

E4

IMPACT SUMMARY & MANAGEMENT FRAMEWORK

DREDGE MANAGEMENT PLAN



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4.1 INTRODUCTION

4.1.1 Environmental management framework

The Environmental Impact Statement (EIS) presents an integrated framework for environmental management. This framework is shown in **Figure 4.1a**.

Activities involving or associated with dredging operations, including management of the dredge pump out mooring and pipeline, management of dredge tailwater during land reclamation and similar activities that would be managed by the dredge contractor are dealt with in this Chapter E4 – Dredge Management Plan (DMP).

Non-dredging aspects of the project are covered by the Environmental Management Plan (EMP) (Chapter E3) which includes activities both on the airport site and surrounds during the construction and operational phases of the project.

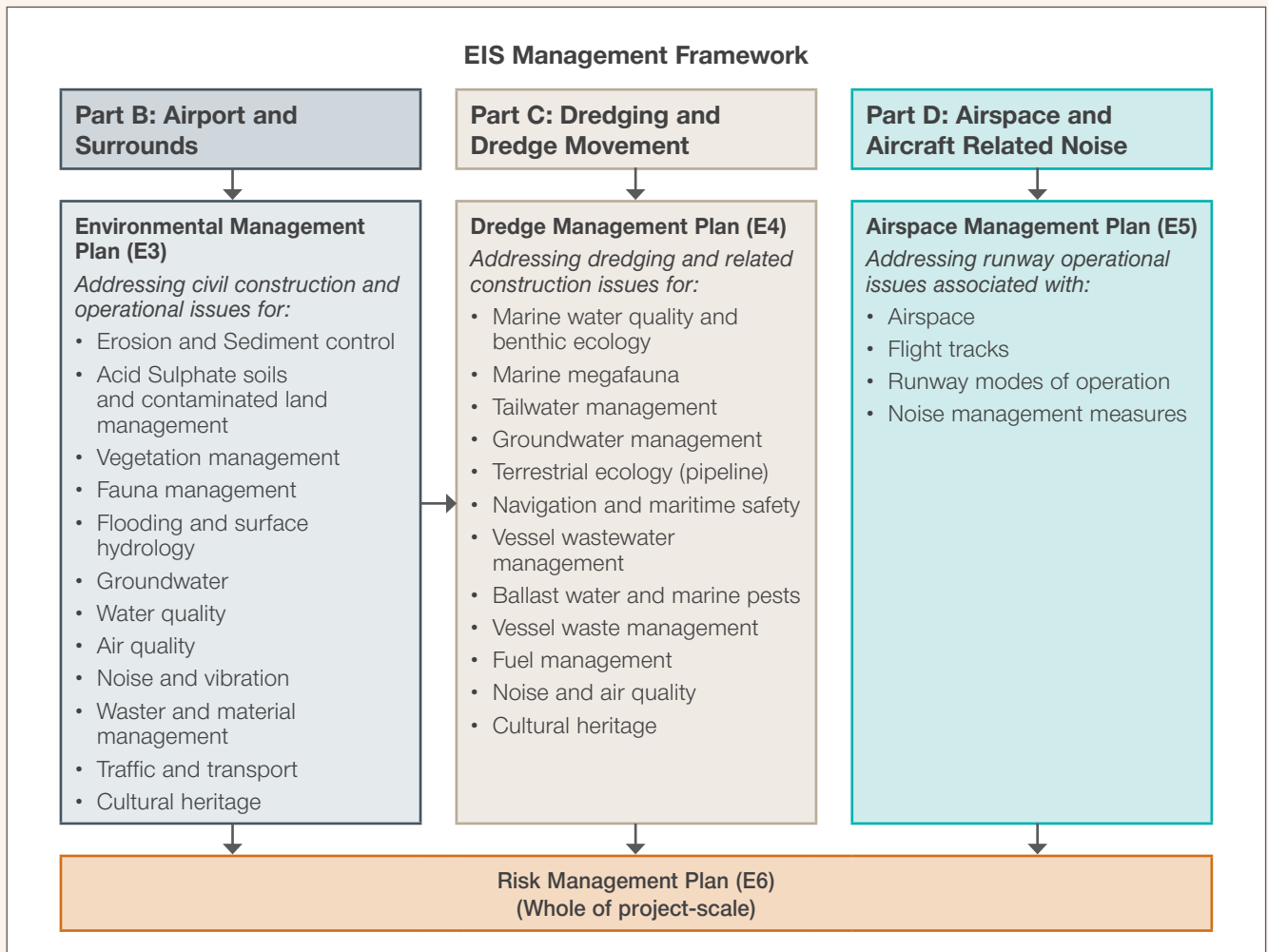
This includes civil works associated with master drainage, preparing the site to accept sandfill material, flood mitigation, bulk earthworks, vegetation clearance and rehabilitation of land that would be addressed by a civil contractor and/or the Sunshine Coast Airport (SCA) as operator of the airport.

4.1.2 Purpose, scope and objectives

The purpose of this DMP is to identify the preferred means of addressing environmental issues associated with dredging operations for the Sunshine Coast Airport Expansion Project (the Project), with respect to the following activities: sand dredging, vessel movements, mooring and dredge pipeline installation, operation, and decommissioning and the management of dredge tailwater.

In general, the DMP reflects and/or provides a greater level of detail to mitigation and monitoring commitments discussed in the preceding chapters of the EIS. This is achieved by setting out the framework for management, mitigation and monitoring of relevant impacts of the action within issue-specific management plans.

Figure 4.1a: Environmental management framework used in the EIS



The high level objectives of this DMP are:

- To minimise, monitor and manage water quality impacts attributable to dredging operations
- To avoid or otherwise minimise adverse impacts on estuarine (i.e. in Marcoola Drain and Maroochy River) and marine flora and fauna during dredging operations.
- To identify and adopt best practice management practices for the following:
 - handling and storage of all waste materials on the dredge vessel
 - handling and management of fuel and wastewater transfer operations
 - reducing the risk of translocation of organisms in ballast water or on the hull of the dredge vessel
 - minimising nuisance noise from the dredging on surrounding facilities, users and visitors
 - minimising air emissions produced during dredging operations and thereby minimise potential effects on the airshed.
- To minimise the risk of an environmental incident occurring associated with the dredging operations such as an oil spill, vessel collision or similar
- To ensure any cultural heritage requirements are observed by the dredge contractor.

4.1.3 Relationship with future approvals

Like the EMP, the DMP is a framework document to guide future activities and decision-making. The DMP contains procedures, guidance, commitments to monitoring and other environmental management measures that will be required to be carried through into more detailed approvals (such as tidal works approvals under the *Sustainable Planning Act 2009*) that are to be obtained by the proponent (SCA) and by the future dredge contractor.

Accordingly, if approved, the commitments to management, mitigation and monitoring within this DMP will be included as part of SCA's contract requirements with the future dredge contractor to ensure the commitments are addressed as part of that contractor's operational environmental management plans and systems.

However, it is recognised that compliance with the requirements of the DMP does not remove general obligations and responsibilities under relevant legislative approvals or permits obtained for the project including any relevant conditions of approval under Federal and/or State legislation.

4.1.4 Roles and responsibilities under this DMP

The principal entities and their roles and responsibilities under the DMP are as follows:

Sunshine Coast Council (SCC)

SCC is the proponent and overall project administrator of the development through the Sunshine Coast Airport (SCA). Following the EIS process, SCA will be responsible for obtaining more detailed approvals under State legislation to carry out the works and will prepare the contract documentation for appointment of a dredge contractor. The contract documentation will include copies of all approval commitments, conditions and requirements.

To oversee construction and dredging phases, it is expected that SCA will appoint an internal or external Superintendent to oversee the works and to manage the dredge contractor. Monitoring and auditing of the dredge contractor during construction may be done by SCA, by a consultant appointed by SCA or by an independent third party depending on the resultant conditions of approvals.

Dredge contractor

The dredge contractor will be responsible for preparation of more detailed plans of operation for the dredging, implementation of their environmental management systems, compliance with all conditions of approval and monitoring and reporting of their activities back to the proponent and/or environmental agencies. Depending on the procurement model, the contractor may also undertake the detailed design and obtain approvals for specific project components such as the dredge mooring as well as undertaking construction.

4.1.5 Relevant legislation, policies and plans

The DMP has been specifically developed in accordance with, and taking into account legislative requirements set out in Acts and Regulations at Commonwealth and State level that are listed below. Further, while consents and approvals have not yet been issued for the project, the DMP has been developed to address issues likely to be conditioned as part of the permit approvals process.

Commonwealth legislation considered in development of this DMP (including Acts implementing relevant international conventions) includes:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*.

The following State legislation is relevant to the proposed dredging:

- *State Development and Public Works Organisation Act 1971*
- *Coastal Protection and Management Act 1995* and draft State Coastal Plan (2013)
- *Environmental Protection Act 1994* (EP Act) and Environmental Protection Policies

- *Fisheries Act 1994* and Regulations
- *Marine Parks Act 2004*, Regulations and Moreton Bay Marine Park Zoning Plan
- *Transport Operations (Marine Safety) Act 1994* and Regulations
- *Transport Operations (Marine Pollution) Act 1995* and Regulations
- *Land Act 1994*
- *Nature Conservation Act 1992* and Conservation Plans
- *Sustainable Planning Act 2009* and Regulations.

4.2 PLAN OF OPERATIONS

4.2.1 Project overview

The proposed Project requires approximately 1.1 Mm³ of fill material for construction of the proposed new runway and taxiway system. It is proposed to source sand from the Spitfire Realignment Channel using a Trailer Suction Hopper Dredge (TSHD) and transporting to a pump-out mooring located offshore of the SCA. The sand will be hydraulically pumped ashore via a delivery pipeline to the sand placement area.

The Spitfire Realignment Channel is an area of proposed dredging by the Port of Brisbane Pty Ltd (PBPL), which once complete, will remove a dogleg from the existing shipping channels, resulting in a channel that will ultimately be 500 m wide and to a depth of -16.5 m Chart Datum (CD). PBPL has a 15 Mm³ allocation to dredge the realignment channel for use as fill and reclamation.

SCA has been in consultation with PBPL to identify opportunities for a combined sand extraction area at the Spitfire Realignment Channel for the Project and PBPL's current allocation. PBPL has indicated a preference for a shared dredging footprint that would be extended deeper than PBPL's current approved dredging footprint, rather than wider. As dredging for the Project is likely to occur before PBPL undertakes any major dredging of the realignment, PBPL have indicated that it would be preferable for the SCA dredging to form a 'shallow' 300 m wide channel within the overall realignment channel footprint. This may then allow the realignment to be used for navigation by some vessels.

Based on bathymetry of the seabed surveyed in 2010, a 1.1 Mm³ allocation would provide a 300 m wide channel to an average depth of approximately -11.55 m CD as shown in **Figure 4.2a**. The final level will depend on any prior dredging undertaken by PBPL, the final fill volume required for the Project and the quality of sand within the footprint.

To develop a combined extraction area of 16.1 Mm³ (i.e. PBPL's 15 Mm³ allocation and 1.1 Mm³ for the Project) the base of the realignment would need to extend to approximately -17.05 m CD as shown in **Figure 4.2b**.

Chapter C2 describes the baseline geotechnical and geophysical conditions of the Spitfire Realignment Channel. It also describes the engineering qualities of the material in the Spitfire Realignment Channel based on existing geotechnical information.

Based on the interpretation of the information available at the time of the EIS, the Spitfire Realignment Channel was assessed as likely to yield sufficient quantity of sand (1.1 Mm³) that will be suitable for the Project. The dredged material will comprise predominantly medium-grained sand.

A desktop assessment of the conditions at the Spitfire Realignment Channel, detailed in Chapter C2, indicates that the likelihood of sediment contamination is negligible within the dredge footprint and the material is clean sand with a very small fines fraction (<6%).

4.2.2 Description of plant to be used

As discussed above the appropriate dredge vessel for the channel dredging will be a TSHD. A TSHD is a mobile type of dredger that removes seabed material as it travels using a trailing suction draghead connected by a suspended suction pipe to inboard pumps. Dredged material is stored in the on-board hopper compartment and is transported to the pump-out for discharge to the runway site by the TSHD. Because of the large volume of material that can be stored in the on-board hoppers, and the relatively high travel speed of the vessel, this type of dredger is most economically suited to dredging long and shallow lengths of seabed and for conveying material long distances to the required destination. A TSHD is also suited to dredging in areas where stationary plant or anchored equipment would interrupt navigation.

Given that TSHDs excavate seabed materials by suction, the technique is best suited to dredging of unconsolidated materials such as the sand material expected in the Spitfire Realignment Channel.

4.2.3 Dredge cycle – elements of this DMP

The key elements of the dredge cycle covered by this DMP are as follows:

4.2.3.1 Sand dredging operations at the borrow site

The dredging operations at the borrow site will involve hydraulically extracting sand mixed with water from the seabed in the Spitfire Realignment Channel using one or two trailing suction pipes and loading into the vessel's hopper until the vessel is filled to the optimum level. These operations will be undertaken by a TSHD working during most weather conditions.

Figure 4.2a: Indicative dredge footprint based on 2010 seabed bathymetry: 300 m wide channel to depth of approximately -11.55 m CD

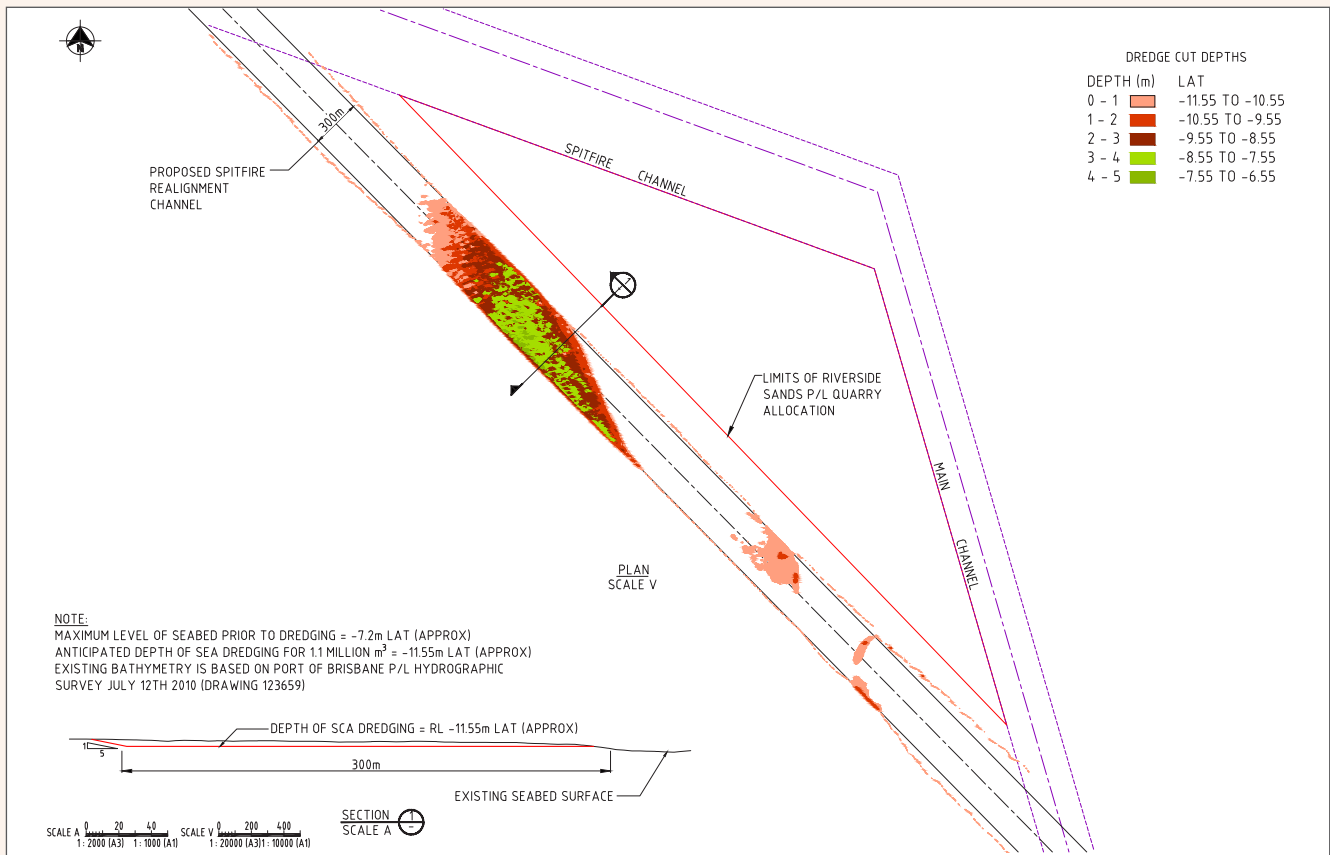
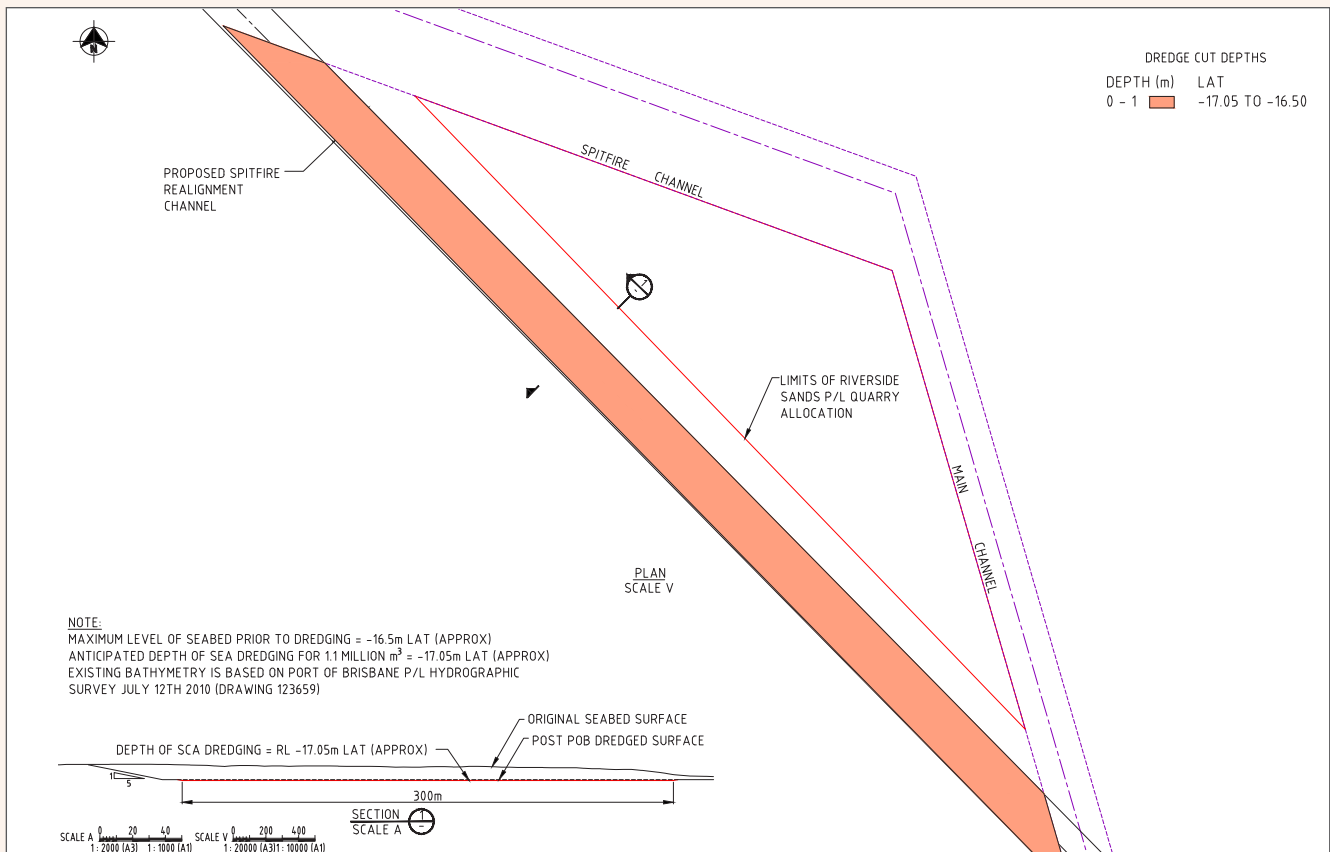


Figure 4.2b: Indicative dredge footprint for dredging undertaken after PBPL sand allocation extracted: 500 m wide channel to approximately 17.05 m CD



4.2.3.2 Vessel transit issues

Once the hopper of the dredge vessel is filled, it will transit the designated shipping channels to the extent of the Port limits off Caloundra at Point Cartwright (Fairway Beacon). From here it will take the most direct route to the pump-out mooring site offshore of Marcoola beach. The final navigation route will be determined through consultation between the dredge contractor and Maritime Safety Queensland (MSQ)/Regional Harbour Master (RHM).

It is expected that the dredge vessel will experience some delays navigating to and from the site because of interactions with shipping traffic at the Port of Brisbane but such delays are not significant and do not pose risks to maritime navigation.

4.2.3.3 Establishment and operations at the pump out site

The pump-out point will be located approximately 600 m to 1000 m offshore from Marcoola beach, selected as the providing the shortest distance of offshore pipeline. A temporary mooring will be established here to allow the TSHD to couple to a floating pipeline and to pump the sand-water slurry to the runway site. A tug will be in attendance at the pump-out to assist with manoeuvring.

A steel pipeline will be laid on the seabed where it will be coupled to a length of flexible pipeline that transitions to a fully floating pipeline near the pump out. From the shore, the pipeline runs inland across the beach dunes at Marcoola under David Low Way, and through to the runway site. The alignment of the dredge pipeline is described in Chapter A4.

4.2.3.4 Pipeline establishment, maintenance and decommissioning

While several techniques may be used to discharge sandfill material from a TSHD, given the distance from the ocean to the new runway location, pump-out via a pipeline is the only suitable option for the Project. Under this scenario, the sand in the hopper is fluidised with water and pumped to the runway site. Typically, the larger a dredge, the greater the on-board pumping capacity; consequently, larger dredgers can normally pump greater distances than smaller dredgers.

4.2.3.5 Site filling, tailwater and groundwater management

The runway area will be lined with a high-density polyethylene (HDPE) liner to prevent percolation of salt water into the underlying groundwater. The liner will cover the entire reclamation area except in a surcharge area and the polishing pond at the north-western end of the runway where the underlying clays act as a natural barrier, reducing the potential infiltration of saltwater and groundwater.

It is anticipated that the general filling sequence will be from south-east to north-west, which is the general direction of the slope of the existing ground. The filling process will entail the TSHD pumping the sand and water slurry mix through the main sand delivery pipeline, which will be split into a number of branch pipes in a banded placement area. The sand will settle close to the end of the delivery pipes with the tailwater being directed into a polishing pond before being discharged to Mt Coolum Creek via the northern perimeter drain.

4.3 GENERAL REQUIREMENTS – DREDGE MANAGEMENT

This section of the document outlines the general environmental requirements of the DMP that a future dredge contractor would be expected to fulfil. The SCA's role with respect to this section would be to ensure these requirements are addressed and met by the contractor as part of project planning to ensure activities are being carried out consistently with the commitment outlined in the this DMP, relevant conditions of approval, and any existing procedures or protocols within Port limits or as directed by the MSQ/RHM.

Section E4.4 of the DMP identifies particular elements and management plans for the dredging activity under which there are specific requirements that will need to be met in addition to the general requirements outlined below.

General Requirements – Sand Dredging

Objective	To ensure sand dredging operations and associated activities comply with relevant environmental duties and obligations as set out in Queensland legislation and with environmental permit requirements
Performance Criteria	Not applicable to this section of the DMP.
Implementation Strategy	<p>The dredge contractor will need to address the following requirements:</p> <p>General method statement</p> <p>A general method statement will need to be prepared outlining the intended scope of works and methodology to be employed. At a minimum, the method statement should include the following:</p> <ul style="list-style-type: none"> • Introduction • Description of the general scope of works (noting this may need to be by stage only) • References to international dredging standards company standards (such as quality, occupational health and safety and environment management systems), how they apply to the current project and any other project specific document • Responsibilities of the contractor and key staff (on the dredge vessel and on shore) • A clear map of the areas where the proposed dredging activities are to take place consistent with regulatory approvals • A general description of the dredging process and the specifics of the plant to be used in the dredging process including the proposed dredging methods, dredging control, dredging patterns, vessel navigation routes to be used and vessel operations while at the pump out location including ancillary activities such as waste management and fuel bunkering • Specific method statements in accordance with the requirements outlined in Section E4.4 of this DMP. <p>Site-based environmental management plan (dredge operations)</p> <p>Regulatory permits will likely require preparation of a site-based EMP related to the dredging operation to be submitted to the relevant regulatory agencies (e.g. Department of Environment and Heritage Protection (DEHP). The management plan (hereafter referred to as the 'Dredge Operations' EMP) must address the following:</p> <ul style="list-style-type: none"> • Environmental commitments – including a commitment by senior management of the contractor to achieve specified and relevant environmental goals • Identification of environmental issues and potential impacts • Control measures for routine operations to minimise the likelihood of environmental harm • Contingency plans and emergency procedures for non-routine situations • Organisational structure and responsibility • Effective communication • Monitoring of contaminant releases • Conducting environmental assessments • Staff training • Record keeping • Periodic review of environmental performance and continual improvement. <p>In addition the general requirements above, the Dredge Operations EMP must also address specific requirements (such as water quality monitoring) as outlined in Section E4.4 of this DMP.</p> <p>Maintenance of measures, plant and equipment</p> <p>The dredge contractor must ensure that all measures, plant and equipment necessary to undertake the activity are operated and maintained in a proper and efficient condition.</p> <p>This includes appropriate servicing and maintenance of engines and emission control devices such that emissions comply with relevant guidelines and standards.</p> <p>Complaint response (general requirements)</p> <p>All complaints received by the dredge contractor related to environmental issues such as noise, air, or water quality must be recorded including investigations undertaken, conclusions formed and actions taken. Notification about the complaint and any associated response must be provided to SCA in a timely fashion.</p>

General Requirements – Sand Dredging

Implementation Strategy (continued)

Complaint response (general requirements) (continued)

The complaint response procedure will include:

- The time, date, name and contact details of the complainant
- Reasons for the complaint
- Any investigations undertaken
- Conclusions formed
- Any actions taken.

Reasonable and practicable measures

The dredge contractor must take all reasonable and practicable measures to prevent and/or minimise the likelihood of environmental harm being caused.

Notification of environmental harm

The contractor is responsible for its notification obligations under the Queensland EP Act including notifying DEHP if it becomes aware that material or serious environmental harm is caused or likely.

Notifications of commencement

The contractor must inform SCA of its intention to commence dredging within an appropriate timeframe, to be determined.

Insurances

The dredge contractor will be responsible for taking out and maintaining public liability and other insurances. Copies of the insurance covers must be provided to SCA prior to the commencement of works.

Signage

Before dredging commences and during the whole operation, the dredge contractor will be responsible for displaying a sign at the site of dredge pump-out that shows the name of the dredge vessel and the relevant permit numbers (to be provided).

Record of monitoring

The dredge contractor must keep records of all monitoring results required by SCA or as part of regulatory agency permit requirements. Specific monitoring requirements and the frequency of reporting are contained in Section E4.4.

Record of dredging volumes and monthly reports

The dredge contractor must keep records on the volume and size distribution of material removed from the approved dredge footprint area. This must be summarised in a monthly report and provided to SCA within 5 working days after the end of each month that the dredge is operating.

Monitoring

There are no specific monitoring requirements as part of this section of the DMP.

Reporting

The documentation outlined in the Implementation Strategy above will need to be to the satisfaction of regulatory agencies. Copies of all plans will be provided to SCA for review prior to lodgement with authorities.

A weekly report about dredging operations must be provided by the contractor to SCA as outlined above. Other specific reporting requirements are outlined in Section E4.4 of this DMP.

Auditing

All relevant documentation outlined in the Implementation Strategy must be lodged and confirmed as approved by regulatory agencies prior to commencing work. Proof of this must be provided to SCA.

SCA staff will also carry at least one audit of the contractor during major capital dredging operations to ensure documentation and performance against the general requirements are being met.

Additional auditing requirements are outlined in Section E4.4 of this DMP.

Corrective Action

Corrective action will be required in the context of the findings of the audits or in the context of any issues raised by regulatory bodies.

Corrective actions may also be required as a result of complaints from the community in accordance with the complaint response process outlined above.

4.4 ENVIRONMENTAL STRATEGIES AND MANAGEMENT PLANS

4.4.1 General

This section of the DMP identifies specific environmental strategies and management plans (EMPs) related to the dredging, vessel movements, dredge pump out, installation and operation of the dredge pipeline and site water management (surface and ground) during reclamation that will need to be addressed by the dredge contractor.

Unless specifically stated, commitments to activities such as environmental monitoring may be undertaken by the contractor, by SCA or by a third party contracted by SCA depending on the procurement approach taken for the works. As such, the focus of the DMP is an outline of the management and monitoring commitments and performance requirements with the responsibility for implementing the commitments to be developed as part of the procurement strategy for the project and subsequently as part of the operational dredge management plan in consultation with relevant agencies.

The requirements in this section are intended to apply in addition to the general requirements outlined in Section E4.3 of this DMP and in most cases will need to be integrated within broader site-based management plans and documentation and adapted to meet any conditions of approval imposed on the dredging activity under relevant legislation (including the EPBC Act and relevant State legislation).

SCA's role with respect to this section would be to ensure these requirements are addressed by its appointed dredge contractor as part of project planning and to ensure activities are being carried out consistently with any existing procedures or protocols or under relevant corporate environmental policies or strategies.

4.4.2 Purpose

The purpose of the environmental strategies and management plans are to:

- Identify potential and actual environmental aspects and impacts associated with the works.
- Describe the appropriate measures to prevent, monitor and manage all possible effects.
- Indicate the corrective action(s) to be undertaken if an undesirable impact or unforeseen level of impact occurs.

4.4.3 Elements and structure

The following are the key elements that make up this DMP:

- Marine water quality and benthic ecology
- Marine megafauna management
- Tailwater management
- Groundwater management
- Terrestrial ecology (pipeline)

- Navigation and maritime safety
- Vessel wastewater management
- Ballast water and marine pest incursion
- Vessel waste management
- Fuel and oil management
- Noise and air quality
- Cultural heritage requirements.

The structure used for each of these DMP elements is as follows:

Objective

A description of the environmental values associated with the element to be protected, enhanced and/or managed.

Management action

Outlines the strategies, tasks or action program (to nominated operational design standards) that would be implemented to achieve the performance criteria. Other measures may be taken but they must achieve the performance criteria.

Responsibility and timing

Nominates responsible parties for implementing the environmental management actions/measures and timing information where relevant.

Performance requirements

Outlines measurable performance criteria (outcomes) for each element/scope of works. The criteria include the proponent's commitments to acceptable levels of environmental performance, including environmental objectives, performance standards and associated measurable indicators, performance monitoring and reporting.

Monitoring

Describes the monitoring requirements to measure actual performance. These include monitoring parameters, points, frequency, response trigger values and response activities. Where relevant, indicators have been identified for monitoring before, during construction and/or during operation of the Project, to demonstrate the extent of achievement of the objective.

Reporting

Defines the format, timing and responsibility for reporting of monitoring results.

The DMP also includes an auditing protocol, relevant to each element where relevant. This will outline requirements to demonstrate implementation of agreed construction and operation environmental management strategies and compliance with agreed performance criteria.

Corrective action

Lists the corrective actions (options) to be implemented in case a performance requirement is not reached and the person(s) responsible for each action (including staff authority and responsibility management structure).

Objective: To ensure that water quality in areas surrounding the dredging footprint are not unduly or permanently affected by dredging operations.

Statutory requirement

- *Environmental Protection Act 1994* and Environmental Protection (Water) Policy 1997
- *Marine Parks Act 2004* and Marine Park (Moreton Bay) Zoning Plan 1996
- *Coastal Protection and Management Act 1995* and Coastal Management Plans
- *Fisheries Act 1994*.

Management action

- The Dredge Contractor will develop and implement a reactive monitoring plan which will include (but is not limited to) the following:
 - Description of the dredge vessel including discharge points for turbid waters.
 - Methodology for turbidity monitoring to be undertaken at the two monitoring locations listed in the monitoring requirements discussed below.
 - Methodology for monitoring work that will be undertaken to determine if the plume is consistent with the modelling and investigations undertaken in the EIS process.
 - Methods for processing the measured data; and
 - A report interpreting monitoring results.
- Additionally, the vessel is to be configured with a green valve to further reduce surface sediment and turbidity plumes.
 - The Dredge Contractors is to operate at all times within the approved footprint.

Responsibility

The Project Manager will be responsible for reviewing online compliance reports generated by the auditing system and reports provided by the dredge contractor. If consecutive exceedances are observed by the SCA Project Manager, they are to investigate whether the exceedances were related to natural events or dredge activity.

Timing

A report interpreting monitoring results must be provided to DEHP and Sunshine Coast Airport (SCA) within forty (40) business days of the completion of dredging operations. The report is to include any outcomes or contingency actions undertaken in response to the monitoring results.

Performance requirement

Turbidity shall not continuously exceed 6 NTU at the Marine National Park Zone 03 area for more than 1 hour during any dredge cycle (assumed to be ~8 hours).

Monitoring

Specific performance criteria relating to dredging include the geographic location of the monitoring instruments and turbidity limits that must not be exceeded in areas which have been deemed to be of environmental importance.

- Turbidity sensors are to be installed at locations that will facilitate the capture of representative water quality conditions at the primary area of environmental value. This area is the Marine National Park Zone 03 HEV site situated to the north of the Spitfire Realignment Channel. This sensor should be located at:
 - 27.00 South
 - 153.27 East.
- A control location demonstrating similar background conditions, but located sufficiently distant to the Spitfire Realignment Channel, should be located at:
 - 27.10 South
 - 153.26 East.
- The final location of the turbidity sensors will be agreed with MSQ
- Turbidity sensors will be of the following specifications for real-time, reactive turbidity monitoring:
 - Sensor elevation - 0.5m above the seabed.
 - Monitoring frequency – 5 minutes intervals throughout the dredge campaign.
 - Calibrated to turbidity in units of Nephelometric Turbidity Units (NTU).
 - Coupled telemetry equipment to allow the measurements to be made available to an online system/ central computer in real time.
- The following additional conditions should apply to the monitoring of turbidity:
 - Recommended servicing for each of the instruments is to be conducted weekly during September to March and fortnightly for all other months. On every second service event, measurements using a turbidity probe are to be taken next to each instrument. These measurements are required to validate the instrument readings to determine if re-calibration is required.
 - Instruments used in this monitoring activity are to be certified, calibrated, and appropriately maintained, and are to have supporting certificates presentable to SCA or regulatory agencies on demand.
 - The instruments are to be re-calibrated every six months they are in operation, or more frequently if issues are noted and require corrective actions.
 - Monitoring must be done in accordance with methods prescribed in DERM's 'Monitoring and Sampling Manual 2009'.
 - All measurements are to be sent to a central computer/network in real time. Access to online measurements is to be made available to SCA throughout the dredge campaign.
- Separate to impact monitoring described above, monitoring will be undertaken specifically targeted at validation of the dredge plume source assumptions that underpin the water quality impact assessments. This 'validation' monitoring would be undertaken twice during the dredging operation:
 - during a representative summer period
 - during a representative winter period.
- The methodologies associated with this monitoring component will be governed by the goal of obtaining data for the dredge plume model validation. It is likely to involve a combination of vessel-mounted ADCP (or similar) and in-situ water quality measurements and sampling for laboratory analysis, specifically targeted at characterising the dredge plume spatial dimensions on top of the ambient suspended sediment climate.

Reporting

- The Dredge Contactor is responsible for downloading and summarising all monitoring results into a data register on a weekly basis. On completion of the dredge operations, the register is to be archived and kept for a minimum of five (5) years. The weekly report is to include information of turbidity comparisons between the impact and reference monitoring sites.
- The Dredge Contactor is to provide a report interpreting monitoring results within forty (40) business days of the completion of dredging operations. The report is to include a summary of all monitoring results, details of any dredge cycles that did not comply with conditions and any contingency actions undertaken to avoid non-compliance during dredge runs from reoccurring.
- On completion of each dredge cycle, the Dredge Contractor is responsible for reviewing the results produced by the auditing system to determine whether the dredge run complied with the conditions set forth in the performance criteria.

Corrective action

If it is identified by the auditing system that a dredge cycle did not comply with the limits specified in the Performance Criteria above the following hierarchy of actions are to be undertaken by the Dredge Contractor:

1. The Dredge Contractor / Environmental manager is to immediately investigate reasons leading to the non-compliance. This may involve comparing turbidity from the incident instruments at the HEV location with data measured at the corresponding reference sites. If measurements taken at the reference site are also elevated, then it is likely that the non-compliance was a result of natural events.
2. If it is determined that the non-compliance was not a result of natural events the Dredge Contractor is to notify DEHP and SCA immediately. The dredge master is then required to undertake contingency actions to avoid a non-compliant dredge run reoccurring a consecutive time. This may include:
 - dredging an area of the dredge footprint away from the environmentally sensitive areas
 - dredging against the flow of the tidal currents in order to reduce the size of the dredge plume.

The Dredge Contractor may also be required to alter the dredging pattern or methodology if the weekly turbidity analysis shows demonstrated or persistent impacts. Any suggested changes to dredging approaches to turbidity impacts should be notified to SCA as part of weekly reporting.

- If monitoring instruments are damaged, lost, stolen or become faulty, they are to be repaired or replaced immediately. The Dredge Contractor is to investigate how the instruments were damaged or lost as well as additional equipment or exclusion zones required to prevent similar incidents re-occurring.

Responsibility

The Project Manager will be responsible for reviewing online compliance reports generated by the auditing system and reports provided by the dredge contractor. If consecutive exceedances are observed by the SCA Project Manager, they are to investigate whether the exceedances were related to natural events or dredge activity.

Timing

Timing of monitoring is as stated above.

4.4.4 Marine water quality and benthic ecology

This section outlines the management actions necessary to mitigate impacts to marine water quality and benthic ecology. Water quality impacts are concerned mostly with the generation of a dredge plume and the resuspension of sediments during the dredging operations. These impacts to marine water quality also impact on benthic ecology. Other impacts to benthic ecology are managed by the selection of a dredge footprint and so are not covered in this management plan.

For management actions related to spills and the storage of hazardous materials, see 4.4.10, 4.4.12 and 4.4.13.

Applicability of the Element within the Dredge Cycle

Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
x		x	x	

Objective: To control the impact of dredge plumes on marine water quality and to minimise the impacts of changed water quality on benthic ecology in the vicinity of the dredge footprint

Management action (see Chapter C3)	Responsibility	Timing
A short-term model validation water quality monitoring program similar to Volvox Asia ¹ will be developed to validate model findings for water quality in the EIS (see Chapter C3)	SCA	Prior to commencement and during dredging works
The dredge contractor will develop and implement a reactive monitoring plan which will include (but is not limited to) the following: <ul style="list-style-type: none"> Description of the dredge vessel including discharge points for turbid waters Methodology for turbidity monitoring to be undertaken at the two monitoring locations listed in the monitoring requirements discussed below Methodology for monitoring work that will be undertaken to determine if the plume is consistent with the modelling and investigations undertaken in the EIS process Methods for processing the measured data A report interpreting monitoring results. 	Dredge contractor. The Project Superintendent	Prior to commencement of dredging works
The vessel will be fitted with green valves to further reduce surface water turbidity impacts.	Dredge contractor	Continual throughout dredge vessel operation and carriage

Performance requirements:

- Turbidity must not continuously exceed 6 Nephelometric Turbidity Units (NTU) at the Marine National Park Zone 03 area for more than one (1) hour during any dredge cycle (assumed to be ~8 hours). Any exceedance is a trigger for implementation of corrective actions as outlined below.²

¹ Chapter C3 describes the results of a monitoring program based on the 2008 Volvox Asia (a medium-sized TSHD with hopper capacity of 8000 m³) dredge campaign in the Spitfire Realignment Channel. This campaign is provided as a comparable reference for the Project dredging campaign.

² This trigger value (6 NTU) has been derived based on evaluation of modelling outputs at the Marine National Park Zone boundary, showing predicted turbidity not exceeding 6 NTU. This value is also consistent with expected turbidity values measured during a comparable dredge campaign by the Volvox Asia for the Spitfire Realignment Channel in 2008. See further Chapter C3.

Objective: To control the impact of dredge plumes on marine water quality and to minimise the impacts of changed water quality on benthic ecology in the vicinity of the dredge footprint

Reactive Monitoring:

- Turbidity sensors are to be installed at locations that will facilitate the capture of representative water quality conditions at the primary area of environmental value. This area is the Marine National Park Zone 03 High Ecological Value (HEV) site situated to the north of the Spitfire Realignment Channel. This sensor should be located at:
 - 27.00 South
 - 153.27 East.
- A control location demonstrating similar background conditions, but located sufficiently distant to the Spitfire Realignment channel, should be located at:
 - 27.10 South
 - 153.26 East.
- Turbidity sensors will be of the following specifications for real-time, reactive turbidity monitoring:
 - Sensor elevation – 0.5 m above the seabed
 - Monitoring frequency – 5 minutes intervals throughout the dredge campaign
 - Calibrated to turbidity in units of NTU
 - Coupled telemetry equipment to allow the measurements to be made available to an online system/central computer in real time.
- The following additional conditions should apply to the monitoring of turbidity:
 - Depending on the timing of the campaign, recommended servicing for each of the instruments is to be conducted weekly during September to March and fortnightly for all other months. On every second service event, measurements using a turbidity probe are to be taken next to each instrument. These measurements are required to validate the instrument readings to determine if re-calibration is required
 - Instruments used in this monitoring activity are to be certified, calibrated, and appropriately maintained, and are to have supporting certificates presentable to SCA or regulatory agencies on demand
 - The instruments are to be re-calibrated every six months they are in operation or more frequently if issues are noted and require corrective actions
 - Monitoring must be done in accordance with methods prescribed in the Department of Environment and Resource Management's (DERM) Monitoring and Sampling Manual 2009
 - All measurements are to be sent to a central computer/network in real time. Access to online measurements is to be made available to SCA throughout the dredge campaign.

Validation Monitoring:

- Separate to impact monitoring described above, monitoring will be undertaken specifically targeted at validation of the dredge plume source assumptions that underpin the water quality impact assessments. This "validation" monitoring would be undertaken twice during the dredging operation:
 - During a representative summer period
 - During a representative winter period.
- The methodology associated with this monitoring component will be governed by the goal of obtaining data for the dredge plume model validation. It is likely to involve a combination of vessel-mounted Acoustic Doppler Current Profiler (ADCP) (or similar) and in-situ water quality measurements and sampling for laboratory analysis, specifically targeted at characterising the dredge plume spatial dimensions on top of the ambient suspended sediment climate.

Objective: To control the impact of dredge plumes on marine water quality and to minimise the impacts of changed water quality on benthic ecology in the vicinity of the dredge footprint

Reporting:

- The dredge contractor is responsible for downloading and summarising all monitoring results into a data register on a weekly basis. The weekly report will include information of turbidity comparisons between the impact and reference monitoring sites. On completion of the dredge operations, the register will be archived and kept for a minimum of five (5) years by the proponent's Project Superintendent.
- The dredge contractor will provide a report interpreting monitoring results within forty (40) business days of the completion of dredging operations. The report will include a summary of all monitoring results, details of any dredge cycles that did not comply with conditions and any contingency actions undertaken to avoid non-compliance during dredge runs from reoccurring.
- On completion of each dredge cycle, the dredge contractor is responsible for reviewing the results produced by the auditing system to determine whether the dredge run complied with the conditions set forth in the performance criteria.

Corrective action:

- If it is identified by the auditing system that a dredge cycle did not comply with the limits specified in the performance criteria above the following hierarchy of actions are to be undertaken by the dredge contractor:
 - The dredge contractor/Superintendent is to immediately investigate reasons leading to the non-compliance. This may involve comparing turbidity from the incident instruments at the HEV location with data measured at the corresponding reference sites. If measurements taken at the reference site are also elevated, then it may be likely that the non-compliance was a result of natural events
 - If it is determined that the non-compliance was not a result of natural events the dredge contractor is to notify SCA immediately. The dredge master is then required to undertake contingency actions to avoid a non-compliant dredge run reoccurring a consecutive time. This may include dredging an area of the dredge footprint away from the environmentally sensitive areas or dredging against the flow of the tidal currents in order to reduce the size of the dredge plume. The dredge contractor may also be required to alter the dredging pattern or methodology if the weekly turbidity analysis impacts should be notified to SCA as part of weekly reporting.
- If monitoring instruments are damaged, lost, stolen or become faulty, they are to be repaired or replaced immediately. The dredge contractor is to investigate how the instruments were damaged or lost as well as additional equipment or exclusion zones required to prevent similar incidents reoccurring.

4.4.5 Marine megafauna management

This section outlines requirements that are to be met associated with the management of potential interactions between dredge equipment and marine megafauna.

Applicability of the Element within the Dredge Cycle				
Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
X	X	X	X	

Objective: To reduce the risk of disturbance or injury to marine mammals and sea turtles resulting from dredging and sand pumping activities. Establish and maintain awareness of the importance of protecting marine megafauna

Management action (See Chapter C4)	Responsibility	Timing
Prior to commencement of dredging activities, all employees will receive training from a suitable qualified person.	Project Superintendent	Prior to commencement of dredging works.
A lookout will be maintained for cetaceans while the dredge sails between the dredging area and dredge mooring point. In the event that a cetacean (except dolphins) is sighted, vessel speed and direction will be adjusted to avoid impact on the observed individual (within the safety constraints of the vessel).	Dredge contractor	Continual throughout dredge vessel operation and carriage.
<p>Marine mammals (except dolphin) observation and response procedures including the application of exclusion zones will be implemented when dredge or other ancillary vessels are under-way. The following management responses only apply to vessel that are under-way, but do not apply to dredging and dredged material placement activities:</p> <ul style="list-style-type: none"> Vessels will not intentionally approach within 50 m of a dolphin or within 100 m of a large cetacean (whale) Vessels will operate at a “no wash” speed when they are between 50 m and 150 m of a dolphin or when they are between 100 m and 300 m of a large cetacean Vessels will attempt not to approach cetaceans from an angle of less than 60 into or away from the direction of travel of the cetacean(s) Vessels will not encourage bow-riding by cetaceans. Should any cetacean(s) commence bow-riding in front of a vessel, the vessel master will not change course or speed suddenly Vessel operators will report cetacean sightings to Environmental Officer. 	<p>Dredge contractor.</p> <p>Project Superintendent will be responsible for reviewing and monitoring and incident reports, and responding in liaison with relevant agencies if required.</p>	Continual throughout dredge vessel operation and carriage.
Marine mammals and turtles (except dolphin) observation and response procedures including the application of a 300 m exclusion zone will be implemented during dredging and placement activities. Dredging operations shall be stopped where these fauna are observed within 300 m of the operating dredge until the animals have moved further than 300 m or haven't been sighted for 15 minutes.	Dredge contractor	Continual throughout dredge vessel operation and carriage.
Turtle deflectors will be mounted on the draghead of the TSHD.	Dredge contractor	Continual throughout dredge vessel operation and carriage.
Water jets on the draghead will be switched on before the dredge pump is started and will remain on until the dredge pump is stopped to direct sea turtles away from the draghead thus avoiding direct contact. Dredge pumps will only be started when the draghead is close to the seafloor (not while lowering pipe).	Dredge contractor	Continual throughout dredge vessel operation and carriage.

Objective: To reduce the risk of disturbance or injury to marine mammals and sea turtles resulting from dredging and sand pumping activities. Establish and maintain awareness of the importance of protecting marine megafauna

The dredge pump will be stopped as soon as possible after the completion of dredging.	Dredge contractor	Continual throughout dredge vessel operation and carriage.
Light levels from the dredging works will be limited to those lights that are necessary for the safe operation of the vessel.	Dredge contractor	Continual throughout dredge vessel operation and carriage.

Performance requirements:

- No incidents of vessel related disturbance or mortality to marine mammals and sea turtles.
- Relevant members of the dredging crew to complete a health, safety and environment induction, which will include information on marine mammal and sea turtle management requirements.
- Vessel masters trained in marine mammal interaction procedures.

Monitoring:

- Marine mammals and turtle activity will be performed by a dedicated person from the bridge of the dredge vessel.

Reporting:

- A record of sighted animals will be maintained (except dolphins), indicating the sighting of each individual animal and actions taken.
- Immediate reporting of any incident involving injured or killed animals to the Superintendent.
- Details of the incident are to be compiled into an incident report.

Corrective action:

- In the event of an environmental incident, appropriate emergency response measures shall be implemented to ensure environmental harm from the event is minimised.
- Assist in capture of injured animals per advice from regulatory agencies or the Project Superintendent.
- Other strategies must be implemented, as advised by regulatory agencies, to reduce likelihood of incident recurring.
- Supplementary monitoring to be undertaken to confirm compliance after remediation action is taken.

4.4.6 Tailwater management

This section outlines requirements that are to be met associated with management of tailwater at the Project construction site as part of pumping of sand from the TSHD for construction purposes. The dredged material will be hydraulically placed by the TSHD in the construction footprint, with tailwater being directed into a polishing pond before being discharged to Mt Coolum Creek via the northern perimeter drain.

Applicability of the Element within the Dredge Cycle				
Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
				X

Objective: To ensure discharge water (dredging tailwater) released to the environment is of an acceptable standard for turbidity

Management action (See Chapter B6)	Responsibility	Timing
An on-line turbidity monitoring program will be undertaken to continuously monitor tailwater in the sediment ponds and receiving environment.	Dredge contractor	Continually throughout dredge operations and carriage
In the event the turbidity criteria are exceeded contingency actions as defined below will be undertaken to reduce the turbidity of water discharge from site.	Dredge contractor	In the event of turbidity criteria exceedance

Performance requirements:

- At both turbidity sensors within the sediment ponds/cells (described below) the tailwater will conform to the following performance thresholds for discharge:
 - Warning discharge criteria (triggers review and implementation of corrective actions – see below):
 - Where the tailwater discharged exceeds 50 NTU (80th percentile) where background levels (E01505) are less than 45 NTU (80th percentile)
 - Where the tailwater discharged exceeds +20 per cent above background (80th percentile) turbidity levels where background levels are greater than 45 NTU (80th percentile).
 - Absolute discharge criteria (stop discharge):
 - Where tailwater discharged exceeds 150 NTU (80th percentile) where background levels are less than 45 NTU (80th percentile).
- The timeframe to which the 80th percentiles are to be calculated over are noted below.
- Exceedances are a trigger for implementation of corrective actions as outlined below.

Objective: To ensure discharge water (dredging tailwater) released to the environment is of an acceptable standard for turbidity

Monitoring:

Monitoring works listed in the below table must be undertaken throughout the reclamation phase:

Tailwater Turbidity Monitoring Requirements

Locations	Sediment pond discharge (see Figure 5.5o in Chapter A5)	Maroochy River (EO1505); Background (see Figure 6.3g in Chapter B6)
Depth	0.5 m below the water surface near the weir box	0.5 m below the water surface
Frequency	15 minute intervals	15 minute intervals
Parameter	Turbidity	Turbidity
Units of measure	NTU	NTU
Sampling method	Adjustable sensor anchored within the sediment pond	Sensor fixed to a floating buoy in the river

- Turbidity measurements taken from at sediment pond discharge and the background (EO1505) site are to be used to compute the 80th percentile turbidity from the previous 24 hours of measurements at both locations. The criteria shall be assessed once in a 24 hour period unless the warning level criterion is activated. A new dataset will be established following each assessment of the criteria (they are discrete datasets, not a rolling dataset). If the warning criterion is activated, monitoring is to increase to every 12 hours in accordance with the Corrective Actions.
- Monitoring specified in the above table is to meet the following requirements:
 - Depending on the timing of the dredge campaign, servicing of the instruments is to be conducted weekly during September to March and fortnightly for all other months
 - The instruments are to be recalibrated every six months they are in operation or more frequently if issues are noted and need corrective actions
 - Instruments used in this monitoring activity are to be certified, calibrated and appropriately maintained and are to have support certificates presentable on demand
 - Measurements are to be conducted using online turbidity probes which provide measurements to a central computer/network in real time. Access to online measurements is to be made available to SCA throughout the reclamation phase.

Reporting:

- The dredge contractor will be responsible for the monthly reporting of tailwater turbidity as part of the monthly environmental report. The reports will include the monitoring results, temporal trends and the tailwater performance against the requirements specified.
- The dredge contractor is responsible for downloading and summarising turbidity monitoring results into a data register on a weekly basis.
- If an exceedance of the turbidity criteria prescribed in the Performance Criteria occurs that is likely to cause environmental harm as defined under the EP Act, the dredge contractor is to report to SCA immediately.
- The dredge contractor will provide a turbidity investigation report to SCA within 7 days following the exceedance of the turbidity criteria prescribed in the Performance Criteria. This report will include:
 - Monitoring data from all instruments for at least one week leading up to and 3 days after the exceedance
 - Rainfall data for the week leading up to the exceedance
 - Assessment of monitoring result against the criteria
 - Details of works being undertaken at the time of exceedance
 - Any contingency actions implemented and an assessment of its effectiveness.
- SCA shall audit the contractor on a bi-monthly basis to confirm compliance with the requirements of this section.

Objective: To ensure discharge water (dredging tailwater) released to the environment is of an acceptable standard for turbidity

Corrective action:

- Turbidity monitoring is to occur to determine when contingency activities are to be initiated. These contingency actions aim to reduce the impact tailwater discharge has on the receiving environment. Therefore on exceedance of the thresholds specified in the Performance Criteria, the following hierarchy of corrective actions are to commence:
 - Warning Discharge Criteria. In the event that the 'Warning Discharge' criterion is exceeded, the following actions shall be implemented:
 - Assessment of the criteria detailed in the Performance Criteria is to be increased to once every 12 hours at the sediment pond discharge
 - If an exceedance is noted in two consecutive assessment period the dredge contractor is to initiate corrective actions to decrease the turbidity of water discharged from the sediment pond. This may include but not be limited to a) increase the residence time of the supernatant within the reclamation area to increase settlement time, and/or b) install silt curtains within the sediment pond. Within 24 hours the dredge contractor is to provide a summary report to SCA detailing the actions that are implemented
 - In the event that the discharge turbidity drops below the warning criteria, the assessment period shall return to frequencies specified in the Monitoring Requirements
 - In the event that the 'Absolute Discharge' criterion is exceeded, refer to the requirements below.
 - Absolute Discharge Criteria. In the event that the 'Absolute Discharge' criterion is exceeded, the following shall be implemented:
 - Discharge from the dredge sediment ponds is to cease immediately, however dredging may continue
 - The dredger shall undertake actions to reduce turbidity in the discharge water, which may include but not be limited to a) silt curtains may be installed where the filling cell is discharging into subsequent cells, b) non-toxic flocculation of the sediment pond and/or subsequent cells may be performed, and c) the area within the dredge footprint that is being dredged may be modified or dredging may be slowed to allow additional settlement time. The dredge contractor is to provide a summary report to SCA within 24 hours detailing the actions that are implemented
 - Assessment of the criteria is to be decreased to once in a 6 hour period. Discharge cannot recommence until the discharge water quality is below the absolute (red) discharge criteria of 150 NTU.
 - If damage to the sediment pond is detected, tailwater is to be pumped to an alternative sediment basin, or discharged if it meets the turbidity criteria detailed in the Performance Criteria. Works are then to be undertaken within 48 hours to repair the damaged pond.
 - If monitoring instruments are damaged, lost, stolen or become faulty, they are to be repaired or replaced immediately. The Project Superintendent is to investigate how the instruments were damaged or lost as well as additional equipment or exclusion zones required to prevent similar incidents reoccurring.

4.4.7 Groundwater management

This section provides management actions required for preventing the infiltration of dredge tailwater into the underlying groundwater. The risk of this infiltration arises at the construction site during the pump-out of dredge material into the reclamation area.

Applicability of the Element within the Dredge Cycle

Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
				X

Objective: To prevent salt water from dredge tailwater percolating into the underlying groundwater

Management action (See Chapter B3)	Responsibility	Timing
The reclamation area will be lined with a HDPE liner to prevent percolation of salt water into the underlying groundwater.	Dredge contractor	Continual during dredge pump-out and reclamation works
The reclamation area will be surrounded by water retaining bunds to prevent salt water escaping from the site and percolating into the underlying groundwater.	Dredge contractor	Continual during dredge pump-out and reclamation works

Performance requirements:

- Minimise the escape of tailwater from the reclamation area other than through the northern perimeter drain.

Monitoring:

- The dredge contractor will supervise reclamation works through visual monitoring to ensure escape of tailwater is minimised. This visual monitoring will focus on:
 - maintaining the integrity of the bund and HPDE liner,
 - detecting seepage from or under the bunded area in adjoining areas,
 - monitoring tailwater drainage off the site is progressing through the designed drainage network.

Reporting:

- Daily construction logs will be maintained by dredge contractor.

Corrective action:

- If there is a significant unplanned or unintended tailwater release, SCA must be contacted immediately.
- Wherever possible, tailwater escaping from the reclamation area other than through the intended drainage regime should be contained and pumped back into the reclamation area.
- For significant releases that could affect groundwater resources, a groundwater monitoring program should be considered to determine any impacts to groundwater and the need for mitigation measures.

4.4.8 Terrestrial ecology (pipeline and site water management)

This section provides management actions necessary to mitigate impacts on terrestrial ecology, including terrestrial fauna and flora, in the dredge pipeline corridor.

Applicability of the Element within the Dredge Cycle

Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
			X	X

Objective: To minimise impacts to terrestrial ecology and to provide for rehabilitation

Management action (See Chapters B7 and B8)	Responsibility	Timing
Pre-clearing surveys within the clearing footprint of the dredge pipeline to be undertaken for any threatened or near threatened flora species. If any threatened or near threatened species are identified appropriate mitigation measures are to be applied to conserve the species (e.g. translocation).	Dredge contractor	Pre-clearing
Clearing contractors to be briefed on the potential occurrence of threatened and near threatened flora species, as well as the occurrence of 'marine plants' at the tailwater outlet.	Dredge contractor	Pre-clearing
Pre-clearing survey to identify and clearly mark all declared pest plants. Declared pest plants are to be treated and removed separately from native vegetation waste. Declared pest plants identified include: <ul style="list-style-type: none"> Asparagus fern Groundsel bush Lantana. 	Dredge contractor	Pre-clearing
Clear demarcation of clearing zones, including the use of exclusion fencing and signage where necessary to clearly identify the location of significant areas, to prevent unnecessary vegetation damage. Minimise disturbance to marine plants at tailwater outlet (e.g. trim, rather than remove, trees on edge of clearing zone).	Dredge contractor	Pre-clearing
Cleared native vegetation is to be salvaged and disposed of at a green waste transfer station to be mulched and/or composted. Alternatively, cleared native vegetation can be stockpiled on site and mulched for use in revegetation or landscape works.	Dredge contractor	During clearing
Weed control and revegetation of the dredge pipeline is to be undertaken in line with a Vegetation Management Plan.	Dredge contractor	On-going
All clearing to incorporate implementation of appropriate erosion and sediment control strategies, see EMP for details of relevant requirements.	Dredge contractor	Continual throughout all vegetation clearing works

Performance requirements:

- Clearing is restricted to defined areas required for dredge pipeline, and tailwater outlet and associated maintenance activities areas.
- No new pest plants (including non-declared exotic species) established during sand pumping/pipeline operations.
- Complete revegetation of the dredge pipeline corridor in line with a Vegetation Management Plan.

Monitoring:

- Sediment controls and vegetation fencing and signs monitored throughout sand pumping operations.
- Monitoring of the occurrence of weeds and pest plants in the dredge pipeline and surrounding vegetation.
- During revegetation, monitoring is required along the dredge pipeline in line with a Vegetation Management Plan.

Reporting:

- Maintain records of clearing dates, areas and volumes of material.
- Revegetation/rehabilitation success of dredge pipeline in line with a Vegetation Management Plan

Corrective action:

- Repair/replacement of sediment controls and vegetation fencing and signage.
- Rehabilitation of areas accidentally cleared.

4.4.9 Navigation and maritime safety

This section outlines requirements associated with mitigating impacts related to navigation and maritime safety, as well as management of dredging operations in severe weather. The scope of this section includes impact associated with both shipping traffic and recreational craft.

Applicability of the Element within the Dredge Cycle

Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
X	X	X	X	

Objective: To ensure no delays to shipping traffic and recreational craft, and to ensure maritime safety

Management action (See Chapter C5)	Responsibility	Timing
All vessels associated with the Project will operate in accordance with the Port Procedures, including pilotage requirements, and any special directions received from the RHM and Port Control	Dredge contractor	Continual throughout dredge vessel operation and carriage.
Notices to Mariners and notices to local recreational boating groups will be issued where disruptions will occur in relation to dredge pump-out activities.	Dredge contractor. MSQ and RHM to issue notices.	Continual throughout dredge vessel operation and carriage.
If required by the RHM, a temporary exclusion zone will be established around pump-out location during the sinking of the pipe. Where an exclusion zone is established, it will be clearly marked and lit by buoys and managed through Notices to Mariners and notices to local recreational boating groups.	Dredge contractor to negotiate with MSQ and RHM. MSQ and RHM to issue notices.	During manoeuvring and sinking of pipe at pump-out location.
The parts of the pumping pipeline above the water level will be appropriately lit and clearly visible to approach vessels, and fitted with reflective tape to enhance visibility during the hours of darkness.	Dredge contractor	Continual throughout dredge vessel operation and carriage
Where required by MSQ, a vessel traffic management plan will be prepared to manage the closure of nearshore access over the length of the pipeline.	Dredge contractor. MSQ to assess and approve vessel traffic management plan.	Prior to commencement and throughout dredging campaign.
Should weather conditions affect dredging operations, dredging operations will cease and the dredge vessel will be anchored at a sheltered location, most likely within the port pilotage area as directed by the RHM.	Dredge contractor	Throughout dredge vessel operation and carriage
Should weather conditions affect pump-out operations, operations will cease and the dredge vessel will be anchored at a location off the coast where conditions are less severe.	Dredge contractor	Throughout pump-out operations
Further procedures will be developed for operations in severe weather.	Dredge contractor	Prior to commencement of dredging campaign

Performance requirements:

- No incidents related to damage to other vessels or injury to operators of other vessels.
- No breach of special directions from the RHM, MSQ or Port Control.

Monitoring:

- Any interactions with other vessels will be recorded in vessel's log.

Reporting:

Any interactions with other vessels will be recorded in vessel's log.

Corrective action:

Consultation with MSQ, RHM and Port Control must be undertaken in regards to the need for additional exclusion zones or changes in vessel movement times.

4.4.10 Vessel wastewater management

This section outlines requirements that are to be met associated with vessel washdown procedures during operations such as washdown of decks and washdown of the dredge head and other equipment. It also includes the management of sewage.

Applicability of the Element within the Dredge Cycle				
Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
	X	X		

Objective: To minimise the release of potential contaminants to the environment from washdown operations and to ensure wastewater on-on board, including sewage, is appropriately treated and managed

Management action (See Chapter C5)	Responsibility	Timing
The washdown of the vessel deck and/or dredge head will only be undertaken in accordance with relevant permits and approvals.	Dredge contractor	Continual during dredge vessel operations and carriage
Any solid waste collected on the dredge head will be stored and disposed of at appropriate facilities.	Dredge contractor	Continual during dredge vessel operations and carriage.
Degreasers will only be used if sweeping or watering the deck/equipment is not appropriate or practicable.	Dredge contractor	Continual during dredge vessel operations and carriage.
All sewage generated on-board the dredge vessel will be directed to the on-board treatment system. The system will be designed to meet the Queensland legislative standard for Grade A treated sewage.	Dredge contractor	During at sea operations
Effluent from the treatment system will only be discharged in appropriate locations to ensure compliance with the Queensland <i>Transport Operations (Marine Pollution) Act</i> and Regulations (s48 of the Act and Sch. 4 of the Regulations).	Dredge contractor	During at sea operations
The requirements of the Transport Operations (Marine Pollution) Act and Regulations (including relevant maps) for treated and untreated sewage discharge will be included as part of the dredge contractor's EMP (Dredge Operations) and discussed as part of the training and induction process for relevant crew.	Dredge contractor	During at sea operations
All effluent will be diverted to holding tanks when operating in nil discharge areas. The holding tank will be pumped out either in accordance with untreated sewage requirements under Queensland legislation or otherwise by appropriate licensed contractors while the dredge is in port.	Dredge contractor	During at sea operations

<p>Performance requirements:</p> <ul style="list-style-type: none"> No inappropriate use of degreasers or washdown in sensitive environments. All sewage discharges meet the legislative requirements of the <i>Transport Operations (Marine Pollution) Act 1995</i> and Regulation.
<p>Monitoring:</p> <ul style="list-style-type: none"> Visual inspection for contamination of waters will be undertaken whilst washing deck or equipment. Testing and analysis of the treatment system and resultant sewage discharge by an accredited laboratory will be undertaken at the beginning of the dredge campaign.

Objective: To minimise the release of potential contaminants to the environment from washdown operations and to ensure wastewater on-board, including sewage, is appropriately treated and managed

Reporting:

- A report about the testing and analysis of the treatment system and sewage discharge (as per monitoring section above) will be provided to the Project Superintendent including details of maintenance of corrective action.
- The Project Superintendent will be notified as to the event of any unintentional spill of contaminant associated with washdown.
- If untreated sewage is released in a nil discharge zone, the breach must be reported to MSQ as soon as possible including estimates of the likely volume of sewage discharged and the location of the release. Depending on the volume of material discharged and the sensitivity of the location of the discharge, the dredge contractor may be directed to undertake water quality monitoring and/or clean up at its cost. If the release is likely to cause environmental harm as defined under the *Environmental Protection Act 1994*, the dredge contractor must also notify SCA.

Corrective action:

- If an unintentional release of contaminant occurs, procedures must be reviewed and rectified immediately.
- A regular review of sewage storage system inputs and operation must be implemented and maintained. Procedures should also be modified to meet discharge requirements.

4.4.11 Ballast water and marine pest incursion

This section outlines requirements that are to be met by the dredge contractor associated with ballast water and biofouling management before leaving the port of origin, during transit between areas of operation, during operations, and following completion of dredging activities.

Applicability of the Element within the Dredge Cycle				
Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
	X			

Objective: To prevent the spread of unwanted marine pests and contaminants associated with the ballast water and hull of the dredge vessel

Management action (See Chapter C5)	Responsibility	Timing
<p>Prior to leaving its port of origin:</p> <ul style="list-style-type: none"> The dredge vessel will be thoroughly washed If discharge pipes have been utilised in prior operations, a thorough flush of these systems will be undertaken The dredge vessel hull, hopper and dredge gear (especially dredge heads) will be inspected to ensure that no material which may transport organisms (sediments, organic material or waters) is retained. 	Dredge contractor	Prior to departure from port of origin.
<p>During transit between port of origin and the Port of Brisbane:</p> <ul style="list-style-type: none"> There will be no deep water ballast exchanges in the Great Barrier Reef Marine Park Any ballast tanks holding seawaters will be exchanged with a minimum 150% of design volume with seawaters at a location as distant from the coastline or other shallow (<100 m) areas as possible but not less than 5 nautical miles from the coast (in accordance with International Maritime Organization requirements) Any waters held in the hopper during transit will be treated as for other ballast waters. 	Dredge contractor	Transit from port of origin to Port of Brisbane.
<p>On arrival at the Port of Brisbane the dredge vessel is to operate in accordance with Department of Agriculture, Fisheries and Forestry (DAFF) and Australian Customs regulations.</p>	Dredge contractor	On arrival at the Port of Brisbane.
<p>If requested by DAFF hull inspections will be carried out for attached marine pests. Works will not commence until the dredge vessel and all plant are certified as free of marine pests to DAFF standards.</p>	Dredge contractor Requirements for inspections to be imposed by DAFF in accordance with relevant standards	On arrival at the Port of Brisbane.
<p>Measures for control of biofouling will be undertaken in accordance with Australian legislation and guidelines. One or more of the following measures will be implemented:</p> <ul style="list-style-type: none"> Painting hulls, sea chests, sea inlet pipes, overboard discharges with an antifouling system Installing marine growth prevent systems, which release dosed water in sea chests and internal seawater systems Regularly inspecting the vessel for biofouling, including areas of the ship that cannot be painted. 	Dredge contractor	Continual throughout dredge vessel operations, carriage and transit

Objective: To prevent the spread of unwanted marine pests and contaminants associated with the ballast water and hull of the dredge vessel

When leaving the Port of Brisbane following the end of dredging works all relevant DAFF rules pertaining to ballast water will be complied with.	Dredge contractor	Following completion of dredging works
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Performance requirements:

- No high risk ballast water brought into territorial waters.
- Ensure ballast water discharge and marine pest inspections occur in accordance with DAFF standards.
- No harmful marine organisms are translocated on the underkeel hull, dredge heads or within the hopper of the dredge.

Monitoring:

- Monitoring and audits may be carried out by DAFF on the dredge contractor at the prerogative of the agency.

Reporting:

- Hopper water discharge and replacement records will be kept in the ship's log and made available upon request.
- A record will be kept of volumes, location and time of all ballasting and deballasting operations.

Corrective action:

- If an unintentional release or exchange occurs, ballast and deballasting procedures must be reviewed and rectified immediately.
- If marine pests are encountered on ship's hull or other equipment they must be treated and removed in accordance with DAFF instruction before commencing work.

4.4.12 Vessel (solid) waste management

This section outlines requirements to manage solid and hazardous waste generated from or incidental to the dredging operations.

Applicability of the Element within the Dredge Cycle				
Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
X	X	X		

Objective: To ensure that general refuse produced on board the dredge vessel is collected, retained and transferred to an appropriate facility without unintentional material loss, and to ensure hazardous waste generated on-board is appropriately managed

Management action (See Chapter C5)	Responsibility	Timing
Vessel will be fitted with appropriately sized waste disposal bins. These bins will be secured and fitted with secure lids to prevent material being blown overboard during storage or handling.	Dredge contractor	Prior to commencement of works.
Where practicable, all material will be compacted to further prevent unintentional loss.	Dredge contractor	Continual throughout dredge vessel operations, carriage and transit.
Dredge contractor to ensure bins are collected and emptied at appropriate intervals (e.g. emptied at 75% capacity or below).	Dredge contractor	Continual throughout dredge vessel operations, carriage and transit.
While at-sea all hazardous waste will be stored in an appropriate and secure manner and clearly marked in accordance with legislative requirements.	Dredge contractor	During all works at sea.
During transfer: Where required, all hazardous waste will be transferred to appropriate containers and transported to an appropriate facility for disposal Collection and transport of designated hazardous wastes will be undertaken only by a licensed contractor.	Dredge contractor	During transfer.
All procedures to minimise spills or leakages during storage and transfer will be followed. Spill response equipment will be easily identifiable and conveniently located so as to respond to a spill if it occurs.	Dredging contractor	Continual, throughout dredge vessel operations, carriage and transit.

<p>Performance requirements:</p> <ul style="list-style-type: none"> No loss of solid waste material overboard during collection or transfer. No discharge other than at berth. No inappropriate storage or disposal of hazardous waste.
<p>Monitoring:</p> <ul style="list-style-type: none"> The dredge crew will carry out regular visual inspections of collection points and visual inspection of on-deck bins. The dredge crew will carry out regular visual inspections of hazardous waste storage containers to determine their integrity and identify if any spills or leakage has or is occurring.

Objective: To ensure that general refuse produced on board the dredge vessel is collected, retained and transferred to an appropriate facility without unintentional material loss, and to ensure hazardous waste generated on-board is appropriately managed

Reporting:

- Dredge contractor will report any loss of waste material or any community complaints received about solid waste management to the Project Superintendent.
- Incident reports will be provided to the Project Superintendent detailing any spills or incidents involving hazardous waste and clean-up operations.

Corrective action:

- If practicable, measures should be taken to retrieve material that is lost. Procedures leading to the material loss should be reviewed with immediate action taken to rectify deficiencies.
- If procedures for hazardous waste breakdown or a spill occurs, the procedures must be reviewed and staff trained about appropriate response.

4.4.13 Fuel management and oil spills

This section outlines requirements that are to be met associated with the bunkering of fuel by the dredge vessel during the operation, refuelling activities at the booster pump station, and for dealing with fuel/oil-related emergencies relating to the vessel or the operation of plant on Marcoola Beach during pipeline assembly/disassembly.

Applicability of the Element within the Dredge Cycle				
Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
	X	X	X	

Objective: To minimise the occurrence of spills associated with the refuelling of the dredge vessel, booster pump station and plant operated on Marcoola Beach

Management action (See Chapter C5)	Responsibility	Timing
Refuelling operations will occur in accordance with the Port Procedures at licenced facilities within the Port.	Dredge contractor	Continual throughout dredge vessel operation and carriage
Fuel levels will be monitored by the dredge contractor and the licensed contractor.	Dredge contractor and licensed contractor responsible for refuelling	Each refuelling event
For all transfers of bulk liquids by the vessel, notice will be given to Port Control.	Dredge contractor	As needs basis
The dredge vessel will maintain a shipboard oil pollution emergency plan (or equivalent) which outlines the roles, responsibilities and actions to be followed should an uncontrolled release of oils/fuels occur.	Dredge contractor	Prior to commencement of works. In the event of a fuel/oil emergency, the emergency plan should be reviewed as necessary
In the event of a significant fuel or oil spill, immediate notification shall be provided to MSQ and/or DEHP, as appropriate.	Dredge contractor	Immediately subsequent to a fuel spill
No fuelling of plant to occur on Marcoola Beach	Dredge contractor	There is continual throughout pipeline assembly and disassembly

<p>Performance requirements:</p> <ul style="list-style-type: none"> No spills or leaks during fuel transfer operations Significant spills notified immediately to MSQ and/or DEHP.
<p>Monitoring:</p> <ul style="list-style-type: none"> Visual inspections of fuel-dispensing equipment and surrounding environment during operations and after fuel transfer will be undertaken by dredge staff and licensed contractors Relevant authorities will be provided with copies of shipboard oil pollution emergency plan prior to commencement of work.
<p>Reporting:</p> <ul style="list-style-type: none"> MSQ and/or DEHP will to be notified in the event of any unintentional spill of fuel or oil associated with fuel bunkering.
<p>Corrective action:</p> <ul style="list-style-type: none"> If an unintentional release or spill occurs, procedures must be reviewed and rectified immediately Contingency and clean up procedures must be implemented.

4.4.14 Noise and air quality

This section outlines requirements that are to be met with regard to nuisance air quality and noise issues from dredging operations.

Applicability of the Element within the Dredge Cycle

Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
X	X	X	X	

Objective: To prevent the generation of nuisance air quality and noise during dredging operations

Management action (See Chapters B15, B16 and C5)	Responsibility	Timing
Vessel crew will be made aware of noise and air quality requirements within relevant permits and/or approvals.	Dredge contractor	Prior to commencement of works
Dredging works will be conducted in the following proposed times: For site preparation and assembly and disassembly of the dredge pipeline, construction hours will be between 7:00 am and 6:00 pm, Monday to Friday. Deliveries of plant and materials may occur outside these hours. Equipment will include dozers, front-end loaders, excavations, scrapers, and water trucks. For dredging and placement activities, construction hours will be 7 days per week, 24 hours per day (use of dozers, light towers, dredge booster pump, tug and TSHD).	Dredge contractor	Continual throughout dredge vessel operations and carriage
The dredge contractor will ensure that engines and equipment on board the dredge vessel are properly maintained in good working order.	Dredge contractor	Continual throughout dredge vessel operations
All equipment on board the dredge will be maintained and operated in a safe and efficient manner.	Dredge contractor	Continual throughout dredge vessel operations
All non-essential maintenance will be carried out only during day-light hours.	Dredge contractor	Continual throughout dredge vessel operations and carriage

Performance requirements:

- No or minimal complaints lodged from the public or users of Moreton Bay and beach users at Marcoola about noise or air quality associated with dredge operations.

Monitoring:

- Investigation will be required in response to any noise complaints received during the dredging operation. If monitoring is necessary, it is to be conducted in accordance with the DEHP Noise Measurement Manual 2000 and AS2436-2.
- Where there is any air quality complaints received during the dredging operations, air quality monitoring will be required.

Reporting:

- The results of any noise or air quality monitoring will be provided to the Project Superintendent within 14 days following completion of any monitoring.
- In the event that the monitoring indicates an exceedance of a performance criteria set out in a permit or other statutory instrument, refer to Corrective Actions.

Corrective action:

- In the event that responsive noise or air quality monitoring indicates an exceedance of the relevant criteria, an investigation shall be undertaken into the potential cause/s.
- The investigation should include, at a minimum, assessment of the layout and positioning of noise-producing plant and activities and determine actions that could be taken to minimise noise emission levels to surrounding receptors.
- Follow up measurements are to be conducted two weeks later to confirm whether excessive noise levels have continued or whether air quality is within performance criteria. If noise levels or air quality continue to exceed criteria, the dredge contractor is to submit a plan to SCC indicating how these can be further mitigated.

4.4.15 Cultural heritage requirements

This section identifies the management activities required to prevent adverse impacts to cultural heritage in the reclamation area and areas associated with the dredge material placement activities (i.e. the alignment of the pipeline, the booster pump facility). Cultural heritage relates to Aboriginal archaeological material protected under the *Aboriginal Cultural Heritage Act 2003*.

Applicability of the Element within the Dredge Cycle				
Sand Dredging	Vessel Transit	Pump Out	Pipeline	Site Water Management
		X	X	

Objective: To ensure the protection of cultural heritage values and archaeological material		
Management action (See Chapter C6)	Responsibility	Timing
The dredging works will at all times be undertaken with regard to the cultural heritage duty of care outlined in the <i>Aboriginal Cultural Heritage Act 2003</i> and associated guideline.	Dredge contractor	At all times
If archaeological material is identified during dredging, reclamation and associated activities, work will cease in the vicinity of the material to allow its significance to be established and an appropriate course of action undertaken as defined in the Cultural Heritage Management Plan. The findings will be reported to SCA and the DEHP.	Dredge contractor	As-needs basis
If needed, further archaeological assessment of the material will be undertaken to determine the level of significance and appropriate action in accordance with the Cultural Heritage Management Plan.	Dredge contractor, representative from SCA and Traditional Owners	As-needs basis
Where work has ceased because of the presence of a site of cultural heritage significance (on land), the possible site will be clearly marked with tape and protected from other on-going activities.	Dredge contractor	As-needs basis

<p>Performance requirements:</p> <ul style="list-style-type: none"> Cultural heritage values of the site are managed in accordance with the Cultural Heritage Management Program. Cultural heritage duty of care is upheld.
<p>Monitoring:</p> <ul style="list-style-type: none"> As per the requirements outlined in the Cultural Heritage Management Plan.
<p>Reporting:</p> <ul style="list-style-type: none"> As per the requirements outlined in the Cultural Heritage Management Plan.
<p>Corrective action:</p> <ul style="list-style-type: none"> The Cultural Heritage Management Plan will identify corrective action to be undertaken in the event that archaeological material is damaged due to failure to identify material or initiate appropriate management techniques (including ceasing work).