Rd, YOUNG, NSW, 2594

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DRN: J.W DATE: 16-8-19
CHK: DATE:
REFERENCE DRAWINGS
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CLIENT FREE ARYE
PROJECT SHEEP HILL CONCEPT WHARF
TITLE PRELIMINARY GRAIN STORAGE SITE PLAN
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APPENDIX C – Policies

Work Health & Safety Policy

Quality Policy

Environmental Policy

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BARDAVCOL

WORK HEALTH & SAFETY POLICY STATEMENT

It is the policy of Bardavcol Pty Ltd to ensure, so far as is reasonably practicable, that all employees, subcontractors, suppliers, visitors, clients and their agents, and the general public are, whilst at or adjacent a Bardavcol worksite, safe from injury and risks to health.

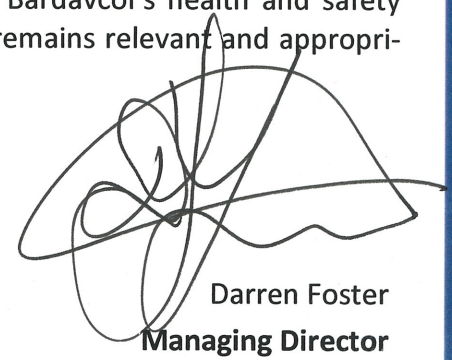
Further, Bardavcol will provide and maintain, so far as is reasonably practicable, a safe working environment and safe systems of work, in compliance with all relevant Acts, Regulations, Standards, Codes of Practice and customer requirements pertaining to Work, Health and Safety.

To achieve these objectives, Bardavcol will establish, implement and maintain appropriate policies, plans, procedures and measurable targets for the elimination of work-related injury and illness. Bardavcol will ensure plant, substances and structures are provided in a safe condition, and will provide appropriate information, instruction, training, supervision, management and facilities as are reasonably necessary. Bardavcol will integrate health and safety measures with all elements of its work, and will monitor working conditions at each workplace under its management and control to ensure compliance with the standards adopted. Bardavcol will consult with workers, health and safety representatives, health and safety committees on relevant issues, and will consult, cooperate with and co-ordinate activities with other persons who have a duty in relation to the same work health and safety matter.

Bardavcol requires that all employees, subcontractors, suppliers, visitors, clients and their agents comply with established policies, plans and procedures and take all reasonable steps to protect their own health and safety and to avoid adversely affecting the health and safety of any other person whilst at work. In particular, it is the duty of all personnel to use equipment provided for health and safety purposes, to identify and report any observed workplace hazards, and to obey all reasonable instructions in respect of health and safety.

Bardavcol is committed to a process of continuous improvement. Accordingly, Bardavcol will monitor, measure, evaluate and report its performance in the achievement of the stated objectives and targets.

This policy statement shall be displayed prominently at every Bardavcol worksite, and will be reviewed annually in consultation with Bardavcol's health and safety committee and Bardavcol's employees to ensure it remains relevant and appropriate to Bardavcol's activities.



Darren Foster
Managing Director

QUALITY POLICY STATEMENT

Bardavcol Pty Ltd is an independent company based in South Australia, undertaking Civil Engineering construction work for a wide range of South Australian and Federal Government bodies, statutory authorities, local government and private developers.

The company recognises that its customers are entitled to expect that all materials and services will conform to their specified requirements and undertakes to manage and conduct its business in a manner that will meet this expectation.

This will be achieved through planning, implementation, monitoring, control and verification of all aspects of the work as defined in this manual and in the applicable contract.

To achieve this objective it is the policy of Bardavcol Pty Ltd to establish and maintain an effective and efficient quality management system which:

- Will produce objective evidence that the customer's specified requirements are met;
- Will ensure that all subcontractors, suppliers and employees of Bardavcol Pty Ltd whose performance may affect quality will be involved and will comply with this policy and all the requirements that are derived from this policy.
- Will ensure a commitment to continually improving the effectiveness of it's Quality Management System by seeking customer feedback, and by evaluating it's own performance against established corporate objectives and key performance indicators at all levels of the business.

The quality management system which Bardavcol Pty Ltd use is designed in accordance with the requirements of International Standard 9001:2008 - "Quality Management Systems".

The company's Systems Procedure Manual, which describes the quality management systems, is conveyed to all staff and is available to Clients on request

Darren Foster
Managing Director

BARDAVCOL

ENVIRONMENTAL POLICY STATEMENT

It is the firm policy of Bardavcol Pty Ltd to proactively support the protection of the natural environment for the benefit of current and future generations.

Accordingly, Bardavcol will ensure, so far as is reasonably practicable, that the environmental impacts of all its activities, products and services are controlled to prevent pollution and to comply with all relevant Acts, Regulations, Standards, Codes of Practice and customer requirements pertaining to environmental management and protection.

To achieve these objectives, Bardavcol will establish, implement and maintain appropriate policies, targets, plans, procedures and systems of work relating to environmental management. Bardavcol will integrate environmental management measures with all elements of its work, and will monitor environmental conditions at each workplace under its management and control to ensure compliance with the standards adopted.

Bardavcol will further provide appropriate information, instruction, training, and supervision as reasonably necessary to achieve these objectives.

Bardavcol requires that all persons who work for or on behalf of the company, including all employees, subcontractors and suppliers, and those persons who visit Bardavcol workplaces, comply with established policies, plans and procedures and take all reasonable steps to protect the natural environment, prevent pollution and minimise adverse environmental impacts whilst at work.

Bardavcol is committed to a process of continuous improvement. Accordingly, Bardavcol will monitor, measure, evaluate and report its performance in the achievement of the stated environmental objectives and targets, and amend its practices as necessary. Bardavcol will review this policy and objectives annually to ensure continuing relevance and effectiveness.

This policy statement shall be communicated to all persons working for Bardavcol and shall be displayed prominently at every Bardavcol worksite.

Darren Foster
Managing Director

APPENDIX D – Roles and Responsibilities

Project Organisation Chart [TBC]

Project Roles and Responsibilities

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Project Manager

- Responsible and accountable for the overall project performance
- Development, implementation and ongoing review and maintenance of the Project Management Plan (PMP), Risk Register and related project plans
- Commit to and lead a positive safety culture and challenges all 'at-risk behaviour'
- Implement and manage Bardavcol's commercial processes and contractual requirements
- Ensure that project quality and commercial controls are established and maintained
- Monitor project performance against Bardavcol and project specific objectives and targets
- Prepare and submit project reports, as per the PMP, contract and Bardavcol's IMS
- Correct all unsafe acts and conditions and ensures issues are actioned within agreed timeframes
- Commit to and participate in safety conversations with personnel at all levels
- Actively encourages safe behaviour through immediate feedback to personnel involved
- Ensure all incidents and near misses are reported, investigated, corrective actions implemented and lessons learned shared
- Ensure all staff are competent to perform their required duties
- Ensure all work associated with the project is performed in a safe manner and complies with relevant legislation and IMS, project and contractual requirements
- Active involvement in rehabilitation and return to work processes
- Participate in project audits and inspections, as per the PMP
- Ensure there is sufficient and appropriate emergency response equipment on site and emergency response drills are performed as per the PMP
- Ensure communication and consultation occurs with all workers on key project items, including changes to hazards, risks, controls, site rules and other requirements
- Monitor the performance of the project team members to ensure behaviours reflect the expected culture and work is performed to the required standard

Supervisors and Engineers

- Promote a positive safety culture and provide leadership to other workers on site
- Conduct activities, as per the Project Management Plan, Project Risk Register, SWMS and other project plans
- Challenge 'at-risk behaviour' and actively encourage safe behaviour
- Ensure that all tasks are correctly risk assessed and that appropriate controls are implemented and that this process is documented (eg. SWMS, Job Task Cards, Permits)
- Prepare, facilitate, review and implement SWMS, Job Task Cards and other risk assessments, as required
- Perform project inspections and observations, as per the PMP and ensure that positive observations are communicated to workers and action items are closed out as soon as reasonably practicable
- Review project activities, evaluate the effectiveness of quality, safety and environmental controls
- Constructively participate in internal and external audits, as required
- Regularly inspect plant and equipment to ensure that they are in suitable condition and that the required documentation and inspections are in place
- Ensure the correct use and maintenance of Personnel Protective Equipment (PPE) requirements
- Contribute to and/or lead daily Pre-Start meetings and Tool Box Talks
- Ensure workers are inducted and have the required qualifications, training and competencies to perform their required duties
- Contribute to and support rehabilitation and return to work processes, as required
- Ensure that all work under their control is performed safely and in accordance with the project quality, safety and environmental requirements and complies with the relevant legislation, IMS and contractual requirements
- Maintain work areas under their control in a clean and tidy condition at all times
- Regularly communicate and consult with workers under their control on quality, safety and environmental issues and requirements
- Ensure that risk assessments (eg. SWMS, Job Task Cards) and work methods are reviewed and updated, as per the PMP or following a change in scope, method, hazards, risks or controls
- Initiate the reporting and investigation of all incidents and near misses associated with activities under their control and implement corrective actions
- Maintain positive interaction with other project team members, subcontractors, workers and other project stakeholders

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- Proactively manage interfaces with other work groups/subcontractors to coordinate activities and ensure that safety, quality and environmental performance is not compromised
- Receive feedback constructively and either correct or escalate items raised and provide immediate feedback where possible and appropriate
- Correct all unsafe acts and conditions and ensures issues are actioned within agreed timeframes
- Engage in safety conversations with site personnel at all levels
- Contribute to the identification of training needs and make personnel available for scheduled training

Quality, Safety and Environmental Management Representative (QSEMR)

- Develop and maintain a quality management system for the project
- Assist other project personnel with completion of quality documentation
- Collate and package quality documentation into lot packages
- Prepare lot packages for submission to the Client
- Assist in the development and implementation of quality, safety and environmental plans
- Conduct activities as per the Project Management Plan, Project Risk Register, SWMS and other project plans
- Review and update the relevant parts of PMP and Project Risk Register
- Conduct and report inspections, as per the PMP
- Conduct internal audits, as required
- Assist external audits, as required
- Assist the HSE Manager with the continuous improvement of the IMS, as required

Project Safety Advisor

- Promote a positive safety culture and provide leadership to other workers on site
- Communicate and consult with the Project Team members, subcontractors, workers and other stakeholders with regard to project safety hazards, risks and controls
- Coach and mentor workers on safety expectations and performance
- Challenge “at risk” behaviour and encourage safe behaviour
- Initiate safety conversations regularly at all levels
- Liaise with external WHS agencies (as required)
- Collate and prepare project safety records and reports, including SWMS reviews, SWMS/Hazardous Chemical/Plant and other registers, inspections/observations, incident reports, communication and consultation records, risk reviews, permits
- Ensure incidents are reported to the HSE Manager and notifiable incidents to SafeWork SA and the OTR (as required)
- Review relevant drawings, specifications, programmes and schedules
- Review and update the relevant parts of PMP and Project Risk Register
- Identify and request WHS resources to achieve objectives
- Assist with work method planning, including design reviews and with a specific focus on high risk work
- Prepare subcontractor safety packs (or equivalent) and communicate and consult with subcontractors on safety expectations prior to their commencement
- Assist the HSE Manager with the continuous improvement of the IMS, as required
- Stop any unsafe works
- Convene and record toolbox meetings
- Provide input to and be involved with daily prestart briefings
- Assist with the preparation, review and implementation of SWMS, Job Task Cards and other risk assessments
- Conduct and assist incident investigations
- Develop and assist with the implementation of corrective actions from observations, inspections, audits and incident investigations (as appropriate)
- Provide specialist safety advice and assistance to workers (including Bardavcol and subcontractors)
- Assist with the preparation and delivery of inductions and ensure records of induction and training/competency are maintained and stored securely
- Assist in the review of required competencies and training gap analysis and recommend and assist in procuring and delivering project specific training
- Assist in development, implementation and evaluation of emergency response plans, procedures and drills
- Review emergency equipment requirements and provide recommendations to the Project Manager

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- Provide first aid, as required and assist with Bardavcol's return to work processes as required
- Assist with the monitoring of fitness for work requirements, including any alcohol and other drugs testing
- Monitor all project activities to identify and report uncontrolled risks, non-conformances, and improvement opportunities
- Monitor and report on project safety performance, as per the PMP
- Conduct and report inspections, as per the PMP
- Conduct internal audits, as required
- Assist external audits, as required

All Project Personnel

- Ensure that they are inducted and have read and understood the project requirements relevant to their role and responsibilities (eg. SWMS, emergency requirements)
- Understand and actively participate in a positive safety culture and co-operate with project safety, quality and environmental requirements
- Engage in safety conversations with site personnel at all levels
- Has authority to stop unsafe acts
- Positively participates in Pre-Start Briefings, Toolbox Talks and other communication and consultation forums
- Participate in risk assessments and development of SWMS, Job Task Cards, ITPs and other quality control processes applicable to their role and scope of work
- Work in a safe manner at all times and have regard to their own and the safety of others
- Be aware of other activities that they may affect or be affected by and proactively manage interfaces with other workers/activities
- Inspect plant and equipment before, during and after use, document the inspections (where required), tag out and report any damaged or faulty plant and equipment
- Ensure that plant and equipment is calibrated, maintained and serviced, as per the manufacturer's requirements
- Comply with the relevant project documentation, procedures, legislation, site policies and rules
- Keep their work area clean and tidy at all times
- Attend work fit for duty and not affected by alcohol or other drugs
- Identify opportunities and initiative to improve the project safety, quality and environmental performance
- Identify, control and make safe hazards where possible
- Correct all unsafe acts and conditions and ensures issues are actioned within agreed timeframes (applicable to their role and authority level)
- Report incidents, hazards or unsafe acts immediately

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APPENDIX E – Site Layout Plan

Contractor's Activity Zone [TBC]

Site Layout Plan [TBC]

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APPENDIX F – Risk Register

[TBC]

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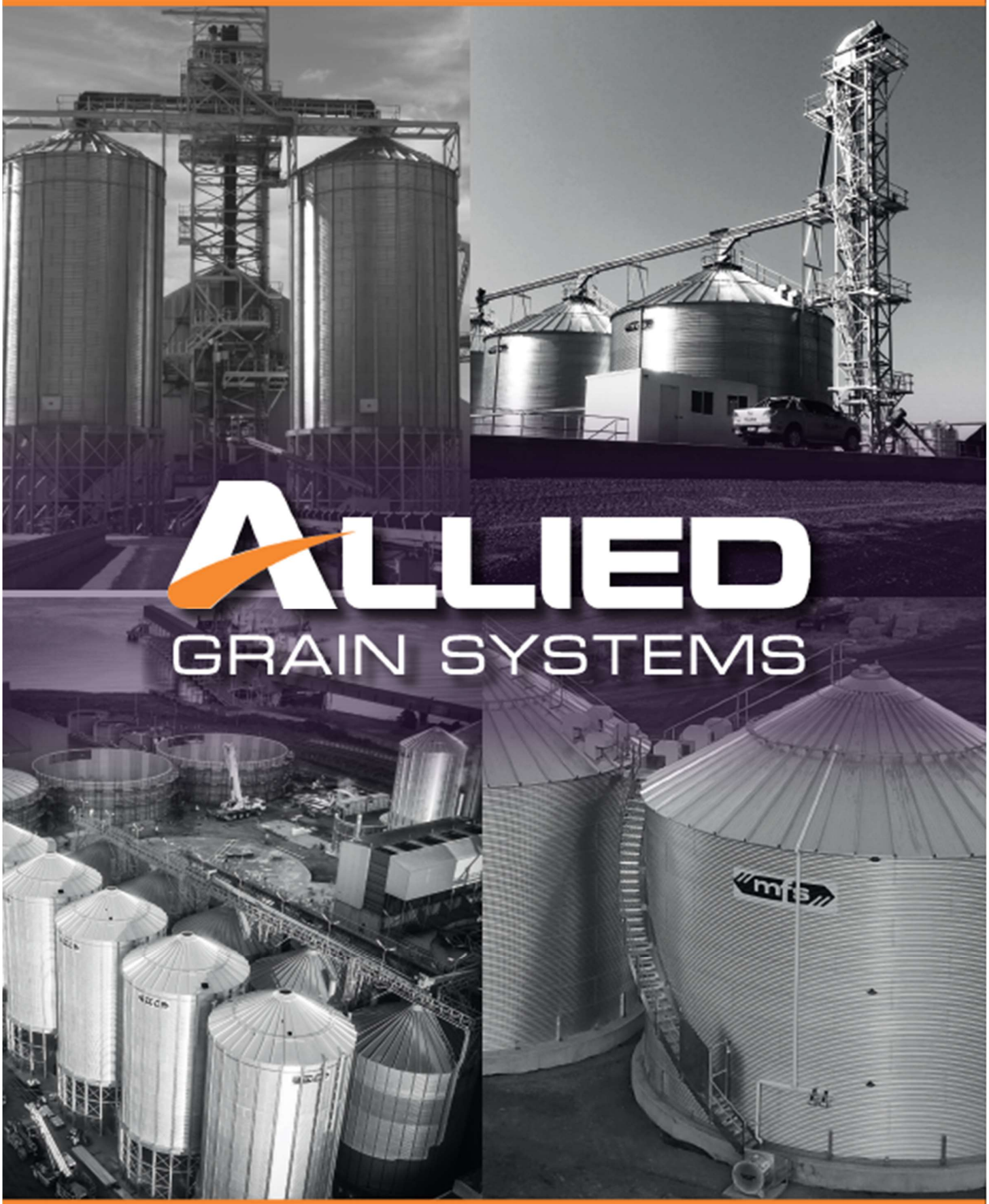
Construction Environmental Management Plan



Port Spencer

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Quality Information

Document Construction Environment Management Plan

Date 16/9/19

Prepared by Luke White

Reviewed by

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	16/9/19	Preliminary – For Review	Luke White/ Project Engineer	

Document Control

Document Construction Environment Management Plan

The following table is to be updated with details of each revision of this document. Revised copies of this document to be provided to all relevant stakeholders and approval agencies.

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	16/9/19	Preliminary – For Review	Luke White/ Project Engineer	

Table of Contents

1 INTRODUCTION

The project is to build a new port facility at Sheep Hill, South Australia (Port Spencer) which is located approximately 70 kms north east of Port Lincoln in the heart of Eyre Peninsula's grain production region, with a natural catchment of approximately 1.6 million tonnes located economically closer to or equidistant to any other port. The Port will comprise a deep-sea port and, initially, up to 1 million tonnes of grain storage for a projected cost of $160 million to $200 million.

2 PROJECT INFORMATION

2. 1 Project Location

Sheep Hill, South Australia (Port Spencer) is located approximately 70 kms north east of Port Lincoln. Its location is outlined in Figures 1, 2 & 3 below:

Figure 1 – Location, Port Spencer

Figure 2 – Location, Port Spencer

Figure 3 – Location, Port Spencer

2. 2 Project Setting

The port site is located within a predominantly rural area. Lipson Island Conservation Park is located approximately 1.5 km to the south of the site and a Crown Land coastal corridor, approximately 50 m wide, extends along the eastern boundary of the port site. The port site is approximately trapezoidal in shape and is currently agricultural land. A fenceline runs approximately north-south through the site, designating the boundary of Allotments 386 and 388. The northern coastal portion of Allotment 388 consists of a small bay with sandy beach. The potential road and rail transport access corridor generally follows the existing alignment of Swaffers Road from the intersection with the Lincoln Highway and passes through agricultural land to the south of the road reserve.

2.2.1 Geology

The proposed port site and transport corridor is underlain by Archean age “Undifferentiated metasediments, coarse grained augen gneisses, granitoid gneisses, amphibolites, mica schists, sericite schists. Doleritic dykes abundant along eastern coast.” The site is located in the Kalinjala Shear Zone. This is a large-scale crustal structure on the Eyre Peninsula which separates the Donington Suite granites to the east from metasedimentary schist, quartzite, dolomite marble and banded iron formations of the Hutchison Group to the west. The rocks beneath the site and exposed at the nearby beach are granite, granitic gneiss (deformed and metamorphosed granite), and schist (extremely deformed sheared granite). The granites and gneiss are likely to belong to the Donington Suite. These were intruded in a long belt along the east coast of the Eyre Peninsula, under the southern Spencer Gulf and outcrop also at the foot of the Yorke Peninsula. The schists may represent a subsidiary shear zone, possibly splintering off the main shear zone.

2.2.2 Topography

The site is flanked to the north, west and south by rounded hills approximately 50 m in elevation. The coastline to the north of the port site consists of a small bay with a sandy beach. The aerial photograph of the site shows an intertidal zone to the west of the small bay in the northern part of the site. The western portion of the site slopes down gently towards an unsealed access track extending approximately north-south along the eastern allotment boundary. The headland on which the proposed port will be constructed rises from the track to approximately 25 m elevation. The headland is characterised by rocky outcrops. To the east

it slopes steeply to a rocky shoreline. The aerial photograph also shows a surface water drainage path extending from the south west of the site and curving towards the centre of the site where it becomes less well defined.

2. 3 Overview of Project

In 2011, Centrex Metals Limited ACN 096 298 752 (Centrex) proposed the Port Spencer site as a deep-sea port to facilitate iron ore exports from its proposed Eyre Iron Joint Venture project. Centrex proposed a development of up to $325 million with a capacity of 20 million tonnes per annum.

The proposed Port is a naturally deep-water port with areas of 20 metres depth within 500 metres of the shoreline. Consultants have confirmed that dredging is not required. This depth can facilitate Panamax- and Post-Panamax sized vessels (Cape-size vessels may be accommodated for in the future but is not currently within the project).

FEL partnered with Centrex at the time to include grain exports from the Port.

In 2011, the Centrex-proposed port received South Australian Government development approvals, subject to conditions, including that work was to start on the proposed port development by October 2016. However, no work commenced on it as the Eyre Iron Joint Venture project was abandoned following the decline in global iron ore prices.

As the Eyre Iron Joint Venture project was gazetted as a major project on 6 January 2011, variations to the gazetted approval are now required. Such variations will relate to changing the proposed Port from an iron ore and grain facility to a pure grain facility. Work is underway on these variations.

Since this time, new and innovative modular design and construction practices have created the potential to significantly reduce the jetty and wharf construction costs to a level that enables Port Spencer to be economically viable even if wheat is the only commodity put through it.

On 3 June 2019 the land was purchased for the proposed Port Spencer site, including 140 hectares of land suitable for commodity storage and handling with previous port approvals transferring with the land.

Preliminary scoping and design of the jetty and wharf has been and continues to be undertaken by Jacobs engineering consultants. A modular wharf system with a 650-metre-long jetty is proposed, with a travelling ship-loader, capable of loading 295-metre-long Panamax-sized vessels requiring 12 metres of draft. The minimum berth depth would be 14.5 metres and range to 20 metres at the end of the jetty. The Port will be a conventional deep-water port with industry-accepted technology and methods to load Panamax and Post-Panamax sized vessels. Larger vessels such as Cape-size ships may be accommodated for in the future but is not currently within the project scope.

Relatively new and innovative practices will be used in the construction of the jetty and wharf. It will be built in kit-form modules in China, then transported and assembled, at the proposed Port site. The final method of construction will be dependent upon consulting engineers' final assessment (time, scheduling, cost, safety etc.). The modular method of construction may reduce certain construction costs materially compared with traditional methods as are used in the mining and resource industries.

The jetty will be positioned in a south-east direction to allow for tidal movements and swell impacts on berthing and mooring. It will consist of a truss jetty spanning between the shore and multiple modular jetty jackets spanning between a series of "dolphins" (i.e. man-made marine structures that extend above the water level which are not connected to shore).

The travelling ship-loader will be rated at a minimum 2,000 tonnes per hour and be capable of loading a Panamax vessel within two days. This is consistent with industry standards and competitive with Port Lincoln and other Australian deep-water ports.

Tug and pilot operations will be sourced from the nearby ports of Port Lincoln and Whyalla. These services will be negotiated with the relevant companies when appropriate.

It is estimated that construction and commissioning of the jetty and wharf should take approximately 17 months, being 14 to 15 months for design, procurement and construction (including manufacturing of modules in China, transport and onsite construction) and a further 1 to 2 months for commissioning.

The wharf will be serviced by 50,000 tonnes of new build silo storage capacity. This storage will be capable of being fumigated and will facilitate vessel loading via an integrated conveyor system. It will be filled via a conveyor loading system from the port bunkers, and by truck directly from farms and external storage sites.

The Port site will initially have 860,000 tonnes of effective bunker storage capacity in addition to the 50,000 tonnes of silos, and related intake and out-loading equipment. After allowing for segregations, the practical capacity of these bunkers will be 730,000 tonnes. They will use approximately 40ha of land.

These estimates are subject to engineering design and costings currently being undertaken and led by Jacobs Engineering Group. The designs will be based on Western Australian operations for like facilities, which are generally more efficient than existing and ageing South Australian grain facilities.

Design and construction are based on a core function requirement that all trucks entering the site are unloaded within 1 hour, and that, once sampling is complete, the trucks are off site within 30 minutes after unloading. Fast, empty hoppers will be used for the major wheat classification grades.

2. 4 Overview of AGS Works

AGS is being contracted to construct:

- Silo System (Figure 4 & 5):
  - 5 large 12,000T grain silos
  - 800TPH In-load system for silos
  - 800TPH Dual drive over hopper into in-load system
  - 2000TPH Out-load system to ship loader including screening equipment and bulkweigher
  - All towers walkways and trestles
  - Stage 2: 6 x 1500T cone bottom silos
- 600 TPH bunker conveyor system (Figure 6):
  - 4 x 2 x Truck unloading hoppers
  - 4 x Bunker loading and unloading conveyors
  - Conveyor in between bunkers and silo system

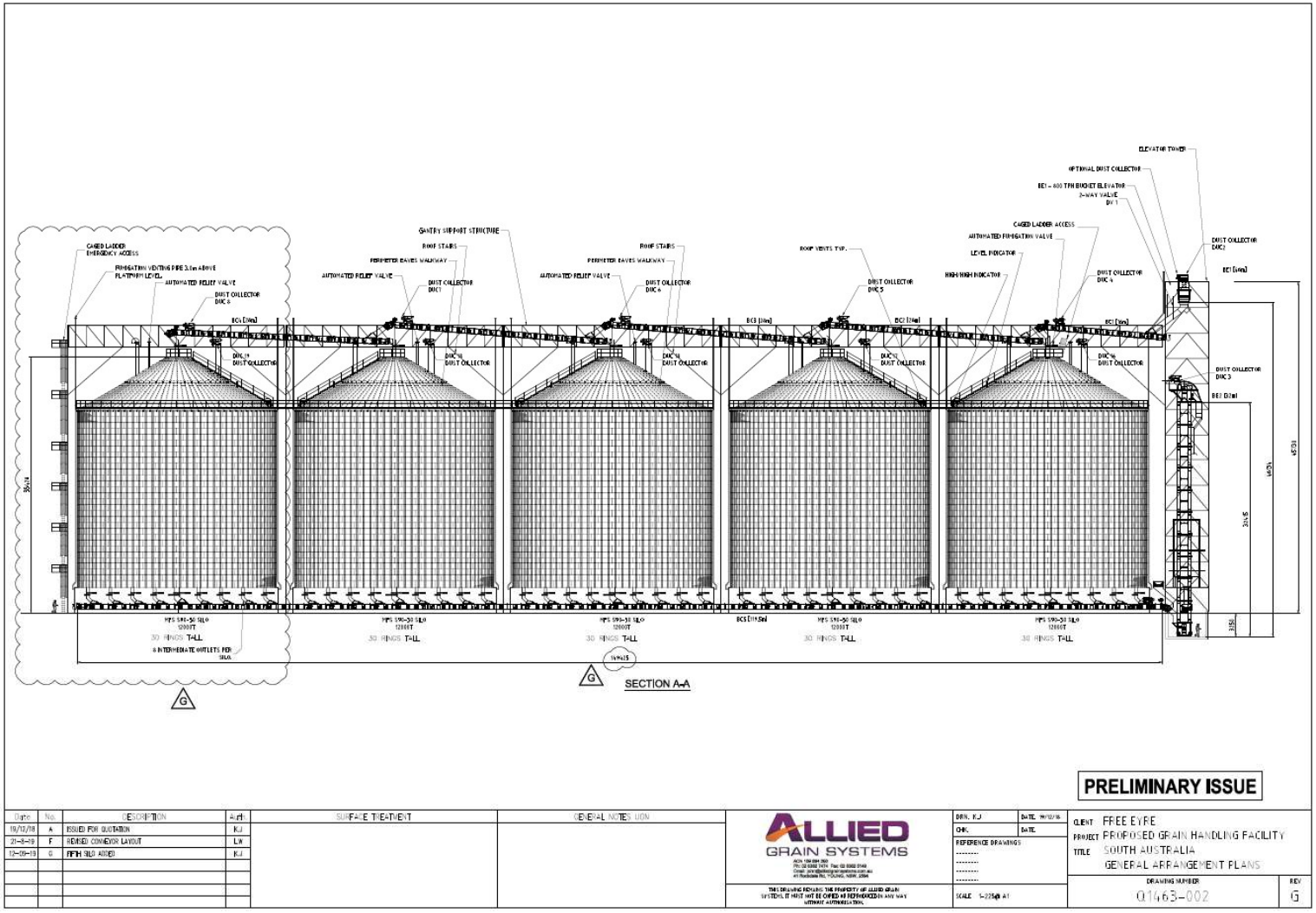


Figure 4 – Q1463-002_G

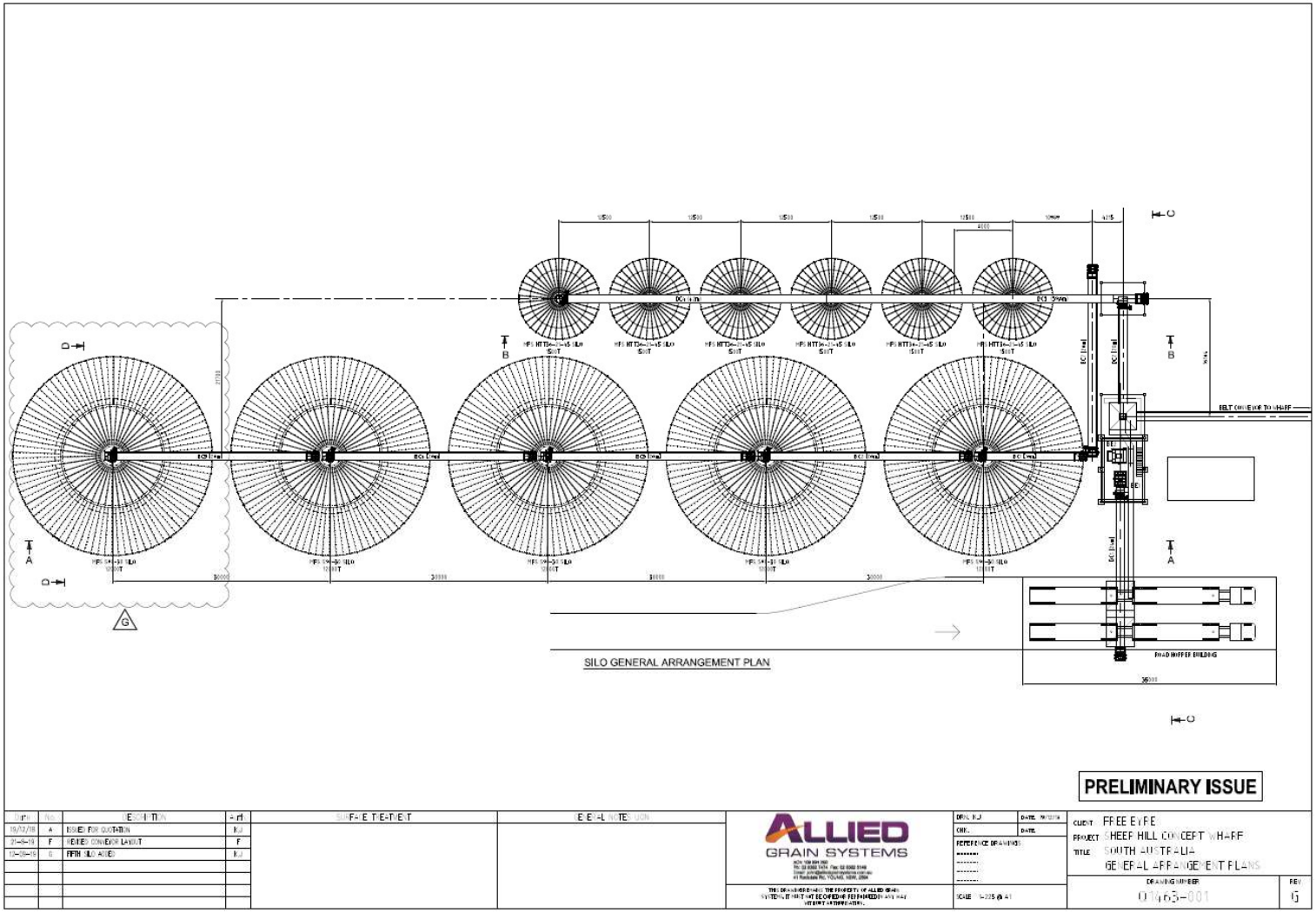


Figure 5 – Q1463-001_G

2. 5 Scope of Construction Works

AGS will be supplied with a flat earthworks platform to begin their construction activities. This will most likely be on granite. This is where AGS scope starts. AGS work is outlined in section 2.4.

2. 6 Description of Construction (Disturbance) Footprint

The construction area for AGS can be seen in Figure 7. The footprint will encompass the surrounding area required as a laydown area and for cranage and other construction activities. The construction will progress as follows:

1. Foundations will be constructed
    a. Tower/trestle foundations piers will be rock drilled
    b. Pier cages will be placed, and the surrounding area formed as to create the base for the towers and trestles
    c. The silo foundation perimeter walls will be formed and poured into place, as designed. This includes the tunnel for the belt conveyor running up the middle of the 5 silos.
    d. These perimeter walls will be filled with crushed rock won from site which has been geotechnically tested to meet the required specifications.
    e. The top of the silo foundation will be poured into place to produce completed foundation ready for silo construction.
2. Silos Built
    a. The roof of a silo is built first. This includes all hardware and perforations. Once the roof and the upper ring have been built the silo lifting sequence can commence.
    b. The silo is lifted using hydraulic jacks, one ring at a time is added to the silo as it is jacked up.
    c. This happens continuously until all 30 rings are correctly pace on the silos in the correct order specified by the manufacturer.
    d. Once completed base angle is placed on the silo as well as hold down plates.
    e. Hold down bolts are used to secure the silo to the foundation.
    f. Throughout the silo building process special care is taken to seal it properly for fumigation purposes.
3. Towers/Walkways Built
    a. The towers and walkways are partly assembled on ground level. Once the have been assembled into sections these sections can then be lifted into place. The sections are lifted together piece by piece to for the structure surrounding the silos.
4. Bucket Elevators
    a. Bucket elevators are constructed as the towers are constructed. The go up the centre of the tower structure.
5. Conveyors
    a. Conveyors are assembled in sections on the ground and then lifted into place in these respective sections.
    b. Ground conveyors are simply assembled in sequence along the grounds surface.

AGS will be operating 24 hours a day 7 days a week on site this includes all deliveries and construction activity.

2. 7 Site Plan

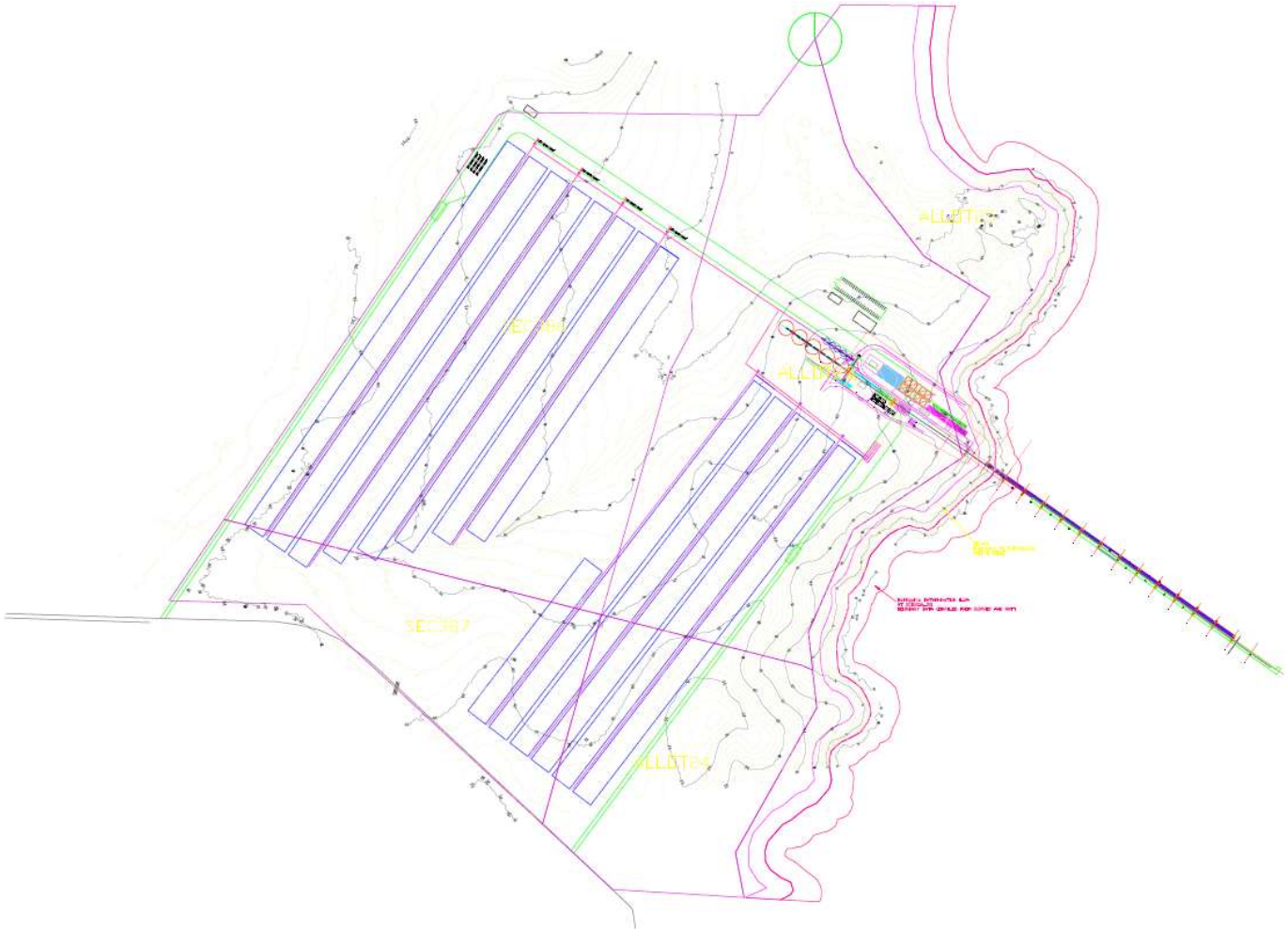


Figure 6 – Overall Site Plan

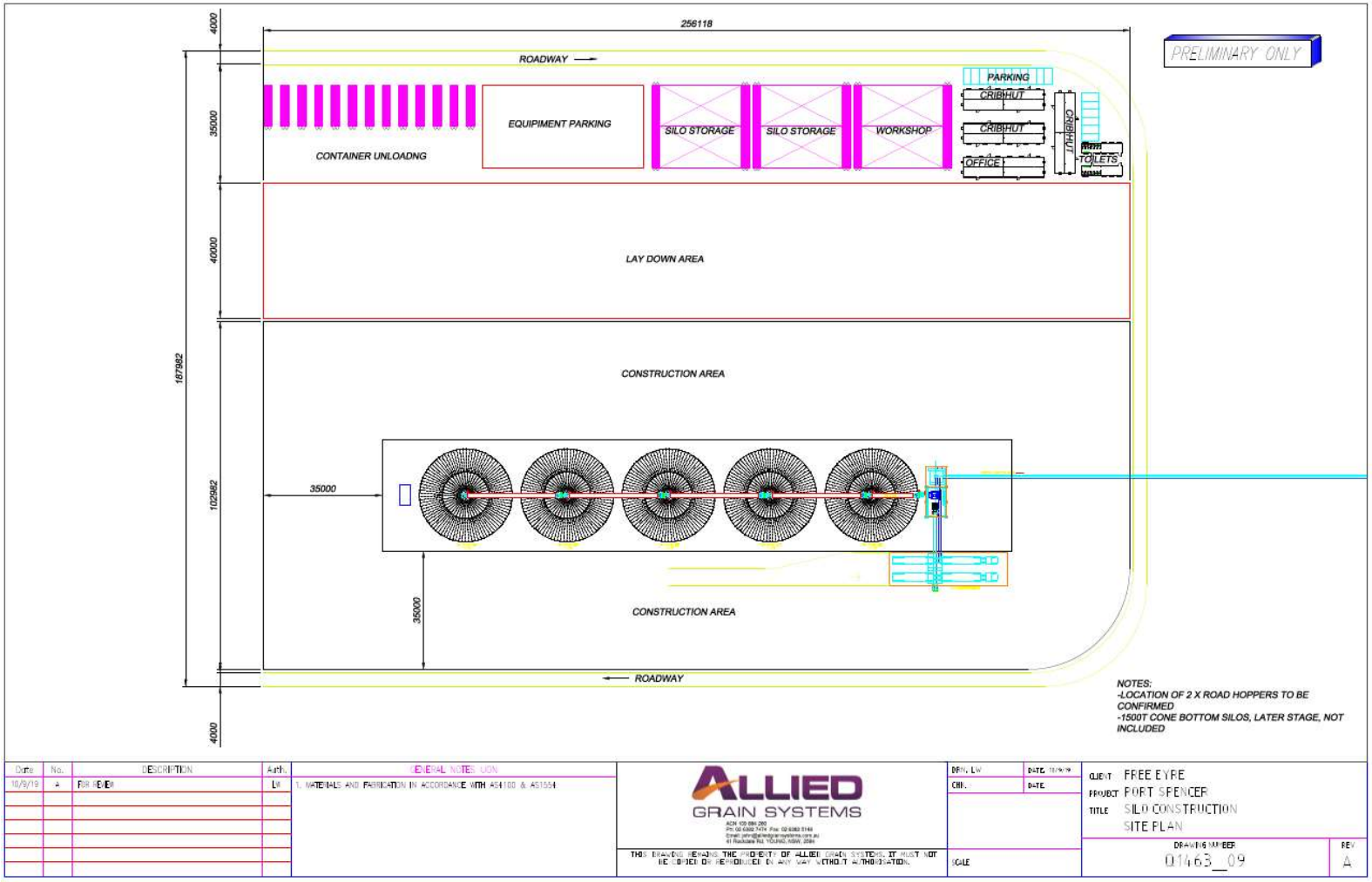
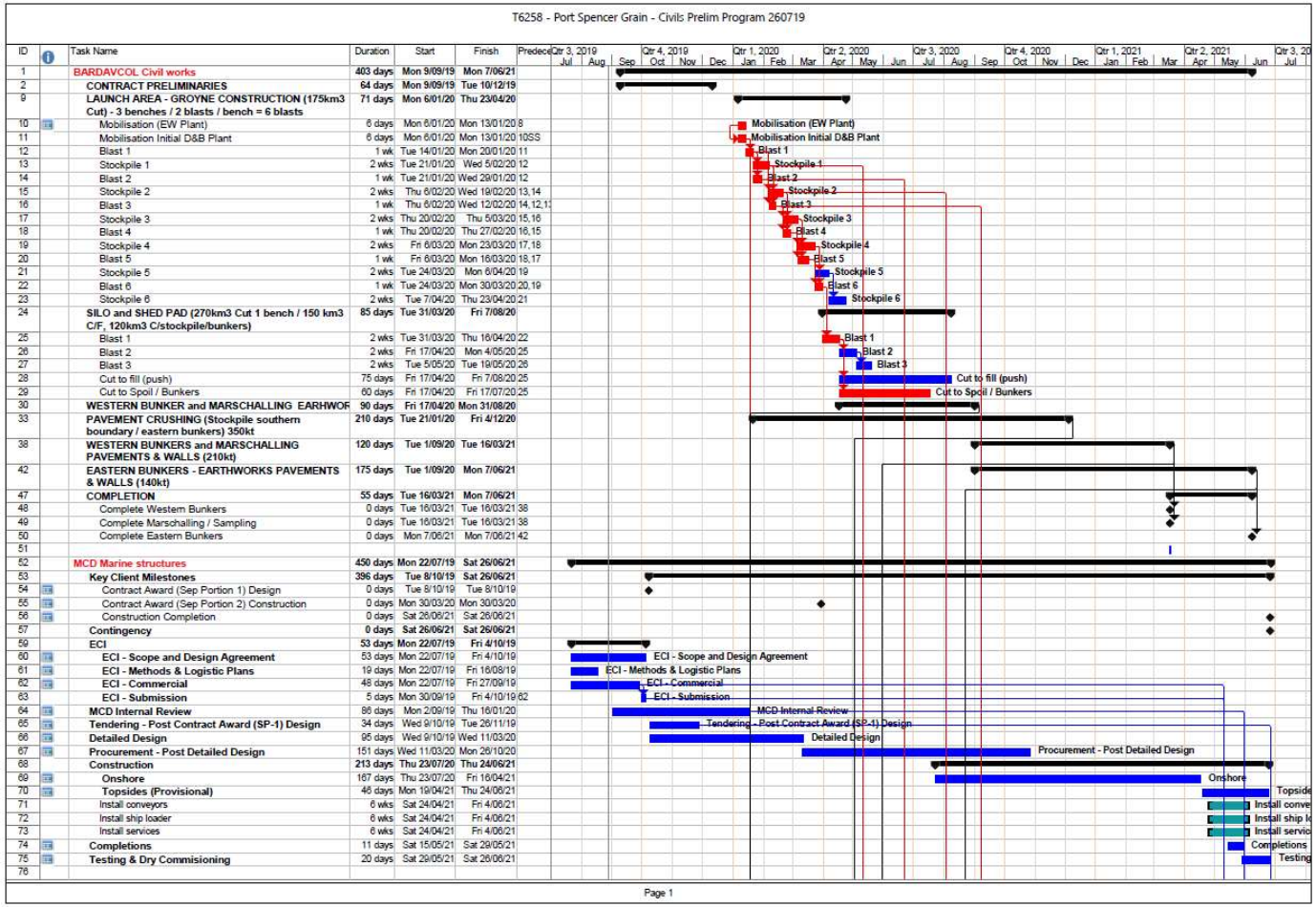


Figure 7 – Q1463-09_A

2. 8 Project Schedule and Timing of Works

The schedule for the Project is outlined in Figures 8 & 9 below:



ID	Task Name	Duration	Start	Finish	Predece
1	BARDAVCOL Civil works	403 days	Mon 9/09/19	Mon 7/06/21	
2	CONTRACT PRELIMINARIES	64 days	Mon 9/09/19	Tue 10/12/19	
9	LAUNCH AREA - GROYNE CONSTRUCTION (175km3 Cut) - 3 benches / 2 blasts / bench = 6 blasts	71 days	Mon 6/01/20	Thu 23/04/20	
10	Mobilisation (EW Plant)	6 days	Mon 6/01/20	Mon 13/01/20	8
11	Mobilisation Initial D&B Plant	6 days	Mon 6/01/20	Mon 13/01/20	10SS
12	Blast 1	1 wk	Tue 14/01/20	Mon 20/01/20	11
13	Stockpile 1	2 wks	Tue 21/01/20	Wed 5/02/20	12
14	Blast 2	1 wk	Tue 21/01/20	Wed 29/01/20	12
15	Stockpile 2	2 wks	Thu 6/02/20	Wed 19/02/20	13,14
16	Blast 3	1 wk	Thu 6/02/20	Wed 12/02/20	14,12,1
17	Stockpile 3	2 wks	Thu 20/02/20	Thu 5/03/20	15,16
18	Blast 4	1 wk	Thu 20/02/20	Thu 27/02/20	16,15
19	Stockpile 4	2 wks	Fri 6/03/20	Mon 23/03/20	17,18
20	Blast 5	1 wk	Fri 6/03/20	Mon 16/03/20	18,17
21	Stockpile 5	2 wks	Tue 24/03/20	Mon 6/04/20	19
22	Blast 6	1 wk	Tue 24/03/20	Mon 30/03/20	20,19
23	Stockpile 6	2 wks	Tue 7/04/20	Thu 23/04/20	21
24	SILO and SHED PAD (270km3 Cut 1 bench / 150 km3 C/F, 120km3 C/stockpile/bunkers)	85 days	Tue 31/03/20	Fri 7/08/20	
25	Blast 1	2 wks	Tue 31/03/20	Thu 16/04/20	22
26	Blast 2	2 wks	Fri 17/04/20	Mon 4/05/20	25
27	Blast 3	2 wks	Tue 5/05/20	Tue 19/05/20	26
28	Cut to fill (push)	75 days	Fri 17/04/20	Fri 7/08/20	25
29	Cut to Spoil / Bunkers	60 days	Fri 17/04/20	Fri 17/07/20	25
30	WESTERN BUNKER and MARSCHALLING EARHWOF	90 days	Fri 17/04/20	Mon 31/08/20	
33	PAVEMENT CRUSHING (Stockpile southern boundary / eastern bunkers) 350kt	210 days	Tue 21/01/20	Fri 4/12/20	
38	WESTERN BUNKERS and MARSCHALLING PAVEMENTS & WALLS (210kt)	120 days	Tue 1/09/20	Tue 16/03/21	
42	EASTERN BUNKERS - EARTHWORKS PAVEMENTS & WALLS (140kt)	175 days	Tue 1/09/20	Mon 7/06/21	
47	COMPLETION	55 days	Tue 16/03/21	Mon 7/06/21	
48	Complete Western Bunkers	0 days	Tue 16/03/21	Tue 16/03/21	38
49	Complete Marschalling / Sampling	0 days	Tue 16/03/21	Tue 16/03/21	38
50	Complete Eastern Bunkers	0 days	Mon 7/06/21	Mon 7/06/21	42
51					
52	MCD Marine structures	450 days	Mon 22/07/19	Sat 26/06/21	
53	Key Client Milestones	396 days	Tue 8/10/19	Sat 26/06/21	
54	Contract Award (Sep Portion 1) Design	0 days	Tue 8/10/19	Tue 8/10/19	
55	Contract Award (Sep Portion 2) Construction	0 days	Mon 30/03/20	Mon 30/03/20	
56	Construction Completion	0 days	Sat 26/06/21	Sat 26/06/21	
57	Contingency	0 days	Sat 26/06/21	Sat 26/06/21	
59	ECI	53 days	Mon 22/07/19	Fri 4/10/19	
60	ECI - Scope and Design Agreement	53 days	Mon 22/07/19	Fri 4/10/19	
61	ECI - Methods & Logistic Plans	19 days	Mon 22/07/19	Fri 16/08/19	
62	ECI - Commercial	48 days	Mon 22/07/19	Fri 27/09/19	
63	ECI - Submission	5 days	Mon 30/09/19	Fri 4/10/19	62
64	MCD Internal Review	86 days	Mon 2/09/19	Thu 16/01/20	
65	Tendering - Post Contract Award (SP-1) Design	34 days	Wed 9/10/19	Tue 26/11/19	
66	Detailed Design	95 days	Wed 9/10/19	Wed 11/03/20	
67	Procurement - Post Detailed Design	151 days	Wed 11/03/20	Mon 26/10/20	
68	Construction	213 days	Thu 23/07/20	Thu 24/06/21	
69	Onshore	167 days	Thu 23/07/20	Fri 16/04/21	
70	Topsides (Provisional)	46 days	Mon 19/04/21	Thu 24/06/21	
71	Install conveyors	6 wks	Sat 24/04/21	Fri 4/06/21	
72	Install ship loader	6 wks	Sat 24/04/21	Fri 4/06/21	
73	Install services	6 wks	Sat 24/04/21	Fri 4/06/21	
74	Completions	11 days	Sat 15/05/21	Sat 29/05/21	
75	Testing & Dry Commisioning	20 days	Sat 29/05/21	Sat 26/06/21	
76					

Figure 8 – Schedule

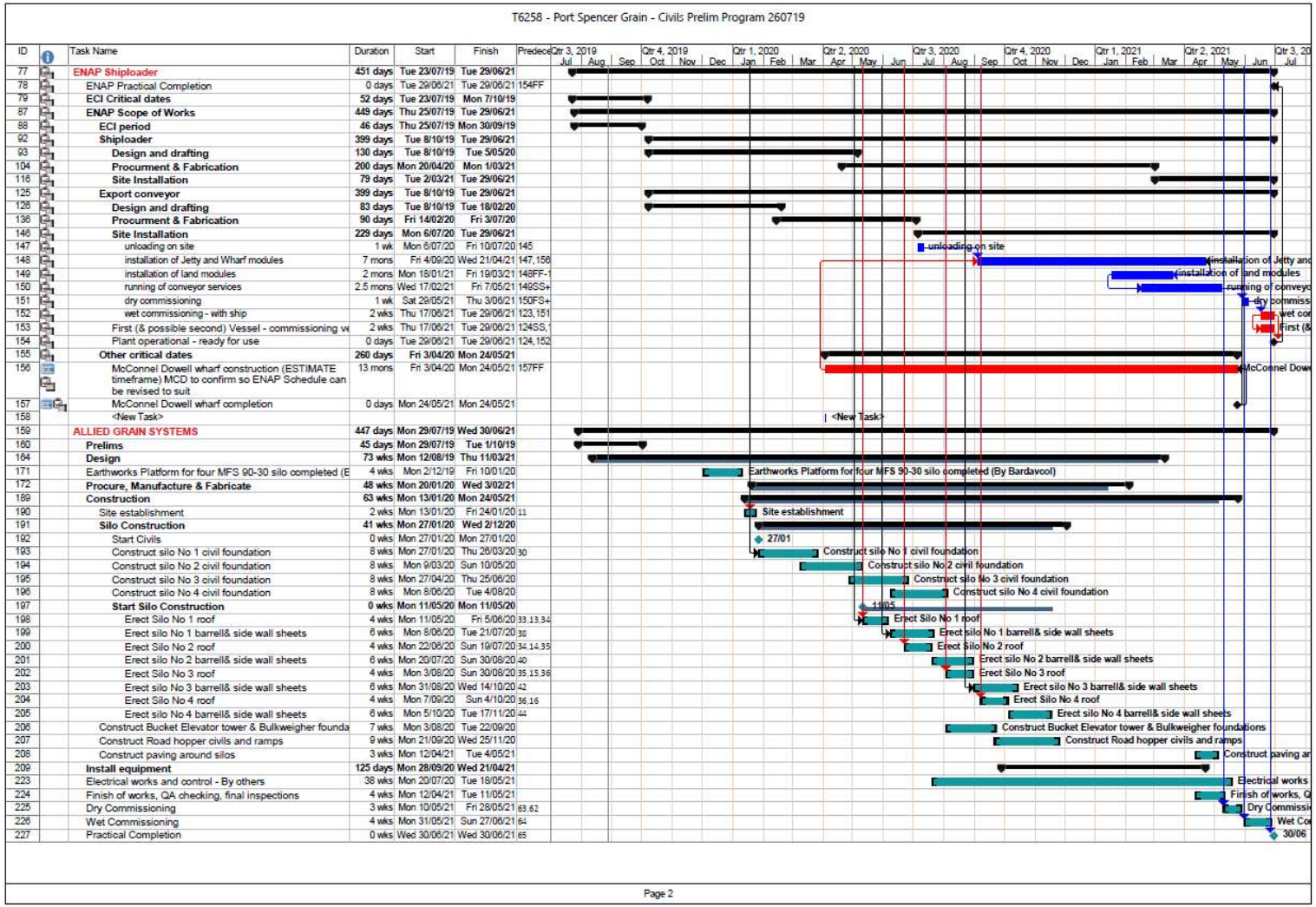


Figure 9 – Schedule

3 CONTACTS AND RESPONSIBILITIES

3. 1 Key Project Personnel

All positions across the project have environmental responsibilities to some extent. These vary in relation to duties described in Table 1, but everyone has a base level Duty of Care to prevent Environmental Harm as described in the Environmental Protection Act 1986.

The interdependencies of positions on the project are shown in Table 1 (over page). Names and contact numbers are correct for this revision but may change during the project.

Table 1 – Responsibilities

Position	Responsibilities	Responsibilities to CEMP	Line Manager	Name	Contact Detail
Project Manager	Reports directly to senior management Responsible for Project management of the construction project Responsible for overall implementation of the CEMP	Reports to senior management on environmental matters Ensures appropriate resources are allocated to implement Ensures Project approvals are in place Orders STOP WORK for any environmental breaches and reports incident Ensures environmental induction and training programs are developed and implemented Ensures adjoining landowners and other stakeholders are kept informed of matters relating to their interest Coordinates the environmental inspection and monitoring program Monitors performance against CEMP			
Site Supervisor	Reports to the Project Manager Responsible for implementing the requirements of this CEMP	Reports to the Project Manager on environmental matters Ensures appropriate contractor resources are allocated to implement Ensures project permits are in place			

		Orders STOP WORK for any environmental breaches and reports incident to Project Manager Ensures environmental induction and training program is implemented for all construction personnel Ensures landowners and other interested parties are notified of noise, dust and traffic issues or other matters relating to their interest Manages the daily and weekly environmental inspection and monitoring program Monitors and reports on environmental discharges to Construction			
Environment Officer	Provide expert guidance and monitoring of environmental performance in accordance with CEMP to Project Manager	Undertake internal monthly audits to ensure compliance to the CEMP. This will involve checking the daily, weekly checklists have been completed and evaluation of compliance with the CEMP Report the outcomes of the audit to the APA Project Manager Issue non-conformance requests on environmental issues identified during field audits Orders STOP WORK for any environmental breaches and reports incident to Project Manager The principal point of advice in relation to the environmental performance of the Project			

		Consider and advise the Project Manager on matters specified in the conditions of this approval, and other licences and approvals related to the environmental performance and impacts of the Project; ensure that environmental auditing is undertaken in accordance with the Authority to approve/ reject minor amendments to the CEMP Authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur. Be consulted in responding to the community concerning the environmental performance of the Project where the resolution of points of conflict			
HSE Representative	Provide expert guidance and monitoring of environmental performance in accordance with CEMP to Project Manager	Orders STOP WORK for any environmental breaches and reports Consider and advise the Project Manager on matters specified in the conditions of this approval, and other licences and approvals related to the environmental performance and impacts of the Project; ensure that environmental auditing is undertaken in accordance with the Authority to approve/ reject minor amendments to the CEMP			

		Authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur. Be consulted in responding to the community concerning the environmental performance of the Project where the resolution of points of conflict			

4 TRAINING AWARENESS AND COMPETENCY

Environmental training awareness and competency will be delivered/assessed throughout the project, to ensure the relevant aspects of this CEMP are communicated to the project team and front-line staff (including contractors and sub-contractors).

These Include:

- Site Environment Induction
- Daily Pre-Start Meetings
- Environmental Toolbox Talks
- Incident bulletins
- Sub-contractor's kick-off meeting
- Contractor and client site kick-off meeting
- Visitor Induction
- Job Specific Environment training
- Training records

5 PROJECT MITIGATION MEASURES AND ENVIRONMENTAL SPECIFICATIONS

Summarised in the tables that follow (Sections 5.2 – 5.12) are risk management tables for areas in the project.

5. 1 Noise Management

Noise Management			
Objective(s)	1. To minimise the impacts of noise on the amenity of the surrounding areas. 2. Construction activities undertaken in accordance with AS 2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites. 3. Construction activities undertaken in accordance with Environmental Protection (Noise) Regulations 1997		
Management Strategy	Noise to be managed primarily through administrative and equipment controls during the construction phase.		
		Responsibility	**Timing**
Control(s)	All equipment used during the construction phase to be regularly maintained to ensure efficient operation; Pre-start checks and maintenance schedules to ensure equipment performance is as required; Noise-dampening equipment to be used on equipment with excessive noise generating characteristics; Construction activities in accordance with AS2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites.		
Performance Indicator(s)	No complaints from adjacent commercial premises and/or community.		
Monitoring	Daily inspection of works sites to occur Service logs for equipment/machinery used on site		
Reporting	Daily inspection of works sites to occur Service logs for equipment/machinery used on site		

Corrective Action(s)	Investigate cause of excessive noise Implement corrective measures prior to the recommencement of site works Reschedule of noise-generating activities to reduce noise annoyance		

5. 2 Dust Management

Dust Management			
Objective(s)	1. To ensure the impacts of dust on adjacent areas and the community are minimised.		
Management Strategy	Dust issues managed principally by emission controls at source, and administrative controls during works.		
		Responsibility	**Timing**
Control(s)	Area to be disturbed minimised. Clearance lots to be approved by Project Manager. Where dust is identified as an issue, dust control measures will be implemented. These will primarily be the use of water carts but may include surface treatments. Vehicle movements controlled (Traffic Management Plan) and kept to established tracks and haul roads. Dust awareness issues in environmental induction process		
Performance Indicator(s)	No complaints from adjacent commercial premises and/or community.		
Monitoring	Daily inspection of works sites to occur, including: ▪ visual check for dust crossing the site boundaries ▪ usual check of high potential dust areas, such as haul roads, stockpiles and operational areas.		
Reporting	Any complaints or incidents to be reported to Project Manager.		
Corrective Action(s)	Investigate cause of excessive dust Implement controls immediately (e.g. water carts)		

	Implement corrective measures prior to the recommencement of site works Implement administrative controls if required, such as rescheduling of dust generating activities to more favourable weather conditions.		

5. 3 Sediment and Erosion Control

Sediment and Erosion Control			
Objective(s)	1. To ensure that the effects of erosion and sedimentation on the environment and biological communities are minimised. 2. Minimise soil disturbance, degradation and erosion.		
Management Strategy	Ensure that direct impacts (land disturbance) are limited to the works area, and that secondary impacts do not impact adjacent areas.		
		Responsibility	**Timing**
Control(s)	Disturbance area will be minimised and clearly demarcated. Works will only be conducted within the works zone. Vehicle movements will be restricted to the defined roads/tracks. Where possible, works area will be designed to ensure stormwater runoff drains into the site. Where runoff from the site is required, it will be via the longest flow path possible to ensure maximise sediment retention. Flows to undisturbed areas will be prioritised. Where required, sediment controls will be put in place. These will include, but not be limited to, rock check dams, sediment basins, sediment fences and silt socks. Sediment controls will be reviewed during site inspections and/or after significant rainfall (more than 10mm in 24hrs resulting in site runoff).		
Performance Indicator(s)	No evidence of significant sediment deposition outside the works area. No evidence of significant rilling, gullies or other instances of run-off erosion.		
Monitoring	Daily inspection of work site to occur.		

	Sediment controls will be reviewed during site inspections and/or after significant rainfall (more than 10mm in 24hrs resulting in site runoff). Review will include removal of accumulated sediments as required.		
Reporting	Incident report for non-conformance of sediment control Logging of sediment control structures - location and condition during weekly site inspection		
Corrective Action(s)	Investigate cause of sediment control failure Review flow path and determine most appropriate controls are in place, additional controls which can be place in-stream and/or changes that can be made to flow path Review similar controls on-site (even though these may not have failed) for similarities		

5. 4 Oil and Other Noxious Substances

Oil and Other Noxious Substances			
Objective(s)	1. To minimise the potential for spills of oils and other noxious substances to as low as reasonably practicable.		
Management Strategy	Reduce quantity of hydrocarbons stored to that required, implement appropriate controls and provide appropriate training and resources for a spill response.		
		Responsibility	**Timing**
Control(s)	All hydrocarbons to be stored in an appropriate bund that can hold 110% of a spill from the largest container, or 10% of total volume of stored liquids, whichever is greater. Refuelling of vehicles/equipment will be undertaken on land (not over water), unless the task is not possible. To reduce the impact of a spill, the lowest volume of hydrocarbons required will be stored in proximity to the marine environment and in the onshore lay down areas. A copy of the current hydrocarbon MSDS will be kept at an appropriate location on site. Drip trays shall be placed under mechanical stationary equipment such as gensets if such equipment is not internally bunded. Onsite spill response training will be carried out on a periodic basis. All deficiencies identified through training and testing of the procedures will be documented and rectified immediately. All equipment will be regularly serviced to reduce emissions and reduce the chance of oil leaks on site and in marine environments. Appropriate controls in place to contain hydrocarbon leaks should they occur whilst servicing. Controls may include use of drip trays when changing oil and transporting waste oils in bunded containers.		

	Only qualified personnel are to carry out services on plant, equipment and vessels. A prescribed Isolation procedure must be followed prior to work on any plant or equipment. Training / awareness to be included in site induction (including all staff, contractors, subbies etc.). Appropriate volume and type of spill response materials will be available at each work site Spill will be contained and cleaned-up immediately. Resultant wastes (soils, rags and absorbent material) appropriately stored and disposed of by an appropriately licenced waste contractor as controlled waste. All spills reported and investigated as required.		
Performance Indicator(s)	Minor spills (<10L) to land contained, controlled and all contamination removed / cleaned-up within 24 hours. No spills to marine waters. Reporting to Project Manager within timeframes specified below No contamination of soil or surface / ground waters. No spills that require an emergency response		
Monitoring	Incident report outlining corrective actions taken and preventative measures to be implemented Statistics reported in weekly meetings and monthly reports.		
Reporting	All marine spills (regardless of volume) to be reported A spill of oil or any other hazardous or noxious substance to the deck of the Dampier Cargo Wharf, Bulk Liquids Berth		

	The following incidents must be reported to on a monthly basis (e.g. at KPI meetings) ▪ If there is less than 10L spilt, the spill is contained on site and it can be fully cleaned up. The following types of spill incidents must be reported immediately (including a follow-up incident investigation report within 48 hours): ▪ Any spill greater than 10L; ▪ Any spill which cannot be fully cleaned up / contained immediately; OR ▪ Any spill which leaves the lease area (e.g. as liquid discharge or dust emission).		
Corrective Action(s)	Stop work immediately, contain spill (if safe). Investigate cause of spill and assess. Implement improvements as required. Investigate and assess adequacy of response – implement improvements as required. Implement corrective measures prior to the recommencement of site works.		

5. 5 Housekeeping and Waste

Housekeeping and Waste			
Objective(s)	1. Reduce waste volume, maximise recycling, reuse and recovery, prevent any construction waste/litter entering the environment.		
Management Strategy	Minimise environmental impacts through appropriate controls and site inductions of employees and sub-contractors.		
		Responsibility	**Timing**
Control(s)	Provide appropriate waste bins, type, volume and service frequency to accommodate anticipated waste streams. All loads arriving or leaving the site will be appropriately secured. Provide information regarding waste management in site specific inductions, including waste separation and importance of securing vehicle loads. Ensure licensed contractors are used to collect controlled wastes		
Performance Indicator(s)	Hazardous materials all appropriately disposed. Recycling of all recyclable construction metal waste Records kept of waste leaving site.		
Monitoring	Daily inspection of work site to occur. Review of waste bins (% full, time to next service). Waste volumes leaving site from waste contractors		
Reporting	Environmental incident reports.	Project Manager	Throughout project
Corrective Action(s)	Investigate cause of inappropriate waste disposal	Project Manager	Throughout project

	Review cause of issue and develop response, such as variation to bin size, service schedule or waste separation awareness. Implement controls		

5. 6 Terrestrial Fauna

Terrestrial Fauna			
Objective(s)	1. To minimise the impact to fauna 2. To prevent the spread of introduced species		
Management Strategy	Ensure impacts to fauna are minimised and impacts outside the disturbance zone are avoided.		
		Responsibility	**Timing**
Control(s)	Provide site specific information on fauna within the Environmental Induction Include identification sheets in prominent locations for priority species Include identification of feral species in prominent locations Include toolbox talks for site specific fauna information during project to ensure currency of information Ensure no activities outside the works zone through clear delineation of the works area, and communication in site inductions Ensure traffic is restricted to established tracks and roads, and speed limits observed. Where excavations are created which may entrap fauna, suitable escape measures are put in place, and excavation are checked for fauna before backfilling. Contact wildlife carer groups/vet for injured fauna Domestic animals prohibited on-site Ensure appropriate waste management (lidded bins), including food scraps, to reduce potential for feral species to become established on-site		

Performance Indicator(s)	No disturbance outside the disturbance zone No injury or death of any fauna caused by vehicles or excavations No injury or death of protected fauna. No domestic animals on-site		
Monitoring	Daily inspection of work site to occur.		
Reporting	Sightings and incidents reported in weekly contractor meetings. Injured native fauna to be reported.		
Corrective Action(s)	Investigate cause of incident Review opportunities/constraints for further minimisation of potential incidents given work procedure parameters Implement corrective measures prior to the recommencement of site works		

5. 7 Native Vegetation and Weeds

Native Vegetation and Weeds			
Objective(s)	1. To minimise the disturbance to existing flora 2. To minimise the introduction and/or spread of weed species		
Management Strategy	Ensure impacts to native vegetation are minimised, impacts outside the disturbance zone are avoided and appropriate management is in place to control spread / introduction of weeds.		
		Responsibility	**Timing**
Control(s)	Provide site specific information on flora within the Environmental Induction Ensure that any native vegetation clearing occurs within the limits of an approved area under the whole of Port native vegetation clearing permit. Ensure no activities outside the works zone through clear delineation of the works area, and communication in site inductions Ensure traffic is restricted to established tracks and roads, and speed limits observed. Ensure effective sediment and erosion control to reduce potential impacts to non-disturbance zone. Ensure all plant and equipment coming to site has been cleaned for site access (weeds and seeds). No fires on-site.		
Performance Indicator(s)	No disturbance of vegetation communities outside the disturbance zone No introduction of weed species		
Monitoring	Daily inspection of work site and boundary to occur.		

Reporting	Any accidental clearing of native vegetation to be reported to the project representative and followed through with an incident report.		
Corrective Action(s)	Investigate cause of incident Implement corrective measures prior to the recommencement of site works Review opportunities/constraints for further minimisation of potential incidents given work procedure parameters.		

5. 8 Traffic Management

Traffic Management			
Objective(s)	1. The ensure traffic movement to and from site as well as on site is effective as to not damage the environment		
Management Strategy	Effective traffic management policies on site		
		Responsibility	**Timing**
Control(s)	All vehicle movement to, around and from the construction site will be undertaken to minimise impacts on the environment and minimise risk to the safety of persons. Ensure all vehicles are adequately maintained to meet Australian Road Rules and RMS standards so that safety is not compromised. Ensure that deliveries and heavy transport movements are scheduled outside peak traffic hours. Regularly inspect road condition for deterioration of pavements where practicable. Transport oversized equipment and machinery in accordance with the RMS guidelines for oversized movements and required permits obtained. Implement appropriate signage to warn road users of the presence of construction vehicles as well as changes to normal traffic conditions. Provide adequate onsite parking and turning areas for vehicles. Traffic Control Plans will be provided for approval		
Performance Indicator(s)	Record of complaints, investigations and responses Record of traffic control plan		
Monitoring	Month Inspection		

	Evidence of permits obtained and record of oversized vehicle movements Signage is in place and no traffic incidents recorded Construction parking restricted to designated areas		
Reporting	Weekly checklist as required		
Corrective Action(s)	Implement corrective measures Review opportunities/constraints for further minimisation Update traffic management plan		

5. 9 Aboriginal Heritage

Aboriginal Heritage			
Objective(s)	1. To minimise effect construction activities, have on aboriginal heritage		
Management Strategy	To monitor and maintain Aboriginal Heritage in the area		
		Responsibility	**Timing**
Control(s)	Monitoring will be undertaken in culturally sensitive areas Aboriginal Cultural Heritage Awareness Program All newly identified Aboriginal sites to be reported and managed		
Performance Indicator(s)	All currently and newly identified Aboriginal sites have been managed effectively		
Monitoring	Heritage Clearance form signed by Heritage professional Record of completed training in the training register.		
Reporting	Weekly checklist as required		
Corrective Action(s)	Implement controls		

ENGINEERING APPLICATIONS
ABN: 93 135 980 111

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

FREE EYRE / PENINSULA PORTS
Port Spencer Project
Export Conveyor and Shiploader Package

Issue	Description	Approved By	Signed	Date
A	CEMP	Anthony Davis		5/9/19

TABLE OF CONTENTS

1 Introduction

Engineering Applications (ENAP) has been engaged by Free Eyre Limited (FEL) to undertake the structural, mechanical and electrical installation of a Export Conveyor & Shiploader capable of an effective 2000t p/h (design of 2500t p/h).

This Construction Environmental Management Plan (CEMP) details the environmental management and control measures which are to be implemented for the construction activities for the ENAP controlled Workfront's to reduce adverse impacts on the environment. The site is located on the Eyre Peninsula (Spencer Gulf), South Australia, which is a critical environmental factor to be considered for this project.

Prior to undertaking any activity that involves potential environmental harm, ENAP will undertake an environmental impact assessment to identify all key risks and controls. This will include conditions to protect land and water from harm. Environmental harm includes any adverse effect on an environmental value.

ENAP will consider all key areas when undertaking construction activities that have the potential to cause environmental impact and endeavours to:

- Identify the environmental values of the site, including any significant flora, fauna and waterways associated with the land;
- Identify the possible impacts due to the proposed activity and all associated risks to the environmental values; and
- Identify the strategies to mitigate the identified risks to the environmental values.

In South Australia, the environmental impacts to land associated with Environmentally Relevant Activities are regulated under the Environmental Protection Act (1993) and subordinate legislation, including the Environmental Protection Regulation (2009).

The Environment Protection Act highlights that there are several defined activities that have the potential to cause land contamination. Where applicable, activities that are likely to cause environmental impacts will be lodged with the Department of Environmental and Heritage Protection to obtain relevant authority to conduct an Environmentally Relevant Activity. These are referred to as 'notifiable activities' and the Environment Protection Act includes provision for the maintenance of the Environmental Management Register and Contaminated Land Register.

If ENAP identify any new or potential Environmental risks following commencement of construction activities, these actual or potential risks will be recorded and actioned.

2 Legislative Compliance

The environmental compliance requirements and legislative requirements and controls to protect the environment have been identified as part of this plan.

3 Approvals, Licences, Permits

ENAP is not responsible for the necessary approvals, licenses, permits and authorizations applicable for the construction activities for the scope of this project. The approvals and permits will be / have been sourced by Free Eyre Limited and its engaged management firms.

4 Environmental Policy

HEALTH, SAFETY & ENVIRONMENT MANUAL

P 002 – ENVIRONMENTAL POLICY

POLICY STATEMENT

ENAP's mission is to provide a comprehensive engineering service to our clients with a key focus on Design, Fabrication, Installation and Maintenance. In an expanding and competitive market ENAP is determined to deliver products and services of excellent quality, all with an emphasis on professional, safe, dynamic and timely outcomes.

ENAP has made a firm commitment to respect and protect the environment in which it operates. Our products and services will include from its design and, throughout all phases of the project, a risk management approach that will embrace the company overall philosophy of:

- Zero Harm;
- Pollution prevention and respect for the environment ;
- Continuous improvement and;
- Sustainable development

ENAP will comply with current environmental protection legislation as the minimum acceptable standard in all its operations in the factory and at customer sites.

AIMS AND OBJECTIVES

The Board of Directors and their Senior Management Team have overall responsibility for implementing this policy; to this effect ENAP will embrace the following environmental objectives:

- Develop and maintain and Integrated Environmental Management System as per AS/NZS ISO 14001 to encompass all ENAP controlled activities.
- Establish a clear chain of command and the communication of defined environmental responsibilities at all company levels.
- Develop environmental objectives and targets for all company activities and effective management plans to control environmental hazards/risks.
- Ensure the company has procedures to identify environmental hazards/risks of its products and services in order to control, eliminate or reduce their impact on the environment.
- Provide competency and awareness training to our personnel so they can perform their duties, not only in safe and responsible manner but, also with the highest regard to environmental protection.
- Reduce pollution by continually search for better and cleaner production methods and,
- Reduce waste by maximising recycling opportunities as they emerge.

ENAP's ultimate goal is to, where possible and practical, preserve energy and resources with minimal or zero discharge of pollutants and waste into the natural environment that we operate.

The responsibility to protect the environment and reduce the impact of our industrial activities on ENAP controlled sites is shared and supported by all company employees.

Date 30/6/16

Approved by:
Drew Stephensen
General Manager

Version No 2 - Issue date: June 2016 Review date: June 2019 Page 1

5 Scope of Works

The scope of the works for ENAP for FEL Port Spencer Export Facility is the Structural, Mechanical and Electrical Installation package of the Export conveyor and Shiploader. This includes ENAP being the Principal Contractor for this scope of these works. The onsite works will be contained within FEL owner lease just North of Lipson and Tumby Bay and comprise of the following elements:

- Structural and Mechanical assembly and installation of the approximate 950m long export conveyor
- Structural and Mechanical assembly and installation of the 2000t p/h (effective) shiploader
- Electrical and control installation of the above two pieces of equipment
- First fill activities of the above-mentioned items
- Dry and Wet Commissioning of the above-mentioned items

6 Existing Environment

The location of the project for the installation of the works for the Grain Export Terminal is in a sensitive environmental area. The proximity of the main construction area is contained within the land holding of Free Eyre Limited. Controls of potentially harmful materials need to be implemented to ensure that there is no disruption to the existing environment conditions. Such areas are identified below and will control the construction methods.

7 Environmental Risk Assessment

The potential environmental impacts during construction activity have been identified and assessed in the Risk Assessment Matrix to determine an unmitigated risk of the activity. The level of risk assessed from the matrix informs the level of mitigations required for that environmental aspect to be acceptable. These risks are to be mitigated through the identified control measures.

Table 1: RISK LEVEL MATRIX – RISK SCORE												
LEVEL OF CONSEQUENCE	CONSEQUENCES OF EVENT OCCURRING *What is the likely outcome of an exposure to the risk?*	LEVEL OF CONSEQUENCE		LIKELIHOOD OF EVENT OCCURRING								
				Almost certain	5	Likely	4	Possible	3	Unlikely	2	Rare	1
Catastrophic	-Major environmental harm. e.g. major pollution incident causing significant damage or potential to health or the environment.	**Catastrophic**	**5**	**VH 25**		**VH 20**		**VH 15**		**VH 10**		**H 5**	
Major	-Long term or serious environmental damage. - Numerous complaints received. - Potential for prosecution.	**Major**	**4**	**VH 20**		**VH 16**		**VH 12**		**H 8**		**H 4**	
Moderate	-Moderate environmental impact. - Will cause complaints. - Possible fine.	**Moderate**	**3**	**VH 15**		**H 12**		**H 9**		**M 6**		**M 3**	
Minor	-Minimal environmental harm. - Potential for complaints. - Fine unlikely.	**Minor**	**2**	**H 10**		**H 8**		**M 6**		**L 4**		**L 2**	
Insignificant	-Little or no environmental harm. - Little potential for fines or complaints.	**Insignificant**	**1**	**H 5**		**M 4**		**L 3**		**L 2**		**L 1**	

LIKELIHOOD OF EVENT OCCURRING	
Almost certain	Event is expected to occur in most circumstances
Likely	Event will probably occur in most circumstances
Possible	Event might occur at some time
Unlikely	Event could occur at some time
Rare	Event may occur only in exceptional circumstances

DETERMINATION OF RISK CONTROL ACTIONS		
RISK SCORE	**RISK LEVEL**	**ACTION REQUIRED**
VH 10 - 25	**VERY HIGH**	**Risk requires best practice controls to be implemented**
H 4 - 12	**HIGH**	Try to reduce the risk, implement better controls if possible
M 3 - 6	**MODERATE**	Job may proceed, ensure risk control measures are in place
L 1 - 4	**LOW**	Job is safe to proceed, risk is negligible or under control

Aspect(s)	Potential Construction Stage Impact(s)	Consequence(s)	Risk Rating	Control(s)
Site Security & Access:	Unauthorised access to site by public (non-inducted people to the project)	Minor	M6	Perimeter fence and/or signage to be installed around construction activity, signage to be in place
Erosion & Sediment Control:	Excavation of footings	Minor	M6	Silt fences to be established and maintained throughout works
	Overland flow	Minor	M6	Install diversions to direct flow away from excavation if rain event is predicted
Water Use & Environmental Water Quality:	Minimise water use during excavation	Insignificant	L2	Keep water use to a minimum – all excess water to be removed with vac truck if required
Air Quality:	Use of plant	Minor	L4	Turn off plant when not in use
	Dust from excavation	Minor	M6	Have hoses on standby to wet down as required
Noise & Vibration:	Use of plant	Minor	L4	Turn off plant when not in use
Hazardous Substances:	Paints & chemicals	Minor	L2	The storage of chemicals on site is to be in the appropriate bunded chemical storage container. Use of chemicals on site to be in accordance with manufacturers recommendations and in accordance with legislative requirements of the Work Health and Safety Act 2011
	Fuels/ oils	Minor	M6	Onsite fuelling activities to be facilitated by a licensed tanker operator and to be undertaken in an isolated / bunded area or have other mechanical controls in place

Contaminated Soil Land:	No contaminated soils nominated in project documents	Minor	M6	No soils are to be removed from site
	If suspected soil arises – stop and test			
Acid Sulphate Soils:	No contaminated soils nominated in project documents			
	If suspected soil arises – stop and test			
Waste Management & Housekeeping:	General waste from workers (food scraps/ paper etc)	Minor	L4	Waste bins to be provided and utilised
	Construction waste – off cuts etc	Minor	L4	Construction waste bins to be provided and utilised
Flora & Fauna and Waterways:	Grassed area in Adjacent property to be retained	Minor	L4	Ensure delineation is kept between hardstand area and grass areas to be retained
	Contamination of the waterways from construction activities	Moderate	H9	Provide catchment protection for waste when working over water Any spillage of waste must be cleaned up as quickly as practicable Industrial standard spill kits to be located on site and inspected regularly. Staff to be trained in the use of spill kits.
Cultural Heritage:	Discovery and/or damage to cultural heritage or significant sites	Moderate	H8	FEL and its partners are to sweep, identify and note all areas of concerns. Construction zones are to build around these located areas
Introducing Contamination	Plant, equipment and materials entering site	Minor	L4	Plant and materials must be clean and free of contaminants before entering the site

8 Construction Site Facilities

The following considerations will be made when selecting the location for the construction site compound within the development:

- Within the footprint of the proposed development;
- Locate office, amenities, dry storage and any chemical storages above flood level and away from natural surface drainage lines;
- Suitable vehicle access;
- Separate storage for fuels, chemicals and hazardous goods, inside bunded area(s) above flood levels;
- Minimise potential for work near dry vegetation which could cause fire; and
- If lighting is required for night-time security, locate lights to avoid nuisance to neighbours.

All site sheds and other facilities will present a neat appearance with safety signs erected as required. The site compound area will be regularly maintained and will be kept tidy and free of rubbish. Covered rubbish bins will be provided.

9 Roles & Responsibilities

9.1 Project Manager

The Project Manager reports to the client, the role includes responsibility for the day-to-day environmental management of the project. The Project Manager is ultimately accountable for the implementation of the requirements contained within this CEMP. The Project Manager is responsible for:

- Assisting in preparing and implementing the CEMP;
- Instructing project personnel on how to comply with environmental policy and procedures;
- Ensuring the Site Supervisor is aware of and complies with the environmental obligations as detailed within this CEMP;
- Ensuring that employees, contractors and sub-contractors are aware of, and comply with, the conditions of approval and requirements of the CEMP relevant to their respective activities;
- Arranging periodic monitoring and regular site inspections by suitably trained personnel;
- Tracking and compliance for the scope of works being performed;
- Initiating remedial measures when environmental deficiencies are observed or in response to environmental complaints;
- Restriction of construction activities affected by an environmental deficiency until remedial action has been taken;
- Engaging consultants where required to provide support in relation to implementing the CEMP; and
- Investigating any incidents or complaints and ensuring necessary corrective action is implemented (in consultation with client for significant incidents / complaints).

9.2 Construction Manager / Site Supervisor

The Construction Manager / Site Supervisor will report to the Project Manager and is responsible for: -

- Managing employees / contractors and construction activities daily to ensure the appropriate environmental controls are implemented and maintained;
- Ensuring all staff are inducted into the site and undertake daily tool box talks;
- Undertake daily site inspections of environmental controls and maintain records of environmental actions;
- Reporting any environmental management concerns or incidents immediately to the Project Manager;
- Recommending improvements to the CEMP to the Project Manager; and
- Implementing any corrective actions issued because of any site inspections, audits or meetings.

9.3 Other ENAP Employees and Contractors

The Work Assistants and Contractors will report to the Site Supervisor and are responsible for: -

- Implementing the CEMP as it applies to their works; and
- Reporting any environmental management concerns or incidents immediately to the Construction Manager / Site Supervisor.

10 Contact Details

10.1 ENAP, Contractor, Client Representatives and/ or Emergency Contacts:

Name	Position	Contact Number/s	Email
Emergency Services	Fire Service, Police Service, Ambulance	000	N/A
TBC	MEDICAL CENTRE		N/A
Anthony Davis (ENAP)	Project Manager	0428 962 224	anthony.davis@enap.com.au
TBC (ENAP)	Site Supervisor – Struct & Mech		
TBC (ENAP – Sub contractor)	Site Supervisor – Electrical		
TBC (ENAP)	HSE Manager		
TBC (FEL)	Construction Manager		
TBC (FEL)	HSE Manager		

11 Environmental Training & Awareness

11.1 Site Induction

All employees and sub-contractors must undertake a Free Eyre Limited / Port Spencer site induction and ENAP Project induction prior to their commencement of work on site. The induction of employees and contractors is the Site Supervisor's responsibility.

The ENAP Project induction will inform employees of their environmental responsibilities on site. It details the most significant environmental aspects and introduces this CEMP as the management tool to address the controls and mitigation measures required to minimise environmental impact on the Project.

The induction will cover the following:

- Contents of the CEMP;
- Critical environmental protection procedures including spill responses, emergency procedures, hazardous substances and dangerous goods handling, and monitoring of imported fill quality;
- The location of the CEMP during works; and
- General obligations.

All visitors to the Site must undergo a visitor's induction. All visitors must be accompanied by a fully inducted member of staff.

Site personnel shall be encouraged to be proactive and report any instances of environmental control measures not operating properly.

11.2 Tool Box Talks & Pre-start Meetings

Tool box talks, and Pre-start Meetings will be conducted daily by the Site Supervisor for employees and subcontractors. Tool box talks will be undertaken in response to evolving issues on the ground, particularly in response to significant environmental and safety incidents and non-conformance issues.

12 Environmental Management & Controls

12.1 Site Security & Access

12.1.1 Objectives

- Prevent entrance of unauthorised people to site during construction activities; and
- Prevent dumping of external waste materials on site.

12.1.2 Management & Control Measures

1) Perimeter security fence may be installed around construction zones, through the construction period. Where necessary, the traffic management should be considered before establishing perimeter fencing, including maintaining thoroughfares for other area users.
2) All entry / exit points should be monitored / controlled while the site is open to prevent entry of unauthorised persons / vehicles. Vehicles entering / exiting site should be managed in accordance with risks identified as part of the work.
3) Delivery truck drivers for the project are to be escorted by a fully inducted person at all times.

4) Ensure that the security gates / fencing on site are locked whenever the Site is unattended.

12.1.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Visual check that perimeter fence intact	Weekly	Site Supervisor	Daily Diary
Visual check that site has been properly secured (i.e. gates locked)	Prior to closing the Site each day and prior to any occasion where site becomes vacated	Site Supervisor	Daily Diary

12.2 Erosion and Sediment Control

12.2.1 Objectives

- Ensure effective drainage: To prevent or reduce soil erosion caused by concentrated flows and to appropriately manage the movement of 'clean' and 'dirty' water throughout construction activities;
- Reduce or prevent erosion: Prevent or reduce soil erosion caused by rain impact and sheet flow; and
- Reduce or prevent sediment: To trap and retain sediment displaced up-slope erosion processes to protect the surrounding environment.

12.2.2 Management & Control Measures

1) Installation of temporary sediment and erosion control measures (e.g. Sediment fencing/ controls). Temporary measures to be maintained until permanent measures are in place.
2) Construct diversion bunds/drains around proposed stockpile areas.
3) ENAP will attempt to identify any potential sources of sediment/risks of erosion. Some risks that may require attention may include but not be limited to:
    - Stormwater discharge points;
    - Existing field and other stormwater infrastructure (i.e. swales);
    - Site access and egress locations; and
    - Nearby sensitive areas.
4) Where necessary ENAP will rehabilitate the environment to a safe, stable, non-polluting and self-sustaining condition.

12.2.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Frequent inspection of drainage, erosion and sediment controls.	Daily	Site Supervisor	Site Diary

12.3 Water Use & Environmental Water Quality

12.3.1 Objectives

- To minimise waste water and to prevent any discharge of water contaminated by sediments or other agents.

12.3.2 Management & Control Measures

1) To plan for the prompt completion of works relating to drainage and sediment control to minimise exposure time of disturbed areas;
2) The provision of sediment and filter traps, in advance of and in conjunction with earthworks operations, to prevent contaminated run-off leaving the site;
3) Identify and quantify all uses of water on the site, and develop and implement practical measures to reduce water usage through water conservation fixtures/fittings, and/or substitution;
4) Discharge of stormwater from the site will be monitored (for both quality and discharge volume) at times when discharge occurs;
5) Workers will be advised of hygiene and safety standards during induction process.

12.3.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Visual inspection of drains, creeks and catchment areas for signs of spills/ contamination.	Daily	Site Supervisor	Site Diary

12.4 Air Quality

12.4.1 Objectives

- To minimise the impact to air quality from site operations.
- Ensure the relevant provisions of the Environmental Protection (Air) Policy 2008 are met.

12.4.2 Management & Control Measures

1) If requested or deemed necessary, air quality monitoring program or complaint-based monitoring to be undertaken;
2) Use of improved technology where practical to replace less efficient equipment Ensure that all relevant licences are in place and being met through confirmation by measurement;
3) Minimise or reduce the effect of air emissions (e.g. plant and equipment to be turned off to eliminate any unnecessary emissions);
4) Use of dust extraction/ suppression equipment where necessary;
5) Ensure roads, parking areas and stockpiles which generate dust are sealed/ covered where possible.

12.4.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Complaints register to be frequently reviewed.	Weekly	Project Manager	Complaints register.

Visual inspections to be undertaken on all items of plant to ensure that they are not producing harmful emissions.	Upon arrival to site	Site Supervisor	Plant owner/ operator to document in pre-plant inspection.

12.5 Noise & Vibration

12.5.1 Objectives

- To minimise so far as practicable:
  - Disturbance to people on site and fauna; and
  - Noise complaints.

12.5.2 Management & Control Measures

1) Where possible plant and machinery will be turned off to eliminate any unnecessary noise emissions, and the use of high efficiency mufflers and noise control equipment. Recommended noise levels outlined in AS2436: 1981;
2) Prior to the use of any major plant and equipment, ENAP will be responsible for corresponding permits to be issued to the operator of the machine. Hold points within this permit will ensure such licenses are in accordance with the machinery being used;
3) Hours of operation of all construction activities will be limited between the hours of 0600 and 1700 Monday to Saturdays (TBC). No construction works will occur on Sundays or Public Holidays without the prior permission of the client;
4) Ensure noise from the site does not exceed the following noise levels- LAeq (15 minute) of 44dB(A);
5) Where necessary, inform nearby residents of possible noise disturbance;
6) Ensure that construction equipment is maintained in line with manufacturers recommended service intervals.

12.5.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Complaints register to be frequently reviewed.	Weekly	Site Supervisor	Complaints register.
Visual inspections to be undertaken on all items of plant to ensure that they are not producing harmful emissions.	Upon arrival to site, and subsequently weekly; or if change to use or working area	Site Supervisor	HSE Form 25 Daily pre-start forms in equipment log book

12.6 Hazardous Substances

12.6.1 Objectives

- To reduce environmental impacts because of exposure to hazardous chemicals.

12.6.2 Management & Control Measures

1) All chemicals are to be managed in accordance with Safety Data Sheets sourced from chemical manufacturer or supplier;
2) All chemicals will be stored in sealed containers, bunded areas, roofed areas (where possible), fume/ explosion resistant cabinets with Safety Data Sheets kept nearby;
3) Site areas to be assessed for suitability of chemical storage;
4) Wherever possible, undertake refuelling off-site at approved refuelling locations;
5) Industrial standard spill kits to be located on site and inspected regularly. Staff to be trained in the use of spill kits.
6) Spills to be immediately managed and controlled via the use of bunding, sealing, containing and removing contaminated areas- all contaminated material to be appropriately disposed of.

12.6.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Chemical storage areas and spill kits will be inspected on a routine basis.	Weekly	Site Supervisor	Daily diary
General visual monitoring of worksite and activities to identify any potential spills or non-compliant storage/ handling	Daily	Site Supervisor	Daily diary

12.7 Contaminated Soils/ Land

12.7.1 Objectives

- To prevent contamination of soils/ Land;
    - Contaminated Soil is any soil that contains elements that are harmful to both the environment and to people. These can be both naturally occurring, through flora and fauna, or manmade contaminants;
- The objective is to prevent any cross contamination of affected and non-affected soils, as well as providing for the environmentally friendly disposal of any contaminated soils removed from site.

12.7.2 Management & Control Measures

1) Early identification of Contaminated soils through existing site documentation and registers (currently NIL)
2) Appropriate stockpiling with sediment controls of affected soils, separately to uncontaminated spoil;
3) ENAP will seek advice from the client or representatives regarding the site excavation depths and will conduct soil testing where ground disturbance or contaminated soils may cause environmental harm;
4) Any soils to be removed from site will be disposed of in an environmentally friendly way, with the clean soil to be re-used/ established wherever possible;
5) No fill material will be imported to or removed from site without confirmation, and where necessary certification is received regarding safety of materials; and

6) Any soil that is believed to be contaminated will be segregated and contained until further testing is complete.
7) Where necessary ENAP will rehabilitate the environment to a safe, stable, non-polluting and self-sustaining condition.

12.7.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Visual monitoring of soil when performing excavation activities or disturbance or importation/ removal/ relocation of soils and other materials.	As required	Site Supervisor/ Contractor	Site Diary

12.8 Waste Management & Housekeeping

12.8.1 Objectives

- To reduce environmental impact caused because of construction waste, which may include but not be limited to:
    - Concrete washout water (trucks and equipment); - skip bins
    - General site waste;
    - Bulk construction waste (road profiling/demolished concrete);
    - Recyclable materials;
    - Potential building materials containing asbestos;
    - Application of bituminous material; and
    - Other waste such as chemicals, materials and substances that may detrimentally impact the environment.

12.8.2 Management & Control Measures

1) Appropriate waste receptacles will be provided on site as required;
2) Characterise all waste streams and develop measures to:
    - Minimise site waste generation;
    - Segregate waste groups; and
    - Direct all recyclable/reusable wastes away from landfill wherever possible.
3) Silt removed from the settling ponds/ silt traps will be incorporated into product stockpiles or overburden materials for use in progressive reclamation.
4) All prescribed industrial waste (PIW) such as waste oil will be stored, and transported from the site, in accordance with EPA prescribed waste transport regulations and associated guidelines.
5) Housekeeping checks will include the following environmental issues:
    - Chemical and fuel bunding;
    - Bund content and drainage point valve in off position (and locked);
    - Spill clean-up and spill kit equipment contents;
    - Waste container labelling;
    - Tarping practices;
    - Road and vehicle cleanliness;

- Unusual noises;
- Visual dust presence of significance; and
- Segregation of inert type wastes from solid and from industrial wastes.

12.8.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Conduct a waste survey to establish the types, quantities and recycling/ re-use percentages for all site wastes.	Monthly	Project Manager	Monthly Survey
Waste receptacles will be inspected daily and emptied weekly.	Daily	Site Supervisor	Site Diary
Site inspections to review cleanliness of site including	Daily	Project Manager	Site Diary

12.9 Flora and Fauna & Waterways

12.9.1 Objectives

- To prevent any contamination of the waterway from construction activities
- To achieve a high-quality environment for native flora and fauna and to conserve the biodiversity of the area.

12.9.2 Management & Control Measures

1) Encapsulate any potential contamination drop zones when working near or over the Spencer Gulf
2) Identify existing vegetation in consultation with land owner/ client;
3) Ensure speed limits to site are commutated to workers and followed;
4) Food waste/ products to be correctly disposed of;
5) Employees must:
   - Not intentionally encourage wild animals with food or shelter;
   - Avoid contact with animals and not provoke any animals in any way;
   - Wear provided PPE and insect repellent where required;
   - Not intentionally remove or relocate plant substances from one location to another;
   - Not ingest any plant material; and
   - Inform their Supervisor if wildlife or potentially toxic/noxious plants are encountered.
6) Where necessary ENAP will rehabilitate the environment to a safe, stable, non-polluting and self-sustaining condition.

12.9.3 Monitoring & Reporting

Monitoring	Frequency	Person Responsible	Record
Before entering a property and commencing work on site, employees must conduct a visual inspection for animals and plants that may pose a potential risk in on site (e.g. snakes/ spiders/ fire ants).	As required.	All personnel	Daily pre-start

12.10 Environmental Rehabilitation

12.10.1 Rehabilitation

ENAP does not consider rehabilitation as something that begins towards the end of the operation, but rather a process that begins in the planning phase. To keep the disturbance footprint at minimum, ENAP aim to progressively rehabilitate the land to a safe, stable, non-polluting and self-sustaining condition.

ENAP will ensure that all rehabilitation has been completed satisfactorily to specified legislation and client's requirements prior to relinquishment. Where necessary, ENAP will remain responsible for the ongoing upkeep of certified areas until relinquishment.

13 Environmental Audit Program

13.1 Environmental Audits

The CEMP implementation system will be audited to ensure effective compliance with environmental controls, reporting and incident management requirements. The audits will occur a minimum of every 6 months throughout the project. This activity will be conducted through, but not limited to:

- A site visit;
- Review checklists;
- Compliance with the CEMP;
- Update on project status;
- Report on any onsite environmental incidents occurring since the last audit;
- Checks for any repeat issues; and
- Any new initiatives in environmental management.

The audits will be documented in a summary report. Audit reports raised will be provided to the Project Manager for determining corrective action and reply. On a 2 yearly basis the Project Manager shall undertake a management review of the CEMP process.

ENAP will develop and implement an auditing program upon request and agreement in contractual terms which may include an independent review of documentation, procedures and random inspections. The business procedure would be updated in response to any recommendations from compliance audits.

13.2 Environmental Monitoring

Continuous monitoring will be required during the construction. Where required measuring equipment used for monitoring shall be regularly serviced and calibrated.

13.3 Environmental Inspections

In addition to formal auditing and monitoring required as part of the construction project, the following inspections will also be undertaken:

On a daily basis, site supervisory staff will inspect the Site and any issues arising will be noted in the daily diaries and communicated to the Project Manager and client as necessary. The inspections will be conducted visually prior to commencement of each day's work and where appropriate during the working day. A final daily inspection will also be undertaken at the end of the workday to ensure that systems and structures are in place.

A weekly site inspection may be conducted by the Project Manager or delegate. Checklists may be used to record and report on activities for compliance with this CEMP and specific issues presenting significant environmental risks will be addressed, such as noisy works, sediment basin management.

Where necessary, any damage or reduced capacity of environmental control measures will be corrected. If required, environmental control measures may be upgraded.

14 Incident Management & Complaints

14.1 Environmental Incidents

An environmental incident is an unplanned event which occurs on site and has the potential to result in adverse environmental impacts either on site or in the surrounding area. Environmental incidents include spills, importation of unsuitable fill material, unintended damage to native vegetation, breaching of fenced off habitat areas or injury to wildlife.

Depending on the nature of the incident and the risk posed to site personnel, all practical steps will be taken to minimise the risk of environmental damage as soon as possible after the event.

In the case of an environmental incident, actions to be taken are:

- Notify the Site Supervisor;
- Immediately cease work in that area and remove people from the immediate area;
- Notify emergency services as/if required;
- Where safe to do so, attempt to contain the hazard and prevent it from spreading;
- If the incident is a spill:
  - Use silt fences, bunding or interception pits;
  - Use absorbent materials stored on site to clean up spill;
  - Contain contaminated soil/absorbent material waste in appropriate containers, and dispose of contaminated soil/absorbent material to an appropriately licensed offsite disposal facility;
- Notify any relevant agencies when an incident causes or threatens material harm to the environment or an exceedance of limit of the performance criteria in the approval or when legalisation requires;
- The Site Supervisor is to notify the client and Project Manager of any environmental incident;

- Temporarily repair or isolate the failed plant or equipment component;
- Sample the impacted site media be it soil and/or surface water; and
- Implement any longer term remedial measures that may be required.

14.2 Incident Notification

The Project Manager will be responsible for completion of the incident report which should include:

- Time, date, nature, duration and location of the incident;
- Location of the place where pollution is occurring or is likely to occur;
- Nature, the estimated quantity or volume and concentration of any pollutants involved;
- Circumstances in which the incident occurred (including the cause of the incident, if known); and
- Action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution.

In order to assist the Project Manager in providing the above information, the Site Supervisor is to collect and document (to the extent practicable) the above information and forward to the Project Manager. For example, this would include taking photographs, collecting surface water samples of any unplanned water discharges both from the source of the pollution and upstream and downstream in the receiving waterway (for analysis and comparison). Any spills or accidents, and the corrective actions undertaken, shall be documented in a Non-Conformance and Corrective Action Report.

14.3 Complaints Handling

The Site Supervisor is to be notified of any received complaints. The Site Supervisor or Project Manager (dependant on the method of complaint) is to complete the Complaints register as practicable and forward a copy to the Project Manager. The Project Manager will forward a copy to the client (if necessary).

The Site Supervisor/Project Manager is to investigate the complaint within 24 hours of the receipt of the complaint (whoever is better suited) and determine corrective actions. If warranted, immediate action will be instigated; otherwise action will be taken within 48 hours of receiving the complaint. Upon completion of the investigation, the client will firstly be notified, and a decision will made to notify the lodger of the complaint regarding any action taken.

14.4 Environmental Incidents Register

The Environmental Incidents Register will detail the issue, the corrective and preventative actions proposed, and the responsibilities and timing for completion of the actions. The register will include any comments and the completion date of corrective actions.

The Project Manager shall review the Environmental Incidents Register monthly to ensure actions are completed and that controls are performing effectively. The Project Manager shall also review the CEMP to determine if the above situations require project scope changes or if the incident identifies opportunities for improvement in mitigations or work practices.

15 Non-conformance

15.1 Non-Conformance and Corrective Action Register

All non-conformances noted in the Site Inspections, Audits, Incident Reports, or reported to the Project Manager by staff or other parties/authorities will be investigated and recorded. Details of the non-conformance, including any immediate corrective actions undertaken, are to be recorded by the Project Manager. All non-conformances are to be recorded in a Non-Conformance and Corrective Action Register.

It is the responsibility of the Project Manager to immediately initiate corrective actions. The Non-Conformance and Corrective Action Register must include details of the corrective action proposed and an appropriate close out date. Corrective Actions will include containment measures, clean-up and restoration of the affected area and of any deficient operational controls or monitoring controls. On completion, the Project Manager will re-inspect the outcomes to ensure that they are acceptable and update the Non-Conformance and Corrective Action Register. The occurrence of such an event will be brought to the attention of personnel responsible, and environmental controls will be updated to prevent a reoccurrence.

Appendix A- Site Layout Plan

LAYOUT TO COME – once determined by Client

Construction activities will take place on both the wharf and mainland. Special care must be taken when working over or near the water.